

Lufft OPUS20 LAN-Datalogger Future Inside



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



www.lufft.com



The world's toughest
legal guidelines: 21
CFR Part 11
(electronic records).

*The pharmaceutical
industry trusts in Lufft.*

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.

Measurement

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.

Qualification and Calibration

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 "Ham-mock". 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.

Storage and Transfer

Representation and Evaluation

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

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.

Alarm

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.

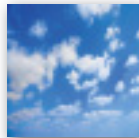
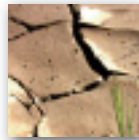
In industry, data **transfer** is sent analogically to a computer in the network. Due to the technical connection with the IP Network, data recording sites each receive an IP address and are linked by means of existing network architecture.





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 | | | | ■** |
| Thermocouple | | | | ■** |
| Humidity | | | | |
| Relative humidity | ■ | ■ | ■ | ■* |
| Absolute humidity | ■ | ■ | ■ | ■* |
| Dew point temperature | ■ | ■ | ■ | ■* |
| Mixture ratio | | | | ■* |
| Air pressure | | | | |
| Barometric air pressure | | ■ | | ■* |
| Relative air pressure | | ■ | | ■* |
| CO₂ Concentration | | | | |
| CO ₂ Concentration | | | ■ | |
| External BUS-enabled digital 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 BUS-enabled sensor, optionally, max. 4 sensors with one OPUS20E

** via 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 |
| | Storage rate | 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 / DIN rail bracket |
| | Interface | USB, LAN |
| | Power supply | 4 x LR6 AA Mignon, USB, (POE opt.) |
| | Max. operation temperature | -20...50°C |
| | Max. rel. humidity | 0...95%r.h.<20g/m ³ (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 LR6 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



Measurement

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 78mm, depth 32mm | |
| | Measurement rate | 10/30s, 1/10/12/15/30min, 1/3/6/12/24h | |
| | Storage rate | 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 / DIN rail bracket | |
| | Interface | USB, LAN | |
| | Power supply | 4 x LR6 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., | |
| 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 LR6 AA Mignon | | 8120.SV1 |
| | Power supply adapter | | 8120.NT |

For high-precision air pressure measurements



Lufft OPUS20 TCO

Temperature, Rel. Humidity, CO₂



| 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 | |
| | Storage rate | 1/10/30min, 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 | |
| | Power supply | 4 x LR6 AA Mignon, USB, (POE opt.) | |
| | Max. operation temperature | -20...50°C | |
| | Max. rel. humidity | 0...95%r.F.<20g/m ³ (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., | |
| CO₂ | Principle | NDIR | |
| | Measurement range | 0...5,000 ppm | |
| | Accuracy | ± 50 ppm +3% of measured value (at 20 ° C and 1,013 mbar) | |
| | Resolution | 1 ppm | |
| | Long-term stability | 20 ppm/a | |
| Accessories | 4 x LR6 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.

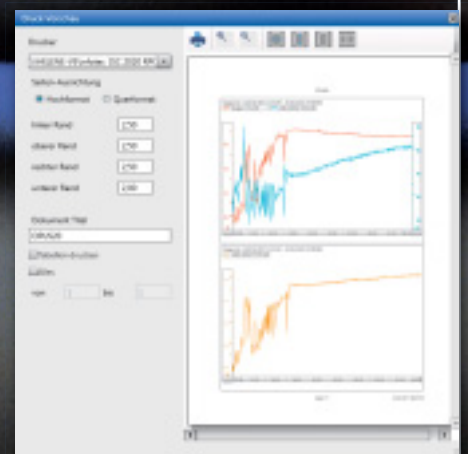
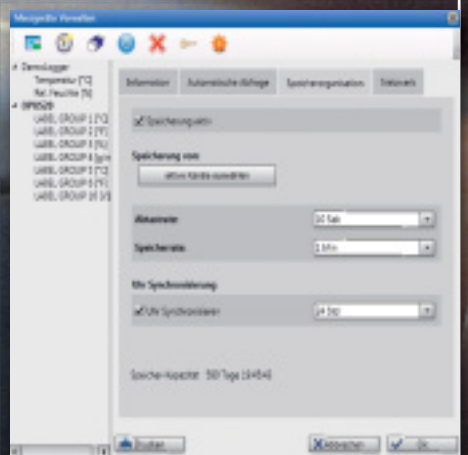
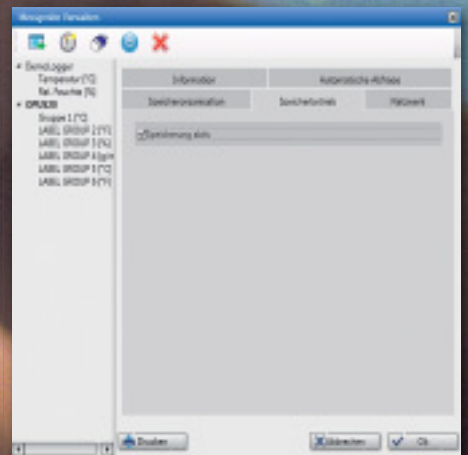
A high level of CO₂ in the air within a room causes headaches, tiredness and lack of concentration. The regulation on CO₂ concentration was established in order to evaluate IAQ (Indoor Air Quality). Normal atmospheric air in so-called ‘clean air areas’ has a level of 360 ppm and approx. 500 ppm in urban 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.

