

EN

CFA drilling tools

LIEBHERR

Deep foundation



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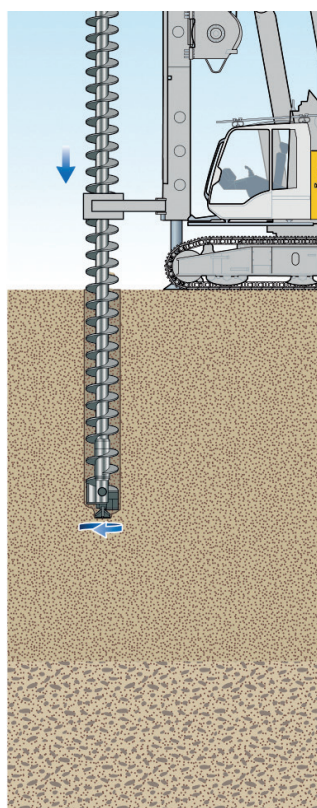
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Continuous flight auger drilling method

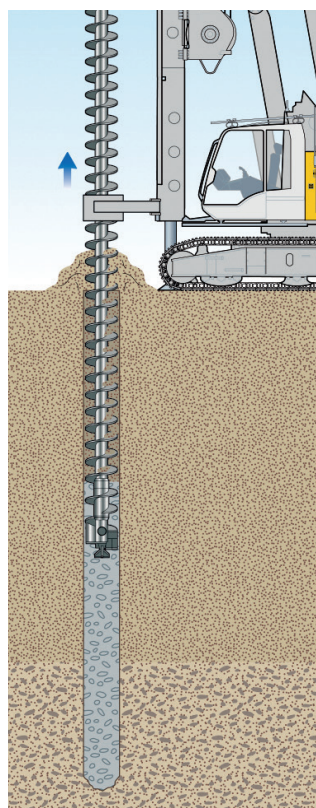
Continuous flight auger drilling is a dry rotary drilling method used to install bored piles. In the process, the continuous flight auger is drilled down to the required final depth in one continuous working step. During drilling, the auger is held in position by a guide (auger cleaner) installed on the leader.

When the final depth is reached, concrete is pumped in through an internal pipe in the auger's hollow stem. At the same time the drilling auger is extracted from the borehole. During the process, an auger cleaner removes the borehole cuttings from the auger. Subsequently, a reinforcement can be installed in the fresh concrete.

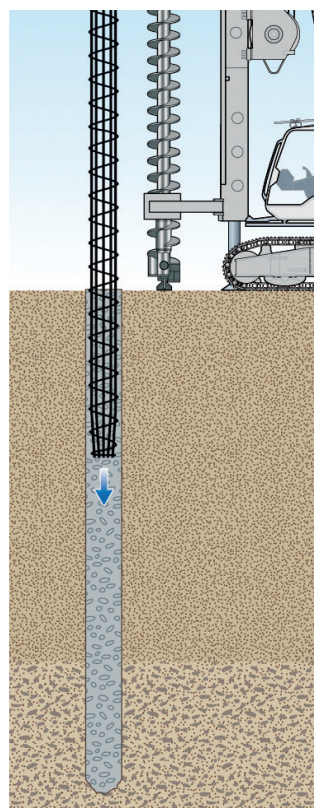
With certain limitations, continuous flight auger drilling is applicable and/or is approved for all types of soil.



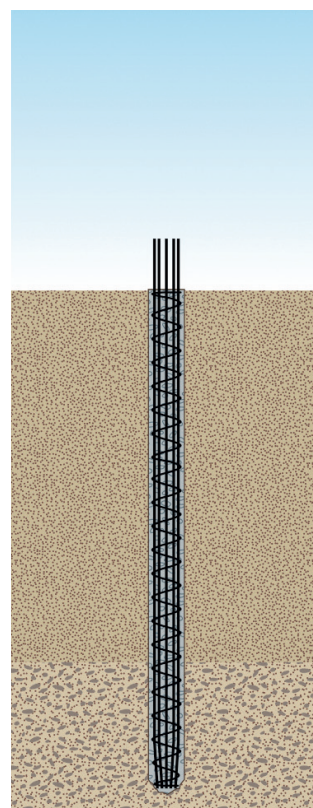
Drilling the auger down to the final depth



