



1 General

- 1.1 Safety
- 1.2 Designated service
- 1.3 Marking

2 Transport, Storage

- 2.1 Transport
- 2.2 Storage

3 Installation

- 3.1 Installation location
- 3.2 Installation position
- 3.3 Installation procedures
 - 3.3.1 Installation into pipeline
 - 3.3.2 Pneumatic connection
 - 3.3.3 Electrical connection

4 Technical Description

- 4.1 Standard execution
 - 4.1.1 Function
 - 4.1.2 Pneumatics diagram
 - 4.1.3 Proposal for test control
- 4.2 Design with integrated control unit
 - 4.2.1 Function
 - 4.2.2 Pneumatics diagram
- 4.3 Electrical data
- 4.4 Terminal connection diagram

5 Initial setting

- 5.1 General measures
- 5.2 Functional test

6 Maintenance

- 6.1 Quarterly maintenance work
- 6.2 Annual service
 - 6.2.1 Inspection after high speed closure
 - 6.2.2 Incidental closure
 - 6.2.3 Closure due to an explosion (explosion closure)
- 6.3 Leak test

7 Removal

8 Disposal

9 Technical data

10 Final comment

A Annex

- Initial setting protocol
- Maintenance log
- Event protocol log

Alterations reserved.

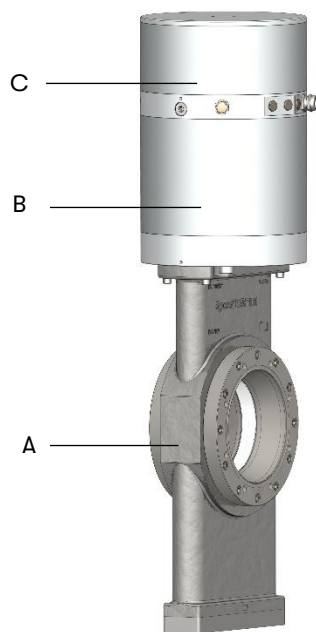
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1 General

To protect production facilities effectively against explosions, the pipelines leading to a vessel need to be isolated against explosions. This is usually realized by means of a High Speed Isolation Valve.

The SpeedWey® HSI is able to prevent the propagation of an explosion in a pipe system and thereby protects plant facilities against destruction. By triggering the pneumatic quick action control valve with an electrical signal from an explosion detector, the gate will be closed within a very short time by compressed air released from an integrated and permanently pressurized tank. Integrated solenoid valves enable to test the functioning of the valve at any time.



- A Valve
- B Pressurized tank
- C Controls compartment

1.1 Safety



This symbol is used as safety and danger indication. Follow all these indications, to avoid endangering of persons and material damage.

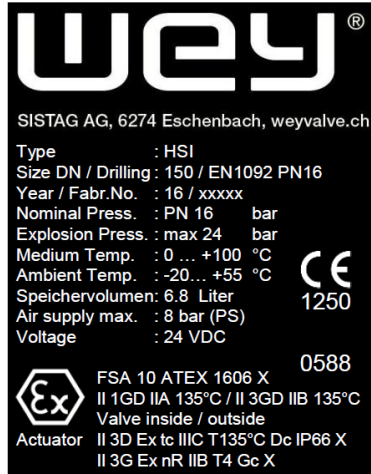
The assembly must consequently follow the recognized rules of engineering and must only be carried out by qualified personnel. Pay attention to relevant regulations and instructions for electrical installations in explosion protected areas, as well as for the introduction of such equipment. For project related valve data, such as dimensions, material and service application refer to the corresponding documentation.

1.2 Designated service

The SpeedWey® HSI is a valve that is suitable for explosion isolation in pipeline systems against pressure and flame propagation. The technical application limits found in the annex of this manual must be observed. The SpeedWey® HSI is not intended for use in recurrent shut-off or regulating processes outside defined functions of explosion closure, incidental closure or functional test.

1.3 Marking

Example



2 Transport, Storage

2.1 Transport

The transport of the valve assembly to the final destination (building site) has to be carried out in a packaging rigid enough for the size of the valve assembly and the type of transport. Possible transport regulations must also be considered. The assembly has to be protected against external influences such as transport damage and weather exposure. In the event of poor climatic conditions or an extended shipping/storage period, we strongly recommend that the SpeedWey® HSI be protected by sealing it in a PE wrap or similar and by adding desiccant to protect it from moisture.

2.2 Storage

Until final installation, the valves should be stored in a dry location and an adequate cover should be used to protect all functional parts against moisture, dust or other debris.

