

# Operating and maintenance instruction

Pressure relief valve DN1 2.0 (4150 bar / 60,000 psi & 6200 bar / 90,000 psi)



Operating and maintenance instruction

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#### Scope of application

The present operating and maintenance instruction is valid for:

Pressure relief valve DN1 2.0	
(4150 bar / 60,000 psi & 6200 bar / 90,000 psi)	
▶ 919015	
▶ 919115	
▶ 919215	
➢ 919015-Ⅰ	
➢ 919115-Ⅰ	
➢ 919215-Ⅰ	
➢ 919015-P	
➢ 919115-P	
➢ 919215-P	
➢ QU-919215-I	
> QU-919215-I-P	



#### Table of contents

1	Gen	eral4
	1.1	Information on use of the operation and maintenance instruction4
	1.2	Scope of delivery4
	1.3	Warranty claim4
	1.4	Disclaimer4
2	Secu	urity5
	2.1	Declaration of symbols5
	2.2	General warning notes5
	2.3	Intended use6
	2.4	Inadmissible usage7
	2.5	Residual risks7
	2.6	Safety installations8
	2.7	Personal protection equipment8
	2.8	Qualification of the staff8
3	Stru	cture and function9
	3.1	Structure9
	3.2	Funktion9
	3.3	Accessories9
4	Gen	eral technical data10
5	Inst	allation and commissioning11
	5.1	Fix pressure relief valve to the machine
	5.2	Function check of the pressure relief valve13
6	Deir	nstallation14
7	Mai	ntenance, Service and Repair14
	7.1	Regular maintenance15
	7.2	Reversing (turning) the valve seat15
	7.3	Replace seal kit and valve seat16
	7.4	Replace restrictor
8	Faul	Its and Troubleshooting
	8.1	Leakage of the pressure relief valve:19
	8.2	Further troubleshooting20
9	Recy	ycling20

Appendix A – Technical drawing and parts list (shipped with the product)



# 1 General

### 1.1 Information on use of the operation and maintenance instruction

This operation and maintenance instruction is a key part of the product. The information in this manual is mandatory and must be read and understood by all the persons before operating with the Pressure relief valve 3/8 2.0. The manual must be stored in distance as well as always accessible to the persons, working with the Pressure relief valve 3/8 2.0.

Should you have any questions regarding the content of the manual, please contact the manufacturer directly.

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### **1.2 Scope of delivery**

The individual parts contained in the shipment can be gathered from the set list in the appendix A (technical drawing and part list). Upon receipt, the shipment has to be checked of integrity. Possible detected defectives must be reported immediately to the manufacturer.

### 1.3 Warranty claim

The ALLFI AG grants warranty for the shipped parts as followed:

- > Material and manufacturer faults of 12 months from date of delivery or
- > Defects within the first 2000 hours of operation

Following spare parts are excluded from the warranty:

- > Seal Kit (consist of: Valve needle, HP-seal 2.0, spring, conus disc 2.0 & Pressure plate 2.0)
- Valve Seat
- > O-Ring
- Valve Case
- Restrictors

### **1.4 Disclaimer**

ALLFI AG refuses any claims of liability (material damages, physical injury, as well as disruption of operation), that are a result of disregarding this operating and maintenance instruction.

For example, the damage as a result of:

- > Inadmissible application of the Pressure relief valve
- > Defective maintenance
- > The disregard of operation instructions
- Chemical and electrolytical influences
- > Use of parts, spare parts, or accessory from a third-party manufacturer
- Arbitrary modifications
- Not or insufficiently trained staff

The disregard of all these instructions happens on exclusive risk and exclusive responsibility of the client. The ALLFI AG is not liable for any production downtimes.



# 2 Security

# 2.1 Declaration of symbols

This operating and maintenance instruction manual contains important notes and symbols, which are to be considered and followed. These include:





Danger symbol without key word: Additional notes

# 2.2 General warning notes

Using of the Pressure relief valve, the following warnings are to be considered.



The specified warnings are not only restricted to the operation with the maximal permissible operating pressure of 4150 bar / 60,000 psi. They are also valid on work with reduced operation pressures!

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- Danger of breathing difficulties and irritation of the skin and eyes by released solid particles or dust.
- During machining of certain material, solid particles and dust may float in the air, which could cause breathing difficulties and irritations to the skin and eyes.

