Wherever measured data is transferred by means of LAN within industry, Lufft's OPUS20 datalogger family can be ideally applied everywhere!

With OPUS20, each ethernet cabable datalogger can be provided with an IP address even in remote monitoring networks, where many dataloggers are in operation.

We see LAN, in connection with professional industrial applications with the highest reliability, as being the best possible data transfer method as opposed to WLAN applications that do not provide 100% data security during data transfer.

Furthermore, power can be supplied via LAN (PoE) with the built-in batteries operating as a UPS (uninterruptible power supply).

For these reasons this device concept corresponds to our development philosophy – "Future Inside"

Lufft OPUS20
LAN-Datalogger
Future Inside

Measurement

Storage and Transfer

Representation and Evaluation

Qualification and Calibration

Alarm

a passion for precision · passion pour la précision · pasión por la precisión · passione per la precisione · a

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Subject to technical modifications Lufft OPUS20 · 10.2011

Lufft

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Rule out Fatal Consequences

Keep Threshold Values in Check

Today's industrial data acquisition generally takes place in real time. The conditions and process environments of measured values regarding room climate change slowly, but are, nevertheless, permanent. Therefore, modern data recording systems that are implemented in this industry have to be reliable like Lufft products. Our products feature the following characteristics: modular design, a flexible and expandable sensor archive, freely programmable representation of measured values, as well as a monitoring system that is precisely tailored to the respective requirements and reacts as quickly as possible to potential nonconformities by setting off an alarm.

The performance and quality of the whole data acquisition system is determined by **measurement**. Each application requires the ideal sensor for the job, and for this reason we offer several sensors – according to specification and area of application – for identical measuring categories. While a customer, for example, implicitly requires sensors in a steel housing, another application might necessitate the need for a differential pressure sensor with display. Due to our experience in various projects we are not only able to recommend, when it comes to sensors, the best possible solution for each application to our customers, but we also possess a variety of alternatives so that each user can find the ideal product.

Data **storage** naturally takes place in the central computer where data is collected at its collection point in real time. What happens if the system crashes? In cases of maximum data security we have integrated data logger modules in the measurement chain. These are situated between the sensor and the central computer and represent a type of "Hammock". If the central computer does not receive all the data, then the data can be read "offline" and transferred from the temporary storage devices (data loggers).

Nowadays modern data logging systems are independent of measurement rates, or rather measurement clocks. The data loggers establish an average value per sensor according to the user's requirements. With particle sensors this is the total sum per time unit.

In industry, data **transfer** is sent analogically to a computer in the network. Due to the technical connection with the IP Network, data recording sites each receive an IP address and are linked by means of existing network architecture.

Qualification completes the successful system implementation procedure; **calibration** ensures an error-free and long-term precise operation. In summary, the best solution is based on two conditions: the first of which is the complete information of the customer's requirements, the other being a flexible system representing the customer's demands. For more detailed information concerning our procedures and what measurements you can yield, please consult our technical description. At the same time we provide a long-term traceability of processes.

Measurement

Qualification and Calibration

Storage and Transfer

Representation and Evaluation

Alarm

Representation and **evaluation** is carried out by the software's client/server structure, allowing users to access and obtain relevant data.

For many pharmaceutical and clean room applications the most important link in the chain is the **alarm**. Ultimately, it is imperative to act immediately to any possible deviations and take appropriate action.

It is essential, for example, that processes such as "long-term stability tests" or clean room production be put right straight away if an error in the process chain arises.

Lufft

Lufft OPUS20 Functions

Functions	THI 8120.00	THIP 8120.10	TCO 8120.20	Lufft OPUS20 E 8120.30
Power supply battery	■	■	■	■
Power supply USB	■	■	■	■
Power supply LAN (POE)	optional	optional	optional	optional
Measured data storage	3,200,000	3,200,000	3,200,000	3,200,000
Typical battery life	> 1 year	> 1 year	> 4 months	> 4 months
LC-display				
One-button operation	■	■	■	■
1-point calibration by user/operator	■	■	■	■
°C/°F switchable	■	■	■	■
Optical/acoustical alarm	■	■	■	■
Date/time	■	■	■	■
Records Min/Max/Avg.	■	■	■	■
SmartGraph 3 evaluation software	■	■	■	■

Measurement Categories	THI 8120.00	THIP 8120.10	TCO 8120.20	Lufft OPUS20 E 8120.30
Temperature				
Air temperature	■	■	■	■ *
PT100				■ **
Thermocpuple				■ **
Humidity				
Relative humidity	■	■	■	■ *
Absolute humidity	■	■	■	■ *
Dew point temperature	■	■	■	■ *
Mixture ratio				■ *
Air pressure				
Barometric air pressure			■	■ *
Relative air pressure			■	■ *
CO_2 Concentration				
CO_2 Concentration			■	
External digital UMB Bus Sensor				
TFF20				■ *
External analog Input				
Sensor input voltage				■ ***
Sensor input electric current				■ ***

Function Table Software	THI 8120.00	THIP 8120.10	TCO 8120.20	Lufft OPUS20 E 8120.30
Graphical representation	■	■	■	■
Numerical data (measured value display)	■	■	■	■
Print function	■	■	■	■
Export function for measured values (e.g. Excel)	■	■	■	■
Gathered printouts of all measurement sites	■	■	■	■
Administration of up to 255 measuring devices	■	■	■	■

* via external UMB-sensors, optionally, max. 4 UMB sensors with one OPUS20E
** ia external analog sensors, optionally, 2 separate analog inputs
*** near analog/digital conversion of 0...1V, 0/4 ... 20 ma possible

THI

THIP

TCO
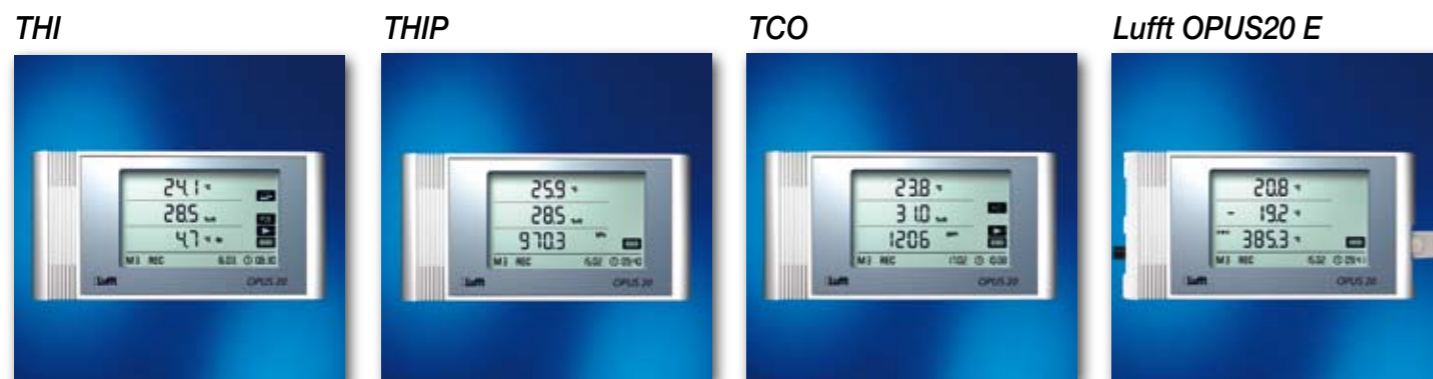
Lufft OPUS20 E

Lufft OPUS20 THI
Temperature and rel. Humidity

Lufft Opus20 Temperature and Relative Humidity			Order-No.
Lufft Opus20 Temperature / rel. Humidity (neutral without Lufft-Logo 8120.00N)			**8120.00**
Lufft Opus20 Temperature / rel. Humidity PoE (neutral without Lufft-Logo 8120.01N)			**8120.01**
Technical data	Dimensions	length. 166mm, width 78mm, depth 32mm	
	Measurement rate	10/30s, 1/10/12/15/30min, 1/3/6/12/24h	
	Construction	plastic housing	
	Operation life (battery)	> 1 Year	
	Data storage	16 MB, 3,200,000 measured values	
	LC-Display	size 90x64 mm	
	Weight	approx. 250g	
	Included in delivery	PC-Windows Software SmartGraph 3 for graphical and numerical representation of measured values / instruction manual/ data cable / battery	
	Interface	USB, LAN	
	Storage rate	1/10/12/15/30min, 1/3/6/12/24h	
	Power supply	4 x LRG AA Mignon, USB, (POE opt.)	
	Max. operation temperature	-20...50°C	
	Max. rel. humidity	0...95%r.h.<20g/m³ (non condensing)	
	Max. altitude	10,000m above sea level	
Temperature	Principle	NTC	
	Measurement range	−20…50 °C	
	Accuracy	±0.3°C (0...40°C), otherwise 0.5°C	
	Resolution	0.1°C	
Rel. humidity	Principle	capacitive	
	Measurement range	10...95%r.h.	
	Accuracy	±2%r.h.,	
	Resolution	0.5%r.h.	
Accessories	4 x LRG AA Mignon		8120.SV1
	Power supply adapter		8120.NT

For climate monitoring in buildings and the control of all climate-sensitive production processes, in electronic data-processing centres, control cabinets, wind turbines, storage rooms and museums.

