actuators for industrial areas

EN

EASY - SAFE – SMART

- *Easy plug-in mounting*
- *Quick and safe installation*
- *Axis mount 12 x 12 mm*
- *Terminal box integrated*
- *Temperature range -40°C ... +70° C*
- *Heating including thermostat integrated*
- *Protection class IP66*
- *Blocking resistant by electronic disconnection*
- *Low power consumption in holding mode*
- *High corrosion resistance by using polymer*
- *Long life by using brushless motors*
- *Maintenance-free*
- *Optional Y-modulating version (analog inputs and outputs mA and V short-circuit-proof)*
- *Electrically isolated circuits for optimum interference immunity*

QT.Nc Manual

BA.NC-0003.05.EN

Assembly and installation instructions for safe use of
Actuator QT...-M... with / without spring return Fail Safe function

made in Germany

pi safety components

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1. General

The manual is included in the delivery and serves to ensure proper handling and optimum functioning of the device. The manufacturer offers no guarantee for this publication and is not liable for any improper handling of the products described. For this reason, the manual has to be read before operation. In addition, all personnel who are involved in the transport, setup, operation, maintenance and repair are to be familiar with this manual. This manual may not, without the prior written consent of the manufacturer be used for competition purposes and will not be passed on to third parties. Copies for personal use are permitted. This documentation may contain technical inaccuracies or typographical errors. The information shall be revised periodically and is not subject to change management. The manufacturer reserves the right to modify or alter the product described at any given time.

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SYMBOLS

This sign shows Safety notes

Safety notes must be followed. Failure to observe may result in personal injury or property damage. The manufacturer assumes no liability.

SAFETY NOTES

Installation, electrical connection, maintenance and commissioning may only be performed by trained specialist.

Avoid excessive mechanical loads and improper use.

Switch off power when mounting and dismounting

The opening and closing times determined acc. to pi test cycle are approximate and may vary depending on the conditions of use. Always check your application fully to eliminate any risks.

The determination of the torque requirement requires information from the damper, valve manufacturers on the cross-section, type, location and technical conditions.

Depending on the external load and low temperatures, the spring return times may be extended.

For outdoor applications, when cleaning work with water and/or heavy water, dirt or sunlight, a protective roof is strongly recommended, see accessories WS.Va-M.

The manual adjustment shaft must be used de-energized, only.

Attachments parts may affect the function. Check always your application fully to eliminate any risks.

Every structural change leads to the expiry of the approval and means a considerable safety risk, further operation is prohibited.

Continuous operation is limited to 2 cycles / 10 minutes.

The maximum number of control cycles (< 1 million) must be observed. Therefore, pay attention to a stable control and avoid clocked signals.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired

2. Product description

The quarter turn actuator QT.Nc-M.. consists of a supply unit and a gear unit. Through the modular concept separation of electronics and transmission is a simple, safe assembly and commissioning. The integrated terminal box ensures a direct electrical connection.

FUNCTION

The QT.Nc-M .. can be installed in industrial areas indoor and outdoor. The actuator performs a 90° (95°) rotation movement and opens / closes dampers and fittings. An optional spring moves the actuator into the safety position in the event of a power failure. These actuators provide air dampers, VAV units, air handlers, ventilation flaps, louvers, reliable control for air damper applications and fire & smoke dampers.

APPLICATIONS

QT.Nc-MF.. Fail Safe actuator
The actuator has the control On / Off / 3Pos. In case of power fail the actuator moves into the safety position by an internal spring.

QT.Nc-MFD... Fire damper actuator
The actuator and associated thermal release FT.Nc- ... sensor.
If the sensor is trips, the actuator moves into the safety position.

QT.Nc-MF02 / QT.Nc-MFD02.. actuators
are only to be installed in 90° applications with the function normally closed. The flap must be closed during assembly and the actuator must be. Due to the extremely fast running times of the spring, there is a risk of gear breakage if incorrectly installed. Installation is not permitted if the application has an angle of rotation of less than 90°.

QT.Nc-MY.. modulating actuator
Modulating actuator with control 0-10 V or 4-20 mA and feedback 0-10 V and 4-20 mA.

QT.Nc-MYQ .. VAV actuator
Modulation actuator with 0-10 V or 4-20 mA control and 0-10 V and 4-20 mA feedback. Fast runtime 5 s / 90° for digestories / laboratory fume cupboard applications.

