

Two-dimensional mixing valve Type ZDM



Detail-
leaflet

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Two-dimensional mixing valve Type ZDM

Application

The ZDM is applied in gas mixing units for low and high pressure ranges.

The gases to be mixed: liquefied gas – air
natural gas – air
natural gas – liquefied gas

are fed into the ZDM, under a constant pressure system, for automatic control of mixing ratio.

The ZDM regulates flow rate by a stroke movement over specified cross-sections, which can be controlled by a rotating movement of the ZDM.

Thus combustion value and Wobbe-Index can be set; an integrated mixer warrants an intensive mixing of the gases operated with.

Function

Pneumatic actuation

Opening

In resting position, the ZDM valve is kept closed by spring force and shuts-off gas as a tight seal.

A permanently installed pneum. positioner puts the valve into operation. The positioner is connected with the valve actuator by a control line.

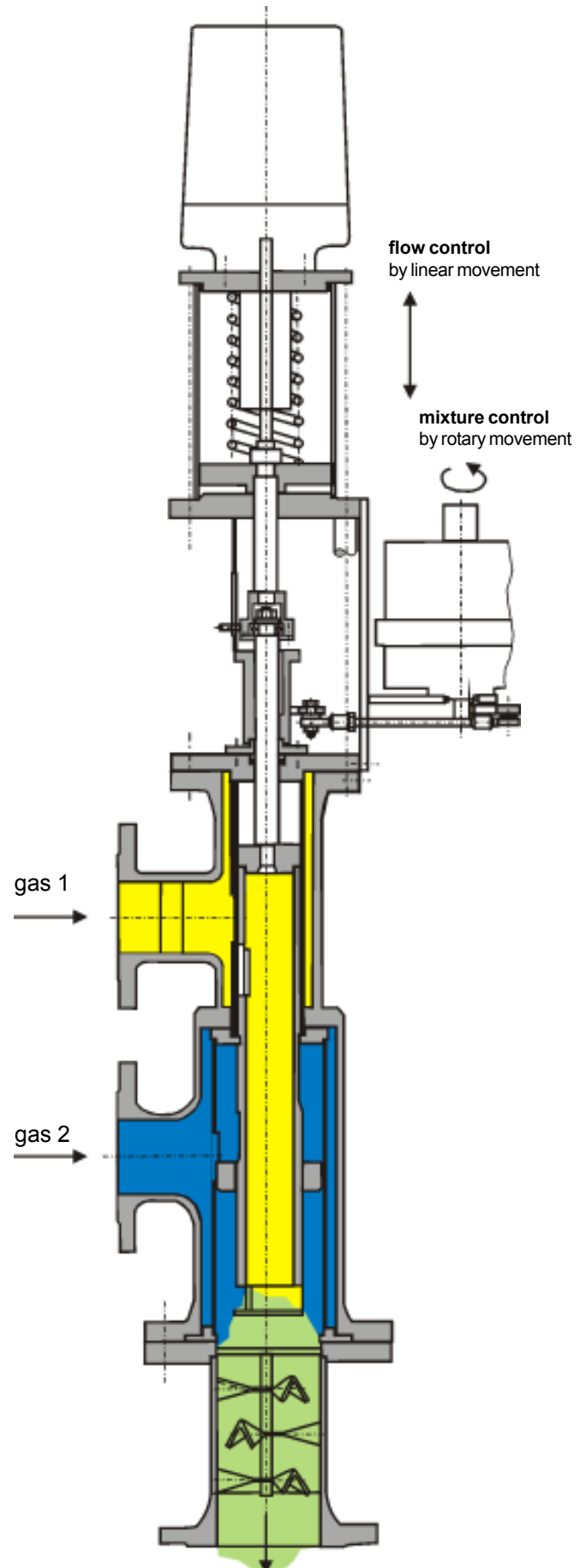
The actuating signal, coming in a range of 0.2 to 1.0 bar or 4 to 20 mA from a regulating or controlling device (controlling variable), is transformed by the positioner to an actuating pressure (max. 6 bar).

The valve moves against the force of closing spring and the acting differential pressure to the open position. The valve stroke (controlling variable) is transferred mechanically via an actuating lever on the positioner. Each valve position requires a corresponding actuating pressure, which is compared and controlled with the actuating signal in accordance with the force compensation process of the metering system of the positioner.

Thus each actuating stroke corresponds to an 0.2 to 1,0 bar or 4 to 20 mA signal.