The Opus20 runs on batteries or powered via USB. Alternatively, you have the possibility to power the device via POE (Power over Ethernet).

For high-precision temperature and humidity measurements

The only LAN datalogger with built-in sensors and the highest precision

Lufft OPUS20 THIP Temperature, Rel. Humidity, Air Pressure

Finally available: Lufft's precise weather station for interior applications – an essential data collector for all calibration laboratories.

Lufft OPUS20 THIP Temperature, Relative Humidity, Air Pressure		Order-No.
Lufft OPUS20 THIP Temperature / Rel. Humidity / Air Pressure (neutral without Lufft-Logo 8120.10N)		8120.10
Lufft OPUS20 THIP Temperature / Rel. Humidity / Air Pressure PoE (neutral without Lufft-Logo 8120.11N)		8120.11
Technical data	Dimensions	length. 166 mm, width 78 mm, depth 32 mm
	Measurement rate	10/30s, 1/10/12/15/30min, 1/3/6/12/24h
	Construction	plastic housing
	Operation life (battery)	> 1 Year
	Data storage	16 MB, 3,200,000 measured values
	LC-Display	size 90x64 mm
	Weight	approx. 250g
	Included in delivery	PC-Windows Software SmartGraph 3 for graphical and numerical representation of measured values / instruction manual/ data cable / battery
	Interface	USB, LAN
	Storage rate	1/10/12/15/30min, 1/3/6/12/24h
	Power supply	4 x LRG AA Mignon, USB, (POE opt.)
	Max. operation temperature	-20...50°C
	Max. rel. humidity	0...95%r.h.<20g/m³ (non condensing)
	Max. altitude	10,000 m above sea level
Temperature	Principle	NTC
	Measurement range	−20…50°C
	Accuracy	±0.3°C (0...40°C), otherwise 0.5°C
	Resolution	0.1°C
Rel. humidity	Principle	capacitive
	Measurement range	10...95%r.h.
	Accuracy	±2%r.h.,
	Resolution	0.5%r.h.,
Air pressure	Measurement range	300…1,300 hPa abs.
	Accuracy	700…1,100mbar at 25°C ±0.5 hPa
	Resolution	0.1 hPa
Accessories	4 x LRG AA Mignon	8120.SV1
	Power supply adapter	8120.NT

For high-precision air pressure measurements

Lufft Opus20 TCO Temperature, Rel. Humidity, CO_2

Lufft Opus20 TCO / Temperature / Relative Humidity / CO_2		Order-No.
Lufft Opus20 TCO / Temperature / Rel. Humidity / CO_2 (neutral without Lufft-Logo 8120.20N)		8120.20
Lufft Opus20 TCO / Temperature / Rel. Humidity / CO_2 POE (neutral without Lufft-Logo 8120.21N)		8120.21
Technical data	Dimensions	length. 166 mm, width 78 mm, depth 32 mm
	Measurement rate	10/30s, 1/10/12/15/30min, 1/3/6/12/24h
	Construction	plastic housing
	Operation life (battery)	> 4 month
	Data storage	16 MB, 3,200,000 measured values
	LC-Display	size 90x64 mm
	Weight	approx. 250g
	Included in delivery	PC-Windows Software SmartGraph 3 for graphical and numerical representation of measured values / instruction manual/ data cable / battery
	Interface	USB, LAN
	Storage rate	1/10/30min, 1/3/6/12/24h
	Power supply	4 x LRG AA Mignon, USB, (POE opt.)
	Max. operation temperature	-20...50°C
	Max. rel. humidity	0...95%r.F.<20g/m³ (non condensing)
	Max. altitude	10,000 m above sea level
Temperature	Principle	NTC
	Measurement range	−20…50°C
	Accuracy	±0.3°C (0...40°C), otherwise 0.5°C
	Resolution	0.1°C
Rel. Humidity	Principle	capacitive
	Measurement range	10...95%r.h.
	Accuracy	±2%r.h.,
	Resolution	0.5%r.h.,
CO_2	Principle	NDIR
	Measurement range	0…5,000 ppm
	Accuracy	± 50 ppm +3 measured values at 20°C and 1,013 mbar
	Resolution	1 ppm
	Long-term stability	20 ppm/a
Accessories	4 x LRG AA Mignon	8120.SV1
	Power supply adapter	8120.NT

The amount of carbon dioxide had been virtually constant at 280 ppm (parts per million) – i.e 280 gas molecules per million air molecules – the last ten thousand years. However in recent years, this measured value has been increasing rapidly at approx. 2 % per year.

A high level of CO_2 in the air within a room causes headaches, tiredness and lack of concentration. The regulation on CO_2 concentration was established in order to evaluate IAQ (Indoor Air Quality). Normal atmospheric air in so-called 'clean air areas' has a level of 360 ppm and approx. 500 ppm in urban areas. The limit of 1,000 ppm ("Pettenkofer Figure") is still seen as being adequate indoor-air quality, which is especially important when regarding all meetings and conference rooms, as well as schools and open-plan offices.
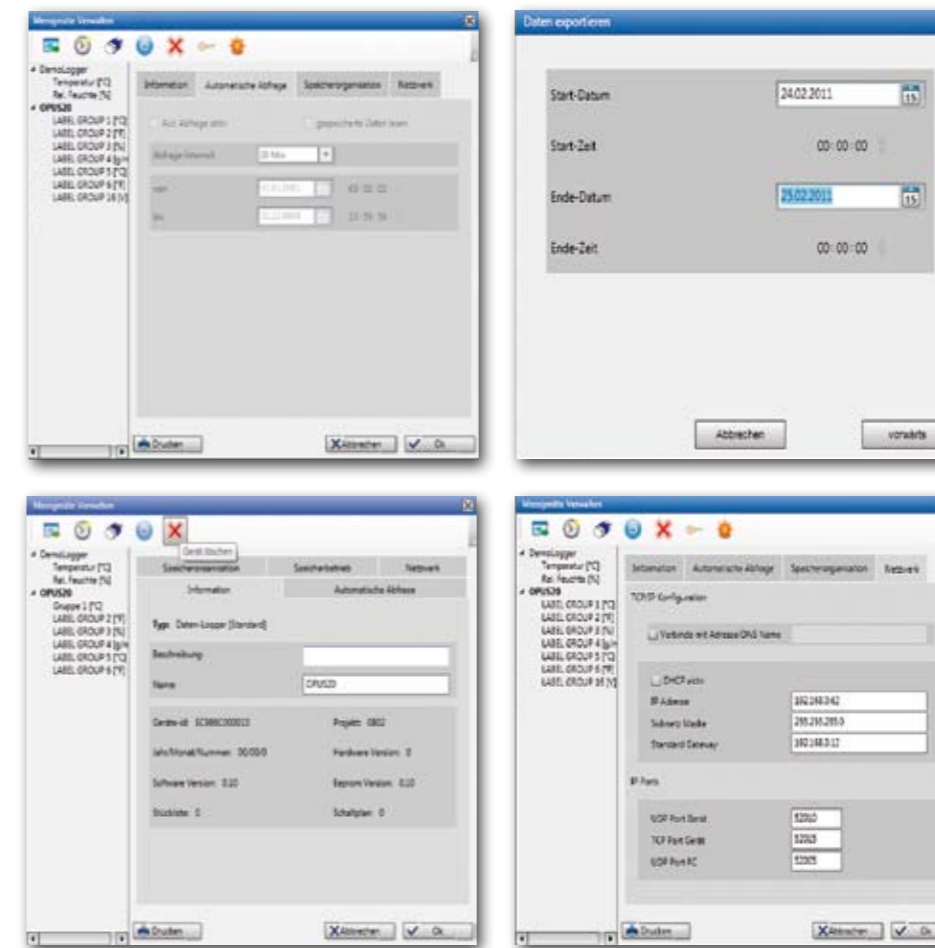
As a guideline for school rooms in the USA the limit of 1,000 ppm applies; for workplaces the occupational exposure limit is 5,000 ppm.