QT.Nc-MFY.. Modulating control with spring return
Modulating control / feedback 0-10 V or 4-20 mA. In case of power fail the actuator moves into the safety position by an internal spring.

INTENDED USE

The device is used in the HVAC industry for technical ventilation. The device is approved according to the harmonized safety standards and in compliance with all manufacturer information that is necessary for the safe operation of the devices, protective systems and devices. Please note the legal requirements of engineering or professional practice. If instructions are not followed, the operating license will expire.

FORESEEABLE MISAPPLICATION

The manufacturer has integrated a maximum of safety to prevent property damage and personal injury. The limits and threats are mentioned. Use outside of the technical data formulated in the user manual is not permitted.

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3. Technical data

QT.Nc-M SUPPLY-UNIT

TYPES		
QT.Nc-MSL	20 ... 70	V AC/DC
QT.Nc-MSH	85 ... 250	V AC

QT.Nc-M... GEAR-UNIT

SPRING RETURN (FAILSAFE) TYPES							
QT.Nc-MF10	Motor	18 Nm	15 s	Spring	18 Nm	10 s	Nm/s/90°
QT.Nc-MF03	Motor	18 Nm	15 s	Spring	15 Nm	3 s	Nm/s/90°
QT.Nc-MF02	Motor	12 Nm	15 s	Spring	12 Nm	2 s	Nm/s/90°
QT.Nc-MF10Y	Motor	18 Nm	15 s	Spring	18 Nm	10 s	Nm/s/90°
QT.Nc-MFD10	Motor	18 Nm	15 s	Spring	18 Nm	10 s*	Nm/s/90°
QT.Nc-MFD03	Motor	18 Nm	15 s	Spring	15 Nm	3 s*	Nm/s/90°
QT.Nc-MFD02	Motor	12 Nm	15 s	Spring	12 Nm	2 s*	Nm/s/90°

*closing time by using thermal fire trigger

NON SPRING RETURN TYPES				
QT.Nc-M	Motor	50 Nm	15 s	Nm/s/90°
QT.Nc-MY	Motor	40 Nm	15 s	Nm/s/90°
QT.Nc-MYQ	Motor	10 Nm	5 s	Nm/s/90°
QT.Nc-MYSQ	Motor	5 Nm	3 s	Nm/s/90°

SUPPLY		
Voltage	See type list	
Frequency	50 – 60	Hz
Power consumption holding mode	5 / 7	W / VA
Power consumption motor mode	20 / 30	W / VA
Dimensioning @ 24 V supply	> 30 / 2	W / A
Protection class / over voltage category / pollution degree	II / 2 / II	insulated
ELECTRICAL CONNECTION		
Terminal clamps	without sleeve 0,08 – 2,5 with sleeve 0,25 – 1,5	mm mm
Cable glands M20x1,5	6 - 13	Ø mm
AUXILLERY SWITCHES		
Voltage	5 ... 250	V
Current	5 ... 100	mA
Limit switches	5 / 80	°
IN-/OUTPUTS MODULATION (OPTION Y)		
Voltage / Current	0 – 10 / 4 – 20	V DC / mA
Position accuracy	0,2	°
Control cycles	< 1 Mio.	Motor starts
Duty cycle	S1 - 20	%
HOUSING		
High Tech Polymer	Halogene, silicone free	
Housing protection	IP66	
GENERAL		
Dimensions H x B x T	320 x 120 x 85	mm
Weight	4,0 /4,1 (without / with spring)	kg
MATERIAL		
Housing	Plastic PC	
Screws	Steel plated	
Seals	EPDM	
Cable glands	plastic	
Gear wheels	Steel / Sinter steel heat treatment	
Output shaft double square	12 x 12, Steel surface treatment	mm
Spring	spring steel	
APPLICATION AREA		
Ambient temperature and storage	-40 ... +70	°C
Ambient temperature and storage for QT.Nc-MF02/MFD02 actuators	-40 ... +50	°C
Humidity, without condensation	0 ... 90	%RH
Mounting position, altitude	any, < 2000 m	
Maintenance	maintenance free, time lubrication	
Corrosion resistance	On-/offshore	

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FT.Nc-72-... THERMAL TRIGGER UNIT Accessory for QT.Nc-MFD actuators

