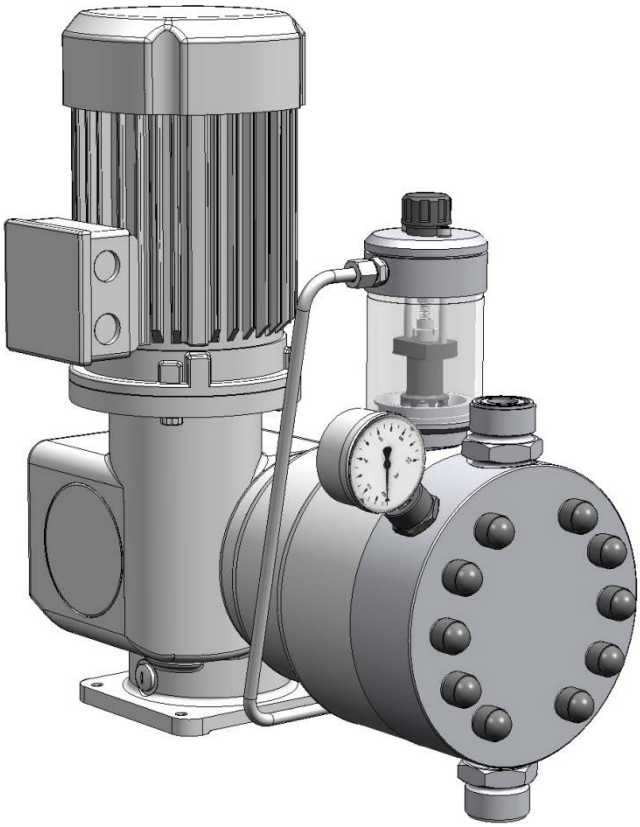
Product: **Piston diaphragm pump**

Type: **M… R… RF…**

...410.2 – 30 KM
...410.2 – 38 KM
...410.2 – 60 KM
...410.2 – 76 KM
...410.2 – 120 KM
...410.2 – 150 KM
...410.2 – 250 KM
...410.2 – 310 KM
...410.2 – 400 KM
...410.2 – 510 KM
...410.2 – 700 KM
...410.2 – 850 KM



Please state here the exact type and serial number of your pump. (can be read off the type plate on the pump)
Type:
Serial-No.:
These data are important in case of queries or for ordering spare and wearing parts and must absolutely be stated.

Manufacturer:

sera GmbH
sera-Straße 1
34376 Immenhausen
Germany
Tel.: +49 5673 999-00
Fax: +49 5673 999-01
www.sera-web.com
info@sera-web.com

CAUTION !

Keep the operating instructions for future application!

Table of contents:

1 General ... 4
2 Types ... 4
2.1 Type designation ... 4
2.2 Type plate ... 4
2.3 Materials ... 5
2.4 Viscosity, pumped medium ... 5
2.5 Dosing range ... 5
2.6 Noise measurement ... 5
3 Safety instructions ... 5
3.1 Quality instructions ... 5
3.2 Marking of notes ... 5
3.2.1 Marking of notes in these operating instructions ... 5
3.2.2 Marking of notes on the product ... 5
3.3 Personnel qualification and training ... 5
3.4 Dangers in case of inobservance of the safety instructions ... 5
3.5 Safety conscious working ... 6
3.6 Safety instructions for owner / operator ... 6
3.7 Safety instructions for maintenance, servicing and installation work ... 6
3.8 Arbitrary modification and production of spare parts 6
3.9 Improper operations ... 6
3.10 Intended use ... 6
3.11 Personal protection for maintenance and service ... 6
3.12 Utilities ... 6
4 Transport and intermediate storage ... 7
4.1 General ... 7
4.2 Transport ... 7
4.3 Storage ... 7
5 Assembly groups of the piston diaphragm pump ... 8
6 Technical Data ... 9
6.1 Dimensions ... 9
6.2 Performance data ... 11
6.3 Motor data ... 12
6.3.1 Motor data size 80 ... 12
6.3.2 Motor data size 90 ... 12
7 Functional description ... 13
7.1 General ... 13
7.2 Assembly groups of the piston diaphragm pumps . 13
7.2.1 Stroke mechanism ... 13
7.2.2 Stroke length adjustment ... 13
7.2.3 Assembly pump ... 15
7.2.4 Pump body ... 16
7.2.5 Suction-/Pressure valve ... 16
7.2.6 Stroke frequency transmitter (option) ... 17
7.2.7 Diaphragm rupture monitoring ... 18
7.3 Driving motor ... 19
7.3.1 Motor connection (standard) ... 19
7.3.2 Direction of rotation ... 19
7.3.3 Terminal box ... 19
7.3.4 Start-up ... 19
7.3.5 Motor protection ... 19
7.3.6 Maintenance of the drive motor ... 19
7.3.7 Restart ... 19
8 Installation ... 20
8.1 Installation instructions ... 20
8.1.1 Provide for an overpressure protection ... 21
8.1.2 Preventing a backflow of the pumped medium ... 22
8.1.3 Eliminating undesired siphoning ... 22
8.1.4 How to ensure suction free from air ... 23
8.1.5 Install the empty-tank alarm ... 23
8.1.6 How to avoid an emptying of the suction line ... 24
8.1.7 Line strainer ... 24
8.1.8 Suction via a siphon vessel ... 25
8.1.9 In case of easily degassing pumped media ... 25
8.1.10 Dosing of suspensions ... 26
8.1.11 Damping of the pulsation ... 26
9 Operation in explosion-hazardous areas ... 28
9.1 General ... 28
9.2 Identification ... 28
9.3 Installation ... 28
9.3.1 General ... 28
9.3.2 Working in explosion-hazardous areas ... 28
9.4 Potential equalization ... 28
9.5 Start-up ... 28
9.6 Operation ... 28
9.6.1 General ... 28
9.6.2 Degassing of the pumped medium ... 28
9.6.3 Temperature indications ... 28
9.7 Maintenance ... 28
10 Maintenance ... 29
10.1 Wearing parts ... 29
10.2 Spare parts ... 29
10.3 List of spare and wearing parts ... 30
10.3.1 Piston diaphragm pump ...410.2-...KM ... 30
10.4 Replacing the diaphragm ... 32
10.4.1 General ... 32
10.4.2 Piston diaphragm pump ... 32
10.4.3 Ventilation after diaphragm replacement ... 33
10.4.4 Setting the compensating valve ... 34
10.5 Oil change ... 37
11 Lubricants ... 37
11.1 Lubricant in stroke mechanism ... 37
11.2 Hydraulic fluid ... 38
12 Fault analysis and corrective action ... 38

13 Foreseeable misuse ... 40
13.1 Transport ... 40
13.2 Assembly and installation ... 40
13.3 Start-up ... 40
13.4 Operation ... 40
13.5 Maintenance/Repair ... 40
13.6 Cleaning ... 41
13.7 Shut-down ... 41
13.8 Disassembly ... 41
13.9 Disposal ... 41
14 Shut-down ... 41
15 Disposal ... 41
15.1 Dismantling and transport ... 41
15.2 Complete disposal ... 41

1 General

Before commissioning and during operation of the **sera** piston diaphragm pumps the respective regulations valid at the place of installation are to be adhered to.

The **sera** piston diaphragm pump is delivered ready for connection. Please read these instructions and especially the safety notes before you install and start up the pump.

2 Types

2.1 Type designation

Example:

Piston diaphragm pump, type **R 410.2 - 30 KM**

R	410.2	30	KM

Information for adjustment

M not controllable
R manually controllable (stroke length adjustment)
F with three phase AC motor, suitable for frequency converter operation

(**RF** combination possible!)

R	**410.2**	30	KM

Indication of model range/stroke mechanism

R	410.2	30	KM

Indication of nominal delivery rate

This number states the nominal delivery rate in litres/hour.
(standard version referring to water)

R	410.2	30	KM

Indication of the execution of the pump

KM Designed as piston diaphragm pump

2.2 Type plate

Each **sera** piston diaphragm pump is factory provided with a type plate. The following information can be found on this type plate.

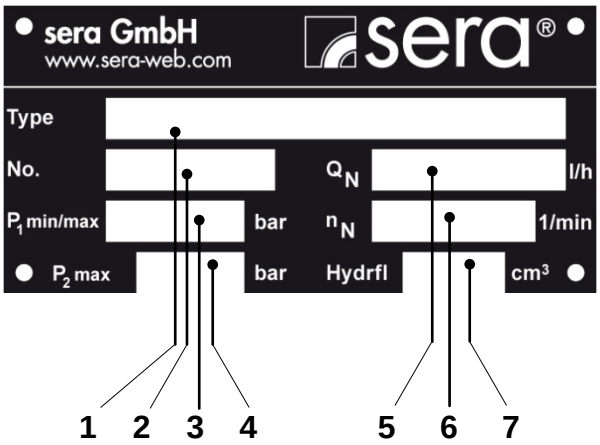


Fig. 01 Type plate

Explanation of the indications on the type plate		
1	Type	**Pump type**
2	No.	**Serial number of the pump**
3	P_1min/max [bar]	**Minimum/maximum permissible pressure in the pump inlet** Minimum/maximum permissible pressure in the inlet cross section which the pump is applicable for. Please consider that the pressure depends on rotation speed, delivery rate, temperature and static pressure at inlet.
4	P_2max [bar]	**Maximum permissible pressure in the pump outlet** Maximum permissible pressure in the outlet cross section which the pump is applicable for. Please consider that the pressure depends on rotation speed, delivery rate, temperature and static pressure at outlet.
5	Q_N l/h	**Nominal delivery rate** Delivery rate which the pump was ordered for, based on the nominal rotation speed n_N, the nominal delivery height $p_2$max. and the pumped medium stated in the supply contract.
6	n_N 1/min	**Nominal stroke frequency** Stroke frequency which the pump has been designed for
7	Hydrfl. [cm³]	**Hydraulic fluid** Quantity of Hydraulic fluid

Table 01 Designation type plate

2.3 Materials

The materials used are stated in the order confirmation and the product description.

2.4 Viscosity, pumped medium

The piston diaphragm pump is suitable for fluids with viscosities < 100 mPas.

2.5 Dosing range

The rate of delivery of the piston diaphragm pump can be set manually via the stroke length adjustment (0…100%).
The linear dosing range is between 20 and 100%.

2.6 Noise measurement

The sound pressure level measured according to DIN 45635 of the piston diaphragm pumps is between 60 and 70 dB (A).

3 Safety instructions

CAUTION !

If the pump is operated in explosion-hazardous areas the instructions given in chapter 9 are to be observed!

3.1 Quality instructions

Observance of these operating instructions and, in particular, the safety instructions, helps to

- avoid dangers to persons, machines and environment
- increase reliability and service life of the pump and the complete system
- reduce repair cost and downtime

The **sera** quality management and quality assurance system for pumps, systems, valves and fittings and compressors is certified according to ISO 9001:2008.
The **sera** piston diaphragm pump meets the valid safety and accident prevention regulations.

CAUTION !

Always keep these operating instructions within reach at the place of installation.

CAUTION !

Pay attention to the safety data sheet of the pumped medium! The owner must take corresponding accident prevention measures to protect operating personnel from danger through the delivery media used!

3.2 Marking of notes

3.2.1 Marking of notes in these operating instructions

Special notes in these operating instructions are marked with the general danger symbol

(safety symbol in compliance with DIN 4844 – W9)

The safety sign appears in the following cases:

- If improper observance or non-observance of the operating manual, work instructions, specified operating procedures and similar can lead to personal injury or accidents.
- If improper observance or non-observance of the operating manual, work instructions, specified operating procedures and similar can lead to damage to property.
- Due to danger of causticization personnel must wear protective clothing (safety goggles, safety gloves and safety apron) for maintenance and repair work on parts which come into contact with hazardous products or for changing the containers.

3.2.2 Marking of notes on the product

Information signs which are directly attached to the pump, e.g. arrows of direction of rotation or signs for fluid connections are to be observed and kept in legible condition.

3.3 Personnel qualification and training

The personnel for operation, maintenance, inspection and installation must be suitably qualified for their tasks. The owner must clearly define responsibility and supervision of the personnel. If the personnel do not have the knowledge required, then personnel is to be trained and instructed correspondingly. Such training can be provided by the manufacturer / supplier upon order of the owner. In addition, the owner has to ensure that personnel have understood the operating instructions completely.

3.4 Dangers in case of inobservance of the safety instructions

Inobservance of these safety instructions can result in danger to persons, hazards to the environment and damage to the pump.

Inobservance of the safety instructions may lead to:

- Failure of important functions of the pump/system
- Inobservance of prescribed methods for maintenance and servicing
- Danger to persons through electrical, mechanical and chemical influences
- Hazards to the environment through leaking dangerous media

3.5 Safety conscious working

The safety instructions specified in this operating manual, the national regulations for accident prevention, the safety regulations for the pumped medium valid at the place of installation as well as internal working-, operating-, and safety instructions of the owner are to be observed.

3.6 Safety instructions for owner / operator

Leaking hazardous delivery media and operating supplies are to be disposed off in such a way that any danger to persons and the environment is excluded. The legal regulations are to be observed.

Danger caused by electrical energy is to be avoided.

3.7 Safety instructions for maintenance, servicing and installation work

The owner must ensure that any maintenance-, servicing- and installation work is only entrusted to authorized and suitably qualified personnel who have carefully read and understood the operating instructions.

Only those spare parts and operating supplies are to be used which meet the requirements of the specified operating conditions.

Threaded joints and connections may only be disconnected when the system is not under pressure.

3.8 Arbitrary modification and production of spare parts

Modifications of or changements to the pump are only permitted after previous agreement of the manufacturer. Original spare parts and accessories which were approved by the manufacturer are essential for safety reasons.

CAUTION !

If the pumps (e.g. drive motor) are modified without authorization of the manufacturer or spare parts are used which are not approved, any warranty claim becomes null and void.

3.9 Improper operations

Operating safety of the supplied piston diaphgram pump is only guaranteed if the product is used as intended, according to the descriptions in Chapter 3.10 of these operating instructions.

3.10 Intended use

The **sera** – diaphragm pump is only to be deployed according to the intended purpose stated in the product description and the acceptance test certificate.

If the piston diaphragm pump is to be used for other applications, then the suitability of the pump for the new operating conditions must be discussed with **sera** beforehand!

Criteria for operation of the piston diaphragm pump
in accordance with the intended use

- Observe characteristics of the pumped medium (please see safety- and product data sheet of the delivery medium – the safety data sheet is to be provided by the supplier / owner of the pumped medium)
- Resistance of the materials which come into contact with the pumped medium
- Operating conditions at the place of installation
- Pressure and temperature of the pumped medium
- Voltage supply

3.11 Personal protection for maintenance and service

In order to avoid risks to health, the provisions of the German Ordinance on Hazardous Substances (GefStoffV) (§14 Safety Data Shee) and relevant national safety regulations for the pumped medium must strictly be adhered to.

In case of accidents check whether the following substances are emitted:

- Leaking fluids
- Leaking vapours
- Noise emissions (sound level)

Emissions are to be monitored by corresponding controly systems of the total installation.

CAUTION !

Wear protective clothing, gloves, breathing mask and a face protecting mask.

CAUTION !

Personal protective equipment must be provided by the owner!

3.12 Utilities

If not agreed otherwise in the contract conditions, the **sera** - piston diaphragm pump will always be supplied with the necessary utilities.
(For type and quantitiy of utilities/lubricants, see Chapter 11)

4 Transport and intermediate storage

4.1 General

sera – products are checked for perfect condition and function previous to shipment.
Check for transport damage immediately after arrival of goods. If damage is found, this is to be reported immediately to the responsible carrier and the manufacturer.

CAUTION !

The packaging material must be disposed of appropriately!

4.2 Transport

Select a hoist which is adapted to the weight of the pump and attach it to the motor flange of the pump (see Fig. 02).

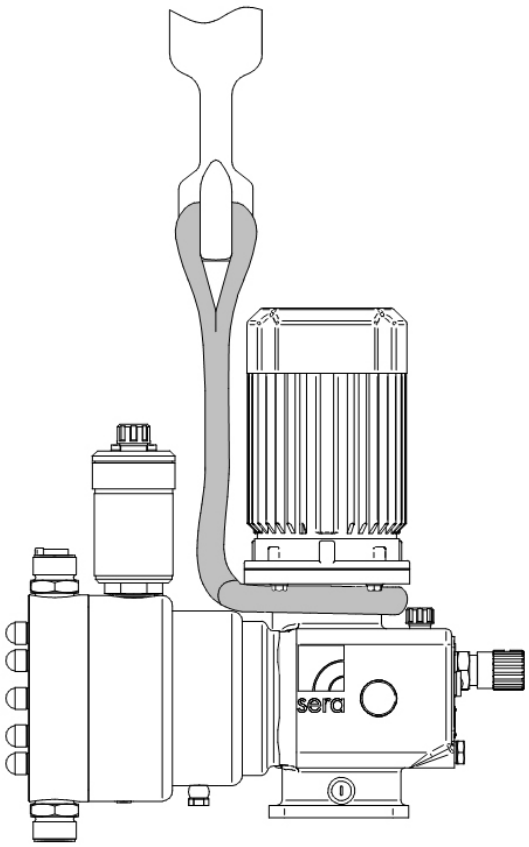


Fig. 02 Transport/Handling

4.3 Storage

An undamaged packaging protects the unit during storage and should only be opened when the piston diaphragm pump is installed.

Proper storage increases the service life of the piston disphragm pump and includes prevention of negative influences such as heat, moisture, dust, chemicals etc.

The following storage specifications are to be obsered:

- Storage place: cool, dry, dustfree and slightly ventilated
- Storage temperature between +2°C and +40°C
- Relative air humidity not more than 50 %.
- The maximum storage time for the standard system is 12 months.

If these values are exceeded, metal products should be sealed in foil and protected from condensation water with a suitable desiccant.

Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar in the storage room.

5 Assembly groups of the piston diaphragm pump

The piston diaphragm pump may be assembled of the following (main) components:

- Stroke mechanism with drive
- Stroke length adjustment
- Assembly pump
- Pump body
- Valves

Optional accessories:

- Stroke frequency transmitter
- Actuator

nicht dargestellt:

- Actuator for explosion-hazardous area
- EExeIIT4 - motor
- Drive motor with frequency converter

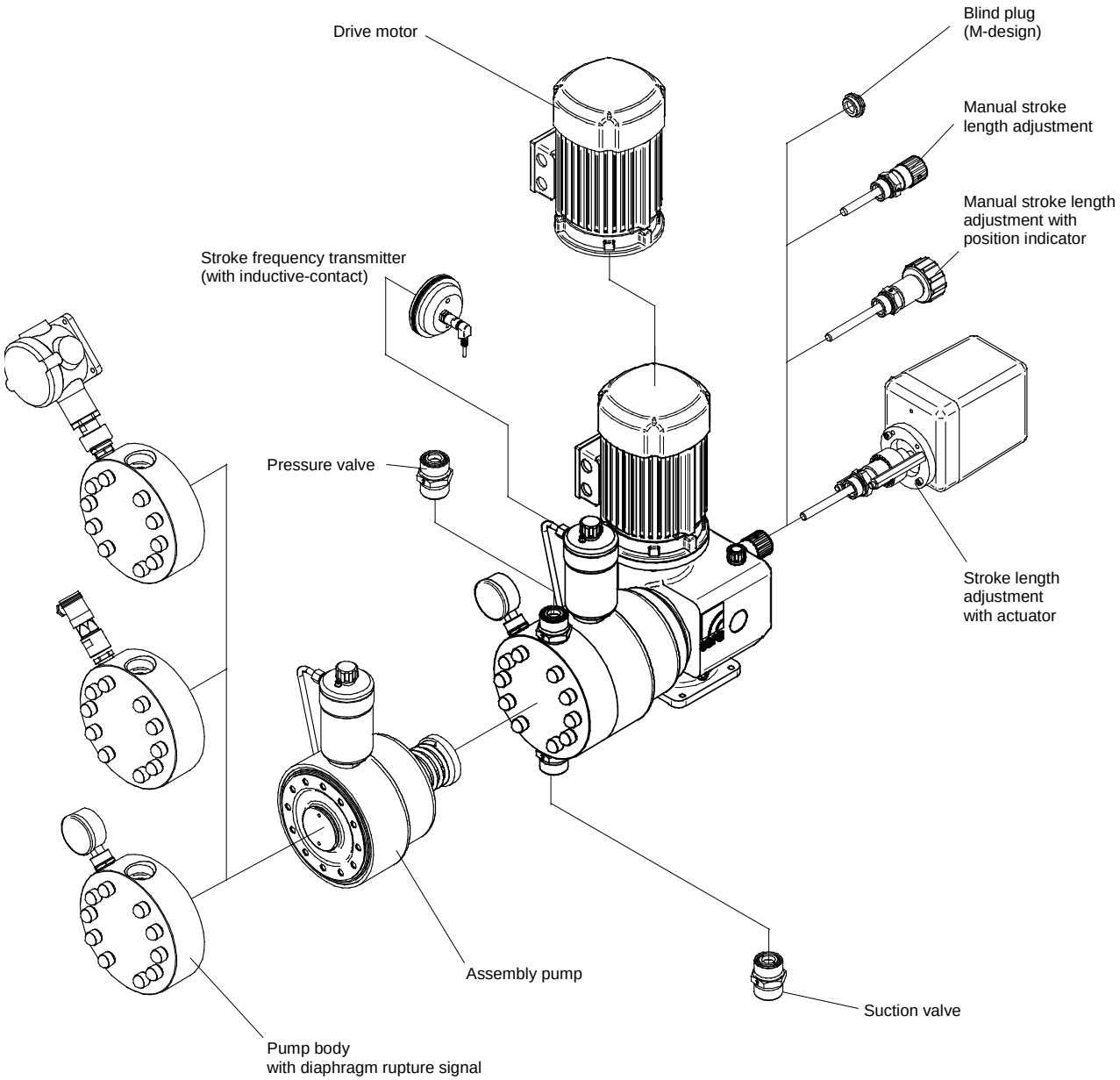


Fig. 03 Overview of assemblies

6 Technical Data

6.1 Dimensions

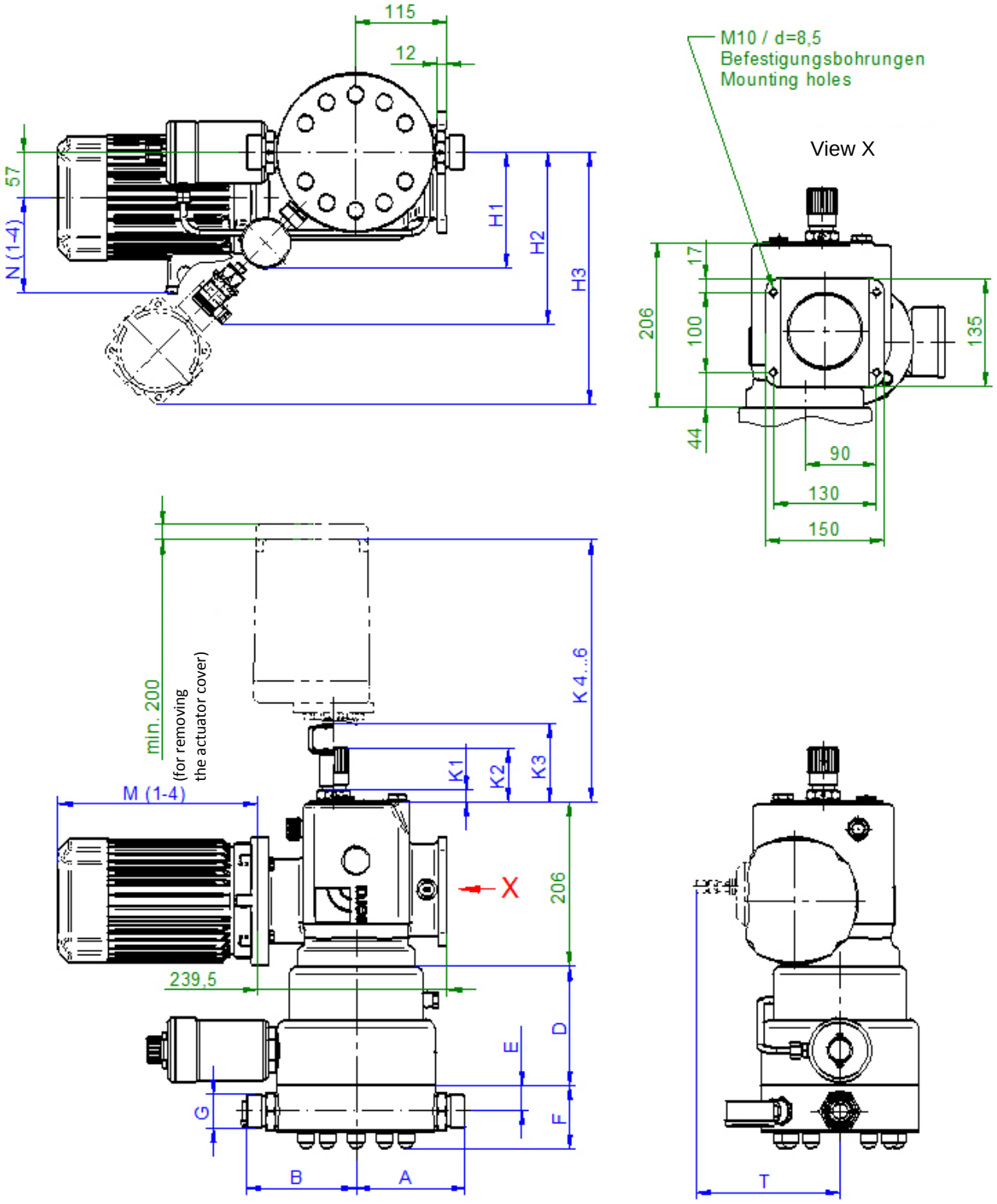


Fig. 04 Dimensions

Tab. 02
Dimensions

All dimensions in mm!

