

## **Dome Pressure Regulator LTD-1**

and

**Pressure control stations  
equipped with LTD-1**



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## Description

The **LTD-1** is a dome-loaded pressure regulator. The upper part is a chamber shaped as a dome, filled with gas and serving as a pressure chamber (therefore: "dome-loaded pressure regulator"). As to its function the pressure force from the encapsulated gas pressure – called "pilot pressure" – corresponds to the spring force with spring-loaded pressure regulators.

The pilot pressure affects a membrane whose lifting movements are transmitted via a pressure pin to the valve seat, which - in the end - is responsible for the control of the outlet pressure, because the outlet pressure is determined by the size and the opening of the valve seat.

The dome chamber can be fed over a wide pressure range that exceeds the characteristic of spring-loaded pressure regulators by far. This is exactly the tool that provides, in turn, an extremely wide controlled pressure range to the **LTD-1**, thereby constituting one of its characteristic features. The outlet pressure of process gas can be metered precisely; handling is very convenient.

The **LTD-1** distinguishes itself by a high flow rate. This traces back to the generous dimension of the valve seat and the opening between valve seat and valve cone.

Thanks to the specific shape of the individual components and a well reflected, even sophisticated design, the control behaviour is extremely good, even in case of very high or very low flow rates.

The outstanding property of the **LTD-1**, however, is that it is capable of generating a defined, adjustable outlet pressure being hardly affected by variations in the inlet pressure.

## Applications

### ■ Medium \*)

The **LTD-1** is suitable for use with the following media:

- Industrial gases, flammable and non-flammable  
(e.g. N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, Ar etc.)
- Natural gas, Propane, Butane
- Air
- Non-viscous liquids.

### ■ Pressure

The **LTD-1** is available in two versions, one for the medium-pressure range (MD) and one for the low-pressure range (ND).

- MD version: Inlet pressure up to 100 barg \*\*)  
Outlet pressure from 0.5 barg to 99 barg
- ND version: Inlet pressure up to 25 barg \*\*\*)  
Outlet pressure from 0.1 barg to 24 barg

### ■ Temperature

The **LTD-1** tolerates a wide temperature range.

- When sealing materials of Viton are used:  
from -40 °C to +100 °C.
- When sealing materials of EPDM are used:  
from -40 °C to +130 °C.

### ■ Operating

The **LTD-1** can be used for both, continuous and discontinuous operation.

### ■ Oxygen Service

The **LTD-1** is supplied **free of oil and grease**.

\*) In case of doubt whether or not the LTD-1 is suitable for a certain medium we will gladly check it for you.

\*\*) max. 40 barg for Oxygen; not suitable for Acetylene.

\*\*\*) max. 1.5 barg for Acetylene.

## Technical features

### ■ Material

The body of the **LTD-1** is available:

- in brass (pressed)
- in stainless steel (turned).

Following sealing materials are available:

- Viton
- EPDM.

### ■ Connections

The **LTD-1** exhibits a G1" inner thread connection, both at inlet and at outlet. \*)

### ■ Dimensions

The nominal length of the **LTD-1** amounts to 127 mm.

### ■ Weights

The brass version of the **LTD-1** weighs approx. 6.5 kg.  
The stainless steel version weighs approx. 13.0 kg.

\*) Other connections like bushings or flanges can be supplied.

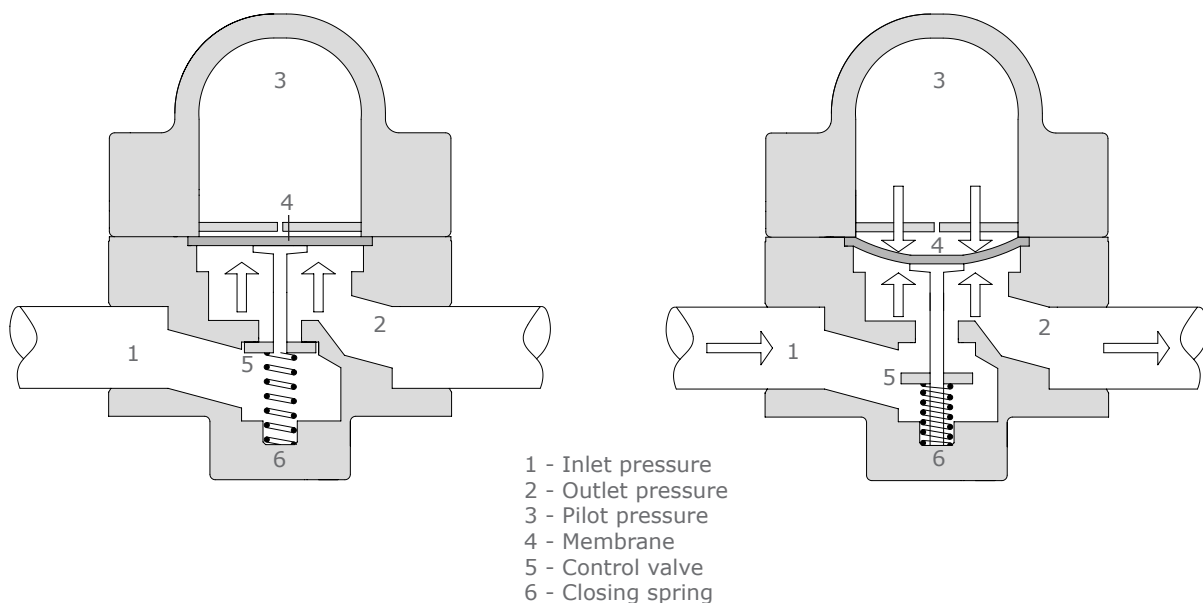
## Functional principle

The functional principle of the dome pressure regulator **LTD-1** is based on the physical law of Boyle, according to which the product of pressure and volume remains constant. For the **LTD-1** this means: The pressure in the dome chamber (= pilot pressure) and the outlet pressure of the process gas are balanced.

Every alteration to the pilot pressure is followed by an alteration to the valve opening which in turn directly influences the outlet pressure. And as every alteration to the outlet pressure has an immediate influence on the volume flow of the process gas, the latter directly depends on the setting of the pilot pressure.

The dome chamber is separated from the flow area of the process gas by a flexible membrane. The membrane safely seals both areas against one another, however it is capable of adapting itself to varying pressure conditions thanks to its elasticity and guaranteeing a balance of forces between the pilot pressure and the outlet pressure.

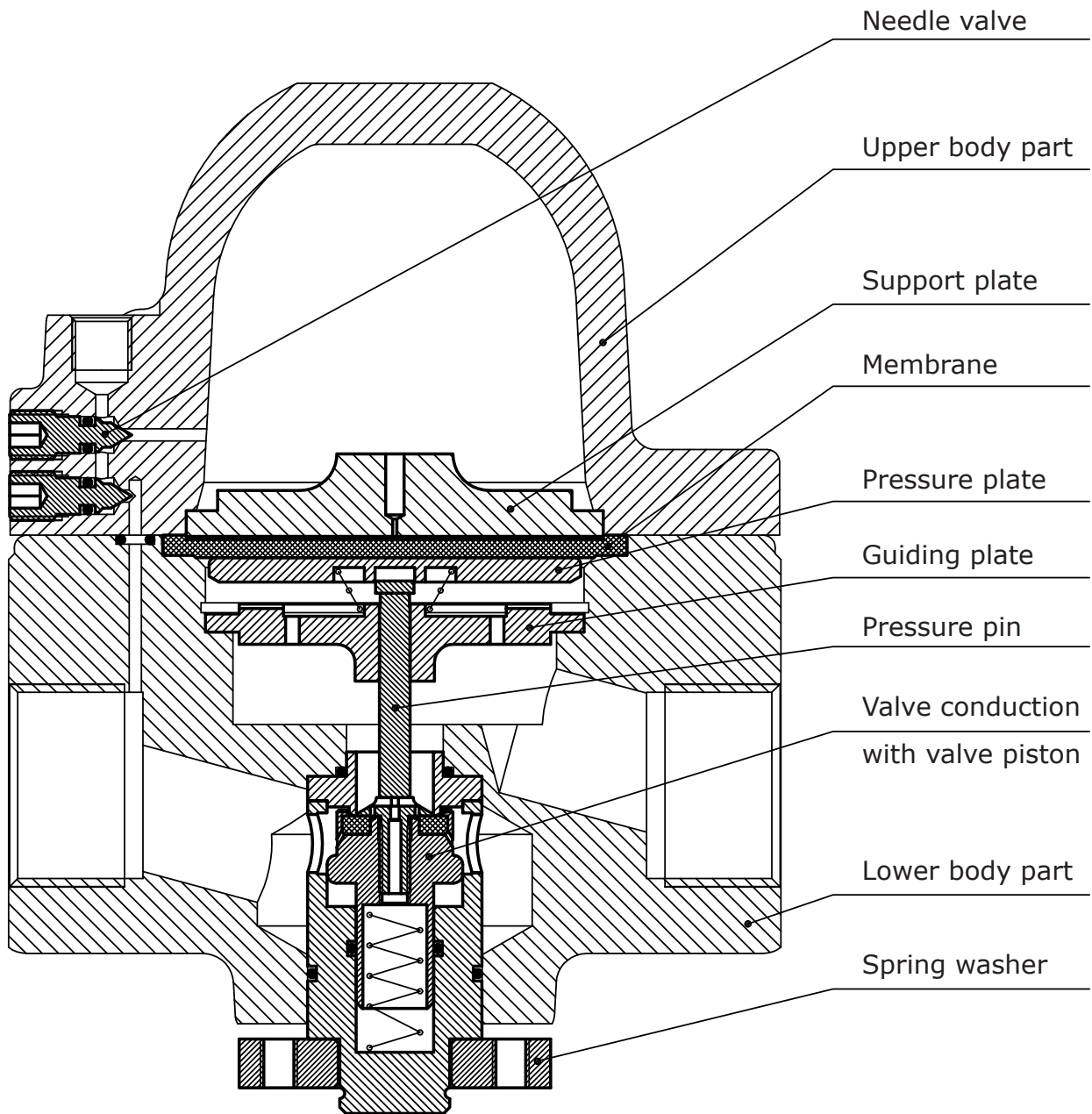
### ■ Layout



The dome chamber is pressure-relieved, the control valve is closed:  
**no gas flow**