TYPES AND TEMPERATUR RELEASE			
FT.Nc-72	Thermal Fire Trigger	72	°C
FT.Nc-95	Thermal Fire Trigger	95	°C
SUPPLY VIA ACTUATOR MFD			
Voltage	U	5	V
Current	I	10	mA
Connection		M12 connector	
MATERIAL			
Housing		PC, Halogene free	
Cable		FRNC	
Seal		EPDM	
Cable gland		brass plated	
GENERAL			
Dimensions H x B x T		90 x 70 x 50	mm
Weight		100	g
SHORT CIRCUIT MONITORING			
Wires		Shieled	
Electronic		Voltage monitoring	
APPLICATION AREA			
Ambient temperature*		-40 ... +125	°C
Storage temperature		-40 ... +60	°C
Humidity, without condensation		0 ... 90	%RH
Mounting position		Any, recommended vertically	
Thermal release		certified acc. to ISO 10294-4	
DELIVERY			
FT.Nc-..			
Self-tapping screws 2x M3.9x50			

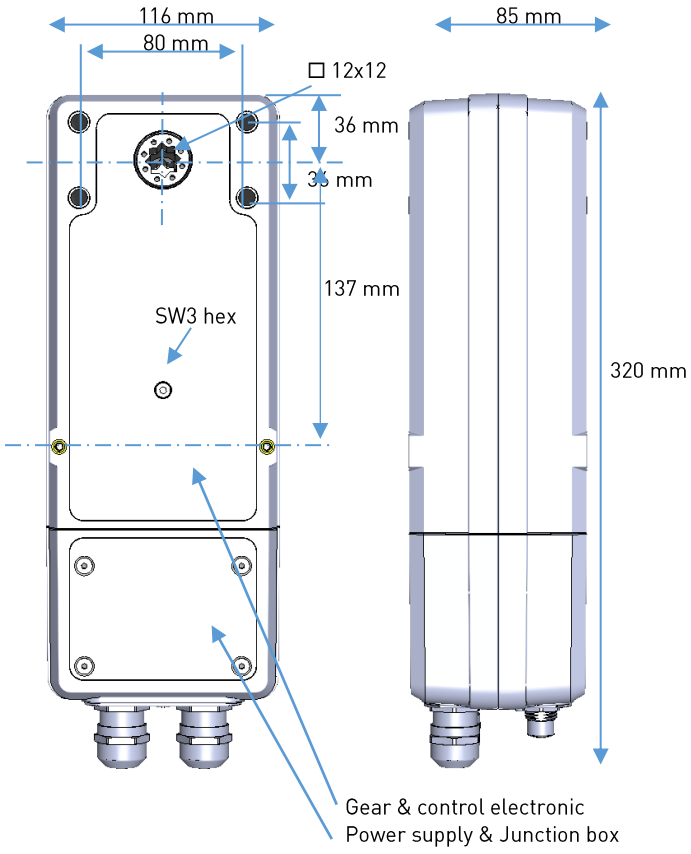
* The ambient temperature refers to the application area. The temperature fuses can already trigger at >60°C.

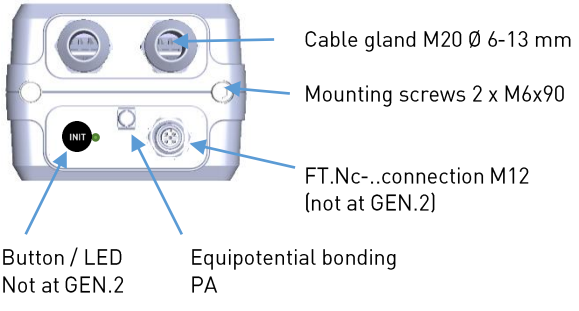
Model	λsd	λsu	λdd	λdu	SFF	PFDavg	PFH	PFDavg (1oo2)	PFH (1oo2)
QT.Nc-M with Sensor FT.Nc	0 FIT	920 FIT	0 FIT	446 FIT	67,3%	$1{,}96 \times 10^{3}$	$4{,}46 \times 10^{-7}$	$2{,}02 \times 10^{-4}$	$4{,}60 \times 10^{-8}$

1) FIT = 1 failure/10^{9} hours is the unit of failure rate.
2) For 1oo2 architecture, common cause failure rate c = 10%.
3) Tproof = 1 year.