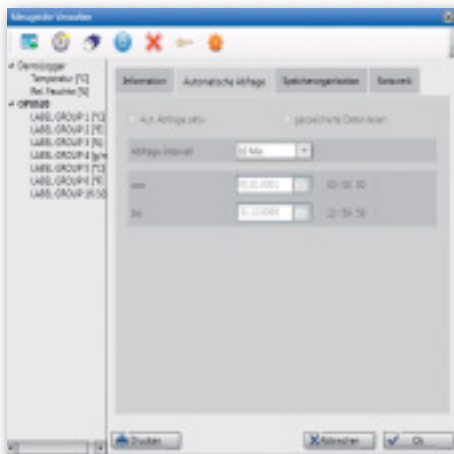


For high-precision CO₂ measurements

software

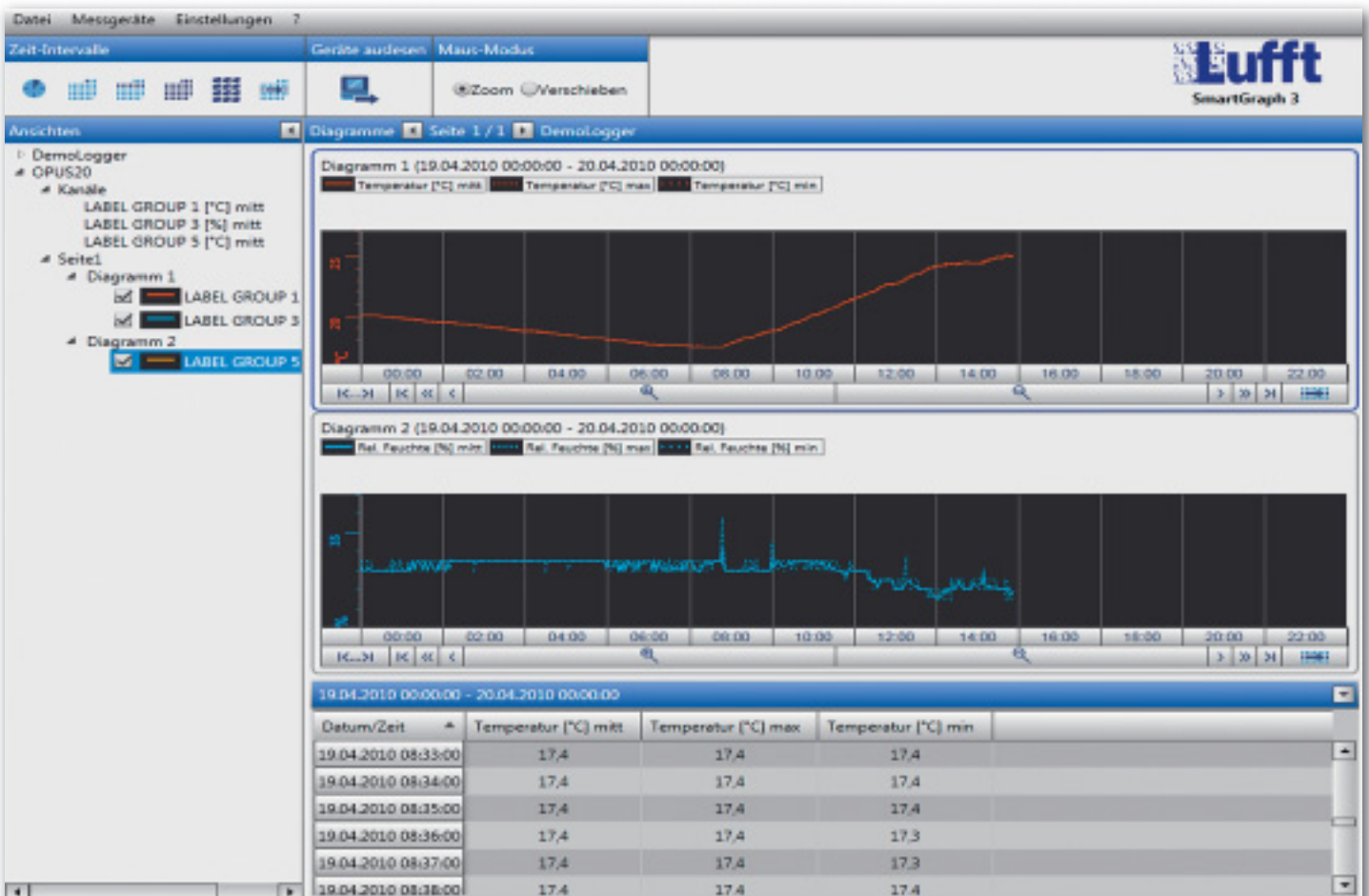
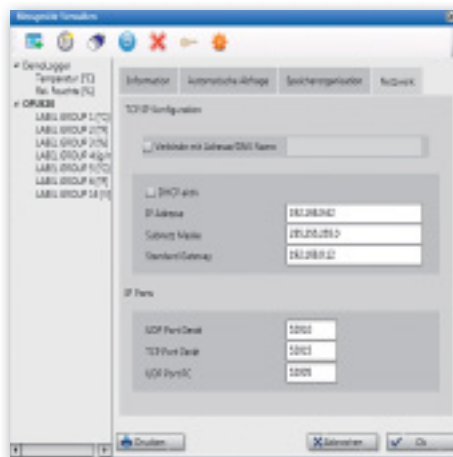
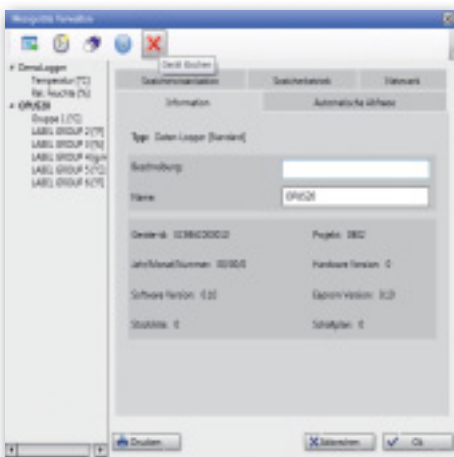