			Pump type (KM, Piston Diaphragm pump)																	
			R 410.2 - 30 KM	R 410.2 - 38 KM	R 410.2 - 60 KM	R 410.2 - 76 KM	R 410.2 - 120 KM		R 410.2 - 150 KM		R 410.2 - 250 KM		R 410.2 - 310 KM		R 410.2 - 400 KM		R 410.2 - 510 KM		R 410.2 - 700 KM	R 410.2 - 850 KM
Valves	G	Screw-in thread Suction-/pressure valve	G¾	G¾	G¾	G¾	G1¼	G1	G1¼	G1	G1¼	G1	G1¼	G1	G1¼	G1	G1¼	G1	G1¼	G1¼
	DN	Nominal diameter	8	8	8	8	20	15	20	15	20	15	20	15	20	15	20	15	20	20
	A	Single valves PVC-U	97	97	97	97	---	132	---	132	---	132	---	132	---	132	---	132	172	172
		Single valves 1.4571/1.4581	---	---	---	---	138	---	138	---	138	---	138	---	138	---	138	---	162	162
		Double valves 1.4571/1.4581	95	95	95	95	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Single valves PP- FRP, PVDF- FRP	---	---	94	94	138	---	138	---	138	---	138	---	138	---	138	---	162	162
		Double valves PP- FRP, PVDF- FRP	94	94	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	B	Single valves PVC	104	104	104	104	---	151	---	151	---	151	---	151	---	151	---	151	192	192
		Single valves 1.4571/1.4581	---	---	---	---	138	---	138	---	138	---	138	---	138	---	138	---	162	162
		Double valves 1.4571/1.4581	95	95	95	95	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Single valves PP- FRP, PVDF- FRP	---	---	94	94	138	---	138	---	138	---	138	---	138	---	138	---	162	162
		Double valves PP- FRP, PVDF- FRP	94	94	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	D	Assembly pump	143	143	143	143	149		149		149		149		149		149		157	157
Pump body (PK)	E	Centre screw-in thread of valves	27	27	27	27	44		44		44		44		44		44		49	49
	F	PK special steel (without front plate)	58	58	58	58	80		80		80		80		80		80		96	96
		PK plastic (with front plate)	67	67	67	67	99		99		99		99		99		99		117	117
	H_1	MBE Manometer	141	141	141	141	163		163		163		163		163		163		179	179
	H_2	MBE Pressure switch	92	92	92	92	112		112		112		112		112		112		138	138
	H_3	MBE Pressure switch (Ex)	155	155	155	155	172		172		172		172		172		172		200	200
Stroke length adjustment (HLV)	K_1	Blind flange for execution without HLV	14	14	14	14	14		14		14		14		14		14		14	14
	K_2	Manual stroke length adjustment (max.)	79	79	79	79	79		79		79		79		79		79		100	100
	K_3	Manual HLV with position indicator	110	110	110	110	110		110		110		110		110		110		115	115
	K_4	Electric servo motor	260	260	260	260	260		260		260		260		260		260		260	260
	K_5	Electric servo motor with PMR3	340	340	340	340	340		340		340		340		340		340		340	340
	K_6	Electric servo motor, explosion-hazardous des.	430	430	430	430	430		430		430		430		430		430		430	430
Drive motor	M_1	Standard motor	255	255	255	255	295		295		295		295		295		295		295	295
	N_1		135	135	135	135	145		145		145		145		145		145		145	145
	M_2	Motor for frequency converter operation	255	255	295	295	295		295		295		295		295		295		295	295
	N_2		135	135	145	145	145		145		145		145		145		145		145	145
	M_3	AC motor	257	257	257	257	341		341		341		341		341		341		341	341
	N_3		120	120	120	120	127		127		127		127		127		127		127	127
	M_4	EExeIIT4 - motor	209	209	247	247	247		247		247		247		247		247		247	247
	N_4		142	142	142	142	142		142		142		142		142		142		142	142
Option	T	Stroke frequency transmitter	181	181	181	181	181		181		181		181		181		181		181	181
Stroke mechanism		Amongst others dimensions for fastening the pump	See Fig. 04																	

6.2 Performance data

Type	Nominal capacity [2] adjustable by changing lift of strokes		Maximum permissible pressure in the pump outlet	Min./max. permissible pressure in the pump inlet	Max. suction height	Inlet / outlet nominal width	Nominal stroke frequency	
	Q_N l/h		p_2 max.	p_1 min. / max.	WC	DN	min $^{-1}$	
	50 Hz	60 Hz	bar	bar	m	mm	50 Hz	60 Hz
...410.2 – 30 KM	0-30	0-36	10 [3] / 80	-0,2/0	2	8	76	92
...410.2 – 38 KM	0-38	0-45	10 [3] / 80	-0,2/0	2	8	97	116
...410.2 – 60 KM	0-60	0-72	10 [3] / 70	-0,2/0	2	8	76	92
...410.2 – 76 KM	0-76	0-90	10 [3] / 70	-0,2/0	2	15	97	116
...410.2 – 120 KM	0-120	0-144	10 [3] / 40	-0,3/0	3	15	76	92
...410.2 – 150 KM	0-150	0-180	10 [3] / 40	-0,3/0	3	15	97	116
...410.2 – 250 KM	0-250	0-300	10 [3] / 20	-0,3/0	3	15	76	92
...410.2 – 310 KM	0-310	0-372	10 [3] / 20	-0,3/0	3	15	97	116
...410.2 – 400 KM	0-400	0-480	10 [3] / 14	-0,3/0	3	15	76	92
...410.2 – 510 KM	0-510	---	10 [3] / 14	-0,3/0	3	15	97	116
...410.2 – 700 KM	0-700	---	10 [3] / 11	-0,3/0	3	20	97	116
...410.2 – 850 KM	0-850	0-1020	8	-0,3/0	3	20	76	92

Tab. 03 Output data

[1] Achievable height with media similar to water and filled suction line
[2] Linear dosing range between 20 and 100% stroke length
[3] Maximum pressure for pump bodies made of plastics

6.3 Motor data

6.3.1 Motor data size 80

Motor type	Motor data								
	Power	Motor speed		Mains frequency	Voltage range	Rated current	Protection rating	Thermal class	ATEX design
	[kW]	[min^{-1}]		[Hz]	[Volt]	[A]	[IP]		
		50 Hz	60 Hz		50 Hz / 60 Hz	50 Hz / 60 Hz			
Standard motor	0,75	~1400	~1700	50/60	**PAY ATTENTION TO THE TYPE PLATE !** The data can be read off the type plate on the drive motor of the respective diaphragm pump !		55	F	---
Motor for FU-operation	0,75	~1400	~1700	50/60			55	F	---
AC motor	0,75	~1500	---	50			55	F	---
EExeIIT4- motor	0,55	~1400	---	50			55	F	II2G EExe IIT4
EExdeIIT4-motor (flameproof enclosure)	0,75	~1400	---	50			55	F	II2G EExde IIT4

Tab. 04 Motor data (R410.2-30KM until R410.2-76KM, size 80)

6.3.2 Motor data size 90

Motor type	Motor data								
	Power	Motor speed		Mains frequency	Voltage range	Rated current	Protection rating	Thermal class	ATEX design
	[kW]	[min^{-1}]		[Hz]	[Volt]	[A]	[IP]		
		50 Hz	60 Hz		50 Hz / 60 Hz	50 Hz / 60 Hz			
Standard motor	1,5	~1400	~1700	50/60	**PAY ATTENTION TO THE TYPE PLATE !** The data can be read off the type plate on the drive motor of the respective diaphragm pump !		55	F	---
Motor for FU-operation	1,1	~1400	~1700	50/60			55	F	---
AC motor	0,75	~1500	---	50			55	F	---
EExeIIT4- motor	1,1	~1400	---	50			55	F	II2G EExe IIT4
EExdeIIT4-motor (flameproof enclosure)	1,1	~1400	---	50			55	F	II2G EExde IIT4

Tab. 05 Motor data (R410.2-120KM until R410.2-850KM. size 90)

7 Functional description

7.1 General

sera - piston diaphragm pumps are run-dry safe oscillating displacement pumps that are characterised by high tightness of the dosing head. The fluid is conveyed by a deformable elastic diaphragm.

Piston diaphragm pumps consist of the following (main) components:

- Drive motor
- Stroke mechanism
- Stroke length adjustment
- Assembly pump
- Pump body
- Suction and Pressure valve

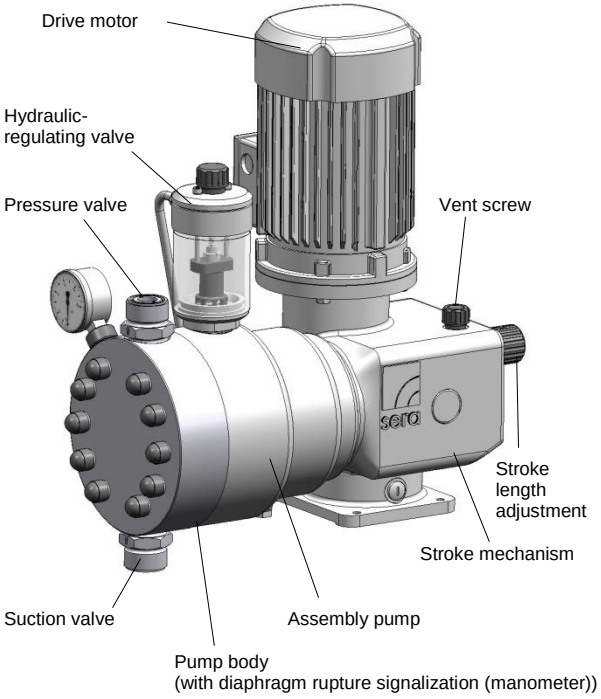


Fig. 05 Assembly groups

7.2 Assembly groups of the piston diaphragm pumps

7.2.1 Stroke mechanism

Function

Piston diaphragm pumps of this type series use a rotary cam drive to transmit the rotation of the drive motor to the displacement body.
In case of the rotary cam drive, the eccentric provides the pressure stroke while the suction stroke is performed by a pressure spring (return spring).
The effective stroke length can be changed by means of an adjustable scale knob which prevents the connecting rod from following the rotary cam up to the rear dead centre during suction stroke (see stroke length adjustment).

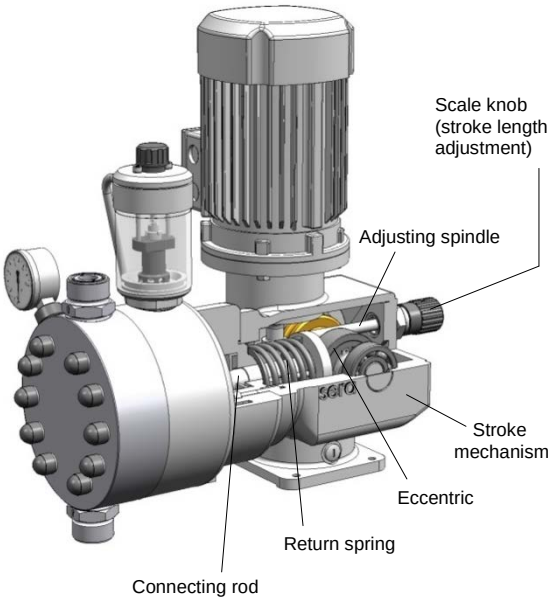


Fig. 06 Stroke mechanism

7.2.2 Stroke length adjustment

General

The delivery rate of the pump is set by changing the stroke length. The stroke length is infinitely variable between 20% and 100%.
A linear dosing behaviour is achieved with stroke length adjustments between 20% and 100%.

7.2.2.1 Manual stroke length adjustment (standard)

The effective stroke length of the connecting rod is changed by turning the scale knob.
The stroke length can be adjusted both during operation and standstill of the pump (depressurized condition).
The set stroke length can be read off a scale, e.g. 75% (see Fig. 07).
With the 20-steps adjustment on the scale knob, the stroke length can be set individually with a tolerance of 0.5%.

Turning counter-clockwise (see Figb. 07) ➔ the effective stroke length increases, the delivery rate increases.

Turning clockwise ➔ the effective stroke length decreases, the delivery rate decreases.

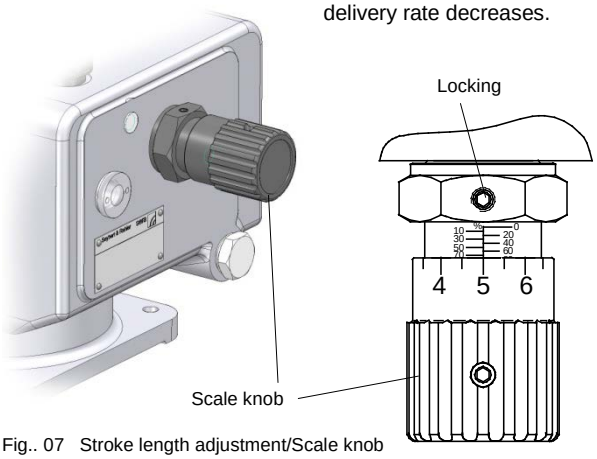


Fig.. 07 Stroke length adjustment/Scale knob

CAUTION !

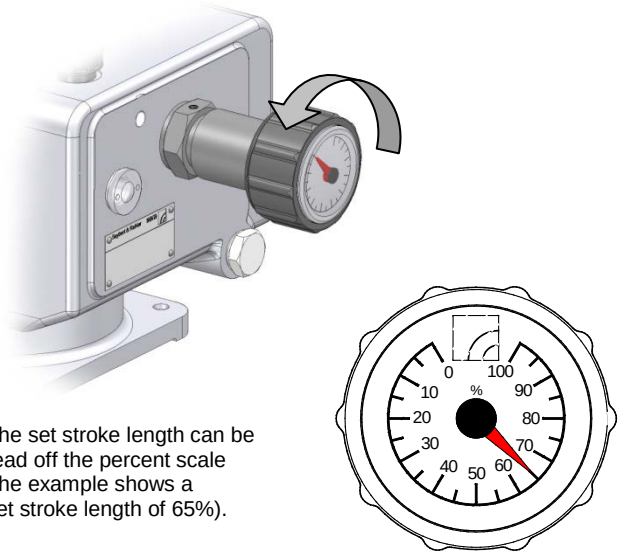
**The locking (see Fig. 07 and 09) is to be released (using a spanner SW3) before the stroke length is changed.
Then the locking must be tightened again. This ensures that the set stroke length does not change during operation.**

7.2.2.2 Manual stroke length adjustment by a dial scale with indication of percent

The stroke length is adjusted by turning the hand wheel. The stroke length can be adjusted both during operation and standstill (in unpressurized condition) of the pump.

Turning counter-clockwise (see Fig. 08) ➔ the effective stroke length increases, the delivery rate increases.

Drehen im Uhrzeigersinn ➔ the effective stroke length decreases, the delivery rate decreases.



The set stroke length can be read off the percent scale (the example shows a set stroke length of 65%).

Fig. 08 Stroke length adjustment with position indicator

In delivery state, the stroke length adjustment is factory set to 50%.

CAUTION !

**The dial scale with indication of percent may become misadjusted during transport.
If the indicator does not match the 50% setting, then the percent scale must be re-adjusted during operation (!) of the pump!**

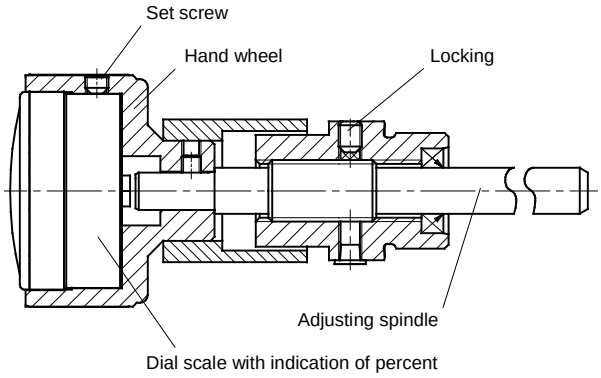


Fig. 09 Stroke length adjustment with position indicator

Adjusting the percent scale:

- Switch on the piston diaphragm pump
- Loosen setscrew
- Remove percent scale from the hand wheel
- Manually turn the percent scale to 0% setting
- Loosen the locking
- Use the hand wheel to set the stroke length to 0%. Turn hand wheel clockwise until there is no further stroke movement (connecting rod does no longer hit the adjusting spindle)
- Insert percent scale again
- Use the setscrew to secure the percent scale to the hand wheel
- Adjust desired stroke length
- Tighten the locking

7.2.2.3 Automatic stroke length adjustment by means of an electrical actuator

The electrical actuator is directly mounted to the stroke mechanism of the dosing pump. A clutch transmits the rotary motion of the actuator drive shaft to the adjusting spindle. The axial displacement is compensated in the clutch.

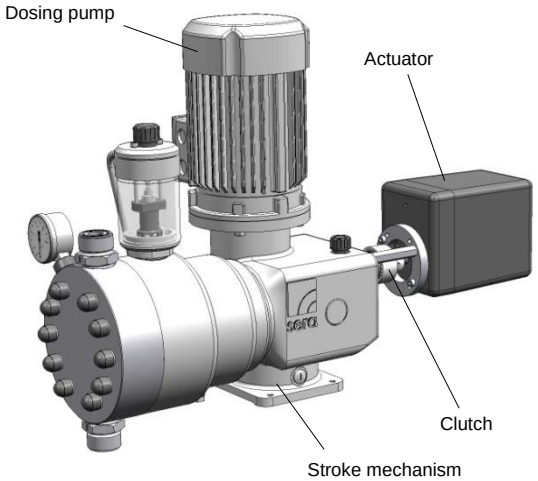


Fig. 10 Stroke length adjustment by electrical actuator

In case of dosing pumps with electrical actuator, a manual adjustment of the stroke length on the pump is no longer possible.
(Exception: actuator with hand wheel)

The actuator is equipped with two integrated limit switches as well as a position potentiometer for position feedback as standard.
Both limit switches are factory set so that the drive will switch off at a stroke length of 0% and 100%, even if a control voltage is applied.
This guarantees that adjustments can only be made within the permissible range. The position potentiometer is driven by a safety clutch which prevents damage caused by incorrectly adjusted limit switches.
Activation is performed by appropriate control units
(see **sera** - accessories)
The set stroke length can be read off on the pump (percent scale).
Information on the electrical connection is given inside the cover of the actuator.

CAUTION !

The adjustment is only possible when the pump is running.

7.2.2.4 Automatic stroke length adjustment by means of an electrical actuator with integrated positioner (PMR3)

same as Chapter 7.2.2.3, additionally:

- PMR3 positioner

This PMR3 positioner which is integrated in the actuator allows an actuator setting from 0…100% that is proportional to the connected input signal.
As an option, the actuator can also be provided with a collective fault signal.
Information on the electrical connection is given inside the cover of the actuator.

7.2.2.5 Automatic stroke length adjustment by means of an electrical actuator (Ex-design)

Pay attention to the documents attached to the actuator.

7.2.3 Assembly pump

Function

The stroke movement of the mechanically linked piston is transferred hydromechanically to the intermediate diaphragm and thus to the pumped medium.
The multi-layer diaphragm touches the spherical cap (pump body or diaphragm ring) when the pressure stroke finishes in the front dead centre.
The compensating valve ensures an optimum quantity of hydraulic fluid between diaphragm and piston.
The so-called blow valve and the hydraulic discharge valve are the most important components of the compensating valve. Both valves are spring-loaded and can be adjusted according to the operating conditions (see Chapter 10.4.4.).
Minimum quantities of fluid may leak on the piston which are compensated for by the adjustable blow valve at each suction stroke.
The leaking fluids are returned to the store tank via a return pipe (see Fig. 12).

CAUTION !

During the operation the pump`s hydraulic fluid may change the color. This will not affect the life time respectively the safety of the pump.

Thus, the system is closed and no more hydraulic fluid may leak out; during normal operation there is no need to replenish hydraulic fluid.
The blow valve always sucks in a greater quantity of hydraulic fluid than is leaking out at the piston during each suction stroke.
The excess quantity is returned into the store tank via the hydraulic discharge valve at the end of a pressure stroke when the diaphragm touches the calotte.

If a stop valve is closed in the pressure pipe during operation of the pump, the complete stroke volume of hydraulic fluid is returned into the store tank to protect the pump from overload.
If the pressure in the pressure pipe falls below the set pressure of the hydraulic discharge valve, the blow valve sucks in hydraulic fluid until the optimum volume has been reached.
This process can take up to several minutes, depending on the operating conditions.

Blow- and hydraulic discharge valve are set to the pressure specified in the order confirmation before shipment.

CAUTION !

The hydraulic discharge valve is not a safety valve according to the pressure equipment directive 97/23EC.

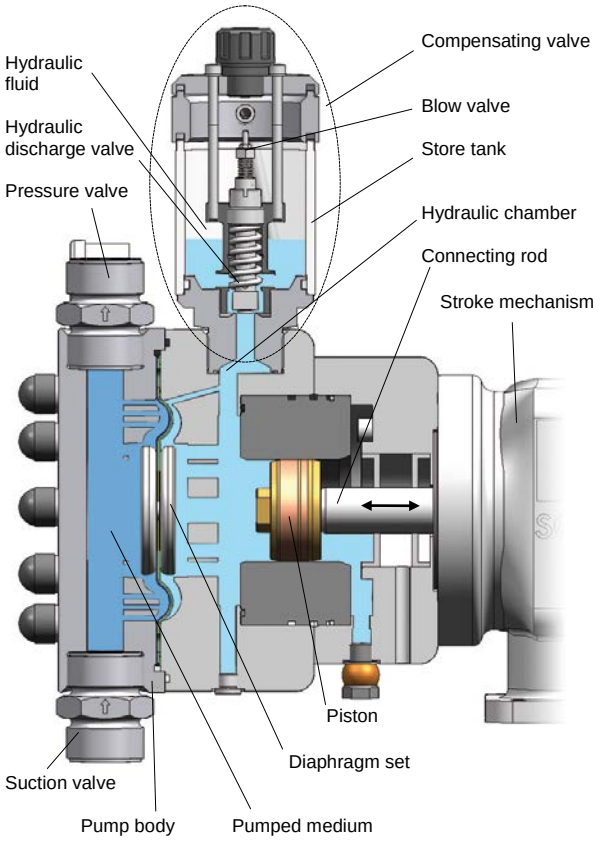


Fig. 11 Functional principle of the piston diaphragm pump

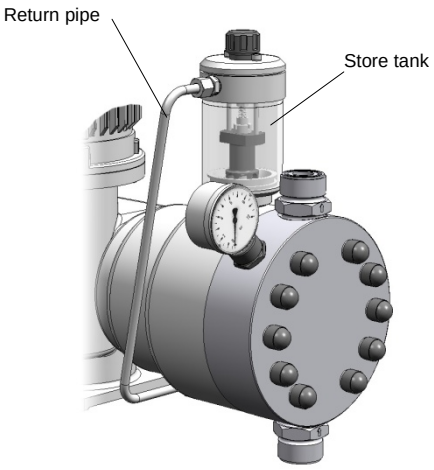


Fig.12 Return pipe

7.2.4 Pump body

Depending on the applied counterpressure, movements of the plastic pump body in elastic materials are possible.

This does not affect the pumps's durability or operating safety

7.2.5 Suction-/Pressure valve

The pump valves are ball valves that only work properly in a vertical position. The condition of the valves has a deciding effect on the operating capability of the pump.
Valves must be exchanged as complete units.

When replacing the valves it is important to check the flow direction (see Fig. 14).

CAUTION!

Pressure valve above; Suction valve below !

7.2.3.1 Multi-layer Diaphragm

The multi-layer diaphragm consists of a package of a total of three individual diaphragms.

- Working diaphragm
- Signal diaphragm
- Protection diaphragm

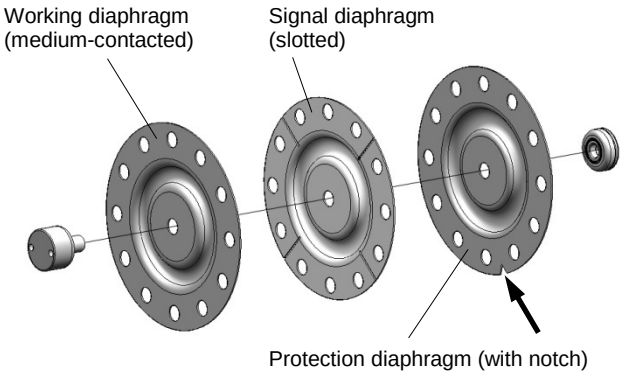


Fig. 13 Assembly of multi-layer diaphragm

The notch of the protection diaphragm indicates the correct mounting position changing the diaphragm set (see Chapter. 10.4)

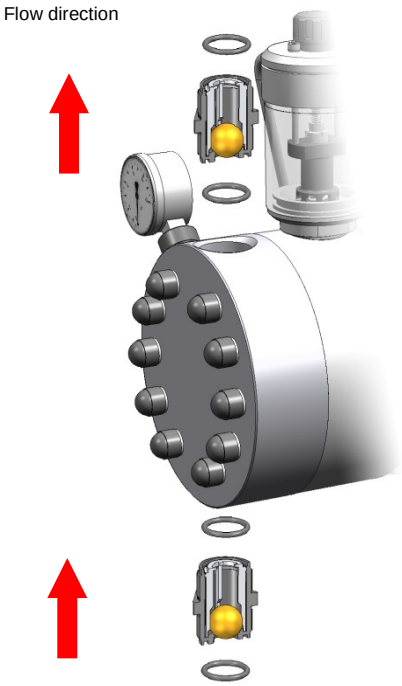


Fig. 14 Mounting position of valves, flow direction

7.2.6 Stroke frequency transmitter (option)

sera – dosing pumps are oscillating displacement pumps with an exactly defined stroke volume per each pump stroke.

If these dosing pumps should be used for automatic filling processes or charge dosing, then the single pump strokes must be determined and converted into electrical signals.

For this purpose, a stroke frequency transmitter (inductive contactor) is added to the pump and reports each single pump stroke to the evaluation unit (e.g. preselection counter, SPC-control unit, etc.)

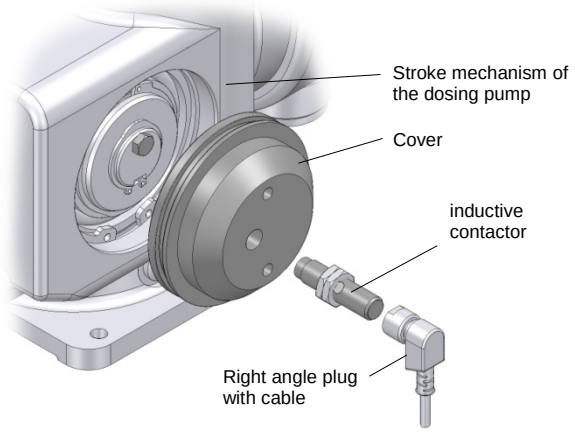
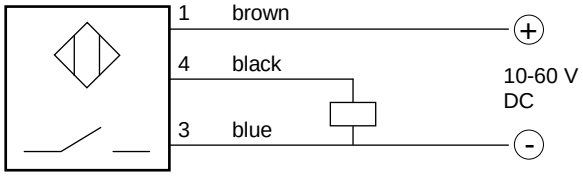


Fig. 15 Stroke frequency transmitter

Technical data

Rated voltage:	10 - 60 V DC
Constant current:	< 200 mA
short circuit-proof	
Connection mode:	plug connector with 2 m cable
LED (green):	indicates supply voltage
LED (yellow):	indicates switching status

Wiring diagram



CAUTION !

When switching inductive loads (protectors, relays, etc.), surge protectors (varistors) must be fitted owing to the high self-induction voltage.

CAUTION !

When the pump is deployed in exlosion-hazardous areas a NAMUR type stoke frequency transmitter (II2G EExia IICT6, gem. ATEX95) is to be provided.

7.2.7 Diaphragm rupture monitoring

sera piston diaphragm pumps of the 409.2 series are equipped with a diaphragm rupture monitoring.

CAUTION!

For more detailed information about the indicators of the diaphragm rupture monitoring, please see Kap. 15!

7.2.7.1 Visual diaphragm rupture monitoring by manometer (only local signalling)

In case of a rupture of the working diaphragm, the medium under pressure flows through a bore in the pump body to the signalling manometer and causes a pointer deflection.

- Switch off the pump immediately
- Replace the diaphragm

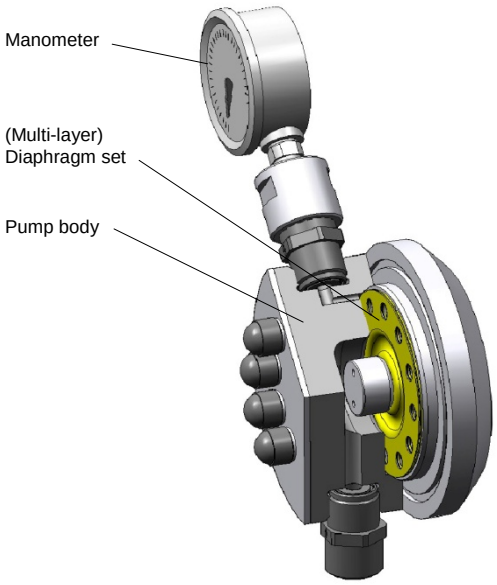


Fig.16 Diaphragm rupture monitoring by manometer

CAUTION!

If the pump is operated with a backpressure that is only slightly higher than the permissible minimum pressure of p_2=1bar, then the deflection of the pointer on the manometer will also be slight!

During normal operation with intact membrane, the manometer shows 0 bar.

7.2.7.2 Diaphragm rupture monitoring by Pressure switch

In case of a rupture of the working diaphragm, a pressure is generated on the pressure switch. The present signal must be evaluated and further processed in such a way that the pump is switched off instantly

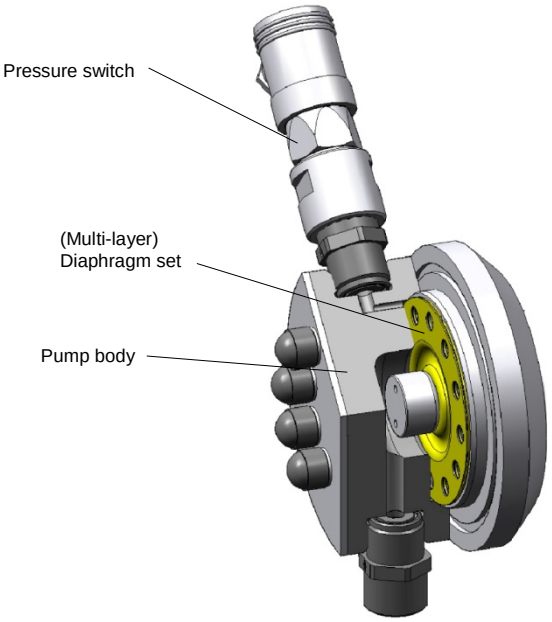


Fig. 17 Diaphragm rupture monitoring by pressure switch

7.2.7.3 Diaphragm rupture monitoring by Pressure switch (Ex-Area)

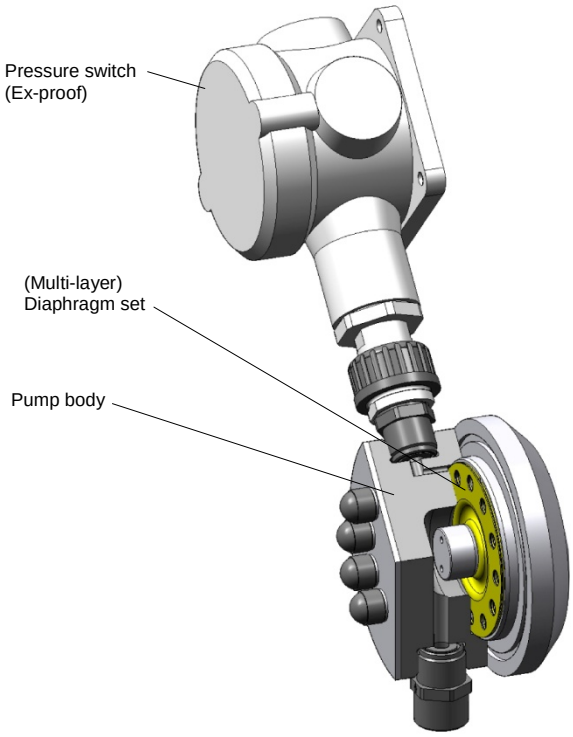


Fig.18 Diaphragm rupture monitoring by pressure switch (Ex)

CAUTION!