The dome chamber is under pressure, the control valve is open:  
**gas flow**

## Design

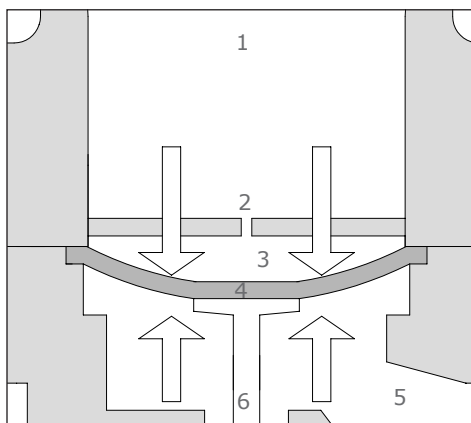




## Engineering particularities

### ■ Damping

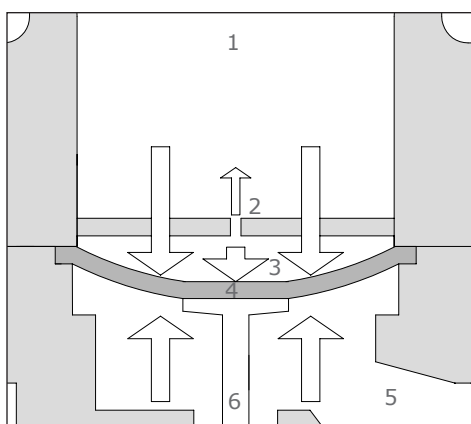
Precise pressure control without delay and without “fluttering and beating” even in case of great variations either in the inlet pressure or in the volume flow.



Operating condition: No pressure alterations.

- >> The primary and the secondary pressure are equal.
- >> The **LTD-1** is well adjusted.

- 1 - Dome chamber under pressure (= control pressure)
- 2 - Nozzle
- 3 - Secondary chamber under pressure
- 4 - Membrane
- 5 - Outlet pressure
- 6 - Control valve spindle

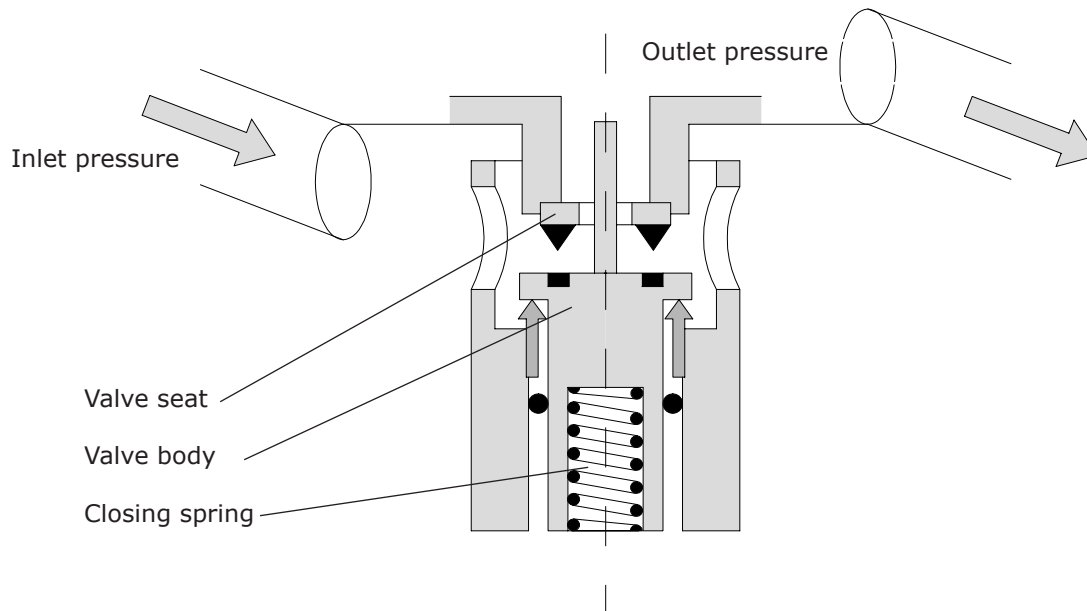


Operating condition: Pressure alterations.

- >> For a short time the primary and the secondary pressure are unequal.
- >> Strong reactive power in the secondary chamber.
- >> Delayed pressure balance with dome chamber.
- >> Damping.

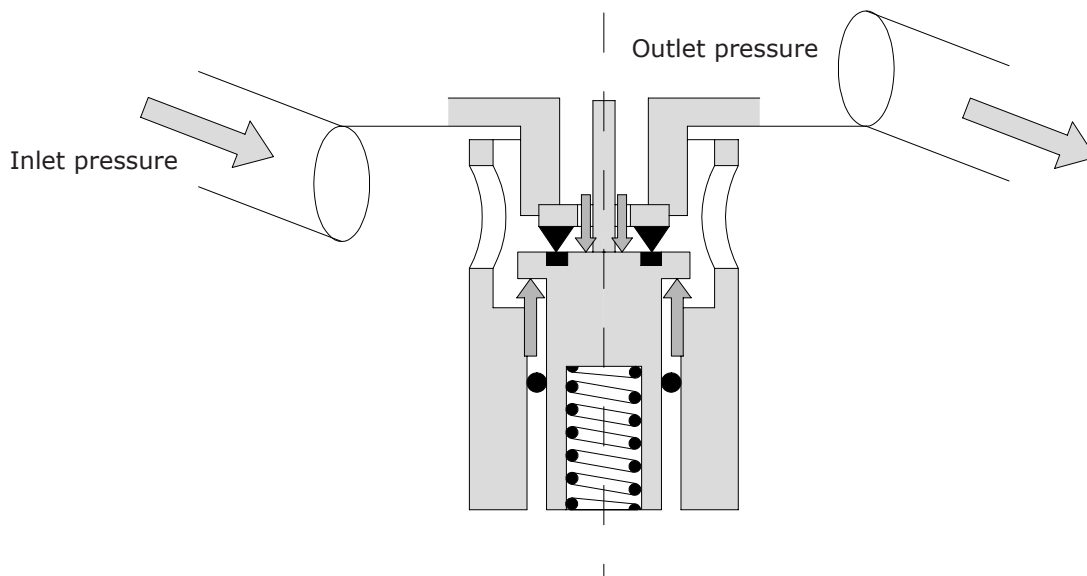
## Engineering particularities

### ■ Pressure-relieved valve



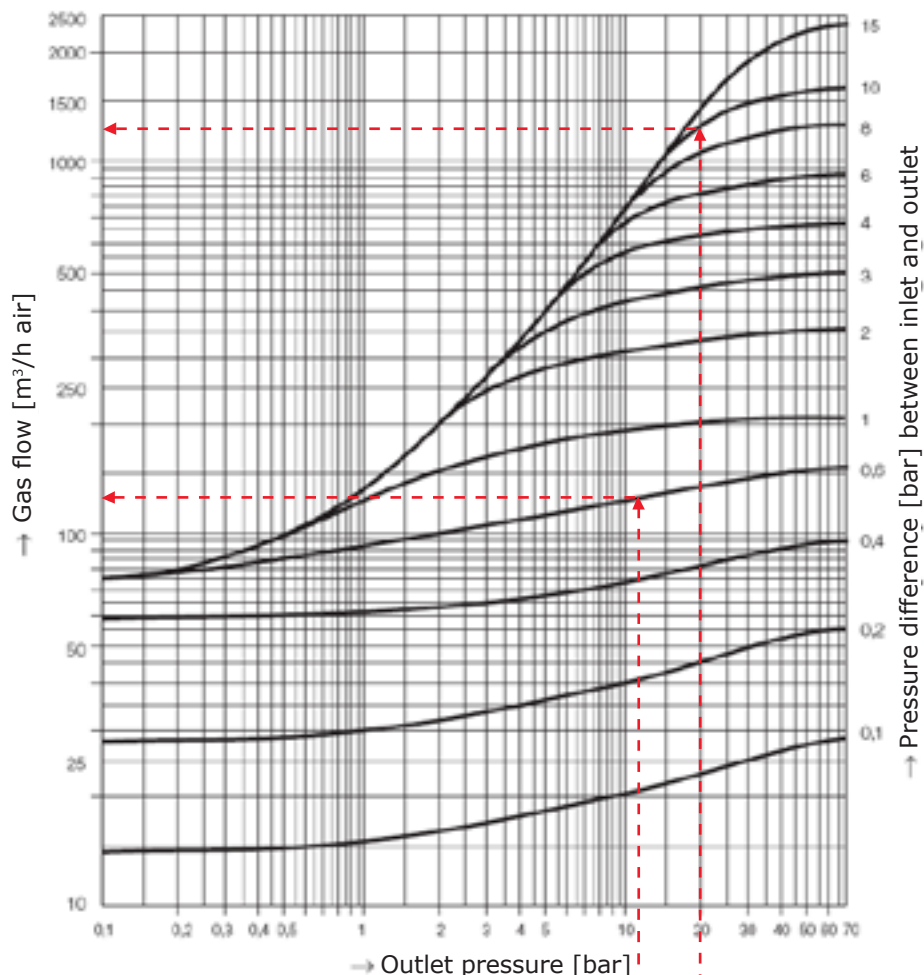
The surface charged with inlet pressure is very small.  
>> Outlet pressure is almost independent from inlet pressure.

