Horizontal drilling systems

Horizontal drilling systems

In the pipe-drilling process, pipes are jacked underground at the same time as soil cutting (face of heading) and soil removal by the auger to the launch pit. The pipe-drilling technique is an economical alternative to open trenches, if building supply and disposal lines have to be laid or small sewers have to be constructed in built-up areas.

The trenchless method prevents ground vibrations and deformations being transmitted to the surrounding soil and to the surface. It is ideal if roads, cycle tracks, pavements, gardens or rails have to be crossed. There are no problems with traffic holdups, noise or emissions from construction machinery. No dependence on the weather. No damage to pipes encountered on route because the mole can be accurately aimed past existing lines.

Compared to open trenches, there are considerable savings on excavator, loader, truck and labour input. No costs arise for the purchase and installation of soil replacement materials such as sand and gravel and for the repair and restoration of the surface.

Horizontal drilling systems

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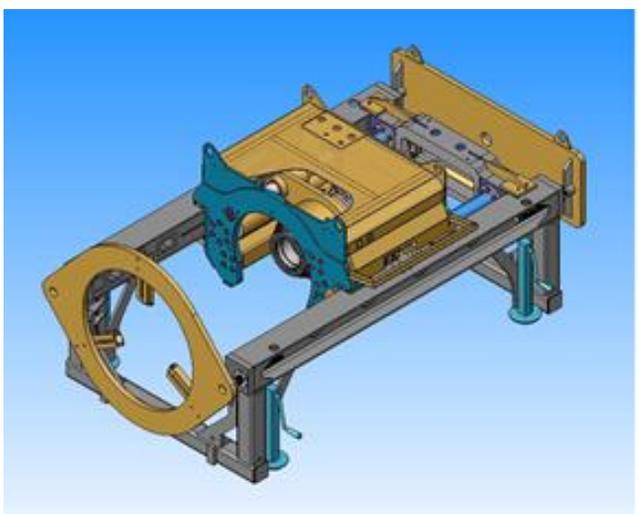


Horizontal drilling systems

Technical Data

Pipe-drilling system	BPU 200	BPU 400	BPU 800	BPU 1200	BPU 1600
Thrust	200 kN	420 kN	1.320 kN	2.400 kN	4.000 kN
Pull-back force	135 kN	252 kN	792 kN	1.440 kN	2.400 kN
Working pressure	315 bar	315 bar	315 bar	315 bar	315 bar
Torque	4.700 Nm	11.600 Nm	27.000 Nm	46.000 Nm	98.000 Nm
Length basic unit	1,9 m	2,5 m	3,1 m	5,9 m	6,1 m
Width basic unit	0,9 m	1,2 m	1,8 m	2,1 m	2,4 m
Weight	700 kg	1.200 kg	3.100 kg	6.900 kg	7.800 kg
Pit length (pipe length 1 m)	2,0 m	2,6 m	3,2 m	6,0 m	6,2 m
Pit length (pipe length 3 m)	4,0 m	4,6 m	5,2 m	6,2 m	6,4 m

Achievable jacking length

Pipe-drilling system	Bore diameter (for steel casings)	Section lengths	Achievable jacking length (dependent on soil):
BPU 200	139 mm to 324 mm	short version 0,5 m; standard version 1 m	Ø 139 mm up to 40 m; Ø 324 mm up to 23 m
BPU 400	168 mm to 406 mm; up to 508 mm from 2 m section length	1 m; with extension frame up to 6 m	Ø 168 mm up to 50 m; Ø 508 mm up to 30 m
BPU 800	406 mm to 813 mm; at 1 m section length 609 mm and 813 mm from 3 m section length	1 m; with extension frame up to 6 m	Ø 323 mm up to 100 m; Ø 813 mm up to 80 m
BPU 1200	609 mm to 1220 mm	3 m / 6m; with extension frame up to 12 m	Ø 609 mm up to 100 m; Ø 1220 mm up to 80 m
BPU 1600	609 mm; up to 1620 mm at 3 m section length	3 m / 6 m; with extension frame up to 12 m	Ø 609 mm up to 120 m; Ø 1620 mm up to 80 m

