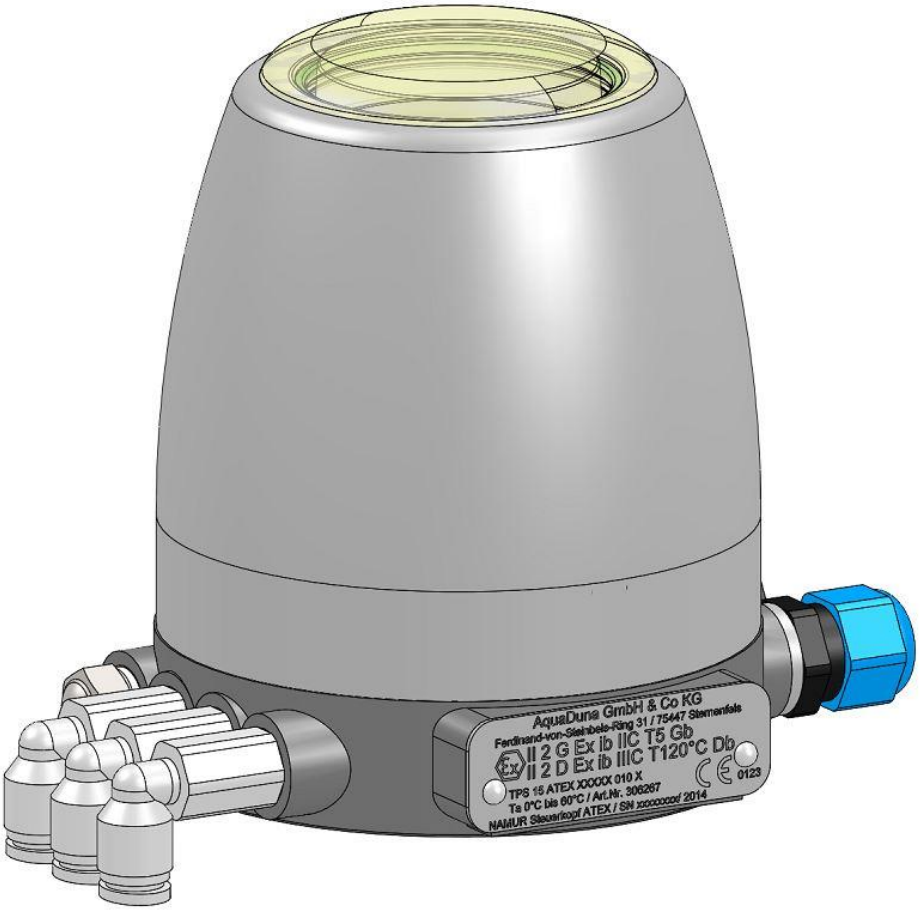
# Operating manual

## NAMUR-ATEX Control Head
## for lifting and rotary valves




We reserve the right to make technical changes and improvements to our products

# Contents

# 1. General information

This operating manual is a component of the control head and must be available to the user at all times. All safety information is to be sufficiently well disseminated and must be complied with. If the device is transferred to other parties then the operating manual must be transferred as well.

## 1.1. Intended operation


Exclusively models that are certified, approved and characterised by ATEX may be used explosion hazard areas of Zones 1, 2 & 21, 22.

These control heads are suitable for use on Kieselmann actuators for lifting and rotary valves and drives for turning valves as well as for use on all drives with suitable transducer systems.

They are designed for their areas of application in the described ATEX zones and are thus suitable for gas and dust. The energy-minimised structure permits their use in both areas.

The personnel for servicing, inspection and installation must possess the corresponding qualification for work in explosion hazard areas. Furthermore, the user must ascertain that the contents of the operating manual is understood in its complete scope by all persons who deal with the installation, start-up, operation and servicing of the ATEX control heads.

Rebuilding as well as modifications of the control heads is prohibited and will result in the loss of the ATEX certification.

A different or additional usage is seen as improper use and the AquaDuna GmbH & Co KG accepts no liability for any resulting damage.

The ATEX control heads are built according to the state of the technology and are safe in operation. Improper use of the ATEX control heads poses a risk to life and limb, the control head itself and to the user's plant.


The special conditions described in point 1.2, the electrical connections point 1.3 and the information on installation and start-up point 7 must be strictly observed.

## 1.2. Special conditions

The EU sample test certificate number is:

TPS 15 ATEX 51981 011 X

This results in the following limitations:


Applicable for dusts in explosion hazard areas are: The UV light resistance of the housing is not proven. It must not be exposed to ultra-violet rays, e.g. direct sunlight.

