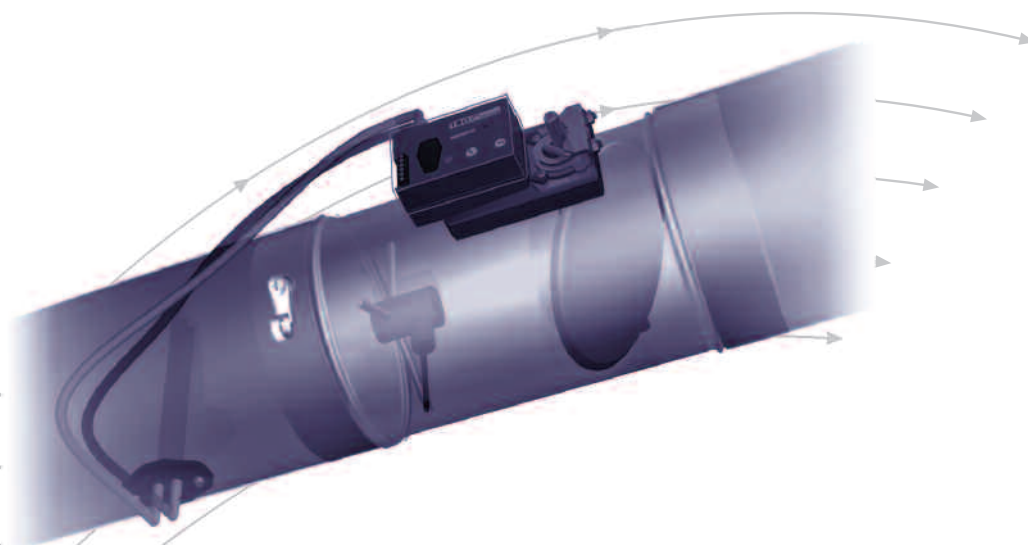


VARYCONTROL RETROFIT

EasySet · CompactSet · UniversalSet
For refurbishment of air terminal units



TROX[®] TECHNIK

The art of handling air

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TROX RETROFIT

Many air terminal units especially those equipped with air velocity sensors must now be refurbished. Possible reasons for this are:

- Faulty or dirty units, electronic or pneumatic
- Energy saving
- Integration into centralised building management system (BMS)
- Retrofit of constant to variable flow rate
- Improvement of comfort

TROX RETROFIT can be used if the replacement of a complete air terminal unit is not possible for any reason.

RETROFIT advantages

- Quick change
- Low refurbishment costs
- No interruption of system operation
- Parts of the existing unit remain untouched
- No changes of the ventilation duct system
- Low costs of disposal
- Rapid return of investment

There are 3 types of TROX RETROFIT kits

- EasySet
- CompactSet
- UniversalSet

The kits consist of control components such as flow rate controller and actuator, a differential pressure grid for flow rate measurement and accessories.

RETROFIT is suitable for circular ducts sizes 100 to 400.

Installation and commissioning

For refurbishment the existing control components are removed but the existing air terminal unit including control damper blade is used. The RETROFIT components have to be installed and wired. The differential pressure grid provided for flow rate measurement should be installed at a suitable place in the circular duct and connected to the transducer connections of the RETROFIT flow rate controller. When the wiring and tubing have been completed the flow rates are set.

The flow rates are set at \dot{V}_{\min} - and \dot{V}_{\max} potentiometers of the RETROFIT kit EasySet. For the CompactSet the settings are done with an adjustment tool or using a special software (by others). The flow rates \dot{V}_{\min} and \dot{V}_{\max} of the UniversalSet are set with an adjustment tool (by others). The VRD3 controller can be set at the $\dot{V}_{\min} / \dot{V}_{\max}$ potentiometers.

Further details can be found in the operating manual attached to each RETROFIT kit.

Refurbishment

For flow rate control a measuring point with differential pressure grid, a controller and an actuator with control damper blade is necessary. The existing control damper blade is used when refurbishment is done with RETROFIT.