SmartGraph3 Software



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.



1515015815
9464752149
4142675491
3471684172
6147581917
6184915768
1849797536
5419414651
6189147621
7176819712
6819728172
4685491548
5419872678
1581985491
7921879517
2167278126
8945742764
5165147641
7147641756
4891675172
8798179179
3521756712
5819175984

Measurement

Highly Sensitive

Measurement





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.

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.

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 $0.45\text{ m/s} \pm 20\%$ 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.

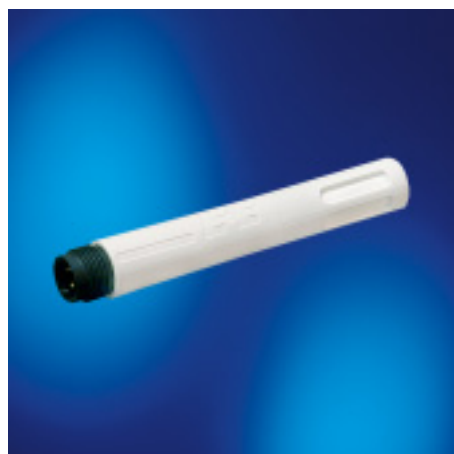
CO₂ In the research areas of the pharmaceutical industry and in universities, the internal conditions of the human body are simulated in incubators. In addition to the 37°C ambient temperature and the relative humidity of more than 90 % there is a high concentration of CO₂. This concentration is between 5 % and 10 %. In comparison: in normal indoor air applications the CO₂ concentration, measured in ppm (Parts per Million), is usually under 1,000 ppm, or rather 0.1 % CO₂. 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.

