

MICROSENS

**Economic
fiber optic solutions for
public utility companies**



**MICROSENS fiber optic solutions -
intelligent, reliable, high-performance**



FIBER TO THE OFFICE (FTTO)



INDUSTRIAL SOLUTIONS



OPTICAL MULTIPLEXING



MICROSENS FIBERGUARD

MICROSENS

Dear customers,

As a modern link between supply and disposal, availability and service, managing directors and boards of public utility companies find themselves exposed to, in particular, an increased cost pressure today.

However, this situation also offers new possibilities for added value, such as using synergistic effects in the service field and the development of new potential for efficiency enhancement through intelligent networks. Whether individual load management, smart-grids, multi-metering or home automation, the prerequisite for maintaining the competitiveness of a modern public utility company is a high-capacity IT infrastructure. Many municipal companies have already identified for themselves the value of a well constructed fiber optic infrastructure as an investment in future competitiveness and autonomy.

MICROSENS systems support you in your decision to increase the profitability of your fiber optic infrastructure, such as using optical multiplexing for the multiplication of transmission capacity.

As a German developer and manufacturer of high-capacity fiber optic components, we have already accompanied a multitude of projects with public utility companies or their telecommunication subsidiaries due to our reliable products and high end consulting capabilities. Starting with a future-proof Fiber To The Office in-house network component through the interlinking of data centers and on to the conceptualizing of city networks based on 10G transmission technology.

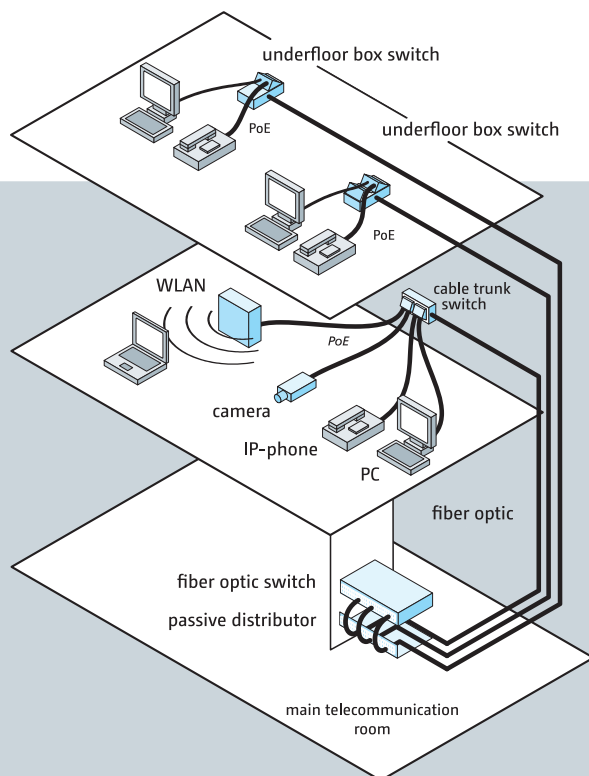
On the following pages, you will learn more about how you, as the engineering or commercial decision maker of a municipal company, can implement economic fiber optic solutions with MICROSENS products.

Enjoy reading this informative brochure.

Future-proof, predictable, cost efficient FIBER TO THE OFFICE (FTTO)

In-house networking for municipal companies

System disentanglement and standardized business processes are new challenges for commercial decision makers of municipal companies. The demands put on information infrastructures are increasing with added financial pressures. Therefore, long-term economic solutions with higher scalability become evermore important.



The use of MICROSENS Micro Switches permits an extension of the fiber optic wiring all the way to the tertiary level of wiring (cable ducts, sub-floor boxes as well as wall and desktop installations)



Avoiding cost intensive modernisation and increasing life time

Being an important component of the IT infrastructure, MICROSENS FTTO (Fiber To The Office) assists in providing a high-performance network and decreases IT costs in the long-term. As a consequence of fast changing technology, many municipal companies were forced to conduct cost intensive modernisation of their copper based infrastructure sometimes repeatedly. Perhaps because the cat.5 cables, which years ago were considered progressive, no longer complied with the requirements of Gigabit-Ethernet, PoE (Power-over-Ethernet) and Voice over IP.

