

 DALI

# Protect your pipeline infrastructure with fiber optic monitoring



# About DALI

DALI is a groundbreaking pipeline monitoring system that ensures the security and efficiency of pipeline infrastructures.

## Reduce Non-Revenue Water

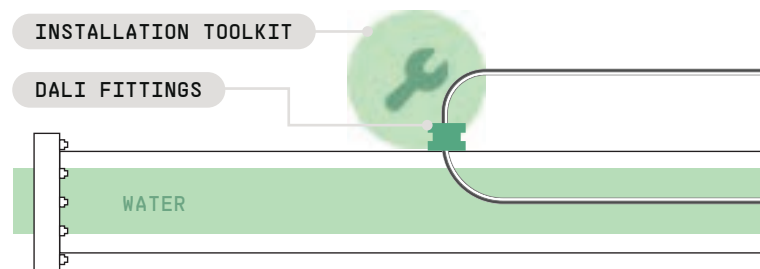
Detect leaks and intrusions in pipelines carrying drinking water and other liquids. With advanced **24/7 monitoring**, it helps utility companies and industrial facilities to reduce Non-Revenue Water (NRW) losses, minimize waste, and prevent incidents. DALI provides **real-time alerts with 5-meter accuracy over long distances** and works seamlessly with **pipelines of any size or material, including plastic**.

## Improve Asset Management

Utility and industry asset managers can **increase the pipeline service life** and make asset management more cost-effective. Using advanced fiber optic technology, DALI provides continuous and accurate leak and intrusion detection. This early warning system helps to **prevent major pipe bursts, extends the lifespan of aging pipelines, and enables more efficient maintenance planning**.

## Build Your Own Fiber Network

DALI needs one optical fiber for monitoring, and allows other fibers to **connect and remotely control network assets like valves and sensors**. This setup supports robust data communication networks and can **transform water pipelines into fiber backbones** in collaboration with telecom operators. With high fiber capacity (up to 144 fibers), DALI builds secure connections to network infrastructure and offers **potential for leasing fiber capacity to telecom operators**.



# What can DALI monitor?



## All pipeline types

- Water mains
- Water distribution
- Pressurized sewage pipes
- Industrial pipelines
- District heating networks



## Any pipe material

- Concrete
- Steel
- Plastic (PE, PP, PVC)
- Cast iron
- ...