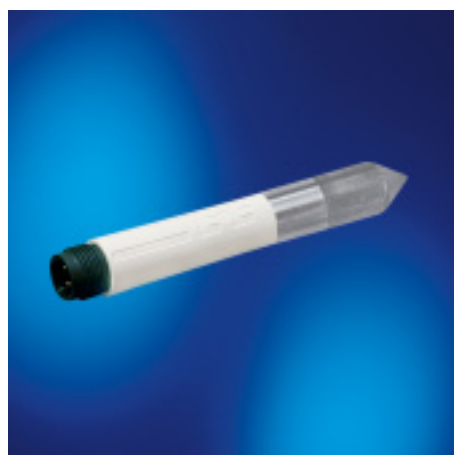


Measurement

Temperature/Humidity Sensors



| Temperature/ Humidity Sensor | | | Order-No. |
|--|---------------------------------|-------------------------------|-------------------|
| Temperature/ Humidity Sensor | | | 8120.TFF |
| Temperature/ Humidity Sensor (stainless steel sintered cap) for clean rooms | | | 8120.TFFE |
| Temperature | Air temperature measuring range | -40 ... 80 °C | |
| | Accuracy | ±0.1°C at 20°C | |
| | | ±0.3°C at -10°C...+50°C | |
| | | Otherwise ≤0.5°C | |
| | Humidity | Rel. humidity measuring range | |
| Accuracy | | ±2% r.H. (0...90% r.H.) | |
| | | ±3% r.H. (0...100% r.H.) | |
| Absolute humidity measuring range | | 0 ... 300g/m³ | |
| Dew point temperature measuring range | | -40 ... 80 °C | |
| Humidity ratio measuring range | 0 ... 550g/kg | | |
| Necessary Accessories <small>(either cable or Y connector)</small> | Cable | 2m | 8120.KAB2 |
| | Cable | 10m | 8120.KAB10 |
| | Y Connector | | 8120.STY |



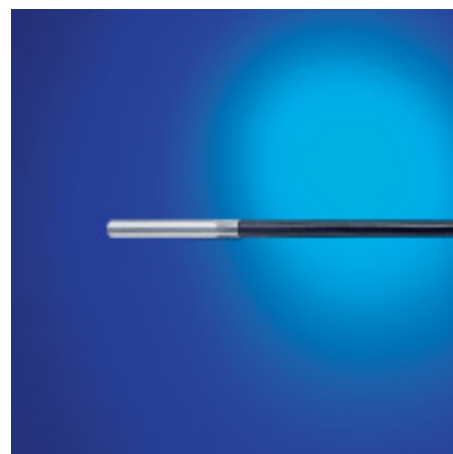
| Temperature/Humidity Sensor | | | Order-No. |
|--|-----------------|---|----------------|
| Well-priced and precise temperature and humidity transmitter with display | | | 5608.00 |
| Rel. Humidity | Principle | capacitive | |
| | Measuring range | 0...100% r.H. | |
| | Accuracy | ±3% (option: ±1.5% calibrated) | |
| Temperature | Principle | digital p-n junction | |
| | Measuring range | -20...+80°C | |
| | Accuracy | ±0.4°C at 20°C (option: ±0.3°C calibrated) | |

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

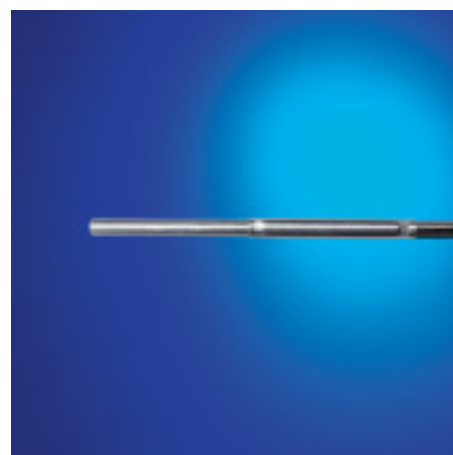
Air Temperature/CO₂



| 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 CO₂ 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 | |