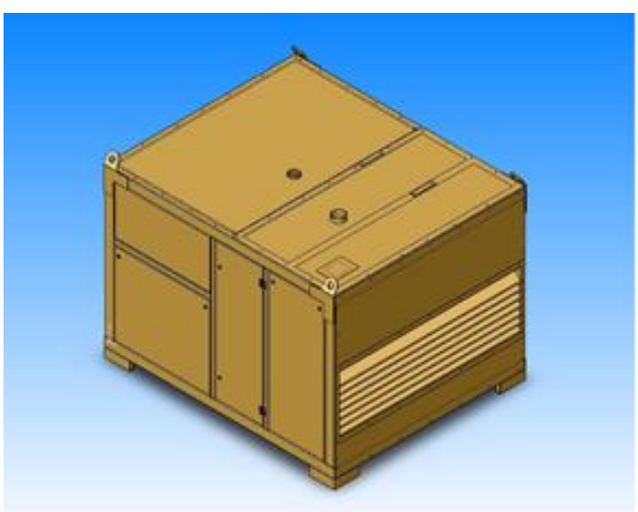
Horizontal drilling systems

Samples of installation

Pipe-drilling system	BPU 200	BPU 400	BPU 800	BPU 1200	BPU 1600
Hydraulic power pack	HA 200	HA 400	HA 800	HA 1200	HA 1600
Auger-boring system (Steel pipes)	DN 150 - 300	DN 200 - 500	DN 300 - 1000	DN 600 - 1400	DN 800 - 1800
Auger-boring system (Jacking pipes)	DN 150 - 250	DN 200 - 400	DN 250 - 400		
Controlled pilot system	-	X	X	X	X
Hammer drilling (Steel pipes)	DN 150 - 300	DN 150 - 400	-	-	-
Guided auger bore (Steel pipes)	-	-	DN 600 - 1000	DN 500 - 1400	DN 800 - 1800
Conical System (Jacking pipes)	-	-	DN 500 - 800	DN 500 - 1000	DN 500 - 1400
Pipe steering (RVM) (Jacking pipes)	-	-	DN 300 - 600	DN 300 - 1000	DN 500 - 1400

This table shows the various possible applications and combinations.
"Steel casings" are protective steel tubes. The "product pipes", on the other hand, are made of such pipe materials as stoneware, reinforced concrete, PP, PVC and GRP.

Hydraulic power packs



Hydraulic power packs

Each pipe-drilling system has its own special hydraulic power pack. This ensures the optimum function of the various boring systems. The standard load sensing control reduces wear in all motors and pumps. Its task is to coordinate the demanded performance data during pipe ramming.

All units are within the legally demanded noise level and can thus be used without hesitation in inner-city areas. The oil tanks and their cooling systems are designed for high external temperatures so that work can proceed at all times with the optimum oil temperature and the associated viscosity.

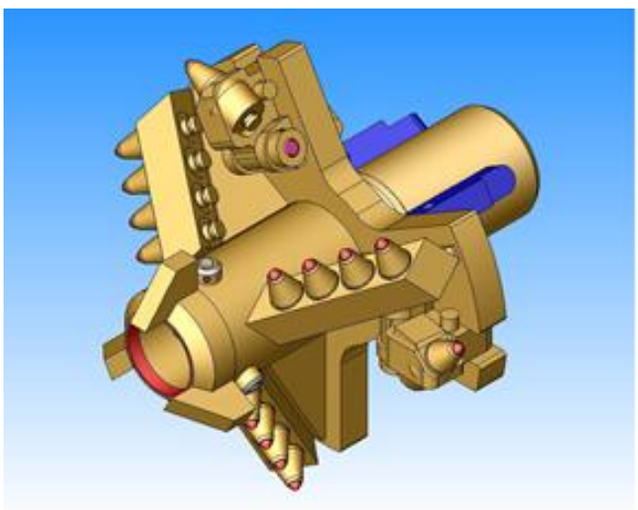
The integrated diagnosis / indication system monitors such functions as oil level / temperature, cooling water level / temperature, electronics and malfunctions. Thanks to visual indications, malfunctions can be quickly localized as they occur.