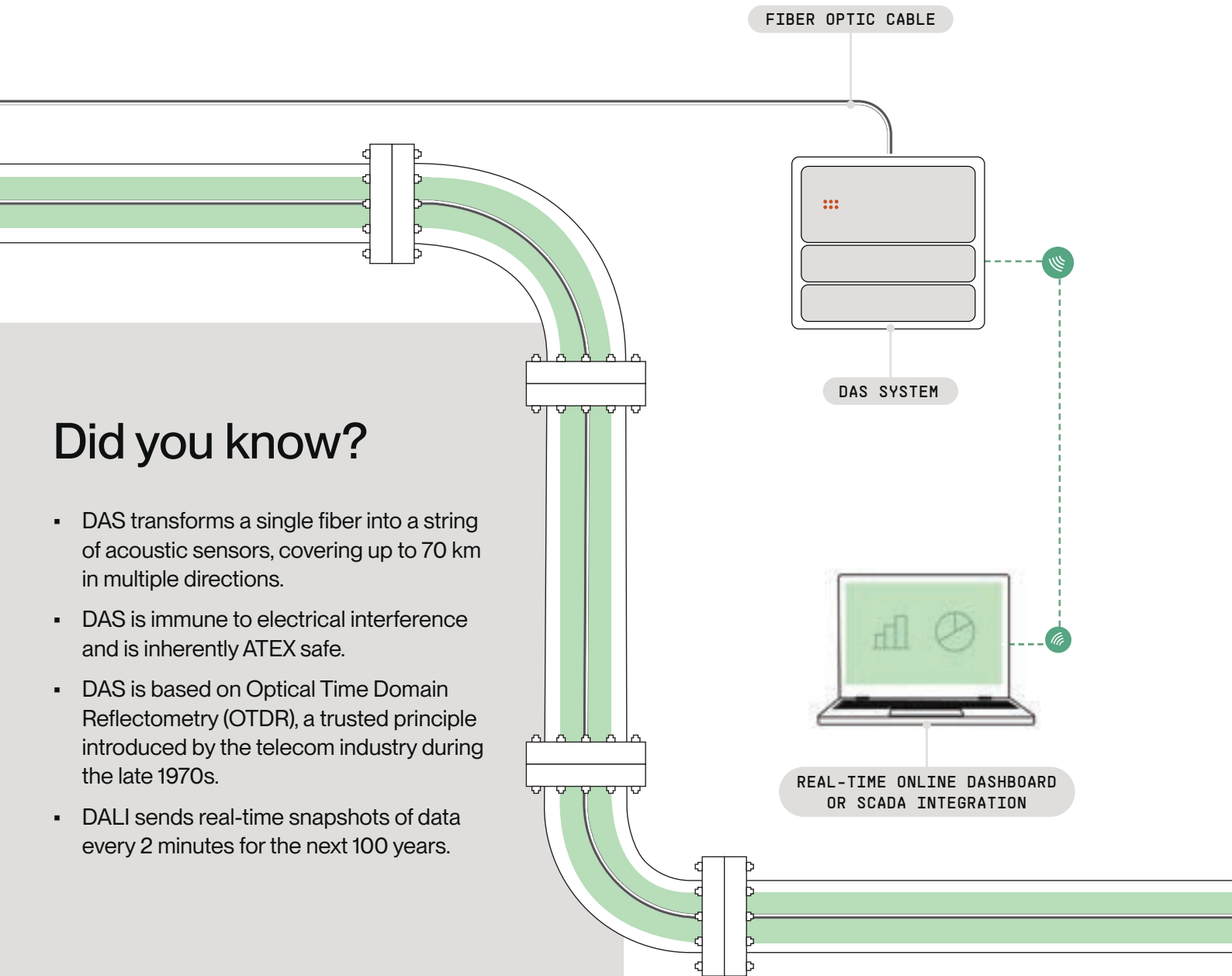
## Any pipe diameter

- Diameter 90 mm - 1400 mm: standard installation toolkit
- Diameter larger than 1400 mm: custom installation

# How DALI works

DALI takes full advantage of fiber optic technology with Distributed Acoustic Sensing (DAS).

1. A fiber optic cable is installed **inside the pipeline**, acting as a string of thousands of vibration sensors **along the entire length** of the pipeline.
2. The Distributed Acoustic Sensing (DAS) device is connected to one end of the fiber and uses a laser to send short pulses of light along the fiber. This creates **a unique pattern of reflections**.
3. Disturbances caused by environmental **vibrations affect this reflection pattern** within the pipeline. These altered optical signals are then analyzed by the Distributed Acoustic Sensing (DAS) device.
4. Using advanced signal processing and machine learning software, DALI accurately detects events like **leaks and intrusions** with an **accuracy of 5 meters**. The system can also be trained to detect specific other anomalies in or around the pipeline.
5. A **real-time online dashboard** displays the pipeline status, alarms, and sends notifications to the DALI user.



## Did you know?

- DAS transforms a single fiber into a string of acoustic sensors, covering up to 70 km in multiple directions.
- DAS is immune to electrical interference and is inherently ATEX safe.
- DAS is based on Optical Time Domain Reflectometry (OTDR), a trusted principle introduced by the telecom industry during the late 1970s.
- DALI sends real-time snapshots of data every 2 minutes for the next 100 years.

# The DALI installation

Install DALI without interrupting pipeline services, exclude downtime and ensure continuous operations.

1. The installation tooling enables **flexible and universal fiber cable deployment**, specifically designed for easy entry and exit of pipelines and bypassing valves.
2. Using DALI's custom fittings, which are **safe for drinking water applications**, the fiber cable is inserted into the pipeline, and the access points around the fiber cable are **reliably waterproofed**.
3. The innovative installation technique **uses the flow to pull the cable through the pipeline**.
4. The **installation is divided into sections**, with each section typically covering distances of up to 2 kilometers or more.
5. Using basic fiber welding, fiber cable sections at bypass points are connected, **creating a continuous link over long distances**.
6. When the tooling is removed, the DALI system is fully operational.
7. If repairs to the pipeline are needed, the fiber cable is withdrawn from the affected area, reinstalled, and reconnected after the repairs are completed.