Achieving planning reliability and reducing follow on costs

The Fiber To The Office concept offers the best of two worlds by using the technological advantages of fiber optics for the wiring of different floors in a building: hardly any length restrictions, interference resistance, future-proofing and long-term reliability. Contrary to the Fiber To The Desk model, FTTO brings the flexibility of twisted-pair to the end device into play again. A future change in technology would therefore only require the active devices to be modernised; the wiring would remain in its entirety. Thus, the MICROSENS FTTO concept combines the investment protection of fiber optic cabling with the flexibility of twisted-pair close to the user.

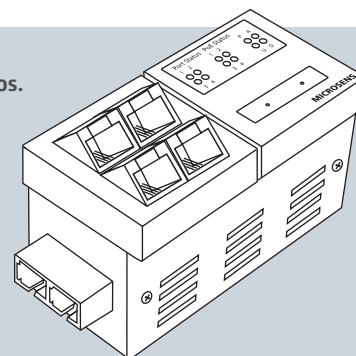
Reducing energy costs with intelligent power management

The connecting element of the FTTO concept is the intelligent engineering of the MICROSENS installation switches. By terminating the fiber optics into copper ports, the application of PoE (Power-over-Ethernet) for use with IP telephony or IP-cameras is possible at any time, flexibility that a pure Fiber To The Desk solution cannot provide. Moreover, the intelligent power management of the switches guarantees optimal operation of the connected devices and, in addition, saves energy.

Low installation costs, central administration, more security

MICROSENS Micro Switches are suitable for a multitude of installation scenarios. The switches also offer many technical advantages:

- Vertical and horizontal installation, no tools needed
- Avoiding "flying cabling"
- Gigabit-Ethernet-Technology with high port density and SFP-Uplink
- Central management via intelligent management software (NMP)
- 802.1x RADIUS-Authentication, VLAN and QoS



Monitor, control, compile. Reliable data as the foundation for tomorrow's economic decisions

Today public utility companies are confronted with a multitude of new tasks.

Whether a gas or water provider, a power plant operator or a modern municipal service provider. Between incentive regulation and municipal public services, optimal business decisions must be made under increasing cost pressure. The foundation for which is built by permanently available data.

INDUSTRIAL SOLUTIONS



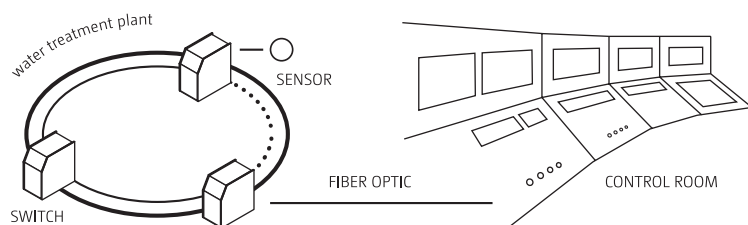
Industrial Ethernet brings business relevant data from production directly into the offices of commercial and technological decision makers. Ethernet, as a universal protocol, is thereby replacing more and more conventional supervisory control systems.

Relevant data from the utility plant directly to the desk

Intelligent control rooms of municipal companies currently consolidate tens of thousands of process data daily, from the monitoring of pump stations to the operational management of electricity and gas networks up to SCADA systems within power plants. Industrial Ethernet offers the necessary bandwidth in order to be able to reliably transmit the continually increasing volumes of data both now and in the future.