The existing control components are removed. The differential pressure grid of the RETROFIT kit will be shortened accordingly and installed at a suitable measuring point.

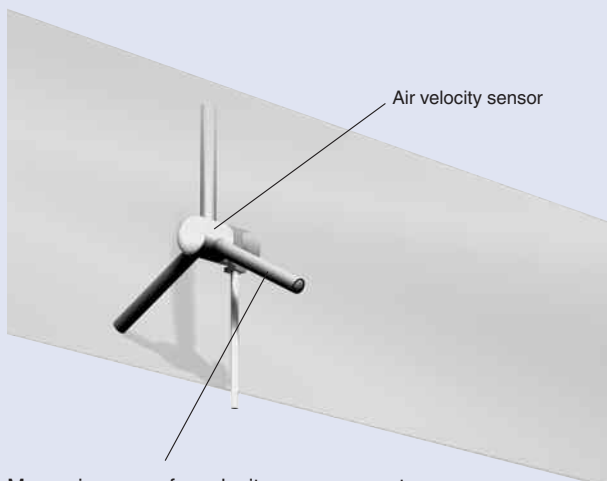
The functions

- Measurement
- Actuate
- Control

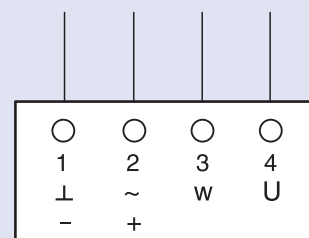
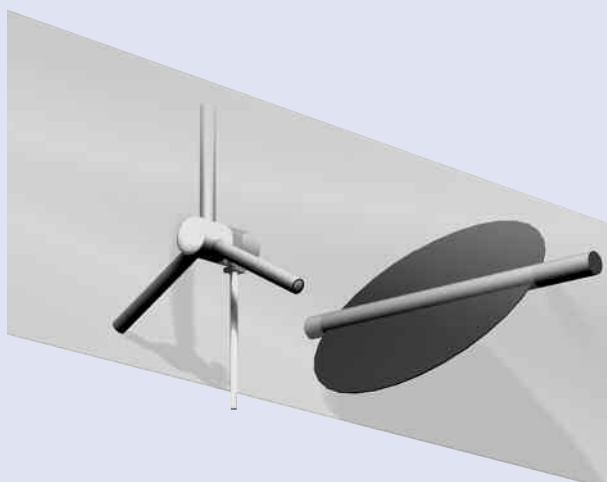
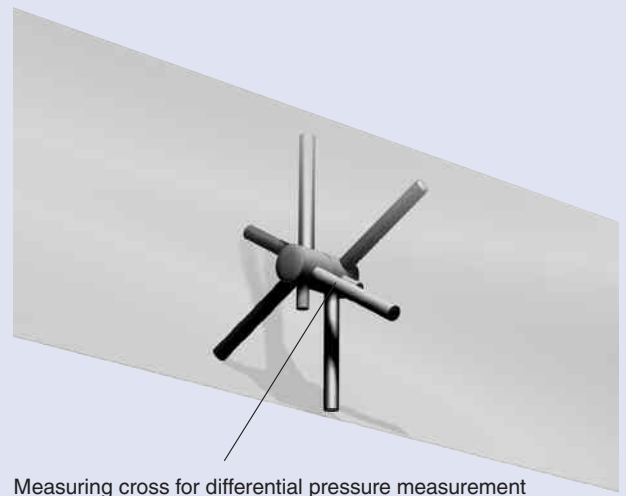
will be available again after the refurbishment. Also the required flow rate or flow rate range must be set.