During the process of opening, the flow cross-sections specified by regulating positions are released and permit the gases to flow into the valve.

There is a change lever opposite the air entry flange. A simple change of this lever enables operation with a second combustion gas. The gas flowing in at the upper entry pipe (medium I) is led through a pipe,



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which ends at an impact plate where it is whirled. Here a preliminary mixing takes place with the gas entering from the lower entry pipe (medium II).

The pre-mixed gas is then led through the subsequent static mixer. A further precise mixing, as required for an optimal combustion, takes place by means of three mixing propellers, which are arranged staggered to another.

A further optimizing of the gas mixture is effected by the quality regulation, i. e. by additional rotating movement of the regulating piston. This takes place either by a pneumatic or electrical actuation. The electrical actuation is an external version.

Using a connecting rod between actuator and actuating lever on the valve stem, the upper regulating cross-section (medium I) can, at any given setting of the valve, be additionally changed by means of a rotating movement. Regulation of quantity and quality (stroke and rotating movement) can take place parallel by simultaneous actuating of both positioners. In order to limit the gas volume, the actuator for quality regulation is equipped with adjustable stops.

Closing

In case of failure of energy supply (actuating pressure) or for reduction of actuating signal to 0.2 bar or 4 mA, the actuating pressure in the cylinder is slackened via the control regulator. The regulating piston is moved into the closed position by the force of the spring and shuts off the gas flow.

Electrical actuation

Opening

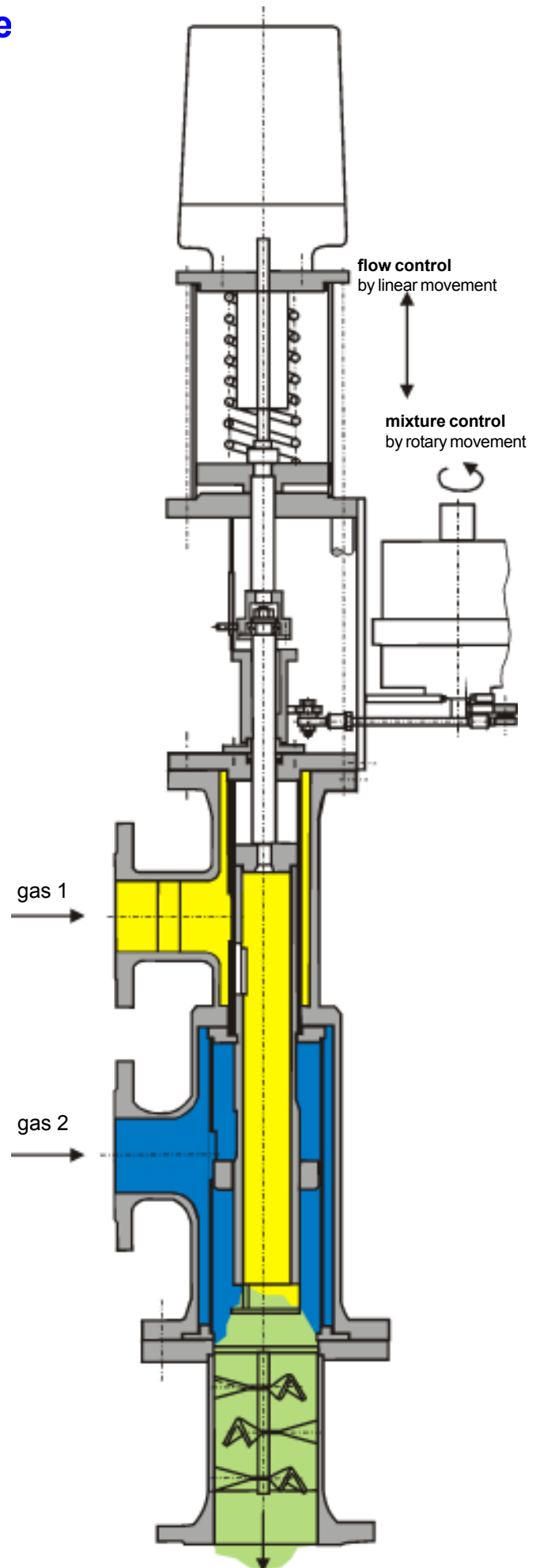
In resting condition, the ZDM valve remains in the position in which electricity supply was interrupted.

