Labcontrol

Laboratory-System-Management

TROX® TECHNIK

The art of handling air

Labcontrol – Labair Management

Working place security combined with efficient energy management in the field of laboratory ventilation

The requirements for engineering of air systems in laboratory buildings are complex and demanding. There is a general need to protect laboratory personnel from dangerous substances whilst simultaneously optimising energy usage.

The LABCONTROL system offers a customised solution including the regulation and monitoring of individual fume cupboards and rooms, all the way up to the provision of an entire laboratory building ventilation system. This is undertaken taking into account the related standards and regulations, e.g., EN 14175 or DIN 1946, Part 7.

To provide the necessary fast response times, room pressure and room temperature controls can be combined. The LABCONTROL product family specifically addresses these requirements electronically- or alternatively we can offer pneumatic options.

The electronic controller uses analogue – and/or digital signals (LonWorks®) for communication. Efficient systems, centralised measurement and monitoring of all system parameters, e.g. error messages, provides increased security. An ability to rapidly modify a system offers greater flexibility. Remote access allows diagnostics and adjustment of parameters without incurring large personnel and time costs.

To achieve such a total concept, requires close co-operation at the design stage of a project between consultants, the end users and the equipment manufacturers (laboratory furniture, air and control engineering). The early coordination of design in the long term can simplify the achievement and maintenance of excellent safety and comfort conditions within the laboratory area.

LNO
LON USER ORGANISATION e.V.

LONMARK®
PARTNER

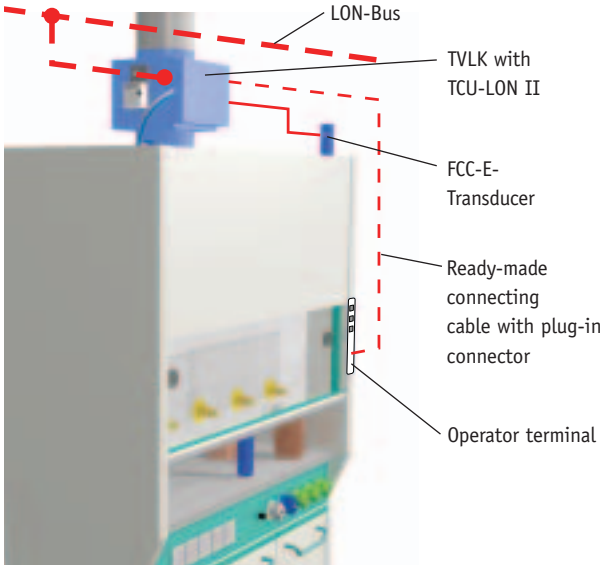
Control

Max Planck Institute for chemistry, Mainz

Fume Cupboard Control

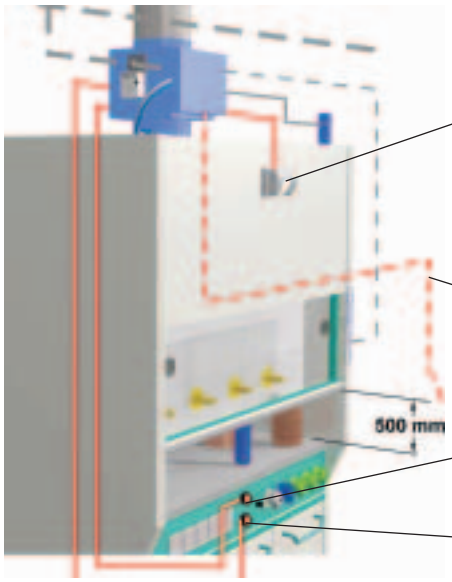
The TCU II or TCU-LON II control units are mainly used for controlling fume cupboards with variable volume flow rates. This is done by intake velocity/volume flow cascade control. All requirements of DIN 12924, EN 14175, BS7258 and ASHRAE standard are complied with.
This controller offers the highest possible level of safety while remaining economical. For use as a fume cupboard controller, the TCU-LON II is combined with a Trox volume flow control device (e.g. TVLK). The unit consists of the TCU-LON II controller with an integrated function control and the volume flow control device with actuator and control damper. In addition, the FCC-E intake velocity transducer is supplied separately and mounted onto the fume cupboard via a 20 mm dia hole by the customer. Also included in the delivery is an operator terminal for user operation of the controller.

Fume Cupboard Control



The FCC-E transducer measures intake velocity without contact, moving parts or wear. The sash window can be adjusted in its vertical plane and slid in its horizontal plane. The interconnection of a number of fume cupboards is also possible. The measurement system records the intake velocity independently of the location of the opening.