Measurement

Air Flow



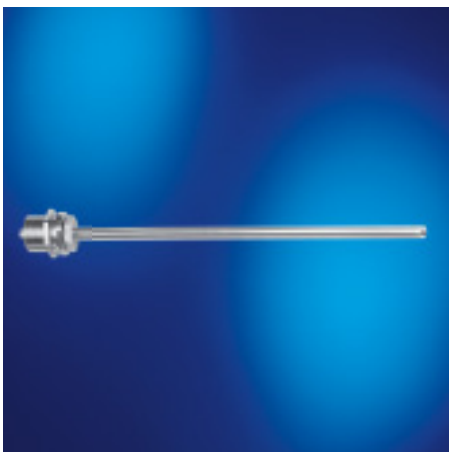
| Air flow | | Order No. |
|---|---|----------------|
| Well-priced air flow transmitter for heating, cooling and ventilation applications | | 5613.00 |
| Duct mounting with display | | |
| Duct mounting without display | | 5613.10 |
| Remote sensor without display | | 5613.20 |
| Remote sensor with display | | 5613.30 |
| Principle | Heated thin film layer | |
| Measuring range | 0 ... 20m/s | |
| Accuracy | ±0.2m/s + 3% of measured value (at 20°C, 45% r.H., 1,013 Pa) | |



| Strömung | | Order No. |
|--|--|----------------|
| Well-priced air flow transmitter in plastic housing for clean room applications | | 5617.00 |
| Wall mounting without display | | |
| Duct mounting without display | | 5617.10 |
| Remote sensor without display | | 5617.20 |
| Principle | Heated thin film layer | |
| Measuring range | 0 ... 1 m/s | |
| Accuracy | ±(0.04m/s + 2% of measured value) (at 20°C, 45% r.H., 1,013 Pa) | |
| Measuring range | 0 ... 1,5 m/s | |
| Accuracy | ±(0.05m/s + 2% of measured value) (at 20°C, 45% r.H., 1,013 Pa) | |
| Measuring range | 0 ... 2 m/s | |
| Accuracy | ±(0.06m/s + 2% of measured value) (at 20°C, 45% r.H., 1,013 Pa) | |



| 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 | |
| Operating voltage | 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 | |
| Operating voltage | 24V DC | |

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

Differential Pressure

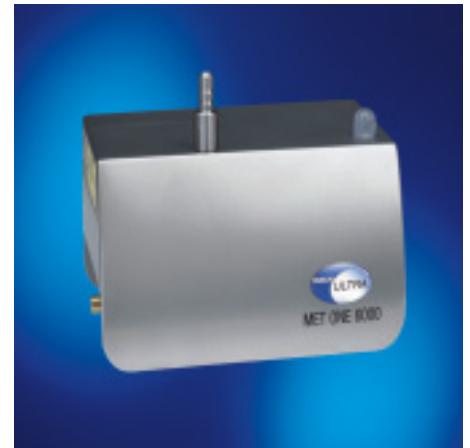


| Differential Pressure | | Order-No. |
|--|------------------------|------------------|
| Well-priced and reliable differential pressure sensor for installation in the control panel, with automatic zero point traceability | | 2191.100B |
| Principle | Micro mechanical | |
| Measuring range | - 100 Pa... +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 separate housing | | 2195.01 |
| With integrated pump | | 2195.11 |
| 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) | |



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.

Not all offered solutions contain a temporary storage device.

Lufft: with its experience the more intelligent solution.

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.



Storing climate conditions enables you to look back and find desired batch production data anytime, even after many years.

Reliable data storage with Lufft systems.



Measurement

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 BUS sensors can be integrated via the OPUS20E's RS485 interface (e.g. particle counter).

Air flow and differential pressure sensors are typically connected to the OPUS20E via analogue inputs as opposed to the maximum of 4 external temperature or humidity sensors that can be integrated via a digital BUS protocol.

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 for External Sensors | | 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 180 mm, width 78 mm, depth 32 mm |
| | Measurement rate | 10/30s, 1/10/12/15/30min, 1/3/6/12/24h |
| | Storage rate | 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 / Instructions/ data cable/ battery/ WAGO connector / DIN rail bracket |
| | Interface | USB, LAN |
| | bus interface | RS 485 |
| | Power supply | 4 x LR6 AA Mignon, USB, (POE opt.) |
| | Max. operation temperature | -20...50°C |
| | Input voltage 0-1V | Measurement range |
| 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