3 Installation

3.1 Installation location

The installation location must be selected bearing in mind that valve is always safely accessible; this is particularly for inspections and revisions. For the outdoor installation the valve must be protected with a suitable cover from direct atmospheric exposure such as solar radiation, snow, ice and rain. For installations above ground, ensure that the erection of a service platform is possible.

3.2 Installation position

The SpeedWey® HSI may be mounted at any random angle in a pipeline. A suitable cover is mandatory if the valve is outside, in a vertical downright position installed. The valve can take an explosion from either side, so the direction of the pressure pulse is there-fore irrelevant.

3.3 Installation procedures

3.3.1 Installation into pipeline

Prior to installation, the SpeedWey® HSI has to be checked for transport damage. If construction work is going on nearby or especially above the assembly, the valve must be covered in such a way as to protect it from accidental damage. The valve must basically be mounted into a pipeline of the respective size between two flanges. It is not allowed to mount it as an end-of-line valve. It is imperative that mechanical stress to the valve body caused by misaligned pipes is avoided. The pipeline must not be pulled with the flange bolts to the valve. If there is a length gap, compensators shall be used.

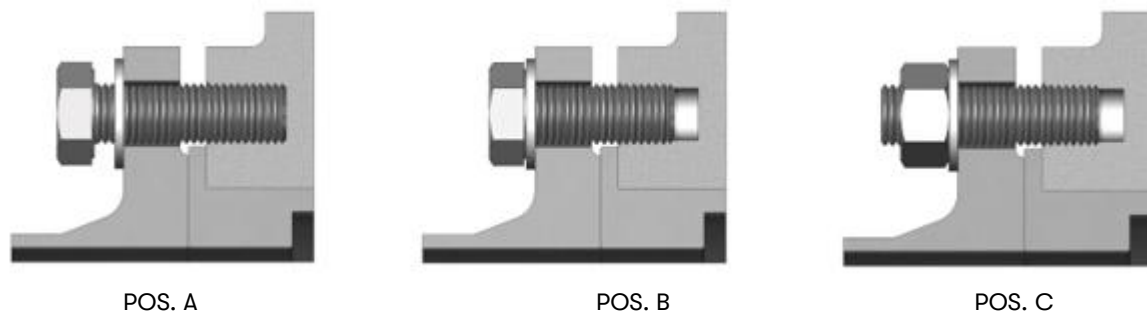


Fig. 1

POS. A **Wrong method.** The tightened bolts shall not touch the bottom of the blind holes.

POS. B **Correct assembly.**

POS. C **This method is also correct.** Screw in the threaded studs, and then tighten the nuts.

The flange bolts have to be tightened crosswise and evenly. For tightening torques refer to the documentation. Depending on the type of flange gasket, the manufacturer's data must be adhered to. Ensure that the flange connections are leak-tight. Leakage may be dangerous for people and environment.



Should hot media be transported in the pipeline, take provisions, that people are protected from contact with the hot surface of the system.

3.3.2 Pneumatic connection

The SpeedWey® HSI is equipped with an integrated air tank which includes a check valve to prevent it from depressurizing. Once connected to the air supply net, the tank will remain permanently under pressure. This is visible from the pressure gauge (5) Fig. 2. If the valve must be removed from the pipeline, the system must first be de-pressurized. (Manual de-pressurization of the tank is achieved by pressing onto release valve (4) Fig. 2).

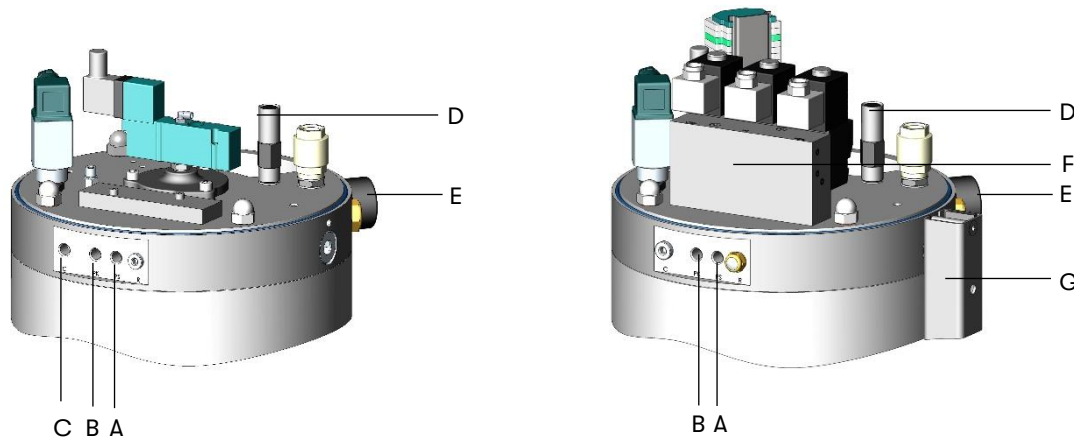


Caution: Manipulations to the pressure tank are forbidden. Preventive measures must be taken to ensure that the maximum working pressure is not exceeded also in a breakdown situation.