In areas that are not explosion-endangered, either the minus pole or the plus pole must be connected together on all supplying associated operating media, see also point 3 Electrical connection of the plug connectors and point 7, Installation and start-up.

## 1.3. Component identification

The NAMUR-ATEX control heads are designated as operating media according to

- II 2 G Ex ib IIC T5 Gb
- II 2 D Ex ib IIIC T120°C Db

(**Ta 0°C to 60°C)**

and the designation is engraved on the nameplate of the control head.

## 1.4. List of figures and diagrams

## 1.5. Symbols used

### Danger instructions

The warning triangle indicates special dangers

Danger of crushing or injuring the hands

### Warnings


Warning of dangers

### Information

Follow operating instructions

Note information


Information of explosion protection

## 1.6. Abbreviations

| | |
|---|---|
| NAMUR | Sensors according to closed current principle<br>Standards Association for Metrology and Control Technology in the Chemical Industry<br>[Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der Chemischen Industrie] |
| nu | not used |
| ATEX | Guideline for explosion protection |
| PV | Pilot valve |

## 1.7. Hazards

The control heads are operated by compressed air at 6-8 bar. In the case of leaks, the construction can lead to a pressure backup in the cover of the control head. We explicitly advise that only original spare parts may be used for repair / servicing. Damage caused by the use of **non-original parts** is **not recognised** by the manufacturer.

The control head may only be used in the environment for which it is intended.

The control head is equipped with a hood with a bayonet lock. Care must be taken that no tools are used in loosening the cover and that the respective direction of rotation for opening and closing are observed.

Only authorised persons may be in the room in which the control head is situated.

If the pulse initiator in the control rod is removed or inserted then care must be taken that the locking cap is screwed down to the metallic stop. If the stop is not fully screwed-in, the hood can be destroyed by the lifting action of the piston rod, rendering the ATEX approval null and void.

The control heads may not be used when the hood is removed; particular care must be exercised during adjustment work (danger of squashing).

# 2. Technology and use

## 2.1. Function of the control heads

The control heads can be combined with Kieselmann valves. They are placed on the respective valve drives and screwed on.

The contactless magnetic sensors permit use with different types of valves. The setting of the valves is acquired by means of the electronics of the control head and this is transmitted to a set of primary controls. The signals are transmitted through dedicated cabling. The electronics signal the valve conditions to the control head. The control of the drive occurs via integrated pilot valves. The air is supplied either directly via the control head or over an external hose connection. Operation may only be carried out in the environment for which it is suited.

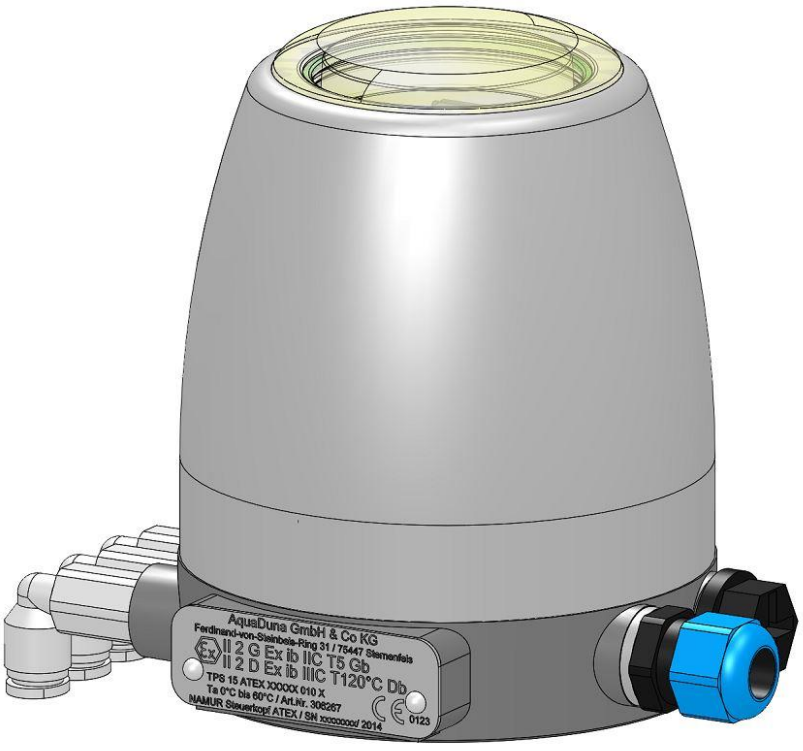



**Figure 1**

The plant may only be installed by qualified personnel. The tubing is to be kept away from interfering components such as supply lines from frequency converters.