For high-precision CO_2 measurements

**Represen-
tation and
Evaluation**

software

**With SmartGraph3 the gathering
of measured data is simple and as
intuitive as possible:**

■ An Opus20 datalogger is automatically
recognised and added as a "network
device".

■ In addition to its data-readout function,
the software possesses a recording mode
that enables parallel recording to be
displayed on the computer.

■ The data from any desired number
of OPUS20 devices can be read out
simultaneously.

■ The zoom function allows for quick
analysis of critical time periods.

■ The exporting of measured data in
csv format enables it to be imported
into Excel.

■ The device configuration can be
printed out in order to check installation
parameters.

■ Alarm limits – like the measured data
– are chronologically managed at various
times so that when changes in alarm
limits occur, they can be retraced.

■ Automatic data readout of all
measured data is supported.
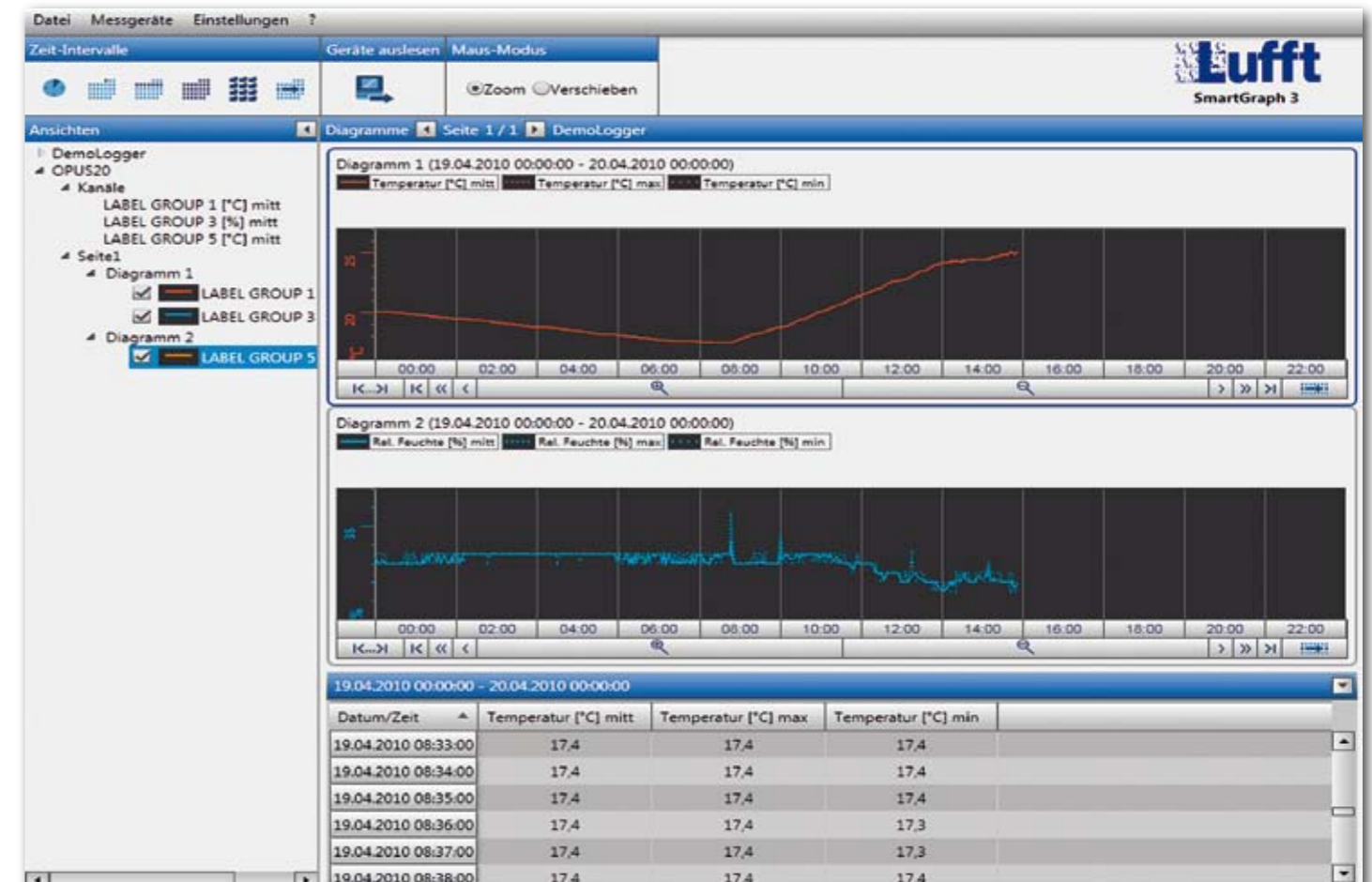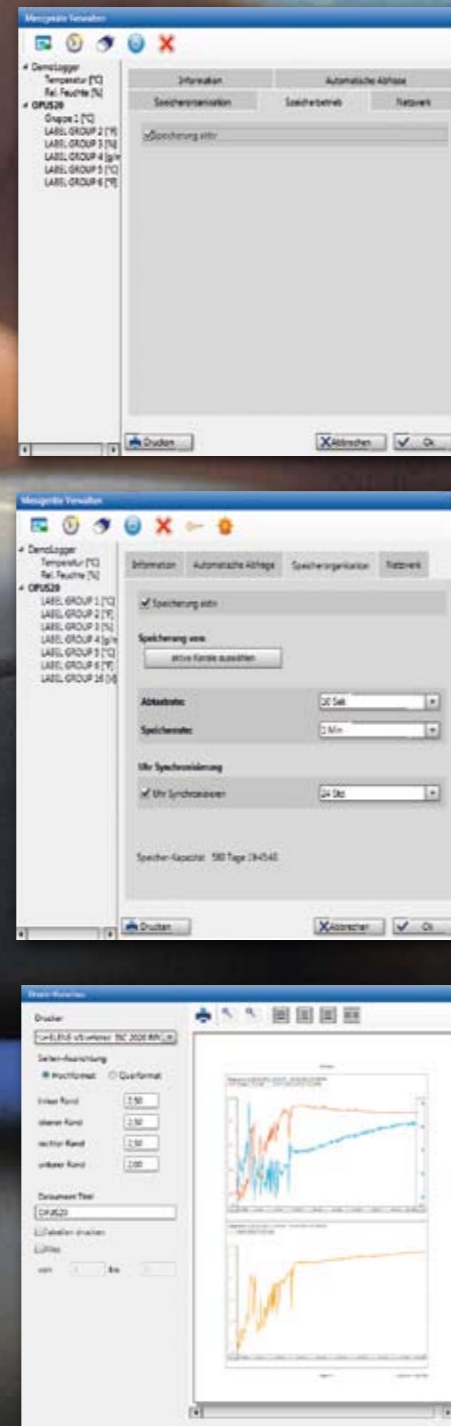
Highly Sensitive
measure-ment

Measuring is not just measuring. Each application and application area requires the ideal sensor. Apart from this, it is imperative in the pharmaceutical production and food industry that the hundreds of guidelines in place are adhered to and a multitude of inspections conducted. Only then can long-lasting international standards be guaranteed. Lufft can help you fulfil all such criteria and find the right product.