Extracting the auger while pumping concrete



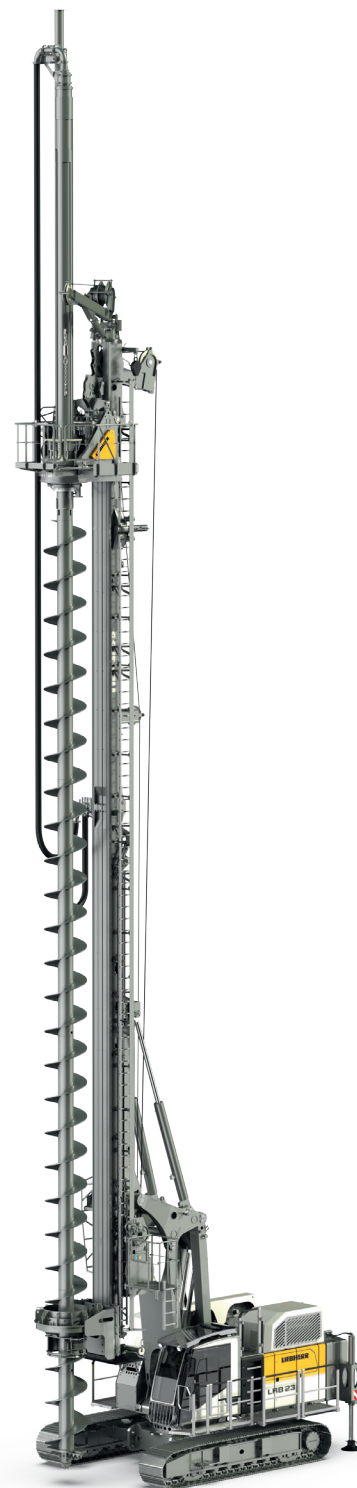
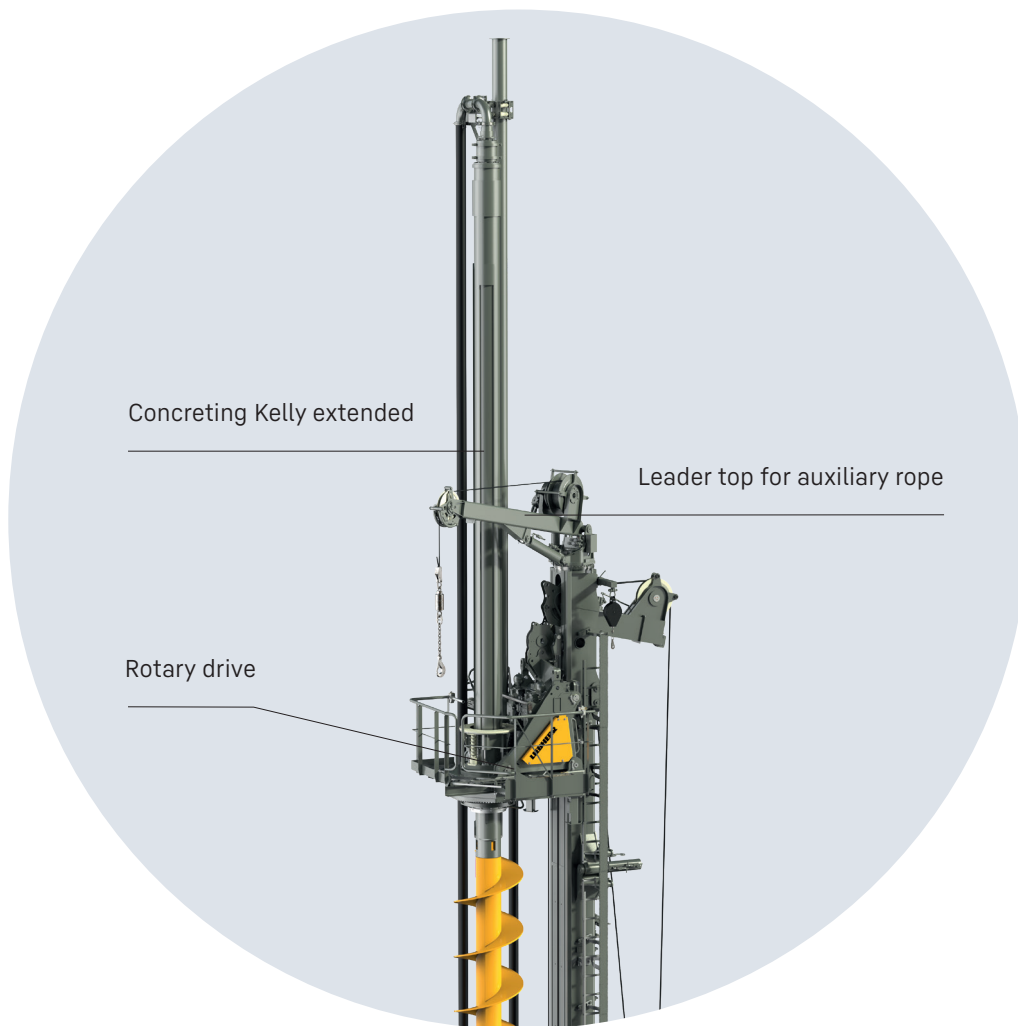
Inserting or vibrating in reinforcement



