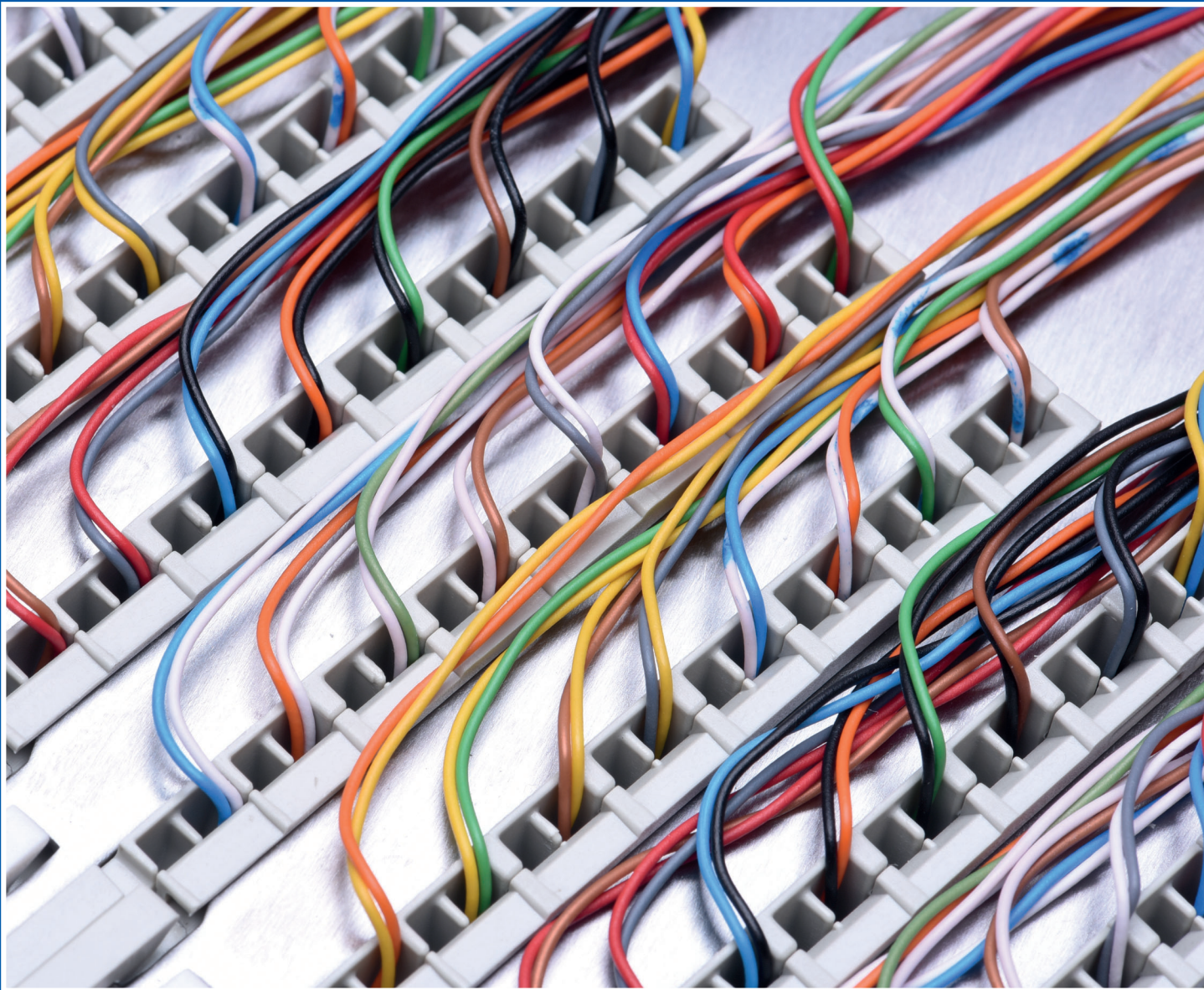


Total Network Transparency

Copper Cable Monitoring



*We develop solutions together:
innovative, reliable, future-proof*

Copper cable monitoring

- an Evergreen



There's life in the old dog yet

As early as the mid-1990s, the end of the copper cable was predicted. It's true that the fibre optic cable alone promised to provide the capacity required for future broadband data exchange.