Fume Cupboard Control with Movement Detector and Additional Switching Functions



* Altogether two options can be used simultaneously

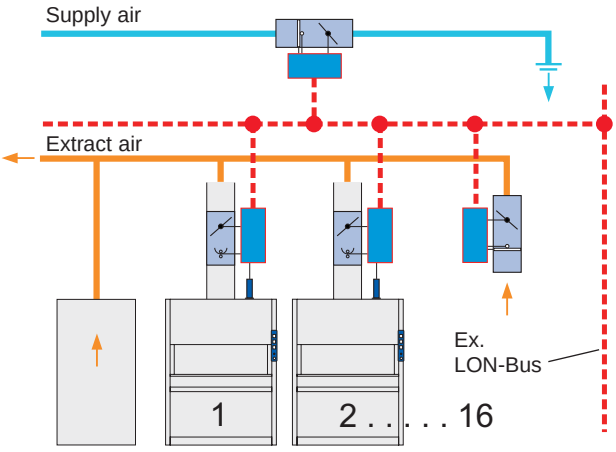
Thermal loads inside of the cupboard do not affect measurement, but automatically lead to an increase in the volume flow rate and thus safe extract of the heat loads. The actual volume flow value is available as a digital LON signal. As a result, the fume cupboard can be included in room air balance. Override switching can be performed by switch and relay, or LON signals can be sent to the controller. There is integral intake velocity monitoring with both acoustic and visual alarms. For night operation, error messages can be suppressed.

Hydrogen Center, Schwerin

Room Volume Flow Control

The TCU-(LON) II controller can be combined with the VAV controller types TVZ, TVA, TVJ, TVT, TVRK, TVR, TVS, to control variable supply and extract volume flows in the room. The velocity control of the fume cupboards is such that stable room pressure can be maintained. Since the air tightness requirements of rooms are continually increasing due, for example, to fire protection measures, this is of critical importance.

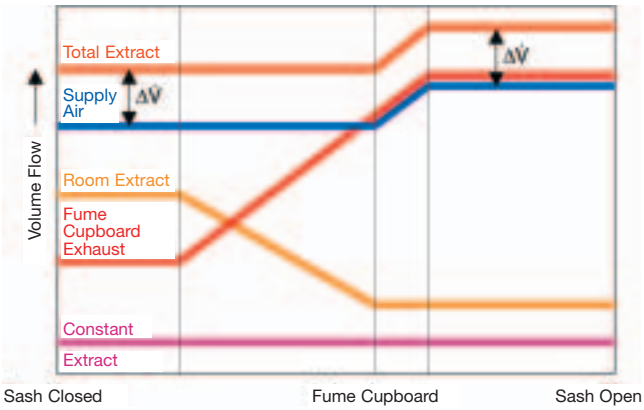
Example



For balancing the room, up to 16 actual volume flow rates from fume cupboards, room controllers or other extract sources can be connected via the LON network to a corresponding room controller. In addition, temperature and room pressure can be connected.

As a characteristic of the LON variant, special operation modes can be passed on from the room controller (master node) to all the other linked controllers. Furthermore, the operation modes can be easily configured in the other linked controllers so that, for example, individual fume cupboards continue to control when in the room reduced operation mode (mode change).

Control Diagram

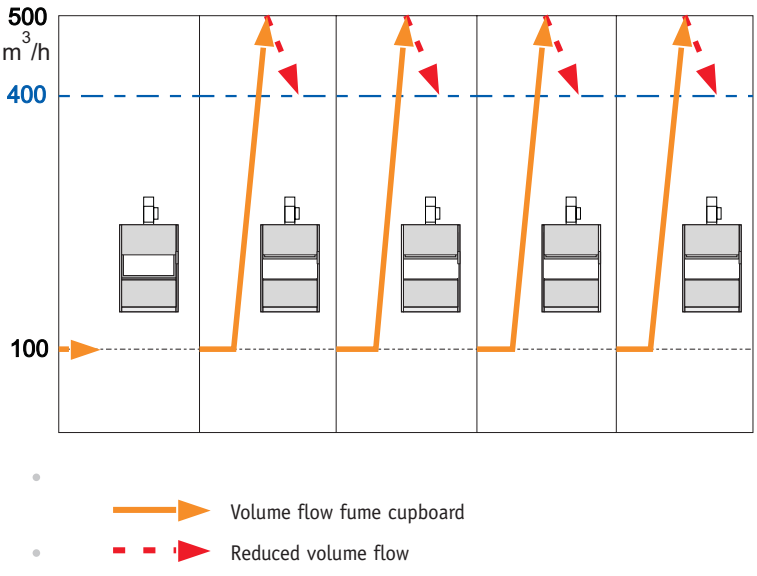


BYK Chemie, Wesel

Room Control Considering the Diversity Factor SF

Large laboratory buildings are often operated with the volume flow balance taking diversity factors into account for reasons of economics. Then the advantages of variable volume flow control can be fully utilised. This method is based on only a few of the fume cupboard sashes being open at the same time. Most of the fume cupboards are assumed to be closed. The advantage of this procedure lies in the fact that both the duct system and the fans can be reduced in size. Until recently, this design requirement could lead to problematical situations which, thanks to the new LABCONTROL generation, are now a thing of the past. It was previously necessary to carry out air flow balancing to ensure that the calculated air conditions were maintained in all areas. This is now checked by the TCU II or TCU-LON II controller itself and corrected as necessary.