Examples for the refurbishment

TVZ, TVR with air velocity sensor (VR1, VR2)



TVZ, TVR with differential pressure sensor in previous construction



Electronic compatibility remains unchanged

Grid technology and measuring point · Labeling

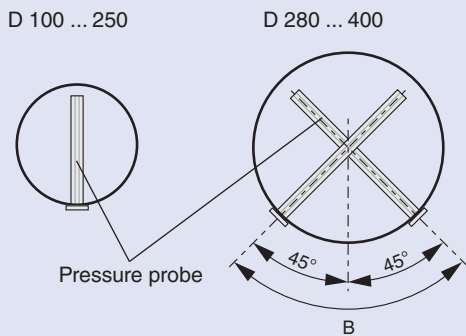
Differential pressure grid

The differential pressure grid is part of RETROFIT kits and provides and senses the pressure differential. Up to a nominal size of 250 mm the differential pressure grid consists of a single element, nominal sizes 280 to 400 mm two elements. The elements must be shortened with the help of a template to suit the corresponding nominal diameter. For installation into the ventilation duct it is necessary to drill a 36 mm diameter hole. The fixing of the element end plate is by means of self tapping screws.

Selection of the measuring point

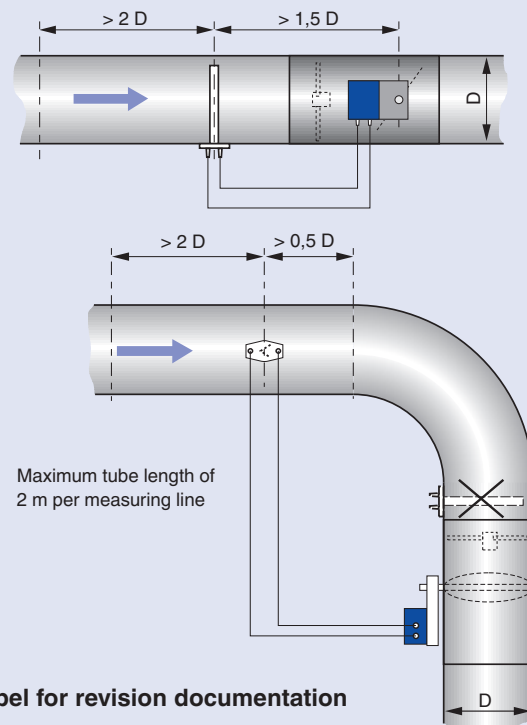
The measuring point must be selected in such a way that the specified maximum permitted tube length does not exceed 2 m for each pressure line. To achieve as uniform flow as possible over the grid there should be a sufficiently long straight duct upstream of the measuring plane, see diagrams below.

Differential pressure grid



Nominal size	B in mm
280	220
315	247
355	279
400	314

Measuring point, differential pressure grid



Label for air terminal unit

RETROFIT	<input checked="" type="checkbox"/> EasySet	TROX® TECHNİK
	<input type="checkbox"/> CompactSet	
	<input type="checkbox"/> UniversalSet	
	<input checked="" type="checkbox"/> 0 ... 10	
	<input type="checkbox"/> 2 ... 10	
D 200	$\dot{V}_{\text{Nenn}} 1450 = 100\%$	Kennzeichnung Raum 210
	$\dot{V}_{\text{min}} 435 = 30\%$	Name Mustermann
	$\dot{V}_{\text{max}} 1160 = 80\%$	Datum 26.08.2008

For identifying the on-site refurbishment, the RETROFIT kit contains a label, which can be printed with the appropriate data (see example).

Label for revision documentation

RETROFIT	<input checked="" type="checkbox"/> EasySet	TROX® TECHNİK
	<input type="checkbox"/> CompactSet	
	<input type="checkbox"/> UniversalSet	
	<input checked="" type="checkbox"/> 0 ... 10	
	<input type="checkbox"/> 2 ... 10	
Projekt XYZ	Gebäude 14	
D 200	$\dot{V}_{\text{Nenn}} 1450 = 100\%$	
	$\dot{V}_{\text{min}} 435 = 30\%$	
	$\dot{V}_{\text{max}} 1160 = 80\%$	
Kennzeichnung Raum 210		
Name Mustermann	Datum 26.08.2008	

A second smaller label can be used for archiving in the revision documentation.

Selection of RETROFIT type

Criteria for the selection of the appropriate kit

The selection of the required TROX RETROFIT kit is determined by the existing control components. A further criteria is the voltage range of the existing system.