## 2.2. Structure of the control heads

The control heads consist of a lower part with bayonet locking on which a stainless steel hood must be placed. Electronics are integrated in the housing that is formed in this manner and this permits the positions of the valves to be controlled and acquired. The integrated pilot valves control the movement of the drives. The electrical connections are made via cables in the lower part. Connection to the supply air is undertaken by means of a compressed air quick-connector. Air supply shut-off valves are available as an option.

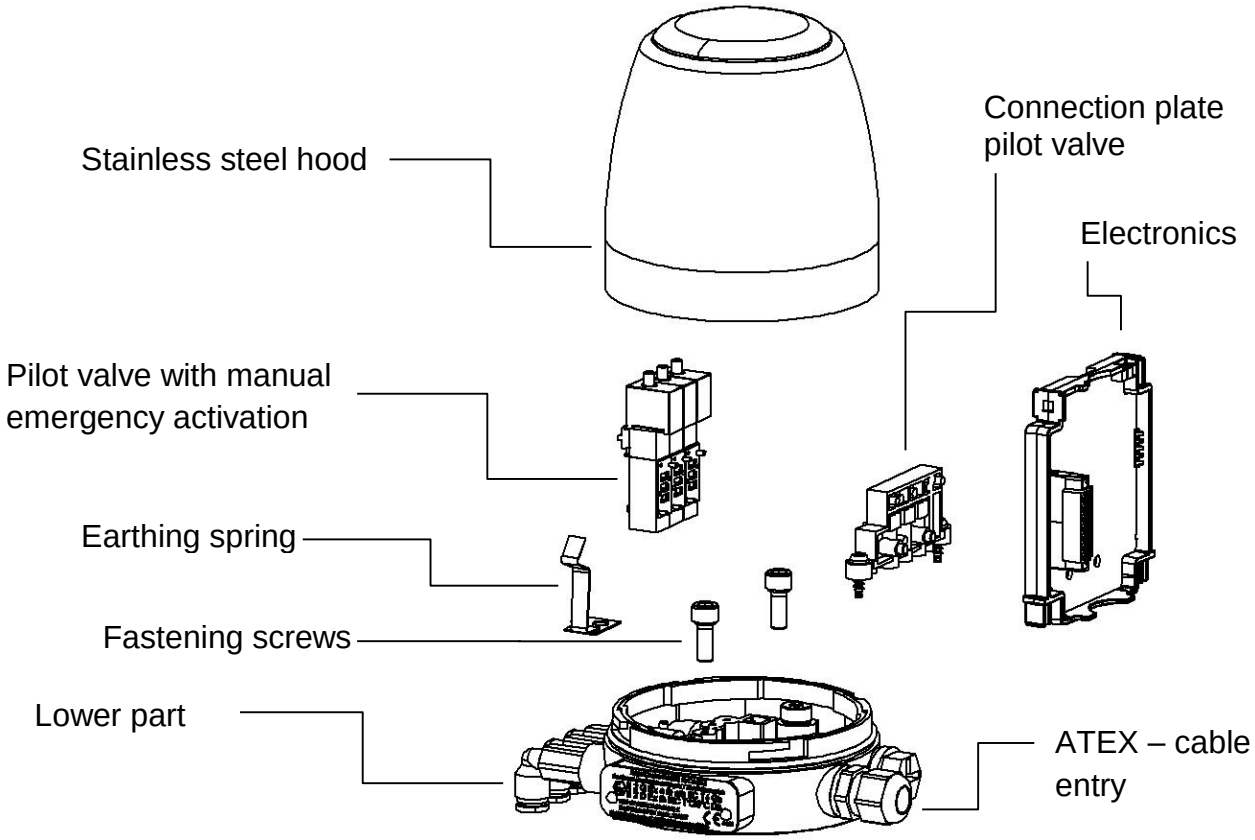



**Figure 2**

## 2.3. Controlling the drives

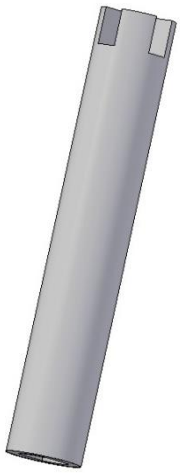
The drive can be controlled via built-in or external pilot valves. External pilot valves are accommodated in the switching installation of the primary controls. The internal pilot valves can be triggered by means of a manual emergency activation.

## 2.4. Position determination

The position of the lift drive is determined by means of a magnetic carrier. This carrier is situated in the spindle of the valve.

The rotating drive is set in motion with the position determination of a rotary encoder with magnets.