### ■ Positive sealing



Outlet pressure is always lower than inlet pressure and spring load.  
>> At no flow the valve seat is absolutely tight.

## Performance diagram



Kv value = 2.9

Conversion factors:

Oxygen:	0.95
Hydrogen:	3.8
Propane:	0.8
Carbon dioxide:	1.0
Nitrous oxide:	0.8
Nitrogen:	1.0
Argon:	0.85
Helium:	2.7

• Example 1:

Pressure is reduced from 13.6 to 13.0 barg  
 The gas flow amounts to approx. 130 Nm<sup>3</sup>/h air.

• Example 2:

Pressure is reduced from 30.0 to 20.0 barg  
 The gas flow amounts to approx. 1250 Nm<sup>3</sup>/h air.

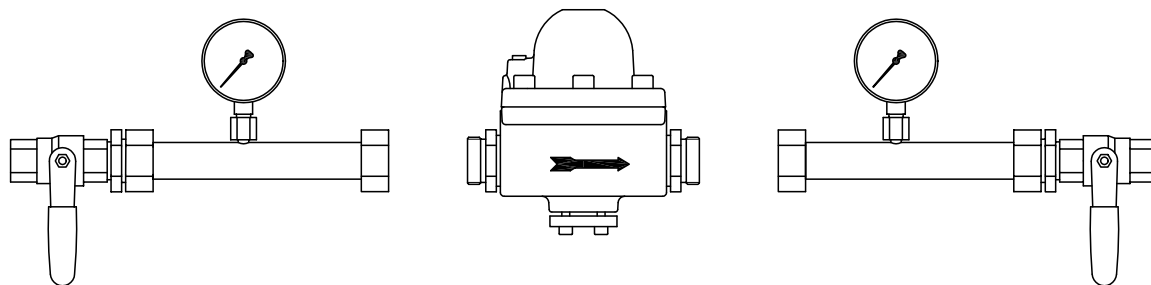
The flow rate can be substantially increased by the parallel switching of two or several **LTD-1** units.

## Installation

The **LTD-1** must be installed according to the flow direction of the process gas (see arrow on the tag).

This is how to proceed:

1. Before installation starts and during installation, keep the shut-off valves in the process gas pipes closed, both at inlet and at outlet of the **LTD-1**.
2. Seal the screw plugs of the process gas pipes and connect the inlet and outlet sides to the **LTD-1**. Preferably, flat gaskets or O-rings should be used. If Teflon tape or liquid sealing agents are used, pay attention that no particles penetrate the **LTD-1**, as they may cause malfunctions.

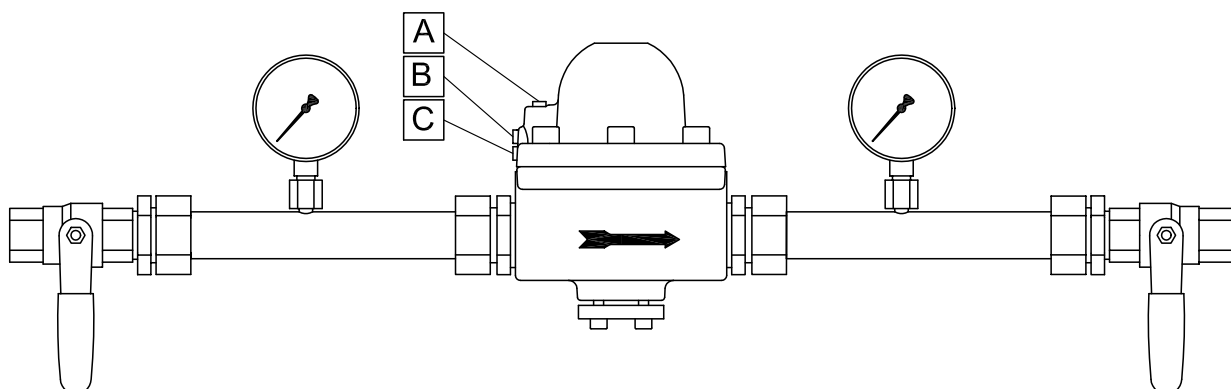


## Commissioning

The order of the following items must be strictly observed:

1. First make sure that the shut-off valves on the pipes at inlet and outlet of the **LTD-1** are closed.
2. Pressure-relieve the dome chamber to allow potentially encapsulated control gas to escape. To this effect, remove screw plug (A) and open needle valve (B) by approx. 2 turns, while keeping needle valve (C) closed. Then screw in plug (A) and close needle valve (B) by applying a torque of approx. 0.5 Nm. Keep needle valve (C) still closed.
3. Slowly open shut-off valve in the process gas pipe at inlet to the **LTD-1**.
4. Open needle valve (C) by approx. half a turn.
5. Open the needle valve (B) and simultaneously observe the pressure gauge in the process gas pipe at outlet of **LTD-1**. Process gas now flows into the dome chamber and starts building up pressure (= pilot pressure).
6. As soon as the outlet pressure desired is reached in the process gas pipe at outlet of the **LTD-1**, close needle valves (B) and (C) by applying a torque of approx. 0.5 Nm. They must not be tightened by applying a higher torque, since otherwise the valve seat can be damaged.
7. If the outlet pressure is too high, the dome chamber must be pressure-relieved, i.e. the encapsulated pilot pressure must be reduced. To this effect, repeat items 2 to 6.
8. When the desired outlet pressure is reached, open slowly the shut-off valve in the process gas pipe at outlet of the **LTD-1**.
9. If outlet pressure drops, the pilot pressure encapsulated in the dome chamber must be adjusted, i.e. increased, up until the outlet pressure desired has stabilized. To this effect, repeat items 4 to 6.

Then the **LTD-1** is ready for operation.



## Delivery program: LTD-1 body in brass

Type of gas	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure	Nominal length	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and carbon dioxide)	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 100 barg	Oxygen: 0.5-39 barg, remaining gases: 0.5-99 barg	127 mm	Internal thread G1"RH	LTD-1 MD/Viton/brass	3701000
	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	0.1-24 barg	127 mm	Internal thread G1"RH	LTD-1 ND/Viton/brass	3702000
Industrial Gases (except acetylene, methane and oxygen)	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	100 barg	0.5-99 barg	127 mm	Internal thread G1"RH	LTD-1 MD/EPDM/brass	3705000
Industrial Gases (except methane and oxygen)	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	Acetylene: max.1.5 barg, remaining gases: 0.1-24 barg	127 mm	Internal thread G1"RH	LTD-1 ND/EPDM/brass	3706000

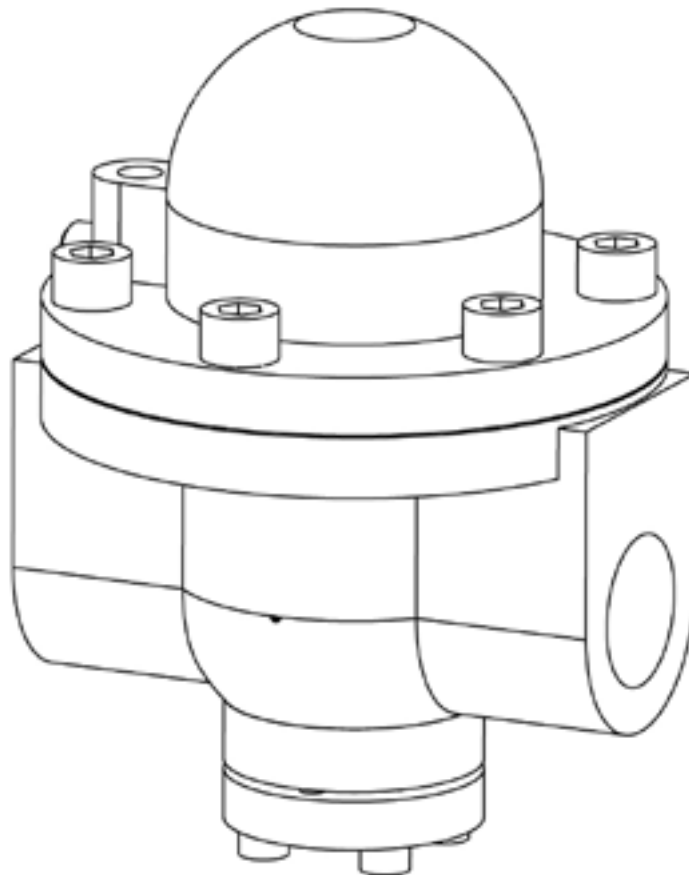


Illustration: Brass LTD-1

## Delivery program: LTD-1 body in stainless steel

Type of gas	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure	Nominal length	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and carbon dioxide)	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 100 barg	Oxygen: 0.5-39 barg, remaining gases: 0.5-99 barg	127 mm	Internal thread G1"RH	LTD-1 MD/Viton/stainless steel	3703000
	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	0.1-24 barg	127 mm	Internal thread G1"RH	LTD-1 ND/Viton/stainless steel	3704000
Industrial Gases (except acetylene, methane and oxygen)	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	100 barg	0.5-99 barg	127 mm	Internal thread G1"RH	LTD-1 MD/EPDM/stainless steel	3707000
Industrial Gases (except methane and oxygen)	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	Acetylene: max.1.5 barg, remaining gases: 0.1-24 barg	127 mm	Internal thread G1"RH	LTD-1 ND/EPDM/stainless steel	3708000