Make sure, that the pneumatic compressed air supply network is equipped with a self-dependent operating safety device.

For operation of the actuator use only dry, filtered air acc. Class 4/5 ISO 8573-1

max. dust particle size	40 µm
max. dust particle concentration	10 mg/m ³
max. excess oil concentration	5 mg/m ³
pressure dew-point	10 K below minimal ambient temperature



Standard execution

A	Connection PS (air tank)
B	Connection PK (function control) OPEN
C	Connection C (function control) CLOSE
D	Release valve (press to de-pressurize tank)
E	Pressure gauge (indication of tank pressure)

With integrated control unit

A	Connection PS (air tank)
B	Connection PK (function control)
C	-
D	Release valve
E	Pressure gauge
F	Solenoid valves (Option)
G	Position indication (Option)

Fig. 2

(A) PS Connection (air tank)

The pneumatic connection is fitted according to figure 2 directly to the air supply line providing dry filtered air.

PS min.	5 bar subject to closing time (refer to attachment)
PS max.	8 bar

In special cases, reduced PS max. is possible - please check tag plate and technical documentation.

Remark:

Facing ideal process parameters, normal air supply pressure is sufficient for valve actuation. In case, higher pressure is required, this pressure increase can be achieved through a booster. The pressure increase factor is approx. 1.8. The booster can be included in the complete system or being mounted onto the outside of the valve afterwards. The minimal pressure has to be available while the maximum pressure must not be exceeded.

(B/C) PK/C Connection (functional test)

From the connection PK and C (acc. diagram 4, 4.1, 4.2) thru a pressure regulating valve (supplied by customer) a reduced test pressure in relation to the valve size (Table 1) must be provided.

Valve Size	Pressure
DN 100	2 bar
DN 150 - 200	2,5 bar
DN 250- 300	3 bar
DN 400	4 bar

Tab. 1 Test pressure

3.3.3 Electrical connection

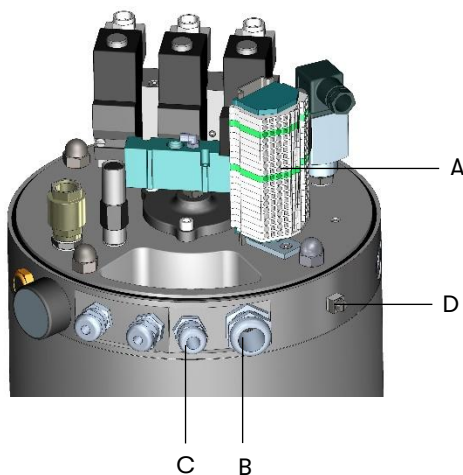


For electrical installation observe local rules, standards and directives. Additional directives and guidelines for installation and operation of explosion protection equipment, when installed into Ex-zones must also be observed.

Check if the equipment fulfills the safety requirements at site:

Ambient temperature	-20...+ 55°C
Protection requirement	IP 66
Protection class	II 3D Ex tc IIIC T135°C Dc IP66 X / II 3G Ex nR IIB T4 Gc X

All electrical connections are to be made according to the terminal connection diagram (fig. 5) and wired to terminal clamps. The electrical control unit must fulfil all requested functions as per (table 2). After installation a correct earthing connection must be verified. Provide an all-pole separation for the electrical supply of the SpeedWey® HSI. The electrical components must be safeguarded against a short circuit contact according to their nominal data (the magnetic sensors have an internal short circuit guard). The cable entry can withstand an impact energy of 4 Joule and must be protected for higher impact energy



- A Terminal clamps plug-in max. 2.5 mm²
- B Control cable gland M25x1.5 for cables 14-18mm
- C Alarm cable gland M16x1.5 for cables 6-10mm
- D External earthing terminal

Fig. 3

For the function control of the SpeedWey® HSI we recommend the use of the especially designed Testbox TBS 2. As an option the testbox can also be supplied by Sistag.

4 Technical Description

4.1 Standard execution

4.1.1 Function

The SpeedWey® HSI is equipped with a quick action control valve for immediate actuation in case of an explosion. The quick action release valve V3 is directly connected to the alarm control unit which itself is transmitting and analysing the detection of any explosion. The quick action valve must be on current for maximum 1-2 seconds to avoid any heat-up and to keep the air loss from the air tank minimized. The examination of the OPEN / CLOSE function is ensured by connecting connections C / PK with the site air supply. An integrated pressure switch controls the pressure of the air tank. The signal must be integrated in the control system.