Magnetic carrier
for lifting valve



Rotary encoder
for rotary valve

**Figure 3**

## 2.5. LED signalling

### Light diodes

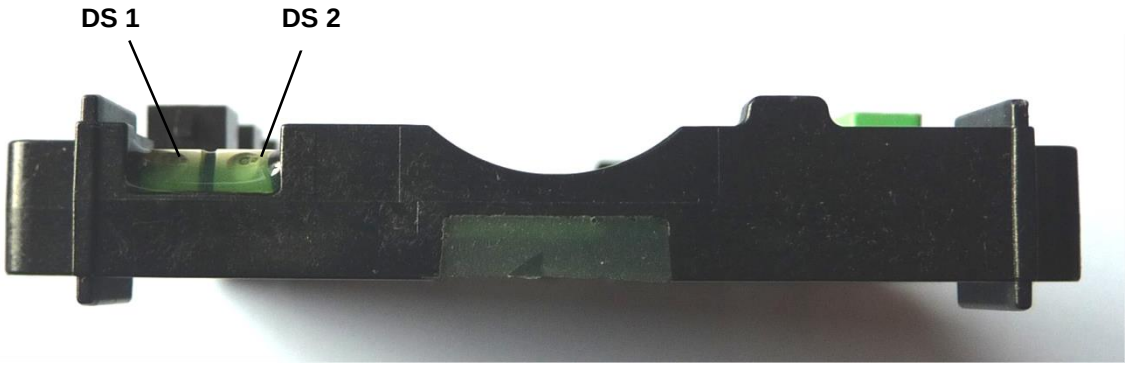



**Figure 4**

Signalising the drive position by means of light diodes DS1 and DS2 on the circuit board

| | | Remarks |
|---|---|---|
| Valve setting 1 | DS 1 yellow | Lower switch occupied |
| Valve setting 2 | DS 2 yellow | Upper switch occupied |
| Valve setting undefined | DS1 and DS 2 OFF | - |

**Table 1**

# 3. Electrical connections of the plugs

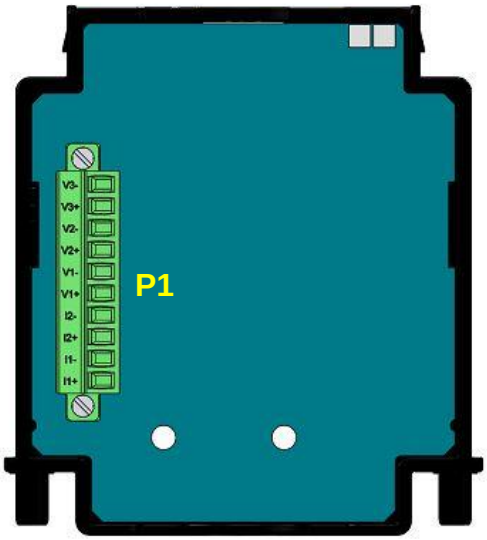



Figure 5


Figure 6

## 3.1. Electrical connection plug 10 pole (P1)

**Installation instructions point 7.3 must be specially observed!**

| | | |
|---|---|---|
| Plug P 1.1 | INI 1+ bottom | (I1+) |
| Plug P 1.2 | INI 1- bottom | (I1-) |
| Plug P 1.3 | INI 2+ top | (I2+) |
| Plug P 1.4 | INI 2- top | (I2-) |
| Plug P 1.5 | Pilot valve 1+ | (V3+) |
| Plug P 1.6 | Pilot valve 1- | (V3-) |
| Plug P 1.7 | Pilot valve 2+ | (V2+) |
| Plug P 1.8 | Pilot valve 2- | (V2-) |
| Plug P 1.9 | Pilot valve 3+ | (V1+) |
| Plug P 1.10 | Pilot valve 3- | (V1-) |