The pressure switch is factory set to a switching pressure of ≤ 1bar. For this reason and in order to guarantee a correct dosing function, the pump should always be operated with a pressure of ≥ 1bar!

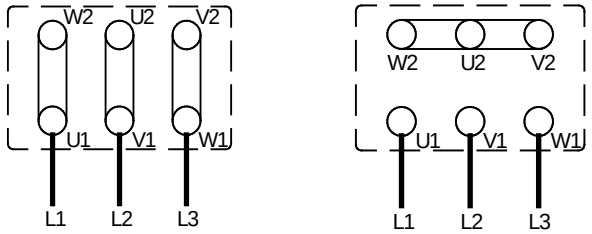
7.3 Driving motor

sera - piston diaphragm pumps are driven either by a three-phase motor or an AC motor.

7.3.1 Motor connection (standard)

In case of a three-phase motor

The motor connection depends on the voltage indication on the type plate and the applied supply voltage.



△ Delta connection Y Star connection

Fig. 19 Circuit diagram(s) three-phase motor

Example:

Indication on the type plate:	230/400 V
Three-phase power system on site:	400 V
Correct motor connection:	Y Star connection

In case of an AC motor

The AC motor has a main and an auxiliary winding. The running capacitor is switched in series to the auxiliary phase.

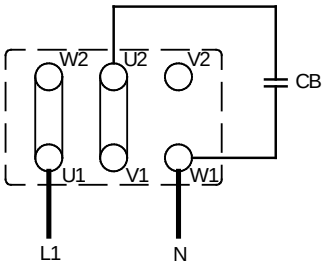


Fig. 20 Circuit diagram AC-motor

7.3.2 Direction of rotation

The direction of rotation of the drive motor is arbitrary.

7.3.3 Terminal box

Before closing the terminal box, please check that:

- all terminal connections are tightly fitted
- the interior is clean and free of foreign bodies
- unused cable entries are closed and screw plugs are tightened
- the sealing is correctly inserted in the cover of the terminal box; check proper condition of all sealing surfaces so that the demands of the protection category are fulfilled.

7.3.4 Start-up

Preconditions:

Make sure that voltage and frequency correspond with the indications on the type plate of the motor. Permissible voltage tolerance (DIN VDE 0530)

for rated voltage	+ 10%
for rated voltage range	+/- 5%

The connecting cable must be dimensioned according to the motor characteristics.

Secure connecting cable with a strain relief.

The nominal motor power refers to an ambient temperature of 40°C and an installation site below 1000m above sea level. Motor output will be reduced if these values are exceeded (see VDE 0530).

Adapted for “moderate” groupe of climates according to IEC 721-2-1.

CAUTION !

The drive motor will heat by operation of the pump.
Do not touch the motor during operation!

7.3.5 Motor protection

Provide for adequate motor protective equipment in order to protect the motor from overload (e.g. motor protection switch with thermal overcurrent release).
Connect the ground wire to the marked earth screw in accordance with VDE 0100.

CAUTION!

Fuses do not protect the motor!

7.3.6 Maintenance of the drive motor

The electric motor should always be kept clean so that neither dust, dirt, oil nor other contaminates may affect the correct operation.

In addition, we recommend to ensure that:

- the motor does not produce strong vibrations
- suction and blowing openings for the supply of cooling air are not closed or restricted (may lead to unnecessary high temperatures in the windings).

The ball bearings inserted in the motor are lubricated for life.

7.3.7 Restart

Restart the system as described in Chapter 7.3.4 after maintenance work of after longer periods of standstill.

8 Installation

CAUTION!

In case of operation in explosion-hazardous areas, the instructions in Chapter 9 must also be followed!

8.1 Installation instructions

- The standard model of the pump is only approved for installation in dry rooms in a non-aggressive atmosphere, at temperatures between +2°C and +40°C and at permitted humidity until approx. 90%. (For operation in explosion-harzardous areas, see Chapter 9).
- For dimensions of the pump connections and fixing holes, see Fig. 04, Table 02.
- and no tension and that it is aligned precisely.
- Install the pump at the optimum possible operating height. Mount the pump in such a way that the valves are vertical.
- Ensure that there is sufficient space around the pump body and the suction and pressure valve so that these parts may be easily dismantled, if required.
- The stroke length adjustment, indicator scale and visual diaphragm rupture signalling must be easily accessible and readable.
- Design the nominal diameters of the downstream pipes and of the connections built into the system to be the same size or larger than the inlet / outlet nominal widths of the pump valves.
- To check the pressure ratios in the pipe system, we recommend to provide for connections for pressure gauges (e.g. manometers) near the suction and pressure attachments.
- Provide evacuation fittings
- Prior to connecting the pipes, remove the plastic caps on the suction and pressure attachments of the pump.
- Check that the fixing screws for the pump body are tightly fitted and, if necessary, retighten.

Torque for tightening the fixing screws	
Pump type	**Torque** (Nm)
...410.2 – 30 KM	15
...410.2 – 38 KM	15
...410.2 – 60 KM	15
...410.2 – 76 KM	15
...410.2 – 120 KM	15
...410.2 – 150 KM	15
...410.2 – 250 KM	15
...410.2 – 310 KM	15
...410.2 – 400 KM	15
...410.2 – 510 KM	15
...410.2 – 700 KM	25
...410.2 – 850 KM	25

Tab.06 Torque for tightening

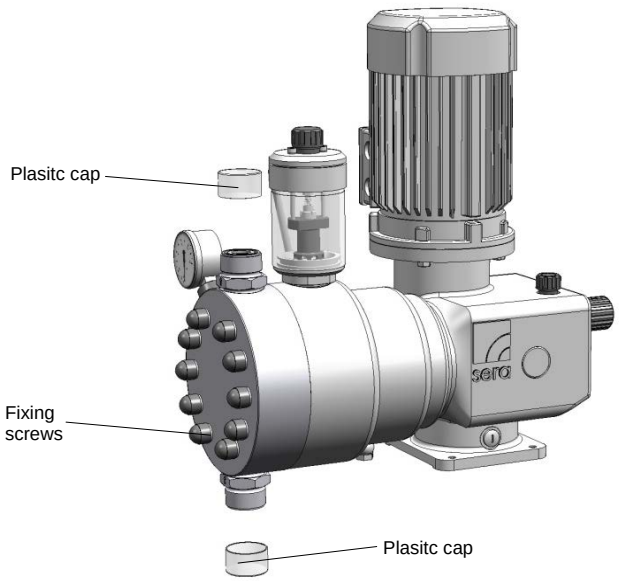


Fig. 21 Piston diaphragm pump with plastic caps

- For models with a built-on actuator, ensure sufficient space for removal of the cover (see Chapter 6.1 “Dimensions“)
- Connect pipes to the pump in such a way that there are no forces acting on the pump, such as e.g. misalignment, weight or stress of the pipe.
- Keep the suction lines as short as possible.
- Use pressure- and medium-resistant hoses / pipes.
- All pipes and containers connected to the pump must comply with the regulations and must be cleaned, tension-free and intact.
- Exchange the plug in the compensating valve for the vent screw in the bag.
- Keep the adjusting key (included in the delivery scope) in close proximity to the pump.

CAUTION !

When toxic, crystal-forming or corrosive liquids are being delivered, the pipe system must be equipped with devices so that it can be emptied, cleaned and, if necessary, rinsed with a suitable medium.

CAUTION !

If the system is operated on a 60Hz mains it is essential to consider the possible higher stroke frequency when designing the pipe geometry.

CAUTION !

The piston diapraghm pump must be installed in such a way that no damage can be caused if medium is leaking out.

In order to avoid cavitation, overloading and excessive delivery, the following points should be noted:

- avoid high suction heights
- keep pipes as short as possible
- choose sufficiently large nominal diameters
- avoid unnecessary choke points
- install a pulsation damper
- install a pressure relief
- install a pressure keeping valve, if necessary
- in the case of degassing media, provide for a supply

CAUTION !

The operator must take suitable precautions on the supply side (collecting tray) to ensure that the container does not run dry in the event of a diaphragm rupture.

8.1.1 Provide for an overpressure protection

If the permissible pressure in the system may be exceeded, e.g. when a shut-off valve is closed or if the line is blocked:

- install the overflow valve

When using an external relief valve the following is valid for the feed back pipe:

- lead the overflow line with descending gradient in the store tank which is under atmospheric pressure or in an open drain gutter (see Fig. 22)
- or connect the overflow line directly to the pump suction line, but only if there is no check valve inside the suction line (e.g. foot valve of a suction lance) (see Fig. 23).

The hydraulic discharge valve installed in the pump protects the pump from overload. Under certain circumstances an external discharge- or safety valve mounted on the pump pressure side is not required.
In general, however, an external overpressure protection should be provided.

CAUTION !

<u>Do not</u> connect shut-off valves when the pump is operating.

CAUTION !

An overpressure protection (e.g. discharge valve) should always be installed if the permissible operating pressure may be exceeded.

CAUTION !

The pumped medium may spout out if the pump is damaged.

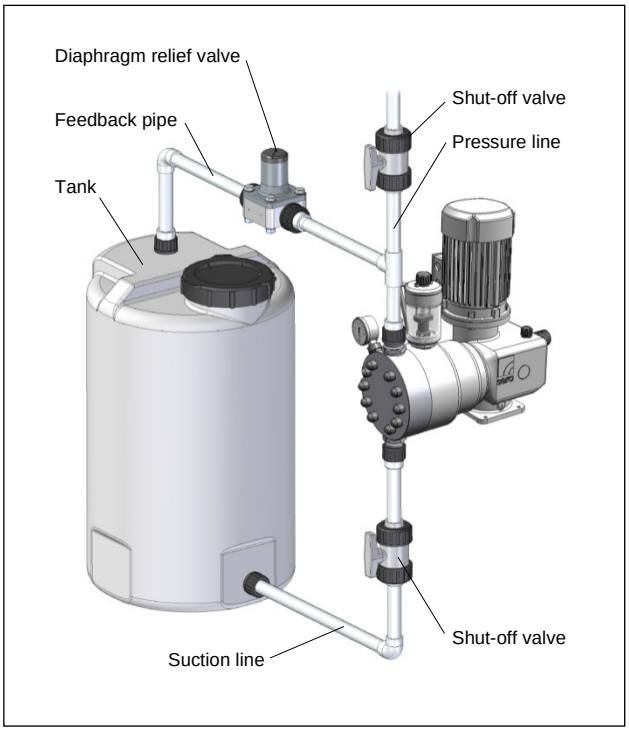


Fig. 22 Installation with (external) relief valve

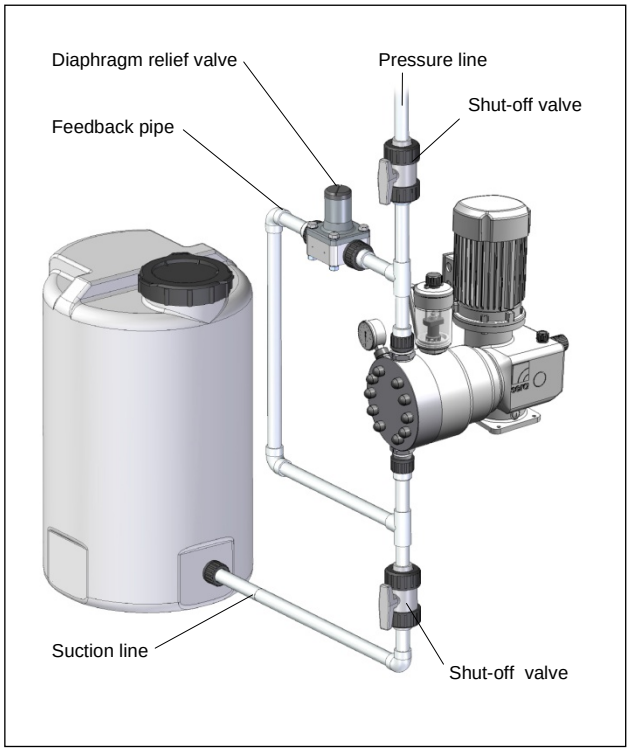


Fig. 23 Installation with (external) relief valve

8.1.2 Preventing a backflow of the pumped medium

If the dosing line is linked with a main line:

- install an injection fitting (dosing valve).

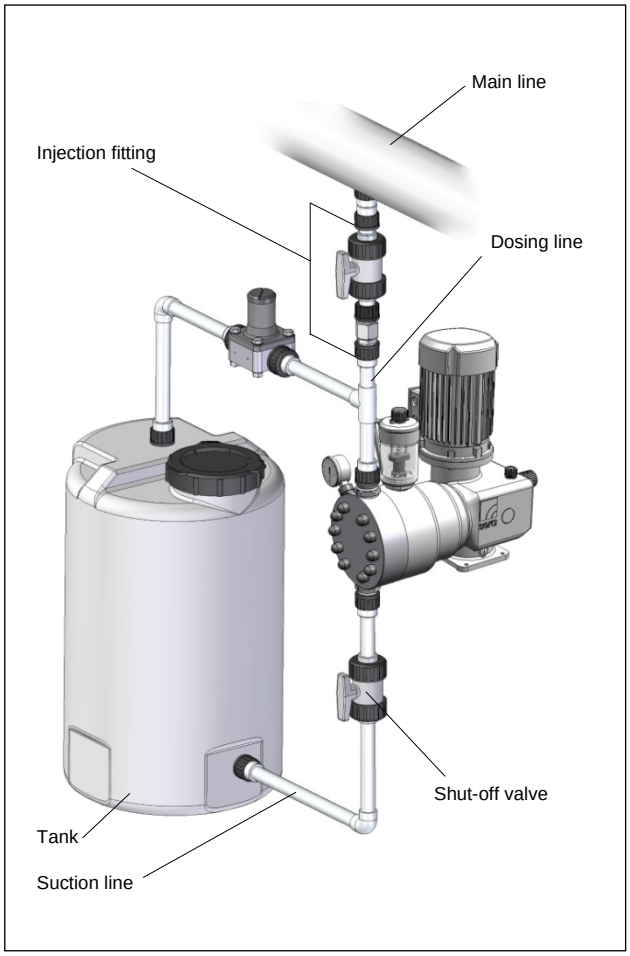


Fig. 24 Installation of an injection fitting

CAUTION !

There will be an unintentional mixture in the dosing line if a possible backflow from the main line is not prevented.

CAUTION !

Pay attention to / avoid chemical reactions arising from a backflow of the pumped medium.

8.1.3 Eliminating undesired siphoning

When dosing into a main line with negative pressure:

- install a pressure keeping valve into the dosing line.

CAUTION !

When installing a pressure keeping valve, make sure that an uncontrolled dosing is prevented (by a positive pressure difference (≥ 1 bar) between pressure and suction side).

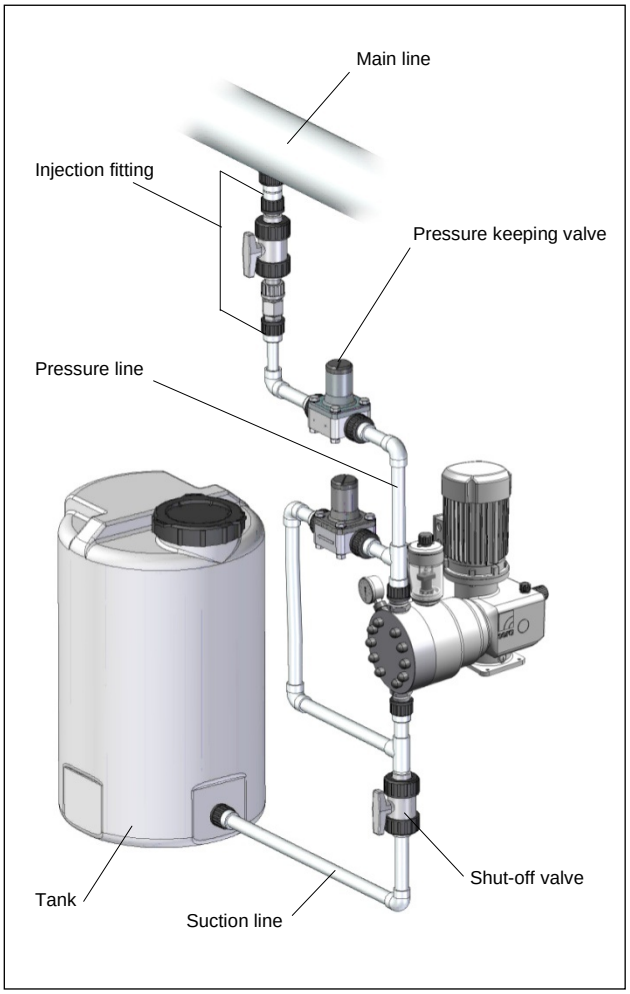


Fig. 25 Installation of a pressure keeping valve

8.1.4 How to ensure suction free from air

If, due to a falling fluid level in the tank, air may be drawn in and delivered to a pressurised line or against a pressure keeping valve:

- install a vent valve into the pressure line.

CAUTION !

The delivery may be interrupted if air enter in the suction line!

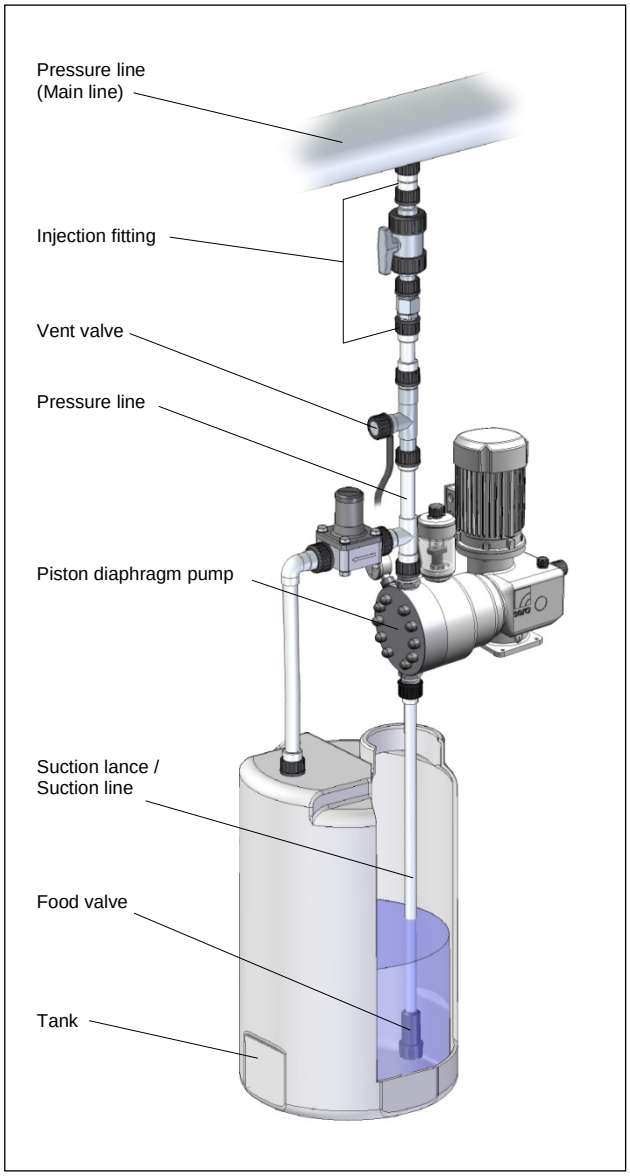


Fig. 26 Installation of a vent valve

8.1.5 Install the empty-tank alarm

so that the tank is refilled before air is drawn in.

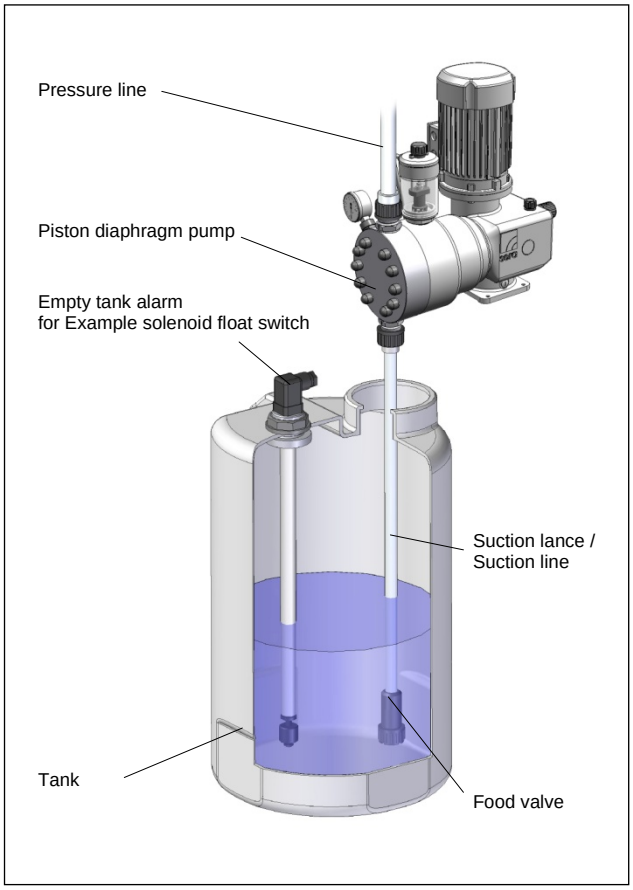


Fig. 27 Installation of the empty-tank alarm

CAUTION !

The delivery may be interrupted if air enter in the suction line!

8.1.6 How to avoid an emptying of the suction line

- Install a foot valve at the end of the suction line

Based on calculations, the dimension '**H**' may not exceed the number that is equal to the specified maximum suction height of the pump divided by the density of the pumped medium and in consideration of mass acceleration and viscosity of the medium.

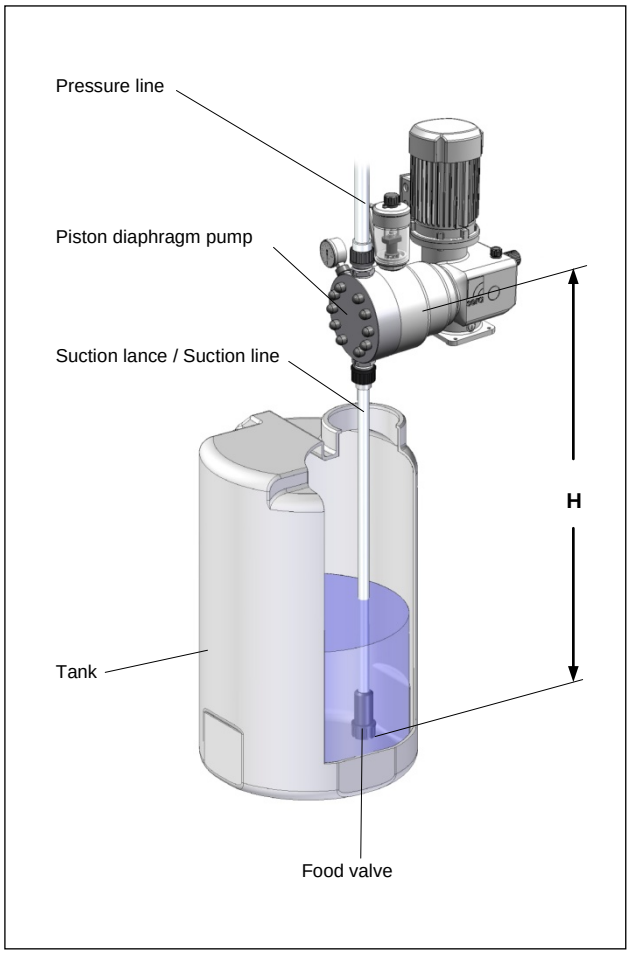


Fig. 28 How to avoid emptying of the suction line

8.1.7 Line strainer

- Connect the suction line slightly above the bottom of the tank and install a line strainer (0.1 – 0.5mm aperture size – depending on nominal width of the valve).

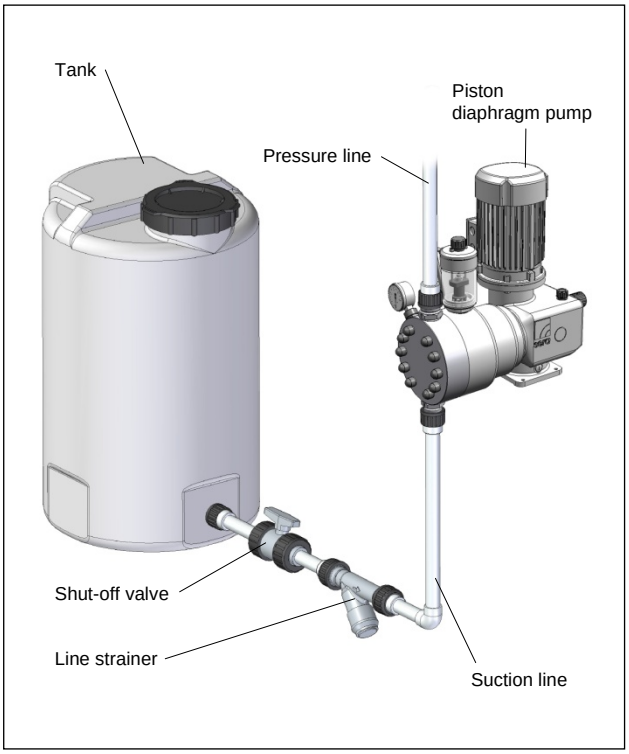


Fig. 29 Installation of a line strainer

CAUTION !

Pump and system may not function properly if contaminates are not collected.

8.1.8 Suction via a siphon vessel

For use with high tanks without connection on the tank bottom:

- install the siphon vessel
- pay attention to accelerating pressure which may be generated in a long suction line.

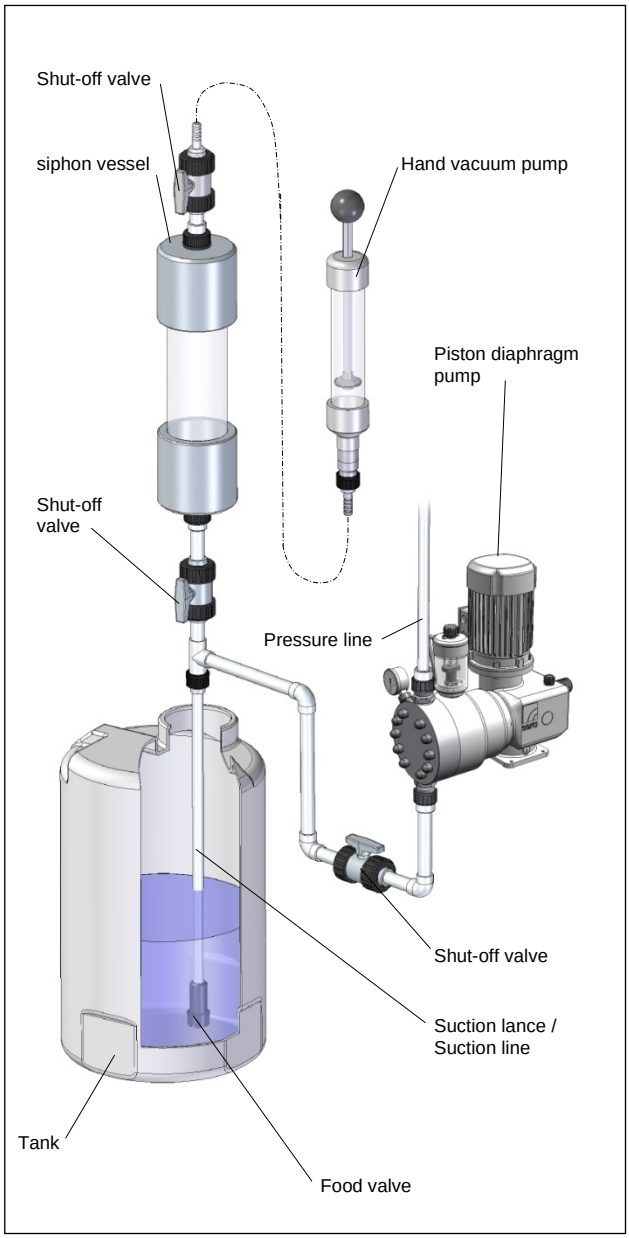


Fig. 30 Installation siphon vessel (**sera** - fitting)

8.1.9 In case of easily degassing pumped media

- Install the pump so that it can be operated with afflux.