This prevents a diversity factor = 1 occurring in areas that, for example, are near the fans, which results in a diversity factor of lower than the calculated value in other areas. It is difficult, of course, for laboratory users to find out which part of the laboratory is responsible for this imbalance. Unacceptably high deviation of the air balance is recognized by LABCONTROL and can be corrected by lowering the volume flow at the open fume cupboards. A negative effect on adjacent laboratory areas is prevented.
The fume cupboard controller generates an alarm at the operator terminal, alerting the user that the diversity factor has been exceeded. In addition, an alarm message can be transmitted via LON and/or relay output to the BMS if the diversity factor is exceeded.



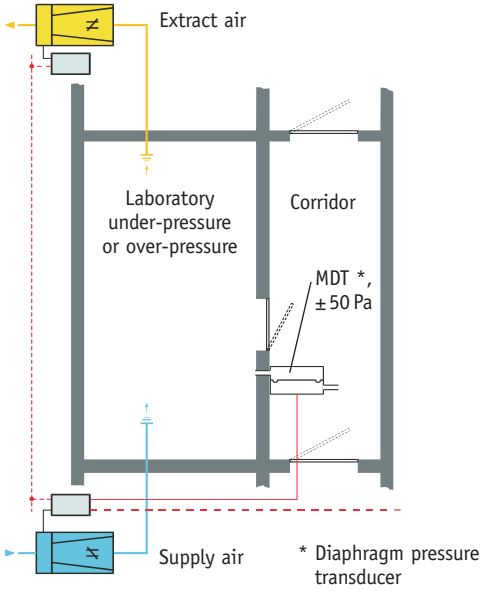
Example

- Room with 5 fume cupboards,
  $V_{max\ fume\ cupboard}$ = 500 m^3/h,
  $V_{max\ fume\ cupboards\ total}$ = 2500 m^3/h
- At most, 3 fully open fume cupboards allowed simultaneously, equals $V_{max\ fume\ cupboards\ total}$ = 1700 m^3/h
- As in the example shown, also with the fourth fume cupboard open, the TCU-LON II- controller will reduce the total volume flow V_{max} to 1700 m^3/h, 400 m^3/h per fume cupboard.
  The four fully opened fume cupboards give an alarm signal. For safety operation, one cupboard must closed.

Room Pressure/Room Balance Cascade Control

Instead of having only a room balance control, it is possible to make a combination between a room balance and room pressure control. In this case, all individual extract air volume flow rates are recorded and communicated to the room controllers. The room controllers themselves balance the necessary room supply and extract air. Additionally, the recorded room pressure is connected to the room supply controller in cascade. If there is a difference between actual room pressure and the specified required value, a supply-extract volume flow difference shift will compensate for this.

Room Pressure/Room Balance Cascade Control



In contrast to room pressure control only, this process takes the room volume flow balance into account, which has a benefit in terms of fast response time and bearing in mind the fast acting control system for the fume cupboards. Extreme volume flow rate control-damper blade positions are avoided as only fixed tolerances are used in the control of the room pressure. A changeover between under and over pressure (septic/aseptic) can be configured as well. The TROX TPM can be used as a display unit to show the room pressure and, if necessary, further error messages.

Temperature Control

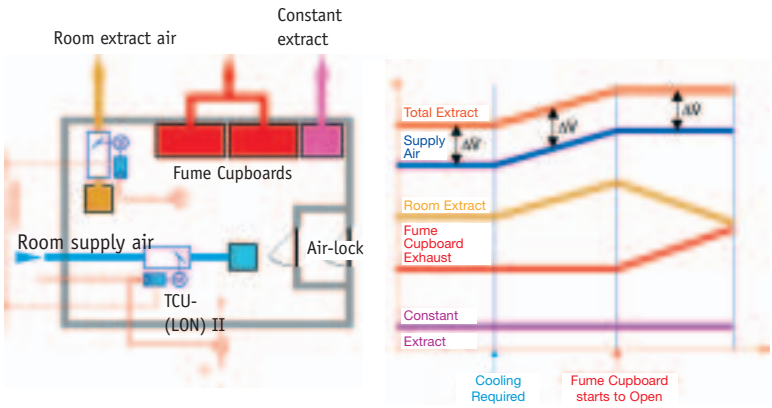
Volume Flow Rate Change

A temperature control can be achieved in a number of ways. The volume flow rate is varied dependant on the temperature signal, without room pressure changing.

Following variants are available:

1. Volume flow rate influence with temperature control by TCU-(LON) II, direct connection of temperature signal (see example). Switch-over for summer/ winter integrated and can also be controlled.
2. Changing of volume flow by an external temperature controller with 0 to 10 VDC signal, or as LON order (only TCU-LON II).