Operation is started using a potentiometer installed in the electro-actuation. The electro-actuation is activated by the signal coming from the regulating or control device in a range of 0 – 1000 (controlling variable). Here 0 – 1000 corresponds to 0 – 100% of valve stroke (output quantity).

Thus each actuating signal within a range of 0 to 1000 corresponds to a specified valve setting.

During the process of opening, the flow cross-sections specified by the regulating pistons are released and permit the gases to flow into the valve.

Medium I which flows in at the upper entry pipe is led



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through a pipe which ends at an impact plate where it is whirled. Here a preliminary mixing takes place with medium II entering from the lower entry pipe.

The pre-mixed gas is then led through the subsequent static mixer. A further precise mixing, as required for an optimal combustion, takes place by means of three mixing propellers, which are arranged staggered to another.

A further optimizing of the gas mixture is effected by the quality regulation, i. e. by an additional rotating movement of the regulating piston. This takes place either by a pneumatic or electrical actuation. The electrical actuation is an external version with integrated potentiometer.

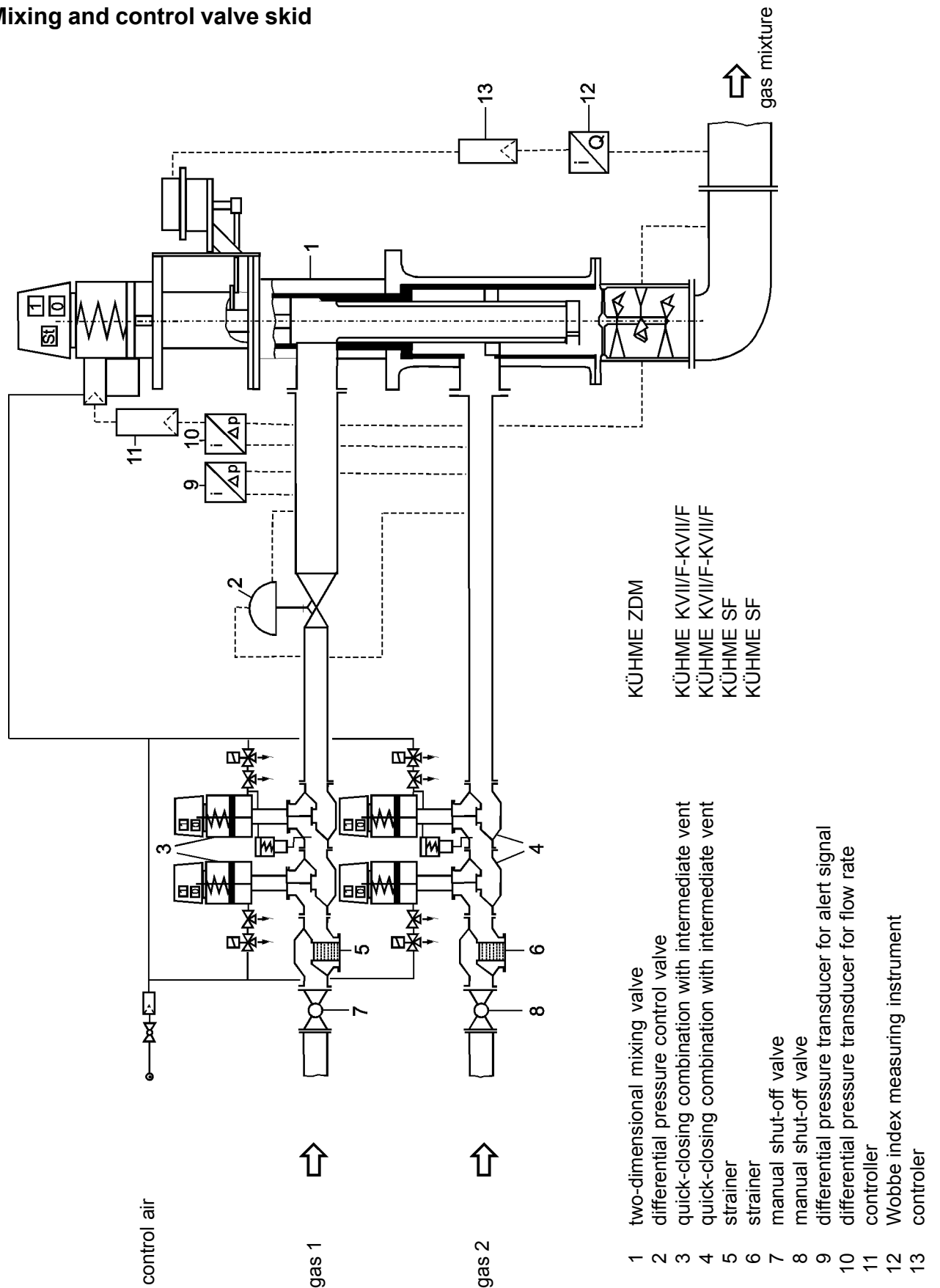
Using a connecting rod between actuator and actuating lever on the valve stem, the upper regulating cross-section (medium I) can, at any given setting of the valve, be additionally changed by means of a rotating movement. Regulation of quantity and quality (stroke and rotating movement) can take place parallel by simultaneous actuation of both potentiometers.