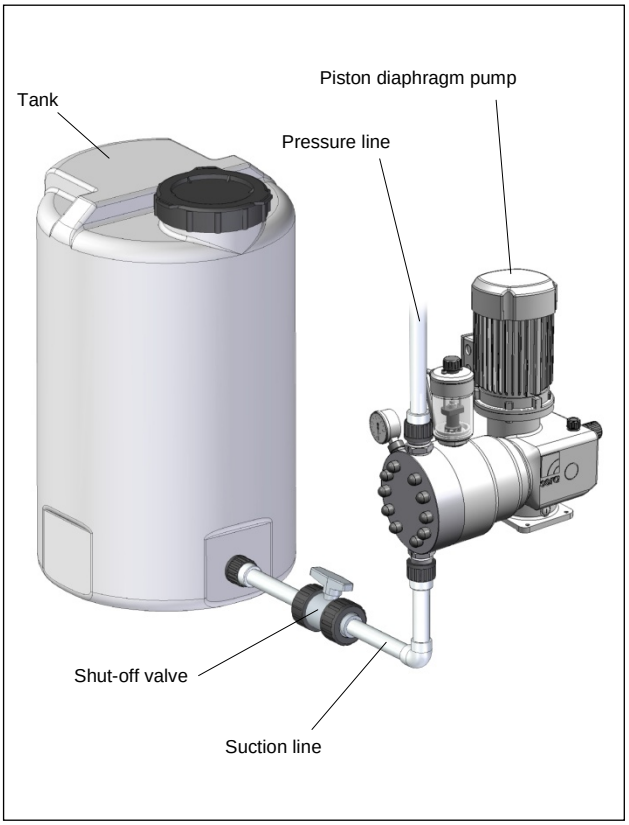


Fig. 31 Installation under afflux

8.1.10 Dosing of suspensions

Pump head must be cleaned to avoid precipitation, e.g. as:

- intermittent rinsing

or

- rinsing when pump was switched off

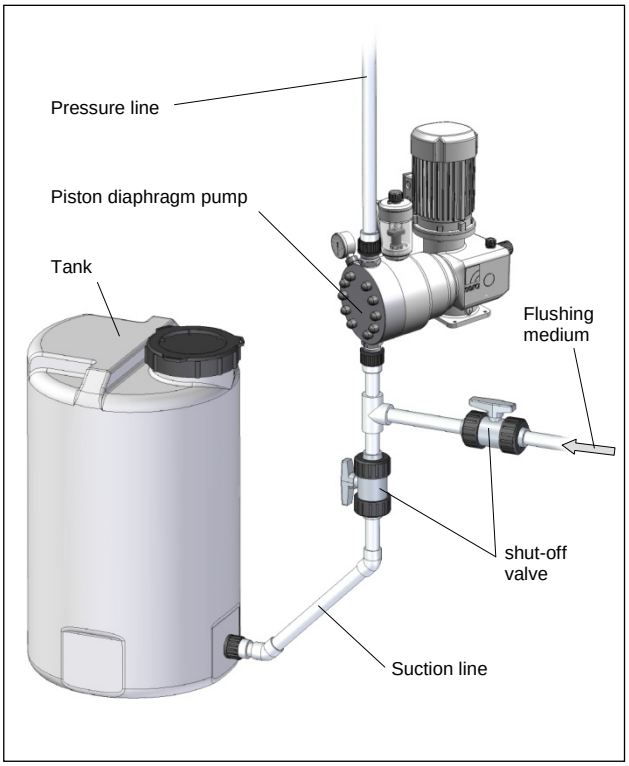


Fig. 32 Dosing of suspenions

CAUTION !

The rinsing process should be automated.

8.1.11 Damping of the pulsation

By installing pulsation dampers if:

for procedural reasons, a pulsation-poor flow rate is desired.

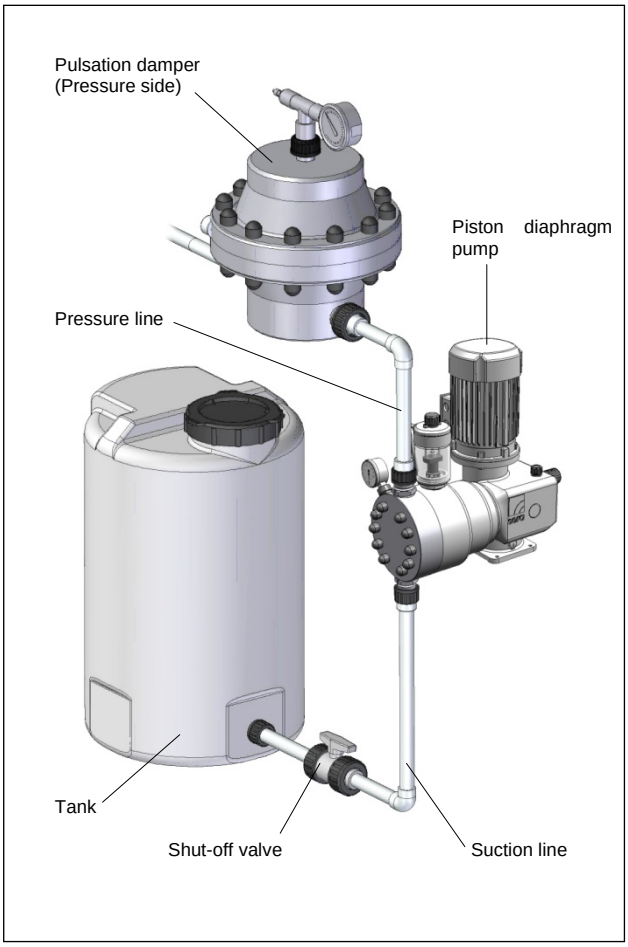


Fig. 33 Installation of a pulsation damper (I)

Accelerating forces which arise due to the pipe geometry must be reduced.

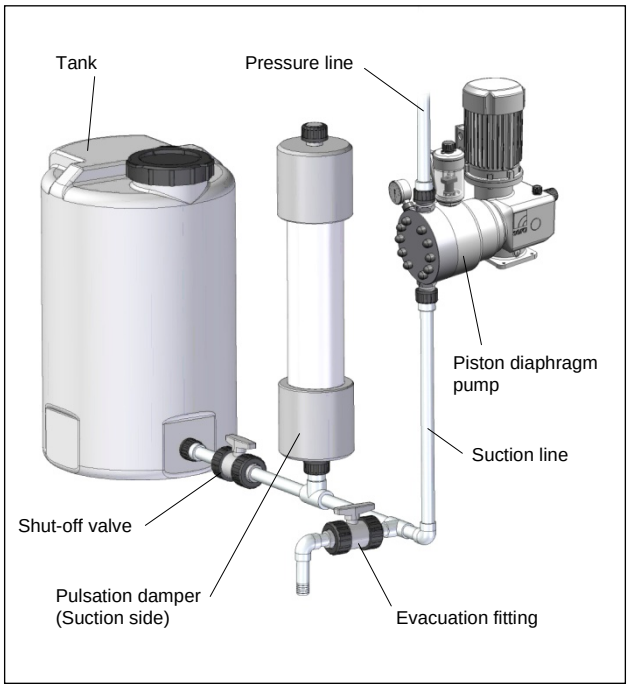


Fig. 34 Installation of a pulsation damper (II)

CAUTION !

Undamped accelerating forces can cause the following malfunctions / damage:

Fluctuations of the delivery rate,
dosing errors,
pressure thrusts,
valve wobbles,
increased wear on the suction- and pressure side of the pump;

Mechanical breakdown of the pump,
leakage and valve wobbles as a result of the maximum pressure on the pressure side of the pump being exceeded.

Installation of suction and/or pressure pulsation dampers near the pump head.

- If both pulsation damper and pressure keeping valve should be integrated install the pressure keeping valve between pump and pulsation damper.

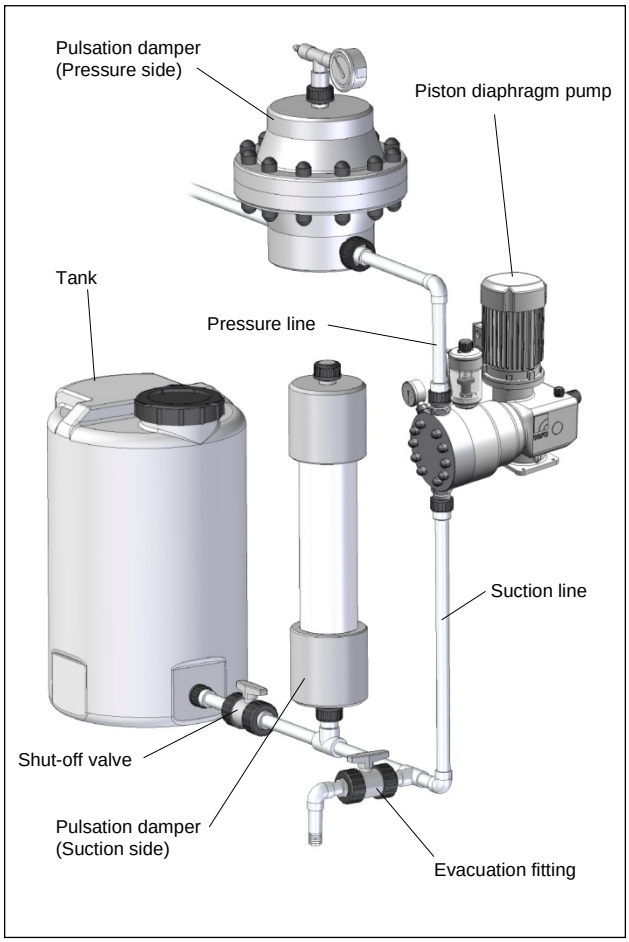


Fig. 35 Installation of a pulsation damper (III)

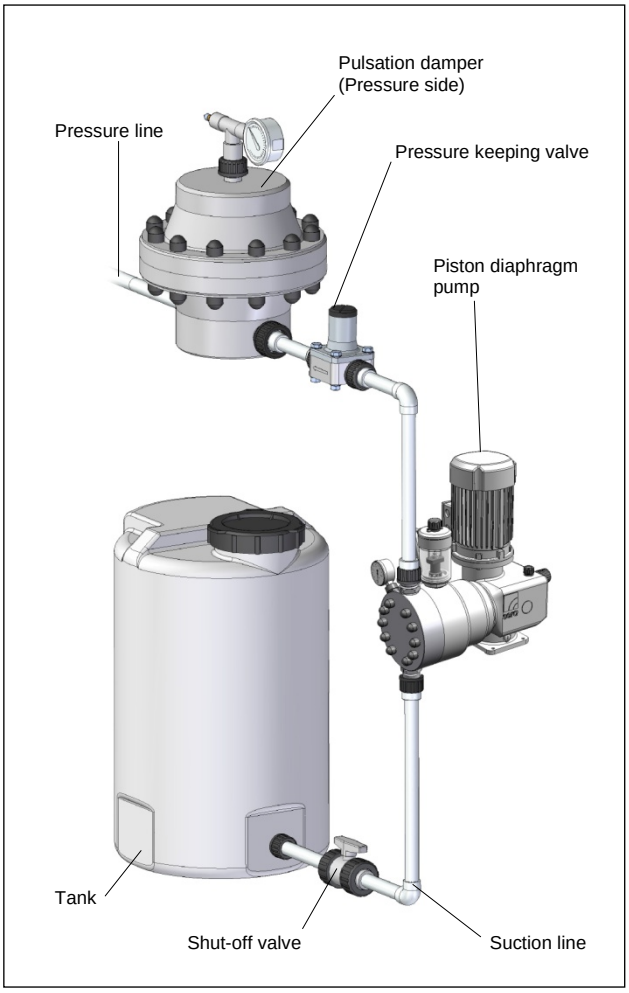


Fig. 36 Installation of pulsation damper and pressure keeping valve

9 Operation in explosion-hazardous areas

9.1 General

CAUTION !

The prerequisite for the use in explosion-hazardous areas is an appropriate design of the pump.

The product supplied by **sera** meets the requirements of directive 94/9/EC if it is correspondingly marked. This guarantees safe operation in explosion-hazardous areas.

CAUTION !

It is the operator's task to define the field of application and to check whether the pump is suited for this application. He/she must clearly define the zone, the device category, the explosion group and the temperature class.

9.2 Identification

The pump has a label stating the zone/device category /explosion group/temperature class in compliance with directive 94/9/EC.

- Ex II2G c IIBT4 or
- EX II2G c IICT4

(note special specifications in the confirmation of order).

9.3 Installation

9.3.1 General

The intended operating conditions in explosion-hazardous areas according to directive 94/9/EG are stated in the confirmation of order or the product description. The indicated limit values should not be fallen below or exceeded.

Installation regulations given in the operating instructions must be adhered to.

9.3.2 Working in explosion-hazardous areas

CAUTION !

Use only suitable tools for performing assembly and maintenance work on machines or plants in explosion-hazardous areas.
Directive 99/92/EC must be observed.

9.4 Potential equalization

After fixation, make sure that the pump is properly connected to the potential equalization system on site.

9.5 Start-up

After installation, the pump must immediately be used for the suction of fluids, i.e. the pump must immediately be started after the tank has been installed and filled.

9.6 Operation

9.6.1 General

The intended operating conditions in explosion-hazardous areas according to directive 94/9/EG are stated in the confirmation of order or the product description. The indicated limit values should not be fallen below or exceeded.

Details about explosion zone, device category, explosion group and temperature class can be seen from the Declaration of Conformity.

9.6.2 Degassing of the pumped medium

Never let the pump run dry. Check the liquid level in the tank during operation of the pump. Make sure that the pump is switched off when the liquid level in the tank falls below the minimum level required (explosive atmosphere may be carried over).

Vapour bubbles from the pumped medium are harmless as they have no explosive potential.

CAUTION !

Formation of an explosive gas mixture must be prevented.

9.6.3 Temperature indications

Permissible ambient temperature

$0°C \leq Ta \leq +40°C$

9.7 Maintenance

The maintenance notes listed in Chapter 10 are generally applicable.

Exception:

CAUTION !

The oil level in the stroke mechanism of the pump and the level of the hydraulic fluid of the pump must be checked once a week!

10 Maintenance

CAUTION !

Before starting maintenance make sure that the wearing parts and the spare parts required are available.
Deposit the parts so that they will not get damaged.

CAUTION !

All wearing parts are to be checked for prefect condition at regular intervals and exchanged if necessary.

Check the following at regular intervals:

- tight fit of piping
- tight fit of pressure and suction valve
- proper condition of the electrical connections
- tight fit of the screws for fastening the pump body (check this at least every three months)
  For the tightening torques of the mounting screws, please see Chapter 8.1/Table 07 “Installation”.

Repairs on the stroke mechanism may only be performed by **sera**.

10.1 Wearing parts

Depending on their use and period of use, wearing parts must be replaced at regular intervals in order to ensure a safe function of the piston diaphragm pump.

We recommend to replace the intermediate diaphragm after 3000 operating hours or at least once a year.

In case of a premature diaphragm rupture caused by difficult operating conditions, switch off the piston diaphragm pump and replace the diaphragms (see Chapter 10.4).

The following parts are regarded as wearing parts of the piston diaphragm pump:

- intermediate diaphragms
- suction valve
- pressure valve

10.2 Spare parts

The following parts are regarded as spare parts of the piston diaphragm pump:

- pump body
- compensating valve
- piston
- cylinder and cylinder sleeve

10.3 List of spare and wearing parts

10.3.1 Piston diaphragm pump ...410.2-...KM

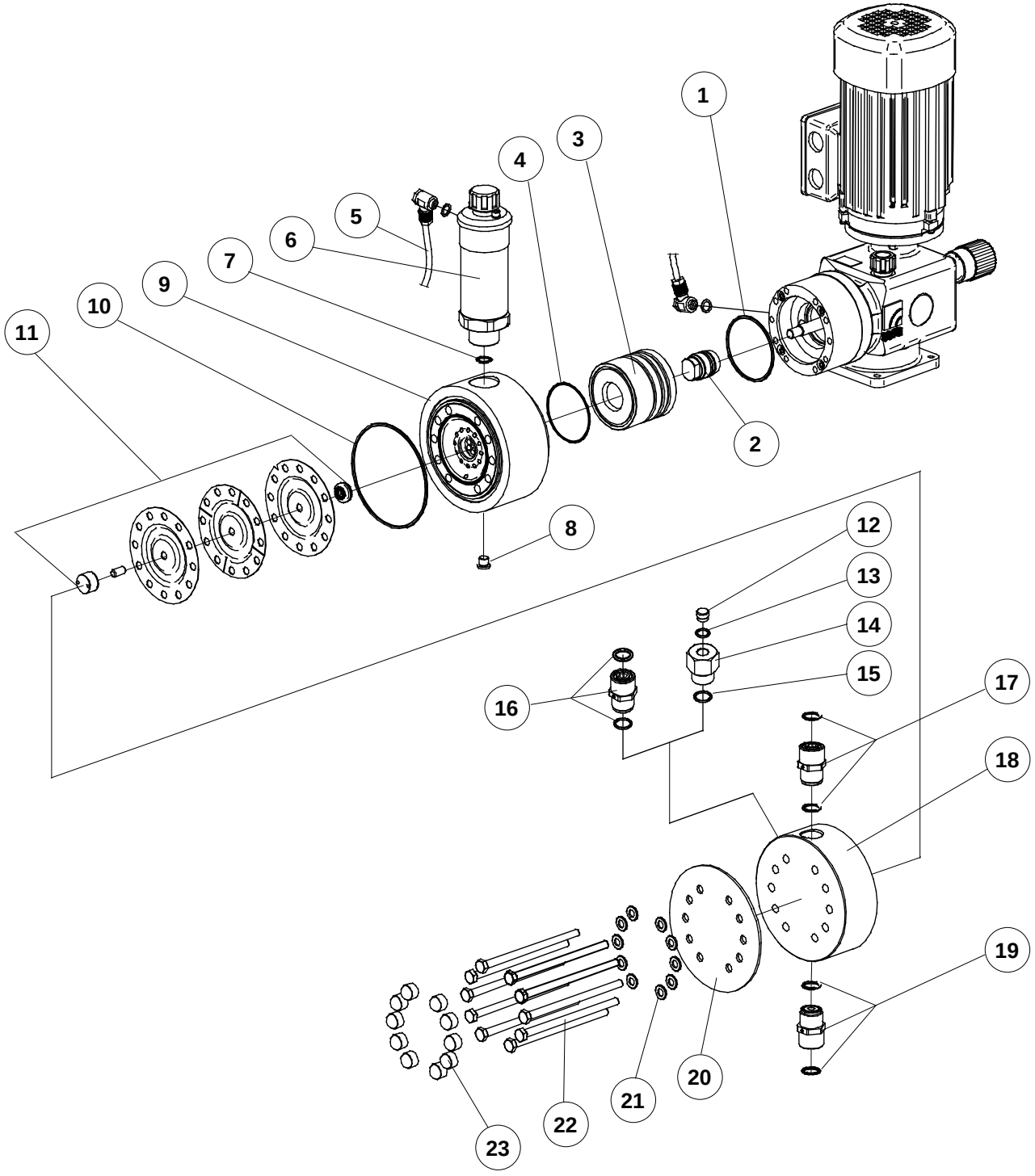


Fig. 37 List of spare and wearing parts

Overview of spare and wearing part kits

Piston diaphragm pump ...410.2- ... KM

Hydraulic compensating valve	
Item	*Designation*
6	Hydraulic compensating valve, complete
5	Return line, complete
7	O-ring

Piston-Set	
Item	*Designation*
2	Piston, complete

Cylinder kit	
Item	*Designation*
9	Cylinder
8	Screw plug

Cylinder bushing kit	
Item	*Designation*
3	Cylinder bushing
1	O-ring
4	O-ring

Suction valve (kit)	
Item	*Designation*
19	Saugventil (inkl. O-Ringe)

Pressure valve (kit)	
Item	*Designation*
17	Pressure valve (incl. o-rings)

Diahpragm kit	
Item	*Designation*
11	Multi-layer diaphragm set
	Hydraulic oil

Pump body kit (Plastic)	
Item	*Designation*
18	Pump body
20	Front plate
21	Disk(s)
22	Hexagon nut(s)
23	Protective cap(s)

Pump body kit (Special steel)	
Item	*Designation*
18	Pump body
21	Disk(s)
22	Hexagon nut(s)
23	Protective cap(s)

Tab. 07 Spare and wearing parts

10.4 Replacing the diaphragm

10.4.1 General

In order to ensure a correct function of the piston diaphragm pump and to fulfill the required safety and protective provisions – especially in explosion-hazardous areas – it is absolutely necessary to check and replace the diaphragms at regular intervals.

CAUTION !

Prior to replacing the diaphragm, empty the pump and, if necessary, rinse it with appropriate fluid in order to avoid contact with aggressive and/or toxic media!

CAUTION !

For replacing the diaphragm, the system must be depresssurised!

- During maintenance or repair work, switch off the drive motor of the piston diaphragm pump and secure it against inadvertent or unauthorised reactivation.
- Take appropriate protective measures: wear protective clothing, breathing protection and safety goggles. Prepare a container with appropriate fluid right beside the pump to be able to remove splashes of the pumped medium.
- Use an appropriate detergent to rinse the piston diaphragm pump until no residues of the pumped medium remain in the pump body. Otherwise, pumped medium may leak when disassembling the pump. Collect the rinsed liquid in a safe way (avoid contact) and dispose of it in an environmentally compatible way. This measure is also necessary if the piston diaphragm pump should be returned for repair.

10.4.2 Piston diaphragm pump

- Drain off hydraulic fluid by opening the screw plug and the vent screw and press on the blow valve using a screwdriver.
- Loosen nuts on the pump body.
- Remove pump body and front plate (not illustrated) to the front.

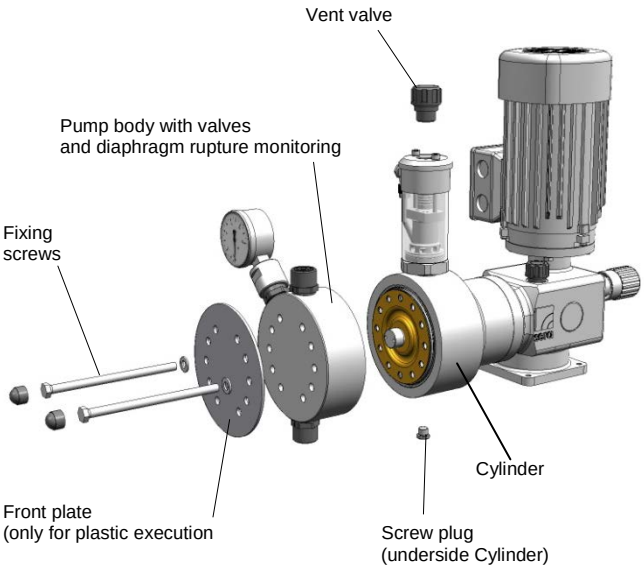


Fig. 38

- Remove multi-layer diaphragm set out of the cylinder.
- Check all components of the hydraulic system incl. the compensating valve for damage and soiling if these have come into contact with the medium in case of a diaphragm rupture.

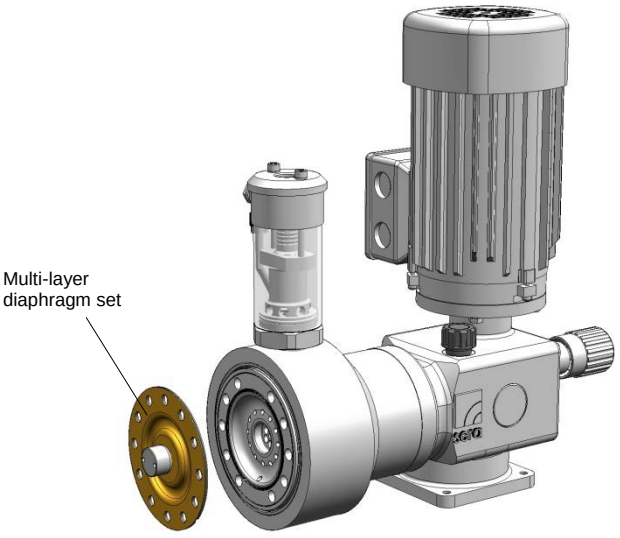


Fig. 39

Assemble the pump in reverse order

- Insert the multi-layer diaphragm set to the cylinder.
- When assembling the pump body, please note: suction valve below, pressure valve above!
- Pay attention to tightening torques (see Chapter 8.1, Table 07). Secure the nut crosswise.
- Fill hydraulic fluid in store tank (type and quantity are indicated in Chapter 11.2)
- Set maximum stroke length.
- Fill hydraulic fluid in store tank and make sure not to overfill in first stage.
- Start pump and press on blow valve with a screwdriver at each stroke of the pump. Hydraulic fluid is sucked in.
- Fill remaining hydraulic fluid in store tank.
- Press again on the blow valve with a screwdriver and repeat process until no bigger air bubbles escape from the hydraulic chamber.
- Switch pump off again.
- Screw in vent valve

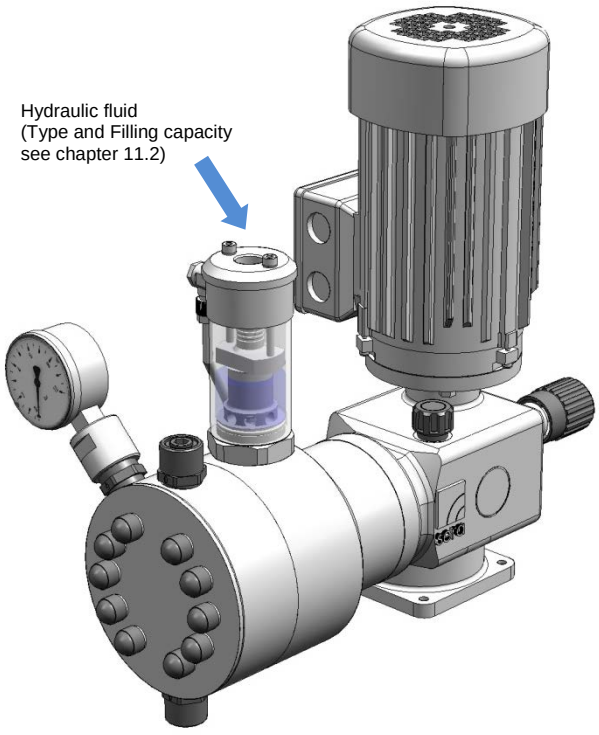


Fig. 40 Filling of the hydraulic fluid

- Reset stroke length to the initial value.
- Connect suction- and pressure line
- The diaphragm pump is ready for operation

CAUTION !

Fill in new hydraulic fluid after every diaphragm change.

10.4.3 Ventilation after diaphragm replacement

Before reactivating the pump after a diaphragm replacement, remove the air between the diaphragm layers.

a) diaphragm rupture signalization by manometer or pressure switch:

- Screw out the signal device
- Apply delivery pressure and have the pump run for a short period (30s)
- Switch off the pump
- Screw in the signal device (see Fig. 41).