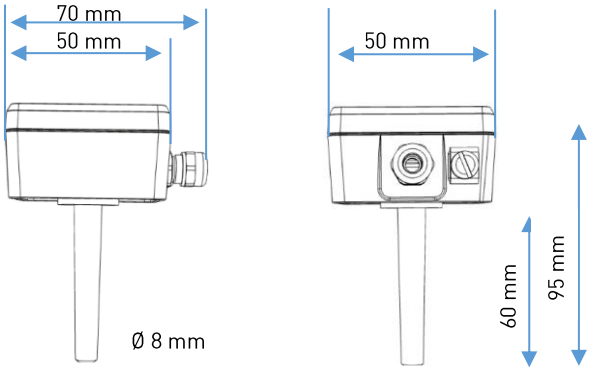
4. Dimensions

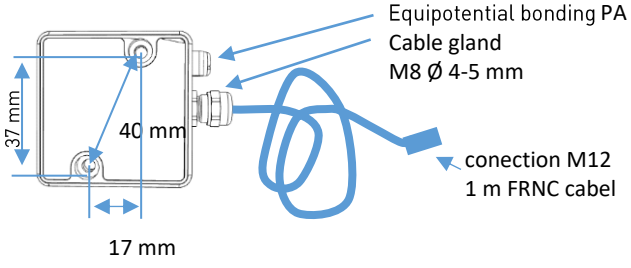
QT.Nc (ACTUATOR)





FT.Nc-.... (THERMAL FIRE TRIGGER)





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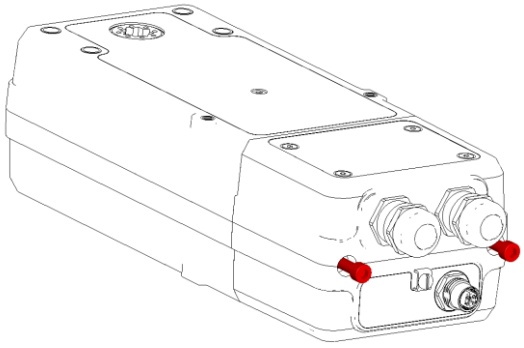
5. Mounting / Installation

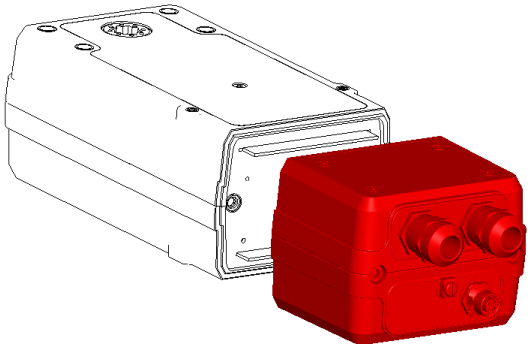
In the delivery state, the power supply unit is installed (terminal box cover at the top), that the actuator runs clockwise UP and the counterclockwise CLOSE. By rotating the gear unit, the rotational direction / spring return direction of e.g. left (counterclockwise) to the right (clockwise). If this is necessary, proceed according to the next step, otherwise the installation follows.

ELEKTRONIC UNLOC

Disconnect and check the voltage

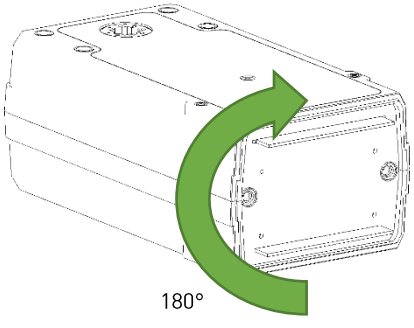


Loosen the fastening screws 2 x M6x90 hex 5 mm



Disconnect the power supply unit

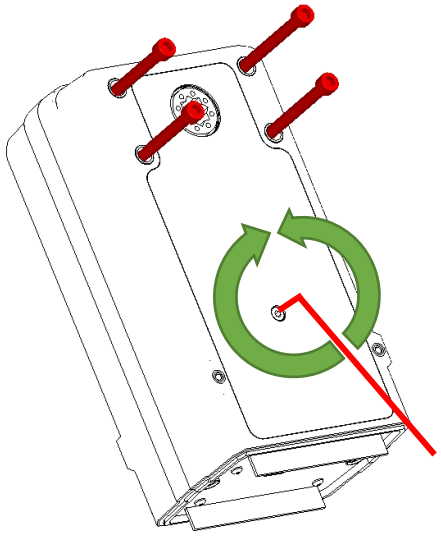
ROTATION OF ACTUATOR CW / CCW



DIRECT MOUNTING

Regard the rotation of the actuator and the valve / valve during assembly.