Humidity Measurements Special measuring conditions require special sensors. In most cases only stainless steel sensors are permitted in clean rooms. Ideally, these sensors have corrosive free connector inserts between the electronics and sensor head. On the other hand, in explosion-proof areas a sensor with a specially designed power supply is applicable: in this "zone-zero application" the electronics for the transmitter are mostly mounted outside the critical area.

Normal humidity measuring in a clean room essentially provides sensors with a "stress-free climate" as opposed to "long-term stability tests" where equipment is tested under tropical conditions. It is important, however, to complete a basic calibration of the sensors on site and if necessary, carry out the unproblematic replacement of equipment.

The triple point of water (balance of all 3 physical states solid, liquid and gas) is used to represent the International Temperature Scale and for the highest precision of temperature measurements in the milli-Kelvin range.

Incidentally, each precise humidity measurement requires a parallel temperature measurement. Only by using this method are you guaranteed the best possible results.

Air Temperature No rules without exceptions: in certain cases a combined temperature/humidity sensor makes little sense. This especially applies to refrigerators with extremely low temperatures. Such ranges require various sensor designs with the smallest possible diameter in order to acquire precise temperature measurements. Take for instance the PT100 Sensors with a measuring range of up to -100 °C.

Air Flow is one of the parameters that needs to be monitored – especially in highly sterile filling processes (the so-called Zone A). The Good Manufacturing Practices (GMP) rules released by the FDA state that air flow speed has to be 0.45 m/s ± 20 % in any area.

Differential Pressure A minimal amount of excess pressure is used when working in sterile environments such as in hospital operating theatres or in clean room applications. By means of excess pressure it is, to some extent, possible to separate up to 3 or 4 different internal levels by their particles.

The trick to this process is to keep the differential pressure as low as possible. As a result the requirements for the recording equipment (transmitter) are very high: in addition to a very good long-term stability, the transmitters have to be precise and able to detect the smallest fluctuations in values, because even a minimal deviation of the transmitter can cause problems

with the alarm process. Since differential pressure is always measured against a reference norm (the so-called "zero point" – normally the pressure around the production room), sensors with displays are mostly used in order to make the zero-point adjustment easier.

Particles In pharmaceutical manufacturing, for example, equipment is mounted in the filling areas that sucks all particles by means of a pump and transfers these to the actual measuring unit. Here, the particles are put through particle sensors which numerically measure and register the size of the particles for a defined period of time.

While the pharmaceutical industry typically distinguishes between particles of 0.5 to 5 micrometres, the requirements in the semiconductor industry are considerably higher. Here, particles sizes of 0.3 to 0.5 micrometres are detected.

CO_2 In the research areas of the pharmaceutical industry and in universities, the internal conditions of the human body are simulated in incubators. In addition to the 37 °C ambient temperature and the relative humidity of more than 90 % there is a high concentration of CO_2. This concentration is between 5 % and 10 %. In comparison: in normal indoor air applications the CO_2 concentration, measured in ppm (Parts per Million), is usually under 1,000 ppm, or rather 0.1 % CO_2. In school classrooms these values can be up to 3,000 ppm, which can lead to concentration disorders.

Sensors that are placed in incubators should have long-term stability and be easy to check on site by using a calibration standard.

Temperature/Humidity Sensors

Air Temperature/CO$_2$

Temperature/Humidity Sensors			Order-No.
Sensor in plastic housing, plug-in design with gold contacts, easily replaceable, sinter filter for high protection of sensor			**8120.TFF**
Rel. Humidity	Principle	capacitive	
	Measuring range	0 ...100 % rh.	
	Accuracy	±2 %	
Temperature	Principle	PT1000, Class A	
	Measuring range	−40…80 °C	
	Accuracy	±0.2 °C	
Accessories	Cable	2m	**8120.KAB2**
	Cable	10m	**8120.KAB10**
	Y-Connector		**8120.STY**

Temperature/Humidity Sensors Stainless Steel			Order-No.
Sensor in stainless steel housing, plug-in design with gold contacts, easily replaceable, sinter filter for high protection of sensor			**8120.TFFE**
Rel. Humidity	Principle	capacitive	
	Measuring range	0 ...100 % r. F.	
	Accuracy	±2 %	
Temperature	Principle	PT1000, Class A	
	Measuring range	−40…80 °C	
	Accuracy	±0.2 °C	
Accessories	Cable	2m	**8120.KAB2**
	Cable	10m	**8120.KAB10**
	Y-Connector		**8120.STY**

Air Temperature			Order-No.
PT100 Temperature Sensor with 10m cable			**8160.TF**
PT100 Temperature Sensor with 50m cable			**8160.TF50**
Temperature	Principle	PT100	
	Measuring range	−50…150 °C	
	Accuracy	Class A	
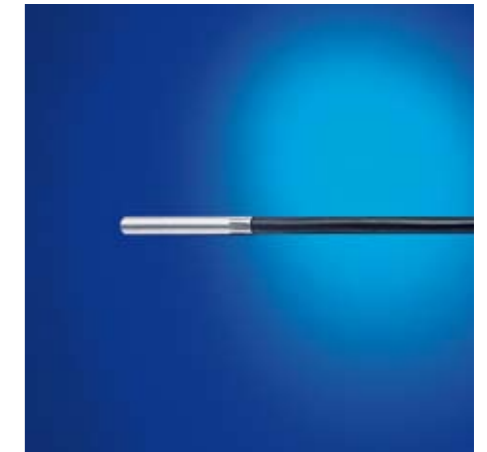
Surface Temperature			Order-No.
PT100 Temperature Sensor with 10m cable			**8160.TFLT**
PT100 Temperature Sensor with 50m cable			**8160.TFLT50**
Temperature	Principle	PT100	
	Measuring range	−100…100 °C	
	Accuracy	Class A	
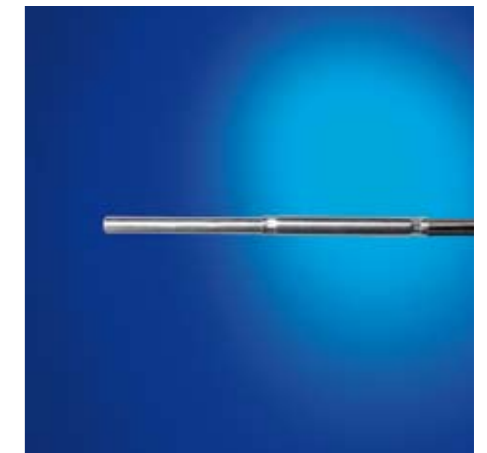
CO$_2$			Order-No.
Reliable CO$_2$ transmitter with on-site calibration possibilities			**8520.02**
CO$_2$	Principle	Infra-red absorber	
	Measuring range	0..10,000ppm	
	Output signal	4...20mA	
	Accuracy	0...10,000ppm: ± (100ppm + 5% of the measured value)	
	Power supply	24V AC/DC	
Accessories	Power supply adapter		**8366.USV1**

Further information about our products can be found on our website www.lufft.com

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Air Flow

Air Flow	Order-No.
Well-priced air flow transmitter for heating, cooling and ventilation applications	**5613.00**
Principle	Heated thin film layer
Measuring range	0...20m/s
Response time	t90: typically 4s (at 10m/s)
Outputs	0...10V, 4...20mA
Accuracy	1... 20m/s: ±(0.4m/s + 6% of measured value)
Power supply	24V AC/DC ±20%

Air Flow	Order-No.
Well-priced air flow transmitter in plastic housing for clean room applications	**5617.00**
Principle	Heated thin film layer
Measuring range	0…1 m/s, 0…1.5 m/s, 0…2 m/s
Response time	t90: typically 4s (at 1m/s)
Outputs	0...10V, 4...20mA
Accuracy	0.2... 2m/s: ±(0.08m/s +4% of measured value)
Power supply	19...29V DC

Air Flow	Order No.
High-precision air flow transmitter in stainless steel, L-shaped design (laminar flow)	**8380.00 stainless steel**
Principle	Hot wire
Measuring range	0…1 m/s
Accuracy	±(0.06 m/s + 10 % of measured value)
Outputs	4...20mA
Power supply	24V DC

Air Flow	Order No.
High-precision air flow transmitter in stainless steel housing (rod module for installation at work stations)	**8380.01 stainless steel**
Principle	Hot wire
Measuring range	0 … 1 m/s
Accuracy	±(0.06 m/s + 10 % of measured value)
Outputs	4...20mA
Power supply	24V DC

Further information about our products can be found
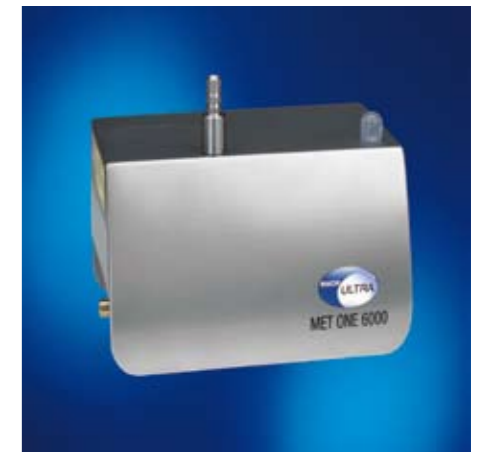on our website www.lufft.com

Differential Pressure

Differential Pressure	Order-No.
Well-priced and reliable differential pressure sensor for installation in the control panel, with automatic zero point traceability	**2191.100B**
Principle	Micro mechanical
Measuring range	- 100 Pa... +100 Pa
Accuracy	0.8 % of measured value
Output	4...20mA
Power supply	12V DC
Option: Measuring range	0...100Pa	**2191.100**

Particle

Particle Counter (Pharmaceutical)	Order-No.
Counts particles in the 0.5 and 5 micron size range; pump and sensor in seperate housing	**2195.00 Metone**
Dimensions (w x d x h)	13.56 x 8.13 x 10.87 cm
Weight	0.68 Kg
Power consumption	9...28V DC
Operating temperature	10 to 32 °C (50 to 90 °F)
Signal Output Ethernet	Analog 4-20mA (dual mode)
Particle sizes	0.5 μm and 5.0 μm
Flow rate	1.0 CFM (28.3 LPM)

Further information about our products can be found
on our website www.lufft.com

Reliable
Storage
and
Transfer

The system is simple; Lufft Data Loggers store and transfer data. One could also say that it is simply ingenious! From a technical point of view, it is optimally engineered and highly reliable. Starting with the first measurement transmitted through intelligent sensors to a temporary data storage device, up to the transfer of the measured values to the central computer: perfect data transfer, because process stability is Lufft's number one priority.

Storage

In a measurement chain, an intelligent, digital or analogue sensor transfers measurement data to the processing station. It is, in fact, technically possible to store the data directly in the central computer; however, faults that occur during the data transfer would then result in a loss of data.

It is for this reason that Lufft uses temporary storage devices for monitoring systems that require the highest level of reliability. These storage devices, or so-called 'data logger modules', record the measured values directly at the sensors and buffer them. This type of system design, which characterises modern data monitoring systems, is based upon the principle of distribution of risk and guarantees the independent function of smaller data acquisition units. A further advantage is that the customer is able to adapt his monitoring network – during its relatively long period of use – without any difficulty to the ever-growing system requirements.

Flexible data acquisition modules are not only able to acquire data from every sensor (current, voltage) with an analogue output, but can also process communication protocols from intelligent sensors. It is the RS485 Interface located in the logger module that makes all this possible. Consequently, the customer is not only able to integrate the ideal transducer into his system solution, but can also use existing sensors.

Transfer

Industrial real-time data acquisition is usually a matter of "Indoor Solutions". Subsequently, current technologies – such as LAN- or WLAN connections – have become prerequisites in most modern industrial buildings.

If the customer uses a LAN connection (Ethernet), then all measured data – typically from each level in the measuring cabinet – is consolidated and finally ready to be retrieved via the IP address.

In this case the entire monitoring application has a star-shaped construction. The alternative to this is a "long bus" (physically via RS485) like the CAN-bus, which transports all measured data to the central computer.

Lufft OPUS20E
for External Sensors

With up to 10 external channels/sensors per Opus20E.

The Opus20E offers the highest flexibility and is excellent value for money. It allows the connection of up to 4 external temperature and relative humidity sensors, as well as 2 further analogue sensors. Intelligent sensors can be integrated via the Opus20Es' RS485 interface (e.g. particle counter).

Air flow and differential pressure sensors are typically connected to the Opus20E via the analogue input. In contrast, a maximum of 4 external temperature/humidity sensors are integrated via a digital protocol (UMB).

In connection with its LAN capabilities, the Opus20E is able to realize universal measurement networks in real time. For standard applications the Smart-Graph 3 comes into play, and in order to fulfil the 21 CFR 11 guidelines the well-established and proven MCPS7 software is available.

Lufft OPUS20E			Order-No.
Lufft OPUS20E (neutral without Lufft-Logo 8120.30N)			**8120.30**
Lufft OPUS20E PoE (neutral without Lufft-Logo 8120.31N)			**8120.31**
Technical data	Dimensions	length. 180mm, width 78mm, depth 32mm	
	Measurement rate	10/30s, 1/10/12/15/30min, 1/3/6/12/24h	
	Construction	plastic housing	
	Operation life (battery)	> 1 Year	
	Data storage	16 MB, 3,200,000 measured values	
	LC-Display	size 90x64mm	
	Weight	approx. 250g	
	Included in delivery	PC-Windows Software SmartGraph 3 for graphical and numerical representation of measured values / instruction manual/ data cable / battery	
	Interface	USB, LAN	
	UMB bus interface	RS 485	
	Storage rate	1/10/12/15/30min, 1/3/6/12/24h	
	Power supply	4 x LRG AA Mignon, USB, (POE opt.)	
	Max. operation temperature	-20...50°C	
Input voltage 0-1V	Measurement range	0 ... 1V	
	Accuracy	+/- 200uV +/- 0.1% of measured value	
	Resolution	< 500uV	
Current measurement	Measurement range	2-wires: 4 ... 20mA, 3-wires: 0 ... 20mA	
	Accuracy	+/- 4uA +/- 0.1% of measured value	
	Resolution	< 5uA	
	Resistance	approx. 50 Ohm	
Thermocouple K	Measurement range	-200°C ... 1200°C	
	Accuracy	+/- 1°C +/- 0.5% of measured value at -200°C ... 0°C +/- 1°C +/- 0.2% of measured value at 0°C ... 1200°C	
	Resolution	< 0.2°C	

With up to 10 external sensors connectable per OPUS20E.
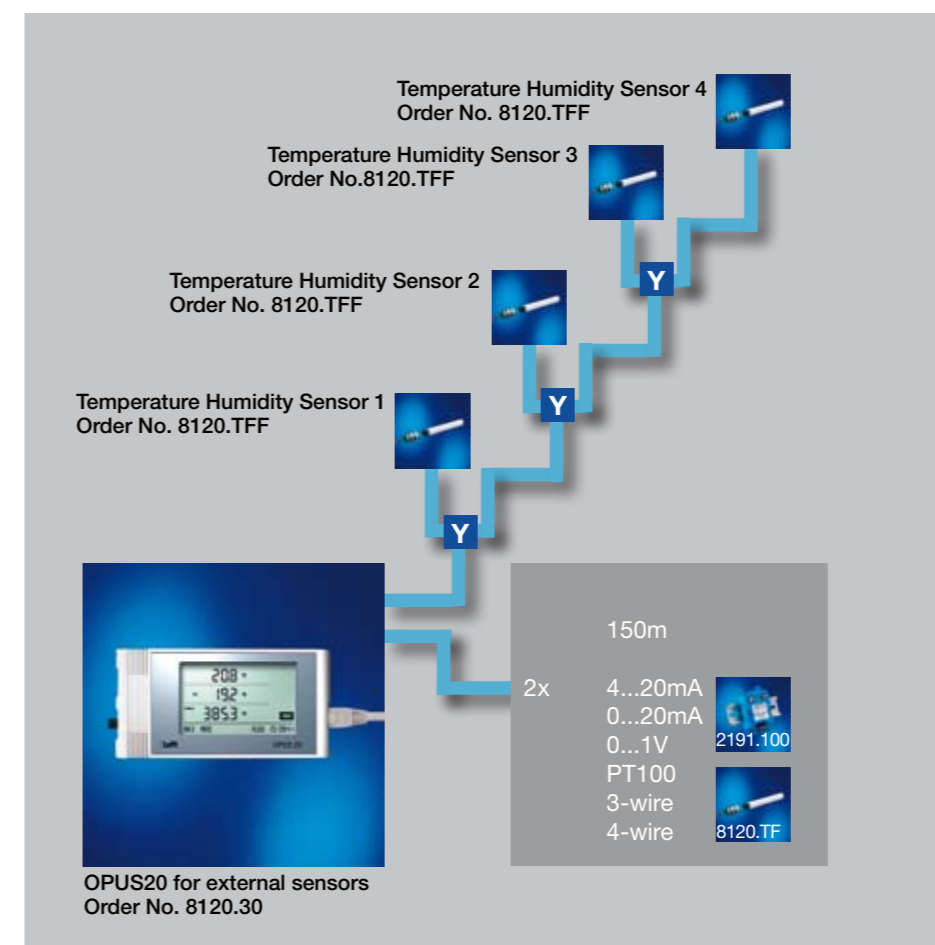
Lufft OPUS20E
Configurations Examples