With new technologies, the copper cable has partially made up for this shortcoming. Copper cable is still an indispensable medium in the field of signaling.

Therefore, LANCIER Monitoring has continuously developed copper cable monitoring.

The application of compressed air to cables prevents the penetration of moisture and thus prevents worsening of the transmission quality.

Aging and minor damage can lead to leaks in the cable sheath. If the protective compressed air leaks, moisture will increasingly impair the transmission quality. The LANCIER monitoring system locates such faults quickly and precisely - regardless of whether they are caused by creeping cable faults or a sudden break, e.g. due to earthworks.

However, not all copper cable lengths are protected with compressed air. The transmission quality of longitudinally watertight cables is monitored by means of the insulation and loop resistance of the cable.

Alternatively or additionally, humidity sensors report penetrating liquids.

Copper cable monitoring by LANCIER Monitoring

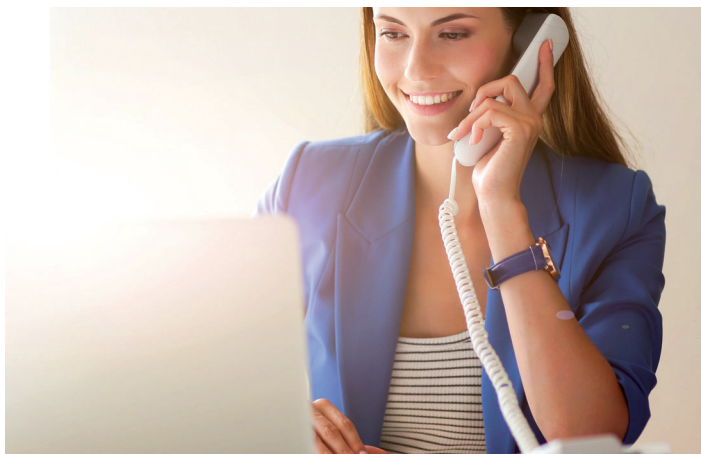
- Pressurisation systems for primary cable protection
- Pressure sensors for pressure monitoring and fault location
- Resistance sensors for determining transmission quality and breaks in the cable line
- Humidity sensors for the penetration of liquids
- Monitoring stations and modular system for the collection of measurements
- Unified monitoring system for evaluation, alarming, fault location and the graphic representation of measurement results

The most significant reasons for copper cable monitoring

Transmission quality

The natural enemy of copper cable is moisture. If it penetrates the cable sheath or sleeves, the transmission quality deteriorates considerably. This affects analogue and digital technology equally.

The early detection and locating of corresponding cable faults using LANCIER Monitoring solutions enables rapid intervention before cable faults become more serious and the connection fails.



Cable damage

In particular in the event of civil engineering works, it is common for telephone cables to be accidentally damaged or pulled out completely. In this instance it is important for the cable network operator to identify and locate the damage quickly and unmistakably. After all, the person responsible for the damage does not always notice his error or want to admit it. Using cable monitoring from LANCIER Monitoring, the location and time of cable damage can be documented clearly. This is an important point when claiming for damages.

Cable theft and vandalism

Commodity prices are increasing worldwide - including for copper. This is a reason for the constant rise in criminality in the area of cable theft. This especially concerns easily accessible outdoor cables and signal cables. Here too the LANCIER monitoring system reports the malfunction immediately and securely - rapid intervention is then possible.

Vandalism to buildings and connection points (e.g. street side cabinets) can be detected and combatted by monitoring door contacts and tear-off wires.



Cable monitoring

Pressurised air monitoring and humidity monitoring

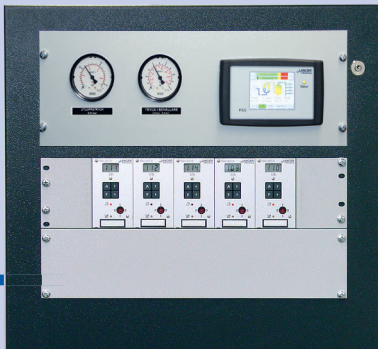
Cables protected using compressed air can be monitored seamlessly, starting with the pressurisation system.

Immediately after the generation of compressed air, addressable flow sensors constantly measure the consumption of air, pressure sensors determine the local cable pressure in cable sleeves and externally in street side cabinets or manholes.