The table below shows which of the three sets is suitable to replace the existing control components.

Shaft clamp

The shaft clamp of the kits is suitable for following shafts.

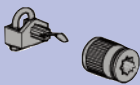

- EasySet and CompactSet

Circular shafts 10 to 20 mm, Square shaft ends 8 to 16 mm
Shaft end minimum length 45 mm








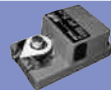
- UniversalSet

Circular shafts 8 to 20 mm, Square shaft ends 8 to 18 mm
Shaft end minimum length 25 mm

Other types of shafts require special adapters.

	Special adapters	Order code
	<ul style="list-style-type: none"> – EasySet – Compactset – Square shaft end 8 mm × 8 mm¹ – Short circular shaft end Ø 8 to 12 mm 	1
	<ul style="list-style-type: none"> – UniversalSet – Square shaft end 8 mm × 8 mm¹ 	2

¹ Existing actuator KM 24-I

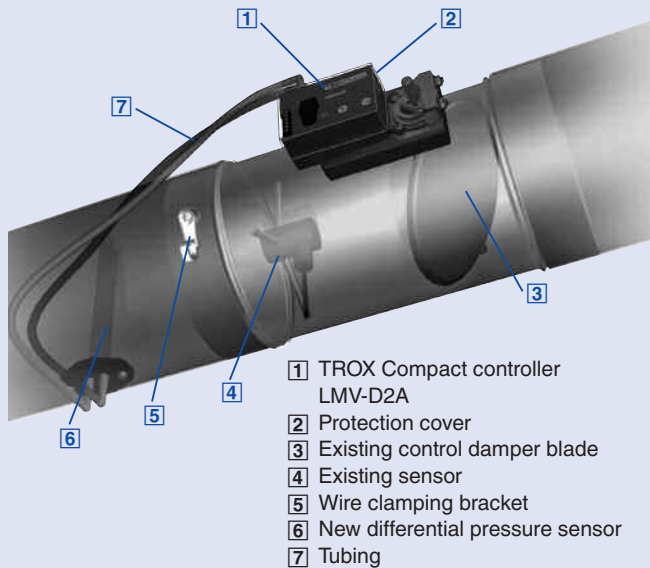
Selection of RETROFIT type			
Existing controller	Control mode		RETROFIT solution
	0 – 10 V DC	2 – 10 V DC	
VR1 ¹ 	×		EasySet ² CompactSet UniversalSet
VR2 ¹ 		×	CompactSet UniversalSet ²
VRD ¹ 		×	CompactSet UniversalSet ²
VRD2 ¹ 	×		EasySet ² CompactSet UniversalSet
		×	CompactSet UniversalSet ²
NMV24-V 	×		EasySet ² CompactSet ² UniversalSet
NMV24-D 	×		EasySet ² CompactSet ² UniversalSet
NMV-D2 	×		EasySet ² CompactSet UniversalSet
		×	CompactSet UniversalSet ²
NMV-D2M 	×	×	CompactSet ² UniversalSet

¹ In combination with actuators KM24-I, SM24-I, NM24-V und SM24-V

² Existing functionality remains unchanged

The kits

EasySet



- 1 TROX Compact controller LMV-D2A
- 2 Protection cover
- 3 Existing control damper blade
- 4 Existing sensor
- 5 Wire clamping bracket
- 6 New differential pressure sensor
- 7 Tubing