Closing

The closing action is dependent on the actuating signal of the potentiometer, if the actuating signal of the potentiometer is correspondingly set, the electro-actuation of the ZDM valves moves to the "closed" position. Subsequently this action is interrupted by the limit switches and signalled (and vice versa also in position "open", of course).

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Mixing and control valve skid



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Specification

Performance of the ZDM

- wide range of adjustment
- high consistency of quality of gas mixture
- wide area of application
- range of adjustment 1:10
- nominal diameter DN 50 to 300/ 2" to 12"
- operating pressure up to 25 bar / 360 psi
- operating temperature -15 to 200 °C
- max. Δp during opening 1 bar/ 15 psi

General

The ZDM valve is used as a fully automatically operating regulating unit for controlling proportion and quality of gases.

Being a double-actuating unit, two gases e. g.: liquefied gas – air or natural gas – air or natural gas – liquefied gas are fed into the ZDM under a constant pressure, which is controlled by specified cross-sections via a valve stroke. The combustion value can be optimized by means of an additional rotating movement of the ZDM. The subsequent static mixer warrants an intensive mixing of gases thus achieving a high efficiency of utilization.

Significant features of construction

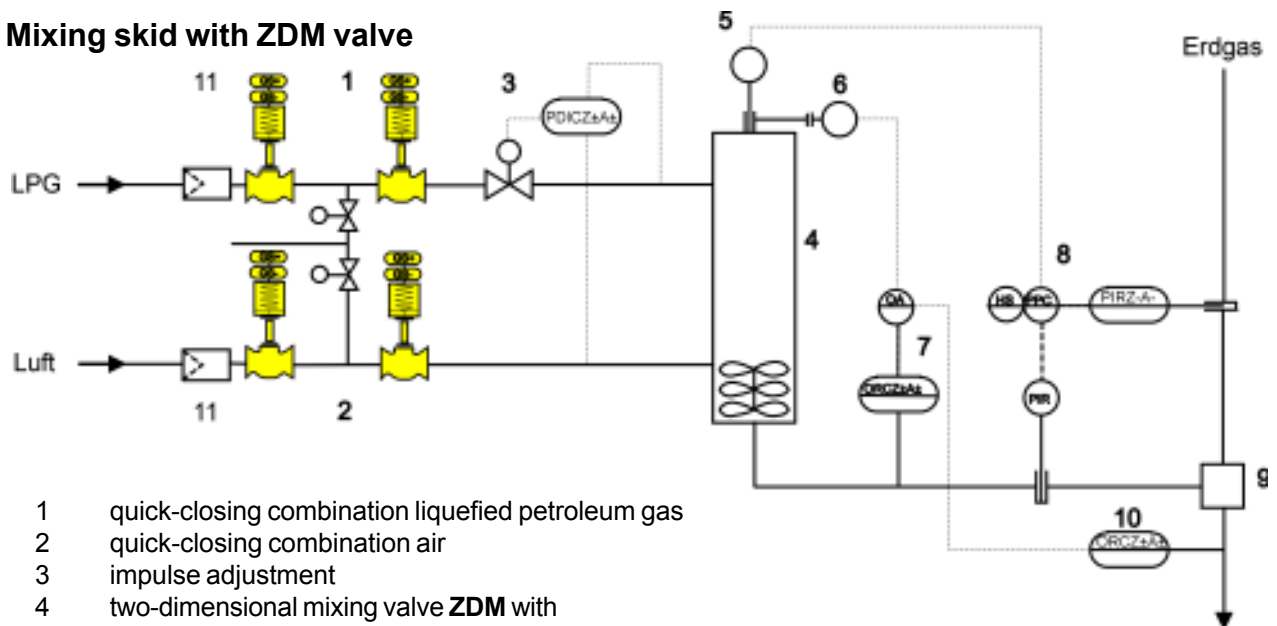
- stem seal without stuffing box by means of elastic seal rings achieve constant conditions of friction and actuating times
- elastic sealing of regulating piston for tight O-seal
- maintenance-free sliding bearings on Teflon basis at stem guides
- aluminium supporting bearings at regulating piston
- honed piston sleeve with chemically treated surface
- static sealing by means of O-rings
- complete unit free of non-ferrous metals