As an option a solenoid unit can be integrated into the control compartment, with which the periodical test can be simply executed. Two magnet-inductive sensors (limit switches) may optionally provide the position control.

Function	Action
Initial position	(C, PK depressurized)
Valve open	
Valve closes	C pressurized
Functional test	
Valve opens	PK pressurized
Functional test	
Valve closes	V3 activate
Quick shutting	

Tab. 2a

After every functional test the valve must be set back to its initial position (OPEN)

After any closure the valve must remain in the closed position.



The safety function of the isolation valve is only ensured if the respective pressure load is available and the electric triggering can take place. In case of any power break-down (pressure/electricity) immediate action must be taken to resolve the problem.

4.1.2 Pneumatics diagram

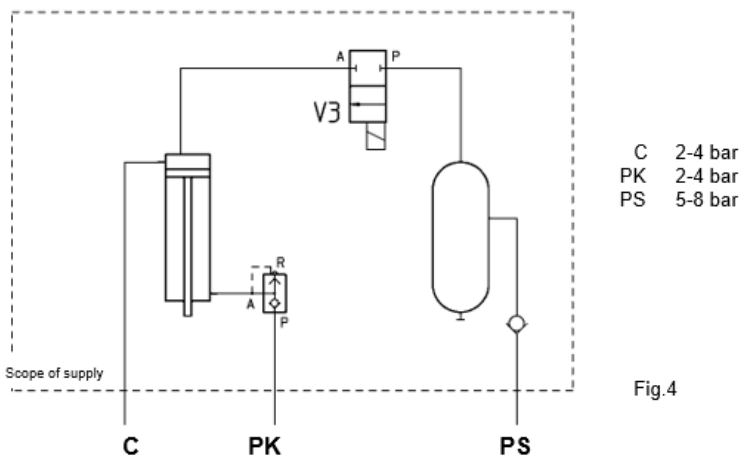


Fig.4

Fig. 4

In the drive of the SpeedWey® HSI are the quick air release valve, as well a pressure switch for monitoring of the air tank pressure integrated. The mechanism for functional tests is to be provided by the end user. The connections C/PK must be unpressurised in the starting position. If the airline is not permanently connected connections must be closed off with a vent plug.

4.1.3 Proposal for test control

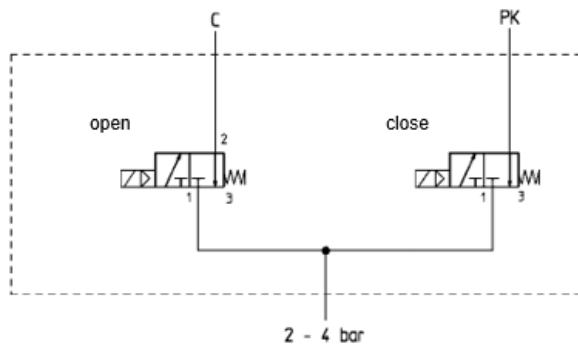


Fig. 4.1

4.2 Design with integrated control unit

4.2.1 Function

The solenoid valves V1, V2a, V2b must be connected at site to a control unit. Such a unit ensures that the solenoids are controlled in order to fulfil the requested functions (functions see table 2). Two magnet-inductive sensors (limit switches) may optionally provide the position control.

Function	V1	V2a	V2b	V3
Initial position	-	-	-	-
Valve open	-	-	-	-
Valve closes	-	-	+	-
Functional test	-	-	+	-
Valve opens	+	+	-	-
Functional test	+	+	-	-
Valve closes	-	-	-	-
Quick shutting	-	-	-	+ *)
After an explosion shutting	-	+	-	-
Tank de-pressurizing	-	+	-	-

+ Solenoid with current

- Solenoid no current

*) Solenoid coil V3 during max.1-2 seconds under current

Tab. 2b

After every functional test the valve must be set back to its initial position (OPEN) After any closure the valve must remain in the closed position. As an alternative the control valves for the function test and depressurization can be operated using the manual emergency switch (refer to the Functional Test Chapter 5.2)



The safety function of the isolation valve is only ensured if the respective pressure load is available and the electric triggering can take place. In case of any power break-down (pressure/electricity) immediate action must be taken to resolve the problem.