Using measurement data, cable faults and the fault location can be determined with pinpoint accuracy before a malfunction occurs.

In addition, the moisture content of the compressed air (in sleeves, for example) can be monitored in order to detect penetrating moisture immediately. Moisture monitoring is also used in jelly-filled cables.

Pressurisation systems



Pressurisation system

Compressed air generation

stationary and mobile **pressurisation systems** with demand-oriented capacities, e.g.

- up to 1.000 l/h
- up to 2.600 l/h
- up to 5.200 l/h
- up to 10.000 l/h



The **FMA 200C** flow meter determines the air consumption of the cable. Increased consumption is the first indication of leaks in the cable sheath.

Sensors

In sleeves

Pressure measurement

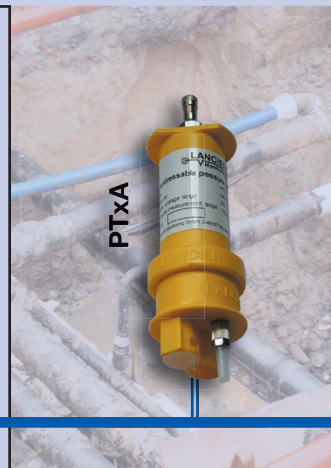
Several **PTxA** pressure sensors determine the pressure gradient along the cable route. In this way, cable leaks can be detected and located precisely.



Humidity measuring

In sleeves of non-pressurised, jelly-filled cables, carrying out humidity monitoring with **HTxA** provides information on the cable quality.

In street side cabinets/manholes



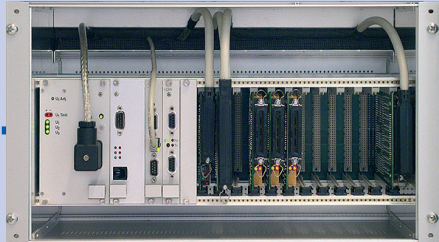
Pressure measurement

PTxA pressure sensor in moisture-protected multi-housing.

Evaluation with global access

Measuring Stations

RTU



Universally usable monitoring station (remote testing unit) with measuring cards for modular adaptation to a wide range of measuring tasks.

MUX 101-DW



Compact monitoring station in wall housing for universal measuring tasks with 16 measuring channels.

RM-Module System



Modular monitoring system for universal measuring tasks with alarm output contacts.

Various monitoring stations are available for evaluation purposes.

Depending on the mission, they cover individual measuring tasks or offer a comprehensive range of measurements.

Worldwide networking

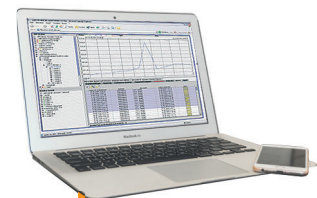
All evaluation systems can be linked via IP network with control rooms, control centers etc. - even globally.

External services

TMN (Telecommunication Management Network)

Cable management system

GIS (Geographical Information System)



Client with UMS-Software

IP network

Pressurised telecommunication cable

One pair is used for measurement data transmission (see separate document "The LANCIER Tx-Bus")

Various alternatives for the measuring bus connection

Cable monitoring

Insulation and loop resistance monitoring

Non-pressurised telephone cables can be monitored with regard to their transmission quality by means of the insulation and loop resistance of a representative supervision pair. The resistance values change if moisture penetrates. This is detected and reported by the monitoring system.

The loop resistance value provides additional information on cable disruptions, e.g. due to being pulled out, theft or sabotage.