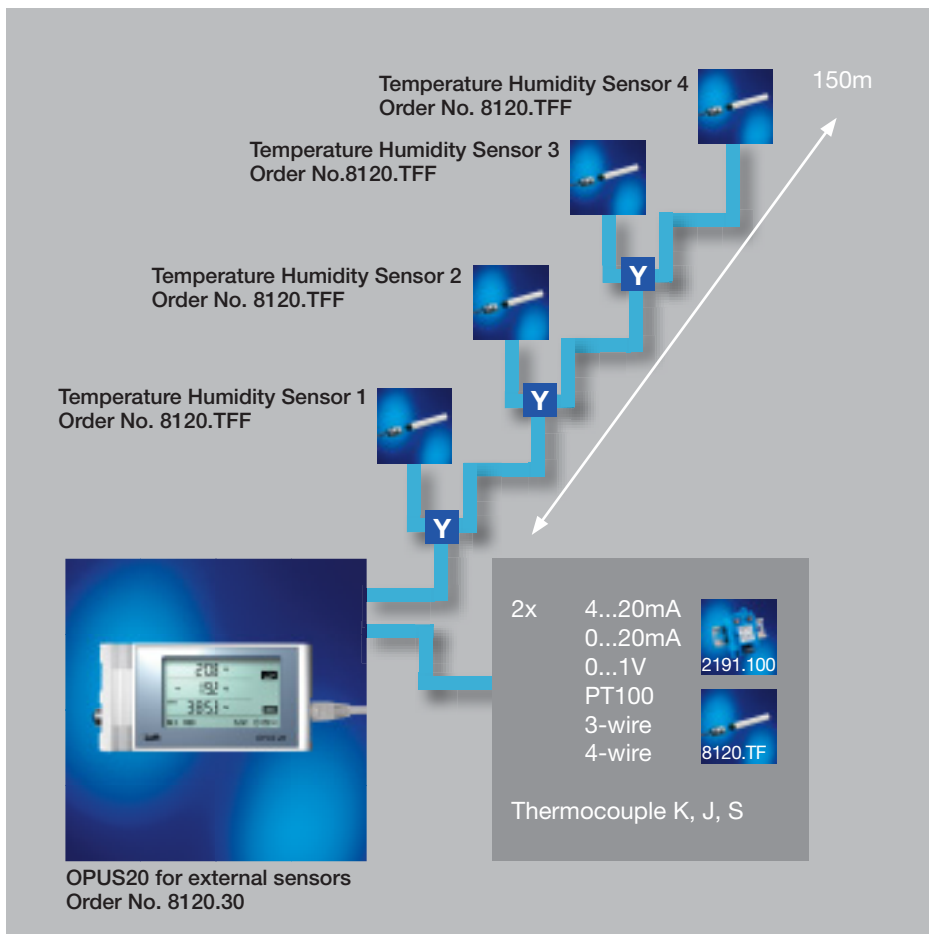
| Lufft OPUS20E for External Sensors | | | Order-No. |
|------------------------------------|---|---|-------------------|
| Technical data | | | |
| Thermocouple J | Measurement range | -200°C ... 1,200°C | |
| | Accuracy | +/- 1°C +/- 0.5% of measured value at -200°C ... 0°C +/- 1°C +/- 0.2% of measured 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.KAB2 |
| | Cable | 10m | 8120.KAB10 |
| (see page 12) | Temperature/ humidity sensor | | 8120.TFF |
| | Temperature/ humidity sensor (stainless steel sintered cap) for clean rooms | | 8120.TFFE |

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.

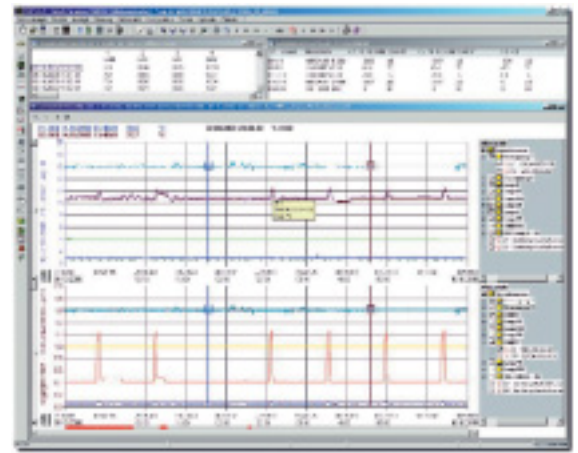
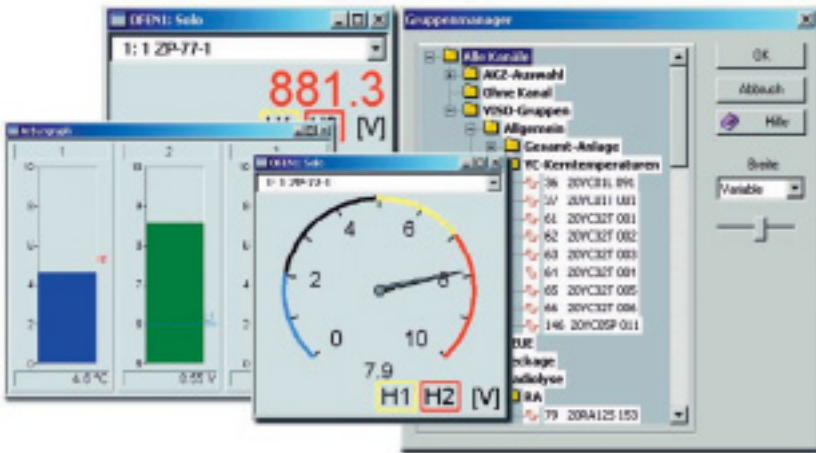


