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krom//schroder

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(TR) (CZ) (PL) (RUS) (H) ➔ www.docuthek.com

Operating instructions Tightness control TC 410

Contents

Safety

Please read and keep in a safe place

Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at www.docuthek.com.

Explanation of symbols

•, **1**, **2**, **3**... = Action
▷ = Instruction

Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

⚠ DANGER
Indicates potentially fatal situations.

⚠ WARNING
Indicates possible danger to life and limb.

! CAUTION
Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

GB

Checking the usage

TC 410 for tightness test before every controlled start-up or after every controlled shut-down in systems with 2 safety valves. Tightness control TC 410 can be used for individual valves, quick opening or slow opening with start gas rate. The valves are controlled directly for testing by the TC 410. A pressure switch for gas must be mounted on the interspace between the valves to be monitored for the tightness test.

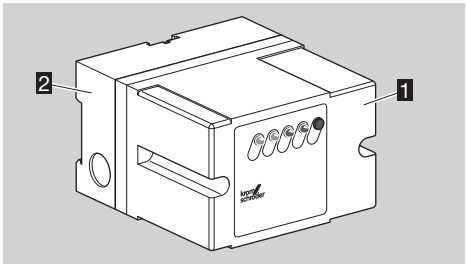
This function is only guaranteed when used within the specified limits – see page 5 (Technical data). Any other use is considered as non-compliant.

GB

Type code

Code	Description
TC	Tightness control
4	In control cabinet
1	Testing before or after burner run
0	External pressure switch required
T	T-product
-1	Test period: 10 to 60 s
-10	Test period: 100 to 600 s
K	Mains voltage: 24 V DC
N	110/120 V AC, 50/60 Hz
T	220/240 V AC, 50/60 Hz

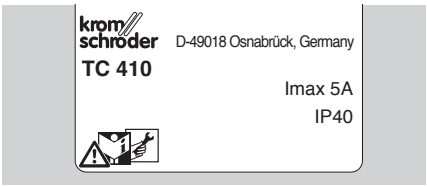
Part designations



1 Upper housing section
2 Lower housing section

Type label

▷ Test period and gas type, mains voltage, power consumption, ambient temperature, enclosure, switching current and maximum inlet pressure – see type label.



Installation

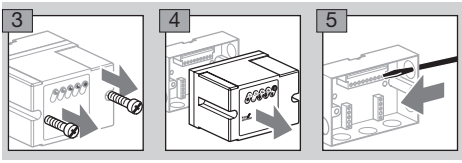
! CAUTION

Please observe the following to ensure that the TC is not damaged during installation:

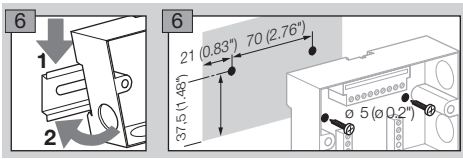
– Avoid condensation.
– Gas type and inlet pressure p_u: dependent on external pressure switch.

▷ Any installation position.
▷ The device must not be in contact with masonry. Minimum clearance 20 mm (0.78").
▷ In the case of very large test volumes V_P, an installed relief line should be of nominal size 40 to allow for the discharge of the test volume V_P.

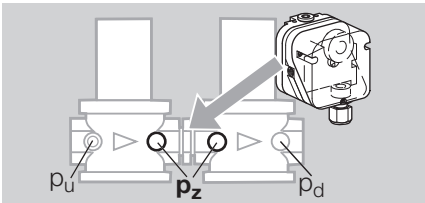
1 Disconnect the system from the electrical power supply.
2 Shut off the gas supply.



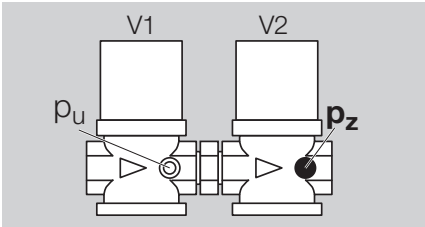
▷ Snap the lower section onto a 35 mm U-shaped mounting rail or screw on the lower section with two screws Ø 5 mm.



7 Mount the pressure switch on the interspace of the valves to be monitored – see operating instructions for pressure switch.



▷ On VG 15 – 40/32, the test point is connected to the valve inlet.