4.2.2 Pneumatics diagram

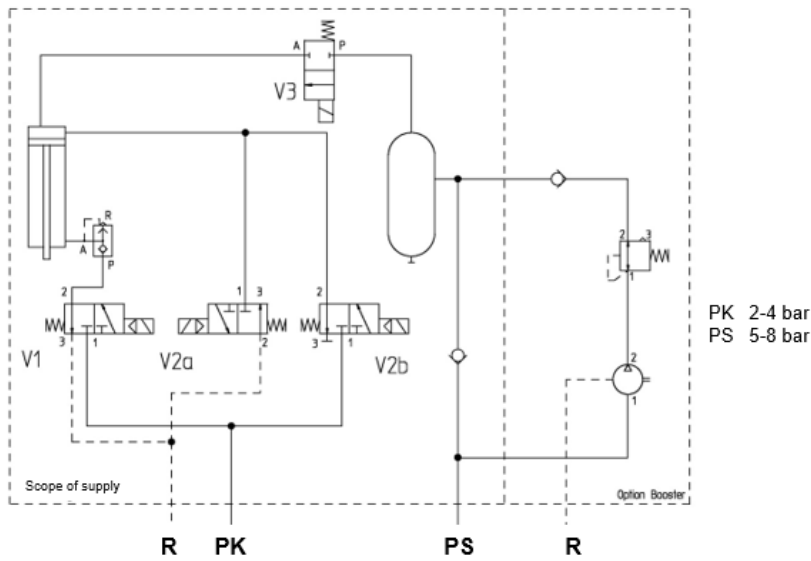


Fig. 4.2

The actuator of the SpeedWeY® HSI consists of one 2/2-way valve (V3 Quick closing) and three 3/2-way solenoids (V1 open, V2a/b close, de-aerate), as well as one controlled, non-electric quick-exhaust valve, which is directly integrated. Also included is a pressure switch to control the pressure of the air tank. Fig. 4.2 shows the scheme including the optional booster device.

4.3 Electrical data

Solenoid coil V3	Voltage	24 VDC
	Power consumption	24 Watt
	Protection	IP65
Solenoid coils V1, V2a, V2b	Voltage	24 VDC
	Power consumption	5 Watt
	Protection	IP 65
Sensors (open, close)	Voltage	24 VDC
	Constant current	< 200 mA
	Function	PNP Shutter
	Protection	IP 67
Pressure switch	Voltage	24 VDC
	Function	PNP Shutter
	Output	Transistor (1.4A)
	Protection	IP 65

4.4 Terminal connection diagram

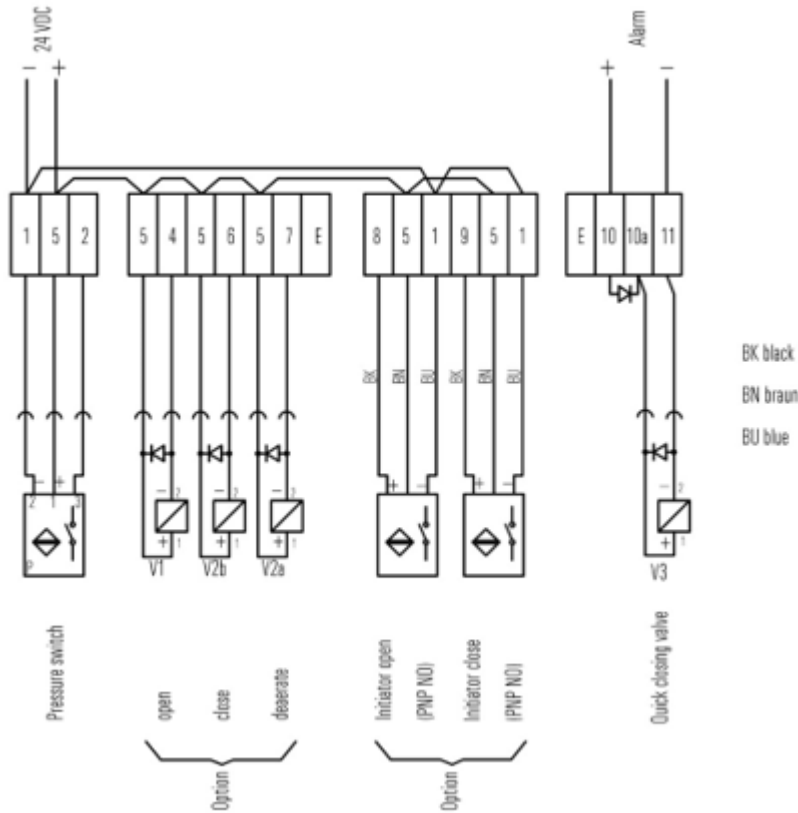


Fig. 5

5 Initial setting

5.1 General measures

- Prior to initial setting check the following points for:
- correct installation of the valve in the pipeline
 - complete connection of all pneumatic pipes and hoses
 - ensure that the min. air tank pressure is available
 - ensure the control pressure for the function test is available
 - electric power supply ensured



The housing of electrical components and strip terminal must be closed. It must not be opened when under power.