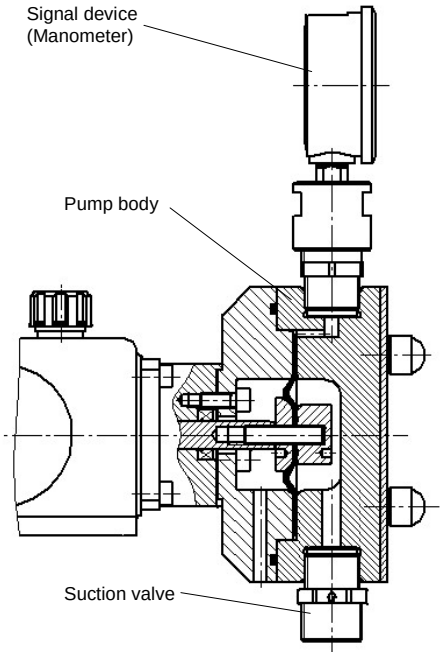


Fig. 41

b) diaphragm rupture signalization by pressure switch ex-design

- Release union nut and remove the signal device (see Fig. 42/43).
- Apply delivery pressure and have the pump run for a short period (30s)
- Switch off the pump
- Screw on the signal device:

  Pressure switch is for pump body made of plastic
  - Adjust the pressure switch to the desired position
  - Tighten union nut by hand and hold the insert socket by means of an open-end wrench

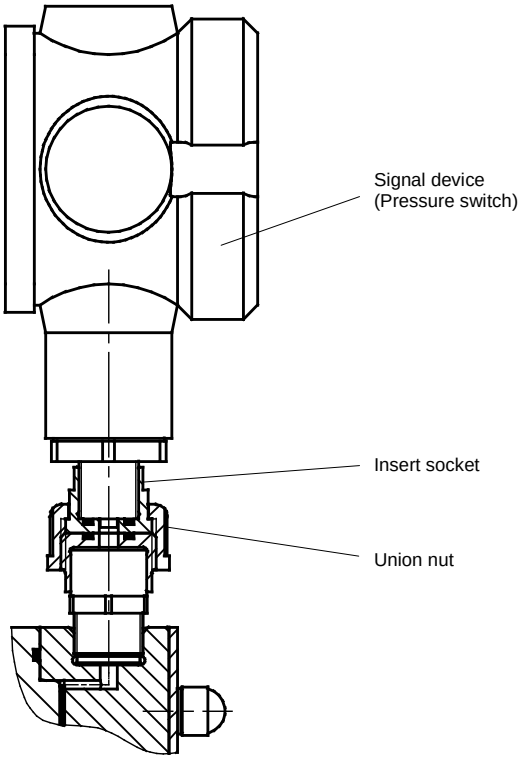


Fig. 42

Pressure switch is for pump body made of stainless steel

- Screw the pressure switch with union nut on the external thread of the socket
- Tighten the union nut with an open-end wrench and while doing so, press against with an open-end wrench at the insert socket. Adjust the pressure switch to the desired position.

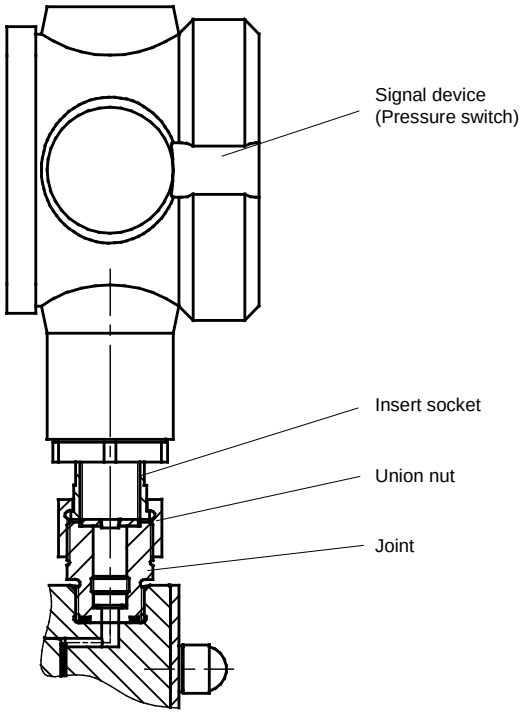


Fig. 43

Add the suction and pressure line and connect the pump to the power supply. The multi-layer diaphragm pump is then again ready for operation

10.4.4 Setting the compensating valve

Blow valve and hydraulic discharge valve are factory-set to the values for suction height and counterpressure stated in the confirmation of order. If operating data on-site deviate from these values the compensating valve is to be reset according to the actual operating conditions while adhering to the maximum permissible pressures.

10.4.4.1 Blow valve

Set the spring tension of the blow valve with the rifle nut so that a stroke movement of appr. 0,5 to 1 mm is achieved at every suction stroke.
Proceed as follows when the pump is switched off:

- Put socket spanner on rifle nut and hold in place.
- Put smaller socket spanner through bigger socket spanner, loosen lock nut and remove socket spanner (see Fig 44).

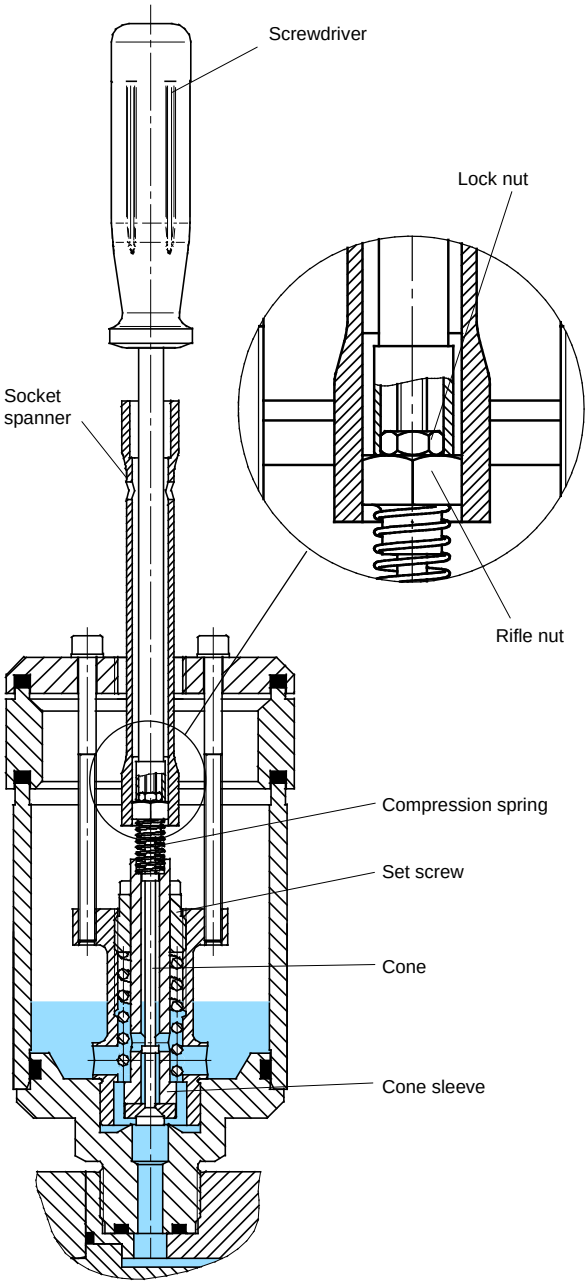


Fig. 44

- Secure cone of blow valve with a screwdriver against distortion and turn rifle nut using the socket spanner (see Fig. 45).

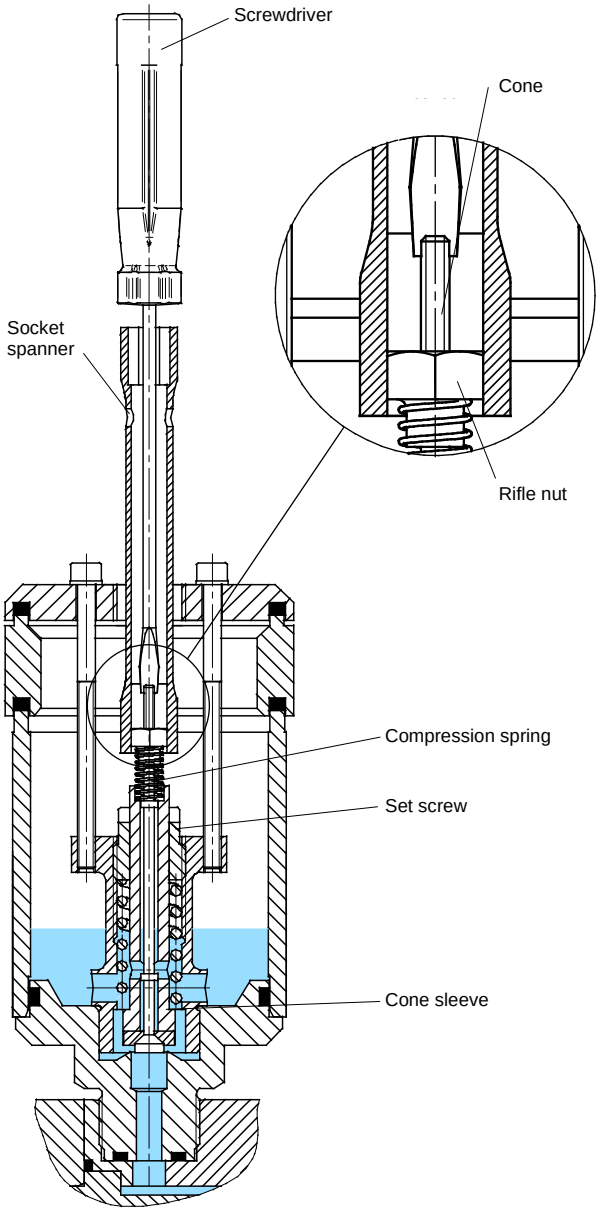


Fig. 45

Clockwise: spring tension is increased (= higher suction height)

Counterclockwise: spring tension is reduced (= lower suction height or supply)

- Remove socket spanner and screwdriver and switch pump on

  (pump is operated within the system).

- Check correct stroke movement of the blow valve. If stroke movement is not correct, repeat setting and check stroke movement again.

- If the defined values are kept, switch pump off and tighten lock nut while holding the rifle nut in place

10.4.4.2 Hydraulic compensating valve

Set the pressure of the hydraulic compensating valve in such a way that it is appr. 10 – 15% higher than the maximum operating pressure of the system.

CAUTION !

The set pressure must not exceed the maximum permissible counterpressure of the pump.

Proceed as follows when the pump is switched on:

a) factory-set pressure too high:

- Turn slowly the adjusting screw anti-clockwise by means of a adjusting spanner with the pump running (see Fig. 46) until the fluid level in the store tank rises suddenly - > hydraulic discharge valve opens

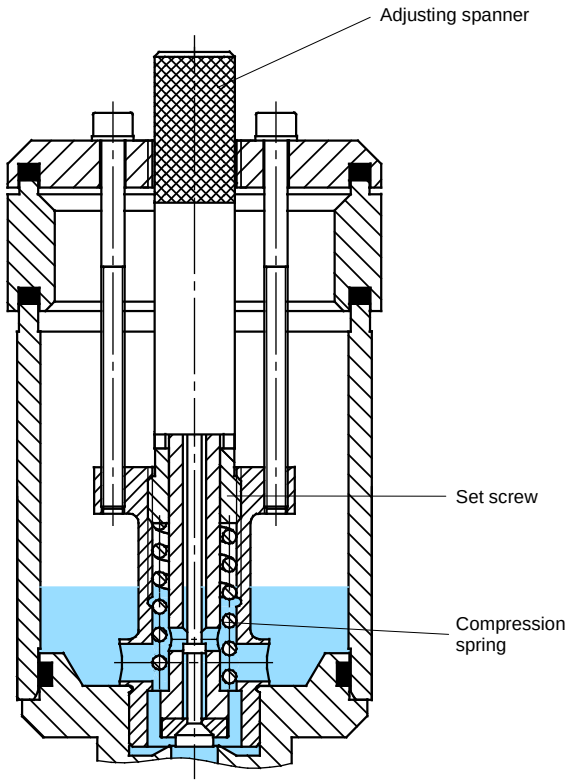


Fig. 46

CAUTION !

The adjusting screw of the hydraulic relief valve must never be screwed in such a way that the pressure spring is pressed together to solid length.

- Turn set screw slowly clockwise until the fluid level lowers again and reaches the level before opening.
- Turn the set screw a ½ turn further to the right. Hydraulic discharge valve is now set to the operating conditions.
- If a manometer is installed on the pump pressure side the set pressure can be checked via the manometer.

b) factory-set pressure too low (hydraulic fluid level rises in the store tank when the pump was switched on):

- Turn set screw slowly clockwise until the fluid level lowers again and reaches the level before the pump was switched on.
- Turn the set screw a ½ turn further to the right. Hydraulic discharge valve is now set to the operating conditions.
- If a manometer is installed on the pump pressure side the set pressure can be checked via the manometer.

CAUTION !

If an external discharge valve or a safety valve is installed on the pump pressure side the set pressure of the hydraulic discharge valve should be by 10% higher than the set pressure of the discharge / safety valve.

CAUTION !

The set pressure must not exceed the maximum counterpressure of the pump (see Chapter 6.2, Tab. 04).

CAUTION !

High dosing precision and a long service life of the piston diaphragm pump are ensured if the compensating valve (hydraulic discharge valve and blow valve) is set according to the operating conditions.

10.5 Oil change

- Check oil level at regular intervals (oil sight glass)

Change oil once a year.
To do so, proceed as follows:

- Unscrew vent screw (see Fig. 05).
- Prepare an appropriate container. Open screw plug and drain off oil.

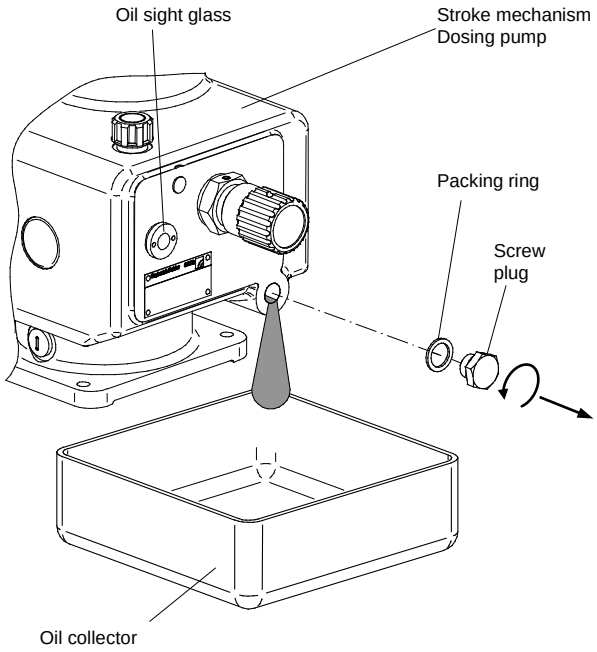


Fig. 47 . (Drain off oil)

- Close bore hole with screw plug (pay attention to packing ring).
- Fill oil in threaded hole of the vent screw.
- Oil type and quantity are specified in Chapter 11.1
- Screw in vent screw..

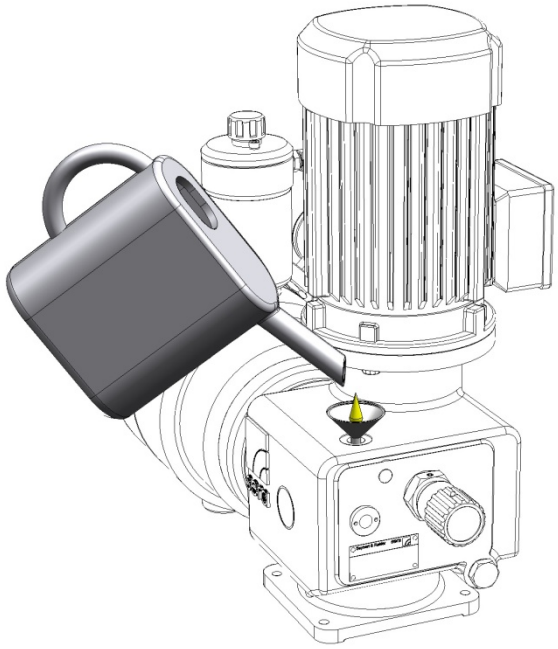


Fig. 48 . (Refilling oil)

11 Lubricants

11.1 Lubricant in stroke mechanism

Pump type	Lubricant	Quantity
...410.2 – 30 KM	Gear oil ARAL Degol BG220	1,25 Litres
...410.2 – 38 KM		
...410.2 – 60 KM		
...410.2 – 76 KM		
...410.2 – 120 KM		
...410.2 – 150 KM		
...410.2 – 250 KM		
...410.2 – 310 KM		
...410.2 – 400 KM		
...410.2 – 510 KM/		
...410.2 – 700 KM		
...410.2 – 850 KM		

Tab. 08 Lubricant in stroke mechanism

11.2 Hydraulic fluid

Pump type	Hydraulic fluid	Quantity
...410.2 – 30 KM	Silicone oil AK100 or Paraffin oil P180	120 ml
...410.2 – 38 KM		120 ml
...410.2 – 60 KM		120 ml
...410.2 – 76 KM		120 ml
...410.2 – 120 KM		350 ml
...410.2 – 150 KM		350 ml
...410.2 – 250 KM		350 ml
...410.2 – 310 KM		350 ml
...410.2 – 400 KM		350 ml
...410.2 – 510 KM/		350 ml
...410.2 – 700 KM		1.300 ml
...410.2 – 850 KM		1.300 ml

Tab. 09 Hydraulic fluid

12 Fault analysis and corrective action

sera products are sophisticated technical products which are only shipped after a comprehensive test.

Faults which should occure can be easily recognized and corrected with the help of the notes in table 10.

Fault analysis and corrective action

Type of fault													Possible cause	Corrective action
Pump does not suck	Pump does not deliver	Delivery rate is not reached	Delivery height is not reached	Delivery rate varies	Delivery rate exceeds permissible value	Drive motor does not start	Tube oscillates heavily	High noise emission	Service life of drive diaphragm too short	Drive overloaded	Stroke mechanism/drive damaged	Pump head leaking		
●	●	●											Suction height too great	Reduce suction height or suction resistance
●	●	●		●									Suction pipe leaky	Check seals, tighten tube connections
●	●					●						●	Shut-off valves in tube closed	Open shut-off valves or check whether they are open – check pump for damage
●	●	●											Store tank empty	Fill store tank
●	●	●	●	●									Pump valves leaky	Remove and clean pump valves
●	●		●	●									Pump valves (ball seats) damaged	Remove and clean valves, check for proper function; fit new valves if required
●	●												Pump valves not correctly mounted or valve balls missing	Check installation and completeness, replace missing parts or install correctly
●	●												Filter in suction pipe clogged	Clean filter
						●				●			Electric data of motor do not correspond with mains data	Check order details. Check electrical installation. Adjust motor to actual mains conditions.
		●	●	●		●	●	●	●	●		●	Counterpressure too high	Measure pressure with manometer directly above pressure valve and compare with permissible counterpressure
●	●	●	●	●									Foreign particles in pump valves	Remove and clean pump valves
				●	●								Pressure on suction side higher than at the end of the pressure pipe	Check geodetic conditions, fit float valve or pressure keeping valve, if necessary
		●	●	●	●	●	●	●	●	●	●	●	Acceleration too high due to pipe geometry	Check acceleration on pressure- and suction side with manometer and compare with layout data. Install pulsation damper, if necessary
									●			●	Material which come in contact with medium are not suitable for the pumped medium	Check whether pumped medium corresponds with layout specifications; choose other material if required
●		●	●	●									Too high viscosity of pumped medium	Check viscosity of pumped medium and compare with layout data; reduce concentration or increase temperature if required.
	●	●		●									Pumped medium outgasses in suction pipe	Check geodetic conditions and compare with data of pumped medium. Operate pump with suction-side supply, reduce temperature of pumped medium
●													Air in suction pipe while pressure is applied on pressure valve ball	Vent pressure side
●	●	●	●	●								●	Pipe connections leaky	Tighten connections according to material type. Be careful with plastic – danger of breakage
●	●	●										●	Temperature too low	Check flow characteristics of pumped medium. Temperature of pumped medium must not fall below -10°C.
●	●					●					●	●	Pumped medium in pipe frozen	Remove pump and check for damage – increase temperature of pumped medium
●	●	●	●	●					●			●	Diaphragm rupture	Replace diaphragm according to Chapter 10.4
●	●	●	●										Compensating valve not adjusted to operating conditions	Set compensating valve according to operating conditions

Tab. 10 (Fault analysis and corrective action)

13 Foreseeable misuse

The following misuse is assigned to the life cycles of the machine.

CAUTION !

Misuse can result in danger to the operating personnel!

13.1 Transport

- Tipping behavior during transport, loading and unloading ignored.
- Weight for lifting underestimated.

13.2 Assembly and installation

- Power supply not fuse protected (no fuse/fuse too large, power supply not conforming to standards).
- No or improper fastening material of the pump.
- Improper connection of the pressure pipes, wrong material i.e. PTFE tape and unsuitable connection pieces.
- Liquid pipes confused.
- Threads overturned/damaged.
- Pipes bent during connection in order to compensate for alignment errors.
- Supply voltage connected without earthed conductor.
- Socket for safe disconnection of the power supply difficult to reach.
- Wrong connecting cables for supply voltage (cross-section too small, wrong insulation).
- Parts damaged (e.g. vent valve, flow meter broken off).
- Wrongly dimensioned pressure and suction pipe.
- Incorrect dimensioned and improperly fastened pump panel (panel broken off).

13.3 Start-up

- Cover on vent openings (e.g. motor).
- Suction or pressure pipes closed (i.e. foreign matters, particle size, stop valves).
- Start-up with damaged system.
- Wrong setting of the hydraulic compensating valve

13.4 Operation

- Fault message ignored → faulty dosing / process error.
- Setting of the hydraulic compensating valve misadjusted.
- Pipes hit, pulsation damper not used → damage to the pipes, medium is leaking.
- Pumped medium contains particles or is contaminated.
- External fuse bridged → no cut off in case of an error.
- Ground wire removed → no cut off by fuse in case of an error, supply voltage directly at the housing.
- Insufficient lighting of the working place.
- Suction height too high, pump capacity too low → process error.

13.5 Maintenance/Repair

- Works carried out which are not described in the operating instructions (works on the stroke mechanism and the assembly pump, electronics opened).
- Prescribed maintenance schedules ignored.
- Use of wrong spare parts/oils (e.g. no **sera** original spare parts, wrong viscosity).
- Improper mounting of spare and wearing parts (e.g. wrong tightening torque for pump body).
- Oil level not checked.
- Use of cables with damaged insulation.
- No shut down / no protection against a restart before maintenance work.
- Pumped medium or utilities during an oil change insufficiently removed.
- Restart without sufficient fastening.
- Valves confused.
- Sensor pipes confused.
- Pipes not connected (e.g. suction- and pressure pipes, gas pipes).
- Gaskets damaged, medium is leaking.
- Gaskets not fitted, medium is leaking.
- Wearing of unsuitable protective clothing / no protective clothing at all.
- Operation of an uncleaned system.
- Pumped medium contaminated with oil.
- Poorly ventilated room.

13.6 Cleaning

- Wrong rinsing medium (material changed, reaction with the medium).
- Wrong cleaning agent (material changed, reaction with the medium).
- Cleaning agent remains in the system (material changed, reaction with the medium).
- Protective clothing insufficient or missing.
- Use of unsuitable cleaning utensils (material changed, mechanical damage by high pressure cleaner).
- Untrained personnel.
- Vent openings clogged.
- Parts torn off.
- Sensors damaged.
- Non-observance of the safety data sheet.
- Control elements actuated.
- Poorly ventilated room.

13.7 Shut-down

- Pumped medium not completely removed.
- Disassembly of pipes with the pump running/with residual pressure.
- Disconnection of the electrical connections in a wrong sequence (ground wire first).
- Disconnection from the power supply not ensured → danger through electricity.
- Poorly ventilated room.

13.8 Disassembly

- Residues of the pumped medium and utilities in the system.
- Use of wrong disassembly tools.
- Wrong or no protective clothing at all.
- Poorly ventilated room.

13.9 Disposal

- Improper disposal of the pumped medium, utilities and materials.
- No marking of hazardous media.

14 Shut-down

Switch off piston diaphragm pump.

Rinse pump head and remove pumped medium; make sure that the rinsing agent is suitable for pumped medium and pump head.

15 Disposal

Shut-down system. Please see “Shut-down“.

15.1 Dismantling and transport

- Remove all fluid residues from pump body, clean thoroughly, neutralize and decontaminate.
- Package unit and ship.

15.2 Complete disposal

- Remove all fluid residues from unit.
- Drain off lubricants and dispose of according to regulations!
- Dismount materials and send them to a suitable waste disposal company!

CAUTION !

The consignor is responsible for leaking lubricants or fluids!

Notes

Notes

Bourdon tube pressure gauge
Lower mount, standard version
Model 111.10

for further approvals
see page 3

Applications

- For gaseous and liquid media that are not highly viscous or crystallising and will not attack copper alloy parts
- Pneumatics
- Heating and air-conditioning technology
- Medical engineering

Special features

- Reliable and cost-effective
- Design per EN 837-1
- Nominal size 40, 50, 63, 80, 100 and 160
- Scale ranges up to 0 ... 400 bar

Bourdon tube pressure gauge model 111.10

Description

Design
EN 837-1

Nominal size in mm
40, 50, 63, 80, 100 and 160

Accuracy class
2.5

Scale ranges
0 ... 0.6 to 0 ... 400 bar (NS 160: max. 40 bar)
or all other equivalent vacuum or combined pressure and vacuum ranges

Pressure limitation
Steady: 3/4 x full scale value
Fluctuating: 2/3 x full scale value
Short time: Full scale value

Permissible temperature
Ambient: -20 ... +60 °C
Medium: +60 °C maximum

Temperature effect
When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. ±0.4 %/10 K of the span

Data sheets showing similar products:
Back mount; model 111.12; see data sheet PM 01.09
Panel mounting series, back mount; model 111.16; see data sheet PM 01.10

WIKA
Part of your business

Standard version

Process connection
Copper alloy,
lower mount (LM)
NS 40: G 1/8 B (male), 14 mm flats
NS 50,63: G 1/4 B (male), 14 mm flats
NS 80, 100, 160: G 1/2 B (male), 22 mm flats

Pressure element
Copper alloy
C-type or helical type

Movement
Copper alloy

Dial
NS 40, 50, 63: Plastic, white, with pointer stop pin
NS 80, 100, 160: Aluminium, white, with pointer stop pin
Black lettering, red mark pointer with measuring ranges 0 ... 0.6 to 0 ... 60 bar

Pointer
Plastic, black
NS 160: Aluminium, black

Case
Plastic, black
NS 160: Steel, black

Window
Plastic, crystal-clear, snap-fitted in case
NS 160: Instrument glass

Bezel ring
without
NS 160: Steel, black

Options

- Other process connection
- Sealings (model 910.17, see data sheet AC 09.08)
- Accuracy class 1.6
- Case steel, black, for NS 40, 50 and 63 with blow-out device
- Surface mounting flange (not with NS 40 and 50)

Special versions

For closed heating systems
NS 63, 80
with red mark pointer and adjustable green sector, scale ranges 0 ... 4 bar, red mark at 2.5 or 3 bar

For heating systems
NS 80, 100, 160
Scale ranges 0 ... 0.6 or 0 ... 1 bar, with retard scale spacing and red mark pointer

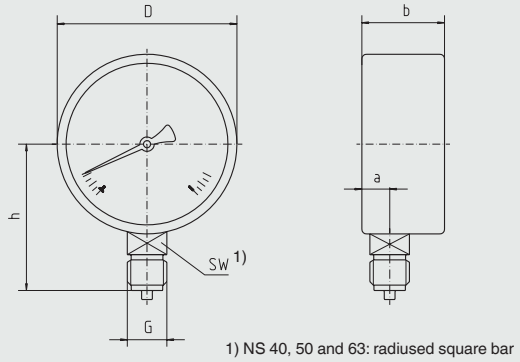
For refrigeration plants
NS 63, 80
with additional temperature scale for refrigerants in °C, refrigerants: R 12, R 22, R 502, R 404 a or R 134 a

For water-level indication (hydrometer)
NS 80, 100, 160
Scale ranges 0 ... 0.6 to 0 ... 40 bar, with second scale in mWS

Dimensions in mm

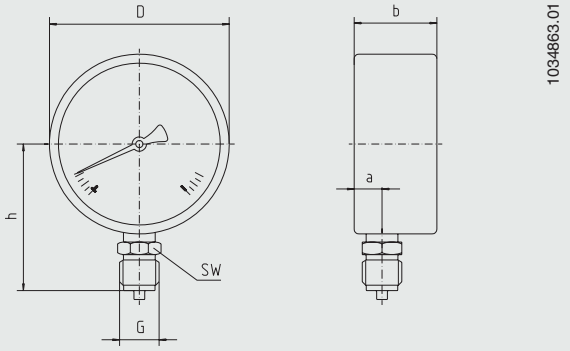
Standard version

40, 50, 63 and 160 mm



1) NS 40, 50 and 63: radiused square bar

80 and 100 mm



NS	Dimensions in mm						Weight in kg
	a	b ±0.5	D	G	h ±1	SW	
40	9.5	26	39	G ⅛ B	36	14	0.08
50	10	27.5	49	G ¼ B	45	14	0.10
63	9.5	27.5	62	G ¼ B	53.5	14	0.13
80	11.5	30	79	G ½ B	72	22	0.18
100	11.5	30.5	99	G ½ B	83.5	22	0.21
160	15.5	42	160	G ½ B	115.5	22	0.85

Process connection per EN 837-1 / 7.3

CE conformity

Pressure equipment directive
97/23/EC, PS > 200 bar, module A, pressure accessory

Approvals

- **GOST**, metrology/measurement technology, Russia
- **GOST-R**, import certificate, Russia
- **CRN**, safety (e.g. electr. safety, overpressure, ...), Canada

Certificates 1)

- 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)
- 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)

1) Option

Approvals and certificates, see website

Ordering information
Model / Nominal size / Scale range / Connection size / Options

© 2005 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.
The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de

Bourdon tube pressure gauge
Model 213.53, liquid filling, stainless steel case

Applications

- For measuring points with high dynamic pressure loads or vibrations
- For gaseous and liquid media that are not highly viscous or crystallising and will not attack copper alloy parts
- Hydraulics
- Compressors, shipbuilding

Special features

- Vibration and shock resistant
- Especially sturdy design
- NS 63 and 100 with German Lloyd and Gosstandart approval
- Scale ranges up to 0 ... 1000 bar

Bourdon tube pressure gauge, model 213.53.100, lower mount

Description

Design
EN 837-1

Nominal size in mm
50, 63, 100

Accuracy class
NS 50, 63: 1.6
NS 100: 1.0

Scale ranges
NS 50: 0 ... 1 to 0 ... 400 bar
NS 63, 100: 0 ... 0.6 to 0 ... 1000 bar
or all other equivalent vacuum or combined pressure and vacuum ranges

Pressure limitation

NS 50, 63:	Steady:	3/4 x full scale value
	Fluctuating:	2/3 x full scale value
	Short time:	Full scale value
NS 100:	Steady:	Full scale value
	Fluctuating:	0.9 x full scale value
	Short time:	1.3 x full scale value

Permissible temperature
Ambient: -20 ... +60 °C
Medium: +60 °C maximum

Temperature effect
When the temperature of the measuring system deviates from the reference temperature (+20 °C):
Max. ±0.4 %/10 K of the span

Ingress protection
IP 65 per EN 60529 / IEC 529

Data sheets showing similar products:
Standard version with liquid filling; model 113.53; see data sheet PM 01.08

WIKA
Part of your business

Process connection
Cu-alloy,
lower mount (LM) or back mount (BM),
NS 50, 63: G ¼ B (male), 14 mm flats
NS 100: G ½ B (male), 22 mm flats

Pressure element
NS 50, 63:
< 60 bar: Cu-alloy, C-type
≥ 60 bar: Cu-alloy, helical type
NS 100:
< 100 bar: Cu-alloy, C-type
≥ 100 bar: Stainless steel 316L, helical type

Movement
Cu-alloy

Dial
NS 50, 63: Plastic ABS, white, with pointer stop pin
NS 100: Aluminium, white, black lettering

Pointer
NS 50, 63: Plastic, black
NS 100: Aluminium, black

Window
Plastic, crystal-clear

Case
Natural finish stainless steel, with pressure relief at case circumference, 12 o'clock.
O-ring seal between case and connection.
Scale ranges ≤ 0 ... 16 bar with compensating valve to vent case.