8 Set the pressure switch to half the inlet pressure $p_u/2$.

▷ The switching differential of the pressure switch may not exceed ±10% of the set value.
Example:
inlet pressure p_u = 100 mbar,
set switching pressure $p_u/2$ = 50 mbar,
max. switching differential 50 mbar x 10% = 5 mbar.
The switch-on and switch-off pressure must be between 45 mbar and 55 mbar.

Wiring

! CAUTION

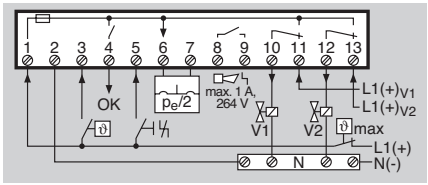
Electric shocks can be fatal!

– Before working on possible live components, ensure the unit is disconnected from the power supply.

Please observe the following to ensure that the TC is not damaged during installation:

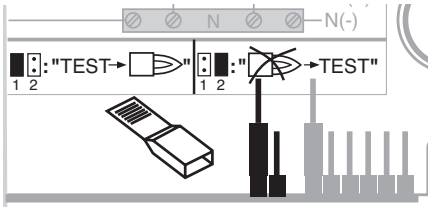
– Incorrect wiring may result in unsafe states and the destruction of the tightness control, the automatic burner control unit or the valves.
– Do not reverse L1 (+) and N (–).

1 Disconnect the system from the electrical power supply.
2 Shut off the gas supply.
3 Open the housing cover of the TC.
▷ Electrical connection: 2.5 mm² terminals.
▷ The data on the type label must comply with the mains voltage.
4 Prepare knock-out holes at the appropriate cable glands.
▷ Use the NO contacts 3 COM and 2 NO on the pressure switch ($p_e/2 = p_u/2$).
5 Electrically wire TC 410.



Setting the test instant

▷ The test instant (MODE) can be set inside the housing using a jumper.
▷ Mode 1: test before burner start-up with incoming ϑ signal (factory setting).
▷ Mode 2: test after burner run with outgoing ϑ signal and also after switching on the mains voltage.
▷ Without jumper = test before burner start-up.
1 Disconnect the unit from the electrical power supply.
2 Unscrew the housing cover.
3 Set the test instant with a jumper, MODE 1 or 2.

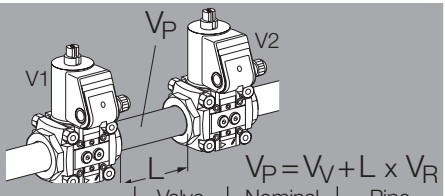


Setting the test period t_P

▷ The test period t_P is set at the works to 10 s (100 s) on TC 410-1 (TC 410-10) and can be changed with a jumper in increments of 10 s (100 s) to a max. of 60 s (600 s).
▷ Without jumper = 60 s (600 s).
▷ The longer the test period t_P, the smaller the leakage rate at which a safety shut-down is triggered.
▷ If no leakage rate is specified, we recommend the max. test period is set.
▷ If a leakage rate is specified, find the test period t_P from the following:
$Q_{max.}$ = max. flow rate [m³/h]
$Q_L = Q_{max.}$ [m³/h] x 0.1% = leakage rate [l/h]
p_u = inlet pressure [mbar]
V_P = test volume [l], see page 3 (Values for valve and pipe volume)
▷ The tightness control TC requires a minimum start rate in order to carry out tightness tests on slow opening valves:
up to 5 l (1.3 gal) test volume V_P = 5% of maximum flow rate $Q_{max.}$,
up to 12 l (3.12 gal) test volume V_P = 10% of maximum flow rate $Q_{max.}$.
1 Determine test period t_P.

$$t_P\,[s] = 4 \times \left(\frac{p_u\,[mbar] \times V_P\,[l]}{Q_L\,[l/h]} + 1\,s \right)$$

Values for valve and pipe volume



Valves	Valve volume V_V [l]	Nominal size DN	Pipe volume V_R [l/m]
VG 10	0.01	10	0.1
VG 15	0.07	15	0.2
VG 20	0.12	20	0.3
VG 25	0.2	25	0.5
VG 40/VK 40	0.7	40	1.3
VG 50/VK 50	1.2	50	2
VG 65/VK 65	2	65	3.3
VG 80/VK 80	4	80	5
VG 100/VK 100	8.3	100	7.9