4 x M6 x 100

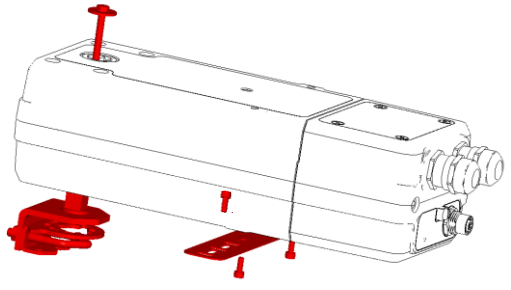


Turn approx. ½ turn at manual override (hex key) to eliminate the preload of 5 °.Then place on the square and screw.

By using the hex key the actuator must be de-energized.

Note the concentricity of the hollow shaft the concentricity of the hollow shaft. If the holes for the screws are eccentric, tension in the drive can occur and lead to loss of torque.
loosen the screws if necessary!

CLAMP ASSEMBLY



Assembly of the clamp block with screw M5x80 and washer. Screw anti-rotation plate 2 x M4 to the drive and fasten the anti-rotation plate. For this purpose, self-tapping screws M3,9x16 are enclosed.
The damper axis should be shortened to approx. 20 - 25 mm.
The clamp requires about 30 mm additional space

Pay attention to the concentricity of the hollow shaft, should tension arise, the anti-rotation plate should be mounted in such a way, if necessary, screwed loosely to compensate for the offset.

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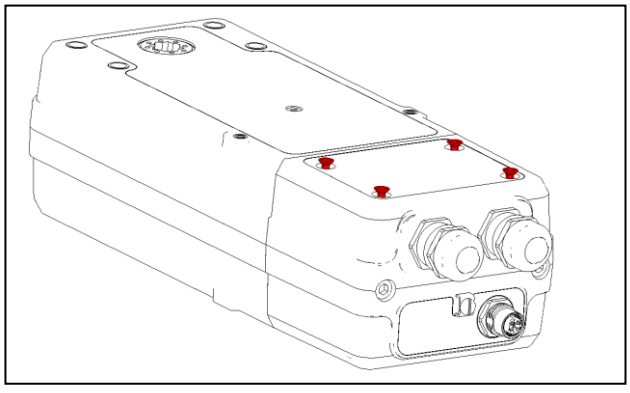
ELECTRICAL CONNECTION

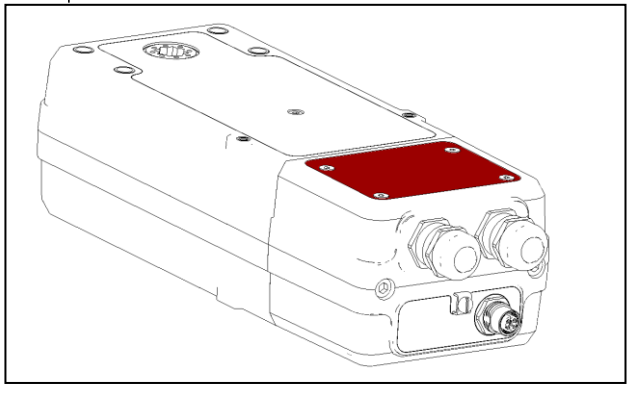
The integrated, electrical terminal box allows direct connection of the supply and the analog outputs. According to IEC 61010-1, in the event of a fault before an impermissibly high current consumption, the device is e.g. secured with a fuse (> 2 A slow blow). Protect all lines against overload, short-circuit or fault currents in order to achieve maximum safety. The device must be connected to the equipotential bonding (PA), an external connection is available for this. The gear unit is connected to the (PA) by means of fastening screws. Regard the voltage drop in case of 24 VAC/DC supply
The line resistance of the supply and return lines must not exceed 3 Ohm. Example: 100 m cable length, cable cross-section 1.5 mm². Copper (0.01678 Ohm / mm²),

$$R = 2 \times \frac{l \times \rho}{A} = 2 \times \frac{100\ m \times 0{,}01678\ \Omega hm/mm^2}{1{,}5\ mm^2} = 2{,}24\ \Omega hm \quad < 3\ \Omega hm\ OK$$

- Disconnect and check the voltage
- Check the power supply voltage, which corresponds to the power supply label
- Loosen the screws M4 of the cover



- Open cover

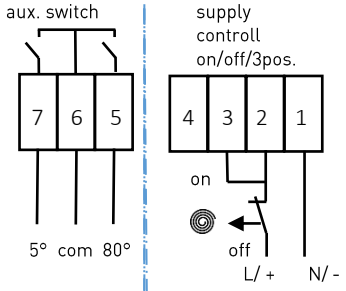


- Remove the cable gland protection
- Insert the cable
- Strip insulation (6 mm)
- Open the clamp by pressing with a screwdriver
- Insert the wire (s)
- Remove the screwdriver
- Close the cover
- An Tighten the cable glands
- Close unused opening with blind plugs

The supply, auxiliary switches and outputs are galvanically isolated, which offers a high degree of interference immunity. However, exchanging the connections can destroy the electronics.