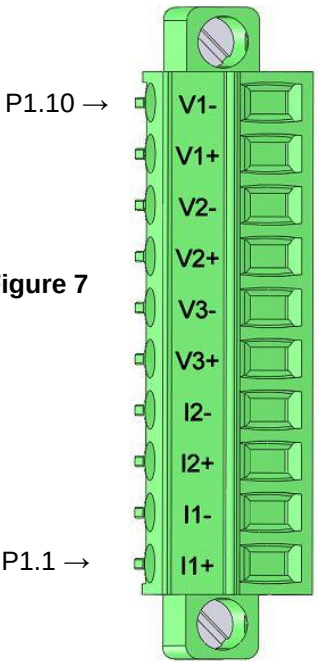



Figure 7

**All channels under one another and securely separated from the earth!**

## 3.2. Electrical connection, 2 pole pilot valve plug, (P2;P3;P4)

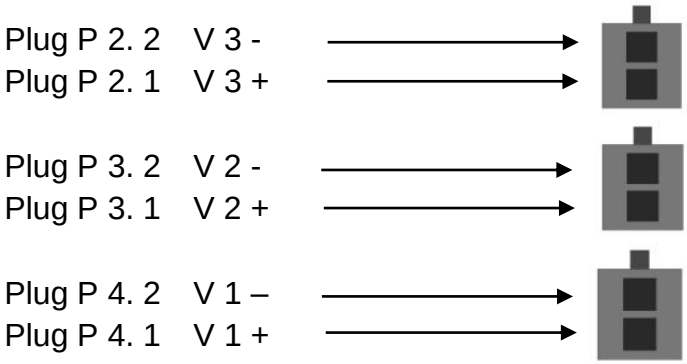



**Figure 8**

## 3.3. Technical data

### NAMUR electronics

| | |
|---|---|
| Pro Namur circuit<br>Input isolation amplifier | 4 mA / 6 mA |
| Power take-up per pilot valve via<br>Output isolation amplifier | 25 mA / 24V mA |
| Ambient temperature | 0°C to 60°C |
| Protection class | IP 67 DIN EN 60529 |
| With stainless steel hood | DIN EN 61140 I |

### Requirements of the control air according to ISO 8573-1:2010

| | |
|---|---|
| Particle size | Max. 5 µm |
| Particle density | Max. 5mg/m³ class 3 |
| Water content | Dew point 2°C class 3 |
| Oil content | Oil-free<br>Max. 25mg / m³ class 3 |
| Air pressure | 6 - 8 bar |
| Air quantity | 160 l/min / 6bar |

As a rule, only trained personnel are to be entrusted with the installation and servicing works. The user bears responsibility for improper handling and processing. The user must ensure that the locks of the hoods are properly engaged. Proper earthing of all metallic parts of an installation must be checked and documented. Improper earthing can lead to explosion and fires. The cabling is to be installed in accordance with the applicable standards. Care must be taken to ensure that the cable screwing is carried out properly.

**Observe installation instructions point 7!**

# 4. Dimensions and assembly

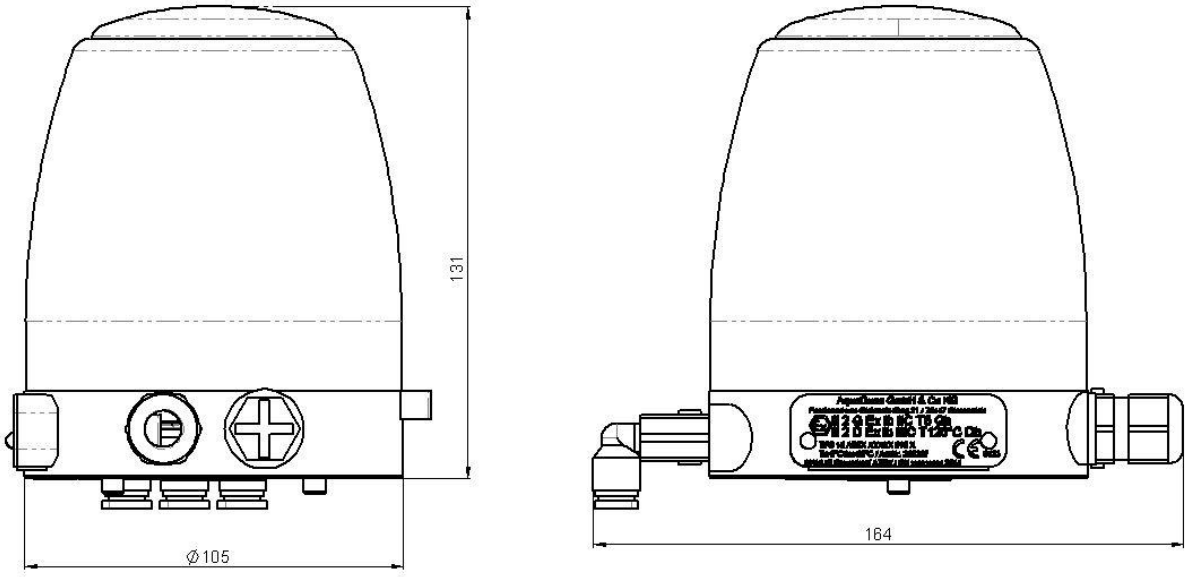



**Figure 9**

| | |
|---|---|
| Pneumatic connections | Plug |
| Pneumatic hose | Ø 6 mm |
| Electrical connection | EX cabling execution |

# 5. Safety

## 5.1. Requirements

The operator of the control head is obligated to properly train both the operating as well as the servicing personnel. All persons who deal with controlling pneumatic drives must be informed of the dangers associated with these devices.

Persons who are not listed as operating or servicing personnel must not be present in the operating area of the devices. The user is required to take the necessary steps.