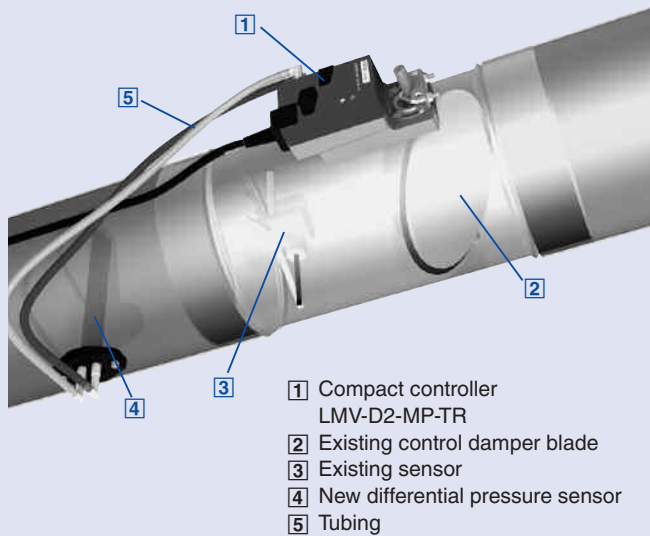
EasySet

TROX EasySet can be used for refurbishment of units currently with VAV controllers with air velocity sensors or differential pressure sensors. The kit consists of following parts:

- New differential pressure grid to measure flow rate using dynamic pressure differential principles
- TROX Compact controller is a controller and actuator combined in one casing.
- Tubes, small parts, operation manual, labels

The percentage setting of flow rates is carried out at scaled potentiometers, without additional adjustment tool. A green indicator light and a service button assists for the final functional check and displays the operating mode.

CompactSet



- 1 Compact controller LMV-D2-MP-TR
- 2 Existing control damper blade
- 3 Existing sensor
- 4 New differential pressure sensor
- 5 Tubing

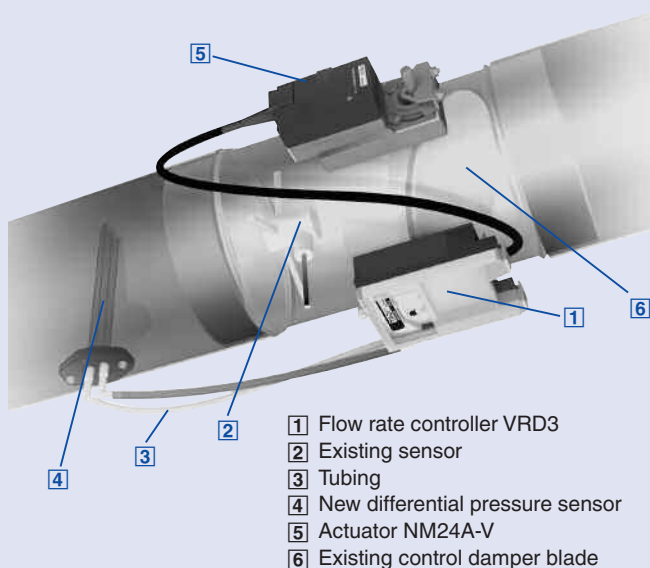
CompactSet

TROX CompactSet can be used for refurbishment of units with VAV controllers with air velocity sensors or differential pressure sensors. Units refurbished with TROX CompactSet are then MP bus compatible. The kit consists of following parts:

- New differential pressure grid to measure flow rate using dynamic pressure differential principles
- The compact controller is a controller and actuator combined in one casing, MP bus compatible
- Tubes, small parts, operation manual, labels

For the CompactSet the settings are carried out with an adjustment tool or an interface together with a special software (by others). Two operating modes can be set: 0 to 10 or 2 to 10 V DC.

UniversalSet



- 1 Flow rate controller VRD3
- 2 Existing sensor
- 3 Tubing
- 4 New differential pressure sensor
- 5 Actuator NM24A-V
- 6 Existing control damper blade

UniversalSet

TROX VAV-EasySet is an assembly made up of control components for refurbishing air terminal units with air velocity sensors or differential pressure sensors and separate controllers and actuators. The kit consists of following parts:

- New differential pressure grid to measure flow rate using dynamic pressure differential principles
- Flow rate controller
- Actuator
- Tubes, small parts, operation manual, labels

The flow rates \dot{V}_{\min} and \dot{V}_{\max} are set with an adjustment tool (by others). The VRD3 controller can also be set at the $\dot{V}_{\min} / \dot{V}_{\max}$ potentiometers. Two operating modes can be set: 0 to 10 or 2 to 10 V DC.