Completed pile

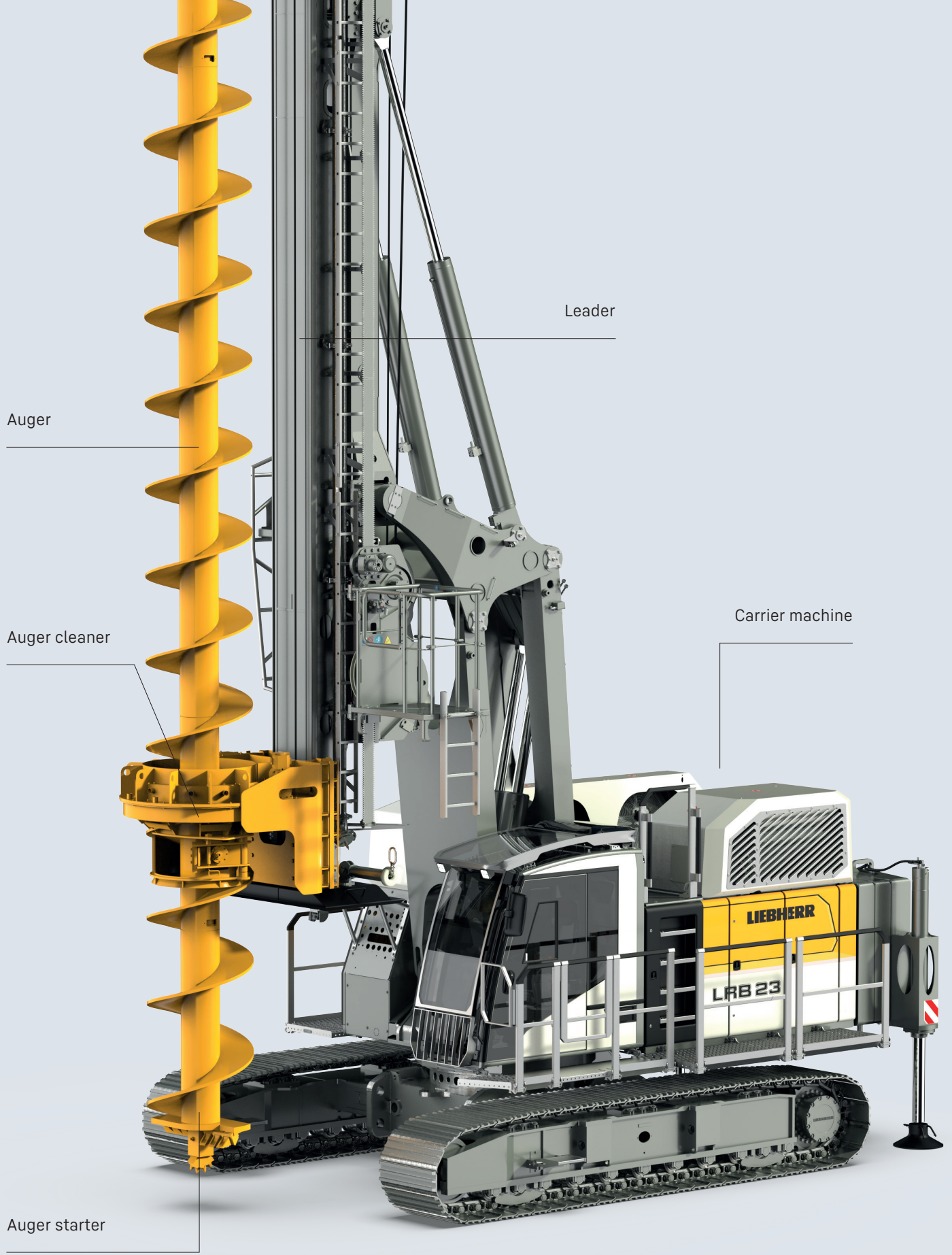
Continuous flight auger drilling equipment

In combination with Liebherr LB and LRB machines and Liebherr concrete pumps, high drilling performances are achieved in continuous flight auger drilling. In conjunction with an extended concreting Kelly, and depending on the size of the machine and the diameter of the continuous flight auger, a drilling depth of more than 30 metres can be achieved.



Continuous flight auger drilling equipment generally consists of the following components:

- Continuous flight auger starter
- Continuous flight auger extensions (different lengths)
- Concreting Kelly or concreting Kelly extended
- Adaptor for drilling drive
- Auger cleaner with adapter suited to the auger diameter used



Auger

Leader

Auger cleaner

Carrier machine

Auger starter

Concreting Kellys

A concreting Kelly is required to drive continuous flight auger drilling equipment. It is installed in the rotary drive and transfers torque and crowd force to the drilling equipment. The concreting Kelly is fitted with a connector on the lower end and connections for a top swivel are fitted on the upper end. Concreting Kellys do not increase the drilling depth of the drilling equipment.



