

## Monitoring systems for Pipe Jacking and Microtunneling

For each jacking pipe the optimum monitoring system

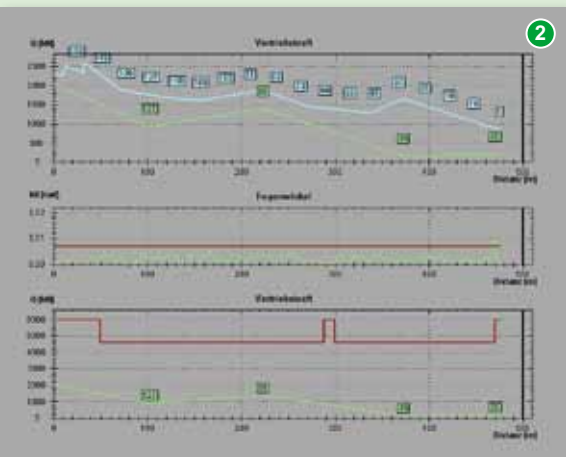
# Overview of Monitoring Systems



Remote support from the Jackcontrol head office



On-site computer



Real-time monitoring; graphs on display

## For each pipe jacking operation the optimum monitoring system

Adapted to the project requirements and the pipe material used, Jackcontrol provides the optimum monitoring system for each type of jacking operation. Thanks to its modular construction, for all combinations of pipe – Pressure Transmission Ring (DÜR, see Table 1) in common use in practice, complete real-time monitoring of the pipe structure is possible during the jacking operation, whereby within the same drive different pressure transmission rings can be used (hybrid construction method). In setting up the software all well-established codes can be taken into consideration, e.g. ATV 161, DWA-A 125 and 161, DIN 19916, SIA 195, CCAA, PJA, etc. The pipe design can be carried out by Jackcontrol, but pipe designs of third parties (pipe manufacturer, project authors, etc.) can also be integrated.

## Sensor technology

The sensors and hardware employed in the pipe and the launching shaft are designed to be robust and suitable for construction sites, with a degree of protection of at least IP67. Besides the sensor units in the tube, in the launching shaft measuring wheels for the positioning and additional manometers on the main jacks are employed.

## On-site computer

The centerpiece of the monitoring equipment is the on-site computer with the following functions:

- recording of measurement data
- evaluation and calculation of the admissible jacking forces for each pipe in real-time
- graphical presentation of the results in real-time
- **automatic alarm before onset of damage**