#### > Therefore:

- Ensure the proper ventilation of the room surrounding the machinery.
- Ensure to wear the personal protective equipment (protection glasses, breathing mask, gloves, ...)



Additionally, the rules and regulations of the working place are to be followed to prevent injuries!

### 2.3 Intended use

The pressure relief valve is designed for pressure relief of a high-pressure system with max. 8 liters content. The pressure relief valve must be firmly connected in the machine. Only pure water may be used as the working fluid. The technical limits must always be observed. The specifications for connection assignment must be observed.

Security



### 2.4 Inadmissible usage

Inadmissible usage of the Pressure relief valve includes:

- > The usage of all other fluids other than water
- The addition of other substances to the water
- Closure of the pressure relief holes
- Excessive stress on the pressure relief valve
- Exceeding permitted limits
- > Operating the pressure relief valve with demounted or disabled technical protection
- > Use the pressure relief valve as a cutting head
- > Use the pressure relief valve as a safety valve
- > pressure relief of a high-pressure system with more than 8 liters content

Likewise, all other uses of the pressure relief valve deviating from the intended use are not permitted. All questions should be addressed directly to the manufacturer.

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### 2.5 Residual risks

The manufacturer and/or operator of the machine where the pressure relief valve is built in, has taken every precautionary measure possible to reduce residual risks, as far as possible reasonably practicably.

Operation phase	Damage	Danger	Reason	(possible) measures
		Liquids leaking under high pres- sure (e.g. at pressure relief holes)	Ignoring the torque	Follow the torque
			Damaged sealing sur- faces	Regular supervision
			Busted/Cracked connec- tions and high-pressure	
			components as a result of defects	Protective wall as a tech- nical protective measure
	Physical injuries	Flying fragments	Ignoring the torque	Follow the torque
Operation			Damaged sealing sur- faces	Regular supervision
			Busted/Cracked connec-	
			tions and high-pressure components as a result of defects	Protective wall as a tech- nical protective measure
		High kinetic en- ergy of water jet	Intrusion of extremities	Wearing safety goggles and other protective equipment
			jet	Carry out regular checks
	Hearing Rapidly dis- damage charging of fluid	Leakage	Wear ear protector	
		charging of fluid	Relieve pressure	Correctly dimensioned water collection system



# 2.6 Safety installations

The manufacturer or the operator of the full machine, which the pressure relief valve is built in, has ensured the following safety arrangements:

- > Safety devices to prevent flying fragments or liquids leaking under high pressure
- > Emergency stoppage to immediately shut down the operating machine
  - → Active: Manually triggered by operator
  - → Passive: Automatically triggered by:
    - o Failure of high pressure components or gross operating faults



Danger for the operator will arise if safety protections are not functionally, not followed or evaded anytime. The operator has to ensure the functionality of the safety protections anytime.

### 2.7 Personal protection equipment

The operator must offer his staff following protection equipment while he's working:



Wear protection glasses against:

- Fluids and dust particles
- Flying fragments

Hand guards against:

- Sharp edges of components
- Intrusion of micro particles into the skin

Inhalation protection against:

Dust particles, micro particles and spray mist

### 2.8 Qualification of the staff

The pressure relief valve may only be operated and maintained by certified, trained staff.



# **3** Structure and function

### 3.1 Structure



### 3.2 Funktion

The pressure relief valve is a high-pressure needle valve and is actuated pneumatically. It is closed by compressed air and a pneumatic piston actuator and opened by spring force. The compressed air supply is switched on and off by a controlled valve (not included in the scope of delivery). For information on the maximum permissible operating pressure of the water, see chapter 4.

### 3.3 Accessories

	or units	10 trining	All Mail 13
Article:	Ejector mandrel	DX Paste	P-Paste
Article no:	900070	051055	051065
Function:	Replace Seal Kit and	Greasing screw connections	Greasing screw connec-
	Valve Seat	and metallic contact areas for	tions and metallic contact
		standard applications	areas for food safe



	H		
Article:	Torque wrench	Open end fitting	Mounting tool for
			O-ring
Article no:	000468	AF 5/8" - 000521	040011
		AF 17 – 000339	
		AF 13/16" - 000519	
		AF 22 – 000272	
		AF 24 – 000280	
		AF 27 – 000511	
Function:	Tightens screws with a		O-ring assembly and dis-
	specific torque		assembly