Valves	Valve volume V_V [l]	Nominal size DN	Pipe volume V_R [l/m]
VK 125	13.6	125	12.3
VK 150	20	150	17.7
VK 200	42	200	31.4
VK 250	66	250	49
VAS 1	0.08		
VAS 2	0.32		
VAS 3	0.68		
VAS 6	1.37		
VAS 7	2.04		
VAS 8	3.34		
VAS 9	5.41		
VCS 1	0.05		
VCS 2	0.18		
VCS 3	0.39		
VCS 6	1.11		
VCS 7	1.40		
VCS 8	2.82		
VCS 9	4.34		

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Calculation example:

$Q_{max.}$ = 100 m³/h

p_u = 100 mbar

$V_P = V_V + L \times V_R = 7$ l

Q_L = 100 m³/h x 0.1% = 100 l/h

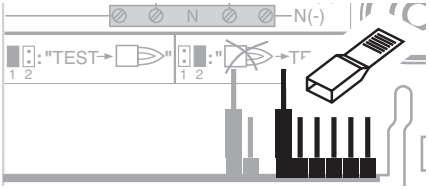
$$4 \times \left(\frac{100 \times 7}{100} + 1 \text{ s} \right) = 32 \text{ s}$$

Set the next highest value (in this example 40 s) with the jumper.

2 Disconnect the unit from the electrical power supply.

3 Unscrew the housing cover.

4 Connect the jumper to the pin for the required test period t_P between 10 and 60 s (100 and 600 s).

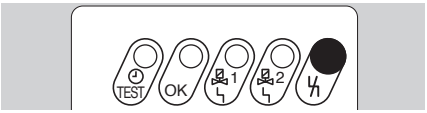


5 Position the housing cover and screw tight.

6 Mark the set test period t_P on the type label with a waterproof pen.

Commissioning

▷ Indicators and operating controls:



TEST = TEST phase (yellow)
OK = operating signal (green)
1 = fault valve 1 (red)
2 = fault valve 2 (red)
= reset button

1 Main switch on.

2 Apply mains voltage to terminal 1.

▷ If one or both fault lamps (red) are lit, wait approx. 5 s then press the reset button. The fault signal goes out.

3 Start the tightness test.

▷ **Mode 1**, test before burner start-up.

4 Voltage at terminal 3.

Or

▷ **Mode 2**, test after burner run.

5 Mains voltage at terminal 1 and renewed test after switching off the voltage to terminal 3.

The test begins:

▷ LED TEST is lit.

After test, if the valves are tight:

▷ LED OK is lit.

MODE 1: voltage at terminal 4.

Or

MODE 2: voltage at terminal 4 does not arrive until voltage is applied to terminal 3.

After test, if the valves are leaking: voltage at terminals 8 and 9.

▷ LED 1 is lit.

Or

▷ LED 2 is lit.

Power failure

▷ If the power fails briefly during the test or during operation, the tightness test will restart automatically.

▷ After a power failure during a fault, both red fault lamps will be lit.

Assistance in the event of malfunction

! CAUTION

Electric shocks can be fatal!

– Before working on possible live components, ensure the unit is disconnected from the power supply.
– Fault-clearance must only be undertaken by authorized trained personnel.
– (Remote) resets may only be conducted by authorized personnel.

▷ Faults may be cleared only using the measures described below.

▷ Press the reset button, see page 4 (Commissioning).
▷ If the tightness control will not start even though all faults have been remedied, remove the unit and send it to the manufacturer for inspection.

? **Fault**
! **Cause**
• **Remedy**

? **No LED is lit although mains voltage and ϑ signal are applied?**
! Fuse defective.
• Replace 5 A slow-acting fine-wire fuse – after replacing the fuse, start the tightness test several times and check the program sequence and the outputs of the tightness control.
• If it does not operate correctly, return the unit to the manufacturer.
! **Mode 1:** test before burner start-up is set; L1 and N are reversed on terminals 1 and 2.
• Connect L1 to terminal 1 and N to terminal 2.
! For 24 V DC: polarity of mains voltage on terminals 1 and 2 reversed.
• Connect + to terminal 1 and – to terminal 2.
! Mains voltage too low.
• Compare to details on the type label. Tolerance: -15/+10% for 110/120 V AC and 220/240 V AC, ±20% for 24 V DC.
? **TC repeatedly signals a fault?**
! A valve is leaking.
• Replace the valve.
! Pressure switch incorrectly set.
• Set the pressure switch to half the inlet pressure.
! Wiring to the valves reversed.
• Start the program and observe the interspace pressure p_Z. The pressure must change during the TEST phase. Check the wiring.
! Inlet pressure p_u < 10 mbar.
• Provide the min. inlet pressure of 10 mbar.
! Interspace pressure p_z cannot be reduced.
• The volume downstream of the valve on the burner side must be 5 times higher than the volume between the valves and atmospheric pressure must prevail.
! The test period t_P is too long.
• Adjust t_P, see page 3 (Setting the test period tP).
? **The downstream automatic burner control unit does not start?**
! On the tightness control, L1 (+) and N (–) on terminals 1 and 2 are reversed.
• Connect L1 (+) to terminal 1 and N (–) to terminal 2.
? **TEST phase running (yellow LED indicator is lit) although no ϑ signal has been applied?**
! Mode 2 set.
• Set jumper to Mode 1, see page 3 (Setting the test instant).