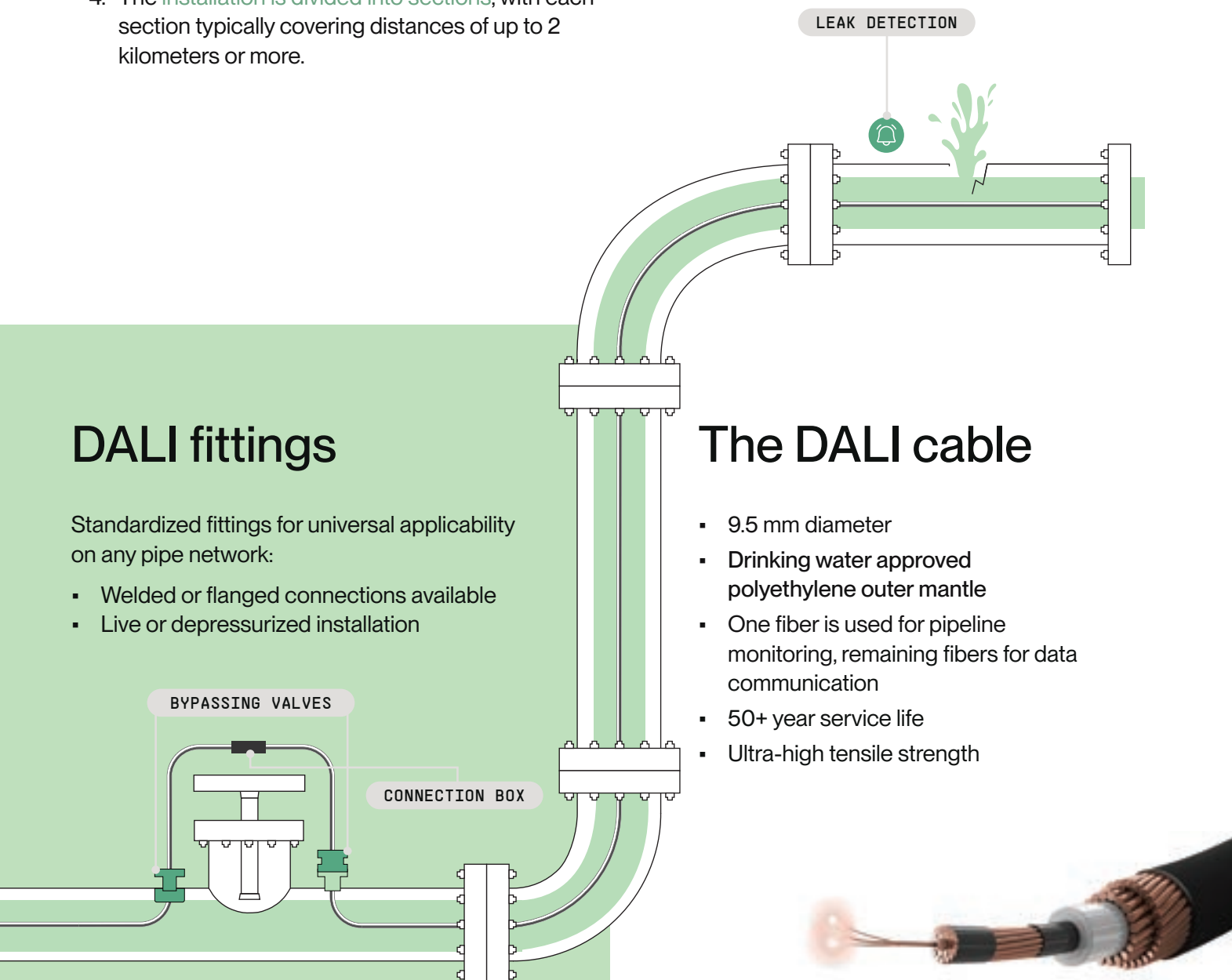
## DALI fittings

Standardized fittings for universal applicability on any pipe network:

- Welded or flanged connections available
- Live or depressurized installation

## The DALI cable

- 9.5 mm diameter
- Drinking water approved polyethylene outer mantle
- One fiber is used for pipeline monitoring, remaining fibers for data communication
- 50+ year service life
- Ultra-high tensile strength



# The DALI solutions

Discover DALI's diverse deployment options, tailored to your needs.

## DALI Monitoring

### Continuous and real-time monitoring

- Long-term deployment
- 24/7 Monitoring
- Real-time detection capability
- Permanent fiber installation
- Permanent DAS installation

## DALI Flex

### Frequent and flexible inspection

- Long-term deployment
- On-demand monitoring
- One-day inspections up to 50km or custom monitoring campaigns
- Permanent fiber installation
- DAS used for inspections, easily movable between assets

## DALI Mobile

### One-time and focused inspection

- One-time inspections
- Segment inspection covering multiple kilometers
- Temporary fiber installation, retracted post-inspection
- DAS connected only during inspection periods

## Return On Investment

A DALI monitoring system has a **long service life** and typically **costs less than 1% of a full pipeline replacement**. In return, you get an extended pipeline lifespan, reduced NRW, and peace of mind for your infrastructure.



# What DALI clients say

“The DALI installation went very smooth and we were impressed by the disinfection procedure used. We see great potential in the use of DALI for monitoring pipelines.”

**Stefan Knijnenburg**  
Advisor Innovation and  
Policy at Evides  
(The Netherlands)

DALI has a high potential to detect leaks and intrusions in our transport pipeline network in real time and at affordable cost.”

**Wim Jacobs**  
Innovation Manager at  
FARYS (Belgium)

“The installation of DALI on our pipes went as we had hoped. AI quickly detected large and mid-sized leaks, with smart analytics refining results for smaller leaks later on. We consider DALI as a valuable, long-term monitoring tool for pipeline integrity.”

**Victor Pelin**  
Specialist Drinking Water  
Distribution at NSVA  
(Sweden)

## Wondering how DALI's real-time data can optimize your pipeline asset management? Let's put a meeting in the pipeline!


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 **Fluves**  **VIGOTEC**

DALI was developed as a partnership of Fluves and Vigotec, combining their expertise in fiber optic sensing and pipeline systems.