Room Pressure, Room Balance and Room Temperature Control



Reheat Control

The TCU II or TCU-LON II can be operated with a VAV controller with an integral reheat. The control signal is provided by the TCU II via a 3 point signal and by the TCU-LON II via LON.

Labcontrol Components

Fume cupboard and room balance controller Type TCU-II

System solution for fume cupboards and room balance

Type TCU-II

- Fume cupboard and room balance controller with analogue communication
- Regulation and monitoring of fume cupboards with variable volume flow
- Operator terminal for status display and special function connection for the fume cupboard
- Measurement of the inlet velocity into fume cupboard with a separate transducer
- Room temperature and room pressure control possible
- Downloading of parameters via Trox Labconnect
- 24 VAC supply

Fume cupboard and room balance digital controller Type TCU-LON II

Type TCU-LON II

- Fume cupboard and room balance controller with LonWorks® technology
- Regulation and monitoring of fume cupboards with variable volume flow
- Operator terminal for status display and special function connection for the fume cupboard
- Measurement of the inlet velocity into fume cupboard with a separate transducer
- Room temperature and room pressure control possible
- Downloading of parameters via Trox Plug-Ins
- FTT 10A Transceiver free topology
- Remote access possible
- 24 VAC supply

VAV-Controller Type TVLK

VAV controller for aggressive media

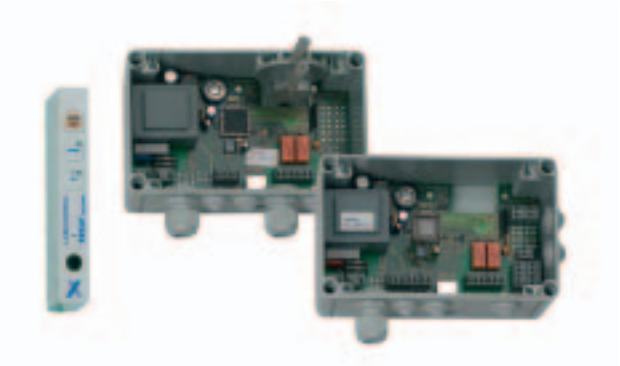
Type TVLK

- All components coming into contact with the air are made of resistant PPS (up to sealing lip of chloroprene rubber)
- Length: only 400 mm
- Diameter: 250 mm
- Demountable differential pressure sensor for cleaning purposes

Monitoring devices for fume cupboards

Type FCM-N1/N2

- Monitoring device for checking the volume flow rate of fume cupboards
- With integral differential pressure measuring device and separate differential pressure sensing element (FCM-N1)
- With the ability to accept an actual flow rate output signal from a VAV controller (FCM-N2)
- Display of the current status by a control terminal (for installation on the fume cupboard)
- Able to transmit error messages
- 230 VAC supply voltage



Monitoring Device for Fume Cupboards, Type FCM-N1/N2

Monitoring devices for room pressure

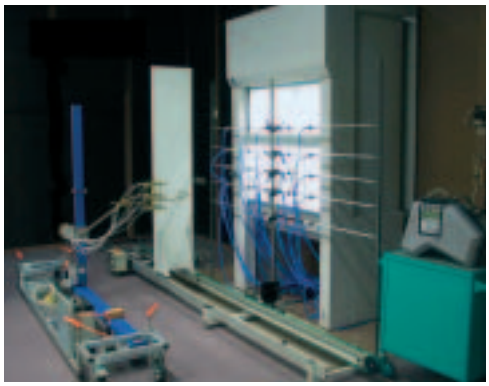
Type TPM

- Room pressure monitoring device
- With the ability to connect to the output from a room pressure differential transducer (ring balance manometer, pressure transducer)
- Display of the current status on a control terminal (wall installation)
- Able to transmit error messages
- 230 VAC supply voltage