Bezel ring
Crimp ring, glossy finish stainless steel, triangular bezel

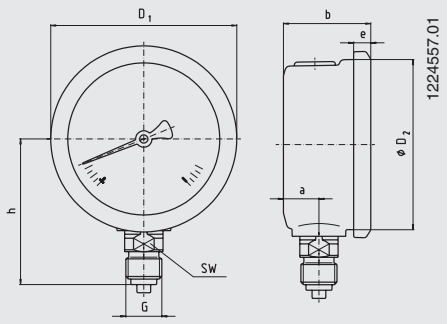
Filling liquid
Glycerine 99.7 %

Options

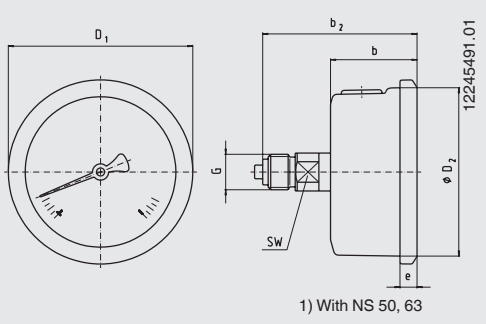
- Measuring system and movement from stainless steel (model 233.53)
- NS 100: Zero adjustment (in front)
- Increased medium temperature with special soft solder
  - NS 50, 63: 100 °C
  - NS 100: 150 °C
- Ambient temperature resistant -40 ... +60 °C with silicone oil filling
- Panel mounting flange, stainless steel, for back connection
- Surface mounting flange, stainless steel (not NS 50)
- Mounting clamp (for back connection)

Dimensions in mm

Lower mount (LM)

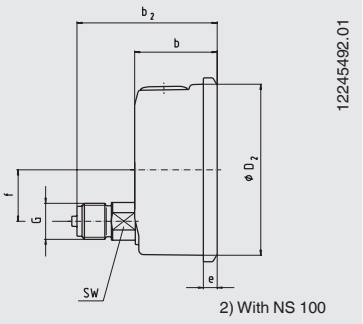


Centre back mount (CBM) 1)



1) With NS 50, 63

Lower back mount (LBM) 2)



2) With NS 100

NS	Dimensions in mm										Weight in kg
	a	b ± 0.5	b_2 ± 0.5	D_1	D_2	e	f	G	h ± 1	SW	
50	12	30	55	55	50	5.5	-	G ¼ B	48	14	0.15
63	13	32	56	68	62	6.5	-	G ¼ B	54	14	0.21
100	15.5	48	81.5	107	100	8	30	G ½ B	87	22	0.80

Process connection per EN 837-1 / 7.3

Ordering information
Model / Nominal size / Scale range / Connection size / Connection location / Options

© 2008 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.
The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. (+49) 9372/132-0
Fax (+49) 9372/132-406
E-mail info@wika.de
www.wika.de

05/2011 GB

Operating Instructions **GB**

Pressure Gauges

Examples:

Model 213.40

Model 432.36, Overpressure safety up to 400 bar

Model 732.14, Overpressure safety up to 400 bar

WIKA

Part of your business

Notes in accordance with Pressure Equipment Directive 97/23/EC

- The pressure gauges are "pressure accessories" in accordance with Article 1, Paragraph 2.1.4
- The volume of the pressure bearing housings of WIKA pressure gauges is < 0.1 L
- The pressure gauges carry CE marking for Fluid Group 1G in accordance with Annex 2, Table 1 when their permissible working pressure exceeds 200 bar

Pressure gauges that do not carry the CE mark are manufactured in accordance with Article 3, Paragraph 3 "Sound engineering practice".

Applied standards

EN 837-1	Bourdon tube pressure gauges, dimensions, metrology, requirements and testing
EN 837-2	Selection and installation recommendations for pressure gauges
EN 837-3	Diaphragm and capsule pressure gauges, dimensions, metrology, requirements and testing

Specifications: see data sheet on www.wika.de

Subject to technical modifications.

© WIKA Alexander Wiegand SE & Co. KG 2009

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg • Germany
Tel. (+49) 93 72/132-0
Fax (+49) 93 72/132-406
E-Mail info@wika.de
www.wika.de

2408976.03 02/2010

1. Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate pressure gauge has been selected in terms of measuring range, design and suitable wetted material (corrosion) for the specific measuring conditions. In order to guarantee the measuring accuracy and long-term stability specified, the corresponding load limits must be observed.

Only qualified persons authorised by the plant manager are permitted to install, maintain and service the pressure gauges.

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

After an external fire, pressure media can leak out, particularly at soft solder joints. All gauges must be checked and, if necessary, replaced before recommissioning the plant.

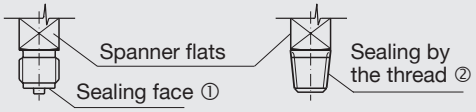
Non-observance of the respective regulations can result in serious injury and/or damage to equipment.

2. Mechanical connection

In accordance with the general technical regulations for pressure gauges (e.g. EN 837-2). When screwing the gauges in the force required for this must not be applied through the case or terminal box, rather only through the spanner flats provided for this purpose (using a suitable tool).

Mounting with spanner

Correct sealing of pressure gauge connections with parallel threads ① must be made using suitable sealing rings, sealing washers or WIKA profile seals. The sealing of tapered threads (e.g. NPT threads) is made by providing the thread ② with additional sealing material such as, for example, PTFE tape (EN 837-2).



The torque depends on the seal used. Connecting the gauge using a clamp socket or a union nut is recommended, so that it is easier to orientate the gauge correctly. When a blow-out device is fitted to a pressure gauge, it must be protected against being blocked by debris and dirt. With safety pressure gauges (see dial symbol Ⓢ) it must be ensured that the free space behind the blow-out back is at least 15 mm.

After mounting, set the compensating valve (if available) from CLOSE to OPEN.
With models 4 and 7, do not open the flange mounting screws.

Requirements for the installation point

If the line to the gauge is not sufficiently rigid for vibration-free mounting, a pipe-support bracket should be used to secure it (possibly via a flexible capillary). If vibration cannot be prevented through suitable installation, liquid-filled gauges should be used. The instruments should be protected against coarse dirt and wide fluctuations in ambient temperature.

3. Permissible ambient and operating temperatures

When mounting the pressure gauge it must be ensured that, taking into consideration the influence of convection and heat radiation, no deviation above or below the permissible ambient and medium temperatures can occur. The influence of temperature on the display accuracy must be observed.

4. Storage

The pressure gauge should be kept in its original packing until installation. The gauge should be protected from external damage during storage. Storage temperature range: -40 ... +70 °C. Protect the gauges from humidity and dust.

5. Maintenance / Repairs

The instruments are maintenance-free. Checks should be carried out on a regular basis to ensure the measuring accuracy of the pressure gauge. The checks or recalibrations must be carried out by qualified skilled personnel with the appropriate equipment.
When dismounting, close the compensating valve (if available).

WARNING!
Residual media in dismounted pressure gauges can result in a risk to personnel, the environment and equipment. Take sufficient precautionary measures.

Pressure switch hex 27

Changeover switch with silver or gold contacts

- *Easily adjustable switching point.*
- *Factory adjustable hysteresis (except type 0140/0141) [1].*
- *High overpressure safety and long life even under harsh operating conditions.*
- *Ready-wired versions with your desired connectors (see p. 38).*
- *Deliverable with socket device or protective cap according to IP65.*

[1] *Our pre-set switches are sealed with lacquer paint and the set pressure is embossed on the body.*

Technical data

Temperature stability for diaphragm / seal materials:	NBR EPDM FKM Silicone HNBR	-40°C – +100°C -30°C – +120°C -5°C – +120°C -40°C – +120°C -30°C – +120°C
Switching frequency:	200 / min.	
Mechanical life expectancy:	10^6 cycles (life expectancy of diaphragm pressure switches only for pressures up to max. 50 bar)	
Pressure rise rate:	≤ 1 bar / ms	
Hysteresis (Only preset at factory):	adjustable average value 10-30% depending on type Type 0140/0141 not adjustable	
Vibration resistance:	10 g / 5 – 200 Hz sine-wave	
Shock resistance:	294 m / s^2; 14 ms half-sine-wave	
Degree of protection:	IP65 with suitable connector installed terminals IP00	
Weight in grams:	0140 / 0141 0170 / 0171, 0180 / 0181, 0183, 0186, 0187, 0190 / 0191, 0196, 0197	approx. 100 g
	0184 / 0185, 0194 / 0195	approx. 130 g

Electrical values

Rated operating voltage U_e	Rated operational current I_e		Utilisation category[2]
250 Volt AC 50 / 60 Hz	4 Ampere	(2 Ampere)[1]	AC 12
250 Volt AC 50 / 60 Hz	1 Ampere		AC 14
24 Volt DC	4 / 2 Ampere	(2 / 1 Ampere)[1]	DC 12 / DC 13
50 Volt DC	2 / 1 Ampere	(1 / 0.5 Ampere)[1]	DC 12 / DC 13
75 Volt DC	1 / 0.5 Ampere	(0.5 / 0.25 Ampere)[1]	DC 12 / DC 13
125 Volt DC	0.3 / 0.2 Ampere	(0.2 / 0.1 Ampere)[1]	DC 12 / DC 13
250 Volt DC	0.25 / 0.2 Ampere	(0.15 / 0.1 Ampere)[1]	DC 12 / DC 13
Rated insulation voltage U_i:	300 Volt		
Rated operating current U_{imp}:	2.5 kV	(4 kV) [1]	
Rated thermal current I_{the}:	5 Ampere		
Switching overvoltage:	< 2.5 kV		
Rated frequency:	DC and 50 / 60 Hz		
Short circuit current rating of the device:	to 5 Ampere	(to 3.5 Ampere)[1]	
Rated short-circuit current:	< 350 Ampere		
IP class of protection according to EN60529:1991+A1:1999:	IP65 with socket device		
Tightening torque of terminal screws:	< 0.35 Nm (concerns only type 0140 / 0141, 0184 / 0185, 0194 / 0195)		
Cable diameter:	0.5 – 1.5 mm²		

[1] Figures in brackets for series 0140 / 0141
[2] Explanations see page 9

Switching performance and materials overview

Type	0140	0141	0170	0171	0180	0181	0183	0184	0185	0186	0187	0190	0191	0194	0195	0196	0197
24 V												■	■	■	■	■	■
42 V			■	■													
250 V	■	■			■	■	■	■	■	■	■						
50 mA												■	■	■	■	■	■
2 A	■	■															
4 A			■	■	■	■	■	■	■	■	■						
Gold contacts												■	■	■	■	■	■
Silver contacts	■	■	■	■	■	■	■	■	■	■	■						
Adjustable hysteresis			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Zinc-plated steel (CrVI-free)	■	■	■	■	■	■	■	■	■			■	■	■	■		
Stainless steel 1.4305										■	■					■	■
DIN–socket device								■	■					■	■		

CE marking

SUCO pressure switches rated with an operating limit of 250 V are covered by the Low Voltage Directive 73/23/EC.

An EC Declaration of Conformity has been issued for these pressure switches and is on file at our offices. The corresponding switches bear the CE mark in our catalogue.

Degree of protection IPXX

The type approval does not apply without restriction to all environmental conditions. It is the responsibility of the user to check whether the electrical connection complies with regulations other than those stated and whether it can be used for special applications which could not be foreseen by us.

Oxygen warning!

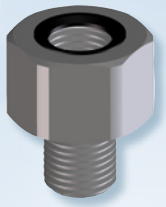
When using oxygen, the relevant safety regulations must be observed. In addition, we recommend that a maximum operating pressure of 10 bar (50 bar for stainless steel enclosures) must not to be exceeded.

Pressure switch hex 27

Accessories and applications

- Socket device IP65 or rubber capped IP54 for increased protection
- Easy installation with mountable socket device
- Thread adapters for special threads

hex 27 accessories

				
	Rubber protective cap with two cable feeds for 1.7 to 2.3 mm diameter cable **When rubber cap attached IP54** Suitable for voltages up to 42 V	**Socket device** Threaded connection Pg9 (Tightening range 6 - 9 mm) **When attached to socket device IP65** Suitable for voltages up to 250 V	**Socket device with indicator light** According to DIN EN 175301- 803-A (DIN 43650) Threaded connection Pg9 (Tightening range 6 - 9 mm) **When attached to socket device IP65** Suitable for 24 V or 250 V	**Thread adapter for special threads** from G1/4-DIN3852-E to R1/4 acc. to DIN 2999 including FKM seals
0170 / 0171	■	■		■
0180 / 0181	■ (Up to max 42 V)	■		■
0183	■ (Up to max 42 V)	■		
0184 / 0185			■ 24 V or 250 V (upon request) see also page 33	■
0190 / 0191	■	■		■
0194 / 0195			■ (24 V on request) also see page 35	■
0186 / 0187	■ (Up to max 42 V)	■		■
0196 / 0197	■	■		■
Order number:	**1-1-70-621-007**	**1-1-80-652-002**	**24 VDC: 1-1-84-652-011** **250 VAC: 1-1-84-652-010**	**1-1-00-420-009**

0186/0187

Diaphragm / piston pressure switches 250 V with stainless steel body

- Stainless steel (1.4305 / AISI 303) body
- With changeover switch and silver contacts
- Max. voltage 250 V
- Overpressure safe up to 300/600 bar[1)]
- Hysteresis adjustable at works

With male thread

$p_{max.}$ in bar	Adjustment range in bar	Tolerance at room temperature	Thread	Order number:			
0186 Diaphragm pressure switch with spade terminals							
300[1)]	0.5 – 5	± 0.2	G 1/4	0186	457 03	X	003
	1 – 10	± 0.5		0186	458 03	X	006
	10 – 50	± 3.0		0186	459 03	X	009
	10 – 100	± 3.0 – 5.0		0186	461 03	X	012
0187 Piston pressure switch with spade terminals							
600[1)]	50 – 200	± 5.0	G 1/4	0187	460 03	X	003

Diaphragm / seal material – areas of application

NBR	Hydraulic / machine oil, heating oil, air, nitrogen etc.	1
EPDM	Water[2)], Brake fluid, ozone, acetylene, hydrogen etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline etc.	3

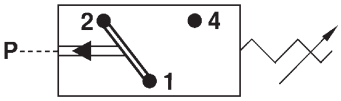
Temperature ranges of diaphragm / seal materials see page 26

[2)] Not recommended for piston pressure switches.

Order number:	018X – XXX 03 – X – XXX

Piston pressure switches are only to a limited extent suitable for use with gases.
See explanation on page 9.

- *Our pressure switches are also available with factory pre-set switching points.*
- *Ready-wired versions can be found starting on page 38 following.*
- *We offer other body materials and connecting threads upon request.*
- *Other diaphragm- / seal materials are available on request, e.g. HNBR or silicone for diaphragm pressure switches.*
- *For further technical data see page 26/27.*



Accessories see page 28

[1)] Static pressure, dynamic pressures should be 30 to 50% lower. These values refer to the hydraulic or pneumatic part of the pressure switch.

Operating Instructions

Please keep carefully for future use

Diaphragm-/ Piston Pressure Switch Series 0180/0181 Series 0183 Series 0186/0187

GB

Installation and commissioning must be carried out in accordance with these Operating Instructions and by authorized, qualified personnel only.

SUCO Robert Scheuffele GmbH & Co. KG
Keplerstraße 12-14
74321 Bietigheim-Bissingen, Germany
Phone: + 49-7142-597-0
Fax: + 49-7142-980151
e-Mail: info@suco.de
www.suco.de

Operation and use

The series 0180/0181, 0183 and 0186/0187 switch opens or closes an electrical circuit when a certain (adjustable) pressure is reached. A diaphragm or piston is moved by the increase in pressure. The amount of diaphragm deflection or piston travel depends on the force of the pressure applied and the (adjustable) spring tension. At a predetermined deflection of the diaphragm or movement of the piston, a microswitch is actuated which opens or closes the electrical contacts (changeover).

The pressure switch monitors a preset pressure.

Conditions governing the use of the product

The following general instructions are to be observed at all times to ensure the correct, safe use of the pressure switch:

- Observe without fail the warning notices and other instructions laid down in the operating instructions.
- Observe the applicable safety regulations laid down by the regulatory bodies in the country of use.
- Use the switch only for monitoring fluid and gaseous medias.
- Do not exceed the specified limits for e.g. pressures, forces, moments or temperatures under any circumstances.
- Give due consideration to the prevailing ambient conditions (temperature, atmospheric humidity, atmospheric pressure, etc.).
- Never expose the pressure switch to severe side impacts or vibrations.
- Use the product only in its original condition. Do not carry out any unauthorized modifications.
- Remove all items providing protection in transit such as foils, caps or cartons.
- Disposal of the above-named materials in recycling containers is permitted.

Operating conditions

Media temperatures other than room temperature (20 °C):

- The effects of extreme temperatures (relative to room temperature) can lead to pronounced variations in the switching point or the failure of the vacuum switch.

Type of protection IP65:

Type testing does not apply to all ambient conditions without limitations. The user is responsible for verifying that the plug-and-socket connection complies with the specified rules and regulations of CE, or whether it may be used for specialized purposes other than those intended by us.

Use with oxygen:

Diaphragm Pressure Switch:

If oxygen is used, the applicable accident prevention regulations must be observed. In addition, we recommend a maximum operating pressure of 10 bar (series 0180) or 50 bar (series 0186), which should not be exceeded.

Piston Pressure Switch:

Piston Pressure Switches are **not** suitable for gaseous media, particulary oxygen.

Protection against overpressure:

The static overpressure safety is included in the technical data.
The overpressure safety corresponds to the hydraulic, pneumatic part of the pressure switch. The dynamic rating of the overpressure safety is smaller than 30 to 50%.

Technical data

Rated operating voltage U_e	Rated operating current I_e	Utilization category
250 Volt AC 50/60 Hz	4 Ampere	AC 12
250 Volt AC 50/60 Hz	1 Ampere	AC 14
30 Volt DC	4 / 4 Ampere	DC 12 / DC 13
50 Volt DC	2 / 1 Ampere	DC 12 / DC 13
75 Volt DC	1 / 0.5 Ampere	DC 12 / DC 13
125 Volt DC	0.3 / 0.2 Ampere	DC 12 / DC 13
250 Volt DC	0.25 / 0.2 Ampere	DC 12 / DC 13

Rated insulation voltage U_i :	300 Volt
Rated surge capacity U_{imp} :	2,5 kV
Rated thermal current I_{the}:	5 Ampere
Switching overvoltage:	< 2.5 kV
Rated frequency:	DC and 50/60 Hz
Rated current of short-circuit protective decvice:	Up to 5 Ampere
Rated short-circuit current:	< 350 Ampere
IP protection to EN 60 529:1991:	IP65 with plug
Tightening torque for terminal screws:	< 0.35 Nm
Conductor size:	0.5 to 1.5 mm^2
Operating frequency:	< 200 min^{-1}
Switching hysteresis:	10 to 30% adjustable at works
Mechanical life Diaphragm type: Piston type:	 10^6 operating cycles (at trip pressures up to 50 bar) 10^6 operating cycles
Body material Serie 0180/0181/0183: Serie 0186/0187:	 Zinc-plated steel (Fe//ZnNi(12)6//A/T2) stainless steel (1.4305)
Temperature range:	NBR -30 °C to +100 °C EPDM -30 °C to +120 °C FKM -5 °C to +120 °C
Overpressure safety Diaphragm Pressure Switch: (0180/0186): Piston Pressure Switch (0181/0183/0187):	 100 bar (0.3 to 1.5 bar, 1 to 10 bar) 300 bar (1 to 10 bar with ending No. 040, 041, 042, 340, 341, 342 and residual pressure ranges) 600 bar

Operating controls and connections

Fig. 1

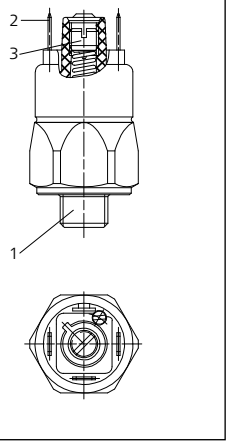
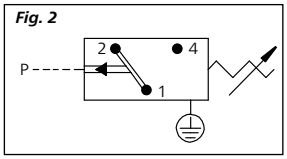


Fig. 2



(1) Pressure connection

(2) Electrical connection (AMP 6.3 x 0.8)

(3) Switching point adjusting screw

Installation

Mechanical, pneumatic, hydraulic

With a size 27 open-ended wrench (to DIN 894 or similar), install the pressure switch, by means of the hexagon connector, in the corresponding pressure socket (for torque specification, see following table).

☞ For sealing the system, use a standard copper gasket of the appropriate dimensions.

Commecting thread	Torque
M10x1taper and NPT 1/8	Tighten until system is hermetically sealed
M10x1straight	35 Nm
Others	45 Nm

Electrical:

Connect up the pressure switch in accordance with the circuit diagram (Fig. 2).

☞ Use a connector type 1-1-80-652-002 (not included in the delivery).

Entry into service

1. Using a continuity tester, wire up the electrical connecitons 1 and 4 (Fig. 2).

☞ If using a testing lamp as a continuity tester, observe the maximum permissible switching capacity (see Technical Data).

2. First, screw in the adjusting screw (3) as far as it will go. To adjust the pressure switch, use a screwdriver with a 6,3 mm wide blade.

☞ Take care to ensure that the adjusting screw (3) does not seize at any point other than when it is fully tightened down.

3. Adjust the pressure switch to the desired actuating pressure (a test pressure gauge is required).
4. Ease off the adjusting screw (3) to a sufficient extent to cause the pressure switch to trip (continuity tester reacts).
5. If necessary, adjust the trip pressure setting by turning the adjusting screw (3).

⚠ When putting the pressure switch into service, please observe the applicable safety regulations laid down by the governing bodies in the country of use.

☞ The adjustment of hysteresis can only be carried out in the factory. If this is unexpertly undertaken, damage may be caused to the pressure swich.

Removing the pressure switch

When removing the pressure switch, observe the following important instructions:

- The pressurized system from which the pressure switch is intended to be removed must be entirely relieved of pressure.
- All the relevant safety regulations must be observed.
- Use a size 27 open-ended wrench (to DIN 894 or similar), to remove the pressure switch.

Art.-No.: 1-1-80-628-014.A 08/08

Continuing development sometimes necessitates specification changes without notice.

Key to drawings:

⚠ Caution ☞ Note ♻ Recycling Danger

Operating Instructions

Please keep carefully for future use

Connector
1-1-80-652-002

GB

Installation and commissioning must be carried out in accordance with these Operating Instructions and by authorized, qualified personnel only.

CE

SUCO Robert Scheuffele GmbH & Co. KG
Keplerstraße 12-14
74321 Bietigheim-Bissingen, Germany
Phone: + 49-7142-597-0
Fax: + 49-7142-980151
e-Mail: info@suco.de
www.suco.de

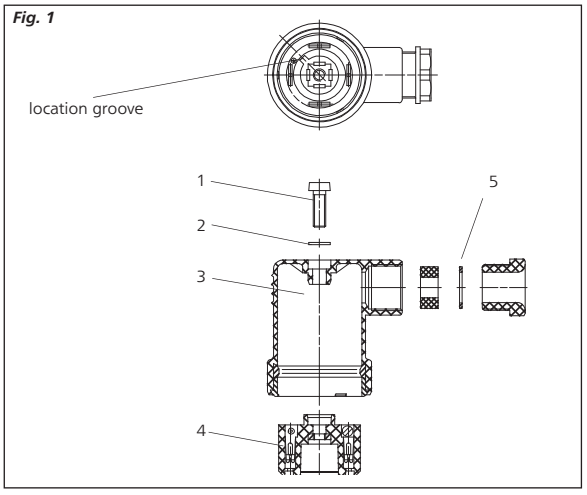
Conditions governing the use of the product

The following general instructions are to be observed at all times to ensure the correct, safe use of the pressure switch:

- Observe the applicable safety regulations laid down by the regulatory bodies in the country of use.
- Observe without fail the warning notices and other instructions laid down in the operating instructions.
- Remove all items providing protection in transit such as foils, caps or cartons.
- Disposal of the above-named materials in recycling containers is permitted.

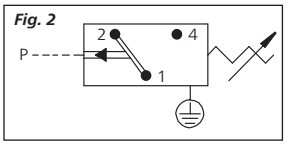
Operating controls and connections

Fig. 1



(1) Fastening screw
(2) Gasket
(3) Plug housing
(4) Terminal board
(5) Pg gland

Fig. 2



Wiring up the connector

Take care to ensure that the cable is laid in such a way that it is not:

- pinched
- kinked
- under tension.

Connection to the connector:

1. Remove the fastening screw (1) from the head end taking care not to damage the gasket (2) (set aside carefully for future use).
2. Now remove the loosed terminal board (4) by pushing it out with a screw driver inserted from above through the fastening screw-hole (1). In this process, it is necessary to overcome the resistance exerted by the gasket.
3. Connect the cable (max. lead cross-section 1,5 mm²) to the screw terminals provided (Fig. 2).
4. Reinstall the terminal board (4) into the plug housing (3). Install the fastening screw (1) with gasket (2) and tighten securely.

Take care to ensure that the gasket (2) and Pg gland (5) are correctly installed, otherwise the conditions specified for protection category IP65 will not be met.

Installing the connector

During installation, take care to ensure that the locating groove engages the locating lug on the pressure switch. Push the connector onto the pressure switch until it locks in place.

Technical data

Rated insulation voltage U_i:	250 Volt
IP-protection to EN 60 529:1991:	IP65
Tightening torque for terminal screws:	< 0.35 Nm
Conductor size:	0.5 to 1.5 mm²
Cable screw coupling:	Pg 9
cable size:	6 to 9 mm

Continuing development sometimes necessitates specification changes without notice.

Key to drawings:

Caution Note Recycling Danger

RP2(E) Pressure switches explosion proof

All industrial environments

Reduced overall dimensions

Good vibration resistance

Resistant to short duration overpressure

LCIE 02 ATEX 6219X

CE 0081

II 2 G D
Ex d IIC T6 or T5 Gb
Ex t IIIC T80°C or T95°C Db IP6X
T°ambient : -20°C to +60°C (T6 or T80°C) or
-20°C to +70°C (T5 or T95°C)

Hazardous areas : 1, 2, 21, 22

These pressure switches maintain a constant pressure around a chosen set value: regulator action. They trigger an alarm or safety system, when the pressure reaches a critical pre-set value.