Technical stability from German manufacturing

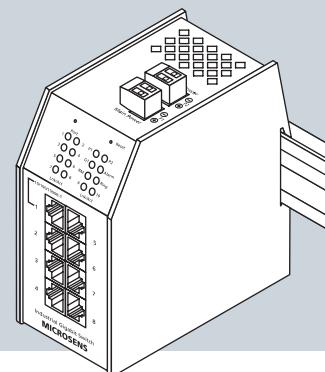
Due to the rising need of real time data, networking components are more often being implemented into rough environments. Conditions which were not foreseen when the Ethernet protocol was initially conceptualized. In order to create reliable solutions for these new areas of application which put particularly high demands on product quality, MICROSENS is therefore focusing on development and manufacturing in Germany.



Central management and maximised reliability

The most modern manufacturing quality and premium semiconductor technology provide MICROSENS Industrial Ethernet components with high shock and vibration resistance. Possible areas of application therefore range from power plants or medium voltage stations to the connectivity of intelligent local network stations for smart metering applications.

- Patented self-healing fiber optic ring topology and a redundant power supply guarantee maximum availability for critical applications
- Public Utility Certification (IEC 61850-3/IEEE1612), Railway Applications (DIN EN 50121-4)
- Power-over-Ethernet, VLAN, QoS, IGMP-Snooping, STP/RSTP and central management (NMP)
- High temperature resistance (-40 to +75 °C operating temperature)



Optical multiplexing

High performance with optimal cost-per-bit ratio

Economic solutions for technical requirements

Decision makers from public utility companies and their telecommunication subsidiaries are confronted with an erratic increase in data to be processed.

The liberalisation of the provider market, legal specifications of response times and structural changes in the market – such as in the form of regional mergers – demand significantly more interfaces and thus also more available bandwidth. However, these capacities have to be affordable.

OPTICAL MULTIPLEXING



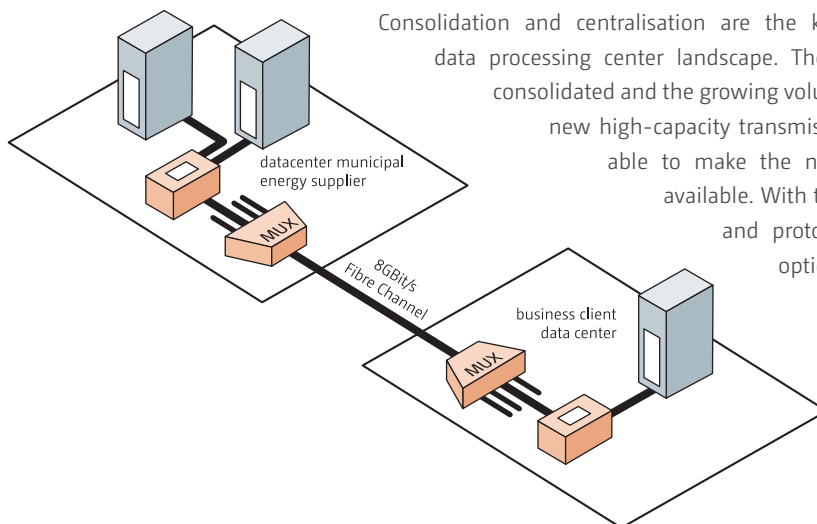
Using fiber optic capacities economically and avoiding funding gaps

With foresight, many regional telecommunication providers invested in an upgrade to fiber optics early. Having their own fiber optic infrastructure serves not only to maintain their autonomy, but also opens the door to new emerging markets at the same time. An optimal operational use of the existing fiber optic capacity is, however, decisive in order to avoid funding gaps. The application of optical multiplexing increases the cost-efficient transmission capacity of their own fiber optic network. The existing capacities can be profitably marketed, perhaps as branch networking of regional companies or the development of industrial areas within the framework of the utility mandate.