Your inquiry should include the following specifications:

- existing media
- quantities [m³/h]
- pressure [bar]
- temperature [°C]
- densities [kg/m³]
- location of unit
- actuator type pneumatic or electric

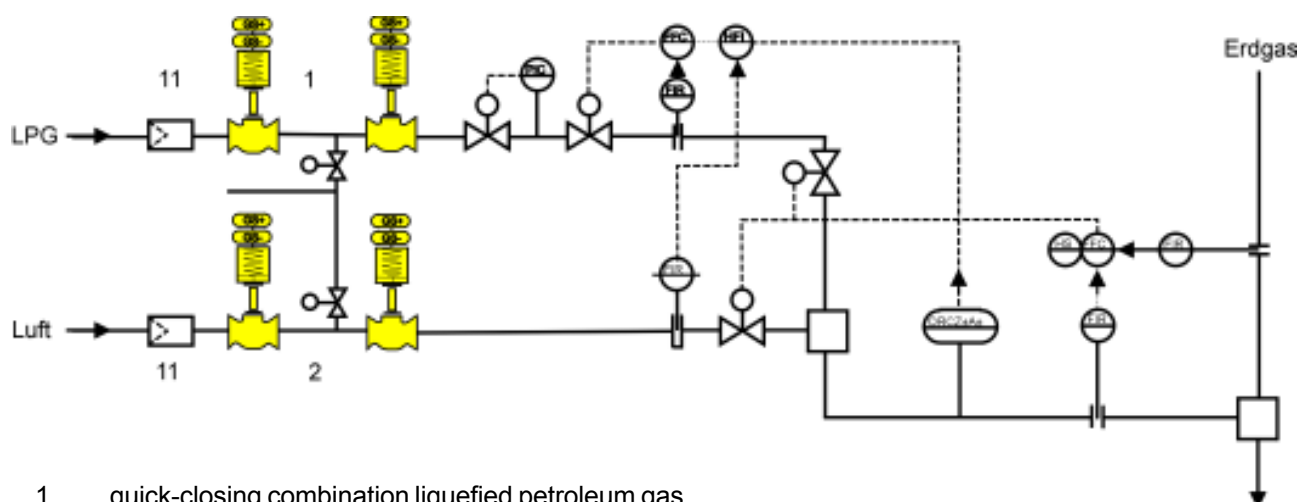
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Mixing skid with ZDM valve



- 1 quick-closing combination liquefied petroleum gas
- 2 quick-closing combination air
- 3 impulse adjustment
- 4 two-dimensional mixing valve **ZDM** with integrated, static mixing arrangement
- 5 flow control
- 6 quality revision
- 7 calorific value measuring instrument
- 8 Proportion control liquefied/air – natural gas
- 9 mixer
- 10 wobble index measuring instrument
- 11 strainer

Conventional mixing valve



- 1 quick-closing combination liquefied petroleum gas
- 2 quick-closing combination air
- 11 strainer

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Inspections and tests

- material and test certificates to EN 10 204-3.1.B for all Pressure bearing parts
- strength test to DIN 3230 / sec. 3
- gas tightness test to DIN 3230 /sec. 3 Leakage rate 1
- performance test acc. to specified operating data

The required tests can be conducted either by the manufacturer, the respective authorities of a surveyor commissioned by the customer. Test protocols are made and supplied together with the documents of delivery.

Installation and maintenance

The ZDM valve is to be installed vertically into the pipeline with valve actuation above. Before installation, the pipeline must be thoroughly blown free of dirt and contaminations. Strainer units with mesh size of 0.5 mm must be fitted directly at valve entry pipes to protect elastic sealing elements in the regulating piston from being damaged.