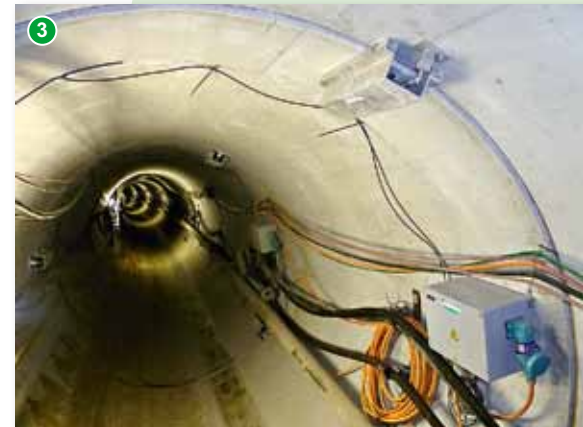
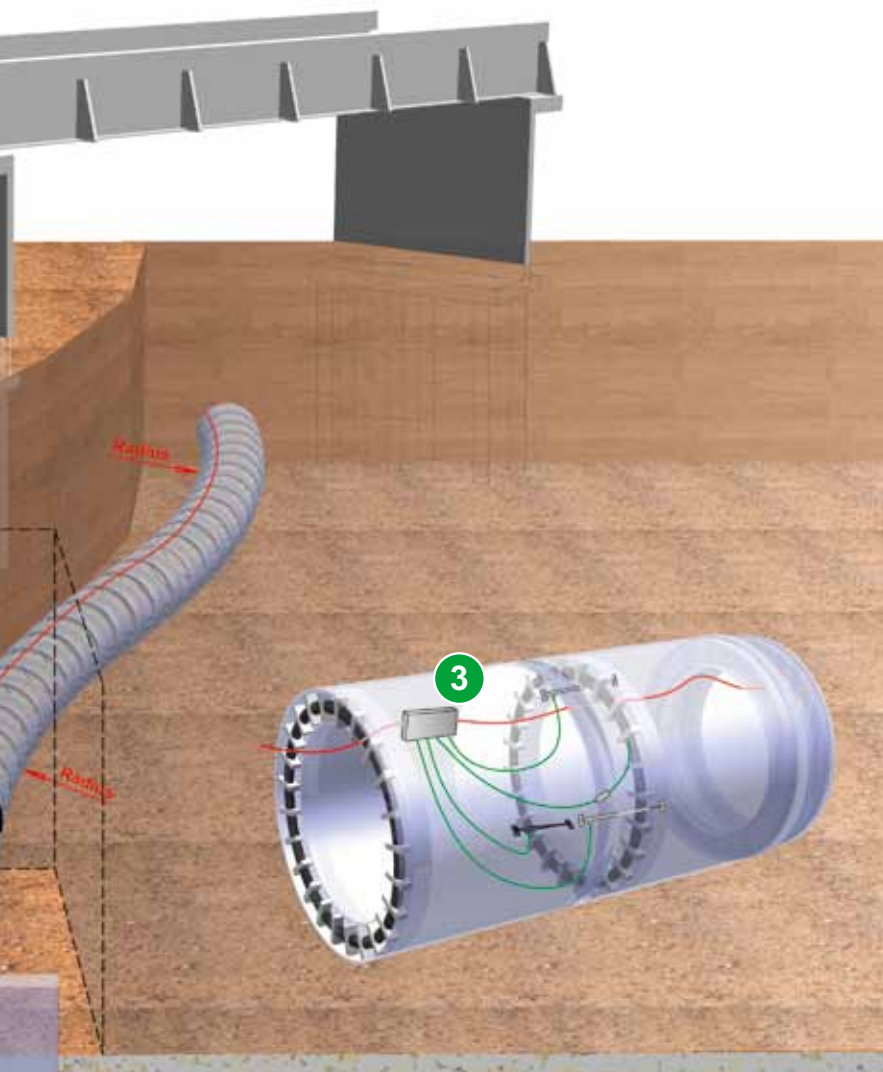
## Remote support via Internet

Remote intervention via the Internet with the on-site computer and a cellular modem transfers the monitoring results at any time to the superordinate decision makers:

- complete remote control of the on-site computer from the Jackcontrol head office
- quick and efficient support by Jackcontrol specialists at head office
- flexible adapting of the software set-up under changing boundary conditions
- remote access for authorized third parties (client, site supervision, etc.)

## Comprehensive quality assurance for jacking pipes

After a successful pipe jacking operation, based on the measurements carried out together with the data analyses, the Jackcontrol specialists prepare a detailed project-specific report, which records the quality attained by the pipes according to the underlying codes, based on the mechanical behavior – not only with regard to the visible inner surface of the pipe, but also to the non-visible outer surface of the pipe in contact with the ground. **Because the client orders a flawless pipe meeting all quality requirements!**



Sensor unit

### Pressure Transmission Ring (DÜR)

Pipe \ DÜR	Hydraulic Joint	Timber	Without
Reinforced concrete			
Polymer concrete			
Vitrified clay			
GRP			
Composite			
Steel			

Table 1: Possible combinations of pipe – Pressure Transmission Ring (DÜR)



**Firm's own joint testing equipment**  
( $Q_{max} = 3000 \text{ kN}$ )

An ongoing development and improvement of products and services is part of the core business of the firm Jackcontrol. To achieve these goals Jackcontrol relies mainly on the firm's own research and development. This leads to continual innovation and a constant improvement of products and services as well as a profound understanding of the physical principles involved. At the same time, thanks to the firm's own practice-oriented research and development, project and client-specific solutions can be obtained quickly and efficiently, not only in hardware/software but also for applications in the fields of mechanics, structural engineering and hydraulics.

Since 2009 Jackcontrol has had use of the joint testing facility at the workshops of Buchholz/Glarus. Based on a pipe diameter of DN 1000, this facility permits force and deformation-controlled tests to be performed on pressure transmission elements with loads of up to 3000 kN. An experienced and motivated team of specialists from the fields of mechanics, structural engineering, hydraulics, electro-technology and computer programming looks forward to new development challenges, which is a guarantee for delivering innovative and practical solutions within a short time frame.

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