Concreting Kellys

Type	Ø Pipe mm	Connectors	Weight kg	Machine		
CK Ø 219	219	8kt SW 175 pin*	300			LRB 16 LRB 18
CK Ø 254	254	8kt SW 175 sleeve	570	LB 16-180 LB 20-240 LB 24-270	LB 20.1 LB 25 LB 30	LRB 23
CK Ø 368	368	8kt SW 250 sleeve	905	LB 28-320 LB 36-410 LB 44-510**	LB 35 LB 45 LB 55**	LRB 355 LRB 355.1

* When using the CK Ø 219, an adapter (double adapter) is required, octagonal, wrench width 175 mm.

** LB 44-510 and LB 55 with drive bar 559: only possible with extension (approx. 1000 mm)

Concreting Kellys extended

These extended concreting Kellys increase the maximum achievable drilling depth for continuous flight auger drilling with the Liebherr LB and LRB series of machines.

By using smaller casing diameters with extended concreting Kellys, contact between the concreting Kelly and borehole wall can be avoided when drilling boreholes with small diameters.



Concreting Kellys extended

Type	Ø Pipe mm	Effective length mm	Connectors	Weight kg	Machine		
CK-EX Ø 219 x 4000	219	4000	8kt SW 175 pin*	1210			LRB 16 LRB 18
CK-EX Ø 254 x 6000	254	6000	8kt SW 175 sleeve	1690	LB 16-180 LB 20-240	LB 20.1 LB 25 LB 30	LRB 23
CK-EX Ø 254 x 8000	254	8000	8kt SW 175 sleeve	2015	LB 24-270	LB 30	
CK-EX Ø 254 x 10000	254	10000	8kt SW 175 sleeve	2300			LRB 23
CK-EX Ø 368 x 8000	368	8000	8kt SW 250 sleeve	3075	LB 28-320 LB 36-410 LB 44-510**	LB 35 LB 45 LB 55**	LRB 355
CK-EX Ø 368 x 10000	368	10000	8kt SW 250 sleeve	3930	LB 36-410 LB 44-510**	LB 45 LB 55**	LRB 355 LRB 355.1

* When using the CK-EX Ø 219, an adapter (double adapter) is required, octagonal, wrench width 175 mm.

** LB 44-510 and LB 55 with drive bar 559: only possible with extension (approx. 1000 mm)

Adapters rotary drive

An adapter is fitted in the rotary drive in order to operate a concreting Kelly or an extended concreting Kelly. This allows to work using concreting Kellys or extended concreting Kellys for casings with smaller outside diameters. Otherwise, it is possible that the gibs on the extended concreting Kelly or the concreting Kelly touch the borehole walls, which may lead to enlargement of the borehole or excessive soiling of the concreting Kelly.



Adapters rotary drive

Reduction	Machine			
Ø 368 mm to Ø 254 mm	LB 16-180 LB 20-240	LB 20.1 LB 25		
Ø 419 mm to Ø 254 mm	LB 24-270	LB 30	LRB 23	
Ø 419 mm to Ø 368 mm	LB 28-320	LB 35		
Ø 470 mm to Ø 368 mm	LB 36-410 LB 44-510	LB 45 LB 55	LRB 355	LRB 355.1
Ø 559 mm to Ø 368 mm	LB 44-510	LB 55		

Connectors

The couplings on continuous flight auger extensions, starters, concreting Kellys, and extended concreting Kellys are octagonal connectors (pin and sleeve) which are manufactured with utmost precision from high-strength, tough, durable tempered steel. These connectors transfer all torques, pull and bending forces that occur during the drilling process. Multiple locks between pin and sleeve also ensure the transmission of high pull forces. Since the outside diameters of the connector and the hollow stem of the tools/components are the same, there is no narrowing of the cross-section in the flight. This ensures optimum material flow. The seal between pin and sleeve prevents water from entering the tremie pipe and, likewise, concrete leaking from the connector.



Octagonal - wrench width 175 mm

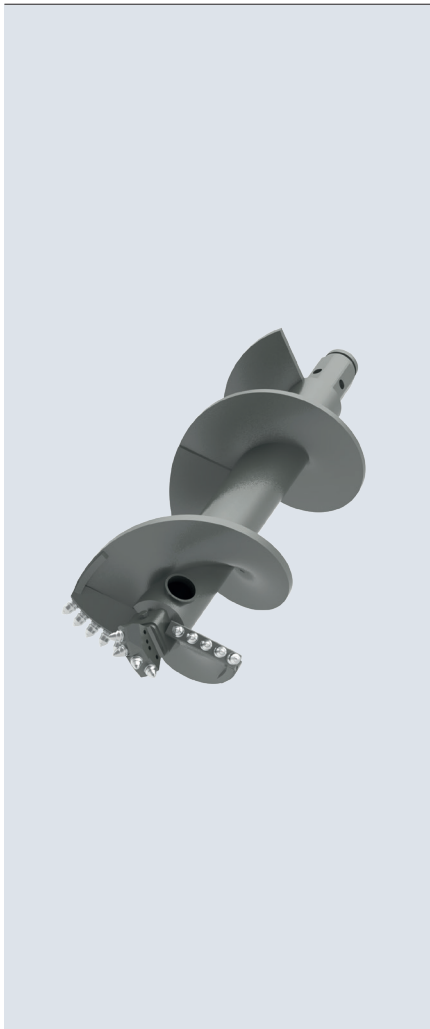
Outside diameter of hollow stem	254 mm
Inside diameter of tremie pipe	125 mm