- perform a functional test according to Chapter 5.2
- enter all work performed into the initial setting protocol.

5.2 Functional test

Follow these steps:

1. The plant or production facility must be shut-down or in revision mode.

2. Standard execution:

By feeding the adequate pressure to connection C the valve will close. By feeding the pressure to connection PK the valve will open. For this the connection C must be vented (refer to table 1 und 2).

Execution with integrated control unit:

Open or close the valve by providing current (24 VDC) to the respective solenoids (see function/terminal diagram). As an alternative the valves can be switched manually (Fig. 6). When the control button is pressed the solenoid is switched (+), when it is released the solenoid falls off again immediately (-).

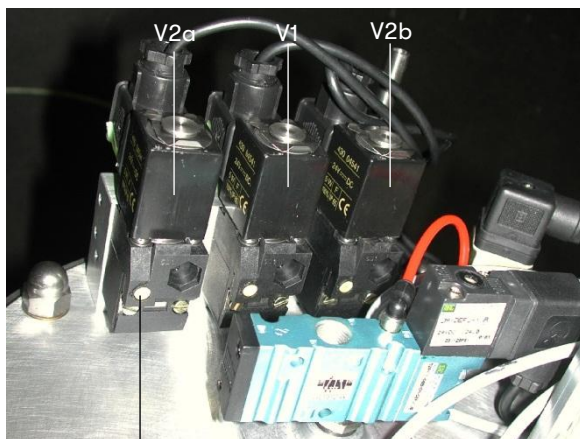


Fig. 6 Manual operation

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After the open cycle the cylinder pressure will be de-pressurized through the quick exhaust valves. Such valves, because of their function, cannot be covered with any sound dampers. Therefore, wear ear protection during a functional test.

The closing or opening cycle must take place within the requested time at the respective pressure according to table 3.

Valve size	Pressure	Close time
DN 100	2 bar	6 sec.
DN 150 - 200	2,5 bar	12 sec.
DN 250 - 300	3 bar	15 sec.
DN 400	4 bar	25 sec.

Tab. 3 test press./time

Should the closing time be too slow, the valve must be inspected.

Possible causes could be:

- Test pressure has been manipulated on the pressure reducing valve. The correct pressure value is found in the initial setting protocol.
- Leakages on cylinder, tank or connecting pipes and hoses.
- Contaminated or damaged valve.



After the functional test the valve must be set back to its initial position (OPEN).

To perform any control functions we recommend the use of the specifically designed Testbox TBS2 (observe therefore manufacturer's instruction manual)

6 Maintenance

All maintenance work must only be carried out when the plant is shut down. Maintenance work has to be carried out completely and in a competent manner in order to ensure the proper functioning of the valve. Maintenance records must be correct and complete and shall be safely filed with the operator. In case of any claims for warranty, these records can be requested for inspection. The customer has to ensure that the functional test, in accordance with chapter 5.2, can be carried out at any time. In any case the pressure- and time parameters acc. table 3 are to be followed. For spare part orders or inquiries, always quote the valve number.

6.1 Quarterly maintenance work

The following steps must be performed at least every three months after the initial setting:

- Visually check the SpeedWey® HSI for any contamination or damage. Clean valve if necessary and replace any defective parts.
- Check on the pressure gauge for the minimum level in the air tank. The minimum required pressure must correspond to the initial setting protocol.
- Perform the functional test in compliance with the instructions in chapter 5.2.
- Enter all work performed in the maintenance log.

6.2 Annual service

Once a year, the valve has to be removed from the pipeline. Thereafter please proceed as follows:

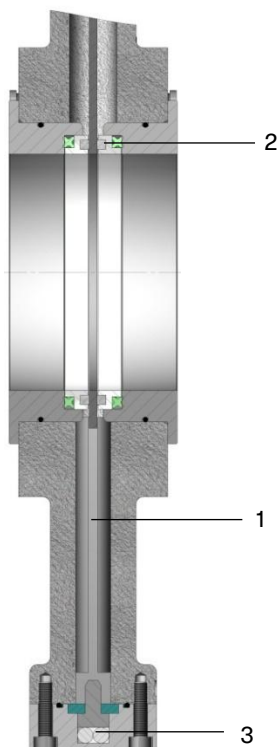


Fig. 7

- Valve must be thoroughly cleaned in- and outside.
- Valve gate (Fig. 7, Pos. 1), Seat ring with seal (2) and damping elements (3) have to be checked for possible damage.
- Replace defective parts.
- Reinstallation of the valve acc. chapter 3.3.
- Check all screws for tight fit.
- Perform functional test acc. chapter 5.2.
- Check on the pressure gauge for the minimum level in the air tank. The minimum required pressure must correspond to the initial setting protocol.
- Enter all work performed into the maintenance log.

