

Civil and underground engineering

Continuous automation with
robust CANopen encoder WDGA

- Perfect target reliability
- Optimize speed
- Consistent automation
- Galvanically isolated CANopen communication
- Operational safety and durability





Faster drilling for faster Internet ... automotive robust encoder ensures consistent automation

Absolute CANopen encoders from Wachendorff provide position data in AT-Boretac machines for automatic pipe feeding.

In the scope of the area-wide expansion of mainly rural regions with glass fiber, underground works are a common sight in residential areas and along through roads. To ensure that investments in high-speed broadband communications are not exceeding the budget estimates of the municipalities in road maintenance, underground construction companies mainly use horizontal drills. AT-Boretac from Schmallenberg is one of the leading manufacturers of these mobile machines in Europe. In the current series, the Sauerland company is relying on automated feeding of drill pipes from a magazine. Wachendorff Automation has designed the robust encoder for positioning the gripper unit in a manner suitable for use on the construction site.

Distances of up to 500 metres are not uncommon with the so-called horizontal flush drilling method. Especially in light soils, pipes and lines can be laid in the ground quickly and effectively with horizontal directional drilling. Whether wastewater or glass fiber: Horizontal drilling technology has established itself in Germany over the past 20 years and is used especially for sealed surface environments. Powerdrill for soils and Rockdrill for rocks are the names of the two machine series from the Sauerland. They are scaled in their performance to provide ideal working conditions for different pipe diameters, distances and radii.

Lay cables faster and more accurately

Back to the fiber optic expansion. Instead of digging long trenches, AT-Boretac's systems first drive the pilot sewer from one excavation pit to the next with an simultaneous drilling and flushing process. Once the operator has hit the

target, the drill head is replaced by a reamer, which in turn is connected to an empty pipe. When pulling back, the reamer expands the drilling section and simultaneously pulls in the pipe. These two work steps are usually sufficient for laying fiber optic cables. If pipes with larger cross-sections have to be laid, the second work step must be repeated and the drill channel enlarged in stages. For this purpose, various reamers with increasing drill diameters are then used. The general procedure remains the same - also with regard to the use of an emulsion of water and Betonite. The natural aggregate in the water lubricates the drill head, ensures that the removal of sediment can flow out of the bore channel and stabilizes the wall of the bore. The clay-based fluid is prepared on site in the mixing station on a truck and then pumped through the drill pipe to the drill head by a high-pressure pump on board the drill rig. Here the Betonite emerges through nozzles.

Automatic reloading of drill pipes

The pipe sections that the self-propelled drilling rigs carry in a magazine are between three to four and a half meters long. Depending on the model, 40 to 70 drill pipes can be stored - and these are automatically removed by a hydraulically driven removal unit and bolted to the drill pipe. Longer pipe sections are recommended for long distances, as the drilling process does not have to be interrupted as often. When the drill pipe is extended, a gripper unit removes a pipe from the magazine, which is then bolted to the drill pipe in the ground by the drilling carriage.

In previous machine generations, the operator had to manually unlock one magazine row after the other. In the current Powerdrill series, however, the row can be conveniently pre-selected via a touch display in the machine cabin. Removal then takes place automatically. To ensure that the gripper unit knows how far it has to travel, a multiturn encoder from Wachendorff Automation passes on the necessary posi-

on data to the controller via electrically isolated CANopen communication. The robust encoder operates magnetically and is parameterised for a resolution of 18 bits in multiturn operation. The WDGA multiturn encoders in protection class IP67 can operate with up to 43 bit resolution, in singleturn operation with up to 16 bit.

For use in horizontal drills, the shock and vibration-resistant encoders are equipped with special bearings. They can support loads of 120 N axially and 220 N radially. Optionally, radial and axial bearing loads of up to 500 N each are also possible. In order not to transfer unnecessary forces to the sensor's axis of rotation, the AT-Borettec encoder is effectively mechanically decoupled by a spring-toothed wheel construction. With a view to operational safety and fast diagnosis in case of error, a status LED is also integrated in the encoder housing. The encoder used at AT-Borettec has two M12 connectors installed and can therefore be integrated into the CAN-BUS in a flexible, economical and mechanically robust way. Additional adapters are not required. The necessary bus termination can also be integrated into the encoder if required.

Robust technology is requested

This equipment is necessary to ensure the operational reliability and long service life of the encoder in this extremely demanding application. „Construction site environments are one of the worst things that can happen to a sensor - even in such an exposed position“ says Benjamin Ochsendorf, sales engineer at Wachendorff. The Wachendorff encoder is freely mounted under the pipe magazine and is directly exposed to the mud and moisture. For this reason AT-Borettec was looking for an extremely robust technology when selecting the sensor.

Maximum comfort for the operator and a machine that has a decent performance when drilling - this allows you to cover distance and make money: This is how the advantages of the current machine series can be summarized. The success of AT-Borettec is based on the good mix of features. In addition

to efficient technology, the demand for ergonomics and comfort is also high in Central Europe. A Bluetooth interface in the operator's cab is therefore just as much in demand as a heating system for the cold season and air conditioning in summer. Automatic loading of the drill pipe also makes life easier for the operator, as he can remain seated in the cab and remains dry in bad weather.

Conclusion

Thanks to the robust design of the sensor, it is possible for AT-Borettec to use the multiturn encoder for the positioning system without further enclosures in construction machines. The high degree of protection, coupled with constructive modifications, ensures that even sludge and drilling fluids do not impair the reliable functioning of the unit.