Octagonal - wrench width 250 mm

Outside diameter of hollow stem	355 mm
Inside diameter of tremie pipe	125 mm

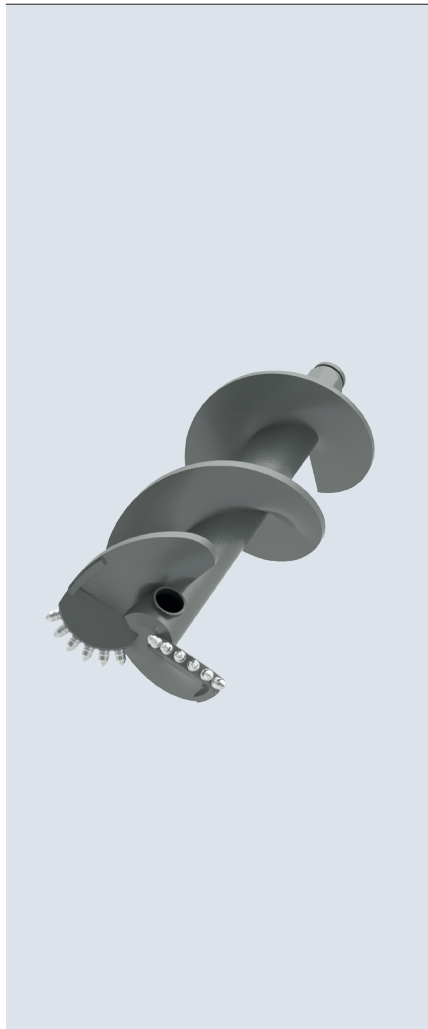
Continuous flight auger starters

During the drilling process, the auger starter at the bottom end of the drilling equipment loosens the soil or rock and conveys it via the flight. The flight auger starters are available in various designs and with different teeth and bits. Therefore, the drilling equipment can be optimised to suit the prevailing soil conditions. The double-start versions support thereby the straight course of the borehole. In the lower section, the flights are made of double thickness material and the cutting bars and flights are provided with wear protection. A lost plastic cover closes the concreting opening behind the main cutter bar during the drilling process.



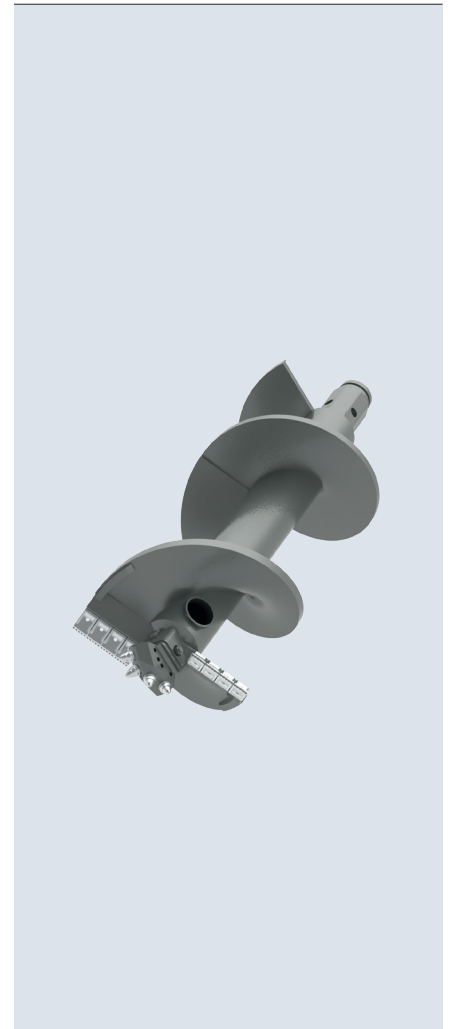
Model CFA-AU-RSC2

Double-start auger starter with round shank chisels, calibrating cutters positioned opposite each other, and pilot bit, used in densely and very densely compacted sand and gravel, as well as rock.



Model CFA-AU-RSC2i

Double-start auger starter with round shank chisels, calibrating cutters positioned opposite each other, without pilot bit, used in densely and very densely compacted sand and gravel, as well as fissured rock.



Model CFA-AU-FC2

Double-start auger starter with flat teeth and pilot bit, used in soft to stiff cohesive soils, mainly in loamy and clayey soils.

Continuous flight auger extensions

Diverse continuous flight auger extensions make it possible to produce the maximum possible tool length for each machine. These are available with effective lengths of 1000 mm, 2000 mm, 3000 mm, 5000 mm and 10 000 mm. The loosened soil fills the flight of the auger extension and so prevents heave during drilling. The outside diameter of the hollow stem and connector are the same. This means there is no narrowing of the cross-section in the flight and optimum material flow is achieved. The outer edge of the flight is provided with wear protection.