In case of gas safety valves installed in the gas supply lines, a strainer unit directly upstream of the valve is sufficient. The same requirements apply for installation of control lines to the positioners.

Venting connections must be installed free without constriction of cross-section.

For self-medium control with gas, venting connections must be led outside.

Putting into operation

Before leaving the factory, the ZDM valve is subjected to a strength and leakage test. The test results are registered in the test certificate. Specifications and operating data are on the type plate mounted on the valve.

After installation of the ZDM valve and connection of control and vent lines, a performance test should be conducted at pressureless conditions:

- positioners are to be adjusted over the range of regulation
- signalling of end position switches is to be checked and eventually re-adjusted

Attention

If a pressure test is conducted on the unit pipeline system above the ZDM valve, the following guidelines must definitely be observed:

1. Before applying pressure, move the ZDM valve to open position and then block at the valve stem.
2. Keep ZDM valve in open position during the entire pressure test in order to warrant pressure equalizing in the system.
3. After testing time has elapsed, the test pressure or system pressure in the ZDM valve must be relieved. Check using pressure control gauge.
4. Move ZDM valve to closed position at pressureless conditions.

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When putting out of operation, it must be warranted that no pressure is formed above the mixer which could overcome the frictional and closing spring forces and open the valve. This must eventually be safeguarded by a self-acting shut-off unit upstream of the mixer.

Maintenance

The ZDM valve construction is virtually maintenance-free owing to selection of special seals and stem guides.

Maintenance intervals are to be specified by the user, they are dependent on operating conditions, degree of contamination and environmental effects.

After a two-year period of operation, a check-out should be done by the manufacturer in order to warrant reliability of operation.



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Referenz-Liste

Kom. Nr. /Jahr (year)	Kunde (customer) Ort (place)	Anlage (installation) Standort (location)	Gas I (gas I) Gas II (gas II)	DN PN	Antrieb (actuator)	
					Art (type)	
8053/81	LOI, Essen	Stadtw. Bochum	LPG Luft	200/150/150 25 125/80/80 16	E E	P P
8183/82	LOI, Essen	LPG, Mülheim	Erdgas LPG	400/400/150 25	P	P
8251/82	LOI, Essen	Henrichshütte	Erdgas Luft	100/100/40 10	E	E
		Schott, Mainz	Erdgas Luft	50/50/25 10	E	E
		Kaper+Messing Langenberg	Erdgas Luft	150/150/65 10	E	E
9834/83	LOI, Essen	Ruhrgas, Dorsten	Erdgas Luft	150/150/50 16	E	E
9942/84	HKL Anlagenbau Ennepetal	Erlus Baustoffe Neufahrn	Propan Luft	125/80/80 16	E	P
1869/86	HKL Anlagenbau Ennepetal	Erlus Baustoffe Neufahrn	Propan Luft	125/80/80 16	E	P
1905/86	Stadtw. Bochum	LPG, Bochum	Propan Luft	200/150/150 16/40	E	P
1960/86	HKL Anlagenbau Ennepetal	Oberland-Glas Neuburg	Propan Luft	250/150/150 16	E	P
1987/86	BASF-Victor	BASF-Castrop	Erdgas Koksofengas	300/250/80 16	E	E
2179/86	Ruhrgas AG Dorsten	Stadtw. Mainz	Luft Erdgas	300/125/80 16	P	H
2499/87	HKL Anlagenbau Ennepetal	Stadtwerke Ludwigsburg	Propan Luft	200/125/125 16	E	P
3281/88	Diga GmbH Essen	Ruhrgas Dorsten	Butan Butan	50/50/50 25	E	E
3468/88	SMD, Bochum	Türkei	Butan Luft	200/150/80 10	P	P
3469/88	SMD, Bochum	Diehl Röthenbach	Butan Luft Erdgas Luft	250/200/150 10/16	P	P
3606/88	SMD, Bochum	Jugoslawien	Propan /Butan Luft	125/80/80 16	P	P
6115/91	Bergen-Diesel Norwegen	Gasmotoren- Prüfstand	Propan Luft	65/50/50 Armaturen- Station	E	P
3.9117/95	Schweißtechnik GmbH Walter Fulbe-Lübeck	BV Ceskyporcelan a. s. Dubi/Tsche	Erdgas Luft	125/80/65 16	P	P
3.9376/96	Ballweg GmbH Überlingen	Stadtwerke Itzehoe	Propan Luft	150/80/80 16 Armaturen- Station	P	P