Other maintenance intervals:

If, during the first year of operation and after performing all service and maintenance duties in compliance with 6.1 and 6.2, no incidents or findings which could impair the proper functioning of the SpeedWey® HSI are noticed, the user may, explicitly at his own responsibility, set longer maintenance intervals.

6.2.1 Inspection after high speed closure

6.2.2 Incidental closure

An incidental closure of the SpeedWey® HSI is defined as such, when after the high speed closure, the valve gate is not subjected to an increased differential pressure, as would occur during an explosion. After 10 initial closing it is recommended to proceed with an annual service acc. to chapter 6.2.

After an initial closing refer to the event protocol proceed as follows:

- Vent the actuating cylinder, then open the valve. If the valve opens properly it is still functional.
- Visually check the SpeedWey® HSI for possible contamination or damage.
- Check the damper parts
 - Vent the air tank
 - Remove the screws and damper device
 - If damper cord and shock bar are out-of-line return them to the initial position; if damaged replace the parts.
 - Mount damper device
 - Refill the air tank
- Perform the functional test according to chapter 5.2
- Check on the pressure gauge for the minimum level in the air tank. The minimum required pressure must correspond to the initial setting protocol.
- Enter all work performed into the maintenance log.

6.2.3 Closure due to an explosion (explosion closure)

If the SpeedWey® HSI was rapidly closed due to an explosion, please proceed as follows:

- Vent of the actuating cylinder of the valve.
- Remove the SpeedWey® HSI according instructions in chapter 7.

It is recommended that the SpeedWey® HSI is returned to manufacturer for reconditioning. Should it not be possible to return the SpeedWey® HSI, please proceed as follows:

- Clean the valve thoroughly inside and out.
- The entire valve assembly must be given a thorough and detailed inspection.
- Replace the seals of the SpeedWey® HSI. Seal kits can be obtained from manufacturer.
- Replace all defective parts.
- Then perform a leak test as per instructions in chapter 6.4.
- Re-install the valve as per instructions in chapter 3.3.
- Perform the functional test as per the instructions in chapter 5.2.
- Check on the pressure gauge for the minimum level in the air tank. The minimum required pressure must correspond to the initial setting protocol.
- Enter all work performed into the maintenance log.

6.3 Leak test

After seal changes on the valve, it has to be subjected to a leak test. At 1 bar (15 psi) differential pressure, the Wey® Valve has to be tight at 1 bar (15 psi) differential pressure through the seat and through the shell and transverse seal towards the outside. The leak test can be performed at the manufacturer's plant, or with a specially developed mobile test kit for easy use. In order to leak test the valve, apply 1 bar (15 psi) air pressure from one side against the closed gate. Fill the other valve gate side with water and verify that there are no air bubbles escaping (no leakage).

7 Removal



Before removal of the valve, be aware that the pipeline could be under pressure and that dangerous media could harm the environment. In order to avoid this, appropriate precautions must be taken. The controls compartment must only be opened when the power supply is disconnected. Directives regarding zones classification (explosion hazardous zones) are binding. Disconnect the electric power supply before removal of the valve. All supply pipes must be disconnected from the actuator. The air tank must be de-pressurized with the manual release valve (see chapter 3.3.2, Fig. 2, Pos. (3)).



In case a pipeline is removed only on one side, ensure that the valve cannot be actuated. Accidental opening of the valve can be harmful to people and environment due to spill of dangerous media. Accidental closing can lead to bad injuries if people or their body parts are within reach of the valve gate.

8 Disposal

Note that contamination from the medium inside of the valve can be harmful to people and environment. Appropriate precautions must be taken. After final service, the valve must be disposed of in a competent and environmentally safe manner.

9 Technical data





Mechanical nominal data

Size	DN 100 – 400 / 4 – 16"
Flange connection	PN 16
Working pressure	16 bar (pressure resistant construction)
Max. Explosion pressure	24 bar (shock- pressure resistant construction)
Medium temperature (operation)	0 – 100 °C
Air tank pressure	5 – 8 bar
Air tank capacity	100-3.1, 150-6.8, 200-13.7, 250-23.6,
dry, filtered air supply	ISO 8573-1 class 4/5 max. dust particle size max. dust particle concentration max. excess oil concentration pressure dew point
Ambient temperature	-20 – 55°C
Closing time	depending on size

Electrical nominal data

Quick action valve (V3)	24 VDC / 24 Watt
Triggering voltages	24 VDC
50VDC	short term condensor voltage
300VDC	short term condensor voltage
Solenoid (V1, V2a/b)	24 VDC / 5 Watt
Sensors (open, close)	
Voltage	24 VDC
Constant current	< 200 mA
Function	PNP Shutter
Pressure switch	
Voltage	24 VDC
Function	PNP Shutter
Output	Transistor (1.4A)