Drilling equipment with octagonal connector

Wrench width 175 mm

Technical data

Octagonal - wrench width 175 mm	
Outside diameter of hollow stem	254 mm
Inside diameter of tremie pipe	125 mm

Continuous flight auger extensions and starters

Ø 450 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 450x 1000/8kt 175	1000	1352	289	350
CFA-AU-EX Ø 450x 2000/8kt 175	2000	2352	512	350
CFA-AU-EX Ø 450x 3000/8kt 175	3000	3352	736	350
CFA-AU-EX Ø 450x 5000/8kt 175	5000	5352	1182	350
CFA-AU-EX Ø 450x10000/8kt 175	10000	10352	2299	350
Starters				
CFA-AU-RSC 2	2000	2600	570	700*/350
CCFA-AU-RSC 2i	2000	2352	535	700*/350
CFA-AU-FC 2	2000	2600	570	700*/350

Ø 500 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 500x 1000/8kt 175	1000	1352	306	350
CFA-AU-EX Ø 500x 2000/8kt 175	2000	2352	546	350
CFA-AU-EX Ø 500x 3000/8kt 175	3000	3352	786	350
CFA-AU-EX Ø 500x 5000/8kt 175	5000	5352	1266	350
CFA-AU-EX Ø 500x10000/8kt 175	10000	10352	2466	350
Starters				
CFA-AU-RSC 2	2000	2600	615	700*/350
CCFA-AU-RSC 2i	2000	2352	580	700*/350
CFA-AU-FC 2	2000	2600	615	700*/350

Ø 600 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 600x 1000/8kt 175	1000	1352	321	450
CFA-AU-EX Ø 600x 2000/8kt 175	2000	2352	577	450
CFA-AU-EX Ø 600x 3000/8kt 175	3000	3352	833	450
CFA-AU-EX Ø 600x 5000/8kt 175	5000	5352	1344	450
CFA-AU-EX Ø 600x10000/8kt 175	10000	10352	2623	450
Starters				
CFA-AU-RSC 2	2000	2600	675	900*/450
CCFA-AU-RSC 2i	2000	2352	640	900*/450
CFA-AU-FC 2	2000	2600	675	900*/450

Ø 650 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 650x 1000/8kt 175	1000	1352	329	500
CFA-AU-EX Ø 650x 2000/8kt 175	2000	2352	592	500
CFA-AU-EX Ø 650x 3000/8kt 175	3000	3352	855	500
CFA-AU-EX Ø 650x 5000/8kt 175	5000	5352	1381	500
CFA-AU-EX Ø 650x10000/8kt 175	10000	10352	2696	500
Starters				
CFA-AU-RSC 2	2000	2600	720	1000*/500
CCFA-AU-RSC 2i	2000	2352	685	1000*/500
CFA-AU-FC 2	2000	2600	720	1000*/500

* for double starter

Ø 700 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 700x 1000/8kt 175	1000	1352	345	500
CFA-AU-EX Ø 700x 2000/8kt 175	2000	2352	625	500
CFA-AU-EX Ø 700x 3000/8kt 175	3000	3352	905	500
CFA-AU-EX Ø 700x 5000/8kt 175	5000	5352	1464	500
CFA-AU-EX Ø 700x10000/8kt 175	10000	10352	2862	500

Starters

CFA-AU-RSC 2	2000	2600	785	1000*/500
CCFA-AU-RSC 2i	2000	2352	750	1000*/500
CFA-AU-FC 2	2000	2600	785	1000*/500

Ø 750 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 750x 1000/8kt 175	1000	1352	352	550
CFA-AU-EX Ø 750x 2000/8kt 175	2000	2352	638	550
CFA-AU-EX Ø 750x 3000/8kt 175	3000	3352	925	550
CFA-AU-EX Ø 750x 5000/8kt 175	5000	5352	1497	550
CFA-AU-EX Ø 750x10000/8kt 175	10000	10352	2929	550

Starters

CFA-AU-RSC 2	2000	2600	840	1000*/550
CCFA-AU-RSC 2i	2000	2352	810	1000*/550
CFA-AU-FC 2	2000	2600	840	1000*/550

Ø 800 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 800x 1000/8kt 175	1000	1352	359	600
CFA-AU-EX Ø 800x 2000/8kt 175	2000	2352	652	600
CFA-AU-EX Ø 800x 3000/8kt 175	3000	3352	945	600
CFA-AU-EX Ø 800x 5000/8kt 175	5000	5352	1531	600
CFA-AU-EX Ø 800x10000/8kt 175	10000	10352	2996	600