As a rule, the devices may only be serviced by suitable technicians. Only original spare parts may be used to do so. Use of third-party parts will render both the ATEX certification and the warranty null and void.

All installation works on the control head are to be carried out when the system is depressurized and not under power!

## 5.2. General ATEX guidelines

The special requirements for ATEX-certified devices are to be observed for devices that are operated in Zone 1. Work on the devices may only be carried out when they are taken out of operation. It is essential to prevent the devices from being operated when open.

## 5.3. ATEX certification

The devices are certified according to DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of 26. February 2014. The markings are to be taken from Chapter 1.2.

# 6. Installation, start-up

## 6.1. Installation of the control head

In order to disassemble the control head, the hood is firmly held in both hands A counter-clockwise rotation of approx. 15° loosens the bayonet lock. The hood can now be lifted up.

The control head is mounted on the drive of the lifting or rotary drive. Special care must be taken that both O-rings are properly built into the lower part of the control head. The air passage in the drive with the kidney-shaped groove at the underside of the control head must be set to fit on to the air outlet opening. The two M6 Allen screws with O-ring installed are required for assembly.

**It is essential for the earthing spring to be attached according to Figure 10. Pay careful attention to ensure correct installation; there must be a secure connection from the spring to the hood so that dangerous potentials can be discharged.**

For drives that are smaller than 100 mm diameter, use an intermediate plate part no. 5630600076-087 with a rotary encoder extension part no. 5630600077-059.

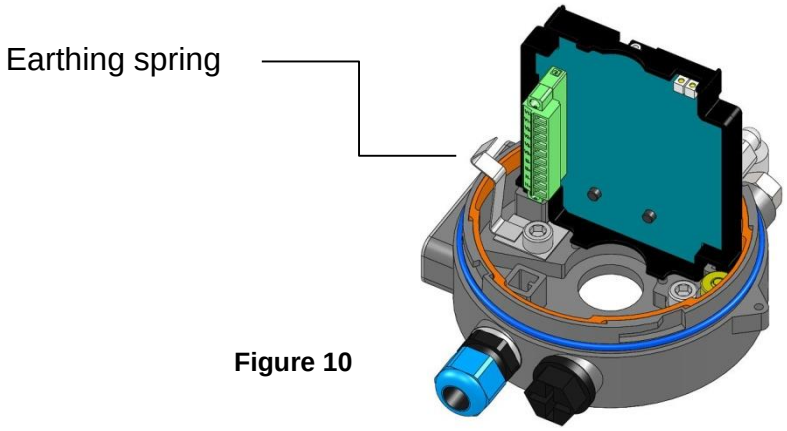



**Figure 10**

All parts must always be checked for proper seating before starting up the control head. The operator is solely liable for improperly installed control heads.

## 6.2. Electrical connections of the control head

**It is essential to observe installation standard EN 60079-14 “Explosive atmospheres - 4: Electrical installations design, selection and erection”**

Connection plug

Ex-cable screwing

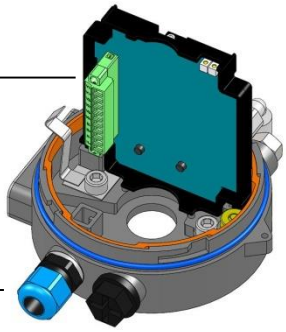


**Figure 11a**

Connections:
**Cable diameter:** 4.5 to 9 mm, the line is to be fixed near to the Ex-cable screwing; no tension forces may be transferred to the Ex-cable screwing!

**Tightening torque:** 1,3 Nm

Connection diagram see point 3.1

**The connection line is to be installed in a fixed and protected manner, damage must be excluded. Air and creep lengths of 3 mm are to be complied with.**

**Cable-free region min. Ø 35**

Connection plug

Ex-cable screwing

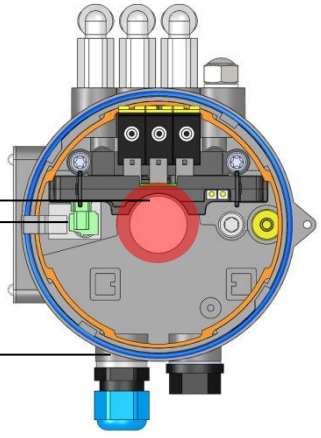


**Figure 11b**

**The cable-free region shown in Figure 11b must be complied with in the installation of the connection cable. The cable connections must be carried out with care.**