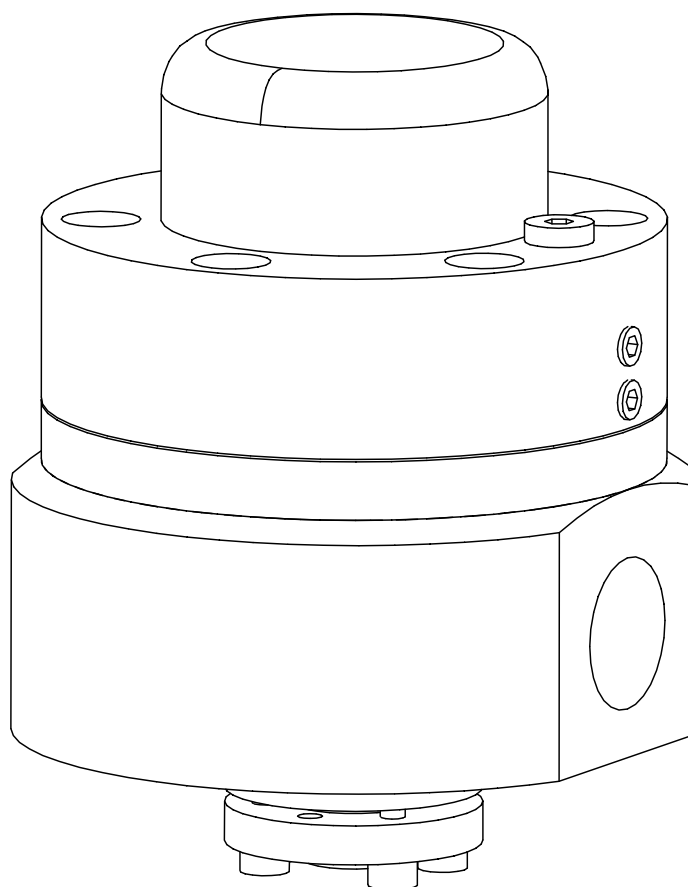


Illustration: Stainless steel LTD-1

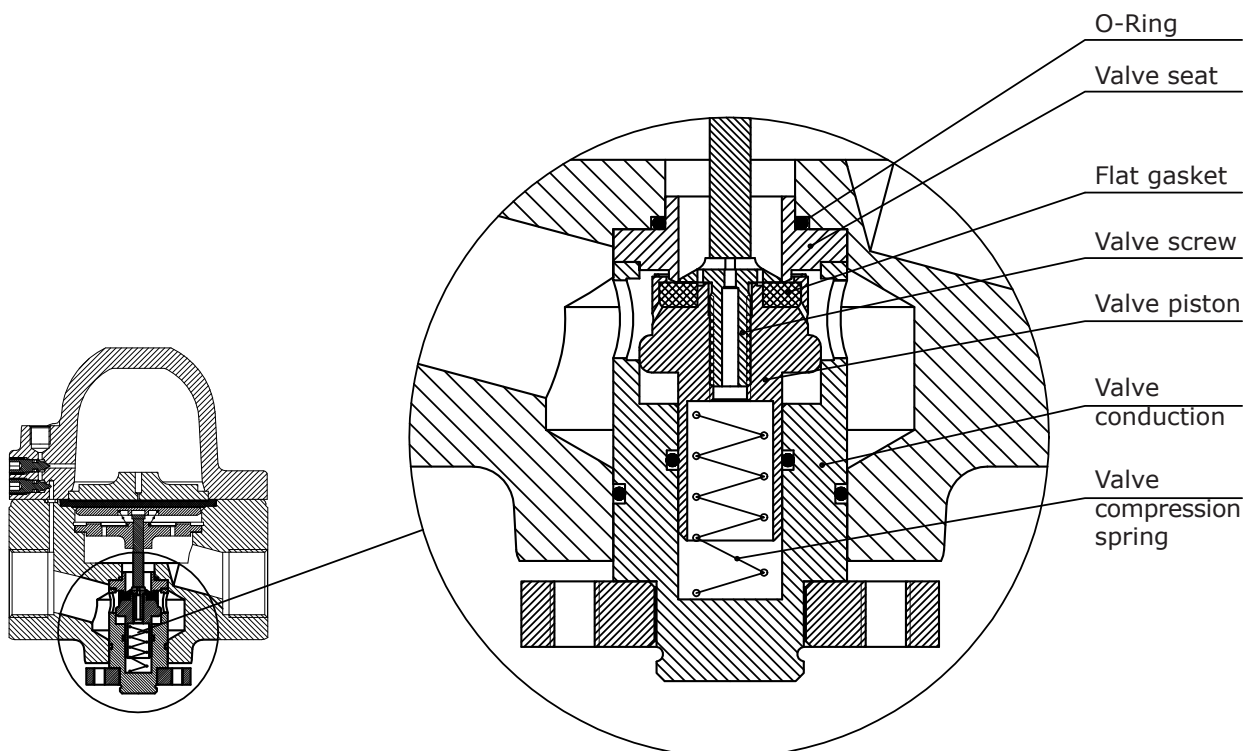
## Maintenance

The **LTD-1** should be maintained in regular intervals by authorized persons. We recommend once a year. L+T GASETECHNIK offers appropriate maintenance kits. Only using of original spare parts guarantees proper function and safety.

Before maintenance starts the **LTD-1** must be pressure-relieved, both at inlet and at outlet (for this, also see section „Commissioning“, items 1+2).

Unscrew the plate at the bottom of the **LTD-1** and pull out the valve conduction. Take the valve piston from the valve conduction and inspect them for traces of wear. If wear cannot be detected, a short cleaning operation and subsequent relubrication with Halocarbon grease are sufficient, but if any scoring is detected, both parts should be replaced. All gaskets in this area must be replaced.

By the time, aggressive process gases may attack and decompose creepingly the membrane, the flat gaskets and the tightening rings. Frequent flushing prevents such decomposition and is therefore strongly recommended. If components are in an evidently bad condition, they must be replaced.





## Maintenance kits as spare parts

The following maintenance kits are available for the **LTD-1**:

<b>Maintenance kits for brass type LTD-1</b>		
Description	Type	Item no.
<b>Maintenance kit, small,</b> for Dome pressure regulator LTD-1, for <b>medium pressure or low pressure</b> , soft seat ring, made of <b>Viton or EPDM</b> , <b>Scope of supply:</b> 3 O-rings, 1 flat gasket, 1 valve screw, 1 valve piston, 1 valve conduction, 1 valve seat, 1 valve compression spring, parts oil and grease free and almost completely pre-assembled	MD/VITON	3704100
	ND/VITON	3705900
	MD/EPDM	3706500
	ND/EPDM	3706600
<b>Maintenance kit, large,</b> for Dome pressure regulator LTD-1, for <b>medium pressure or low pressure</b> , soft seat ring, made of <b>Viton or EPDM</b> , <b>Scope of supply:</b> 6 O-rings, 1 flat gasket, 1 diaphragm, 1 valve screw, 1 valve piston, 1 valve conduction, 1 valve seat, 1 valve compression spring, 1 taper spring (only in case of medium pressure), 2 needle valves parts oil and grease free and almost completely pre-assembled	MD/VITON	3701600
	ND/VITON	3704400
	MD/EPDM	3704300
	ND/EPDM	3706700