Room Pressure Monitoring Device, Type TPM

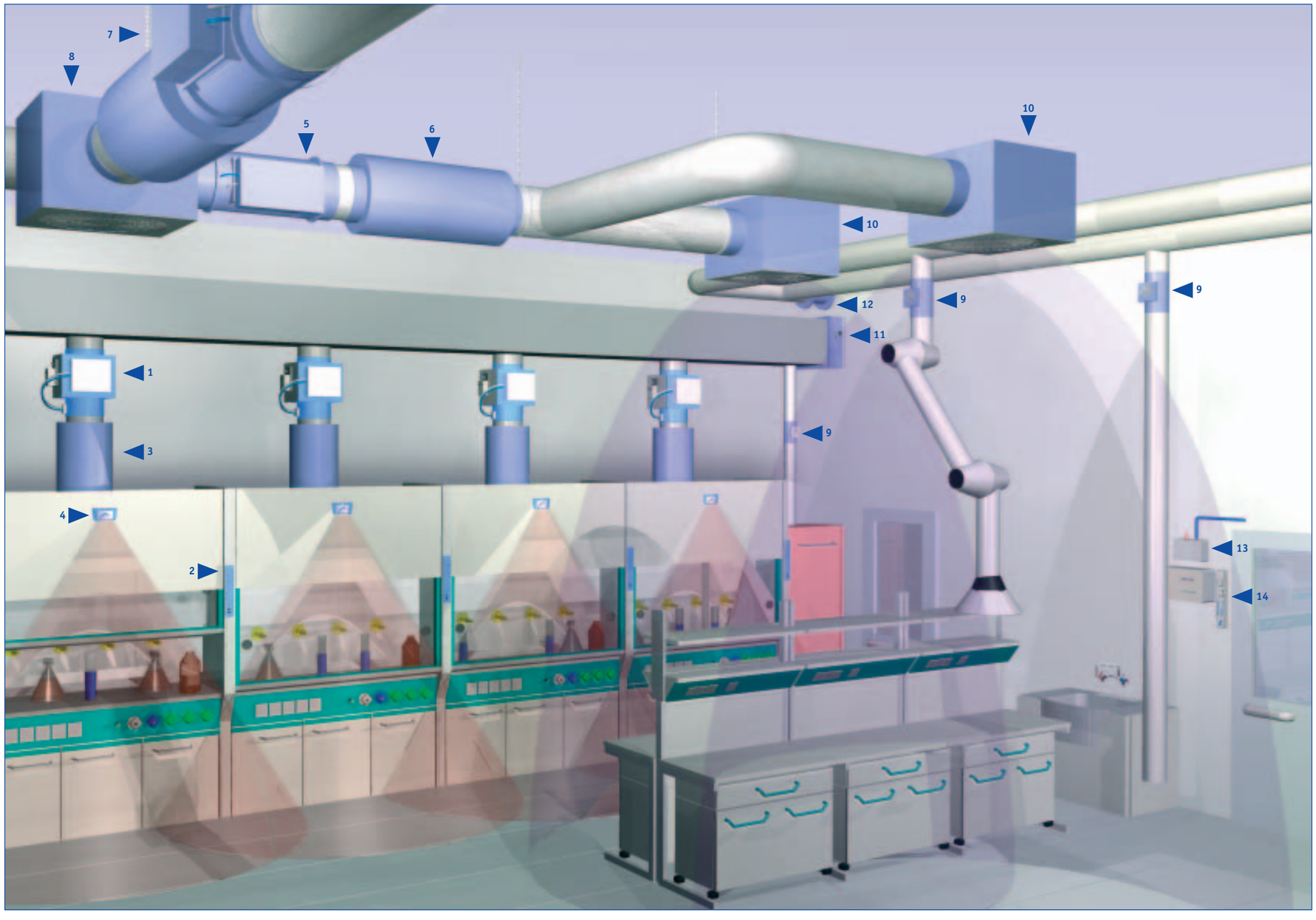
Fume cupboards certification in accordance with EN 14175

- Security and air conditioning tests of fume cupboards according to EN 14175
- Any necessary type examination can be performed to certify the fume cupboards
- Alternatively “onsite tests” can be performed



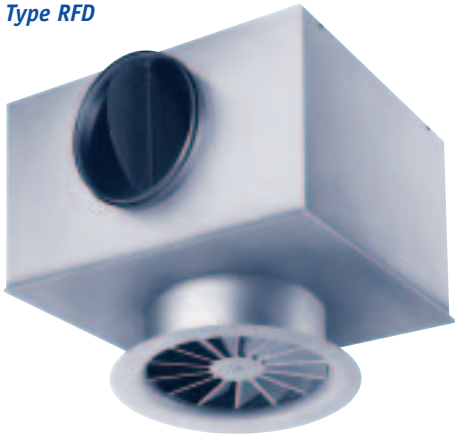
TROX Laboratory System Solutions

1 *TVLK/250-XXX/TMA/FH (LON)*
TVLK/250-XXX/TRA/FH (Analogue)
2 *Operator terminal*
3 *CAK silencer (PPS)*
4 *Optional motion sensor*
5 *TVR/XXX/TMA/RS (LON)*
TVR/XXX/TRA/RS (Analogue)
6 *CA silencer*
7 *TVRK/XXX/TMA/RE (LON)*
TVRK/XXX/TRA/RE (Analogue)
8 *Air diffuser type VDW*
9 *RN-P1/D2/XXX*
10 *Air diffuser type PCD*
11 *FK-K90-1-6*
12 *FKRS-02-K90-1*
13 *MDT room pressure*
14 *TPM room pressure monitoring*



Air Diffusers · Additional Components

Swirl Diffusers
Type RFD



Type RFD · FD · TDF / RA (Hesco)