**Short circuits and poorly installed contacts can cause explosions!**

## 6.3. Values of the connection components

**The NAMUR-ATEX switched components between control and control head must be ATEX-certified. The following values apply:**

| | |
|---|---|
| P 1.1 | INI 1+ bottom |
| P 1.2 | INI 1- bottom |
| P 1.3 | INI 2+ top |
| P 1.4 | INI 2- top |
| P 1.5 | Pilot valve 3+ |
| P 1.6 | Pilot valve 3- |
| P 1.7 | Pilot valve 2+ |
| P 1.8 | Pilot valve 2- |
| P 1.9 | Pilot valve 1+ |
| P 1.10 | Pilot valve 1- |

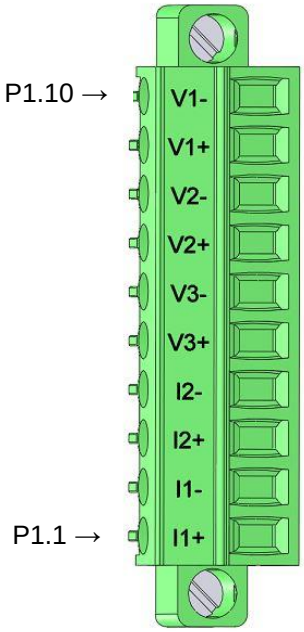



**Figure 12**

### NAMUR isolation amplifier

The following applies to the P1.1-P1.2 and P1.3-P1.4 connections

$U_i = 50V$ ; $I_i = 250mA$ ; $P_i = 600mW$ ; $C_i = 240nF$ ; $L_i = 0$

### Valve module

The following applies to the P1.5 - P1.6, P1.7 - P1.8 and P1.9 - P1.10 connections

$U_i = 50V$ ; $I_i = 250mA$ ; $P_i = 900mW$ ; $C_i = 0$ ; $L_i = 0$

See Point 3.1 electrical connection plugs

## 6.4. Tools required for installation and removal

1. Torx screwdriver size T20
2. Allen key size 5
3. Screwdriver with long blade size 3
4. Screwdriver size 2

## 6.5. Start-up

The control head is ready for start-up when all the screwed connections are tightened and the air lines and the electrical connection are made. The air supply must be in accordance with the requirements. It must be checked whether the air filter in the air entry of the control head is installed and all O-rings are properly in place. The air supply to the control head must be blown free before the initial start-up. Metallic soiling, welding remainders and other solid objects may destroy the control head.

## 6.6. Integration in a plant

If the control head is integrated into an automatic plant, then it must be ensured that its function can be monitored. The monitoring must be ensured by the plant concept. A visual inspection must also be conducted at certain intervals. The function control for optical inspection must be integrated documented. If malfunctions or damage are found during inspection, then these must be rectified immediately.

In the case of remotely controlled valves, care must be taken that no mixing of the media occurs with the manually operated emergency valves. In the case of operation in automatically working plants, the operators must familiarise themselves with the shutdown or emergency state of the plant.

### 6.7. Removal of the control head

The control head must be removed to conduct repairs.

**First the control head must be separated from the power supply!** Then shut off the air supply to the control head. In order to disassemble the control head, the hood is firmly held in both hands. A counter-clockwise rotation of approx.. 15° loosens the bayonet lock. The hood can now be lifted up. The electronics and sensors (including the pilot valve block) can be removed with tool 1. The pilot valve block can have various fittings. In case of activation via external valves, the block is installed without fittings.


If the lower part is to be removed in addition to the control circuit board or the sensors, then all hose and electrical connections must be removed. The lower part is fastened by two M6 Allen screws using tool 2. The lower part can then be lifted up from the valve.

## 7. Spares and wear parts

| | | |
|---|---|---|
| Stainless steel hood | Spare part | 5631000110-021 |
| O-ring set | Spare part | 5631000006-000 |
| Pilot valve block 1 MV DSV | Spare part | 5631001013-A00 |
| Pilot valve block 2 MV DSV To | Spare part | 5631002013-A00 |
| Pilot valve block 2 MV DSV | Spare part | 5631004013-A00 |
| Pilot valve block 3 MV DSV | Spare part | 5631003013-A00 |
| Pilot valve block 1 MV PDA | Spare part | 5631601013-A00 |
| Pilot valve block 2 MV PDA | Spare part | 5631602013-A00 |
| NAMUR-ATEX circuit board | Spare part | 5631000913-000 |
| Screw set | Spare part | 5631000005-000 |
| Magnetic encoder lifting valve | Spare part | See table point 5.0 |
| Rotary Encoder | Spare part | 5630600010-000 |

# 8. Transport and packing

Our products are manufactured, installed and tested with great care. If however, there is still cause for complaint then we will naturally satisfy your concerns within the scope of our warranty. We are also to assist you after the warranty expires.

With all deliveries, the packing list must be compared with the items included in the delivery. After determining that the delivery is complete, the goods should be inspected for damage.