Flow rate ranges - Technical Data

Flow rate ranges				
Nominal size	$\dot{V}_{\min \text{ unit}}$		\dot{V}_{Nom}	
	l/s	m ³ /h	l/s	m ³ /h
100	10	35	97	349
112	13	45	125	450
125	15	55	153	551
140	20	70	195	702
160	25	90	250	900
180	32	113	315	1134
200	40	145	403	1451
225	53	189	525	1890
250	62	222	617	2221
280	80	286	795	2862
315	103	370	1028	3701
355	128	459	1275	4590
400	168	603	1676	6034

The flow rate ranges for all three kits are identical.

Technical data			
Parameter	EasySet	CompactSet	UniversalSet
Supply voltage	24 V AC \pm 20 %, 50/60 Hz or 24 V DC + 20 % / - 10 %		
Power rating A.C. voltage: D.C. voltage:	max. 5.5 VA max. 3 W	max. 5 VA max. 2.5 W	max. 9 VA max. 5.5 W incl. actuator
Control signal	0 to 10 V DC, $R_i > 100 \text{ k}\Omega$		0 - 10 V DC 2 - 10 V DC
Flow rate actual value signal	0 to 10 V DC linear, max. 0.5 mA		0 - 10 V DC 2 - 10 V DC
Transducer range	2 to 300 Pa		
Run time	120 to 300 sec. for 87°		
Torque	min 4 Nm, 6 Nm starting torque	5 Nm	10 Nm
IEC protection class	III (Safe voltage)		
Protection level	min. IP 20	IP 54	IP 40
Ambient temperature	0 °C to + 50 °C		
Storage temperature range	- 20 °C to + 80 °C		

Order Details



Specification texts

EasySet

Parts kit for refurbishment of air terminal units in systems with circular ducts, for nominal sizes 100 to 400 mm, for supply or extract air. Easy customer adjustment of flow rates by potentiometers with percentage scales on the TROX compact controller without supply voltage and external auxiliary devices. A transparent protection cover prevents inadvertent resetting and provides general safety. High visibility external indicator light for signalling the functions:

Set, not set and power failure.

Electrical connections with screw terminals. Terminal for looping the 24 V AC supply voltage, for the connection of voltage transmission to the next controllers.

Voltage range for control and actual value signal from 0 to 10 V DC. Possible override controls with external switches using potential-free contacts: CLOSED, OPEN, \dot{V}_{\min} / \dot{V}_{\max} changeover. Same linear characteristics for all sizes.

CompactSet

Parts kit for refurbishment of air terminal units in systems with circular ducts, for nominal sizes 100 to 400 mm, for supply or extract air. Customer adjustment of flow rates using adjustment tool or software on the TROX compact controller.

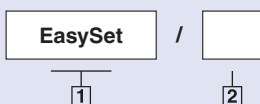
Voltage range for control and actual value signal from 0 to 10 or 2 to 10 V DC. Possible override controls with external switches using potential-free contacts: CLOSED, OPEN, \dot{V}_{\min} / \dot{V}_{\max} changeover. Same linear characteristics for all sizes.

UniversalSet

Parts kit for refurbishment of air terminal units in systems with circular ducts, for nominal sizes 100 to 400 mm, for supply or extract air. Customer adjustment of flow rates at potentiometers on the VRD3 controller or using adjustment tool or software.

Voltage range for control and actual value signal from 0 to 10 or 2 to 10 V DC. Possible override controls with external switches using potential-free contacts: CLOSED, OPEN, \dot{V}_{\min} / \dot{V}_{\max} changeover. Same linear characteristics for all sizes. Separate actuator.

Order code



1 Type

EasySet
CompactSet
UniversalSet

2 Accessories¹

- None, no entry required
- 1 Special adapter for EasySet and CompactSet
Square shaft end 8 mm × 8 mm
Short circular shaft end 8 to 12 mm
- 2 Special adapter for UniversalSet
Square shaft end 8 mm × 8 mm

¹ For air terminal units in previous construction