Lufft OPUS20 for External Sensors			Order-No.
Technical data			
Thermocouple J	Measurement range	-200°C ... 1,200°C	
	Accuracy	+/- 1°C +/- 0.5% of measured value at -200°C ... 0°C	
		+/- 1°C +/- 0.2% of measured value at 0°C ... 1,200°C	
	Resolution	< 0.2°C	
Thermocouple S	Measurement range	-50°C ... 1,700°C	
	Accuracy	+/- 1°C +/- 0.5% of measured value at -50°C ... 0°C	
		+/- 1°C +/- 0.2% of measured value at 0°C ... 1,700°C	
	Resolution	< 0.2°C	
PT100	Measurement range	-200°C ... 500°C	
	Accuracy	+/- 0.2°C +/- 0.1% of measured value	
	Resolution	< 0.02°C	
Accessories	4 x LR6 AA Mignon		**8120.SV1**
	Power supply adapter		**8120.NT**
	Y Connector		**8120.STY**
	Cable	2m	**8120.KAB**
	Cable	10m	**8120.KAB10**

Network with up to 200 channels

The Opus20E is equipped with an analogue input that allows the connection of 2 sensors with voltage and current output, or rather PT100 temperature sensors in 3 and 4 wire technology.

At the same time up to 4 Lufft temperature/humidity sensors can be connected to the datalogger via a serial input.

Each fully equipped Opus20E is a 10 channel datalogger that can record various data. It also allows data to be retrieved online and offline.
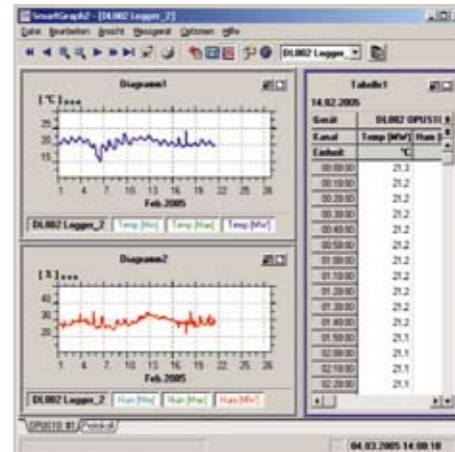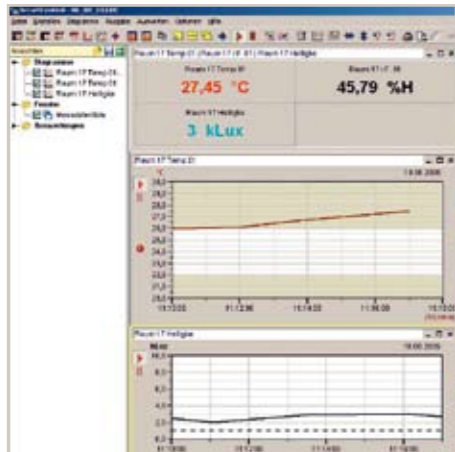

Temperature Humidity Sensor 4
Order No. 8120.TFF

Temperature Humidity Sensor 3
Order No.8120.TFF

Temperature Humidity Sensor 2
Order No. 8120.TFF

Temperature Humidity Sensor 1
Order No. 8120.TFF

150m

2x
4...20mA
0...20mA
0...1V
PT100
3-wire
4-wire

OPUS20 for external sensors
Order No. 8120.30

With up to 10 channels per datalogger transfering data in realtime. Power supply via POE.

For Lufft the "User-Interface" is the icing on the cake, and for the user it's the intuitive access to all functions.

No place for coincidence. Anyone who records data in real time should not be satisfied with an "off the rack" solution only. Lufft has never done this and never will. We have even put a lot of thought into the representation and evaluation of your measured data, and have developed special software that offers users numerous advantages and possibilities. Data errors can be reduced to a minimum by means of clear processing and representation.

Centralized Representation

Measurements are, to some extent, recorded every second: average values accumulate in the data logger, minimum and maximum values are observed, raw date is transferred to the central computer. Recording data in real time means that you have a large amount of data administration and at the same time have to arrange various measuring categories and points in a clear fashion. Some users are only interested in particular rooms, others want to have an overview of the particle sensors.

Consequently, a standard representation setup is simply insufficient. Instead of this, user-specific software is necessary such as MCPS7, which enables the free configuration of graphic or numeric representation, or column monitoring diagrams; thus allowing you to incorporate and present comparable measuring categories in the same diagram.

In addition, MCPS7 has an integrated web server that visualises all the defined diagrams and places them in the intra-/extranet for other users. All you need is a password from the administrator.

Evaluation

The manual and automatic data export in the ASCII format offers the user additional advantages that exceed those of a standard display. There is also the possibility to define several formulae in MCPS7. In addition to this, daily-, monthly- and annual reports offer a simple overview of the trends of the measured values. Furthermore, so-called MKT calculations supply special information – such as the mid-values of recorded temperature data (Mean Kinetic Temperature) – which is required in the pharmaceutical industry.

Finally, in the audit trail of the MCPS7 package (CFR21 compliant) all events are recorded: from system start and end, to user administration, changes to the device configuration, alarm messages plus confirmation text, the log-in and out of users, as well as sensor breakages and system crashes.