Starters

CFA-AU-RSC 2	2000	2600	905	1200*/600
CCFA-AU-RSC 2i	2000	2352	870	1200*/600
CFA-AU-FC 2	2000	2600	905	1200*/600

Ø 900 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 900x 1000/8kt 175	1000	1352	382	650
CFA-AU-EX Ø 900x 2000/8kt 175	2000	2352	698	650
CFA-AU-EX Ø 900x 3000/8kt 175	3000	3352	1014	650
CFA-AU-EX Ø 900x 5000/8kt 175	5000	5352	1646	650
CFA-AU-EX Ø 900x10000/8kt 175	10000	10352	3227	650

Starters

CFA-AU-RSC 2	2000	2600	1025	1300*/650
CCFA-AU-RSC 2i	2000	2352	990	1300*/650
CFA-AU-FC 2	2000	2600	1025	1300*/650

Ø 1000 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 1000x 1000/8kt 175	1000	1352	394	750
CFA-AU-EX Ø 1000x 2000/8kt 175	2000	2352	723	750
CFA-AU-EX Ø 1000x 3000/8kt 175	3000	3352	1051	750
CFA-AU-EX Ø 1000x 5000/8kt 175	5000	5352	1708	750
CFA-AU-EX Ø 1000x10000/8kt 175	10000	10352	3351	750

Starters

CFA-AU-RSC 2	2000	2600	1150	1500*/750
CCFA-AU-RSC 2i	2000	2352	1115	1500*/750
CFA-AU-FC 2	2000	2600	1150	1500*/750

* for double starter

Drilling equipment with octagonal connector

Wrench width 250 mm

Technical data

Octagonal - wrench width 250 mm	
Outside diameter of hollow stem	355 mm
Inside diameter of tremie pipe	125 mm

Continuous flight auger extensions and starters

Ø 550 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 550x 1000/8kt 250	1000	1480	618	400
CFA-AU-EX Ø 550x 2000/8kt 250	2000	2480	871	400
CFA-AU-EX Ø 550x 3000/8kt 250	3000	3480	1124	400
CFA-AU-EX Ø 550x 5000/8kt 250	5000	5480	1631	400
CFA-AU-EX Ø 550x10000/8kt 250	10000	10480	2897	400
Starters				
CFA-AU-RSC 2	2000	2730	950	800*/400
CCFA-AU-RSC 2i	2000	2480	915	800*/400
CFA-AU-FC 2	2000	2730	950	800*/400

Ø 600 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 600x 1000/8kt 250	1000	1480	306	450
CFA-AU-EX Ø 600x 2000/8kt 250	2000	2480	546	450
CFA-AU-EX Ø 600x 3000/8kt 250	3000	3480	786	450
CFA-AU-EX Ø 600x 5000/8kt 250	5000	5480	1266	450
CFA-AU-EX Ø 600x10000/8kt 250	10000	10480	2466	450
Starters				
CFA-AU-RSC 2	2000	2730	983	900*/450
CCFA-AU-RSC 2i	2000	2480	948	900*/450
CFA-AU-FC 2	2000	2730	983	900*/450

Ø 650 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 650x 1000/8kt 250	1000	1480	637	500
CFA-AU-EX Ø 650x 2000/8kt 250	2000	2480	909	500
CFA-AU-EX Ø 650x 3000/8kt 250	3000	3480	1181	500
CFA-AU-EX Ø 650x 5000/8kt 250	5000	5480	1724	500
CFA-AU-EX Ø 650x10000/8kt 250	10000	10480	3084	500
Starters				
CFA-AU-RSC 2	2000	2730	980	1000*/500
CCFA-AU-RSC 2i	2000	2480	982	1000*/500
CFA-AU-FC 2	2000	2730	1017	1000*/500

Ø 700 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 700x 1000/8kt 250	1000	1352	676	500
CFA-AU-EX Ø 700x 2000/8kt 250	2000	2352	987	500
CFA-AU-EX Ø 700x 3000/8kt 250	3000	3352	1298	500
CFA-AU-EX Ø 700x 5000/8kt 250	5000	5352	1920	500
CFA-AU-EX Ø 700x10000/8kt 250	10000	10352	3475	500
Starters				
CFA-AU-RSC 2	2000	2600	1112	1000*/500
CCFA-AU-RSC 2i	2000	2352	1077	1000*/500
CFA-AU-FC 2	2000	2600	1112	1000*/500

* for double starter

Ø 750 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 750x 1000/8kt 250	1000	1480	345	550
CFA-AU-EX Ø 750x 2000/8kt 250	2000	2480	625	550
CFA-AU-EX Ø 750x 3000/8kt 250	3000	3480	905	550
CFA-AU-EX Ø 750x 5000/8kt 250	5000	5480	1464	550
CFA-AU-EX Ø 750x10000/8kt 250	10000	10480	2862	550