With up to 10 channels per datalogger transferring data in realtime. Power supply via POE.



Representation and Evaluation

Software MCPS7 for Lufft OPUS20



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.

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.

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

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.

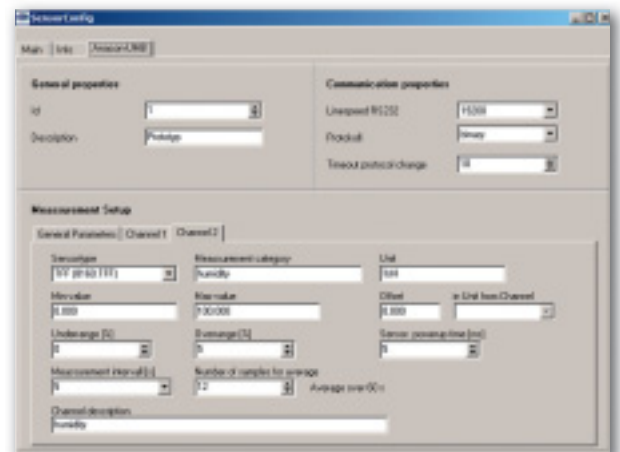
Centralized Representation

Measurements are, to some extent, recorded every second: average values accumulate in the data logger, minimum and maximum values are observed, raw data 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.

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 for Luft OPUS20



Representation and Evaluation

Software

MCPS7 Software for OPUS20

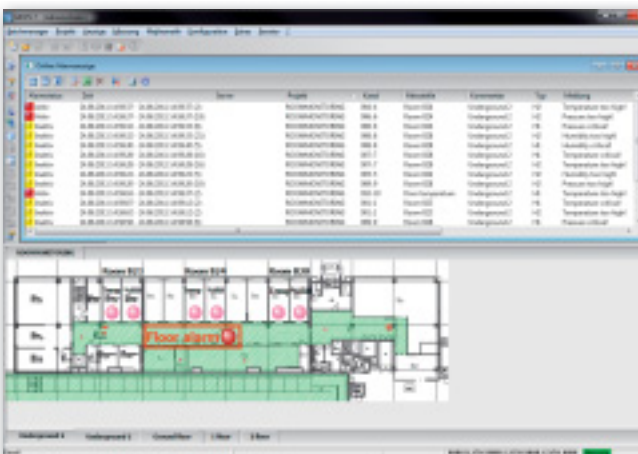
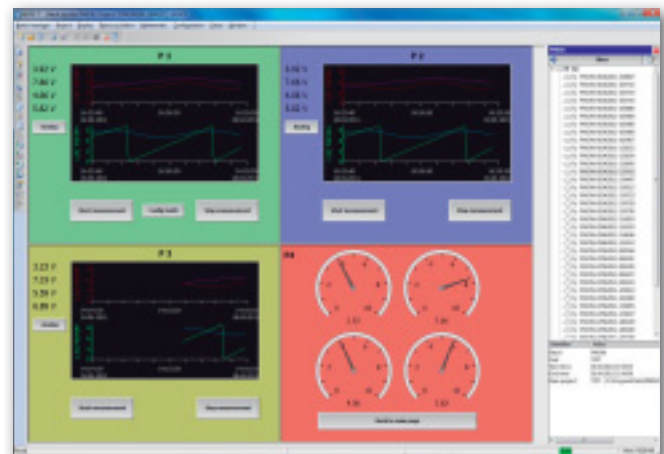
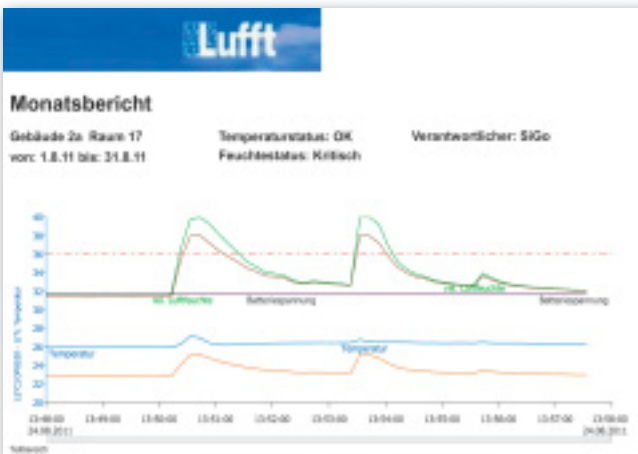
| MCPS Option | Description | Industrial-Standard Order-No. 8040.I1 | Industrial-Professional Order-No. 8040.I2 | Pharmaceutical-Standard Order-No. 8040.P1 | Pharmaceutical-Professional Order-No. 8040.P2 |
|-------------|---------------|--|--|--|--|
| 7000 | MCPS 20Kanäle | ■ | ■ | ■ | ■ |
| 7010 | MATH1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