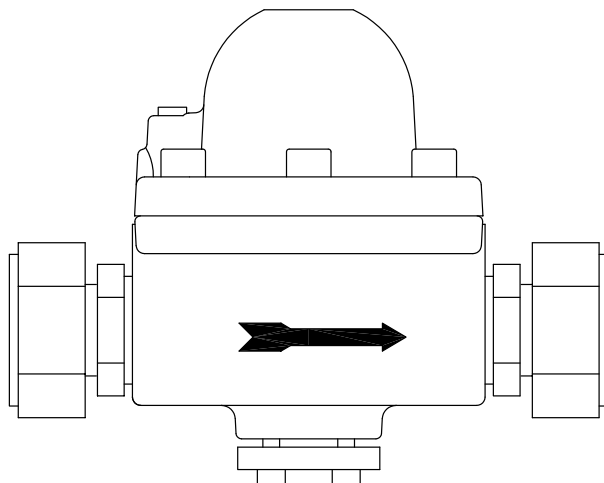
<b>Maintenance kits for stainless steel type LTD-1</b>		
Description	Type	Item no.
<b>Maintenance kit, small,</b> for Dome pressure regulator LTD-1, for <b>medium pressure or low pressure</b> , soft seat ring, made of <b>Viton or EPDM</b> , <b>Scope of supply:</b> 3 O-rings, 1 flat gasket, 1 valve screw, 1 valve piston, 1 valve conduction, 1 valve seat, 1 valve compression spring, parts oil and grease free and almost completely pre-assembled	MD/VITON	3707100
	ND/VITON	3707200
	MD/EPDM	3707300
	ND/EPDM	3707400
<b>Maintenance kit, large,</b> for Dome pressure regulator LTD-1, for <b>medium pressure or low pressure</b> , soft seat ring, made of <b>Viton or EPDM</b> , <b>Scope of supply:</b> 6 O-rings, 1 flat gasket, 1 diaphragm, 1 valve screw, 1 valve piston, 1 valve conduction, 1 valve seat, 1 valve compression spring, 1 taper spring (only in case of medium pressure), 2 needle valves parts oil and grease free and almost completely pre-assembled	MD/VITON	3707500
	ND/VITON	3707600
	MD/EPDM	3707700
	ND/EPDM	3707800

## Accessories

With a view to the variety of applications of the **LTD-1** and the control stations in most different industries numerous connecting adaptors are available:



For example flange connections made of brass or of stainless steel.



For example 1½" and 2" expansion connections made of brass or of stainless steel.

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## Mode A

### ■ Application

Mode A is used if the outlet pressure can remain unaltered over a longer period and minimum variations of the outlet pressure – caused by temperature-induced pressure fluctuations in the dome chamber – are without relevance.

### ■ Description

In mode A the dome chamber of the **LTD-1** is filled with the process gas from the inlet pipe.

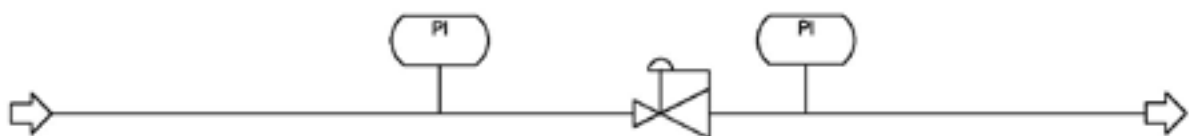
See the descriptions in the relevant section of the dome pressure regulator **LTD-1** on how to proceed for installation and commissioning.

Generally, a pressure control station for mode A can be equipped with any of the **LTD-1** versions mentioned in the matrix "Delivery programme".

If a control station is used with a stainless steel **LTD-1**, all other components of the control station are also made of stainless steel.

The pressure gauges for the inlet or outlet pressures are laid out individually in compliance with the customer's wishes for the pressure range (please specify in your order).

### ■ P & ID



■ **Delivery program**

<b>Control stations equipped with LTD-1, version brass, for mode A</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 100 barg	Oxygen: 0.5-39 barg, remaining gases: 0.5-99 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-MD-Viton-Ms	3701100
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	0.1-24 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-ND-Viton-Ms	3700800
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	100 barg	0.5-99 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-MD-EPDM-Ms	3707900
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-24 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-ND-EPDM-Ms	3708100

<b>Control stations equipped with LTD-1, version stainless steel, for mode A</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 100 barg	Oxygen: 0.5-39 barg, remaining gases: 0.5-99 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-MD-Viton-VA	3706800
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	0.1-24 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-ND-Viton-VA	3706900
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=40$ barg: 2100 Nm <sup>3</sup> /h	100 barg	0.5-99 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-MD-EPDM-VA	3708200
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=12$ barg: 700 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-24 barg	Clamping ring connection for pipe OD 28 mm	DRS-A-ND-EPDM-VA	3708300

(\*) Other outlet pressures available on request.

■ **Scope of supply**

A pressure control station for mode A comprises the following elements:

- 1 stainless steel wall panel
- 1 dome pressure regulator **LTD-1**
- 1 pressure gauge for inlet pressure
- 1 pressure gauge for outlet pressure
- 1 adapter fitting for the inlet of the pressure control station, including threaded connections
- 1 adapter fitting for the outlet of the pressure control station, including threaded connections

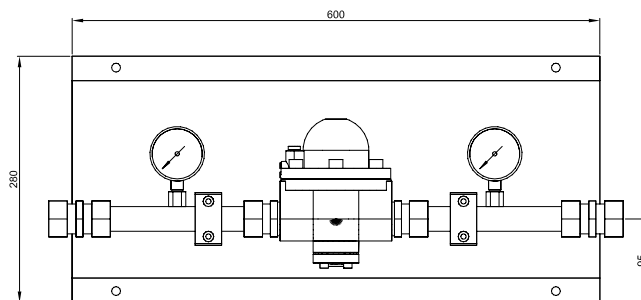
The pressure control station is supplied ready for operation. All above elements are pre-assembled on the stainless steel wall panel.

■ **Spare parts**

The following spare parts are available for control stations equipped with **LTD-1**, mode A:

- dome pressure regulator **LTD-1**
- maintenance kits for it.
- Following spare parts:

Names of parts	Product No.
Pressure gauge made of brass*)	2006600
Pressure gauge made of stainless steel*)	2006700
Adapter fitting made of brass for the inlet and outlet of the pressure control station, including threaded connections	3701300
Adapter fitting made of stainless steel for the inlet and outlet of the pressure control station, including threaded connections	3700900



*Illustration: Pressure control station equipped with LTD-1, mode A*

\*) Please specify measuring range in your order.

## Mode B

### ■ Application

Mode B is used if the outlet pressure is to be **altered frequently** and must be **adjustable in a simple way**.

### ■ Description

In mode B the dome chamber of the **LTD-1** is filled with the process gas from the inlet pipe (= control gas) via a preceding auxiliary regulator (= pilot pressure regulator).

See the descriptions in the relevant section of mode A for how to proceed for installation and commissioning. As to mode B, however, the admission of pressure to the dome chamber is not effected via the screw plugs and needle valves (A, B, C - see page 13), but via the pilot pressure regulator.

The pilot pressure regulator balances pressure variations in the dome chamber which are due to temperature. Thus the outlet pressure preset remains almost constant.

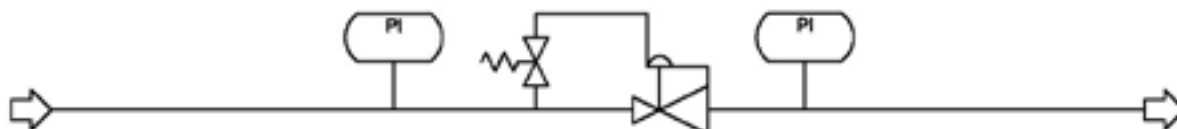
A pressure control station for mode B can be equipped with any of the **LTD-1** versions mentioned in the matrix "Delivery programme".

If a control station is used with a stainless steel **LTD-1**, all other components of the control station are also made of stainless steel.

The pressure gauges for the inlet or outlet pressures are laid out individually in compliance with the customer's wishes for the pressure range (please specify in your order).

The control pressure regulator permits the simultaneous control of several **LTD-1** units switched in parallel. In this case all **LTD-1** units have the same outlet pressure and exhibit the same flow characteristics.

### ■ P & ID





■ **Delivery program**

<b>Control stations equipped with LTD-1, version brass, for mode B</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 50 barg	Oxygen: 3-39 barg, remaining gases: 0.5-49 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-MD-Viton-Ms	3701200
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	0.1-16 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-ND-Viton-Ms	3708400
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	50 barg	3-49 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-MD-EPDM-Ms	3708600
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-16 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-ND-EPDM-Ms	3708700

<b>Control stations equipped with LTD-1, version stainless steel, for mode B</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 50 barg	Oxygen: 3-39 barg, remaining gases: 0.5-49 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-MD-Viton-VA	3706400
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	0.1-16 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-ND-Viton-VA	3708500
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	50 barg	3-49 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-MD-EPDM-VA	3708800
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-16 barg	Clamping ring connection for pipe OD 28 mm	DRS-B-ND-EPDM-VA	3708900

(\*) Other outlet pressures available on request.



■ **Scope of supply**

A pressure control station for mode B comprises the following elements:

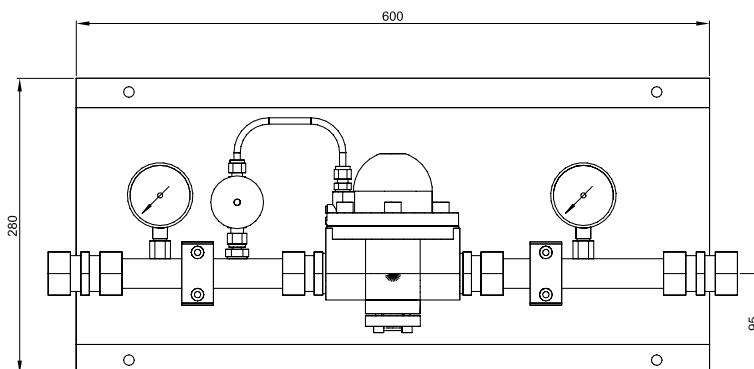
- 1 stainless steel wall panel
- 1 dome pressure regulator **LTD-1**
- 1 pilot pressure regulator, self-relieving
- 1 pressure gauge for inlet pressure
- 1 pressure gauge for outlet pressure
- 1 adapter fitting for the inlet of the pressure control station, including threaded connections
- 1 adapter fitting for the outlet of the pressure control station, including threaded connections

The pressure control station is supplied ready for operation. All above elements are pre-assembled on the stainless steel wall panel.