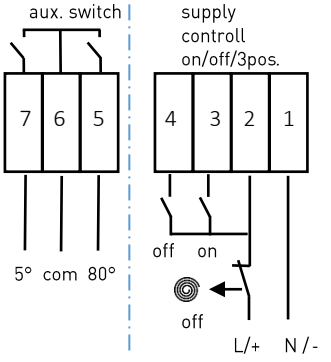
WIRING DIAGRAMS

on / off — **diagram A**



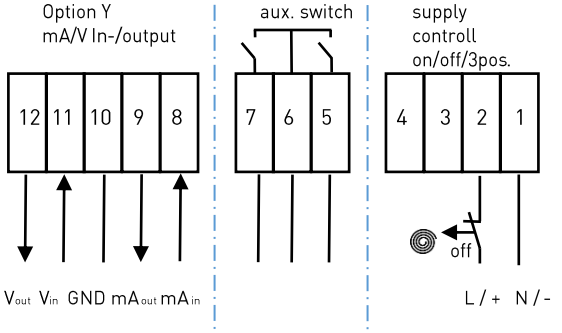
open	bridge 2 to 3 power on
close	power off, actuator closes by spring return

On/off/3pos — **diagram B**



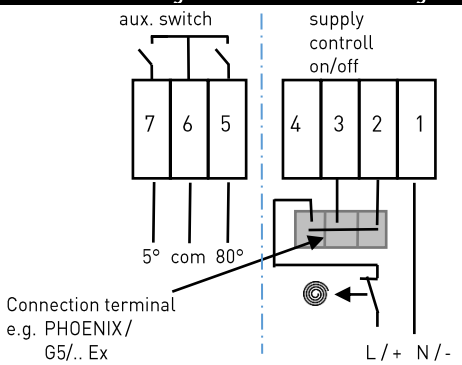
open	bridge 2 to 3 power on
close	bridge 2 to 4 power on
close	power off, actuator closes by spring return

Y / modulating mode — **diagram C**



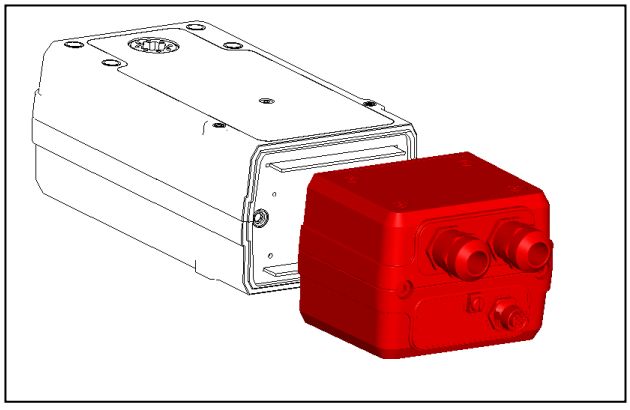
V out	V output 0-10 V
V in	V input 0-10 V
GND	common ground (ground) input/output
mA out	mA output 4-20 mA
mA in	mA input 4-20 mA