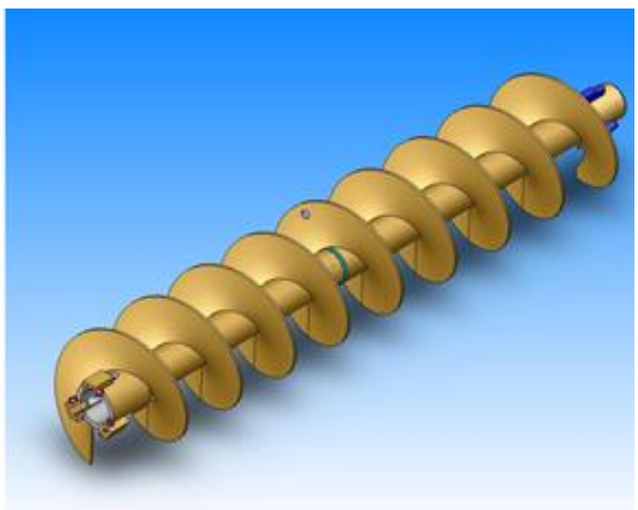
Horizontal drilling systems

Hydraulic power packs

Hydraulic power pack	HA 200	HA 400	HA 800	HA 1200	HA 1600
Pipe-drilling system	BPU 200	BPU 400	BPU 800	BPU 1200	BPU 1600
Output	20 kW	38 kW	73 kW	164 kW	203 kW
Working pressure	315 bar	315 bar	315 bar	315 bar	315 bar
Feed volume	48 Ltr.	110 Ltr.	207 Ltr.	281 Ltr.	350 Ltr.
Control	Load Sensing	Load Sensing	Load Sensing	Load Sensing	Load Sensing
Oil tank	120 Ltr.	300 Ltr.	600 Ltr.	700 Ltr.	800 Ltr.
Diesel tank	71 Ltr.	100 Ltr.	140 Ltr.	140 Ltr.	300 Ltr.
Dimensions (L / W / D in m)	1,8 / 1,0 / 1,3	1,5 / 2,4 / 2,4	2,0 / 2,4 / 2,4	2,0 / 2,4 / 2,4	2,4 / 2,4 / 2,4
Weight	1,2 t	2,2 t	3,4 t	4,2 t	5,2 t

Guided auger bore (HBS)



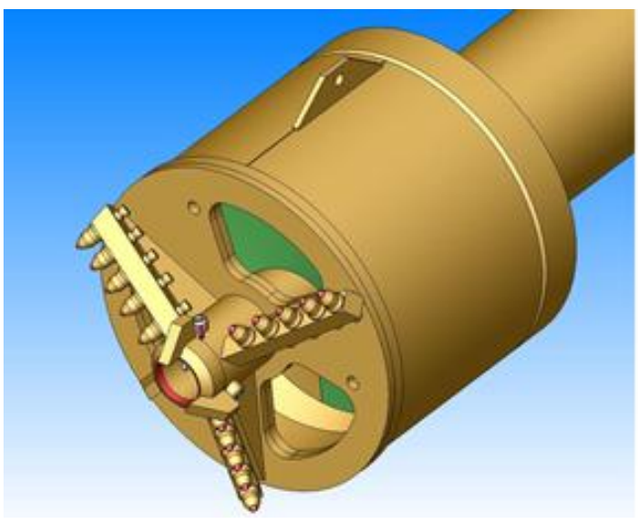


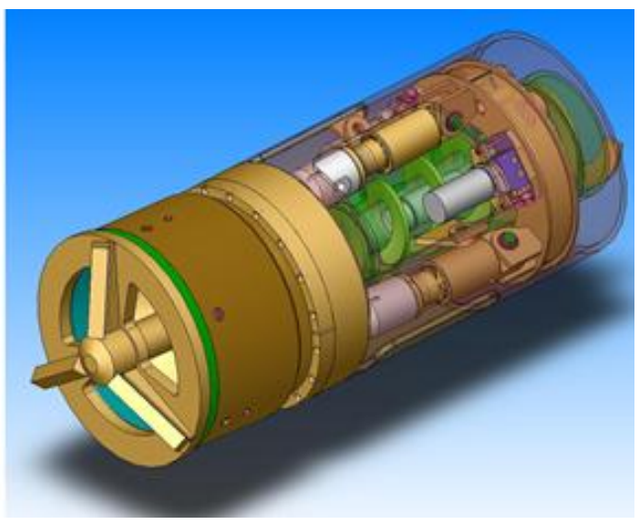
Guided auger bore (HBS)

During guided pipe-drilling with diameters exceeding DN 400, problems may arise with the pressure bearing or widening stage. This can be due to excessive thrust on the pilot rods, constraining forces or uneven ground during driving.
With the hollow auger control from E+S, a guided pilot borehole is also drilled in the ground. However, to install the pipes, the bore head is not forcibly connected to the pilot rods but guided along the pilot tube. This means that the bore head, auger and product pipe overbore the pilot. The pressure bearing and widening stages can thus be omitted. No thrust is required to push the pilot into the reception pit for recovery. This process can be used for guided blind bore holes.

Horizontal drilling systems

Microtunnelling





Microtunnelling

The E+S microtunneling system is a method with auger feed. With this method, pipe driving and guidance take place simultaneously. Guidance is performed by a guide head with the aid of hydraulic cylinders. The soil is cut with a scraping wheel and conveyed by the auger along feed tubes within the product pipe.

In the bore head there is an illuminated target which is continuously monitored by means of a CCD camera. All driving-related information is digitally evaluated, indicated and recorded. Because the product pipe can be lubricated with bentonite during pipe driving, longer boring distances are possible.

HDD - Horizontal Directional Drilling

HDD - Horizontal Directional Drilling

Horizontal drilling systems

By supplementing the pipe-drilling systems from E+S with a measuring system, a mixing and pumping system and the requisite accessories, all pipe-drilling systems from E+S can be re-equipped for horizontal directional drilling (HDD).

The smallest boring system has a torque of 2300 Nm with a pulling force of 8 t. The pit only has to be 1.8 m long and about 1.2 m wide for a rod length of 1 m.