- Swirl diffusers for supply and extract air with fixed blades
- Suitable also for VAV systems thanks to the large volume flow rate turn down ratio (25-100%)
- Rapid reduction of jet velocity and temperature differential due to high induction
- Exposed installation or integrated into the false ceiling
- Circular or square face sections
- Material: powder-coated, galvanized steel (type RA in plastic)
- Plenum box with top or side entry connecting spigot, optionally with volume control damper
- Recommended volume flow range: 8-270 l/s
- Sizes: NW = 125-400 mm; 300/400/500/600/625 mm

Ceiling Diffusers
Type PCD

Type PCD (Hesco)

- PROCONDIF® ceiling Diffusers with high-permeability honeycomb structure
- Controlled velocity profile of the supply air – PROFILE CONTROLLED DIFFUSION
- Ideal for directional discharge, large volume flow rates with moderate temperature differentials
- Circular and square construction
- Material: powder-coated, galvanized steel face plate, inner part made of plastic
- Plenum box optionally with volume control damper
- Volume flow range: 80-170 l/s
- Sizes: □ 600/625 mm; ø 725 mm

Swirl Diffusers
Type TDV-SilentAIR

Types TDV · VDW

- Swirl diffusers for supply and extract air
- Manually adjustable to alter the direction of discharge to match changes in room layouts
- Due to high induction rapid reduction of jet velocity and temperature differential
- Low sound-power levels with high volume flow rates
- More than 30 air changes per hour and supply air temperature differentials of +/-12 K are possible
- Circular or square face sections
- Material: powder-coated, galvanized steel
- Plenum box with top or side entry connecting spigot, optionally with volume control damper
- Recommended volume flow range 15-350 l/s
- Sizes: 300/400/500/600/625/825 mm

Type CAK

- Suitable for a duct system, in which aggressive extract air is handled
- Suitable for type TVRK / TVLK units
- Plastic casing (PPS)
- Non-combustible mineral wool according to DIN 4102 A2
- NW 125-400; lengths 500, 1000, 1500 mm
- Optionally with flanges

Silencer Type CAK

Fire dampers

- Types FK-K90 · EN-FKS-K90 · FKRS-02-K90 with Z-41.3-318 · Z-41.3-653 · Z-41.3-604 general approved construction guidelines
- Recommended construction:
  - with powder coat finish

  Note: Construction provides good resistance against corrosive agents
- Recommended applications:
  - Wall or ceiling slab situations
  - With independent installation frame

  Note: In these applications, a replacement of the unit without disturbing the installation frame is possible
- Maintenance cycles:
  Depending on the equipment technology and the operating conditions
- Available sizes:
  - FK-K90 type
    Widths/Heights of 200/200 to 1500/800 mm and NW 200 to 710 mm fitted with circular connecting spigots
  - EN-FKS-K90 type
    Widths/Heights of 200/200 to 800/200 mm
  - FKRS-02-K90 type
    NW 100, NW 125, NW 160, NW 200