OPUS20: Projektkonfiguration

Abtastrate: 10 S Speichermodus: Standard

| # | Gerät | Kanal | Einheit | Messstelle | Kommentar | Farbe | YMin | YMax | ... |
|---|----------|-------|---------|------------|------------------|------------|------|------|-----|
| 1 | OPUS20-1 | Tc | °C | | Temperatur | Blue | 20 | 40 | 1 |
| 2 | OPUS20-1 | H_rel | % | | rel. Luftfeuchte | Light Blue | 0 | 100 | 0 |
| 3 | OPUS20-1 | H_abs | g/m³ | | abs. Luftfeuchte | Red | 0 | 100 | 0 |
| 4 | OPUS20-1 | DPc | °C | | Taupunkt | Pink | 0 | 20 | 1 |
| 5 | OPUS20-1 | U-Bat | V | | Batteriespannung | Grey | 0 | 10 | 1 |

Buttons: Speichern, +1, +7, Löschen, Abbruch



OPUS20

Gerätekonfiguration

Gerätekonfigurationsnummer: 1

Schrittzahl: 19200

Kommunikationsport: Ethernet: 192.168.5.14

Kanäle: Tc, H_rel, H_abs, DPc, DPf, U-Bat

Gerätekonfigurationsparameter:
Abtastrate: 10s Speicherintervall: 1s

Buttons: OK, Gerät testen, Auto-Erkennung, Abbruch

Qualifica-
tion and
Calibration

Competent

Qualification and Calibration





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

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 qualification, 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 preciseness and robustness. This is guaranteed 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 display that visualises measured values without losses due to rounding and with the same accuracy. At the same time identical measurement information is stored by central software in the archive. These quality requirements can be additionally tested during so-called "factory inspections" or audits of the customer's production 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 frequently conducted after the installation of the system. The requirements of "electronic records" (21 CFR 11) differentiates between the following types of qualification:

- Design Qualification (DQ); occurs during the requirement specification- 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 sensor
- Performance Qualification (PQ); ensures the reliability during the products "life cycle"

Calibration

Imprecise measurements can have expensive 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 regular calibration a reference point measurement 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 qualification 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 respectively.

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

www.dkd-lab.info



Alarm

Accurately Timed

Alarms





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

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

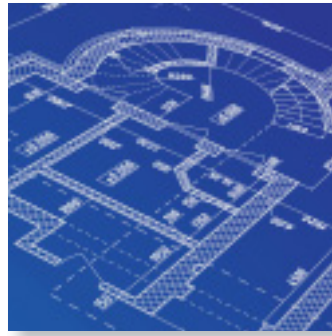
by Worker A within 15 minutes, then the pre-alarm alert is sent to worker B, etc. Depending on the configuration, it is possible to store up to 12 different telephone numbers. The send- and receive protocols manage 80 entries. Various settings such as "active- and forwarding-functions" can be set for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

Alarm



| Signal Tower | | Bestell-Nr. |
|--|--|--------------------|
| Lufft Signal Tower with LED beacons Wall mounting bracket | | 8161.SIGNAL |
| Base mounting | | 8162.SIGNAL |
| Dimensions | 160x50x45 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 Phoenix, 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.

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 capable 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"



Measurement



Storage and Transfer



Representation and Evaluation



Qualification and Calibration



Alarm

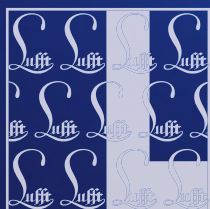
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