on / off mode with connecting terminal — **diagram D**

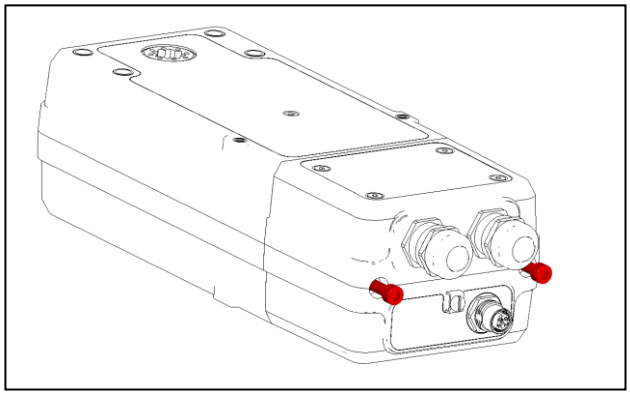


ELEKTRONIC LOOK

- attach the electronics carefully
- lock it together



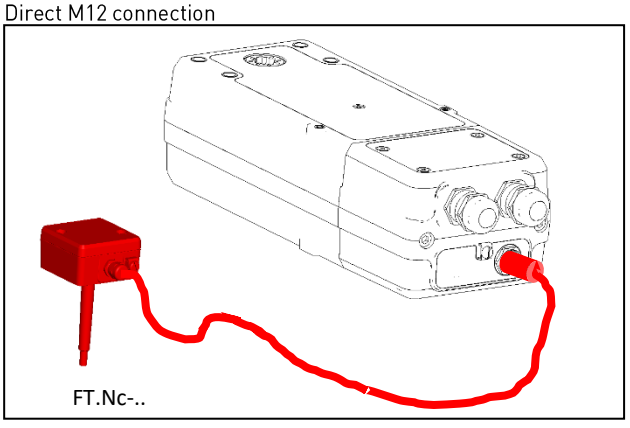
- Tighten the fastening screws. max. 3 Nm



Make sure that the gear unit and power supply unit are tightly closed when screwed together to prevent water or dust from entering.

MOUNTING THERMO TRIGGER FT.NC-...

Direct M12 connection



The function of the thermal release takes place via the voltage of the actuator

If the "Test" button is pressed for longer than 3 s, the actuator moves to the safety position. A voltage reset (power off) must then be carried out in order to acknowledge the locking.

Only connect original parts from the manufacturer!

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6. Commissioning

Ensure that the unit has been properly installed and connected in accordance with the chapters before, and that the voltage supply matches the specifications on the nameplate.

Switch on the power supply the device is ready for operation.

When the damper/flap/valve is first commissioned, the setting angle must be set by pressing the (INIT) button for 3 seconds. The actuator does this in an OPEN and CLOSE cycle. This causes the motor to start gently or brake when the spring returns to the end positions. Failure to do this will lead to premature wear and possibly gear damage. With Y-actuator, the 0-10V/4-20mA inputs and outputs are also calibrated to the angle of rotation.

With control actuators, also pay attention to how often the actuator moves. Controlling for too short or too fast can also lead to premature wear.

7. Manual operation

The actuator can only be manually operated (3 mm hex key) in the de-energized state and moved in any position. If the manual override is used when the supply voltage is applied, the motor will try to work against the force of the manual adjustment. Too large forces (>2 Nm) can be a mechanical destruction.

There is no automatic unlocking of the manual adjustment.

The hexagon key is to be removed in motor / spring operation, otherwise there is a risk of injury

Use manual hex key only, do not use any electrically operated devices such as a cordless screwdriver.

Open the actuator/damper by carefully turning the hexagonal key and close the actuator/damper by turning the hexagonal key back. Switching on the supply voltage and/or releasing the hexagonal wrench can cause damage to the gearbox.

8. Internal auxiliary switch

The actuator has two fixed microswitches for end position feedback. The electrical contacts of these microswitches have a special alloy that is suitable for lower (mA range) currents. When using, make sure that the contacts can no longer be used in the lower (mA range) after a single use with larger currents.

9. Heating

When operating at low temperatures (-20 ° C ... -40 ° C), the actuator requires up to 30 minutes to heat up.
If the actuator is then under continuous voltage, the heating automatically regulates the power. An integrated thermostat switches off the heating.

Please note that the actuator must not be operated below -40°C without power supply.

When used in extreme low temperatures, we recommend an additional housing, which additionally isolates the actuator and encases it even more robustly by using stainless steel.
See accessories

When using the thermal jacket (TJ.Va-M), make sure that it is an insulating housing and the heat by the self-heating convection no longer takes place. The permissible continuous operating temperature of the actuator is reduced to +40°C instead of +70°C. Duty cycle S6 10% = 2 x on/off per 10 min.

10. Troubleshooting

No rotary movement of the output shaft

- Check power supply
- Check the power supply module with the gear module has been properly installed
- Check the direction of rotation of the valve / fitting and that of the actuator
- Check the wiring diagram. The actuator requires a contact for the run command.
  Bridge from 2 to 3 OPEN
  Bridge from 2 to 4 CLOSE