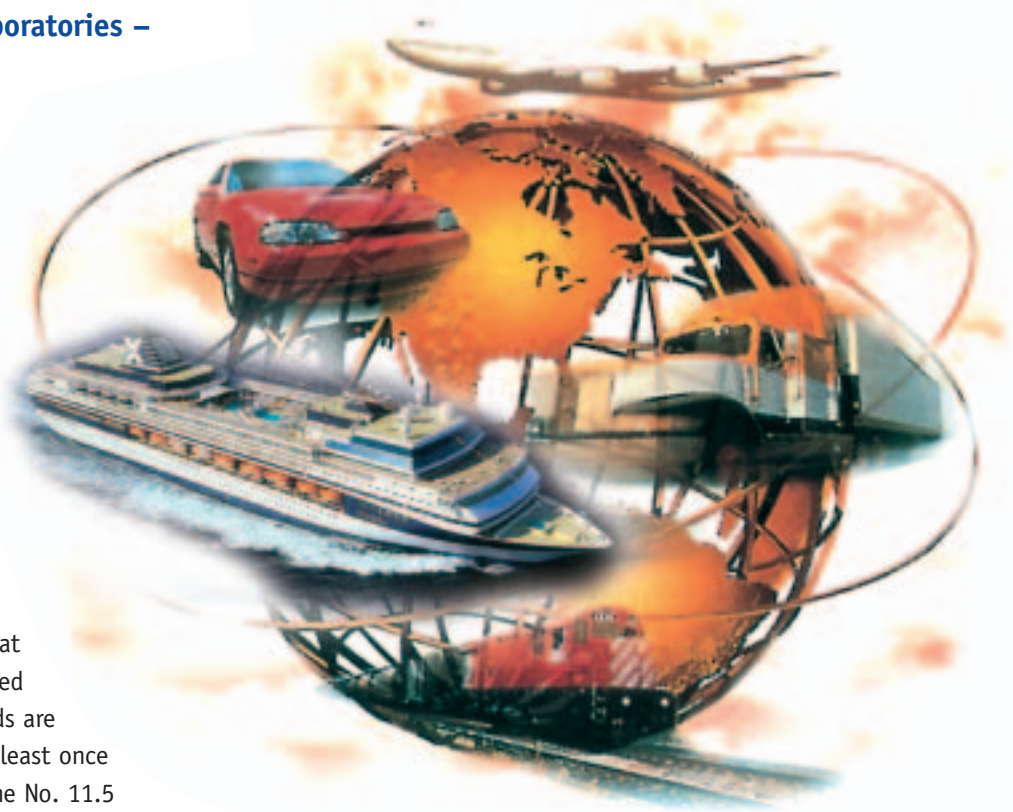
Fire Damper Type FKRS-02-K90

Room control units

- Room control units according to LONMARK® standard
- Suitable for wiring of labcontrol components
- Changeover of the operating modes
- Mode selection of temperature set and actual values
- The display of the respective operating mode as text in the display is possible
- Different designs and materials are possible

Services

Services for Intelligent Laboratories – Putting safety first



Ventilation and air-conditioning systems for laboratories are a vital part of the safety equipment. To achieve optimum efficiency, it is important to check the equipment is functioning correctly before being used for the first time, and to adapt the system to the locally prevailing conditions. The German Government Safety Organisation for the Chemical Industry (BG-Chemie) stipulates in its Guidelines for Laboratories ZH 1/119 Pt. 11.5 that all fume cupboards must be serviced annually. Moreover, fume cupboards are to be inspected by a specialist at least once a year in accordance with Guideline No. 11.5 BGR 120; § 39 Section 3 BBV A1; 2 §53 Section 2 ArbStättV. Similar safety guidelines are in place in countries throughout the world.

That is why we offer our customers commissioning and maintenance agreements.

Please contact us for more information.

Why are commissioning and maintenance by specialised personnel recommended?

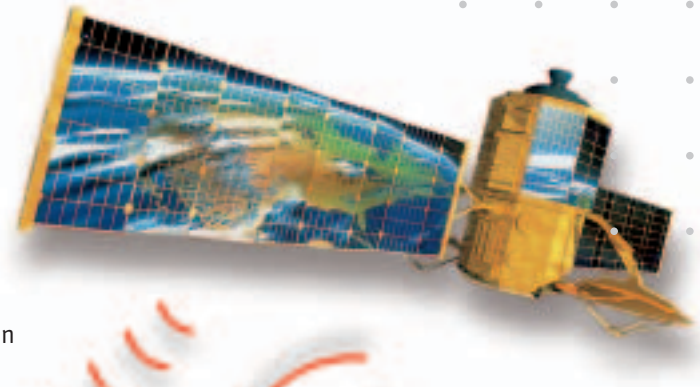
The air handling control systems deal with many complex tasks in laboratory applications. In all operating conditions, the security of the laboratory user is essential. To ensure this, the functioning of the fume cupboards are permanently monitored, as well as the entire room balance. All the parameters, such as room pressure, room temperature or set and actual volume flow rates, can be easily displayed and monitored.

All these parameters are correctly setup during the project commissioning. When the hardware and the software originates from Trox, the interfacing of the components is guaranteed.

On account of the range of possibilities that LABCONTROL systems allow, Trox offers with confidence, a total commissioning package by experienced system engineers. Their ability to safely handle the components and the experience gained within the room air engineering for laboratories will save time and thus money. You can profit from the system integration experience particularly by using the LONWORKS® technology.

Remote access

Do you sometimes wish you had an expert who could assist you in a matter of minutes? Would you like to reset a fume cupboard or room controller to new volume flows or find out the reason for an error message?



The Trox remote access system makes all this very easy. Our service technicians can access your system by telephone or Internet (as agreed upon with you). This allows us to perform remote diagnosis or analyse functions and perhaps modify the system to meet your needs.

Alarm Messages:

You do not have a building management system that is staffed 24 hours a day and want, nevertheless, to receive a warning message in the case of system malfunctions? You can now arrange for LABCONTROL to send error messages (alarm messages) to your mobile phone or fax machine. A fault message for instance, can also be sent to an e-mail address or to a display set up at your company's control centre. You select the option most suitable for your system.