Starters

CFA-AU-RSC 2	2000	2730	1150	1100*/550
CCFA-AU-RSC 2i	2000	2480	1115	1100*/550
CFA-AU-FC 2	2000	2730	1150	1100*/550

Ø 800 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 800x 1000/8kt 250	1000	1480	696	600
CFA-AU-EX Ø 800x 2000/8kt 250	2000	2480	1027	600
CFA-AU-EX Ø 800x 3000/8kt 250	3000	3480	1357	600
CFA-AU-EX Ø 800x 5000/8kt 250	5000	5480	2019	600
CFA-AU-EX Ø 800x10000/8kt 250	10000	10480	3673	600

Starters

CFA-AU-RSC 2	2000	2730	1188	1200*/600
CCFA-AU-RSC 2i	2000	2480	1153	1200*/600
CFA-AU-FC 2	2000	2730	1188	1200*/600

Ø 900 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 900x 1000/8kt 250	1000	1480	726	650
CFA-AU-EX Ø 900x 2000/8kt 250	2000	2480	1087	650
CFA-AU-EX Ø 900x 3000/8kt 250	3000	3480	1448	650
CFA-AU-EX Ø 900x 5000/8kt 250	5000	5480	2170	650
CFA-AU-EX Ø 900x10000/8kt 250	10000	10480	3975	650

Starters

CFA-AU-RSC 2	2000	2730	1291	1300*/650
CCFA-AU-RSC 2i	2000	2480	1256	1300*/650
CFA-AU-FC 2	2000	2730	1291	1300*/650

Ø 1000 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 1000x 1000/8kt 250	1000	1480	743	750
CFA-AU-EX Ø 1000x 2000/8kt 250	2000	2480	1122	750
CFA-AU-EX Ø 1000x 3000/8kt 250	3000	3480	1500	750
CFA-AU-EX Ø 1000x 5000/8kt 250	5000	5480	2257	750
CFA-AU-EX Ø 1000x10000/8kt 250	10000	10480	4149	750

Starters

CFA-AU-RSC 2	2000	2730	1373	1500*/750
CCFA-AU-RSC 2i	2000	2480	1338	1500*/750
CFA-AU-FC 2	2000	2730	1373	1500*/750

Ø 1200 mm extensions	Effective length mm	Total length mm	Weight kg	Flight pitch mm
CFA-AU-EX Ø 1200x 1000/8kt 250	1000	1480	789	900
CFA-AU-EX Ø 1200x 2000/8kt 250	2000	2480	1213	900
CFA-AU-EX Ø 1200x 3000/8kt 250	3000	3480	1636	900
CFA-AU-EX Ø 1200x 5000/8kt 250	5000	5480	2484	900
CFA-AU-EX Ø 1200x10000/8kt 250	10000	10480	4603	900

Starters

CFA-AU-RSC 2	2000	2730	1573	1800*/900
CCFA-AU-RSC 2i	2000	2480	1538	1800*/900
CFA-AU-FC 2	2000	2730	1573	1800*/900

* for double starter

Auger cleaners and adapters

Auger cleaners are absolutely necessary when operating continuous flights auger drilling equipment. They serve as guides for the auger during drilling and clean the auger when it is being extracted during concreting. The auger cleaner consists of a main body, which surrounds the auger. Three different sizes of auger cleaner are available. The auger cleaner is mounted on the leader of the basic machine via a guide. Inside the main body is a rotating sleeve equipped with internal reamers. The sleeve is rotated by a hydraulic drive, with the reamers running along the auger flights and reaming off the borehole cuttings. By fitting adapters, the reamers are modified to the appropriate auger diameter and flight pitch.



Octagonal connector - wrench width 175 mm

M 800 Ø (mm)	450	500	600	650	700	750	800		
M 1000 Ø (mm)	450	500	600	650	700	750	800	900	1000
M 1200 Ø (mm)	450	500	600	650	700	750	800	900	1000

Octagonal connector - wrench width 250 mm

M 800 Ø (mm)	550	600	650	700	750	800			
M 1000 Ø (mm)	550	600	650	700	750	800	900	1000	
M 1200 Ø (mm)	550	600	650	700	750	800	900	1000	1200

Adapters for auger cleaners

Adapters are available in two versions, standard and foldable, for all main body sizes, M 800, M 1000 and M 1200, and for all standard continuous flight auger cutters.

Leader guides

Leader guides and the connecting elements between the leader and the main body of the auger cleaner are available for all leader cross-section sizes. When selecting the leader guide and auger cleaner main body, the maximum drilling diameter of the drilling rig must be taken into account.

Accessories

Lifting caps to mount the continuous flight auger equipment

Lifting caps are used to assemble and disassemble continuous flight augers. An auger extension can be erected and taken off with a lifting cap and the aid of the auxiliary rope.

Lifting cap octagonal wrench width 175 mm

Lifting cap octagonal wrench width 250 mm



Lost cover

When drilling with a continuous flight auger, the concrete outlet on the starter is closed by a lost cover made of plastic. This prevents soil and water from entering the tremie pipe and clogging it or influencing the quality of the concrete. The lost cover is designed so that it is pushed out of the tremie pipe by low concrete pressure at the start of the concreting process.