■ **Spare parts**

All spare parts for mode A as well as the following parts are available for the control stations equipped with **LTD-1**, mode B:

Names of parts	p1 max.	p2	Product No.
Pilot pressure regulator made of brass	25 bar	0,5 - 25 bar	2402200
Pilot pressure regulator made of brass	50 bar	3,0 - 50 bar	2401200
Pilot pressure regulator made of stainless steel	25 bar	1,0 - 15 bar	2401000
Pilot pressure regulator made of stainless steel	50 bar	3,0 - 50 bar	2401300
Adapter fitting made of brass for the inlet of the pressure control station, including threaded connections			3700600
Adapter fitting made of stainless steel for the inlet of the pressure control station, including threaded connections			3700500



*Illustration: Pressure control station equipped with LTD-1, mode B*

## Mode C

### ■ Application

Mode B is used preferably

- if the process gas is **aggressive** or **flammable**,
- if it **strongly depends on temperature** (e.g. Propane, Butane etc.),
- if it is a **liquid** process medium.

In those cases it is recommended to feed a neutral process gas to the dome chamber.

### ■ Description

In mode C the dome chamber of the **LTD-1** is filled with control gas via the control pressure regulator; the control gas used is not taken from the inlet pipe for process gas, but from a separate pipe for neutral gas.

See the descriptions in the relevant section of mode A for how to proceed for installation and commissioning. As to mode C, however, the admission of pressure to the dome chamber is not effected via the screw plugs and needle valves (A, B, C - see page 13), but via the control pressure regulator.

The control pressure regulator balances pressure variations in the dome chamber which are due to temperature. Thus the outlet pressure preset remains almost constant.

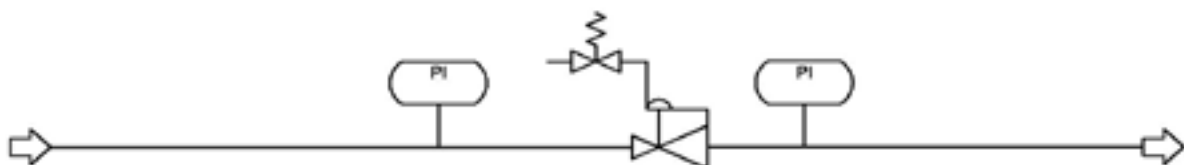
A pressure control station for mode C can be equipped with any of the **LTD-1** versions mentioned in the matrix "Delivery programme".

If a control station is used with a stainless steel **LTD-1**, all other components of the control station are also made of stainless steel.

The control pressure regulator and the pressure gauges for the inlet or outlet pressures are laid out individually in compliance with the customer's wishes for the pressure range (please specify in your order).

The control pressure regulator permits the simultaneous control of several **LTD-1** units switched in parallel. They all have the same output pressure and show the same flow characteristics.

### ■ P & ID



■ **Delivery program**

<b>Control stations equipped with LTD-1, version brass, for mode C</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 50 barg	Oxygen: 3-39 barg, remaining gases: 0.5-49 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-MD-Viton-Ms	3709000
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	0.1-16 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-ND-Viton-Ms	3709100
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	50 barg	3-49 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-MD-EPDM-Ms	3709400
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-16 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-ND-EPDM-Ms	3709500

<b>Control stations equipped with LTD-1, version stainless steel, for mode C</b>							
Type of gas	Dimensions (w x h x d)	Max. Capacity	Max. Pressure at inlet	Adjustable outlet pressure (*)	Connection at inlet and outlet	Type	Product No.
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	Oxygen: 40 barg, remaining gases: 50 barg	Oxygen: 3-39 barg, remaining gases: 0.5-49 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-MD-Viton-VA	3709200
Industrial Gases (except acetylene, methane and natural carbon dioxide)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	0.1-16 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-ND-Viton-VA	3709300
Industrial Gases (except acetylene, methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=16$ barg: 940 Nm <sup>3</sup> /h	50 barg	3-49 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-MD-EPDM-VA	3709600
Industrial Gases (except methane and oxygen)	655 x 280 x 200 mm	$p_2/p_1 < 0.5$ : at $p_2=5$ barg: 320 Nm <sup>3</sup> /h	25 barg	Acetylene: max. 1.5 barg, remaining gases: 0.1-16 barg	Clamping ring connection for pipe OD 28 mm <u>Inlet-pilot pressure regulator:</u> internal thread G1/8" RH	DRS-C-ND-EPDM-VA	3709700

(\*) Other outlet pressures available on request.

### ■ Scope of supply

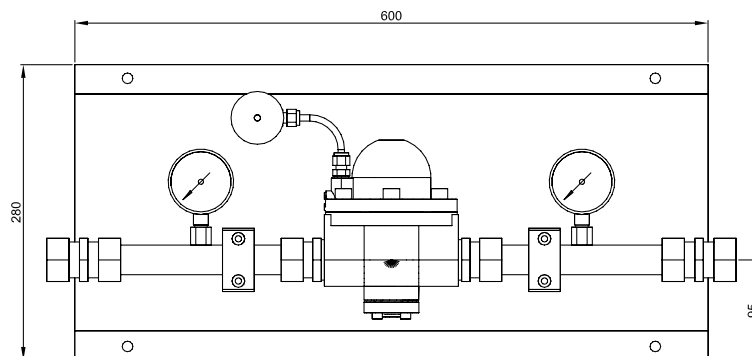
A pressure control station for mode C comprises the following elements:

- 1 stainless steel wall panel
- 1 dome pressure regulator **LTD-1**
- 1 pilot pressure regulator, self-relieving
- 1 pressure gauge for inlet pressure
- 1 pressure gauge for outlet pressure
- 1 adapter fitting for the inlet of the pressure control station, including threaded connections
- 1 adapter fitting for the outlet of the pressure control station, including threaded connections

The pressure control station is supplied ready for operation. All above elements are pre-assembled on the stainless steel wall panel.

### ■ Spare parts

All spare parts for mode B are available for the control stations equipped with **LTD-1**, mode C.



*Illustration: Pressure control station equipped with LTD-1, mode C*

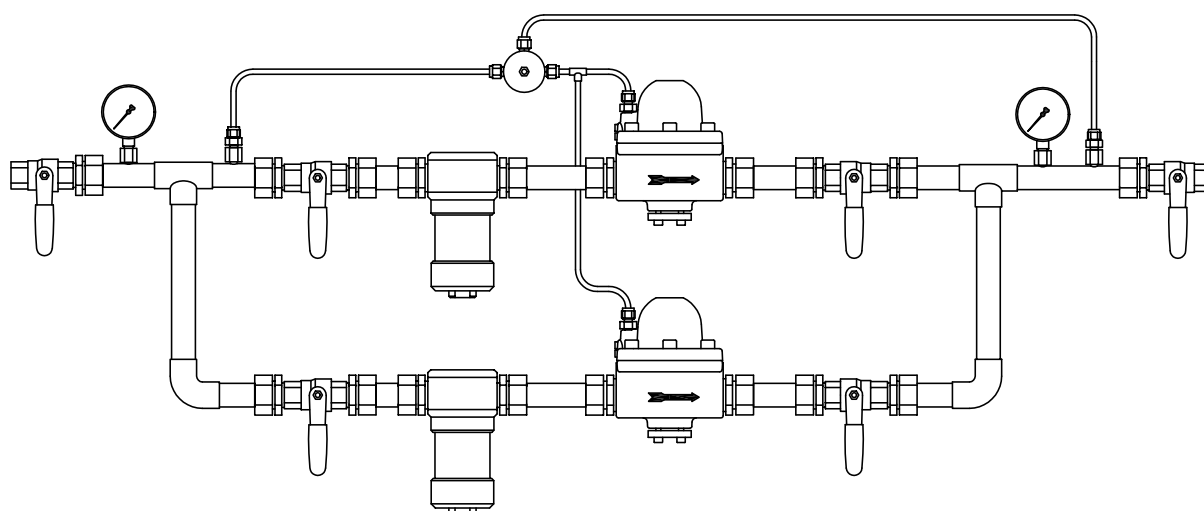
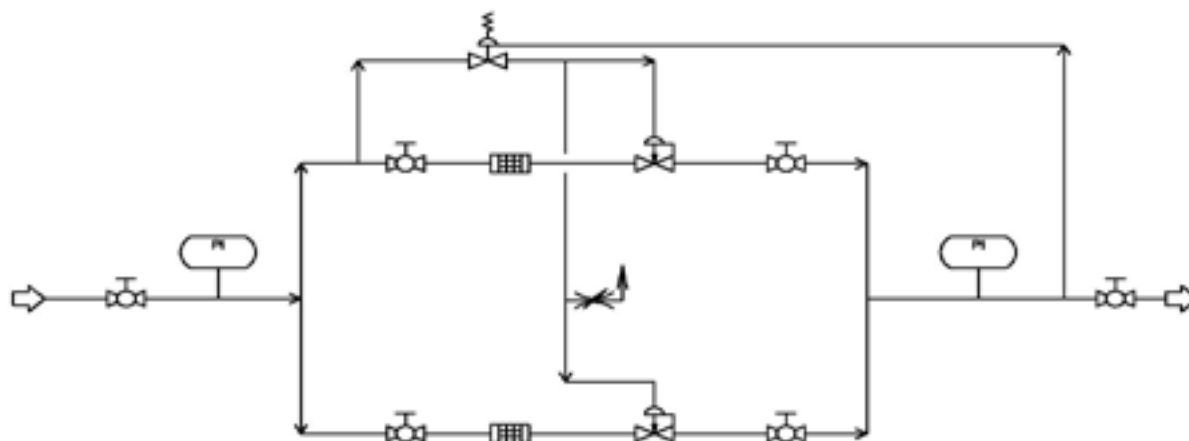
## Options

The literally universal applicability is a characteristic feature of the dome pressure regulator **LTD-1** and the pressure control stations equipped with it. They can be used in manifold ways and combined with other components to build highly efficient pressure control stations.