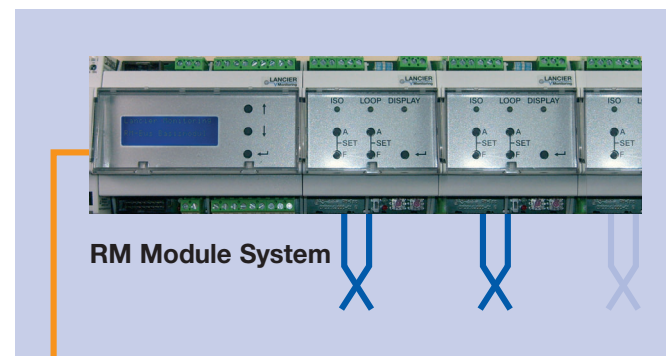
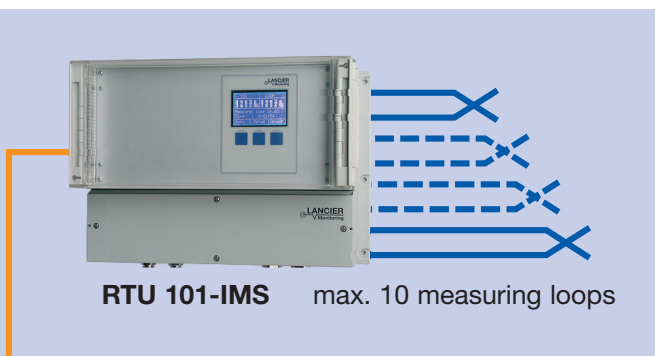
There are various system options, depending on the structure of the network to be monitored and the available signalling paths.

Monitoring multiple cables

The independent monitoring station **RTU 101-IMS** measures up to 10 cables.

The **RM module system** is expanded by one module for each cable to be monitored. Additional measuring modules enable the simultaneous monitoring of further parameters such as temperature, door contacts, etc.

The following applies to both systems: The signals and alarms are output via relay contacts. Integrated interfaces enable integration into the Unified Monitoring System (UMS).



IP network

External services

TMN (Telecommunication Management Network)

Cable management system

GIS (Geographical Information System)

UMS Software

Everything at a glance!

LANCIER Monitoring's UMS display and evaluation software is the high-end cable and device monitoring solution. It combines the measurement values of all monitoring stations, sensors and pressurisation systems on a single desktop, analyses them, localises faults, emits alarms and generates profiles and measurement curves.

The integration of all services, flexible report management and a TMN interface are all possible.

Furthermore, fault locations can be displayed graphically using GIS coordinates and mapping.

In connection with geographic network and inventory data, the UMS software then displays

- a graphic status indicator for monitoring stations
- the position of monitoring stations in the network
- and their geographic position.

UMS components

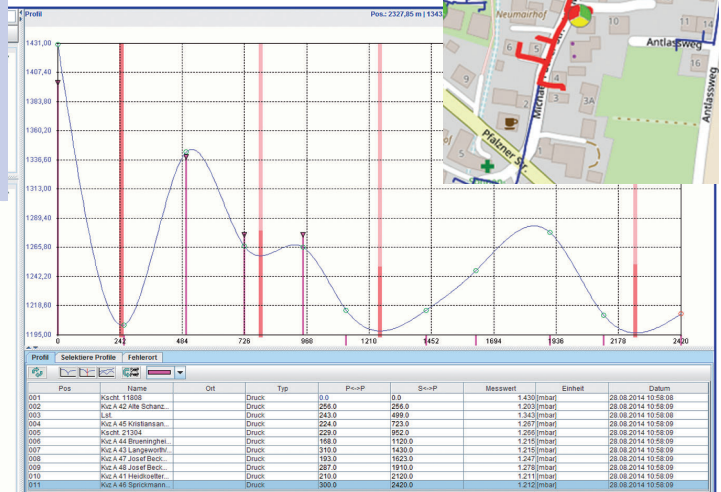
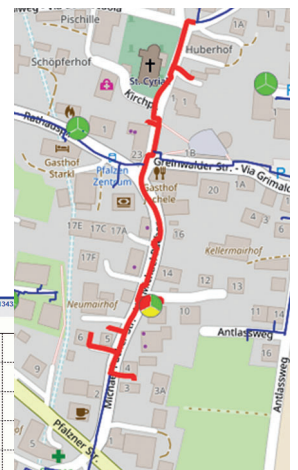
- Flexible and rapid alarming of all recorded faults
- Simple handling thanks to an intuitive user interface
- Simple adaptations to user-specific conditions
- Interfaces to numerous external systems



Client

Your own stored plans and documents ensure fast access and corresponding route assignment.

Fault locations can be displayed with GIS coordinates and mapping in the plans.



Independence with UMS hosting

LANCIER Monitoring supplies you with an access to a server that retrieves, processes and provides the measurement data from the measuring points of your plants.

Always maintain a complete overview through world-wide, password-protected access to the stored data and measured values with direct control of newly established monitoring points including via mobile access.

Economical and efficient!



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