In the case of damage, this must be entered on the delivery papers. The damage must be countersigned by the shipper.

In the case of returns, either the packing must be retained or a package in which the device will not be damaged should be chosen.

# 9. Emergency shutdown


The operators must have familiarised themselves with the plant concept in order to force an emergency shutdown. It is essential that an emergency shutdown is practiced and the necessary elements for emergency shutdowns are made known. The training of the persons who are entrusted with the operation of the plant is to be documented. The operator of the plant assumes liability for all personal and material damage that is caused by incorrect use.

# 10. Disposal

If the control head is taken out of use then the plastic parts are to be sent for recycling of such parts. The electronic modules are sent for re-evaluation of reuse of raw materials provided for this.

**CAUTION!!** Care must be taken to ensure that there is no contamination with materials from the operation. A suitable substance for flushing the parts to be disposed of is to be used for this purpose.

# 11. Legal notice

**Original operating manual**

NAMUR-ATEX control head
Status as of May 2021
Revision 06
AquaDuna GmbH & Co.KG
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Tel.: 07045 / 204980
Fax.: 07045 / 204990
www.aquaduna.com

# 12. Appendix 1

**Namur activation controls**

| | Pilot valve | | | | LED / feed back | | |
|---|---|---|---|---|---|---|---|
| | V3 | V2 | V1 | Action | I2 | I1 | Position |
| Double-seat valve | 0 | 0 | 0 | Close | 0 | 1 | Closed |
| Default setting closed | 1 | 0 | 0 | Cycling top | 0 | 0 | |
| With cycling | 0 | 1 | 0 | Cycling bottom | 0 | 0 | |
| Without cycling lift recognition | 0 | 0 | 1 | Open | 1 | 0 | Opened |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Single seat valve | - | - | 0 | Close | 0 | 1 | Closed |
| Default setting closed | | | | | | | |
| Spring closing | | | | | | | |
| | - | - | 1 | Open | 1 | 0 | Opened |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Single seat valve | 0 | - | 1 | Close | 0 | 1 | Closed |
| | | | | | | | |
| Air opened / air closing | | | | | | | |
| | 1 | - | 0 | Open | 1 | 0 | Opened |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Single seat valve | - | - | 1 | Close | 1 | 0 | Opened |
| Default setting opened | | | | | | | |
| Spring opening | | | | | | | |
| | - | - | 0 | Open | 0 | 1 | Closed |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Gate valve | - | 0 | - | Close | 0 | 1 | Closed |
| Default setting closed | | | | | | | |
| Spring closing | | | | | | | |
| | - | 1 | - | Open | 1 | 0 | Opened |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Gate valve | 1 | - | - | Close | 0 | 1 | Closed |
| | | | | | | | |
| Air opened / air closing | | | | | | | |
| | - | 1 | - | Open | 1 | 0 | Opened |

| | V3 | V2 | V1 | Action | I2 | I1 | Position |
|---|---|---|---|---|---|---|---|
| Gate valve | - | 1 | - | Close | 1 | 0 | Opened |
| Default setting opened | | | | | | | |
| Spring opening | | | | | | | |
| | - | 0 | - | Open | 0 | 1 | Closed |

# 13. Appendix 2

## EU Declaration of conformity

We here with declare that the

Equipment: NAMUR control head ATEX
Series: VA/2015
Serial No.: 60,000,000 ff.

comply with the DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of 26. February 2014 concerning harmonization of legal regulations of member states for equipment and protective systems intended for use in potentially explosive atmospheres.

**Ⓔx II 2 G Ex ib mb IIC T5 Gb**
**Ⓔx II 2 D Ex ib IIIC T 120°C Db**

**for zone 1/21 (Gas/dust atmosphere) Ta 0°C to 60°C**

The EC type examination was carried out at the specified centre TÜV SÜD Product Service 0123 under Certificate Number **TPS 15 ATEX 51981 011 X.**

The aforementioned item of declaration meets relevant harmonization legal regulations of the Union, and the following harmonised standards have been applied:

DIN EN IEC 60079-0:2019
DIN EN 60079-11:2012

The respective operating instructions include important instructions and rules for commissioning of the specified equipment in accordance with Directive 2014/34/EU (ATEX)

Adjustments to or repair work on the equipment specified is not admissible, unless express approval for such has been received from the manufacturer.

If the equipment specified is installed in a superordinate machine, the new risks arising from such installation must be assessed by the manufacturer of the new machine.

The manufacturer bears sole responsibility for the issuing of this Declaration of Conformity.

AquaDuna GmbH & Co.KG., February 2021

Managing Director Frank Zeitler
Name