Byk-Chemie, Wesel

Labcontrol Reference List - Germany

Abbott GmbH & Co.KG
Ludwigshafen
Aldrich Chemie
Steinheim
Asta Medica
Mainz
BASF
Ludwigshafen
BAT
Bayreuth

Bayer Dormagen
Dormagen
Bayer Leverkusen
Leverkusen
Bayer Monheim
Monheim
Bayer Wuppertal
Wuppertal
Biopark
Regensburg
Bioscientia
Ingelheim
BMW
Dingolfing
Boehringer Ingelheim
Ingelheim
Brandenburgische Technische Universität
Cottbus
Byk
Gulden
Byk-Chemie
Wesel
CBW
Bitterfeld-Wolfen
Charité
Berlin
CVUA
Münster
Dow Corning
Wiesbaden
Fachhochschule Ansbach
Ansbach
Fachhochschule Jena
Jena
Fachhochschule Magdeburg
Magdeburg
Fachhochschule Merseburg
Merseburg
Fachhochschule Neubrandenburg
Neubrandenburg
Fachhochschule Rosenheim
Rosenheim
Forschungszentrum Jülich
Jülich
Forstwissenschaft Tharandt
Tharandt
FSU Jena Klinikum2000
Jena
FSU Jena Tierhaus
Jena
Goldschmidt AG
Essen
Grünenthal
Aachen
H.C.Starck
Goslar
Hilti
Kaufering
Hochschule für Technik und Wirtschaft
Dresden
Hüls AG
Marl
Infra Leuna
Leuna
InfraServ Höchst
Frankfurt / Main
Institut für Polymerforschung
Dresden
IUB
Bremen
IZB Martinsried
Munich
Kist Europe
Saarbrücken
Landesuntersuchungsanstalt
Dresden
Landesuntersuchungsamt
Erlangen
Lurgi Zimmer AG
Frankfurt / Main
Merck
Darmstadt
Medizinische Hochschule Hannover
Hanover
Martin-Luther-Universität FB Chemie
Halle
Max Planck Institut Biogeochemie
Jena
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Dresden
Max Planck Institut
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Jena
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Magdeburg
Max Planck Institut
Rostock
OMZ
Heidelberg
Paul Ehrlich Institut
Frankfurt / Main
Physikalische Chemie RWTH
Aachen
Roche
Pensberg
Ruhrhauslabor Essen
Essen
Ruhruniversität Bochum
Bochum
Sachs
Schweinfurt
Sartorius
Göttingen
Solvay
Hanover
Spektroskopie
Dortmund
Staatl. Lebensmittelamt
Braunschweig
Technische Universität Chemnitz
Chemnitz
Technische Universität Dresden
Dresden
Technologiepark Köln Elementis
Cologne
TGZ Bitterfeld Wolfen
Bitterfeld
Universität Bonn Physiologie
Bonn
Universität Dortmund
Dortmund
Universität Essen Klinikum
Essen
Universität Freiburg
Freiburg
Universität Hamburg Toxikologie
Hamburg
Universität Hannover
Hanover
Universität Heidelberg
Heidelberg
Universität Homburg
Homburg
Universität Leipzig Pathologie
Leipzig
Universität Magdeburg Pathologie
Magdeburg
Universität Münster
Münster
Universität Oldenburg
Oldenburg
Universität Rostock
Rostock
Universität Tübingen
Tübingen
Universität Würzburg
Würzburg
UTZ Berlin Adlershof
Berlin
VW-Werk Forschungsgebäude
Wolfsburg
Wasserwirtschaftsamt
Arnsbach
Wasserwirtschaftsamt
Bamberg


AstraZeneca

Labcontrol Reference List - International

Australian Nuclear Science and Technology Organisation (ANSTO)
Australia
Janssen Pharma
Belgium
PIDPA Antwerpen
Belgium
CocaCola
Belgium
Jiling Univercity Shanghai
China
University Shanghai
China
Pliva Zargreb
Croatia
Marcipan Odense
Denmark
University Odense
Denmark
HTX Randers
Denmark
LEO Pharma
Denmark
Astra Zeneca, Dunkerque
France
Aventis Lyon
France
Corning Fontainebleau
France
Galderma
France
IECB Pessac
France
Innothera Arcneil
France
L'OREAL Paris
France
NTE Giberville
France
Rhone Poulenc Lyon
France
SOGIT Grenoble
France
Sanofi Sisteron
France
SNCF Vitry sur Seine Paris
France
University Marseille
France
Birmingham University
Great Britain
Cambridge Science Park
Great Britain
Merck
Great Britain
Moorefield Eye Hospital
Great Britain
Wolfson Laboratories London
Great Britain

L´Oreal, Paris, F

Bristol Meyers Squibb
Ireland
Swords Lab Dublin
Ireland
Dipharma Baranzate di Bollate Milano
Italy
Protezione Civile di Trento
Italy
Schering S.p.A. Segrate Milano
Italy
Euroforum
Luxemburg
Stork Utrecht
Netherlands
High School Oslo
Norway
Amphiagon Pharma
Spain
BASF Tarragona
Spain
Institut de chimie Neuchate
Switzerland
Nestle Konolfingen
Switzerland
Novartis Pharma Basel
Switzerland
Sandoz Basel
Switzerland
Siegfried AG Zofingen
Switzerland
Techcenter Rheinach Basel
Switzerland
University Irchel Zürich
Switzerland
Sabanci University Istanbul
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TROX® TECHNIK

The art of handling air

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