Covering the need for more bandwidth in an economic way

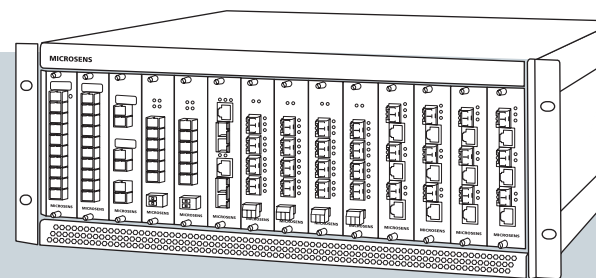
Optical multiplexing offers an optimal cost-per-bit ratio and thereby achieves a short pay back period. The high scalability of MICROSENS systems allows for an incremental upgrade, adapted to the actual need when extending the bandwidth. Consequently, the result is an ideal balance between technical necessity and business sense.

Data center coupling for medium-sized business' - active risk management and business models for public utility companies



Consolidation and centralisation are the key factors of a cost efficient data processing center landscape. The multitude of systems to be consolidated and the growing volume of data combined demands new high-capacity transmission technology in order to be able to make the necessary dedicated bandwidth available. With their modular design, scalability and protocol transparency, MICROSENS' optical multiplexing systems build, per customer order, a perfect basis for the cost-efficient coupling of main and backup data processing center.

- High reliability, redundant design, scalability
- Protocol transparency (SONET/SDH, ATM, Gigabit Ethernet, ESCON/FICON, Fibre Channel)
- CWDM / DWDM Systems (also in mixed operation) for bandwidths from 100 Mbps -10 Gbps, up to 160 separate channels, stretch up to 350 km



MICROSENS FiberGUARD

greater system reliability for fiber optic networks

Increases the overall availability of critical fiber optic infrastructures and protects you from the consequences of a total system failure.

Conformity with legal provisions and internal policies

Today, municipal companies are increasingly implementing high-performance fiber optic networks to reliably exchange mission critical data. In order to provide maximum availability for this important infrastructure, fiber optic networks are mostly structured to provide full system redundancy. However, due to legal provisions and internal compliance policies, this built-in redundancy can often no longer adequately fulfill those existing requirements.

How many single points of failure can you afford?

MICROSENS FiberGUARD improves fiber optic network tolerance in the case of single and multi points of failure or outages, thus enabling you to increase the availability of your complete fiber optic infrastructure at very low cost. If the power supply fails, MICROSENS FiberGUARD provides a bridge for the active components, keeping communications going – irrespective of the type of protocol used – by bypassing the non-working network node.

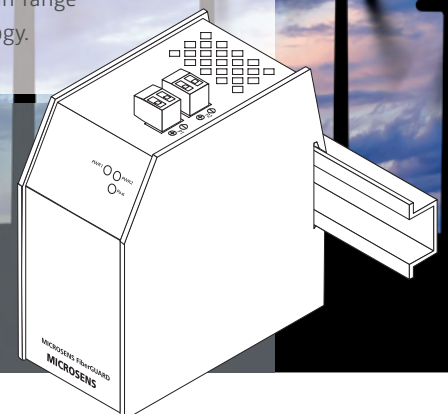
More system reliability for ring and bus topologies

MICROSENS FiberGUARD maintains the operation of a ring topology even when more than one networking node is failing – such as during a regional blackout. However, this is not restricted to ring topologies, bus topologies can also profit from the application of MICROSENS FiberGUARD, as with the failure of a network point, communication with the network station behind is maintained.

Suitable for application under the most difficult environmental conditions

In developing MICROSENS FiberGUARD, particular focus was placed upon reducing any possible sources of error, thus the use of firmware as well as complex semiconductor technology was intentionally avoided. With its robust design, MICROSENS FiberGUARD is suitable for the toughest of environments. Typical areas of application are, for example, remote locations or locations requiring long journeys. Application scenarios can range from wind energy plants or pipeline monitoring to automated technology.

- Long life span, robust design, high temperature resistance
- Increased availability of ring and bus topologies through optical bypass
- Protocol and manufacturer agnostic through its optical bypass
- Alarm relays for external means of alarm



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