Important

Normal operation must be between 10% and 90% of the selected scale. The deadband values in the table overleaf are defined under these conditions.

Any pulsating circuit must be fitted with pulsation dampeners. Suitable separators must be used with incompatible process fluids.

Technical Data (20°C)

Fluids	All fluids compatible with the measuring element from -40...+150°C
Operating ambient temperature	From -20...+70°C
Storage temperature	From -40...+70°C
Reproducibility	±1% of F.S.
Minimum deadband	Depending on the type of microswitch used (see table overleaf)
Conform to CE	Low Voltage Directive DBT 73/23/CE Directive ATEX 94/9/CE (EN 60079-0, EN 60079-1, EN60079-31)
Protection class	IP 66, NF EN 60529
Weight	1.800 kg

Manufacturing

Explosion-proof housing	Epoxy painted aluminium housing
Wall mounting	2 CHC M6 x 16 screws
Earth connection	Via internal or external terminal block
Electrical connection	Via internal terminal block with the cable gland 3/4 NPT certified ATEX for cable Ø 7 to 12 mm
Graduated scale	Internal calibrated scale
Pressure connection	G 1/2
Measuring element	1.4404 s.s. (316 L) diaphragm

Options

Cable gland with metallic pipe inlet 1/2 NPT. ***Code 2177***

Cable gland with metallic pipe inlet M20 x 150 ***Code 2178***

Baumer

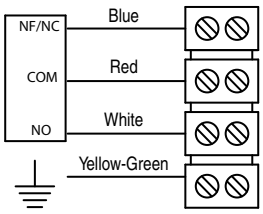
Adjustable ranges

Scale	Code	Max.P		MAXI FIXED DEADBAND						MINI-MAXI ADJUSTABLE DEADBAND	
				Standard (1xSPDT)		Standard (2xSPDT)		Gold contact / Tropicalised / Hermetically sealed		Adjustable	
		Permanent	Accidental	L		U		M / N	P	R	
				to 10 % of scale	to 90 % of scale	to 10 % of scale	to 90 % of scale	to 10 % of scale	to 90 % of scale	to 10 % of scale	to 90 % of scale
bar		bar		mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar
0 + 1	**41**	10	50	30	60	150	300	120	330	*	*
0 + 1,6	**42**			35	70	175	350	150	390	100 .. 200	200 .. 550
0 + 2,5	**43**			40	80	200	400	180	480	125 .. 230	250 .. 700
0 + 4	**44**			45	90	225	450	210	540	150 .. 290	320 .. 900
0 + 6	**45**			50	100	250	500	240	630	190 .. 350	420 .. 1200
0 + 10	**46**			55	110	275	550	300	750	260 .. 500	600 .. 1800
0 + 4	**51**	40	100	110	200	550	1000	600	1320	500 .. 1000	1250 .. 2000
0 + 6	**52**			110	235	550	1175	750	1620	550 .. 1100	1350 .. 2200
0 + 10	**53**			120	270	600	1350	840	2010	650 .. 1300	1500 .. 2600
0 + 16	**54**			130	305	650	1525	960	2370	800 .. 1600	1700 .. 3100
0 + 25	**55**			140	340	700	1700	1050	2730	1000 .. 2000	2000 .. 3900
0 + 40	**56**			150	380	750	1900	1140	3150	1400 .. 2800	2600 .. 5200
0 + 10	**61**	100	200	200	500	1000	2500	1500	3600	1000 .. 2000	3000 .. 6000
0 + 16	**62**			280	700	1400	3500	2100	3960	1150 .. 2300	3500 .. 7000
0 + 25	**63**			360	900	1800	4500	2700	5550	1350 .. 2700	4200 .. 8400
0 + 40	**64**			440	1100	2200	5500	3300	7350	1700 .. 3400	5350 ..10700
0 + 60	**65**			520	1300	2600	6500	3900	9600	2100 .. 4200	6900 ..13800
0 + 100	**66**			600	1500	3000	7500	4500	13200	3000 .. 6000	10000 ..20000

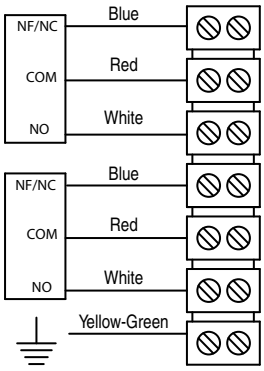
Cable identification, current rating

Cable identification

1 switch



2 switches



Current rating

Microswitch type SPDT

L	Standard Fixed deadband	0.4 A min.; 10 A max. 250 Vac max.
P	Hermetically ultra sensitive Fixed deadband	0.4 A min.; 2 A max. 30 Vdc max.
R	Adjustable deadband	0.4 A min.; 10 A max. 250 Vac max. 220 Vdc max.
U	2 contacts Fixed deadband	0.4 A min.; 10 A max. 250 Vac max. 220 Vdc max.
M	Gold contact Fixed deadband	10 mA min.; 50 mA max. 250 Vac max. 220 Vdc max.
N	Tropicalized Fixed deadband	0,1 A min.; 10A max. 250 Vac max. or 48 Vcc max.

***Important* : Maximum power dissipation in the case must not exceed 5 W**

Regulation

Pressure of regulator type RP2(E)

LCIE 02 ATEX 6219X

CE 0081

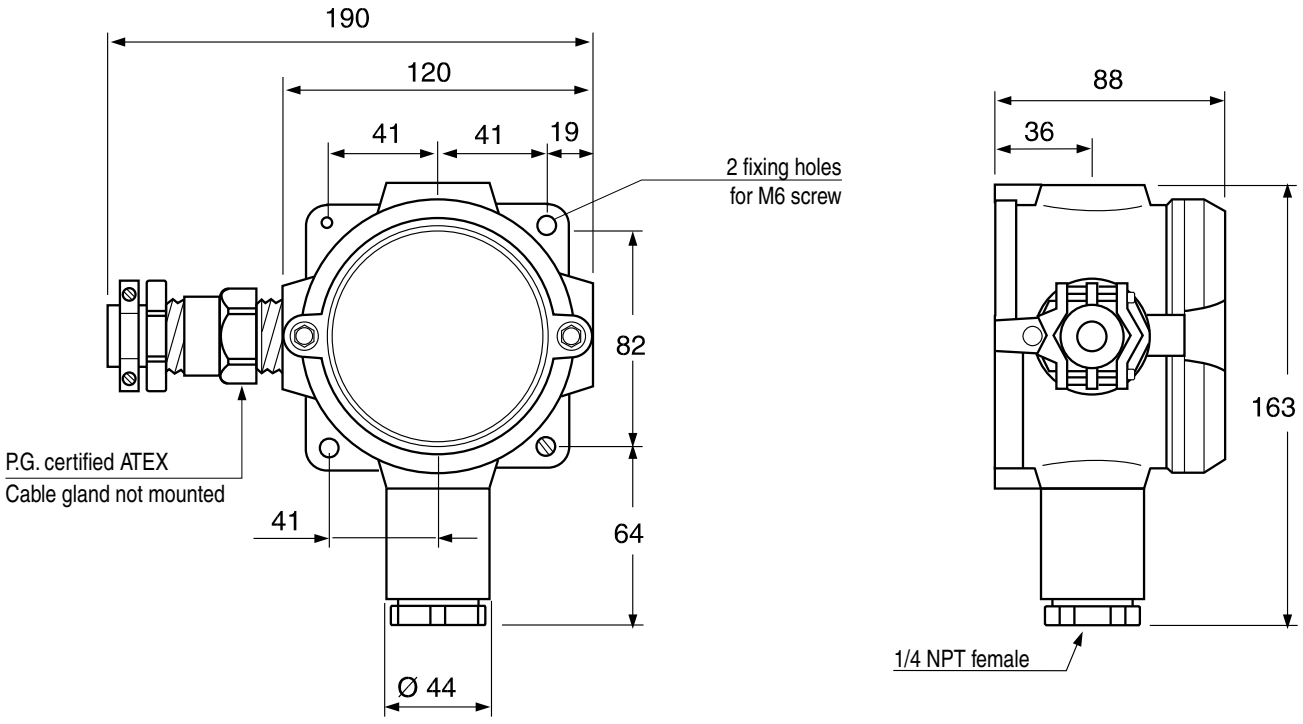
II 2 G D
Ex d IIC T6 or T5 Gb
Ex t IIIC T80°C or T95°C Db IP6X

DO NOT OPEN - LIVE VOLTAGE

-20°C ≤ Ta ≤ +70°C	**Dust IP65**	**Gases**
	T° surface	Class
Ta = 60°C	80°C	T6
Ta = 70°C	95°C	T5

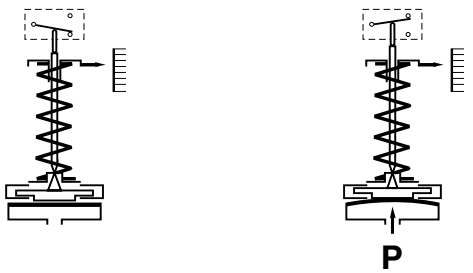
All necessary measures must be taken by the user, to avoid the calorific transfer from the fluid to the apparatus head increasing the head's temperature to such that it reaches the self-ignition temperature of the gas in which it is used.

Dimensions (mm)



Operating principle

A flexible diaphragm actuates a microswitch by means of a piston. The set point is adjusted by means of a compressible spring installed in opposition.



Options

Oxygen applicatione ***Code 0765***
Stainless steel tag plate and wire ***Code 9941***
Connection on pipe 2 " dia. ***Code 0407***
Adjustment of the set point ***Code SETP***

Ordering Details - RP2(E)

		RP2Exxxx
Model	**1´ digit**	
Pressure switch		R
Type	**2´...3´ digit**	
P2		P2
Type of protection	**4´ digit**	
Explosion-proof		E
Type of microswitch	**5´ digit**	
1 SPDT standard changeover switch		L
2 SPDT changeover switches		U
1 gold contact changeover switch		M
1 hermetically ultra sensitive changeover switch		P
1 adjustable changeover switch		R
1 Tropicalized changeover switch		N
Hydraulic connection	**6´ digit**	
G 1/2 male (standard version)		3
1/2 NPT male		6
1/4 NPT female		8
1/2 NPT female		N
Pressure range	**7´...8´ digit**	
See codes in table		xx

code	range in bar		
41	0	+	1
42	0	+	1.6
43	0	+	2.5
44	0	+	4
45	0	+	6
46	0	+	10
51	0	+	4
52	0	+	6
53	0	+	10
54	0	+	16
55	0	+	25
56	0	+	40
61	0	+	10
62	0	+	16
63	0	+	25
64	0	+	40
65	0	+	60
66	0	+	100

EN/2012-11-28 This data sheet may only be reproduced in full

FR NOTICE D'INSTRUCTIONS - Pressostat type RP2E, Thermostat RT2E à enveloppe antidéflagrante

Ces matériels ont été développés, fabriqués et contrôlés en accord avec les directives
94/9/CE (normes EN60079-0, EN60079-1, EN61241-0, EN61241-1) relatives aux matériels pour atmosphères explosives.
Ils sont du type a enveloppe antidéflagrante selon **l'attestation d'examen CE de type LCIE 02 ATEX 6219X**

Marquage
Les informations suivantes figurent sur le matériel :
-Baumer Bourdon-Haenni Vendôme France
-type du matériel:
-étendue de mesure
-n° de fabrication, date code de traçabilité et année
-**CE0081 et les références de l'homologation**
II2 G et D Ex d IIC T6 ou T5 Ex tD A21 T 80 °C ou T 95 °C IP6x
AVERTISSEMENT NE PAS OUVRIR SOUS TENSION

Montage
Le montage doit être effectué conformément aux règles de l'art en usage pour des installations classées en zone dangereuse et protection par enveloppe anti-déflagrante. Avant toute mise en service il est indispensable de s'assurer que le process et le fluide à mesurer par le pressostat ou le thermostat sont compatibles avec les exigences de ce mode de protection: Utilisation seulement en zone 1 ou 2 pour G 21 ou 22 pour D
1-La pression, la température et la nature du fluide à mesurer doivent être compatibles avec l'étendue de mesure du matériel (risque de destruction) et de ses matériaux .
2-La température ambiante doit être comprise entre –20°C et la classe T6 ou T5 . Toutes dispositions seront prises par l'utilisateur pour que le transfert calorifique du fluide vers la tête de l'appareil ne porte pas celle-ci à une température correspondant à la température d'auto inflammation du gaz dans lequel elle se trouve.
3-Les opérations de montage et ou démontage doivent se faire hors tension et à pression nulle et ceci pour éviter toute projection de fluide. Pour éviter toute brûlure, s'assurer que la température du process est dans une plage de température acceptable.
4-Laisser visible les étiquetages et marquages
5-La position de montage influence la mesure :Voir schéma.
6-Il est recommandé de protéger le pressostat ou thermostat de toutes influences d'environnements sévères (pulsations, coup de bélier, vibrations, chocs, source de chaleur, de la foudre, de l'humidité et des intempéries).
7-L'utilisateur doit s'assurer de l'étanchéité du raccordement en utilisant des joints appropriés et compatibles avec le fluide à mesurer.
8-Utiliser une clef de serrage adaptée aux dimensions des raccords. Ne jamais utiliser le boitier comme moyen de serrage.

Raccordement électrique :
Impérativement se conformer aux prescriptions du schéma . Les entrées de câbles (presse-étoupe ou conduit)doivent posséder leur propre agrément CE de type
Respecter le branchement du câble, à dégainer sur une longueur de 150mm, ainsi que les paramètres électriques, voir schéma.

Réglage à faire hors zone dangereuse à l'aide d'instruments de référence.
1er cas : L'appareil est réglé à une valeur de consigne spécifiée à la commande. Dans ce cas aucun réglage n'est nécessaire, l'appareil est utilisable en l'état.

2ème cas : L'appareil est réglé en milieu d'échelle. Pour un changement de valeur avec une clé plate de 10mm+clé pour 6 pans creux 1,5" :
Soumettre l'appareil à la pression ou à la température; dévisser la vis de blocage **VB**, voir schéma; à l'aide de l'échelle graduée **EG** et du repère **VR** ,visser ou dévisser ce dernier jusqu'au basculement du contact; revisser la vis de blocage **VB** : L'appareil est réglé. Vérifier le fonctionnement et le cas échéant retoucher à l'aide de **VR**
Pour les appareils à contacts "**R**" (écart réglable): Le réglage du point de consigne est identique à ci dessus, auquel s'ajoute une possibilité de réglage de l'écart entre l'ouverture et la fermeture du contact par action sur la molette du micro-rupteur, valeur croissante de **A** à **F**. Ce réglage ne modifie pas l'enclenchement du contact bas (consigne).
Ne jamais intervenir sur les réglages internes.

Démontage et maintenance
Ces opérations doivent être effectuées par un personnel qualifié .
Avant tout démontage s'assurer que le régulateur (P ou T) n'est plus alimenté électriquement, que le circuit hydraulique n'est plus sous pression et que la température ambiante permet un démontage sans brûlures. Protéger le plongeur contre les chocs.
Dans le cas d'un remontage, il est indispensable de vérifier si l'équipement à une utilisation sur circuit d'oxygène. Dans ce cas, ces opérations doivent être effectuées par un personnel prévenu, qualifié et disposant de moyens techniques appropriés.
Ne pas remonter le régulateur sur des fluides de nature différente (risque de réaction chimique voire d'explosion).
Remontage :Respecter les mêmes règles que celles préconisées lors du montage initial.
La maintenance, la vérification ou le re-étalonnage doivent être faits par un personnel habilité par Baumer Bourdon-Haenni, utilisant un équipement approprié.

UK USER INSTRUCTIONS - Pressure switch RP2E, Temperature switch RT2E Flameproof enclosure

These instruments were developed, manufactured and checked pursuant to directives:
94/9/CE (standards EN60079-0, EN60079-1, EN61241-0, EN61241-1) relating to the equipment for explosive atmospheres.
They are of flameproof enclosure type according to **EC type examination certificate LCIE 02 ATEX 6219X**

Marking
The following information is reproduced on the transmitter.
-Baumer Bourdon-Haenni Vendôme France
-Type of instrument
-Instrument range
-Serial number, date codes traceability and year
-**CE0081 and approval references**
II2 G or D Ex d IIC T6 or T5 Ex tD A21 T 80 °C or T 95 °C IP6x
WARNING DO NOT OPEN WHEN ENERGIZED

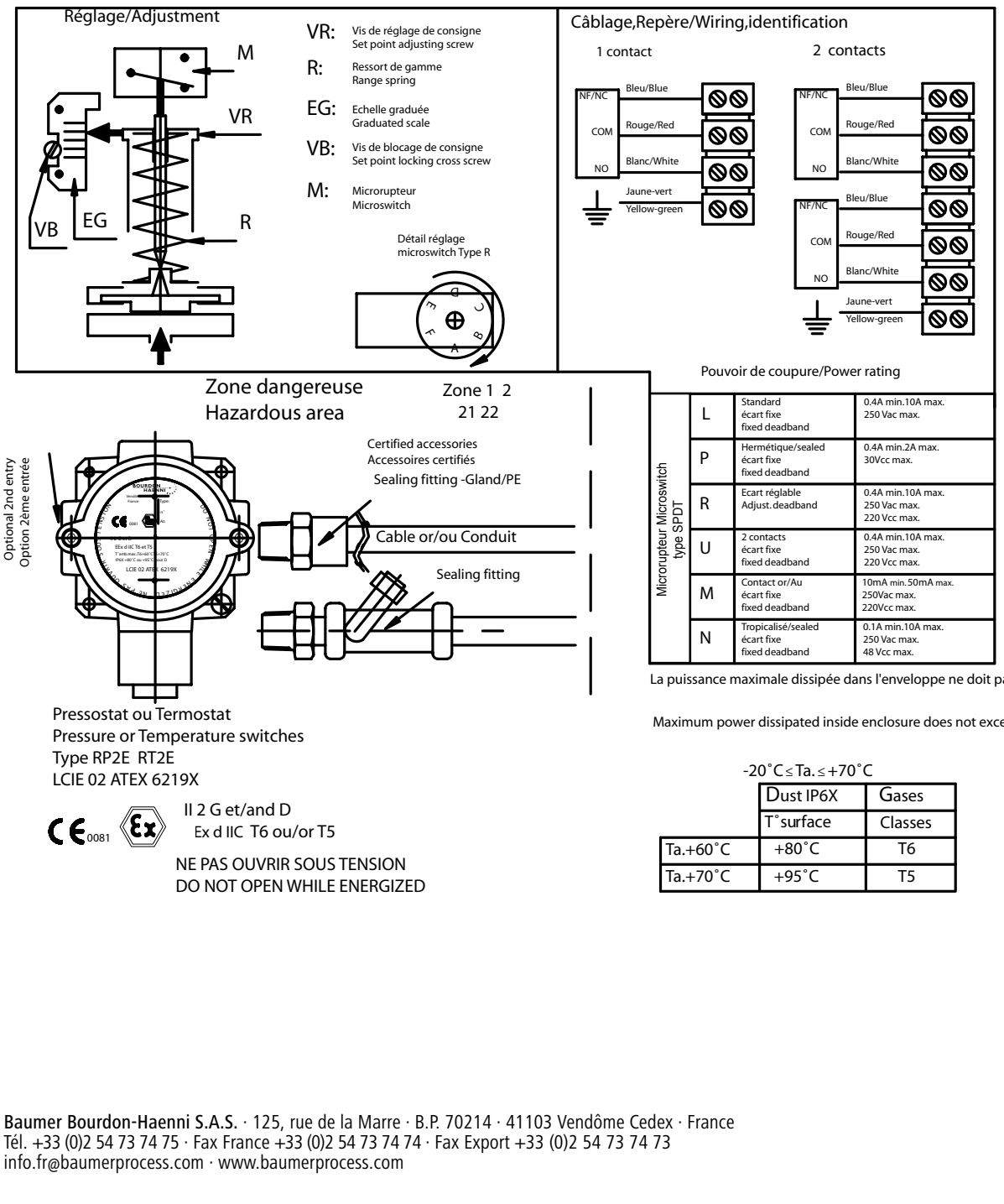
Assembly
The assembly should be carried out pursuant to state-of-the-art rules applicable to hazardous areas and protection by flameproof enclosure. Prior to putting the equipment into operation, it is essential to make sure the process and the fluid to be measured by the pressure or temperature switch are compatible with the requirements of this protection mode: use only in zone 1 or 2 for G 21 or 22 for D
1-The pressure, temperature and nature of the fluid to be measured should be compatible with the instrument range of the transmitter (risk of destruction) and its components.
2-The ambient temperature should range between –20°C and class T6 or T5. All necessary measures must be taken by the user, to avoid the calorific transfer from the fluid to the apparatus head increasing the head's temperature to such that it reaches the self-ignition temperature of the gas in which it is used.
3-The assembly and/or dismantling operations should be done idle and with no pressure whatsoever to avoid any projection of fluid. To avoid burns, make sure the process temperature is within specified temperature ranges.
4-Make sure labels and markings are visible.
5-The position of assembly influences the measurement, see diagram.
6-It is recommended to protect the switch from all severe environmental conditions (pulsations, water hammer, vibrations, shock, heat source, electric and magnetic fields, lightning, humidity and atmospheric influences).
7-The user will ensure the connection is watertight by using appropriate joints compatible with the fluid to be measured.
8-Use a spanner or wrench with the correct connection dimensions. **Never use the enclosure as a means for tightening.**

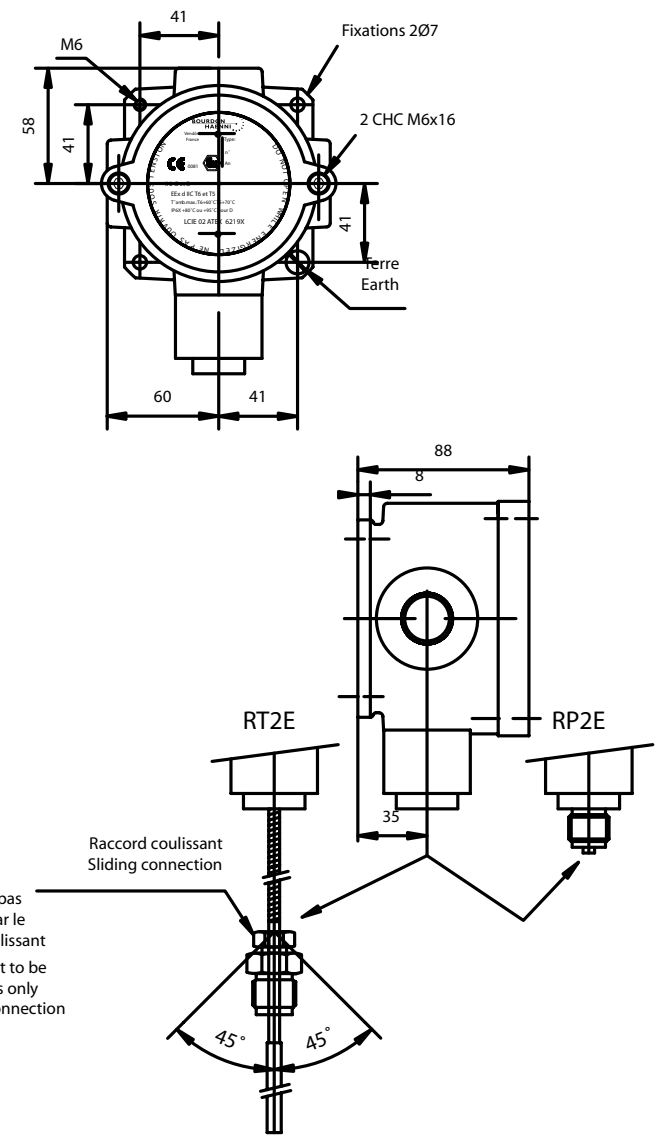
Electrical connection:
Follow diagram instructions to the letter. Conduit entries (packing glands or conduits) should bear their own EC acceptance certificate
Connect the cable, provide for 150mm unsheathing, and comply with the electric parameters – see diagram.

Adjustment to be performed with appropriate tools outside hazardous area.
1st possibility: the device is adjusted to a desired variable specified when placing the order. If so, no adjustment is required. The device can be operated as such.

2nd possibility: the device is adjusted at half of full-scale. To change the variable with a 10mm square wrench and clé pour 6 pans creux 1,5":
Subject the device to pressure or temperature. Unscrew the safety screw **VB**, see diagram; with the instrumental dial **EG** and the reference mark **VR**, screw or unscrew the latter until the contact point tilts; screw back on the safety screw **VB**: the device is now properly adjusted. Check proper functioning and, where necessary, readjust with **VR**.
As regards "**R**" contact devices (adjustable deviations): adjusting the desired variable is as above but in addition it is possible to adjust the deviation between the contact opening and closure by acting on the microswitch wheel, increasing values from **A** to **F**. This adjustment does not affect the triggering of the base contact (desired variable).
Never seek to adjust internal settings.

Dismantling and maintenance
Qualified staff will perform these operations.
Prior to dismantling make sure the Switch (P or T) is not electrically energized, the hydraulic system no longer under pressure and the ambient temperature allows dismantling without burning the operator. For temperature switches protect the measuring element against shock.
When reassembling, it is essential to check whether the equipment is used with an oxygen circuit. If so, a duly informed and qualified staff with appropriate technical means will perform these operations.
Do not reassemble the switch with fluids of a different nature (risk of chemical reaction or of explosion).
Re-assembly: comply with the same instructions as those recommended for initial assembly.
Maintenance, control or recalibration will be performed using appropriate tools by a staff duly authorised by Baumer Bourdon-Haenni.





Baumer Bourdon-Haenni S.A.S. · 125, rue de la Marre · B.P. 70214 · 41103 Vendôme Cedex · France
Tél. +33 (0)2 54 73 74 75 · Fax France +33 (0)2 54 73 74 74 · Fax Export +33 (0)2 54 73 74 73
info.fr@baumerprocess.com · www.baumerprocess.com

320095 ind e 02/2009

DE BETRIEBSANLEITUNG - Druckregler RP2E, Thermostat RT2E

Diese Geräte wurden nach den Vorgaben der Richtlinie
94/9/CE (EN60079-0, EN60079-1, EN61241-0, EN61241-1) entwickelt, hergestellt und geprüft.
Ex-Schutz nach **CE-Typ LCIE 02 ATEX 6219X Zertifikat.**

Kennzeichnung:
Folgende Angaben sind auf dem Gerät angebracht:
Baumer Bourdon-Haenni Vendôme Frankreich
- Gerätetyp:
- Messbereich
- Seriennummer, Datum (codiert) für Rückverfolgbarkeit und Baujahr
- **Kennzeichen CE0081 + Zulassungsnummer**

II2 G und D Ex d IIC T6 und T5 Ex tD A21 T 80 °C und T 95 °C IP6x
WARNUNG NICHT UNTER SPANNUNG ÖFFNEN

Montage:
Die Montage muss nach den technischen Regeln für Anlagen in gefährdeten Bereichen und Geräte mit Ex-Schutzgehäuse erfolgen. Vor der Inbetriebnahme unbedingt prüfen, ob der Prozess und das vom Druckregler bzw. Thermostat zu messende Medium den Anforderungen bzgl. Ex-Schutz entsprechen: Ausschließlich in Zone 1 oder 2 bei G 21 bzw. 22 bei D verwenden.
1-Der Druck, die Temperatur und die Art des Messstoffs müssen mit dem Messbereich des Geräts (Zerstörungsrisiko) und dessen Werkstoffen kompatibel sein.
2-Die Betriebstemperatur muss zwischen –20°C und der nach der spezifischen Eigensicherheit festgelegten Klasse T6 bzw. T5 betragen. Der Kunde nihmt alle Massnahmen damit der Messtoff die Temperatur des Gerätes nicht erhöht, damit der Messtoff nicht den Flammpunkt erreicht.
3-Ein- und Ausbau nur in spannungsfreiem und drucklosem Zustand vornehmen. Achtung: Um Verbrennungen zu vermeiden, vorher sicherstellen, dass die Temperatur des Messtoffs im zulässigen Temperaturbereich liegt.
4-Kennzeichnungen und Markierungen sichtbar lassen.
5-Die Einbaulage hat einen Einfluss auf das Messen: Siehe Zeichnung.
6-Es empfiehlt sich, den Druckaufnehmer vor starken Beanspruchungen (Druckpulsationen, Wasserschlag, Schwingungen, mechanische Schocks, Wärmequelle, Blitzschlag, Feuchtigkeit, Witterungseinflüsse usw.) zu schützen.
7-Der Anwender hat darauf zu achten, dass der Anschluss dicht ist. Dazu eine entsprechende Dichtung einsetzen, die mit dem Messstoff verträglich ist.
8-Verschraubung mit geeignetem Schlüssel anziehen. **Das Gerät nicht als Spannmittel verwenden.**

Elektroanschlüsse:
Die Angaben auf dem Schaltplan genau befolgen. Die Kabeleinführungen (Stopfbuchse oder Leitung) müssen ihre eigene CE-Typenzulassung haben
Die vorgeschriebenen Anschlüsse des Kabels (Kabelhülle über 150 mm entfernen) und die elektrischen Parameter befolgen (siehe Schaltplan).

