

Universal Navigation System

Plug and drive for Microtunnelling equipment.

Due to modern navigation technologies, remote-controlled Pipe Jacking can be effectuated in straight or curve drives, in any tunnel alignment as well as over long distances. High-tech sensor technology ensures high accuracy even in variable tunnel alignments. Depending on tunnel alignment and length, different control respectively navigation systems are used on Microtunnelling equipment. To guarantee the compatibility

between the machines and the navigation systems, Herrenknecht AG developed the Universal Navigation System as a basic module. With the modular concept, U.N.S., Microtunnelling systems can be equipped with the relevant navigation system quickly and economically. U.N.S. is a basic module for integrated or stand-alone navigation systems.

Advantages of U.N.S.

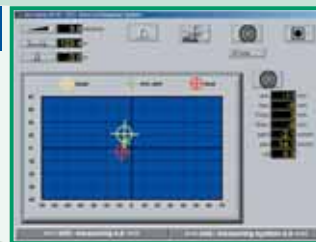
- One basic module for three navigation systems:
 - Electronic Laser System (ELS)
 - ELS with Hydrostatic Water Levelling (ELS-HWL)
 - Gyro Navigation System for Pipe Jacking (GNS-P)
- Consistent system structure: Modularly suitable to any Herrenknecht Microtunnelling equipment.
- Navigation system for any tunnel diameter, length and alignment.
- Integrated or stand-alone system configuration.
- Integration of data logging systems possible; e.g. Interjacking stations Universal Navigation System.



ELS
Electronic Laser System
 (straight drives < 200m length)

ELS-HWL
ELS with Hydrostatic Water Leveling
 (straight drives < 400m length)

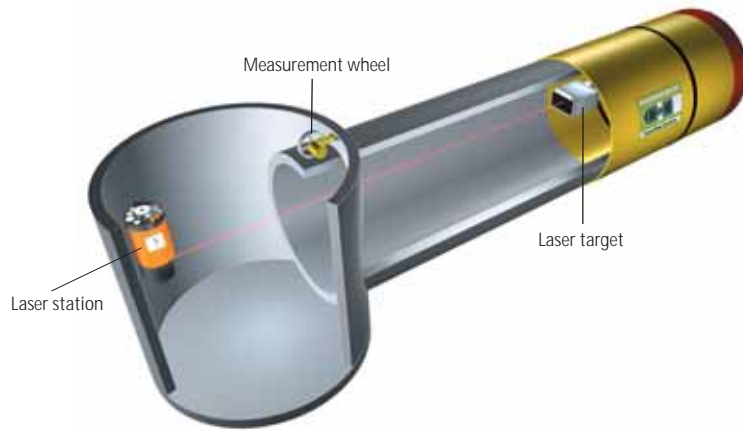
U.N.S.



GNS-P
Gyro Navigation System for Pipe Jacking
 (curved drives, tunnel diameter \geq 800mm)

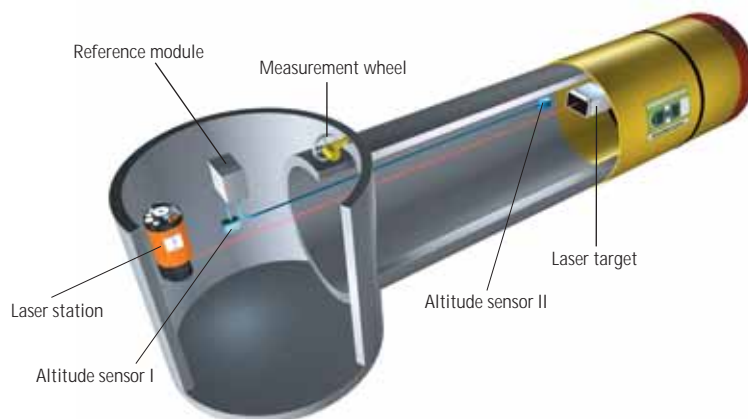
Modules for every requirement.

ELS Electronic Laser System



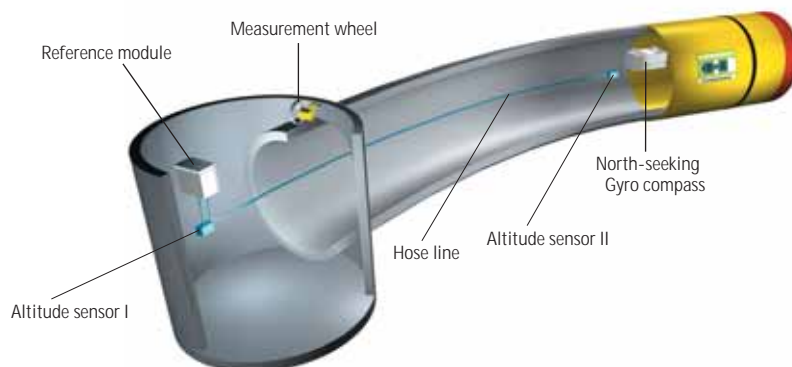
ELS is designed for straight drives and lengths of around 200m. The max. tunnel length depends on the laser used, as well as refraction in the tunnel. TBM position and direction determination takes place continuously. The system comprises the ELS target in the TBM, and the tunnel laser in the pit.

ELS-HWL ELS with Hydrostatic Water Leveling



ELS-HWL is an upgrade to the ELS system and comprises additionally the HWL system. The system is suitable for long, straight drives up to 400m. The Hydrostatic Water Leveling system supplies altitude data permanently via a reference module, which is mounted in the jacking shaft and via an altitude sensor, which is mounted inside the TBM.

GNS-P Gyro Navigation System for Pipe Jacking



GNS-P is designed for curved drives of any radius. The system can be used in tunnels with a diameter of at least 800mm. No components are installed in the pipe and line-of-sight is not necessary between the components. The north-seeking gyro compass, Northstar24, is permanently mounted inside the TBM. Upon request, it calculates the direction due north as a reference to the machine axis. The current position of the TBM is calculated via coupled navigation. The HWL system supplies elevation data permanently.

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