Maintenance

Tightness controls TC require little servicing. We recommend a function check once a year.

Technical data

Mains voltage:
110/120 V AC, -15/+10%, 50/60 Hz,
220/240 V AC, -15/+10%, 50/60 Hz,
24 V DC, ±20%.
Power consumption:
10 VA for 110/120 V AC and 220/240 V AC,
1.2 W for 24 V DC.
Ambient temperature: -15 to +60°C (5 to 140°F), no condensation permitted.
Storage temperature: -15 to +40°C (5 to 104°F).
Screw terminals 2.5 mm^2.
Fusing: fine-wire fuse 5 A, slow-acting, H pursuant to IEC 127, also protects the valve outputs and external operating signal.
Switching current for valves/enable output: max. 5 A.
External operating signal: with mains voltage, max. 5 A resistive load (UL listed: 5 A for 120 V), max. 2 A at cos φ = 0.35 (pilot duty).
Fault output: dry contact (not internally fused), max. 1 A for 220/240 V, max. 2 A for 120 V.
Reset: using a button on the device.
Remote reset: by applying mains voltage (terminal 5).
Housing made of impact-resistant plastic.
Gas type and inlet pressure: dependent on external pressure switch.
Test period t_P: TC 410-1: 10 to 60 s, adjustable. Set at the factory to 10 s.
TC 410-10: 100 to 600 s, adjustable. Set at the factory to 100 s.
Enclosure: IP 40.
5 knock-out holes for M16 plastic cable glands.
Weight: approx. 400 g (0.88 lbs).

Designed lifetime
Max. service life under operating conditions: 10 years after date of production or 250,000 operating cycles pursuant to EN 1643.

GB

Logistics

Transport
Protect the unit from external forces (blows, shocks, vibration). On receipt of the product, check that the delivery is complete, see page 2 (Part designations). Report any transport damage immediately.

Storage
Store the product in a dry and clean place.
Storage temperature: see page 5 (Technical data).
Storage time: 6 months in the original packaging before using for the first time. If stored for longer than this, the overall service life will be reduced by the corresponding amount of extra storage time.

Certification

Declaration of conformity
We, the manufacturer, hereby declare that the products TC comply with the requirements set out in section 5.2.2.3.4 of EN 746-2. They achieve a safety level equivalent to EN 1643:2000.
Elster GmbH

Scan of the Declaration of conformity (D, GB) – see www.docuthek.com

FM approved

Factory Mutual Research Class: 7400 and 7411 Safety overpressure slam shut valves. Designed for applications pursuant to NFPA 85 and NFPA 86.

UL listed for 120 V

Underwriters Laboratories – UL 353 Limit control
Canadian Standards Association: CSA – C22.2 No. 24

Approval for Australia

Australian Gas Association, Approval No.: 4581

Eurasian Customs Union

The products TC meet the technical specifications of the Eurasian Customs Union.

Directive on the restriction of the use of hazardous substances (RoHS) in China
Scan of the Disclosure Table China RoHS2 – see certificates at www.docuthek.com

Disposal

Devices with electronic components:
WEEE Directive 2012/19/EU – Waste Electrical and Electronic Equipment Directive

At the end of the product life (number of operating cycles reached), dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse. Do not burn the product. On request, old units may be returned carriage paid to the manufacturer in accordance with the relevant waste legislation requirements.

Contact

If you have any technical questions, please contact your local branch office/agent. The addresses are available on the Internet or from Elster GmbH.

We reserve the right to make technical modifications in the interests of progress.

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