Explosion nominal data

Inner area (inside the pipeline)	 II 1D 1G IIA 135°C
Outer area (surrounding the valve)	 II 3D 3G IIB 135°C
Actuator	 II 3D Ex tc IIIC T135°C Dc IP66 X  II 3G Ex nR IIB T4 Gc X
Explosive atmosphere	Dust/air mixtures ST1-ST2, KST max. 300 bar m/s Gas/air mixtures (explosion class IIA) KG max. 500 bar m/s
Examination certificate	FSA 10 ATEX 1606 X

Closing times in relation to tank pressure

DN	Closing time [ms]			
	5 bar	6bar	7 bar	8 bar
100	26	23	21	19
150	27	26	23	22
200	36	34	30	28
250	38	36	33	32
300	47	44	41	38
400		58	55	53

The closing times are measured with clean valves at the respective tank pressure and a disconnected air supply. Triggering voltage 24VDC. The closing times get slightly decelerate with higher triggering voltages through the condensor (50V or 300V).

Installation distance

The installation distance is the distance from the detected explosion to the valve. The distance is measured from the vessel wall to the valve gate, in the central line of the pipeline. The exact positioning of the valve must be selected according to the prevailing parameters so that safe control of the decoupling is guaranteed. The valve must be able to reach its end position before an incoming flame or pressure front. Corresponding calculations of the installation distance must be carried out by the supplier of the control unit, taking into account the intrinsic time of the detection and control unit.

Standard materials of construction

Valve part	Material
Body	1.4408
Flange	1.4404
Seat ring	1.4404
Gate	Titanium
Seal primary	PTFE
Seal scoundary	NBR
Actuator	Aluminium
Tank tube	DN 100-200 Aluminium DN 250-400 GFK, 1.4306

10 Final comment

All statements made above are based on our latest knowledge and shall, in connection with the technical documentation, inform users about our products and their service applications. Nothing in the document should be taken to guarantee special features of the products or their suitability for a particular risk. We can assure you of our highly regarded quality within the terms of our general sales conditions. For any further information, please contact our sales/customer service staff.

A Annex

- Initial setting protocol
- Maintenance log
- Event protocol log

Alterations reserved

Valve No.: _____	Designation: _____	Installation location: _____
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INITIAL SETTING PROTOCOL

SpeedWey® HSI

WORK PERFORMED	CHECKED
<input type="checkbox"/> The valve has been checked for correct installation	
<input type="checkbox"/> The valve has been cleaned and is in proper condition	
<input type="checkbox"/> The electrical connections (Wiring, signals) have been checked The function tests an acc. Chapter 4.1 have been verified	
<input type="checkbox"/> The closing function has been tested according tot he function test in chapter 5.2	

<input type="checkbox"/> Measured tank pressure PS (5-8 bar / 70-120 psi)	bar
<input type="checkbox"/> Measured control pressure PK (see chapter 5.2, table 3)	bar
<input type="checkbox"/> Measured closing time at functional test	s

THE SYSTEM HAS BEEN TESTED AND RELEASED FOR CUSTOMER USE

Name of inspector: _____	The customer: _____
Signature: _____	Signature: _____
	Date: _____

Valve No.: _____	Designation: _____	Installation location: _____
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MAINTENANCE LOG

SpeedWey® HSI

Periodic maintenance work

MAINTENANCE WORK	DATE	SIGNATURE
1. Quarterly inspection carried out according to chapter 6.1		
2. Quarterly inspection carried out according to chapter 6.1		
3. Quarterly inspection carried out according to chapter 6.1		
4. Annual maintenance work carried out acc. to chapter 6.2		

1. Quarterly inspection carried out according to chapter 6.1		
2. Quarterly inspection carried out according to chapter 6.1		
3. Quarterly inspection carried out according to chapter 6.1		
4. Annual maintenance work carried out acc. to chapter 6.2		

1. Quarterly inspection carried out according to chapter 6.1		
2. Quarterly inspection carried out according to chapter 6.1		
3. Quarterly inspection carried out according to chapter 6.1		
4. Annual maintenance work carried out acc. to chapter 6.2		

1. Quarterly inspection carried out according to chapter 6.1		
2. Quarterly inspection carried out according to chapter 6.1		
3. Quarterly inspection carried out according to chapter 6.1		
4. Annual maintenance work carried out acc. to chapter 6.2		

Maintenance work after an incidental closure or explosion closure

according to chapter 6.3.1, respectively 6.3.2

EVENT NO.	CAUSE	DATE	SIGNATURE