The software configuration of a sensor permits the flexible construction of a monitoring network design. The logger can incorporate many sensors; with configuration, the sensor is made acquainted with the flexible data acquisition module.
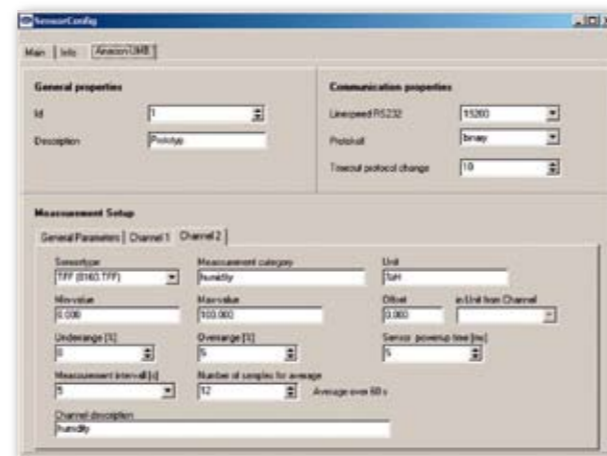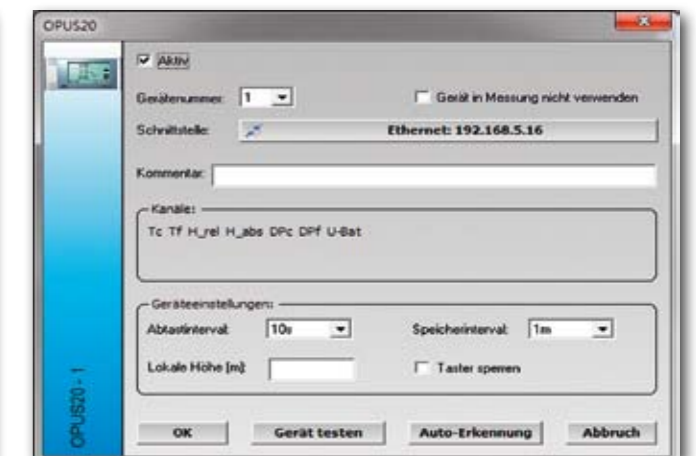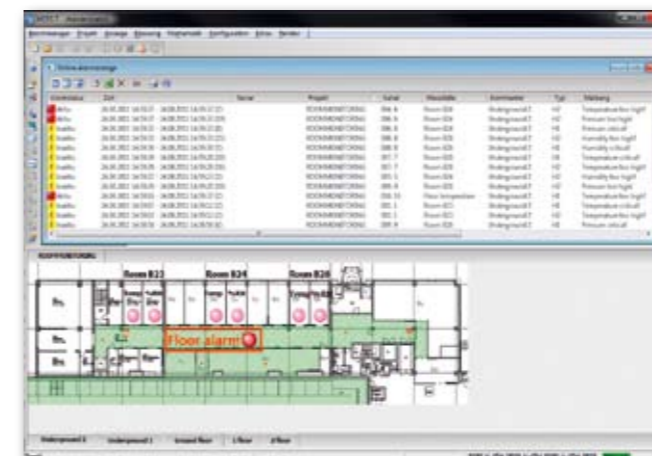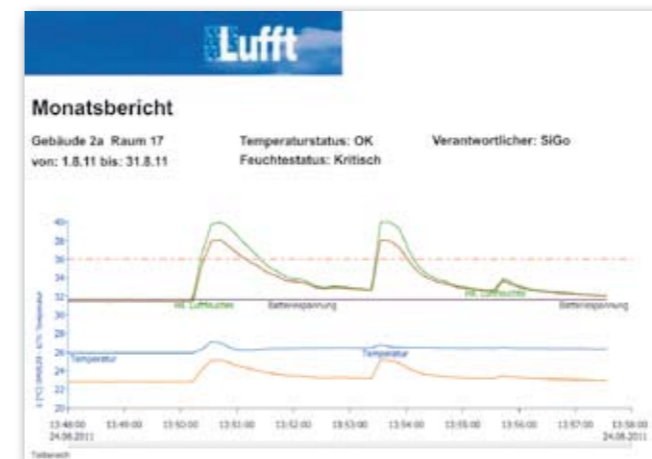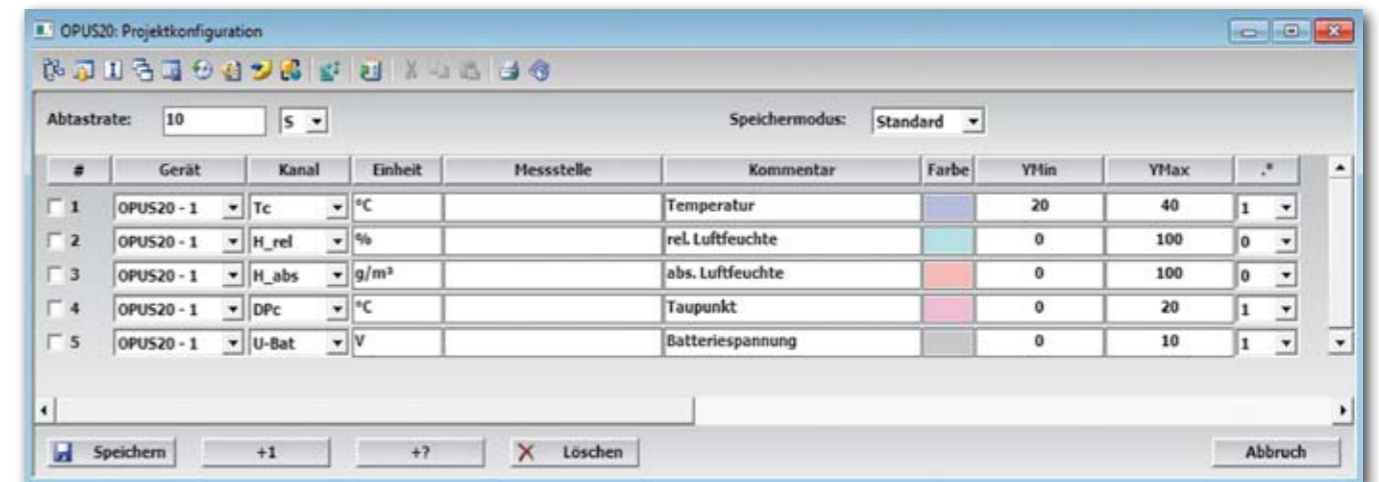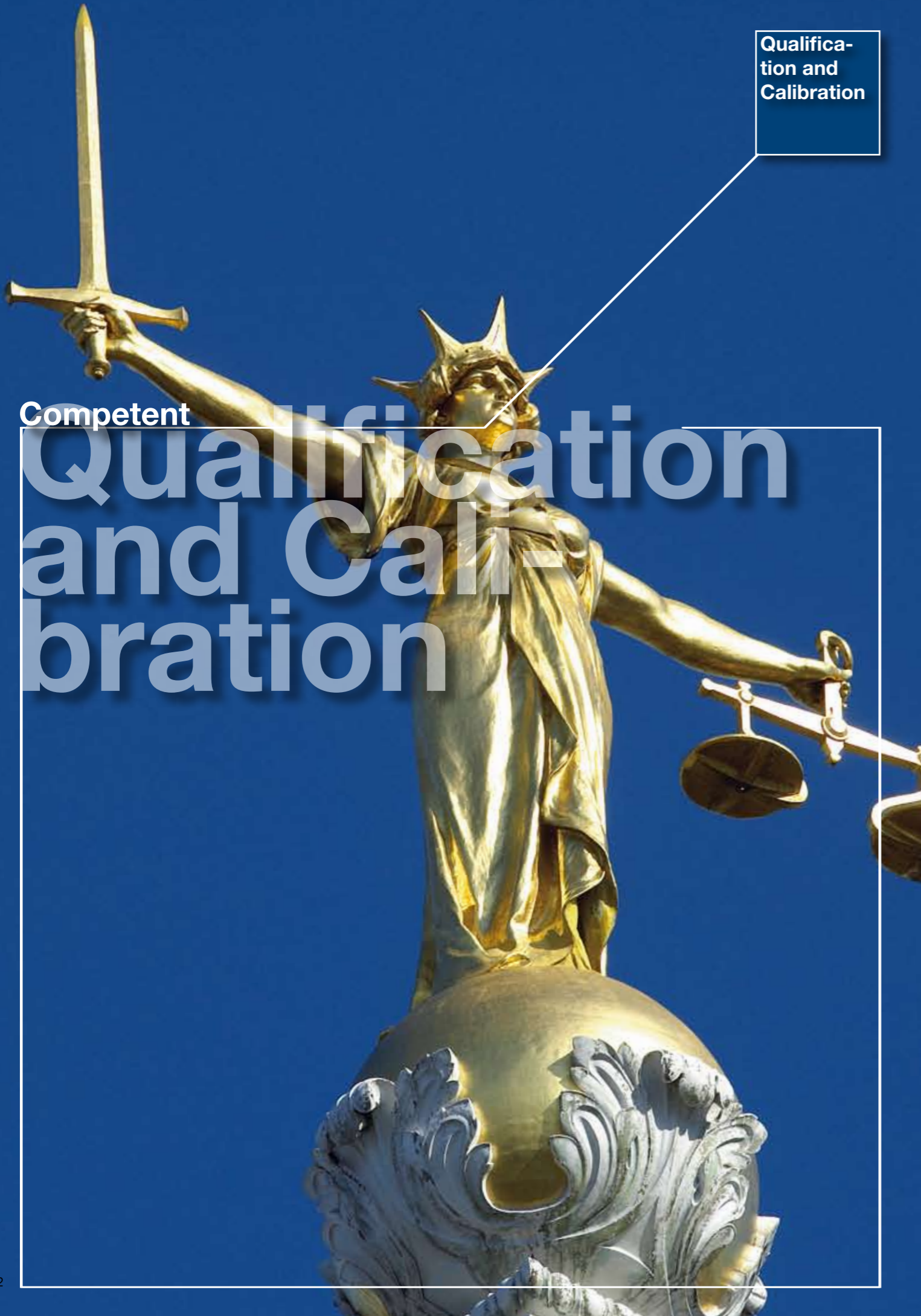
Software