Einstellungen – außerhalb der gefährdeten Zone bzw. durchführen.
Dazu geeignete Instrumente verwenden.
1 Fall : Das Gerät ist bereits werkseitig auf einen Wert voreingestellt, der bei der Bestellung angegeben wurde. In diesem Fall braucht keine Einstellung vorgenommen werden und das Gerät ist sofort einsatzbereit.

2 Fall : Das Gerät auf den mittleren Bereich eingestellt. Zum Verstellen des Werte einen Maulschlüssel Gr. 10 und clé pour 6 pans creux 1,5":
Gerät unter Druck und auf die vorgeschriebene Temperatur setzen, die Feststellschraube **VB** (siehe Zeichnung) lösen, mit der graduierten Skala **EG** und der Markierung **VR**, letztere auf- oder zuschrauben, bis der Kontakt schaltet und anschließend die Feststellschraube **VB** wieder anziehen: Das Gerät ist eingestellt. Danach das Gerät auf einwandfreie Funktion prüfen und ggf. die Einstellung mit **VR** wiederholen.
Bei Geräten mit Kontakten «**R**» (verstellbarer Abstand): ‚Die Einstellung des Sollwerts erfolgt wie oben beschrieben, aber zusätzlich besteht die Möglichkeit, den Abstand zwischen Öffnungs- und Schließstellung der Kontakte durch Drehen der Rändelschraube am Kleinschalter zu verstellen (zunehmender Wert von **A** bis **F**). Durch diese Verstellung wird das Auslösen des unteren Kontakts (Vorgabewert) nicht verändert.
Die internen Einstellungen auf keinen Fall verändern.

Ausbau und Wartung:
Diese Arbeiten sind von qualifizierten Fachkräften durchzuführen.
Vor dem Ausbau prüfen, ob das Gerät (Druckregler / Thermostat) elektrisch nicht mehr versorgt ist, der Messstoff nicht mehr unter Druck steht und die Umgebungstemperatur ausreichend abgesunken ist, um Verbrennungen zu vermeiden. Das Messteil vor Beschädigung durch mechanischen Schocks usw. schützen.
Beim Wiedereinbau unbedingt prüfen, ob das Gerät bei einer Sauerstoffanlage eingesetzt wird. Ist dies der Fall, dürfen die Arbeiten nur von qualifizierten Fachkräften vorgenommen werden, die speziell dazu geschult wurden und über die entsprechenden Geräte verfügen.
Das Gerät nicht an eine Anlage mit anderem Messstoff einbauen (Gefahr einer chemischen Reaktion oder sogar einer Explosion).
Wiedereinbau: Dieselben Vorschriften wie beim Ersteinbau befolgen.
Wartung, Prüfung und Neukalibrierung dürfen nur durch qualifizierte, von Baumer Bourdon-Haenni zugelassene Fachkräfte erfolgen, die über die entsprechenden.

ES INSTRUCCIONES DE USO - Presostato tipo RP2E, Termostato RT2E con funda antideflagrante

Estos materiales han sido desarrollados, fabricados y controlados de acuerdo con las directivas
94/9/CE (normas EN60079-0, EN60079-1, EN61241-0, EN61241-1), relativas a los materiales para atmósferas explosivas.
Son de tipo con funda antideflagrante según el certificado de examen **CE de tipo LCIE 02 ATEX 6219X**

Marcas
-En el material se encuentran las siguientes informaciones:
-Baumer Bourdon-Haenni Vendôme Francia
-El tipo de material
-Alcance de la medición
-nº de fabricación, fecha código de trazabilidad y año
-**CE0081 y las referencias de la homologación**
II2 G ó D Ex d IIC T6 ó T5 Ex tD A21 T 80 °C ó T 95 °C IP6x
ADVERTENCIA NO ABRIR ESTANDO ENERGIZADO

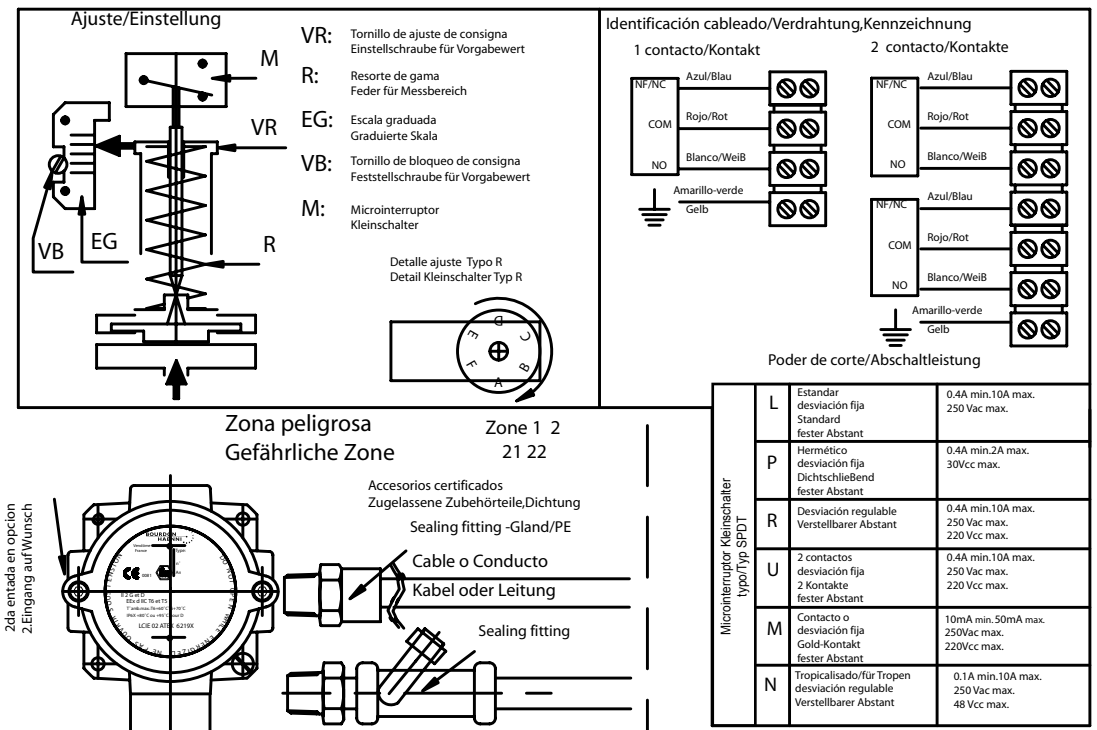
Montaje:
El montaje se debe realizar en conformidad con las reglas del arte en uso para instalaciones clasificadas en zona peligrosa y protección con funda antideflagrante. Antes de realizar la puesta en servicio, es imprescindible asegurarse de que el proceso y el fluido que el presostato o el termostato deben medir son compatibles con las exigencias de este modo de protección: Utilización únicamente en zona 1 ó 2 para G 21 ó 22 para D.
1-La presión, la temperatura y la naturaleza del fluido que se va a medir deben ser compatibles con el alcance de medición del material (riesgo de destrucción) y de sus materiales.
Está formalmente prohibido usar un transmisor con un fluido para el que no haya sido diseñado.
2-La temperatura ambiente debe estar comprendida entre -20º C y la clase T6 ó T5. El usuario tomará todas las disposiciones necesarias para que la transferencia de calor del fluido hasta el cabezal del aparato no lleve la temperatura de este a la temperatura de auto inflamación del gas en el cual se encuentra.
3-Las operaciones de montaje-desmontaje se deberán llevar a cabo sin voltaje y a presión nula, para evitar que pueda haber una proyección de fluido. Para evitar cualquier quemadura, asegurarse de que la temperatura del proceso se encuentra en el intervalo de temperatura aceptable.
4-Dejar visibles las etiquetas y marcas
5-La posición del montaje influye en la medición: Ver esquema.
6-Se recomienda proteger el presostato o el termostato de cualquier influencia severa del entorno (pulsaciones, golpe de ariete, vibraciones, golpes, fuentes de calor, campos eléctricos y magnéticos, rayos, humedad e intemperie).
7-El usuario debe asegurarse de la hermeticidad de la conexión utilizando juntas adecuada y compatibles con el fluido que se debe medir.
8-Utilizar una llave de apriete acorde con las dimensiones de las tuercas. No utilizar nunca la caja como medio de apriete.

Conexión eléctrica:
Atenerse obligatoriamente a las indicaciones del esquema. Las entradas de los cables (prensaestopas o conductos) deberan tener sus propias autorizaciones CE de tipo.
Respetar la conexión del cable, que se debe pelar en una longitud de 150 mm, así como los parámetros eléctricos, ver esquema.

Regulación a realizar fuera de zona peligrosa con ayuda de los instrumentos de referencia.
1º caso: El aparato está regulado a un valor de consigna indicado en el pedido. No es necesario efectuar ningún ajuste, el aparato se puede utilizar tal cual.

2º caso: el aparato está regulado en la mitad de la escala. Para un cambio de valor con una llave plana de 10 mm + clé pour 6 pans creux 1,5":
Atornillar y desatornillar este último hasta girar el contacto; volver a enroscar el tornillo de bloqueo **VB**,ver esquema; con la ayuda de la escala graduada **EG** y del indicator **VR**, atornillar o destornillar este último hasta el accionamiento del contacto y apretar de nuevo el tornillo de bloqueo **VB**: el aparato está regulado. Comprobar el funcionamiento y si fuera necesario retocar con ayuda de **VR**.
En el caso de aparatos con contactos «**R**» (desviación regulable), la regulación del punto de consigna es idéntico a lo arriba expuesto, aunque se añade una posibilidad de efectuar la regulación de la desviación entre la apertura y el cierre del contacto girando la rueda del microinterruptor, valor creciente de **A** a **F**. Esta regulación no modifica el enclavamiento del contacto bajo (consigna).
No manipular nunca los ajustes internos.

Desmontaje y mantenimiento:
Estas operaciones deberán ser realizadas por personal cualificado.
Antes de proceder a desmontarlo, asegurarse de que el regulador (P o T) ya no está alimentado eléctricamente, que el circuito hidráulico ya no está bajo presión y que la temperatura ambiente permite desmontarlo sin riesgo de quemaduras.
Proteger el émbolo de los golpes.
Si hay que volver a montarlo, es imprescindible verificar si el equipo se usa sobre el circuito de oxígeno, en cuyo caso las operaciones las llevará a cabo personal competente, cualificado y con los medios técnicos apropiados.
No volver a montar el transmisor en un fluido de distinto al original (existe riesgo de reacción química e incluso de explosión).
Montaje: respetar las mismas normas indicadas para el montaje inicial.
El mantenimiento, la comprobación o el recalibrado, deben ser realizado por personal autorizado por Baumer Bourdon-Haenni, y utilizando un equipo adecuado.



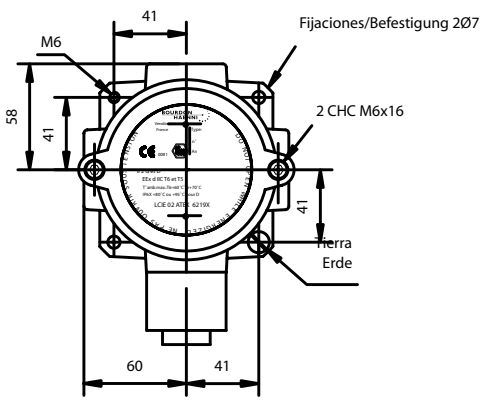
Microinterruptor Kleinschalter typo/Typ SPDT			
	L	Estandar desviación fija Standard fester Abstant	0.4A min.10A max. 250 Vac max.
	P	Hermético desviación fija DichtschlieBend fester Abstant	0.4A min.2A max. 30Vcc max.
	R	Desviación regulable Verstellbarer Abstant	0.4A min.10A max. 250 Vac max. 220 Vcc max.
	U	2 contactos desviación fija 2 Kontakte fester Abstant	0.4A min.10A max. 250 Vac max. 220 Vcc max.
	M	Contacto o desviación fija Gold-Kontakt fester Abstant	10mA min. 50mA max. 250Vac max. 220Vcc max.
	N	Tropicalisado/für Tropen desviación regulable Verstellbarer Abstant	0.1A min.10A max. 250 Vac max. 48 Vcc max.

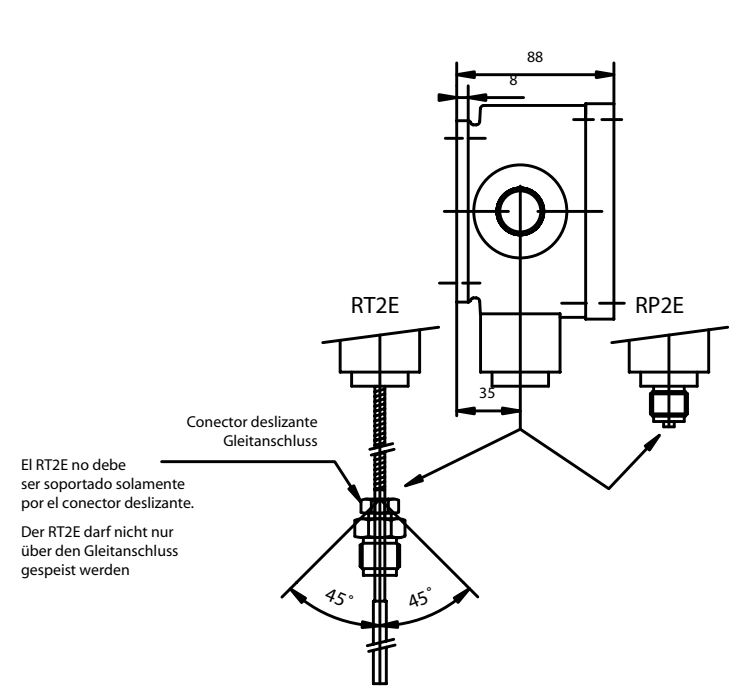
La potencia maxima disipada en el cuerpo no debe pasar de 5W.

Die erzeugte Wärme durch die Leistung im Gehäuse soll kleiner wie 5W sein.

-20˚C ≤ Ta. ≤ +70˚C

	Polvo IP6X Dichte IP6X	Gas Gase
	T˚surfacie Oberfläsche T˚	Clases Klasse
Ta.+60˚C	+80˚C	T6
Ta.+70˚C	+95˚C	T5





Baumer Bourdon-Haenni S.A.S. · 125, rue de la Marre · B.P. 70214 · 41103 Vendôme Cedex · France
Tél. +33 (0)2 54 73 74 75 · Fax France +33 (0)2 54 73 74 74 · Fax Export +33 (0)2 54 73 74 73
info.fr@baumerprocess.com · www.baumerprocess.com

320095 ind e 02/2009

1 ATTESTATION D'EXAMEN CE DE TYPE

2 Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles
Directive 94/9/CE

3 Numéro de l'attestation CE de type
LCIE 02 ATEX 6219 X

4 Appareil ou système de protection :
Boîtier pressostat ou thermostat
Type : RP2E ou RT2E

5 Demandeur : BOURDON-HAENNI

6 Adresse : 125, rue de la Marre
41 103 VENDOME FRANCE

7 Cet appareil ou système de protection et ses variantes éventuelles acceptées est décrit dans l'annexe de la présente attestation et dans les documents descriptifs cités en annexe.

8 Le LCIE, organisme notifié sous la référence 0081 conformément à l'article 9 de la directive 94/9/CE du Parlement européen et du Conseil du 23 mars 1994, certifie que cet appareil ou système de protection est conforme aux exigences essentielles en ce qui concerne la sécurité et la santé pour la conception et la construction d'appareils et de systèmes de protection destinés à être utilisés en atmosphères explosibles, données dans l'annexe II de la directive. Les vérifications et épreuves figurent dans notre rapport confidentiel N° 60003163/01.

9 Le respect des exigences essentielles en ce qui concerne la sécurité et la santé est assuré par la conformité aux documents suivants :
-EN 50014 (1997) + amendements 1 et 2
-EN 50018 (2000) et EN 50281-1-1 (1998).

10 Le signe X lorsqu'il est placé à la suite du numéro de l'attestation, indique que ce matériel ou système de protection est soumis aux conditions spéciales pour une utilisation sûre, mentionnées dans l'annexe de la présente attestation.

11 Cette attestation d'examen CE de type concerne uniquement la conception et la construction de l'appareil ou du système de protection spécifié, conformément à la directive 94/9/CE.
Des exigences supplémentaires de cette directive sont applicables pour la fabrication et la fourniture de l'appareil ou du système de protection.

12 Le marquage de l'appareil ou du système de protection devra comporter, entre autres indications utiles, les mentions suivantes :
Ex II 2 G et/ou D
EEx d IIC T6 ou T5
IP6X, T +80°C ou T+95°C

Fontenay-aux-Roses, le 05 février 2003

1 EC TYPE EXAMINATION CERTIFICATE

2 Equipment or protective system intended for use in potentially explosive atmospheres
Directive 94/9/EC

3 EC type Examination Certificate number
LCIE 02 ATEX 6219 X

4 Equipment or protective system :
Pressure sensitive switch or thermostat housing
Type : RP2E or RT2E

5 Applicant : BOURDON-HAENNI

6 Address : 125, rue de la Marre
41 103 VENDOME FRANCE

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 LCIE, notified body number 0081 in accordance with article 9 of the Directive 94/9/EC of the European Parliament and Council of 23 March 1994. certifies that this equipment or protective system has been found to comply with the essential Health and Safety Requirements relating to the design and construction of equipment and protective system intended for use in potentially explosive atmospheres, given in Annex II of the Directive.
The examination and test results are recorded in confidential report No 60003163/01.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with :

-EN 50014 (1997) + amendments 1 and 2
-EN 50018 (2000) and EN 50281-1-1 (1998).

10 If the sign X is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC Type examination certificate relates only to the design and construction of this specified equipment or protective system in accordance with the Directive 94/9/EC.
Further requirements of the Directive applies to the manufacture and supply of this equipment or protective system.

12 The marking of the equipment or protective system shall include the following :

Ex II 2 G and/or D
EEx d IIC T6 or T5
IP6X, T +80°C or T+95°C

Le Directeur de l'organisme certificateur
Manager of the certification body

Timbre sec / Dry seal

Seul le texte en français peut engager la responsabilité du LCIE. Ce document ne peut être reproduit que dans son intégralité, sans aucune modification
The LCIE's liability applies only on the French text. This document may be reproduced In full and without any change

Rev A

LCIE
Laboratoire Central
des Industries Electriques
Une société de Bureau Veritas

33, av du Général Leclerc
BP 8
92266 Fontenay-aux-Roses cedex
France

Tél : +33 1 40 95 60 60
Fax : +33 1 40 95 86 56
contact@lcie.fr
www.lcie.fr

Société anonyme à directoire
et conseil de surveillance
au capital de 15 745 984 €
RCS Nanterre B 408 363 174

(A1) **ANNEXE**

(A1) **SCHEDULE**

(A2) **ATTESTATION D'EXAMEN CE DE TYPE**

LCIE 02 ATEX 6219 X

(A2) **EC TYPE EXAMINATION CERTIFICATE**

LCIE 02 ATEX 6219 X

(A3) Description de l'équipement ou du système de protection :

Boîtier pressostat ou thermostat
Type : RP2E ou RT2E

Ce matériel, d'un volume interne de 0,35 dm^3, est construit en alliage d'aluminium.
Le boîtier est prévu pour recevoir un pressostat ou un thermostat équipé de micro-contacts et fonctionne en position verticale de façon intermittente ou en continu.

En variante, les entrées de conduit pourront être utilisées pour les raccordements électriques de l'appareil.

Le marquage est le suivant :

BOURDON-HAENNI
Adresse
Type : ...
N° de fabrication : ...
Année de construction : ...
Ex II 2 G et/ou D
EEx d IIC T6 ou T5
Tamb : de – 20°C à + 60°C (T6) ou de – 20°C à + 70°C (T5).
IP 6X, T+80°C ou T+95°C pour D
LCIE 02 ATEX 6219 X
NE PAS OUVRIR SOUS TENSION

Le marquage CE est accompagné du numéro d'identification de l'organisme notifié responsable de la surveillance du système approuvé de qualité (0081 pour le LCIE).

Le matériel devra également comporter le marquage normalement prévu par les normes de construction du matériel électrique concerné

(A3) Description of Equipment or Protective System:

Pressure sensitive switch or thermostat housing
Type : RP2E or RT2E

This electrical apparatus of 0,35 dm^3 internal free volume is made of aluminium alloy.
The housing can hold a pressure sensitive switch or a thermostat equipped with micro-contacts and can operate in vertical position, intermittently or continuously.

By variation, the conduit's inlets can be used for the electrical connections of the equipment.

The marking is the following :

BOURDON-HAENNI
Address
Type : ...
Serial number : ...
Year of construction : ...
Ex II 2 G and/or D
EEx d IIC T6 or T5
Tamb : from – 20°C to + 60°C (T6), from – 20°C to + 70°C (T5).
IP 6X, T+80°C or T+95°C for D
LCIE 02 ATEX 6219 X
DO NOT OPEN WHILE ENERGIZED

The CE marking shall be accompanied by the identification number of the notified body responsible for surveillance of the approved quality system (0081 for LCIE).

The equipment must also carry the usual marking required by the manufacturing standards applying to such equipments.

Paramètres spécifiques du ou des modes de protection concerné(s) :

Specific parameters of the mode of protection concerned :

Version / *Version*	**Intensité / *Current***	**Tension / *Voltage***
Standard / *Standard*	0,4 A min. – 10 A max.	250 VAC max ou 220 Vcc max. / *250 VAC max or 220 VDC max.*
Hermétique / *Sealed*	0,4 A min. – 2 A max.	30 Vcc max. / *30 VDC max.*
Réglable / *Adjusting*	0,4 A min. – 10 A max.	250 VAC max ou 220 Vcc max. / *250 VAC max or 220 VDC max.*
Double / *Double*	0,4 A min. – 10 A max.	250 VAC max ou 220 Vcc max. / *250 VAC max or 220 VDC max.*
Contact / *Contact*	10 mA min. – 50 mA max.	250 VAC max ou 220 Vcc max. / *250 VAC max or 220 VDC max.*

La puissance maximale dissipée dans l'enveloppe ne dépasse pas 5 W.

Maximum power dissipated inside the enclosure does not exceed the value of 5 W.

LB-01

(A1) **ANNEXE**

(A1) **SCHEDULE**

(A2) **ATTESTATION D'EXAMEN CE DE TYPE**

LCIE 02 ATEX 6219 X (suite)

(A2) **EC TYPE EXAMINATION CERTIFICATE**

LCIE 02 ATEX 6219 X (continued)

(A4) Documents descriptifs :

Dossier technique N°163/02 Rév 0 daté du 17 décembre 2002.
Ce document comprend 3 rubriques (5 pages).

(A4) Descriptive documents :

Technical file No 163/02 Rev 0 dated December 17th, 2002.
This file includes 3 items (5 pages).

(A5) Conditions spéciales pour une utilisation sûre :

Toutes dispositions seront prises par l'utilisateur pour que le transfert calorifique du fluide vers la tête de l'appareil ne porte pas celle-ci à une température correspondant à la température d'auto inflammation du gaz dans lequel elle se trouve.

(A5) Special conditions for safe use:

All necessary measures must be taken by the user, to avoid the calorific transfer from the fluid to the apparatus head increasing the head's temperature to such that it reaches the self-ignition temperature of the gas in which it is used.

(A6) Exigences essentielles en ce qui concerne la sécurité et la santé :

Conformité aux normes européennes EN 50014 (1997 + amendements 1 et 2), EN 50018 (2000) et EN 50281-1-1 (1998).

(A6) Essential Health and Safety Requirements:

Conformity to the European standards EN 50014 (1997 + amendments 1 and 2), EN 50018 (2000) and EN 50281-1-1 (1998).

Vérifications et épreuves individuelles
Chaque exemplaire du matériel devra avoir subi avec succès une épreuve de surpression statique d'une valeur égale à 12,5 bars pendant une durée au moins égale à 10 secondes sans toutefois avoir à dépasser 1 minute.

Individual examinations and tests
Each single unit must be successfully submitted to a static overpressure test at 12,5 bars during at least 10 seconds but without exceeding 1 minute.

1 **AVENANT D'ATTESTATION D'EXAMEN CE DE TYPE**

2 **Appareil ou système de protection** destiné à être utilisé en atmosphères explosibles **(Directive 94/9/CE)**

3 Numéro de l'avenant :
LCIE 02 ATEX 6219 X / 01

4 Appareil ou système de protection :
Boîtier pressostat ou thermostat
Type : RP2E ou RT2E

5 Demandeur : BAUMER BOURDON HAENNI

15 **DESCRIPTION DE L'AVENANT**

Changement de raison sociale :
BAUMER BOURDON HAENNI
Mise à jour selon les normes EN 60079-0 (2006), EN 60079-1 (2004), EN 61241-0 (2005) et EN 61241-1 (2004).

Les résultats des vérifications et essais figurent dans le rapport confidentiel N° 60057202/557976/8.

Paramètres spécifiques du ou des modes de protection concerné(s) :
Inchangés.

Le marquage doit être : Inchangé excepté pour les modifications suivantes :
BAUMER BOURDON HAENNI
Ex d IIC T6 ou T5
Ex tD A21 T80°C ou T95°C IP6X
Avertissement - ne pas ouvrir sous tension

16 **DOCUMENTS DESCRIPTIFS**

Dossier de certification N° 51/07 rev1 du 29/08/07.
Ce dossier comprend 5 rubriques (8 pages).

17 **CONDITIONS SPECIALES POUR UNE UTILISATION SURE**
Inchangées.

18 **EXIGENCES ESSENTIELLES DE SECURITE ET DE SANTE**
Couvertes par les normes EN 60079-0 (2006), EN 60079-1 (2004), EN 61241-0 (2005) et EN 61241-1 (2004).

19 **VERIFICATIONS ET ESSAIS INDIVIDUELS**
Néant.
Fontenay-aux-Roses, le 9 février 2008

1 **SUPPLEMENTARY EC TYPE EXAMINATION CERTIFICATE**

2 **Equipment or protective system** intended for use in potentially explosive atmospheres **(Directive 94/9/EC)**

3 Supplementary certificate number :
LCIE 02 ATEX 6219 X / 01

4 Equipment or protective system :
Pressure sensitive switch or thermostat housing
Type : RP2E or RT2E

5 Applicant : BAUMER BOURDON HAENNI

15 **DESCRIPTION OF THE SUPPLEMENTARY CERTIFICATE**
New company name :
BAUMER BOURDON HAENNI
Normative update according to standards EN 60079-0 (2006), EN 60079-1 (2004), EN 61241-0 (2005) and EN 61241-1 (2004).

The examination and test results are recorded in confidential report N° 60057202/557976/8.

Specific parameters of the mode(s) of protection concerned:

Unchanged.

The marking shall be : Unchanged excepted for following modifications :
BAUMER BOURDON HAENNI
Ex d IIC T6 or T5
Ex tD A21 T80°C or T95°C IP6X
Warning - do not open when energized

16 **DESCRIPTIVE DOCUMENTS**

Certification file N° 51/07 rev1 dated 29/08/07.
This file includes 5 items (8 pages).

17 **SPECIAL CONDITIONS FOR SAFE USE**

Unchanged.

18 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS**

Covered by standard EN 60079-0 (2006), EN 60079-1 (2004), EN 61241-0 (2005) and EN 61241-1 (2004).

19 **ROUTINE VERIFICATIONS AND TESTS**
None.

Le responsable de certification ATEX
ATEX certification manager

Henri CERVELLO

Seul le texte en français peut engager la responsabilité du LCIE. Ce document ne peut être reproduit que dans son intégralité, sans aucune modification.
The LCIE's liability applies only on the French text. This document may only be reproduced in its entirety and without any change.

LCIE Laboratoire Central des Industries Electriques Une société de Bureau Veritas
33, av du Général Leclerc BP 8 92266 Fontenay-aux-Roses cedex France
Tél : +33 1 40 95 60 60 Fax : +33 1 40 95 86 56 contact@lcie.fr www.lcie.fr
Société par Actions Simplifiée au capital de 15 745 984 € RCS Nanterre B 408 363 174