Some examples:

### ■ Option 1 - Parallel switch

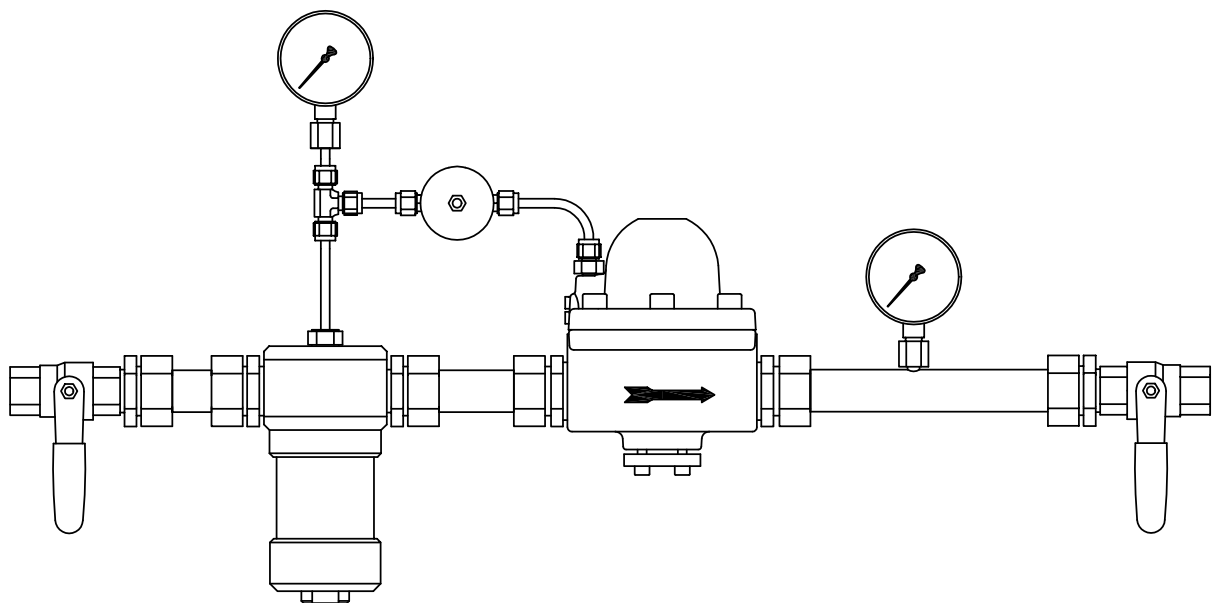
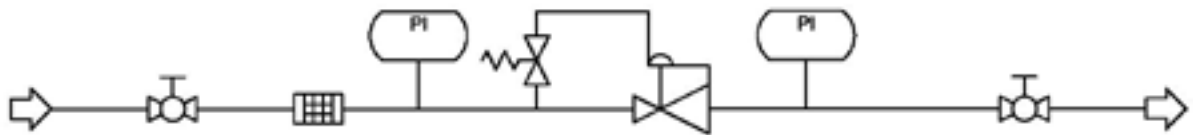
The flow rate of pressure control stations equipped with **LTD-1** can be substantially increased by the parallel switching of two or several **LTD-1** units.



*Illustration: Pressure control station equipped with LTD-1, type B, switched in parallel*

■ **Option 2 - Extended configuration**

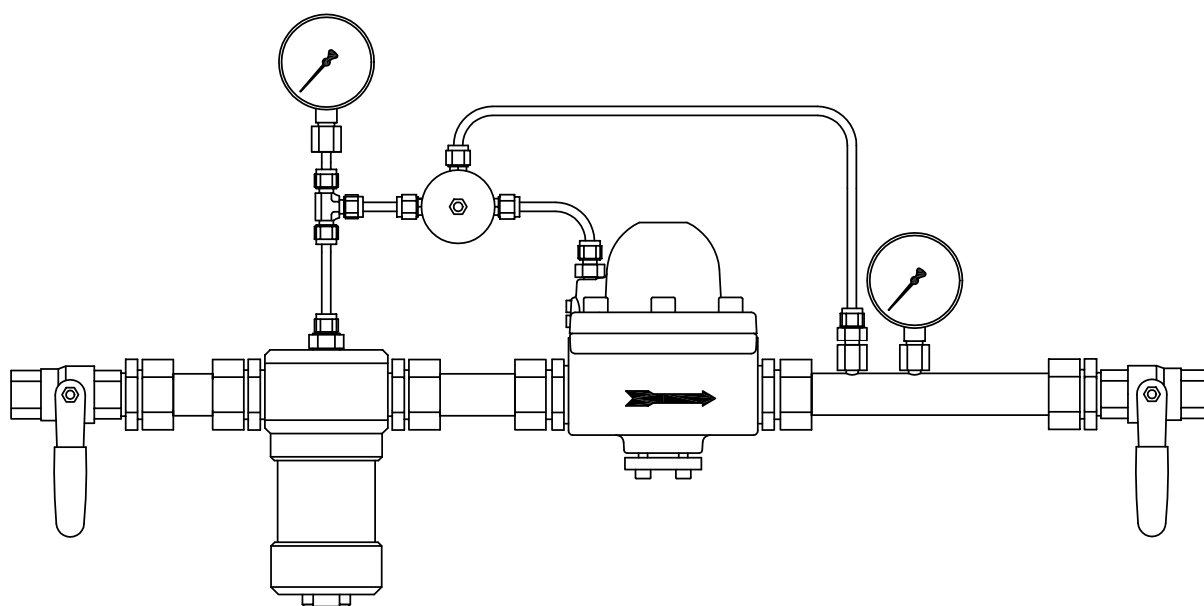
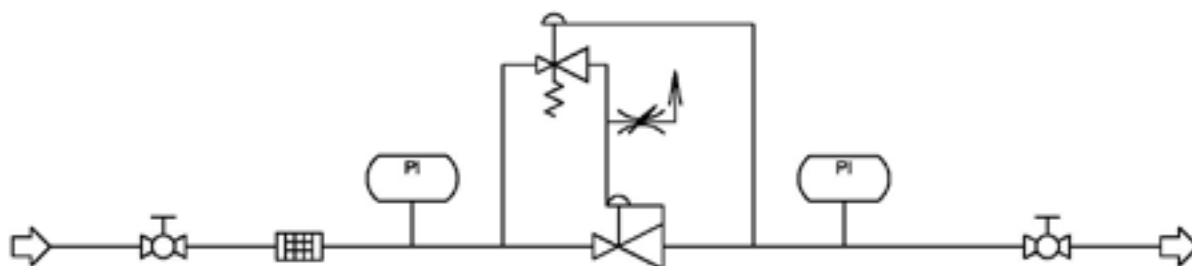
Pressure control stations may, at request, be designed with an extended configuration. Many components are available, like ball valves at inlet and at outlet, filters etc.