MCPS7 Software for OPUS20

MCPS Option	Description	Industrial-Standard Order-No. 8040.I1	Industrial-Professional Order-No. 8040.I2	Pharmaceutical-Standard Order-No. 8040.P1	Pharmaceutical-Professional Order-No. 8040.P2
7000	MCPS 20Kanäle	■	■	■	■
7010	MATH1			■	■
7012	SMS-E			■	■
7013	ERES			■	■
7016	PMon			■	■
7022	C200	■		■	■
7027	ALARM		■	■	■
7067	OPUS20 Driver	■	■	■	■

*Qualification can only be
done by a qualified and
experienced professio-
nals. We ensure that you
have excellent measuring
technology experts at
your side for such a task.*

Competent

Qualification and Cali- bration

*Imprecise measurements can have
expensive repercussions. Therefore,
Lufft products are tested according
to the motto "To trust is good, to
control is better". Our products have
to pass special tests that exceed
those of conventional ones; firstly
through a special type of qualifica-
tion, both in production and at the
customer, and secondly with help of
our DKD certified calibration which
ensures incorruptible results.*

Qualification

A reliable monitoring system has to fulfil
the highest requirements regarding pre-
ciseness and robustness. This is guar-
anteed by a test report that is provided
by the manufacturer with each sensor. In
addition to this, at Lufft the acquisition
and analogue conversion of data is carried
out in a special high resolution (16- or 32
bit technology), so that the preciseness of
the sensors is retained.

A further quality feature is the local dis-
play that visualises measured values with-
out losses due to rounding and with the
same accuracy. At the same time iden-
tical measurement information is stored
by central software in the archive. These
quality requirements can be additionally
tested during so-called "factory inspec-
tions" or audits of the customer's produc-
tion plant. Finally, there is an acceptance
test in the plant and the highly sensitive
goods are then sent, sometimes travelling
around half the globe.

A further "on-site qualification", also
known as the first calibration, is frequent-
ly conducted after the installation of the
system. The requirements of "electronic
records" (21 CFR 11) differentiates bet-
ween the following types of qualification:

- Design Qualification (DQ); occurs
  during the requirement specifica-
  tion- and technical-specification
  phase
- Installation Qualification (IQ);
  technical on-site acceptance
  such as an inspection of the
  wiring on the basis of the
  interface diagrams
- Operation Qualification (OQ);
  testing of the measurement chain
  from the sensor to the software,
  validation of the measurement
  chain, testing the accuracy of the
  senor
- Performance Qualification (PQ);
  ensures the reliability during the
  products "life cycle"

Calibration

Imprecise measurements can have expen-
sive economical repercussions, and for
this reason a periodical adjustment of the
sensors (justification), as well as a special
comparison measurement (calibration)
are of the utmost importance. During re-
gular calibration a reference point meas-
urement is compared with a reference
standard, which normally has a much
higher accuracy than the measurement
under test. This round robin test is always
a closed test, because these reference
standards – whether directly or indirectly
– have an accuracy that is based on and
can be traced back to the official norm.

In order to calibrate more than one point,
various conditions are generated on site
according to customer requirements e.g.
3 different values for relative humidity.
Such applications are indeed qualitative
very sophisticated, and as such require
specially trained personnel with profound
experience in climatologic measurement
technology; especially when dealing with
the setup of comparison measurements
regarding adjustment times.

The following applies to both quali-fication
and calibration: there is a stan-

dard guideline, but no uniform procedure.
Therefore, each user defines via the IQ/
OQ his special requirements that have to
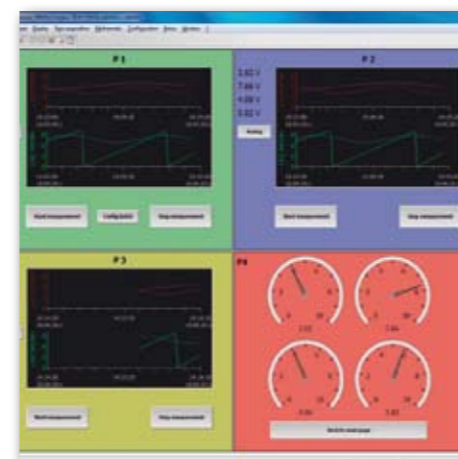be observed in both procedures respec-
tively.

Incidentally, Lufft has also been accredi-
ted for air flow measurement to add to its
existing DKD laboratories for temperature,
relative humidity and air pressure.

www.dkd-lab.info

No matter what your organigram looks like for this important task, our alarm system can be implemented.

Accurately Timed

Alarms

Lufft cannot afford any flaws, and especially not when companies have to react as quickly as possible. Pharmaceutical- and clean room applications are excellent examples of this, where possible deviations require immediate action. For this reason Lufft has a special alarm concept to safeguard the measurement process. This is an alarm system with various applications, which can be individually tailored to the respective requirements without any problem.

Real-time data acquisition has a decisive advantage: it makes critical conditions instantly visible. As long as all basic conditions remain within green limits, the system files all the measured values and ensures complete documentation. If there are too many particles in the air or the climate drifts into "tropical" long-term analysis, then actions have to be taken immediately!

Hence, the main focus of this task lies within an application suitable alarm concept, which is situated in an "active process". This means that the alarm is

conveyed to all responsible persons: by SMS, e-mail, siren or light. Users' reactions are documented in a so-called audit trail: Alarms registered, Measures taken,...

As responsibilities in each business organisation are individually regulated, the alarm concept has to be adapted to the respective conditions accordingly. This means that the user can adjust the alarm configuration to meet his specific requirements. For example:

• Each sensor has a pre-alarm and main alarm that is set off by deviations both above and below the prescribed value parameters.
• Each deviation results in a warning message on the computer which is coupled with – if desired – an alarm siren.
• Each alarm has to be confirmed and documented in the audit trail.

Sensors can be defined in any groups in the measuring chain. This is done by a logical allocation in the software. Advantage: not dependent on physical wiring, high flexibility, less error-prone, and simple possibilities for adjustment.

With the aid of additional hardware, SMS and e-mails (including the escalation procedure) can be sent and confirmation requested. For example: a pre-alarm alert is sent to worker A. If no confirmation is sent

by Worker A within 15 minutes, then the pre-alarm alert is sent to worker B, etc. Depending on the configuration, it is possible to store up to 12 different telephone numbers. The send- and receive protocols manage 80 entries. Various settings such as "active- and forwarding-functions" can be set for several alarms. For example: due to different operation on the weekend in comparison to the normal working week.

Alarm

Signal Tower	Bestell-Nr.
Signal Tower with LED Beacons	**8161.SIGNAL**
Dimensions	160 x 50 x 45 mm
Housing design	Plastic
Max. burden (resistor)	0.5 A/30 V: 500,000 cycles 0.3 A/30 V: 1,000,000 cycles
Display	2 Lines, 8 Characters
Weight	200 g
Storage temperature	-30…70 ° C
Protection type	IP42, with Protection
Power supply	9…15 VDC, typically 12 V, battery-driven
Connecting system	COMBICON Phönix, gold contacts
Power consumption active	<60 mA
Power consumption stand-by	<100 µA
Max. operating temperature	-30…60 ° C
Max rel. humidity	0…95 % r. F. (non condensing)
Accessories	MCPS7 Software

Measuring is not just measuring. Each application and application area requires the ideal sensor. Apart from this, it is imperative in the pharmaceutical production and food industry that the hundreds of guidelines in place are adhered to and a multitude of inspections conducted. Only then can long-lasting international standards be guaranteed. Lufft can help you fulfil all such criteria and find the right product.

Lufft