Absolute encoders WDGA from Wachendorff ... highly precise and highly dynamic, robust

With their patented EnDra® and QuattroMag® technologies, the single and multiturn absolute encoders of the WDGA series from Wachendorff have new, outstanding features:

- Wear-free, since no gearbox and designed for the highest bearing loads
- Environmentally friendly and maintenance-free, as no (buffer) battery
- High energy efficiency due to low power consumption
- Space-saving design
- Highest accuracy and dynamics

More details under

www.wachendorff-automation.com/wdga



WA2001_0

AT-Borettec has designed the horizontal boring machines as self-sufficient solutions. The supply with rinsing water and the treatment of the drilling mud is done by the recycling station on the truck.



WA2001_1
Horizontal drills from AT-Boretec are currently requested as machines for laying fiber optic cables in the course of broadband expansion. An absolute CANopen encoder from Wachendorff, among other sensors, ensures fast and accurate drilling as well as the automated reloading of the drill pipes.



WA2001_2
Instead of digging long trenches, AT-Boretec's systems first drive the pilot duct from one excavation pit to the next by drilling and flushing at the same time. An absolute CANopen encoder from Wachendorff ensures that the drill pipes are automatically fed in. The highest degree of robustness is required under such environmental conditions.



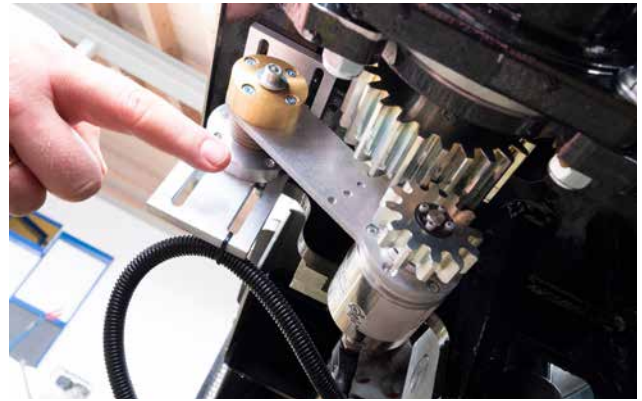
WA2001_3

The machine operator no longer needs to leave his cabin to change the drill pipes.



WA2001_4

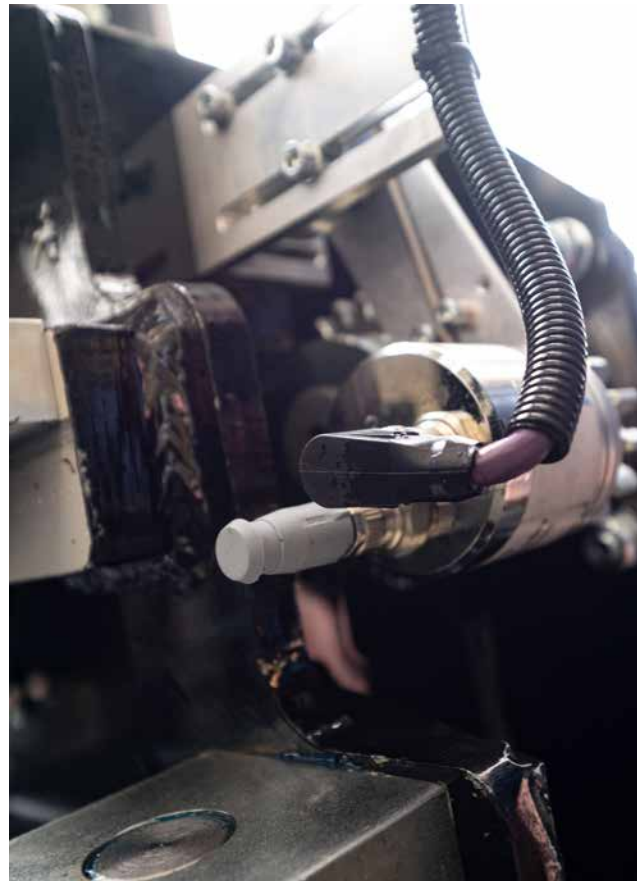
The absolute CANopen encoder WDGA from Wachendorff is installed without any further protective enclosure. The shock and vibration-resistant sensor has been fitted with specially adapted bearings for this application. The CANopen encoder from Wachendorff provides the controller with the necessary data for positioning the removal unit of the drill pipe.



WA2001_5

A spring-toothed wheel design from Wachendorff mechanically decouples the encoder and thus reduces unwanted forces on the sensor axis.

The CANopen encoder from Wachendorff provides the control system with the necessary data for positioning the removal unit.



WA2001_6

The encoder used at AT-Boretec has two M12 connectors installed and can therefore be integrated flexibly, economically and mechanically robustly into the CAN-BUS. Additional adapters are not required. The necessary bus termination can also be integrated into the encoder if required. The encoder is designed in protection class IP67.



Encoder

WA2001_7

A status LED is integrated in the encoder housing to ensure operational reliability and rapid diagnosis in the event of an error. The CANopen encoder from Wachendorff provides the control system with the necessary data for positioning the removal unit for the drill pipes.

Any Questions? Just call +49 (0) 67 22 / 99 65-414 send us an E-mail at support-wdga@wachendorff.de or call your local distributor: www.wachendorff-automation.com/distri



Wachendorff Automation GmbH & Co. KG
Industriestrasse 7 • D-65366 Geisenheim

Tel.: +49 (0) 67 22 / 99 65 - 25
Fax: +49 (0) 67 22 / 99 65 - 70
E-Mail: wdg@wachendorff.de
www.wachendorff-automation.com



Your distributor: