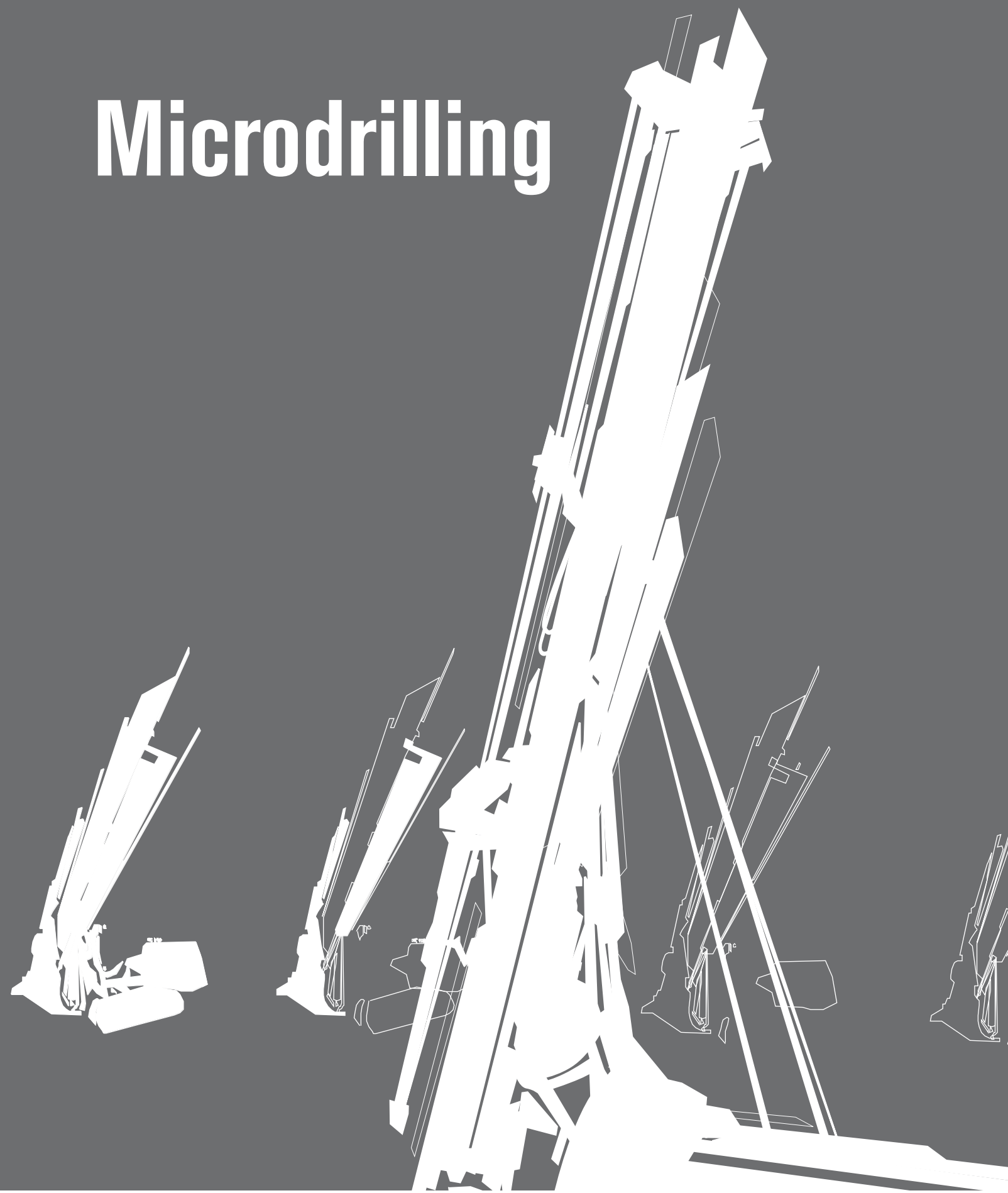


Microdrilling



Microdrilling

EQUIPMENT / TECHNOLOGIES

	PSM-8	PSM-8B	PSM-8G	STM-8G	SM-14	PSM-16G	STM-16G
MICROPILES	●	●	●		●	●	
ANCHORINGS	●	●			●		
JET GROUTING	○ OPTIONAL KIT	○ OPTIONAL KIT	○ OPTIONAL KIT		○ OPTIONAL KIT	○ OPTIONAL KIT	
DOUBLE ROTARY ANCHORS / MICROPILE					○ OPTIONAL KIT		
VIBROROTARY					○ OPTIONAL KIT		
TOP HAMMER	○ OPTIONAL KIT	○ OPTIONAL KIT	○ OPTIONAL KIT		○ OPTIONAL KIT	○ OPTIONAL KIT	
SOIL INVESTIGATION HARD	●	●					
SOIL INVESTIGATION DIAMOND	○ OPTIONAL KIT	○ OPTIONAL KIT	●	●		●	●
GEOHERMAL							
TUNNELLING							
Special Applications					○ CFA / PB	○ CFA / PB	

● = primary configuration

○ = optional kit available

Microdrilling

Introduction

The use of micropiles in the special foundations field has found a steady development thanks to two main requirements: the possibility of consolidating soil while increasing their bearing capacity by means of compact size equipment with improved use flexibility and the possibility of using drilling technologies into loose soils which would be technically impossible to be faced by means of large diam. rigs, with a certain advantage in the execution times and methods.

The micropile mainly works with its point so that, whenever morphologic conditions allow it, we always attempt to introduce the point into the sound rock.

Therefore, the mostly used technologies are:

- **DTH drilling and single rotation drilling** (with helicoidal rods or rods and three-cones with air or water air outlet). In order to improve the execution, more complex technologies are used, such as **rotopercussion drilling with top hammer** (in the presence of rock), **vibrorotary** (with loose soils), **cased drilling by single rotary** (with odex, tubex, simmetrix and similar methods), and **cased drilling with double rotary** (with loose soil or under ground water).

Diameters falling under the definition of micropile are up to 300 mm.

The cement grout following to drilling and reinforcement phases (with iron pipes, HB beams or cages) can be either by simple gravity or by high pressure.

This last solution allows a remarkable increase in the bearing capacity maintaining the same diameter.

Over the past few years, the trend involved a continuous increase in maximum diameters with sizes up to 600 mm, to be performed with the same types of hydraulic drill rigs.

The choice of the right micropile is anyway linked to and depends on various parameters, such as the soil mechanical features, the diameter to be executed, the most suitable drilling technique and, last but not least, criteria of economic criteria.

Soilmec covers all drilling methods and rigs suitable for executing small diameter consolidation into the micropile sector:

MICROPILES
ANCHORINGS
JETTING
SOIL INVESTIGATIONS
TUNNELLING
GEOTHERMAL
SPECIAL APPLICATIONS

The philosophy of the group is based on the construction of drilling equipment that can offer a high performance and allow, thanks to a modular design, the maximum flexibility of use in the site and which, at the same time, guarantees the choice and the application of various technologies in order to profitably drill any kind of soil.

Whereas strong specifications are requested, due to the nature of the work to be accomplished, rigs that are dedicated rigs - according to the technology they apply - have been designed and introduced, in view of their best use and operational result.



Micropiles and Anchoring

MICRODRILLING

The range consists of articulated hydraulic drills whose kinetic mechanism makes them suitable for creating micro-piles and anchoring at differing angles.

The articulated versions of Soilmec and PSM hydraulic drills currently range from 8 to 33 tons in weight, with different rotary strokes and mast lengths available, different rotary heads, different push-pull systems, and a wide range of optional accessories.

Micropiles are generally laid at angles no greater than 15°, but anchoring and/or drains may use assorted positioning techniques and particular kinetic mechanisms to achieve other angles.

On sites where it is possible to operate large-scale equipment a vertical 30 ton rig has been developed for diameters up to 500mm and depths up to 55m, exploiting mast length and using special loading systems.



Equipment

Model	Torque daNm	Rotary stroke mm	Max (Rated) power kW	Weight t	Kinetic mechanism
PSM-8	1024	3900	103 (85)	8.5-9.2	Combinated boom articulation
PSM-8G	916	3900	103 (85)	8.5	Fixed
PSM-16G	1024	4000	200 (176)	16	Fixed
PSM-8B	1024	3900	103 (85)	8.5	Complete boom articulation
SM-14	1207	4000/7000	123 (119)	13.5	Complete boom articulation
PSM-20	1747	7000/10000	155 (135)	20/22	Combinated boom articulation
SM-21	2025	4000÷7000/10000	188 (176)	21/23	Combinated boom articulation
SM-30	3659	14000	205 (164)	33	Parallelogram
ST-30*	2622	14000	153 (143)	32	Tunnel telescopic boom

* in micropiling version

PSM-8

MICROPILES AND ANCHORING

The PSM-8 is a multipurpose drilling rig. Its modular design is engineered for the execution of: Micropiles, Tie-backs, Jet-Grouting, Coring, Drain, Water wells. The rig is fitted with proportional, hydraulic servo-assisted controls that make the operations smooth and trouble free even in the hardest working conditions.

Thanks to a particular kinematic mechanism (composed of: 650 mm extendable boom; swivelling $\pm 29^\circ$; joint 90° ; motoreducer slew rig for radial drilling, optional) **the PSM-8 is a versatility unit that can be tailored to any customer need or geological conditions.**

The PSM-8 may be further tailored with a wide range of optional items such as:

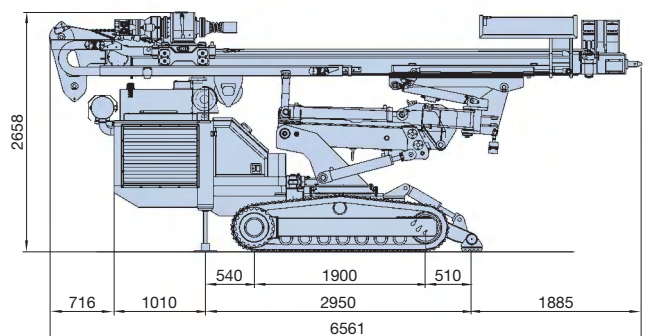
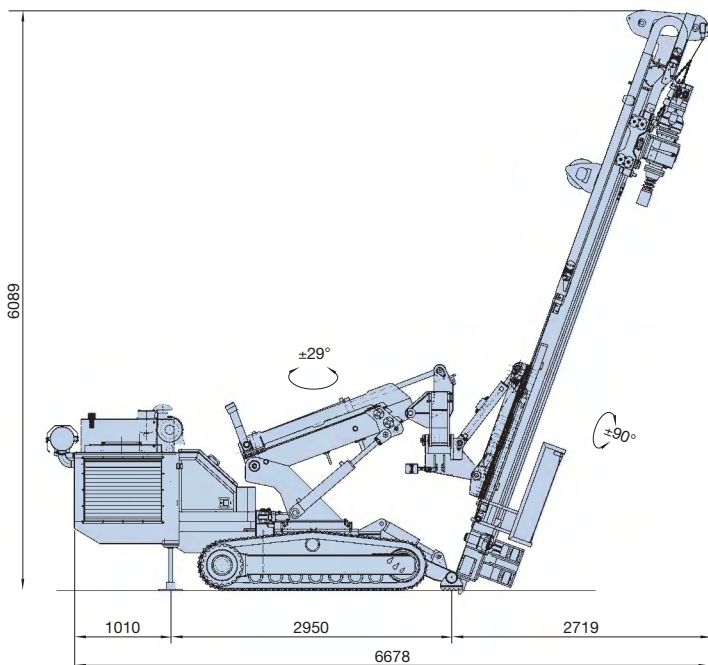
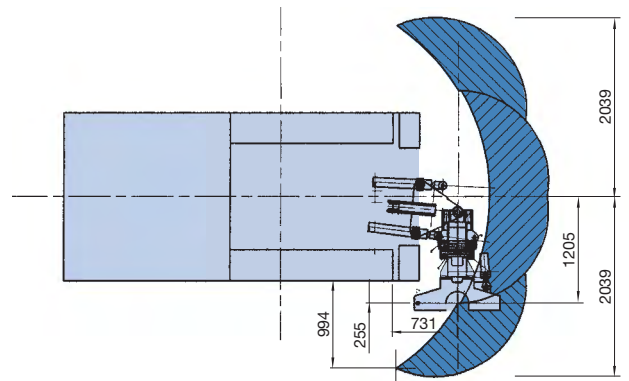
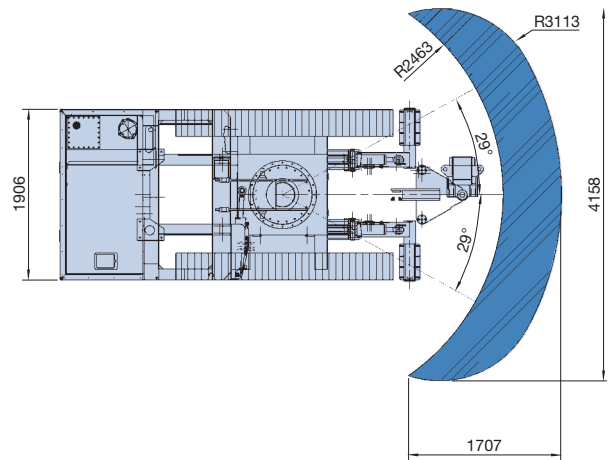
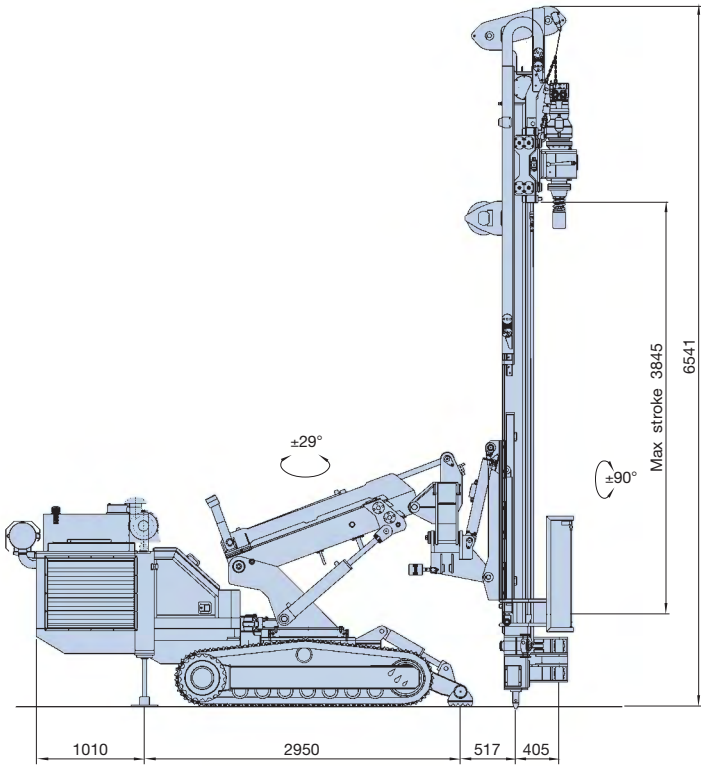
- Jet Grouting
- Mud pump (screw type fitted on board, triplex type for external use only)
- Top Hammer
- Rod carousel
- Slew ring < for radial drilling
- Radio operated remote control

Engine		DEUTZ TCD 2012 L04 Tier 3	
Power	kW	103 @ 2400 rpm	
Rated power	kW	85	
Hydraulic System			
Main pump	l/min	149	
Service pump	l/min	68+40+33+26	
Rotary		HR-10 G	
Max torque	daNm@rpm	1024	
Rotation speed	rpm	381	
Mast feed/hoist system		Standard	Optional
Standard cradle stroke	mm	3845	2100
Rod length	mm	3000	1500
Max hoist force	kN	60	
Max feed force	kN	60	
Max speed (slow/fast)	rpm	0-17 / 35	
Clamp & Breaker			
Clamping range	mm	60-260	
Max clamping force	kN	110	
Max breaking torque	daNm	3600	
Service winch			
Max line pull 1st layer	kN	15	
Rope diameter	mm	10	
Undercarriage			
Track shoe width	mm	300	
Overall length	mm	2474	
Overall width	mm	1900	
Travelling speed	km/h	2,36	
Weight			
Total weight	kg	8500 / 9200	
Average pressure on ground	MPa	0,07	

PSM-8

MICROPILES AND ANCHORING

Standard Version



PSM-8G

MICROPILES AND ANCHORING

Designed mainly for geognostic use, it can be used for vertical drilling micropiles or inclined +/- 13°.

Main features:

- Rotation head with 6 ratio gearbox
- Fixed kinetic mechanism

Optional:

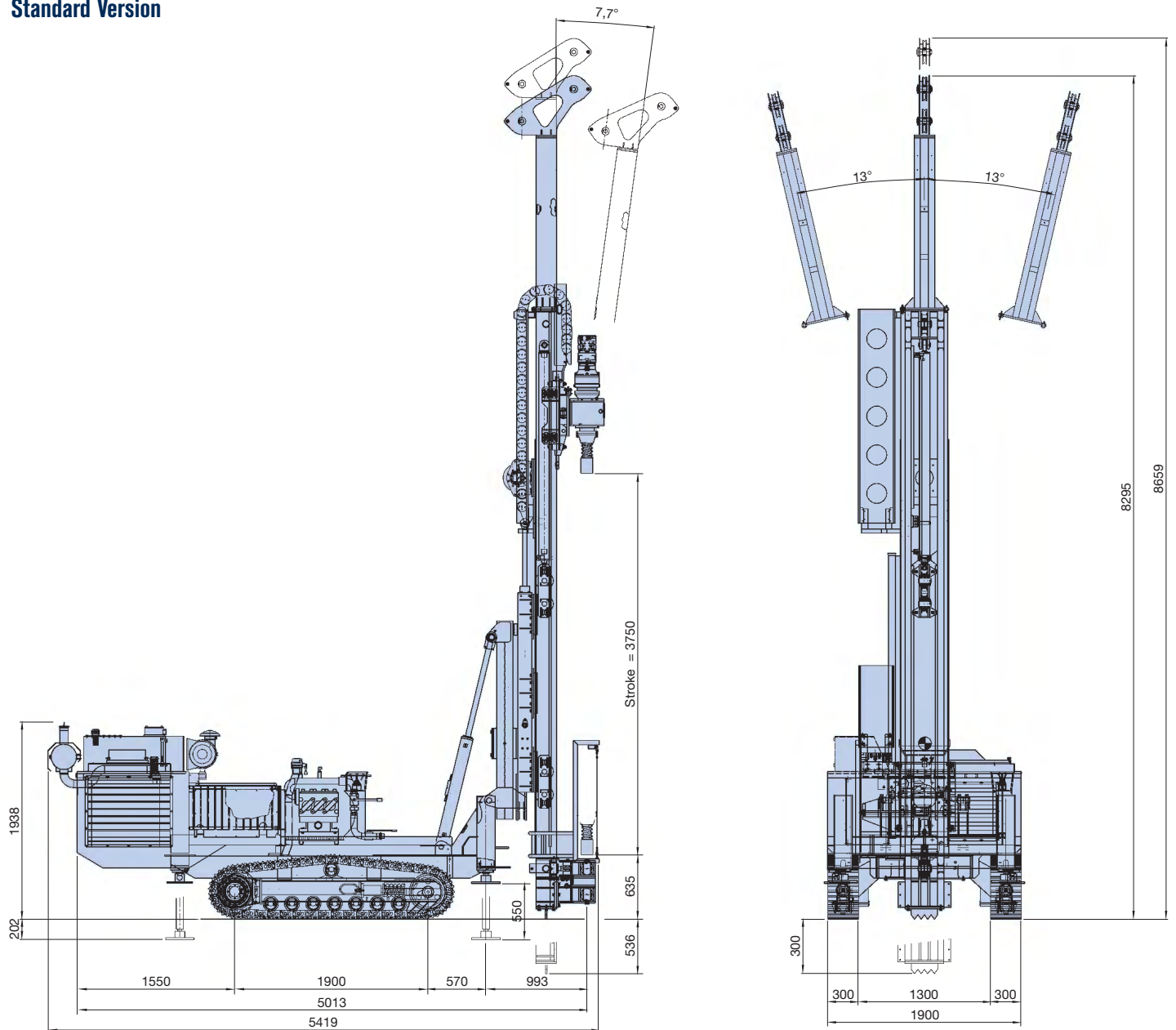
- Jet-Grouting kit for treatments up to 12 m
- Mud pump screw type and triplex type fitted on board
- Wire-line winch
- Slew ring for inclined drilling holes

Engine		DEUTZ TCD 2012 L04 Tier 3
Power	kW	103 @ 2400 rpm
Rated power	kW	85
Hydraulic System		
Main pump	l/min	149
Service pump	l/min	71+46+29+23
Rotary		HR-9 coring
Max torque	daNm@rpm	916 @ 52
Rotation speed	rpm	0-832
Mast feed/hoist system		
Standard cradle stroke	mm	3750
Rod length	mm	3000
Max hoist force	kN	98
Max feed force	kN	73,6
Max speed (slow/fast)	rpm	11 (14) - 32 (44)
Clamp & Breaker		
Clamping range	mm	60-260
Max clamping force	kN	110
Max breaking torque	daNm	3600
Service winch		
Max line pull 1st layer	kN	15
Rope diameter	mm	10
Undercarriage		
Track shoe width	mm	300
Overall length	mm	2474
Overall width	mm	1900
Travelling speed	km/h	2,36
Weight		
Total weight	kg	8200 / 9000
Average pressure on ground	MPa	0,07

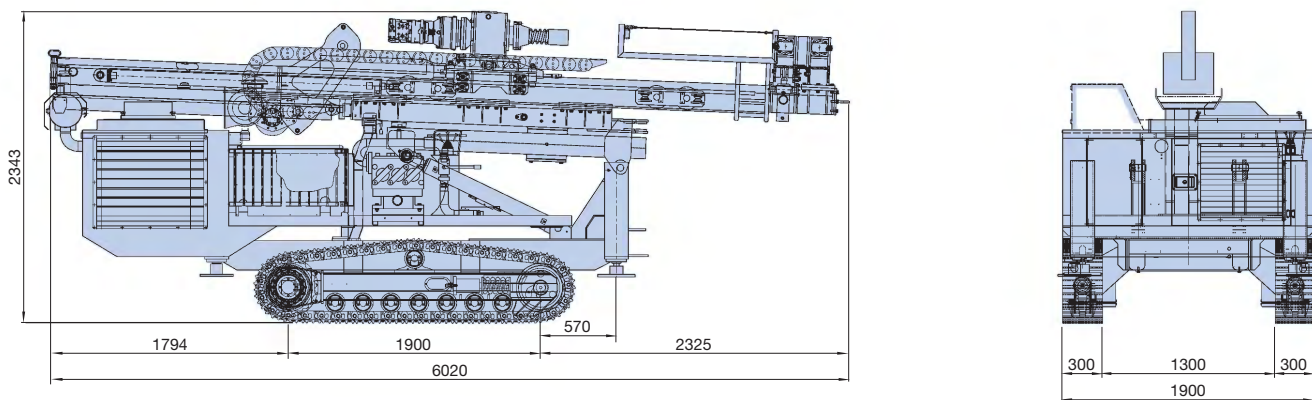
PSM-8G

MICROPILES AND ANCHORING

Standard Version



Transport conditions



PSM-8B

MICROPILES AND ANCHORING

This crawler mounted drilling rig has a joint articulation of new design for the mast and an easy simple use. The unit is very versatile and suitable for specialized works such as: anchors, soil nails, tie-backs, micropiles, jet grouting, etc.

Main features of the rig are:

- Max torque: 1024 @ 381 rpm/max
- Rotary stroke with 2 options (short and long): 2065 mm or 3845 mm
- Hydraulic clamp and breaker: diam 60-260 m

A wide range of optional device are available such as:

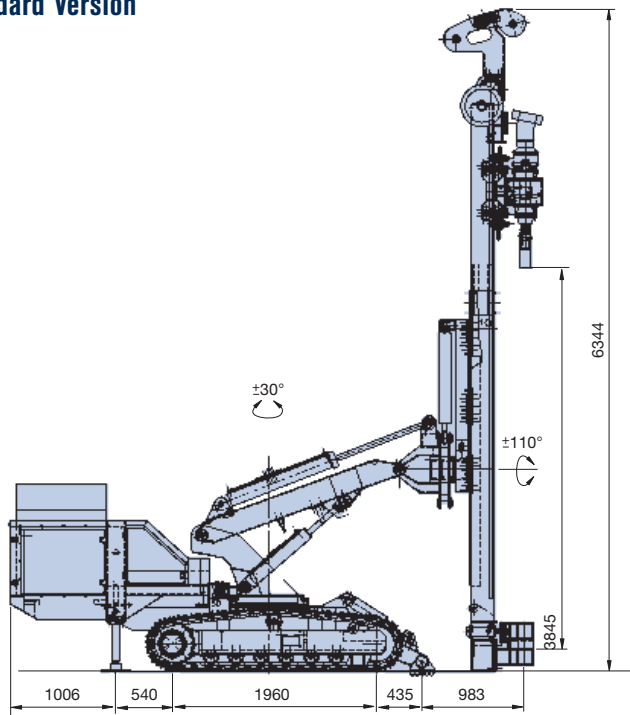
- Mud pump (screw type fitted on board, triplex type for external use only)
- Jet grouting kit for mono, bi or three fluid (max treatment 12 m)
- Top hammer
- Special low headroom mast, stroke 2100 rpm

Engine		DEUTZ TCD 2012 L04
Power	kW	103 @ 2400 rpm
Rated power	kW	85
Hydraulic System		
Main pump	l/min	149
Service pump	l/min	71+46+29+23
Rotary		HR-10
Max torque	daNm	1024
Rotation speed	rpm	381
Mast feed/hoist system		
Standard cradle stroke	mm	3845
Rod length	mm	3000
Max hoist force	kN	60
Max feed force	kN	60
Max speed (slow/fast)	rpm	0-17 / 35
Clamp & Breaker		
Clamping range	mm	60-260
Max clamping force	kN	110
Max breaking torque	daNm	3600
Service winch		
Max line pull 1st layer	kN	15
Rope diameter	mm	10
Undercarriage		
Track shoe width	mm	300
Overall length	mm	2474
Overall width	mm	1900
Travelling speed	km/h	2,36
Weight		
Total weight	kg	8000 / 8700
Average pressure on ground	MPa	0,063

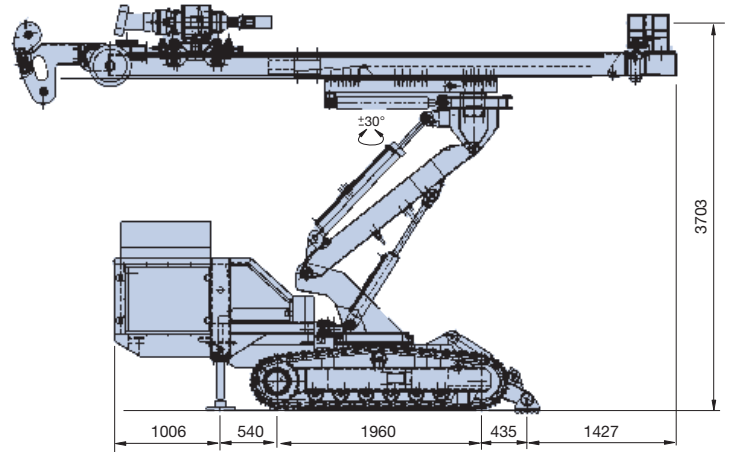
PSM-8B

MICROPILES AND ANCHORING

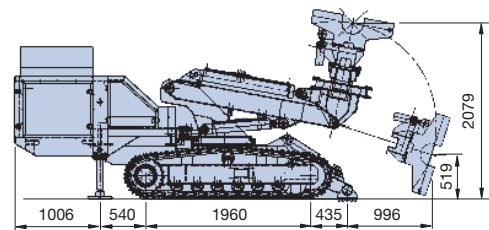
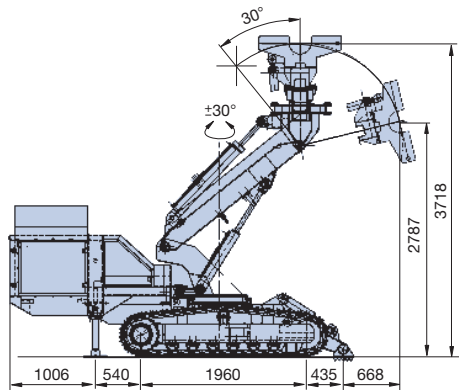
Standard Version



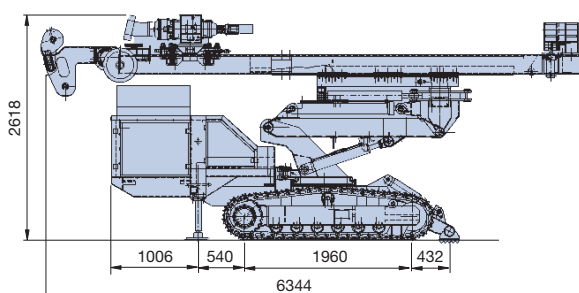
High horizontal drilling



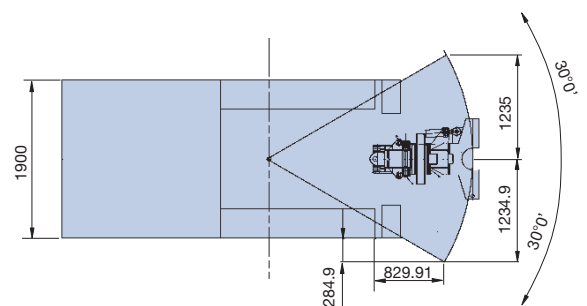
Anchors version



Transport conditions



Working area



SM-14

MICROPILES AND ANCHORING

Soilmec SM-14 is a multipurpose drilling rig. Its modular design is engineered for the execution of: Micropiles, Tie-backs, Jet-grouting, Drain, Water wells.

The rig is fitted with proportional, hydraulic servo-assisted controls that make the operations smooth. Featured with Load Sensing System, it has lower running costs and a reduced wear and tear on components.

Soilmec SM-14 versatility unit that can be tailored to any customer need or geological conditions:

- Available with a wide range of rotary heads ranging from 800 daNm to 2500 daNm (special attachment for each HR are available)

Soilmec SM-14 may be further tailored with a wide range of OPTIONAL items such as:

- Jet-grouting kit for mono, bi or three fluids treatment for \varnothing 114 mm rods (\varnothing 127 mm with special kit)
- Kinematic motion 90° mast articulation for tie-back and anchoring drilling (twin cylinders)
- Mast rotation by gearmotor for \pm 180°
- Service crane for handling of drilling rods and for rods & casing
- Designed for working with carousel
- Special mast stroke: 1500 - 1800 - 2100 - 3000 - 7000 mm
- Radio operated remote control
- Rod carousel 10x114 mm
- Double rotary head
- Grout pumps
- Mud pump

Several hydraulic rotary available with different regulation torque.



Travelling Remote Board



Radio Remote Control



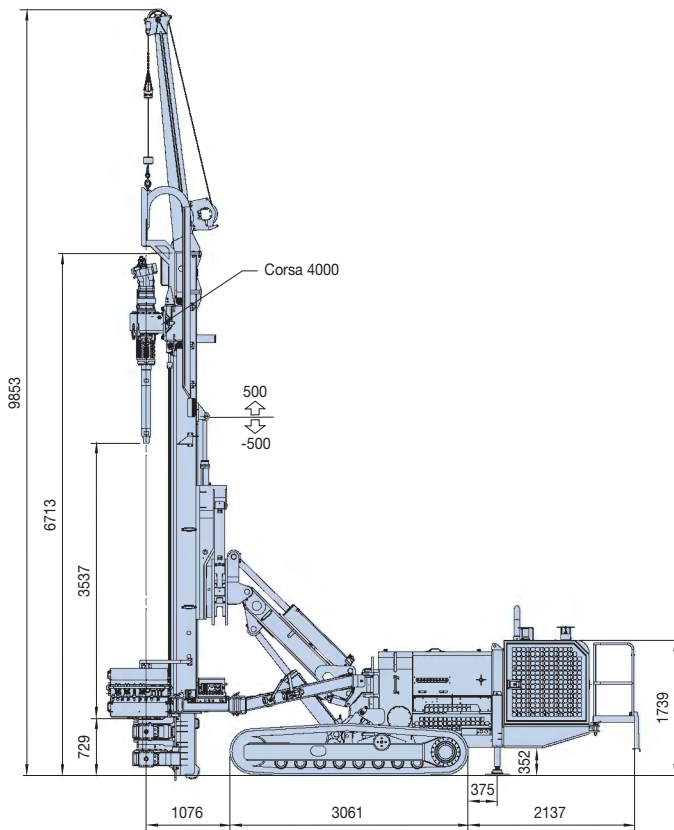
Std. kinematic articulation
4x90° sector turntable

Engine		CUMMINS QSB 4.5 Tier 3		
Power	kW	123 @ 2000 rpm		
Rated power	kW	119 @ 2200 rpm		
Hydraulic System				
Main pump	l/min	156		
Service pump	l/min	156		
Rotary		HR-12	HR-16G	
Max torque	daNm	1207	1560	
Rotation speed	rpm	0-221	0-184	
Mast feed/hoist system		Standard (Cylinder)	Optional (Gear motor)	
Standard cradle stroke	mm	4000	7000	
Rod length	mm	3000	6000	
Max hoist force	kN	89	87	
Max feed force	kN	45	87	
Max speed (slow/fast)	rpm	0-28	0-28	
Clamp & Breaker		Standard	Optional	
Clamping range	mm	50-135	50-360	60-415
Max clamping force	kN	266	266	266
Max breaking torque	daNm	5060	5060	5060
Service winch				
Max line pull 1st layer	kN	20		
Rope diameter	mm	10		
Undercarriage				
Track shoe width	mm	400		
Overall length	mm	3062		
Overall width	mm	2300		
Travelling speed	km/h	2,7		
Weight				
Total weight	kg	13000 / 14000		
Average pressure on ground	MPa	0,07		

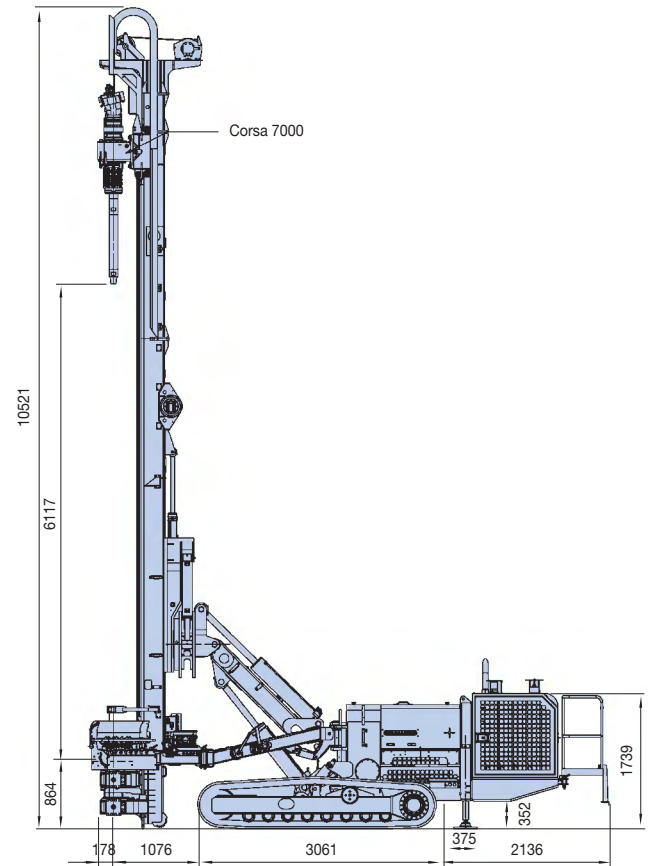
SM-14

MICROPILES AND ANCHORING

**Standard version
(Stroke 4000 mm cylinder)**

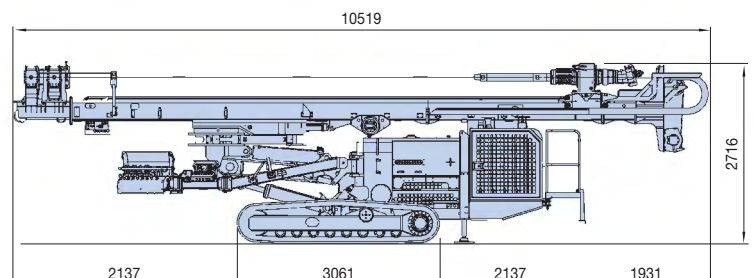
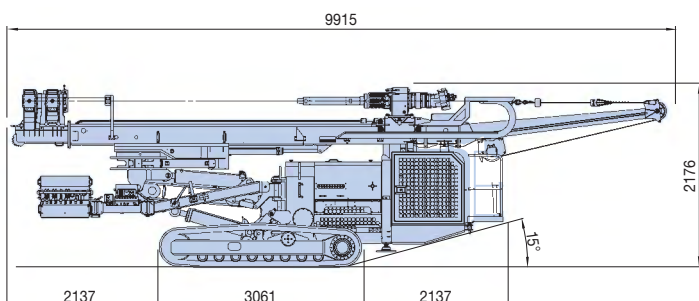


**Optional version
(Stroke 7000 mm gear motor)**



Available: Optional kinematism 90° mast articulation and slew ring with motoreducer (slewing boom articulation)

Transport conditions



PSM-20

MICROPILES AND ANCHORING

The **PSM-20** is a multipurpose hydraulic drilling rig. Its modular design is engineered for the execution of micropiles, tie-backs, anchors, jet-grouting, drains, water wells. The rig is fitted with a proportional hydraulic system that makes drilling operations smooth and precise, even in the most difficult operating conditions.

The modular design of the PSM-20.

The stroke of the drilling rig can be varied from 7200 to 10200 mm (and vice versa) with a simple mast extension (or reduction) kit with hydraulic pipe rack. Various systems for the mechanical loading of the drilling rods are available with depths that range from 18 to 45 m for both vertical and inclined drilling of anchors or tie-backs. The particular kinematic mechanism with a 90° joint lets you drill anchors and tie-backs with the rotary drilling over the mast. This particular condition lets you reduce the mechanical consumption and friction and, in particular, work in total safety. The clamp/joint-breaker, thanks to a lifting system fitted with a hydraulic piston with a 600 mm stroke lets you extract the casings.

Various optional items and applicable technologies available:

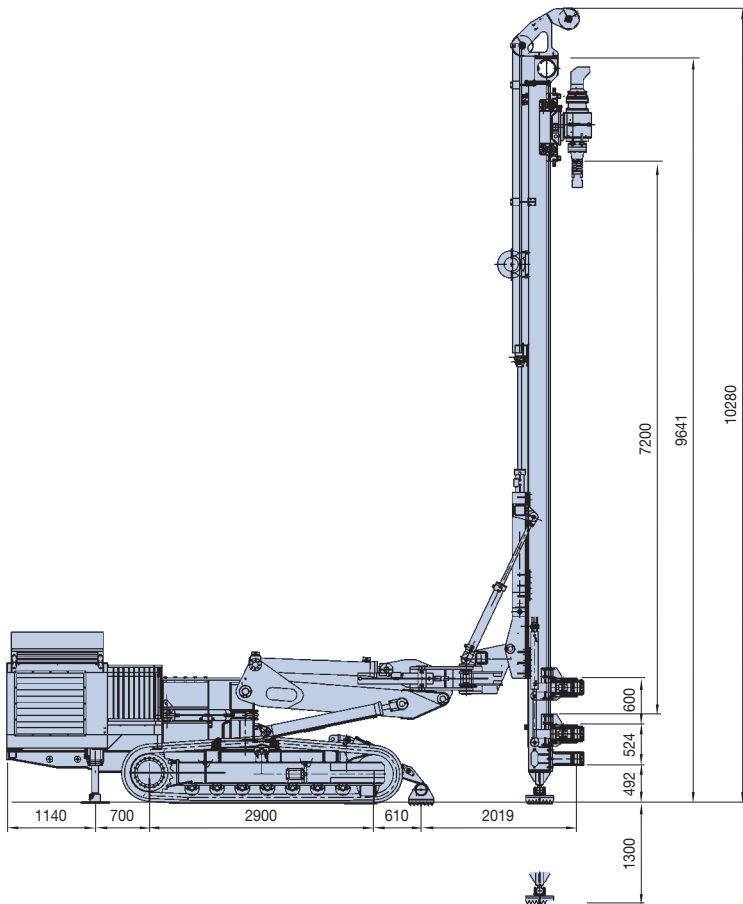
- Top hammer
- Vibrorotary
- Double rotary
- Rotary with 133 mm inner diameter
- Jet Grouting for mono, bi and triple-fluid rods - 90 mm max diameter with standard rotary
- Jet Grouting for mono, bi and triple-fluid rods - 127 max with rotary type HR21G
- Hydraulic loader 2 x 6000 x 140 max
- Hydraulic rod loader 2 x 7500 x 127 max
- Carousel rod loader 6 x 4500 x 140 max
- Carousel rod loader 8 x 4500 x 114 mm
- Rods/casings lifting crane
- Radio control

Engine		DEUTZ TCD 2012 L06 Tier 3	
Power	kW	155 @ 2400 rpm	
Rated power	kW	135	
Hydraulic System			
Main pump	l/min	260	
Service pump	l/min	86+54+32+22+16	
Rotary		Standard HR-17 G	Option HR-21 G
Max torque	daNm	1747	2154
Rotation speed	rpm	295	315
Mast feed/hoist system		Standard (Gear motor)	Optional (Gear motor)
Standard cradle stroke	mm	7200	10200
Rod length	mm	6000	9000
Max hoist force	kN	83	83
Max feed force	kN	83	83
Max speed (slow/fast)	rpm	0-28	0-28
Clamp & Breaker		Standard	Optional
Clamping range	mm	50-320	50-360
Max clamping force	kN	266	170
Max breaking torque	daNm	5060	7160
Service winch			
Max line pull 1st layer	kN	20	
Rope diameter	mm	10	
Undercarriage			
Track shoe width	mm	500	
Overall length	mm	2500	
Overall width	mm	2900	
Travelling speed	km/h	2,0	
Weight			
Total weight	kg	20000 - 24000	
Average pressure on ground	MPa	0,07	

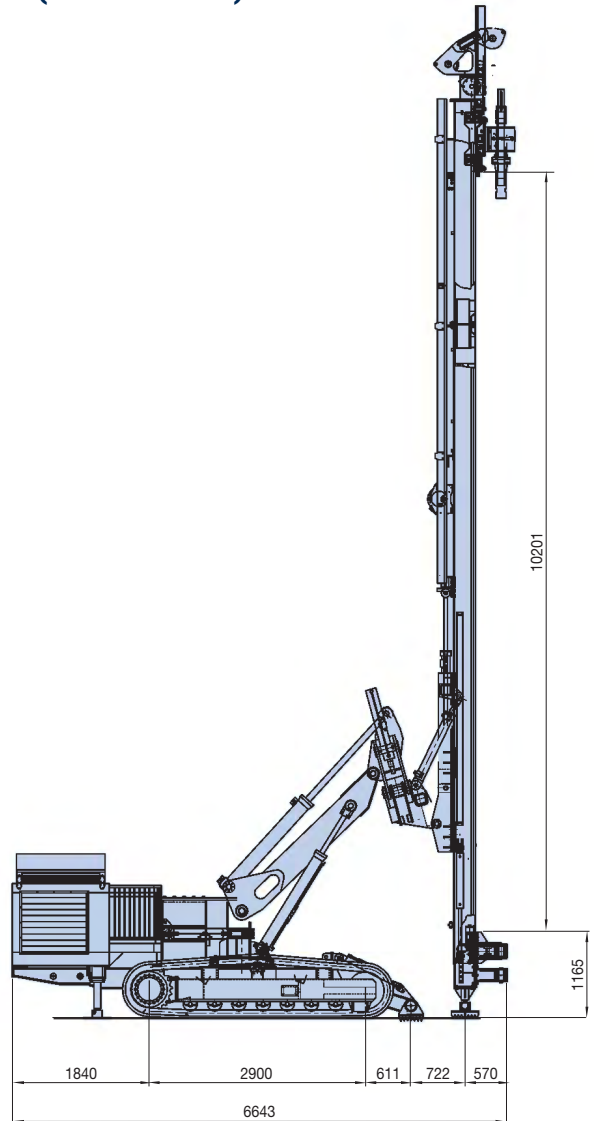
PSM-20

MICROPILES AND ANCHORING

Standard version
(7200 mm stroke)

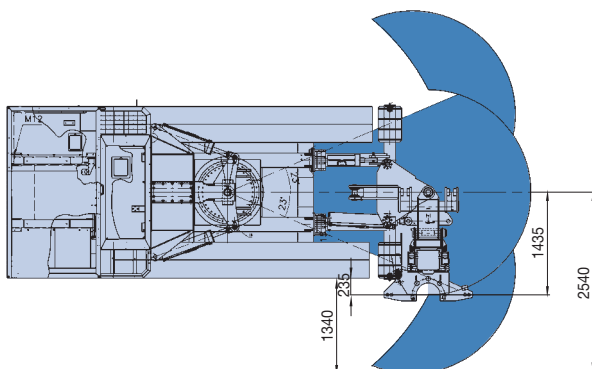


Optional version
(10200 mm stroke)

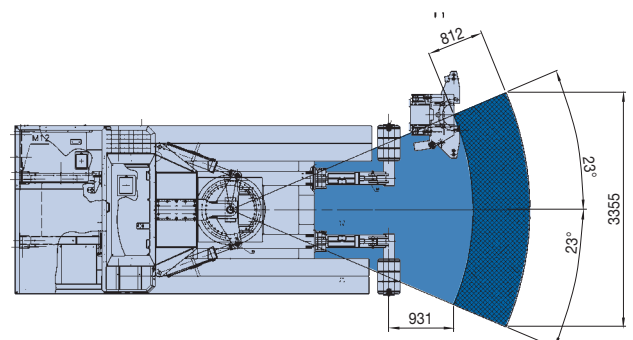


Working area

Articulation 90° opened



Articulation 90° closed



SM-21

MICROPILES AND ANCHORING

Soilmec SM-21 is a multipurpose drilling rig. Its modular design is engineered for the execution of: Micropiles, Tie-backs, Jet-grouting, Anchors, Water wells. Soilmec SM-21 is fitted with proportional, hydraulic servo-assisted controls so that drilling and positioning operations become easy, precise and smooth. The new hydraulic design optimizes the usage of the rig keeping the running cost down and powering any utility whenever required.

Soilmec SM-21 versatility unit that can be tailored to any customer need or geological conditions:

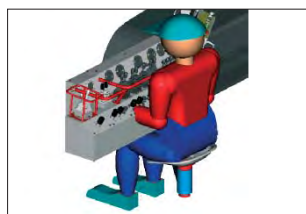
- Variable speed rotary head
- Top hammer
- Vibrorotary
- Double rotary
- Reverse circulation

Soilmec SM-21 standard version is already equipped with some important items:

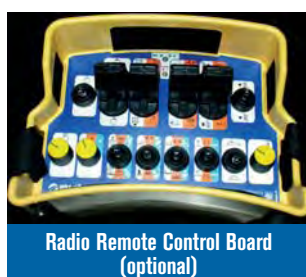
- Foam pump
- Rod carousel for N°6 x 3000 mm long rods

Soilmec SM-21 may be further tailored with a wide range of OPTIONAL items such as:

- Jet-grouting: Soilmec SM-21 is able to reach treatment up to 20 m in single passage. The rotary hollow passage has now been increased to suit up to 140 mm o.d. rods
- Service crane for handling of drilling rods and for rods & casing
- Radio operated remote control, c/w hydraulic control panel
- Rod carousel. We also have the following options:
N° 10 x 3000 mm; N° 10 x 4500 mm and N°2 x 6000 mm long rods
- Double rotary
- Vibrorotary



Drilling Control Board



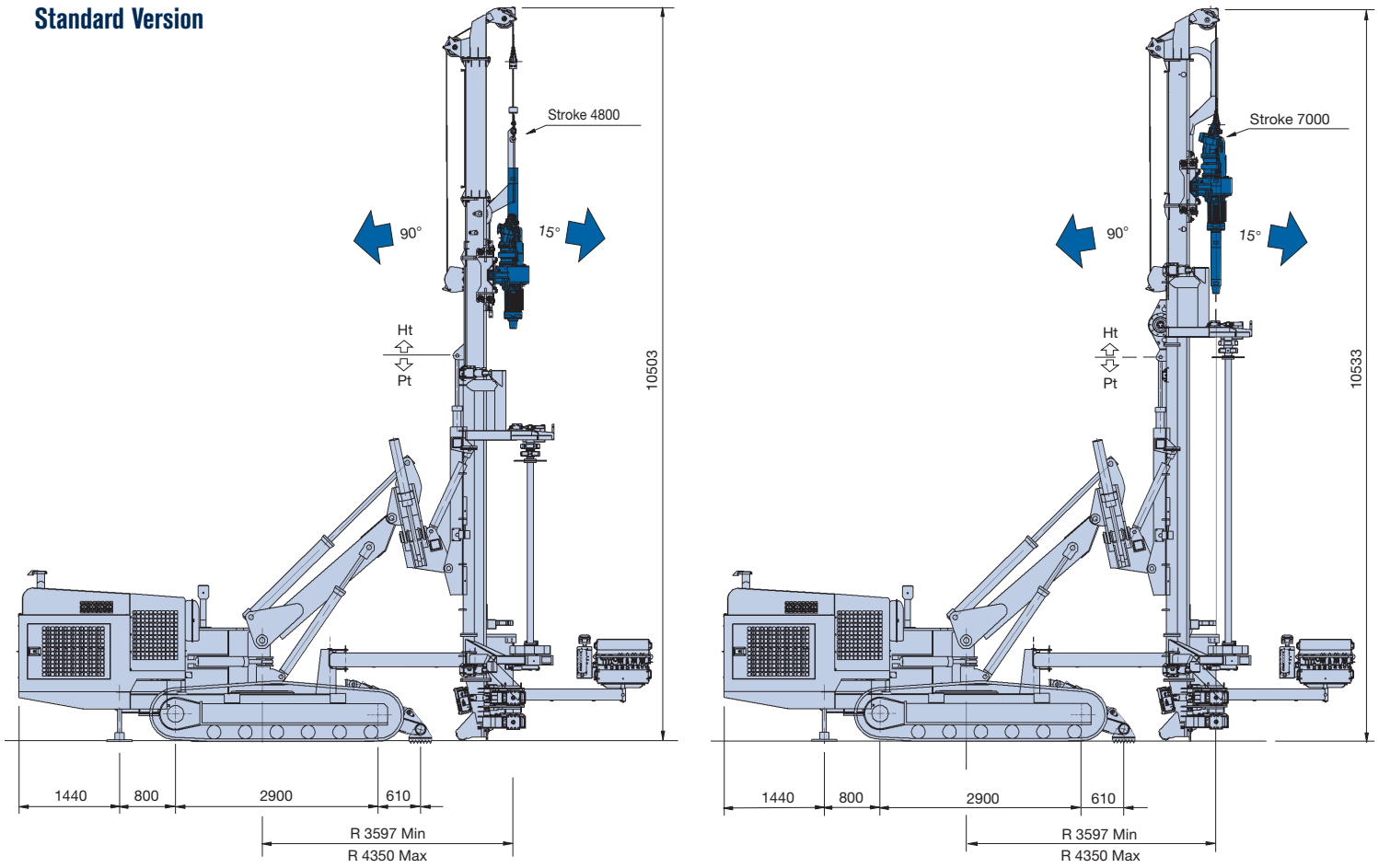
Radio Remote Control Board (optional)

Engine		DEUTZ TCD 2013 L06 2V Tier 3	
Power	kW	188	
Rated power	kW	176	
Hydraulic System			
Main pump	l/min	266	
Service pump	l/min	17+64+64+26	
Rotary		HR-20	HR-37
Max torque	daNm	2025	3659
Rotation speed	rpm	179	127
Mast feed/hoist system		Cylinder	Gear motor
Standard cradle stroke	mm	4800	7000
Rod length	mm	3000	6000
Max hoist force	kN	141	113
Max feed force	kN	79	113
Max speed (slow/fast)	rpm	0-24	0-29
Clamp & Breaker		Standard	Optional
Clamping range	mm	50-315	60-415
Max clamping force	kN	266	266
Max breaking torque	daNm	5060	5060
Service winch			
Max line pull 1st layer	kN	20	
Rope diameter	mm	10	
Undercarriage			
Track shoe width	mm	500	
Overall length	mm	3631	
Overall width	mm	2500	
Travelling speed	km/h	2,48	
Weight			
Total weight	kg	21000	
Average pressure on ground	MPa	0,07	

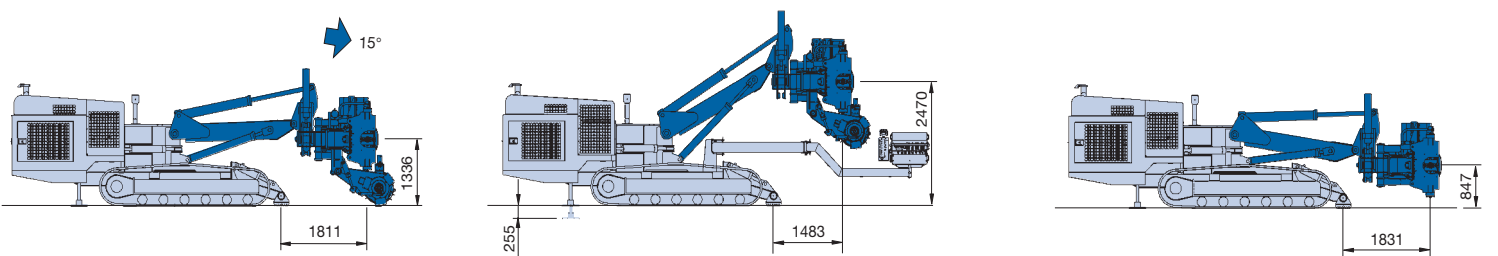
SM-21

MICROPILES AND ANCHORING

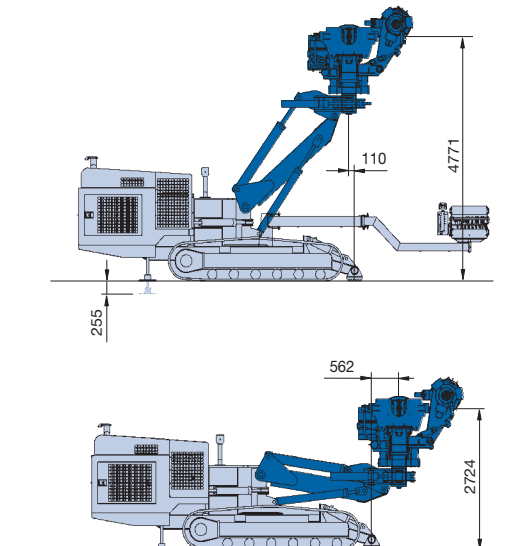
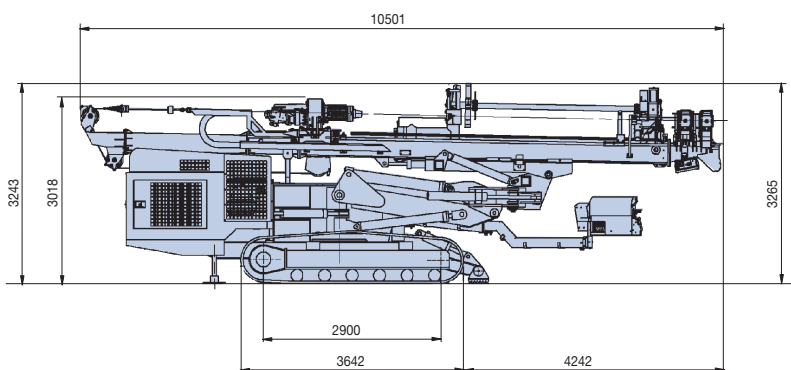
Standard Version



Anchors - Tie back version



Transport conditions



SM-30

MICROPILES AND ANCHORING

Following the several requests for drilling micropiles and performing deep jet grouting treatments Soilmec designed the new SM-30 (multipurpose) hydraulic rig.

Main characteristics are:

- Depth: 55 m in jet grouting without manual operations
- Rotary feed stroke: 14,2 m
- Rotary torque: ranging from 1860 to 3659 daNm
- Rod feeder: n. 2 x 12 m rods
- Total operating weight: 33 tons
- Possibility to work with various rotaries, Top Hammers and DTH.

Additional technical features:

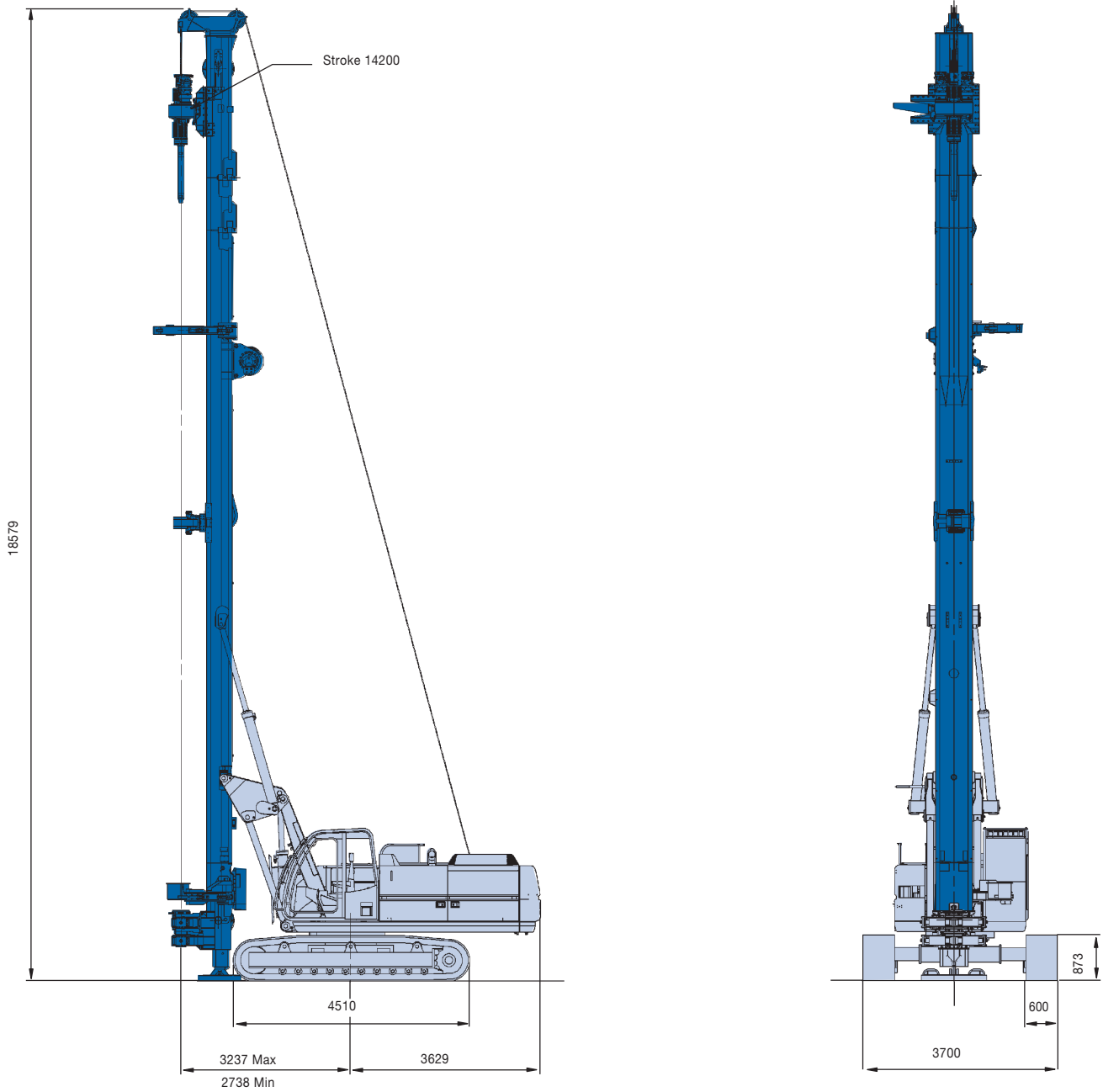
- **Load sensing hydraulic system.**
- **Two main hydraulic pumps** for a total delivery of 352 l/min, with variable displacement and constant power.
- All the movements are controlled by electro-hydraulic proportional joysticks, inside and outside the cabin, allowing the operator to work in the easiest way.
- **Cable pull-down by 12 ton winch.**
- **Casing extractor (200 kN, stroke 750 mm)**
- **3rd clamp for double string battery (rod and casing)**

Engine		CUMMINS QSB 6.7C Tier 3		
Power	kW	205		
Rated power	kW	164		
Hydraulic System				
Main pump	l/min	352		
Service pump	l/min	96+37+24+20		
Rotary		HR-20	HR-37	
Max torque	daNm	2025	3659	
Rotation speed	rpm	0-117	0-83	
Mast feed/hoist system				
Standard cradle stroke	mm	14200		
Rod lenght	mm	12000		
Max hoist force	kN	12		
Max feed force	kN	12		
Max speed (slow/fast)	rpm	0-28		
Clamp & Breaker		Standard	Optional	
Clamping range	mm	50-315	50-360	60-415
Max clamping force	kN	266	266	266
Max breaking torque	daNm	5060	5060	5060
Service winch				
Max line pull 1st layer	kN	65		
Rope diameter	mm	16		
Undercarriage				
Track shoe width	mm	600		
Overall lenght	mm	4510		
Overall width	mm	2550 - 3700		
Travelling speed	km/h	2,2		
Weight				
Total weight	kg	33000		
Average pressure on ground	MPa	0,082		

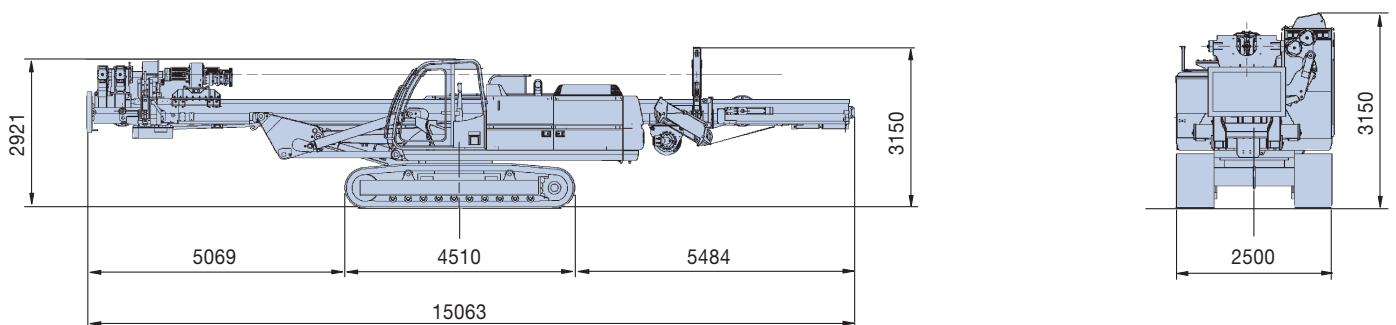
SM-30

MICROPILES AND ANCHORING

Standard Version



Transport conditions



ST-30

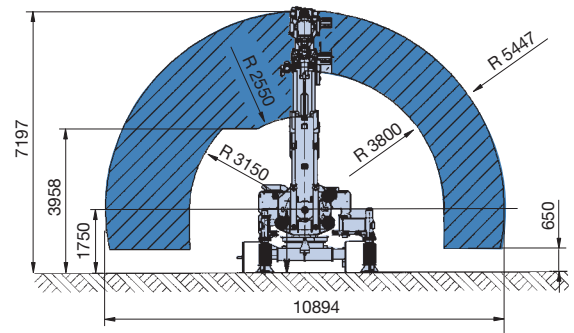
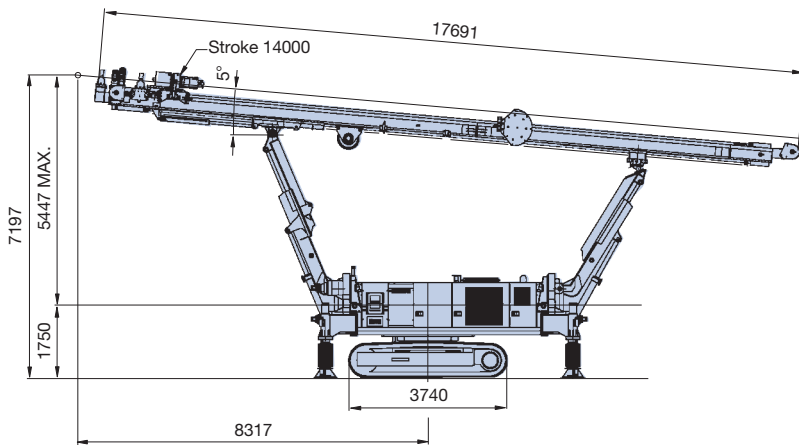
MICROPILES AND ANCHORING

The ST-30 hydraulic tunnel machine is designed for sub-horizontal consolidation, for half-section or full-section drilling, up to a maximum height of 6.98 m from ground level.

A special accessories kit lets you use the equipment also for vertical or inclined drilling, for traditional consolidation or the invert of the tunnel with a stroke of 14 m and a max diameter of 114 mm.

This feature means full-range use of the equipment for the best investment and operating flexibility.

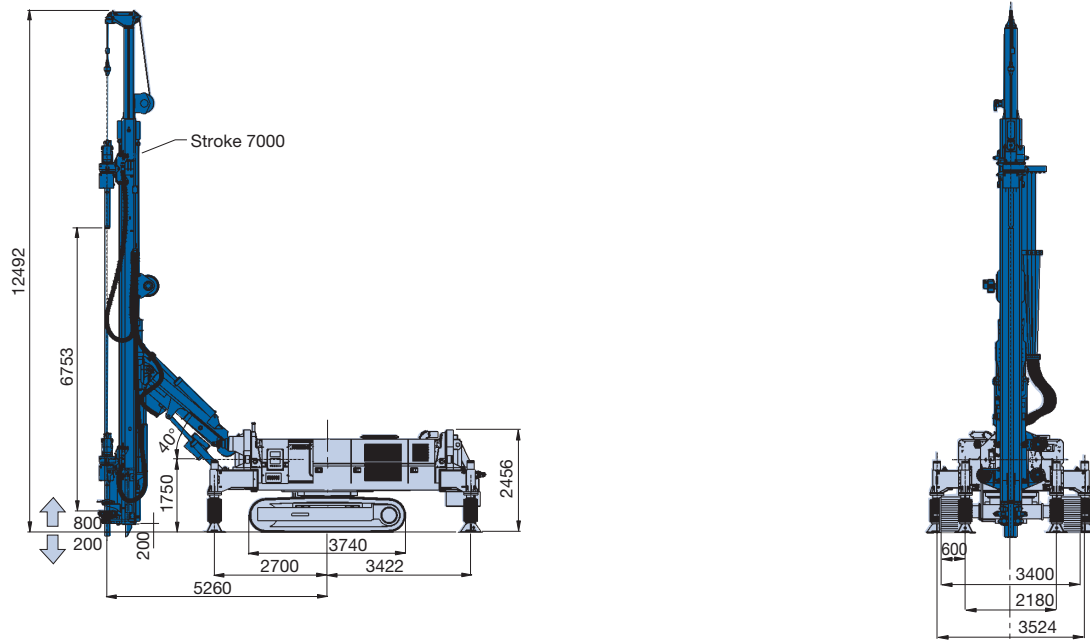
Tunnel version (5°)



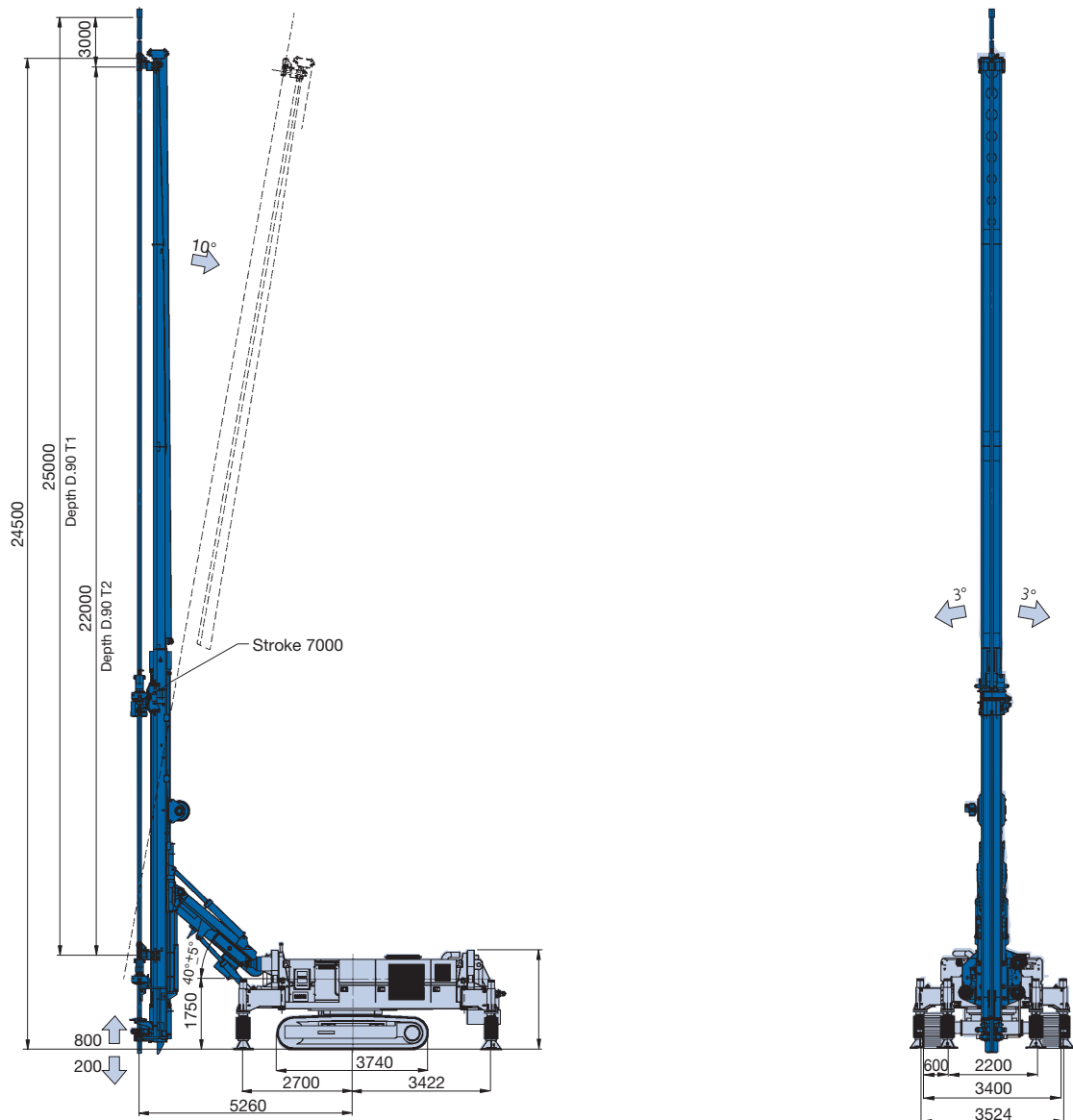
* double hydraulic system (diesel+electric)

Engine		DEUTZ TCD 2012 L06
Power	kW	153
Rated power	kW	143
Hydraulic System*		
Main pump	l/min	297
Service pump	l/min	55+25
Rotary		HR-12
Max torque	daNm	1027
Rotation speed	rpm	221
Mast feed/hoist system		
Standard cradle stroke	mm	14000
Max hoist force	kN	84
Max feed force	kN	84
Max speed (slow/fast)	rpm	0-6-30
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Service winch		
Max line pull 1st layer	kN	20
Rope diameter	mm	10
Undercarriage		
Track shoe width	mm	600
Overall length	mm	3700
Overall width	mm	2500 - 3740
Travelling speed	km/h	1,5
Weight		
Total weight	kg	32000
Average pressure on ground	MPa	0,09

Standard Version



Jet Grouting version



Jet Grouting

MICRODRILLING

Technique

Jet grouting technique consists of disaggregating the soil and mixing it with cement mixtures.

MAIN APPLICATIONS:

- underpinning
- diaphragm walls
- tunnel consolidations
- bottom plugs
- slopes consolidations
- dam cut-offs
- diaphragm walls gaps
- break-in and break-out for TBM

MAIN ADVANTAGES:

- wide range of soils that can be successfully treated.
- capability to obtain columns of consolidated soil with diameter ranging from 60 to more than 300 cm by using small diameter drilled holes, in general not larger than 100÷140 mm.
- capability to overpass pre-existing foundations, boulders, rocky layers.
- use of light weight and small size drilling rigs in small working areas.

Drilling method

Jet grouting techniques are world-wide classified into three categories according to the number of injected fluids:

- **mono-fluid system:** cement grout is used as disaggregating and consolidating fluid (TREVJET T1)
- **double-fluid system:** cement grout plus air are used as disaggregating and consolidating fluid (TREVJET T1/S)
- **triple-fluid system:** water plus air are used as disaggregating fluid while cement grout is used as consolidating fluid (TREVJET T2)

The site organization is very important for the three methods. The average total installed power is the following:

- **mono-fluid system: 600÷700 HP**
- **bi-fluid system: 700÷800 HP**
- **triple-fluid system: 850÷1.000 HP**

MONO-FLUID (up to 100 cm column dia.)

Simultaneous break-up and mixing of soil by a jet of cement grout. Rotary and Roto-Percussion drilling systems can be adopted by using the same jetting rods. The self-drilling monitor can be equipped with 1 or more jetting nozzles.

BI-FLUID (up to 250 cm column dia.)

Simultaneous break-up, partial removal and mixing of soil by a combined jet of cement grout plus air. Nozzles are designed to allow air-jet to create shroud around the grout-jet. By this effect the grout jet can be more efficient, maintaining sufficient energy to perform larger columns. Rotary and Roto-Percussion drilling system can be adopted by using the same jetting rods.

TRIPLE-FLUID (up to 300 cm column dia.)

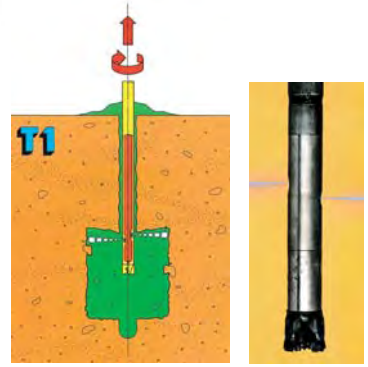
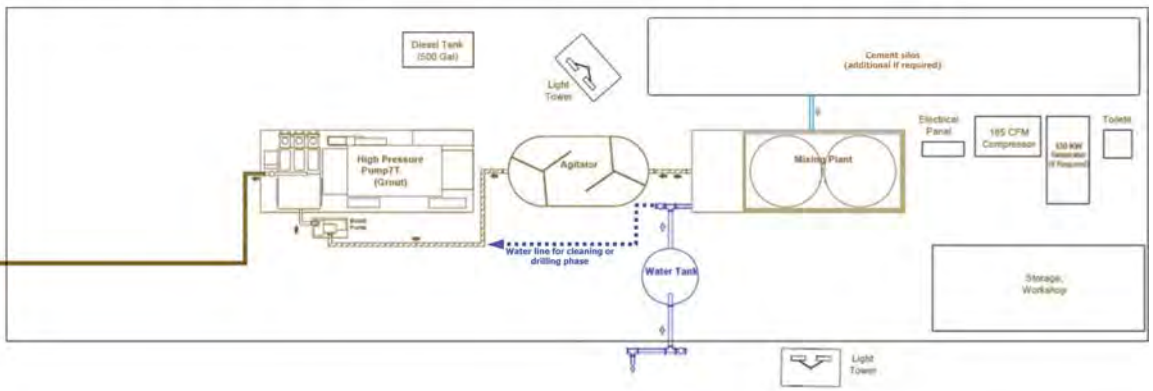
Simultaneous break-up, partial removal of finer particles and mixing of soil by jets respectively of water plus air, and cement grout. Rotary drilling systems can be adopted by using the same jetting rods. In case of difficult soils, drilling operations have to be performed with an auxiliary roto-percussion drilling string.



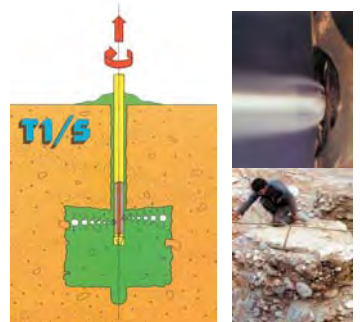
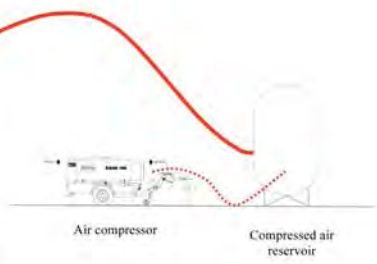
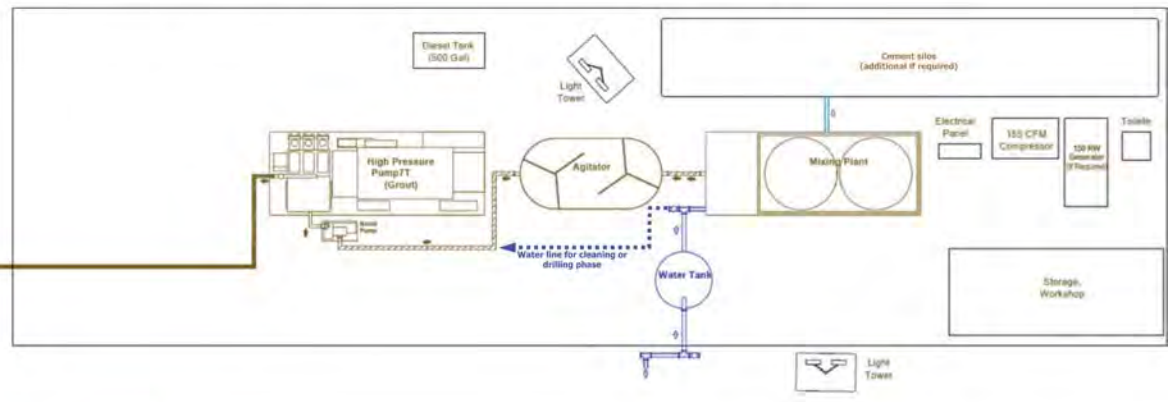
Jet Grouting

MICRODRILLING

JET GROUTING PLANT T1 METHOD (mono-fluid)



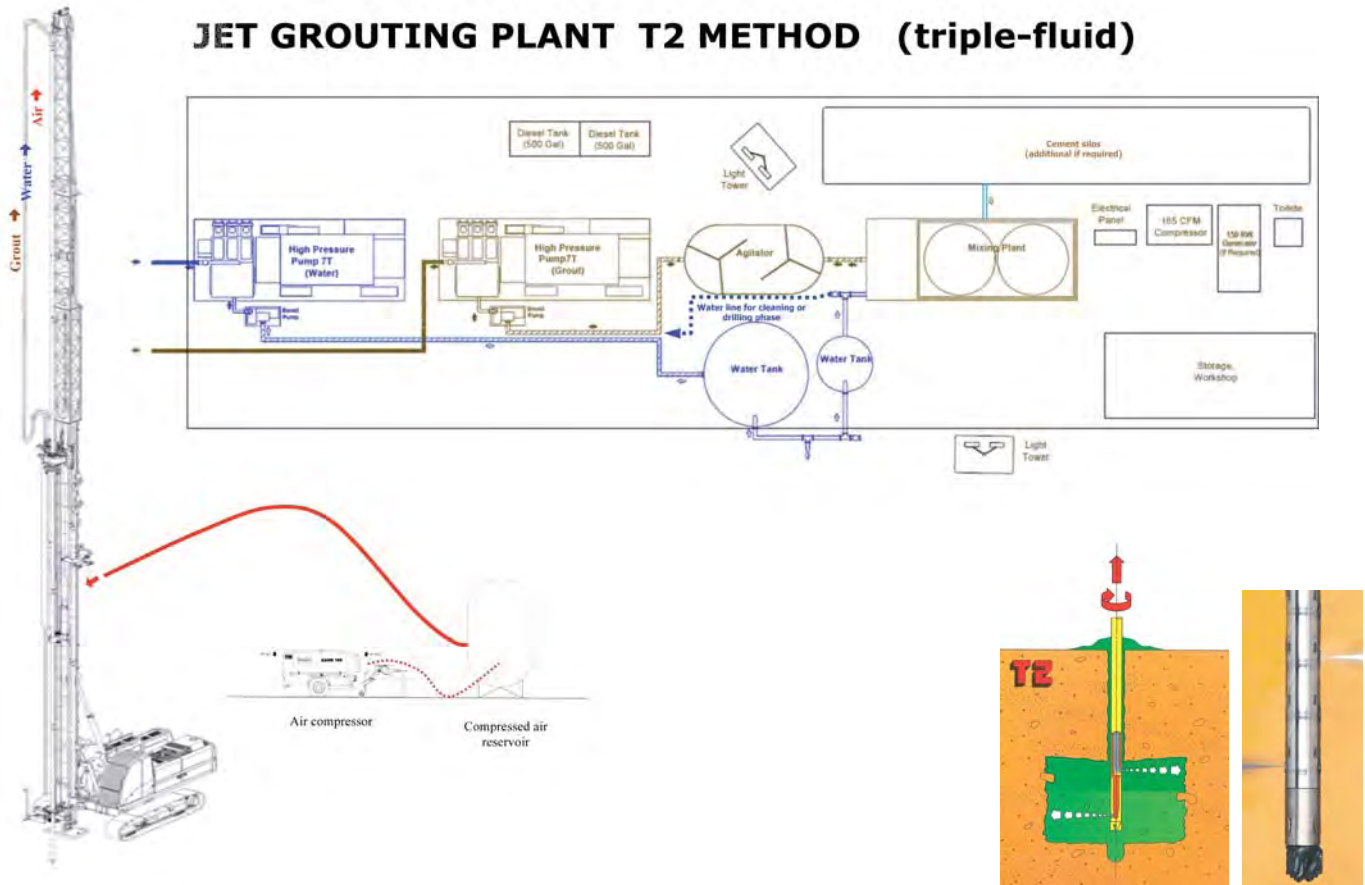
JET GROUTING PLANT T1S METHOD (bi-fluid)



Jet Grouting

MICRODRILLING

JET GROUTING PLANT T2 METHOD (triple-fluid)



Jet Grouting

MICRODRILLING

All models in the SOILMEC/PSM range are suitable for jet grouting.

It is possible to choose the jet grouting configuration when first setting up, from the wide range of rotaries, with an internal tube from 93 to 143 mm, together with the matching chuck, for column treatments up to 3000 mm in diameter and compatible with the type of soil.

Drills initially designed for other technologies may also be adapted for jet grouting using the appropriate transformation kits available for individual models.

Single pass treatments, starting from 12 m are possible with the PSM 8, the lightest rig in the range, then up to 36 m with the special SM-30 that, with the aid of a special loading system, can reach a depth of 55 m.

Drill with COMPLETE BOOM ARTICULATION AND COMBINATED BOOM ARTICULATION

<i>Model</i>	<i>Treatment depth m</i>	<i>Allowed rod diameter mm</i>
PSM-8	12	76 (90)
PSM-8B	12	76 (90)
SM-14	16	114 (127)
PSM-20	21	90 (127)
SM-21	20	140

Drill with FIXED KINETIC

<i>Model</i>	<i>Treatment depth m</i>	<i>Allowed rod diameter mm</i>
PSM-8G	12	76 (90)
PSM-16G	16	127
SM-30 *	32	140
ST-30 (Vertical version)	25	114 (127)

* special equipment with triangular support, SR-30 derivation.

Drill with TUNNEL TELESCOPIC BOOM

<i>Model</i>	<i>Treatment depth m</i>	<i>Allowed rod diameter mm</i>
ST-15	11	114 (127)
ST-20	14.2 - 16	114
ST-30	14	114 (127)
PST-60	24	90 (127)
ST-120	24	90 (127)

Jet Grouting

MICRODRILLING

SOILMEC pumps are used for high pressure grout technologies for soil consolidations.

The experience gained in the oil field as well as in soil improvement over the last two decades, has enabled to develop sturdy and reliable.

Soilmec pumps are mechanically driven through a system made of clutch, gearbox, cardan joint and chain.

Optional items:

- Diesel engines of different brands
- Booster pump
- Visualizing and recording devices for treatment parameters
- Container or skid-mounted version



Model	Max pressure bar (psi)	Max delivery lt./min (G,P,M.)	Nominal power kW (HP)
5T-400J	900 (13.050)	442 (116)	298 (400)
7T-500J	900 (13.050)	599 (158)	373 (500)
7T-600J	800 (11.600)	760 (200)	447 (600)
7T-800J	750 (10.880)	614 (162)	597 (800)
7T-1000J	800 (11.600)	682 (180)	746 (1000)

Notes:

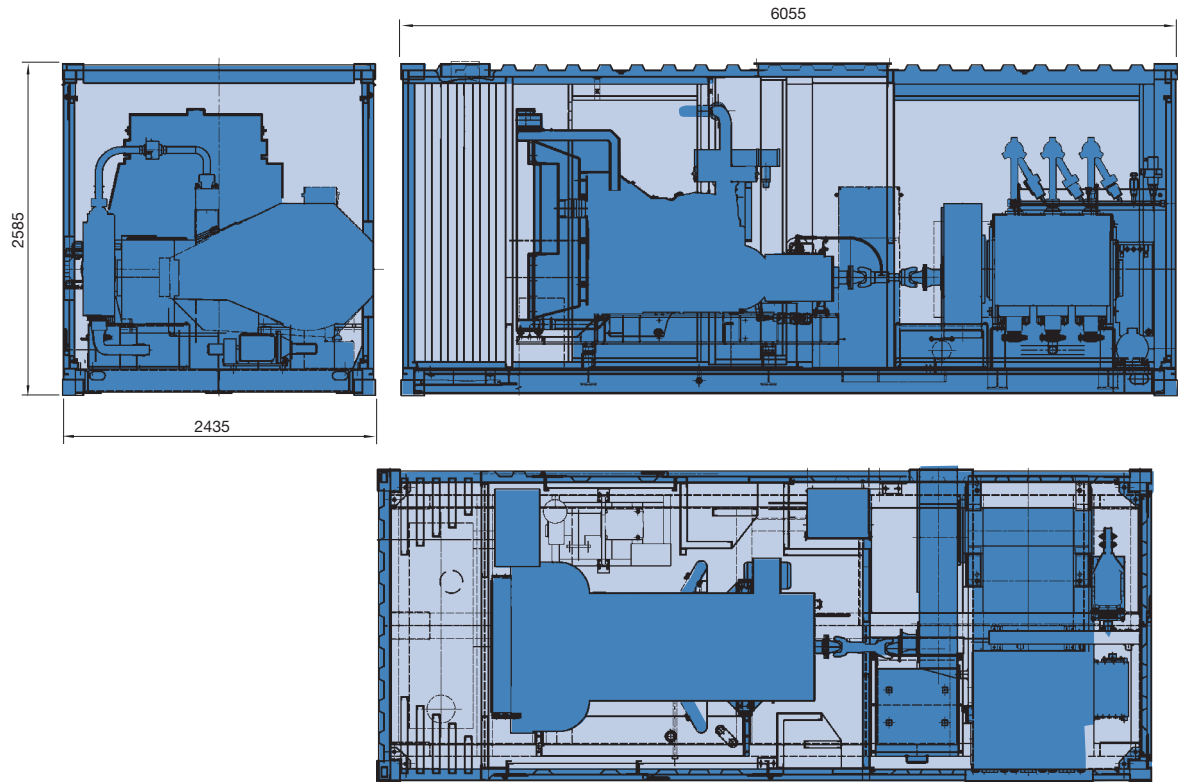
1) Volumetric efficiency : 100%.

2) Mechanical efficiency: 90%

High pressure pumps

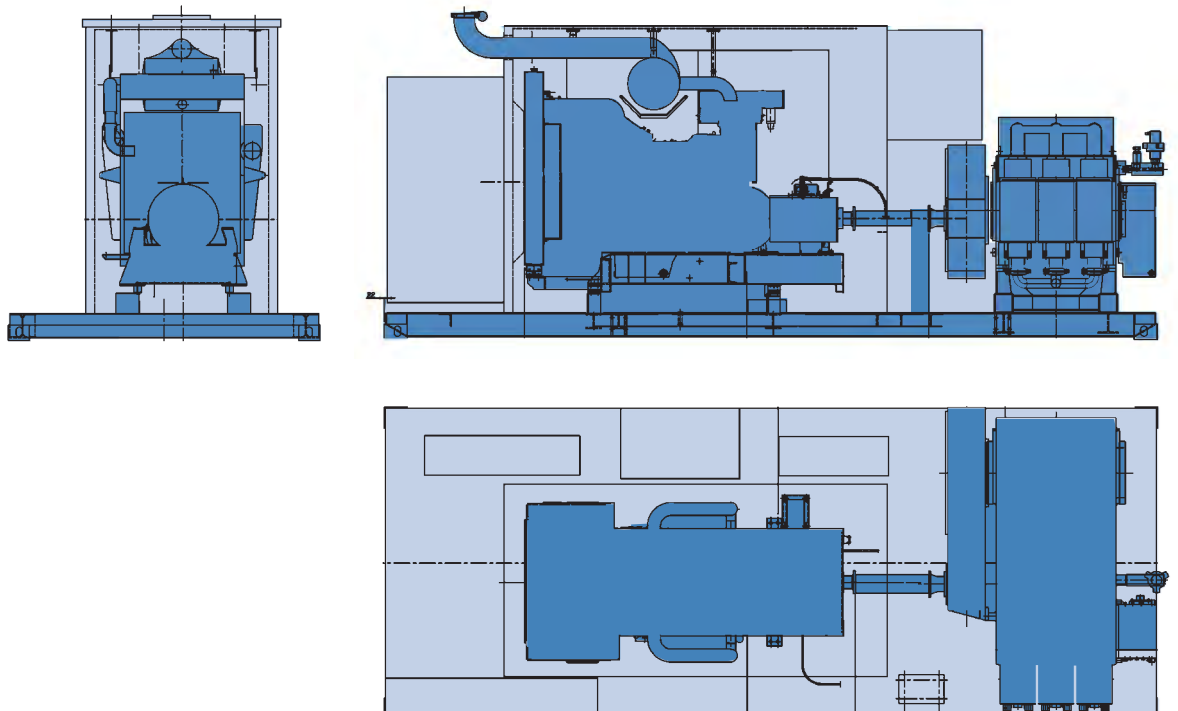
JET GROUTING - JOB SITE ACCESSORIES

Containerized version



Only for
5T-400J, 7T-500J e 7T-600J

Skid version

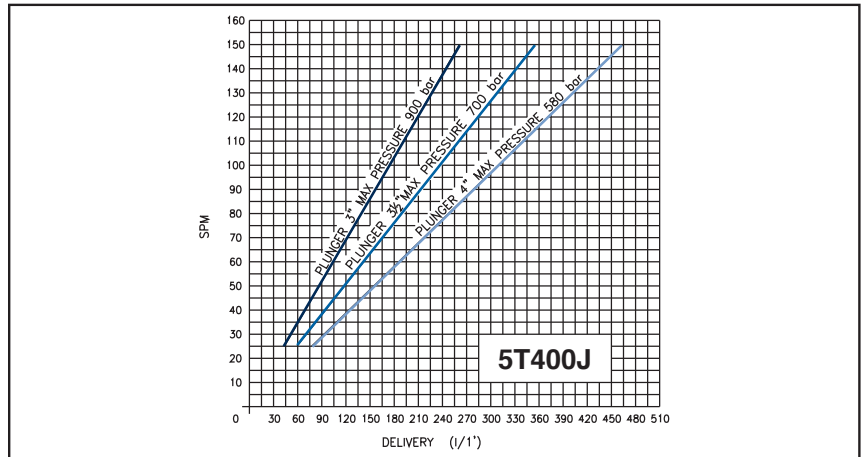


High Pressure Pumps

JET GROUTING - JOB SITE ACCESSORIES

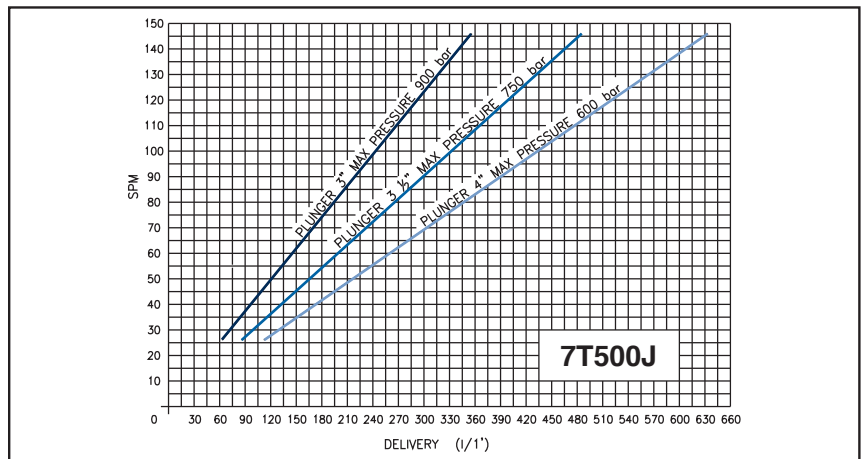
5T-400J

Plunger diameter	in	3 - 3 1/2 - 4
Stroke	in	5
Max discharge press.	bar (P.S.I.)	900 (13.050)
Max delivery	l/min (G.P.M.)	442 (116)
Nominal power	kW (HP)	298 (400)
Mass (approx.)	kg (lbs)	12.500 (27.560)



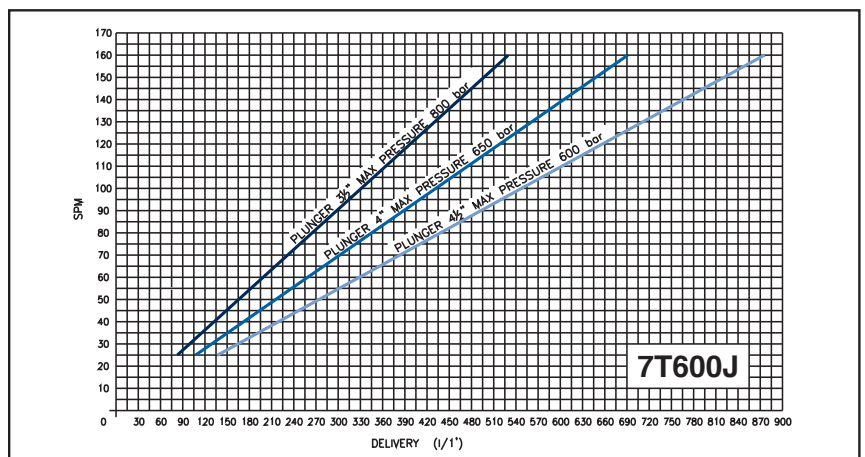
7T-500J

Plunger diameter	in	3 - 3 1/2 - 4
Stroke	in	7
Max discharge press.	bar (P.S.I.)	900 (13.050)
Max delivery	l/min (G.P.M.)	599 (158)
Nominal power	kW (HP)	373 (500)
Mass (approx.)	kg (lbs)	13.400 (29.550)



7T-600J

Plunger diameter	in	3 1/2 - 4 - 4 1/2
Stroke	in	7
Max discharge press.	bar (P.S.I.)	800 (11.600)
Max delivery	l/min (G.P.M.)	760 (200)
Nominal power	kW (HP)	447 (600)
Mass (approx.)	kg (lbs)	14.000 (30.870)

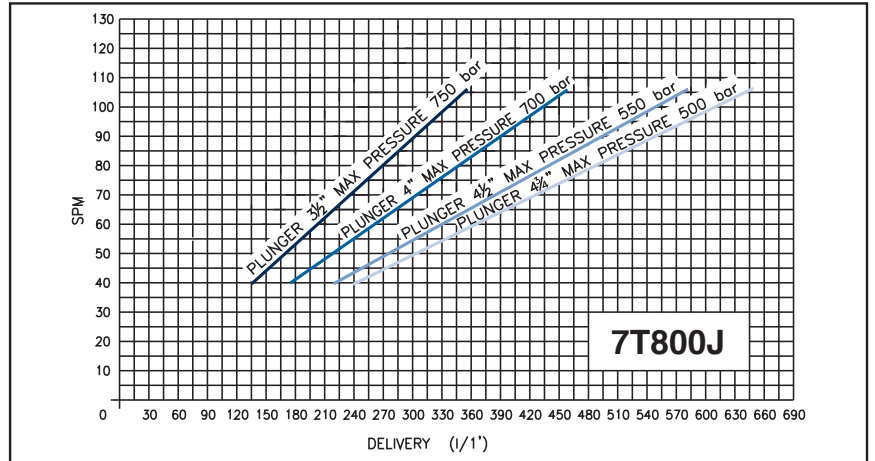


High pressure pumps

JET GROUTING - JOB SITE ACCESSORIES

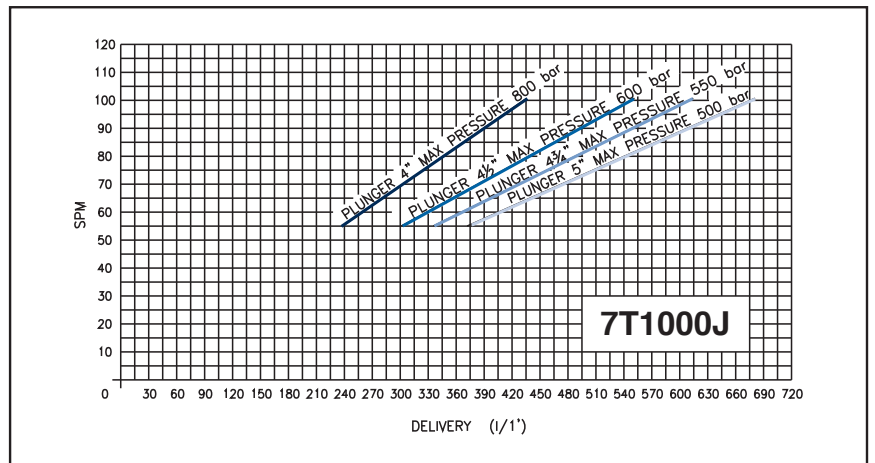
7T-800J

Plunger diameter	in	3 1/2 - 4 - 4 1/2 - 4 3/4
Stroke	in	7
Max discharge press.	bar (P.S.I.)	750 (10.880)
Max delivery	l/min (G.P.M.)	614 (162)
Nominal power	kW (HP)	597 (800)
Mass (approx.)	kg (lbs)	23.000 (50.700)



7T-1000J

Plunger diameter	in	4 - 4 1/2 - 4 3/4 - 5
Stroke	in	7
Max discharge press.	bar (P.S.I.)	800 (11.600)
Max delivery	l/min (G.P.M.)	682 (180)
Nominal power	kW (HP)	746 (1.000)
Mass (approx.)	kg (lbs)	24.000 (52.900)



PSM-8 / PSM-8B

JET GROUTING - COMPLETE AND COMBINATED BOOM ARTICULATIONS RIG

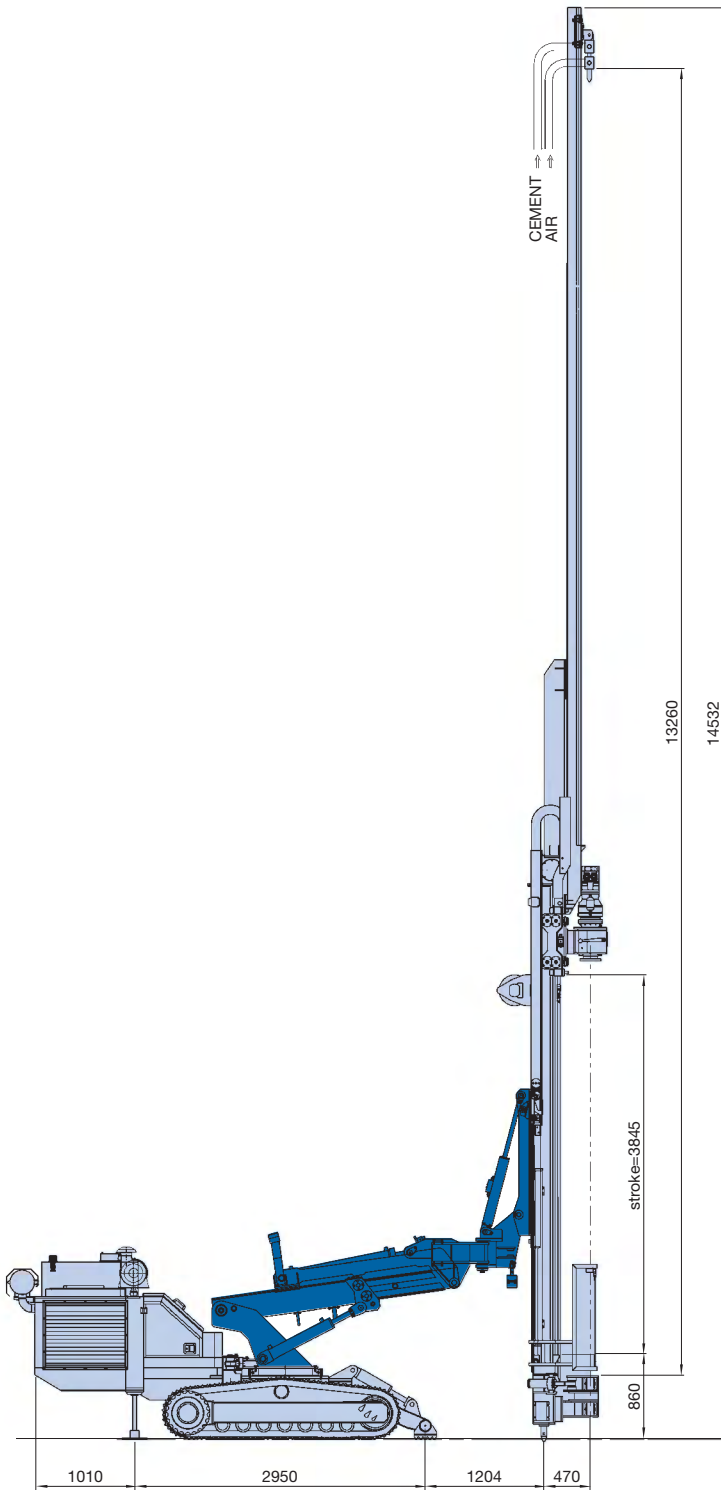
To use 90 mm diameter rods the optional HR-10 G rotary is required.
Systems for measuring and recording the drilling parameters can be fitted.