All accessories for metric cutting heads are included in case set 882101 All accessories for imperial cutting heads are included in case set 882101-I

# 4 General technical data

Pneumatic pressure:	6 - 7bar / 87 – 102psi
Minimum working pressure:	0 bar / 0 psi
Maximal working pressure: see appendix A	4150bar / 60,000psi 6200bar / 90,000psi
Connection lines:	Appendix A
Nominal size (DN)	1mm
Pressure loss coefficient (l/min & bar)	0.2
Maximal working temperature:	50 °C
Maximum transport and storage temperature:	60 °C
Reaction time:	up to 2 cycles per minute
Weight:	ca. 1.5kg

Requested water quality:

Water parameter	Unit	Value
Electrical Conductivity	μS / cm	100 – 450
PH-value	-	7.0 - 8.5
Total hardness	°dH	2.0 - 10.0
Carbonate hardness (acid capacity pH 4.3)	°dH	2.0 - 10.0
Degree of alkalinity pH 8.2	mmol / I	0 - 0.25
Chloride	mg / I	≤ 50
Iron	mg / I	≤ 0.2
Manganese	mg / I	≤ 0.05
Copper	mg / I	≤ 2.0
Silicate	mg / I	≤ 5.0
(Filtrate-) solid content	mg / I	≤ 350

Technical data as dimensions can be found in the technical drawing in appendix A.



# 5 Installation and commissioning

#### General installation tip:

- > Use of a pneumatic oiler is forbidden.
- > Compressed air filter with water separator must be installed.
- Compressed air filter and pneumatic valve must have a minimum nominal flow rate of 5 m<sup>3</sup>/h.
- > Absolute cleanliness of the pipes is important before connection.
- Follow the steps below for installation.
- If you are installing the program for the first time, follow the corresponding subchapters step by step.





#### NOTE

#### > Material damage as a result of pitting

- > Not or insufficient greased threads or contact areas can pit.
- > Therefore:
- Always grease threads and metallic contact areas. Check appendix A for additional information.

#### NOTE

- > Material damage or leakage as a result of fouling
- > Fouling components, especially at threads, can lead to leakages and damage.
- > Therefore:
- > Pay attention to the cleanliness of the components while maintaining.

### NOTE

- > Material damage as a result of leakages
- Constant leakage may damage the product.
- > Therefore:
- > Immediately eliminate leakages (see chapter 8 "Faults and Troubleshooting").

### 5.1 Fix pressure relief valve to the machine

The pressure relief valve must be connected to the machine at the mounting ring. Other fastening possibilities must be discussed with the manufacturer.



> During installation, ensure that none of the pressure relief holes are closed!





	3.	Slide the gland nut over the HP tube.
	4.	Screw the collar on the HP tube (left-handed thread). There must be 1 or 2 convo- lutions visible between the conus and the pressure ring.
(Exemplary drawing)	5.	Fix pressure relief valve on the machine. Fix coupling ring on mounting plate with three M6 screws Hole pattern see appendix A
	6. 7.	Connect the HP tubes with the pressure relief valve torque see appendix A. Plug in compressed air con- nection by snapping in.

### **5.2** Function check of the pressure relief valve

Close and open the pressure relief valve several times under operating conditions (water pressure = operating pressure). Check the following points:

- Error-free opening and closing
- No delays in opening and closing
- > Tightness

If all the points checked are functioning correctly, the pressure relief valve is ready for normal operation. If any defects are found, please refer to chapter 8 "Malfunctions and troubleshooting".



# 6 Deinstallation

A	
I	

Before uninstalling the pressure relief valve, release pressure from the HP tubes and protect against unexpected re-pressurizing.



- 1. Remove pneumatic hose.
- 2. Remove HP tubes.
- 3. Remove pressure relief valve from the machine

# 7 Maintenance, Service and Repair



Before uninstalling the pressure relief valve, release pressure from the HP tube and protect against unexpected re-pressurizing.

All maintenance, service and repair work not written in this document has to be executed by the manufacturer.

#### NOTE

#### > Material damage or leakage as a result of fouling

- Dirty components, especially considering the threads, may lead to leakages and damage of the pressure relief valve.
- > Therefore:
- > Ensure a proper cleaning of the components.

#### NOTE

#### > Property damage as a result of pitting

- > Threads that are not greased or insufficiently greased may pit.
- > Therefore:

Always grease threads and metallic contact areas. Check appendix A for additional information.