*Illustration: Pressure control station equipped with LTD-1, type B, with extended configuration*

■ **Option 3 - Outlet pressure control**

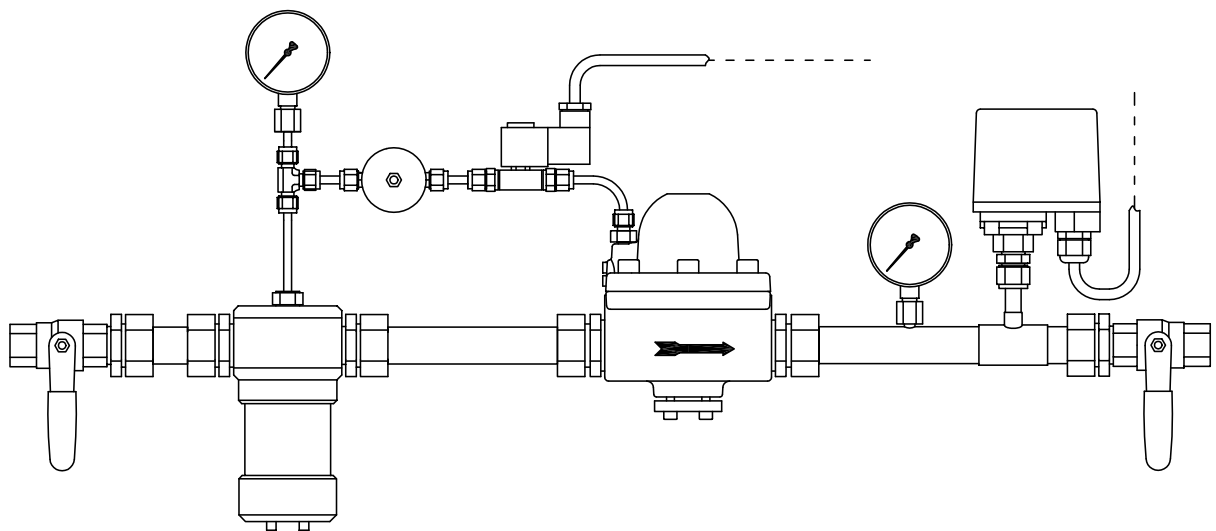
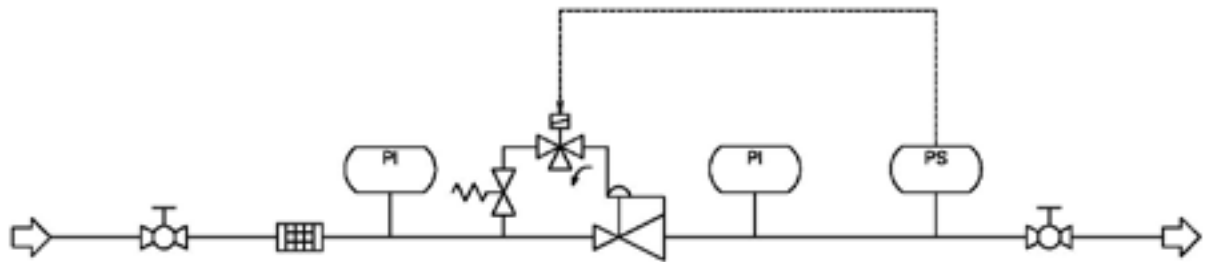
For many industrial processes maintaining absolutely the outlet pressure is a must. In order to meet this challenge with high precision and permanently, the control pressure regulator is added an external retrogressive tool. It is thereby loaded with process gas both from the inlet and from the outlet pipe.



*Illustration: Pressure control station equipped with LTD-1, type B, control pressure regulator with external retrogressive tool*

■ **Option 4 - Locking valve function**

The **LTD-1** offers the exceptional advantage of a positive sealing between valve cone and valve seat. Therefore, it can also be used as pressure regulator with locking valve. To this effect, a pressure switch is installed at outlet which acts on a 3/2-way solenoid valve.



*Illustration: Pressure control station equipped with LTD-1, type B, with pressure switch and solenoid valve*

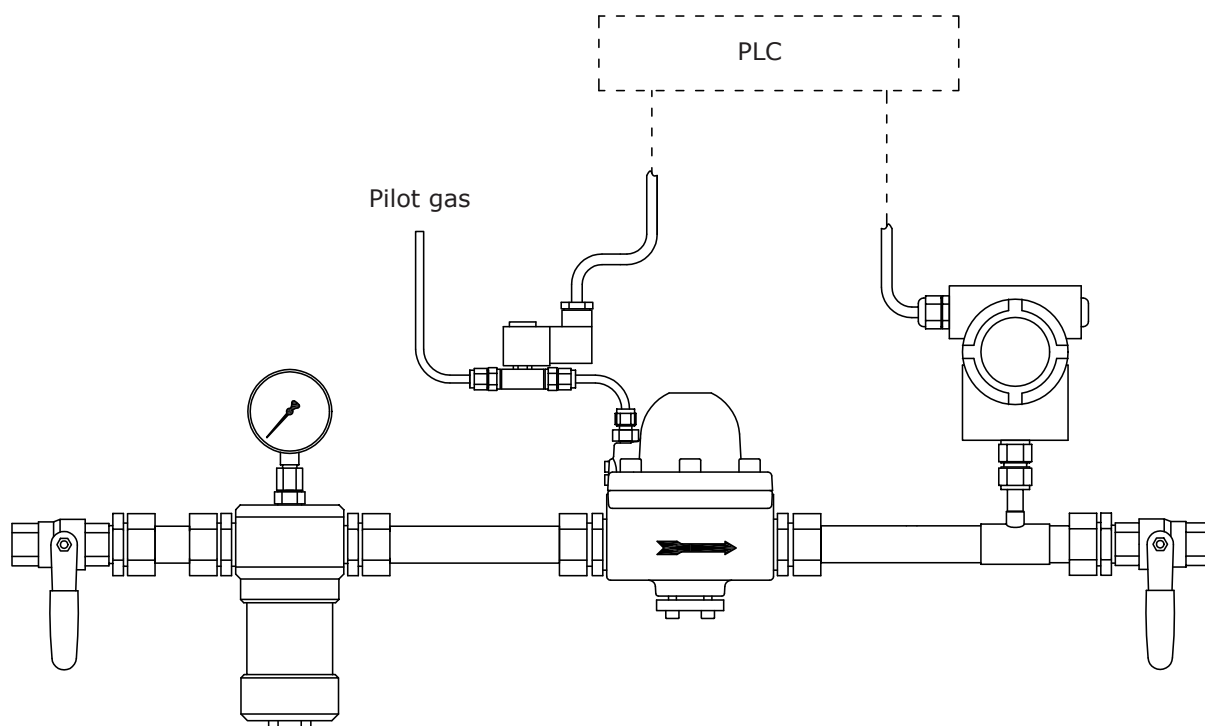
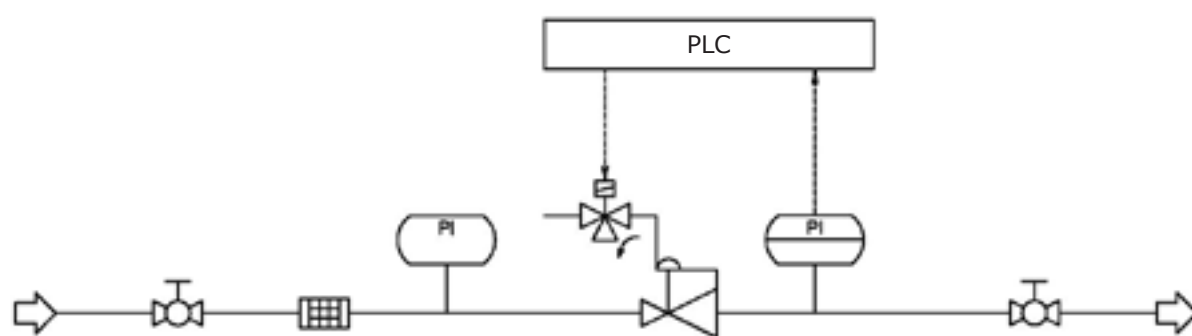
Important remark: The above options are meant to give just an impression of the manifold applications of the **LTD-1** and the pressure control stations. However the examples do not represent the complete range of applications. Upon request, we are ready to individually analyse each application and propose a solution harmonising with it.



■ **Option 5 - Remote control**

Many industrial processes are automated and subject to remote control from a control centre. Then it should not be necessary that pressure modifications required by the process are performed manually on site.

To ensure that the large regulating range offered by the **LTD-1** is used to an optimum, in these cases the control station is provided a proportional valve which is controlled by the control centre. Pressure is measured by a sensor.



*Illustration: Pressure control station equipped with LTD-1, with proportional valve*

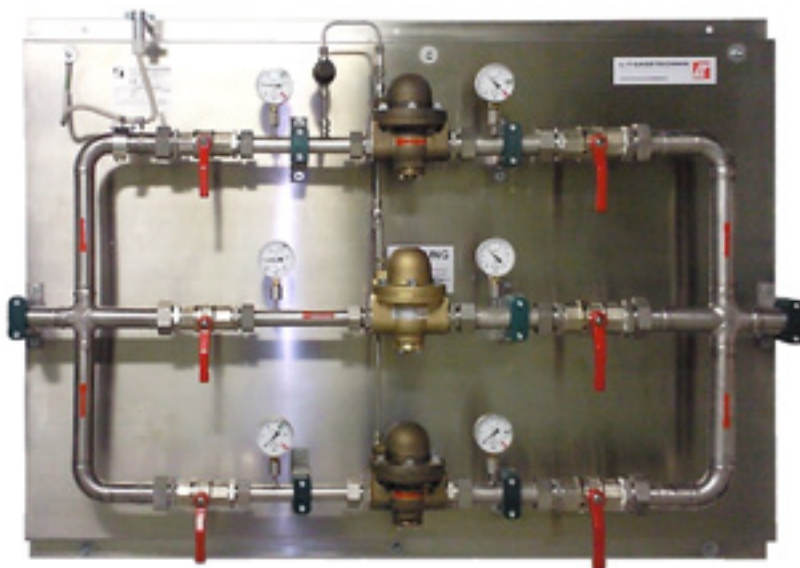
## Accessories

The following accessories are available:

- Gas filter GR-40
- Safety valves
- Ball valves
- Supporting bracket for the stainless steel version
- Shut-off ball valves for pressure gauges
- Counterflanges
- etc.



*Illustration: Pressure control station equipped with LTD-1, type B, with redundancy*



*Illustration: Pressure control station equipped with LTD-1, type B, switched in parallel*



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