LED displays

▪ Duration green	normal operation
▪ Blink 0.75 s on/off	initialization run
▪ Blink 0.1 s on/off	overtemperature electronics
▪ Blink 0.25 s 2x on/1 s off	heating mode
▪ Blink 0.25 s 3x on/1 s off	FT.Ex trigger triggered
▪ Blink 0.1 s on/1 s off	Power supply reverse polarity with DC supply, terminals 1 and 2 are swapped
▪ Flash 0.1 s 2x on/1 s off	Spring return
▪ Blink 0.1 s 3x on/1 s off	FireTrigger locked Switch off power briefly
▪ Blink 0.25 s 4x on/1 s	Blocked motor

11. Initialization

	ACTION	ACTUATOR	FUNCTION	DESCRIPTION
ADJUSTMENT				
	INIT 3 s	QT.Ex-M...	INIT drive	Soft start , gentle block in end position
	INIT 3 s	QT.Ex-M...Y	INIT drive	Soft start , gentle block in end position Calibrate outputs 0-10 V / 4-20 mA to angle of degree

12. Maintenance

The device is maintenance-free, a functional test and regular cleaning of dust and dirt with a damp cloth is recommended. The functional check (open-close) increases safety. A monthly functional check is to be carried out. The actuators are designed according to the specification for regular function checks. Notes on the regular function check can be found in the European Product Standard. Furthermore, other requirements such from the operating instructions of the damper/valve manufacturer are to be followed.

13. Repair

Return of a device to claim services. The installation and operation of the QT.Nc in accordance with this manual are very unproblematic. Should the unlikely event occur that a device has to be returned for repair or testing to our service department, a return form is provided under "service address" on the last page.

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14. Demounting

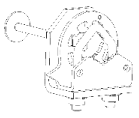
- Disconnect and check the voltage
- Open the screw terminal box cover 4x
- Remove the cable
- Loosen screws of gear unit
- Pull out the electronics module
- Loosen the screws of the gear unit
- Remove the gearbox assembly

15. Disposal

Every year, thousands of tons of polluting electronic components land on landfills around the world. To ensure the best possible disposal or recovery of electronic components, the European Union has adopted the WEEE Directive. (Waste Electrical and Electronic Equipment) Please return these products directly to us at the end of their lifecycle so that we can dispose of them properly. The WEEE is an important contribution to the environment and we are happy to help protect the environment with this disposal concept.

16. Accessories

KR.Vz-12

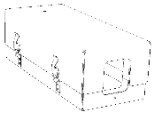


clamping block for axles Ø 10-20 mm,
☐ 10-16 mm incl. anti-twist lock plate steel galvanized

WS.Va-M

Weather shield as additional protection under adverse conditions made of stainless steel

TJ.Va-M



Thermo jacket as additional protection under cold conditions made of stainless steel

Note
chapter 9 Heating

FT.Ex-72

Thermal Fire Trigger 72°C
for Fire Damper Actuators QT.Ex-MFD..

Attention :
GEN.2 actuators needs a GEN.2 Trigger

AH-12-08
AH-12-10

Reducing adapter 12 mm to 8
resp. 10 mm

EN

Revision

VERSION	DATE	SUPPLEMENT / CHANGE / REMARK
01	20.02.2018	First edition
02	02.01.2019	Corrections
03	14.08.2020	QT rev. 02
04	29.01.2021	QT-M operating concept/trigger solution
05	18.04.2024	QT-M operating concept/trigger solution

EN

EU Konformitätserklärung
EU Declaration of Conformity
Déclaration de Conformité UE

pi safety components GmbH & Co. KG ▪ Mühlenweg 2 ▪ 96358 Teuschnitz / Haßlach ▪ Germany

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt
declares as manufacturer under sole responsibility, that the product
déclare sous sa seule responsabilité en qualité de fabricant que le produit

QT.Nc-M...
FT.Nc-...

EN

EN

den Vorschriften folgender Europäischer Richtlinien durch Anwendung harmonisierter Normen entspricht:
conforms with the provisions of the following European Directives by applying the harmonised standards:
est conforme aux prescriptions des Directives Européennes suivantes par l'application des normes harmonisées :

Richtlinien/Directives/Directives		Normen/Standards/Normes	
2014/35/EU	(LVD)	EN 61010-1 + A1	(2010) + (2019)
2014/30/EU	(EMC)	EN 60529	(2012)
2012/19/EU	(WEEE)	EN 61326-1	(2006)
2011/65/EU	(RoHs)	EN 61326-2-3	(2006)
		EN 55011 Class A	(2016)
		EN 50581	(2012)
		ISO 10294-4	(2001)

petz industries GmbH & Co. KG
Nürnberg, den 18.04.2024

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Rolf Petz
Geschäftsführer
Managing director
Le Directeur