# 7.1 Regular maintenance

What	Through whom	When
Check tightness see also 8.1	Operator	daily
Check valve for heat generation See also 8.2	Operator	daily

# 7.2 Reversing (turning) the valve seat

Reason: Valve seat leaking

1		<ol> <li>Removing the pressure relief valve from the machine is recommended (Chapter 6)</li> <li>Screw restrictor out of valve case At- tention! Counter hold the valve case AF 24</li> </ol>		
2	Groove on bottom	<ol> <li>Remove the O-ring from valve case with help of tool 040011</li> <li>Remove the valve seat from the valve case. Note the orientation of groove of the valve seat (top or bottom).</li> </ol>		
		When groove was on top:		
		Valve seat can be reinstalled with groove at the bottom.		
		When groove was on bottom:		
3		Now that both seats are worn out, valve seat must be replaced with new one and installed with groove on top.		
		It is recommended to change the seal kit as well. (See chapter 7.3)		

4



- 1. Insert O-ring into valve case using assembly tool 040011
- Screw restrictor into valve case and tighten (torque see appendix A). Attention! Counterhold on valve case AF24.
- 3. Fix pressure relief valve to the machine. (Chapter 5.1)
- 4. Pressure relief valve function check (chapter 5.2).

### 7.3 Replace seal kit and valve seat

Reason: High pressure seal leaking











# 7.4 Replace restrictor



- Removing the pressure relief valve from the machine is recommended (Chapter 6)
- Clamp pressure relief valve as shown in a bench vise.
   Attention! Use protective jaws.
- 3. Screw restrictor out of valve case
- 4. Grease new restrictor on the thread according to Appendix A.
- 5. Screw in new restrictor and tighten (torque see appendix A).

# 8 Faults and Troubleshooting



Before uninstalling the pressure relief valve, release pressure from the HP tube and compressed air tube.

Protect against unexpected re-pressurizing.

NOTE
Material damage as a result of leakages
Constant leakage may damage the product.
Therefore:
Immediately eliminate leakages.

Warning! After any troubleshooting, pressure relief valve function check (chapter 5.2).



# 8.1 Leakage of the pressure relief valve:



Pos. of the leak- age	Cause of the leakage	Action	Chapter
<b>1</b> Seal kit (Check twice if the leakage is not at posi- tion 2)	HP-Seal damaged	Replace seal kit	
	Seal cone in valve case or Pressure plate damaged	Replace damaged parts	7.3
	Wrong torque for the pneu- matic cylinder	Use correct torque according ap- pendix A	
	Water pressure to high	Please note operating limits	4
<b>2</b> HP screw con- nection	Wrong torque for HP screw connection	Tight HP screw connection accord- ing appendix A	5.1
	Seal cone of HP tube dam- aged	Recut the cone of the HP tube	
<b>3</b> Seal cone valve case – valve seat	Wrong torque for restrictor inlet	Tight restrictor according appendix A	7.2
	Seal cone damaged	Replace valve seat and/or valve case	7.3
<b>4</b> Seal cone restric- tor - valve seat	Wrong torque for restrictor inlet	Tight restrictor according appendix A	7.0
	Seal cone damaged	Replace valve seat and/or valve case	1.2
<b>5</b> Seal cone restric- tor – valve case	Wrong torque for restrictor outlet	Tight restrictor according appendix A	7.3
	Seal cone damaged	Replace restrictor and/or valve case	1.4



# 8.2 Further troubleshooting

Error	Possible causes	Action	Chapter
Pressure relief valve does not close properly	Water pressure above the permissible operating pressure	Take into account operat- ing limits	4
	To low air pressure	Take into account operat- ing limits	4
	Valve seat or needle damaged	Replace seal kit	7.3
	Foreign body in the valve seat	Clean valve seat	7.2
	Pneumatic cylinder defect	Get pneumatic cylinder repaired (manufacturer)	7.3
Pressure relief valve becomes warm/hot	Valve does not close properly (leaking at needle seat) → possible causes see above (pressure relief valve does not close)		
Valve does not open	Valve needle jammed	Clean or replace seal kit	7.2
	Pneumatic cylinder defect	Get pneumatic cylinder repaired (manufacturer)	7.3

# 9 Recycling

The pressure relief value is made of metal and plastic. All the metal parts can be recycled. The plastic parts are to be professionally recycled as per local specifications.