		PSM-8	PSM-8B
Max treatment	mm	12000	12000
Max rod diameter	mm	76+90	76+90
Operative weight (jet grouting configuration)	kg	9200	8800
Engine			
Power	kW	103	103
Rated power	kW	85	85
Hydraulic System			
Main pump	l/min	149	149
Service pump	l/min		
Rotary		HR-10	HR-10
Max torque	daNm	1024	1024
Rotation speed	rpm	382	382
Mast feed/hoist system			
Standard cradle stroke	mm	3845	3845
Rod length	mm	3000	3000
Max hoist force	kN	60	60
Max feed force	kN	60	60
Max speed (slow/fast)	rpm	0-17 / 35	0-17 / 35
Clamp & Breaker			
Clamping range	mm	60-260	60-260
Max clamping force	kN	110	110
Max breaking torque	daNm	3600	3600
Service winch			
Max line pull 1st layer	kN	15	15
Rope diameter	mm	10	10
Undercarriage			
Track shoe width	mm	300	300
Overall length	mm	2474	2474
Overall width	mm	1900	1900
Travelling speed	km/h	2,36	2,36
Weight			
Total weight	kg	8500 / 9200	8000 / 8800
Average pressure on ground	MPa	0,07	0,07

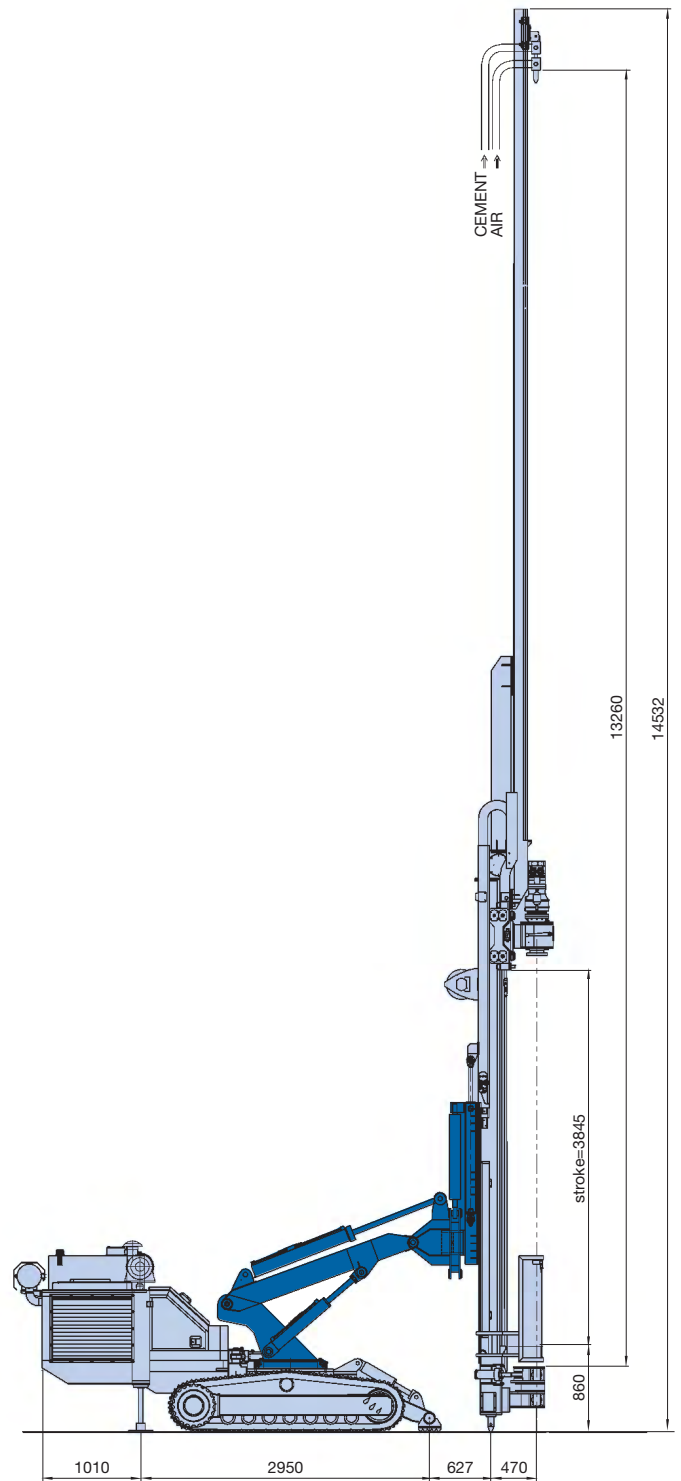
PSM-8 / PSM-8B

JET GROUTING - COMPLETE BOOM ARTICULATION

PSM-8



PSM-8B



SM-14

JET GROUTING - COMPLETE BOOM ARTICULATION

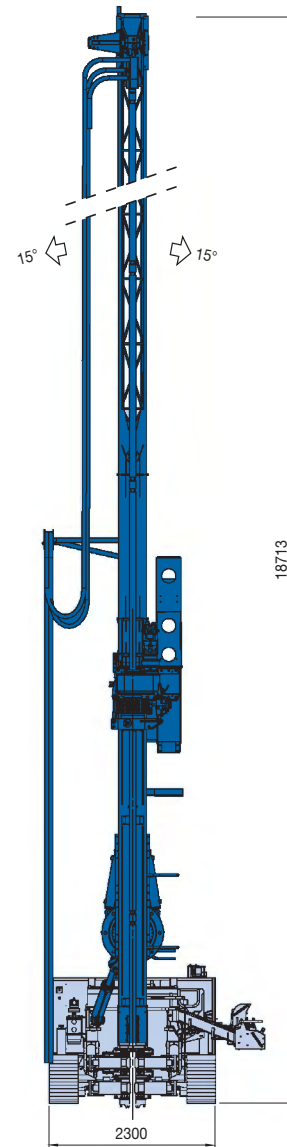
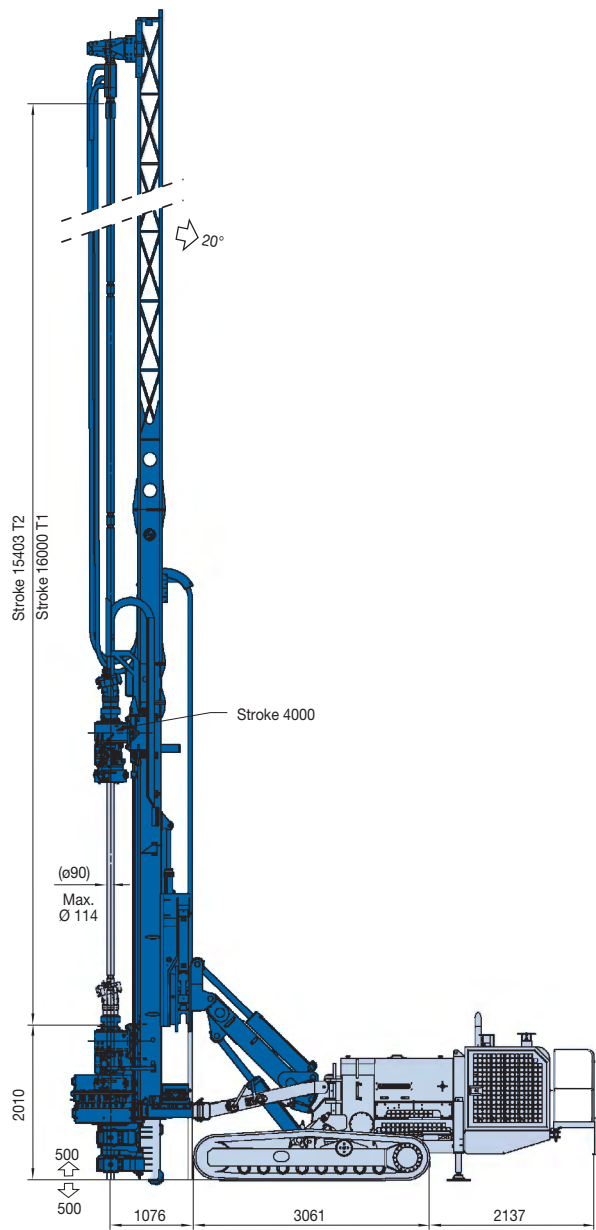
The SM-14 is very versatile and particularly suitable for jet grouting, with an appropriate transformation kit.

- Max depth treatment: 16 m (monofluid system) and 15,4 (bifluid/trifluid system) with rod up to 127 mm diameter c/w special adapter kit
- Systems for measuring and recording the drilling parameters can be fitted
- Variable rotary available

Max treatment	mm	15400 ÷ 16000		
Max rod diameter	mm	90 - 114 - 127		
Operative weight (jet grouting configuration)	kg	13800		
Engine		CUMMINS QSB 4.5 Tier 3		
Power	kW	123 @ 2000 rpm		
Rated power	kW	119 @ 2200 rpm		
Hydraulic System				
Main pump	l/min	156		
Service pump	l/min	156		
Rotary		HR-12	HR-16G	
Max torque	daNm	1207	1560	
Rotation speed	rpm	0-221	0-184	
Mast feed/hoist system		Standard (cylinder)	Optional (gear motor)	
Standard cradle stroke	mm	4000	7000	
Rod length	mm	3000	6000	
Max hoist force	kN	89	87	
Max feed force	kN	45	87	
Max speed (slow/fast)	rpm	0-28	0-28	
Clamp & Breaker		Standard	Optional	
Clamping range	mm	50-315	50-360	60-415
Max clamping force	kN	266	266	266
Max breaking torque	daNm	5060	5060	5060
Service winch				
Max line pull 1st layer	kN	20		
Rope diameter	mm	10		
Undercarriage				
Track shoe width	mm	400		
Overall length	mm	3062		
Overall width	mm	2300		
Travelling speed	km/h	2,7		
Weight				
Total weight	kg	13000 / 14000		
Average pressure on ground	MPa	0,07		

SM-14

JET GROUTING - COMPLETE BOOM ARTICULATION



PSM-20

JET GROUTING - COMPLETE BOOM ARTICULATION

The PSM-20 hydraulic drilling rig, with the relevant kit, lets you execute jetting treatments down to a depth of 21 m without the use of rod loaders.

The jet grouting kit has a special telescopic extension. In fact, the jet extension guided by the rotation head, slides on the main mast so you can transport the rig at the end of the job with the kit completely mounted and ready for use on another site.

90 mm diameter rods are used with the standard rotary.

To use 127 mm diameter rods, the optional HR-21 rotary is required.

Systems for measuring and recording the drilling parameters can be fitted.

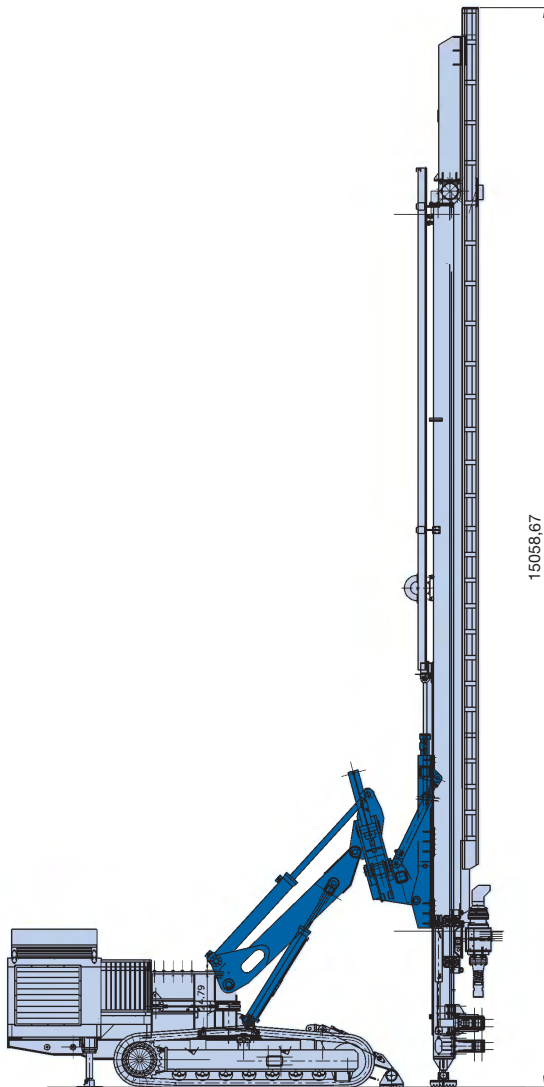
Max treatment	mm	21000	
Max rod diameter	mm	90 (127*)	
Operative weight (jet grouting configuration)	kg	21500 ÷ 22500	
Engine		DEUTZ TCD 2012 L06 Tier 3	
Power	kW	155 @ 2400 rpm	
Rated power	kW	135	
Hydraulic System			
Main pump	l/min	260	
Service pump	l/min	86+54+32+22+16	
Rotary		Standard HR-17	Option HR-21 (Gear motor)
Max torque	daNm	1747	2154
Rotation speed	rpm	295	315
Mast feed/hoist system			
		Standard (Gear motor)	Optional (Gear motor)
Standard cradle stroke	mm	7200	10200
Rod length	mm	6000	9000
Max hoist force	kN	83	83
Max feed force	kN	83	83
Max speed (slow/fast)	rpm	0-28	0-28
Clamp & Breaker			
		Standard	Optional
Clamping range	mm	50-320	50-360
Max clamping force	kN	266	170
Max breaking torque	daNm	5060	7160
Service winch			
Max line pull 1st layer	kN	20	
Rope diameter	mm	10	
Undercarriage			
Track shoe width	mm	500	
Overall length	mm	2500	
Overall width	mm	2900	
Travelling speed	km/h	2,0	
Weight			
Total weight	kg	20000 - 24000	
Average pressure on ground	MPa	0,07	

* optional rotary, 127 mm

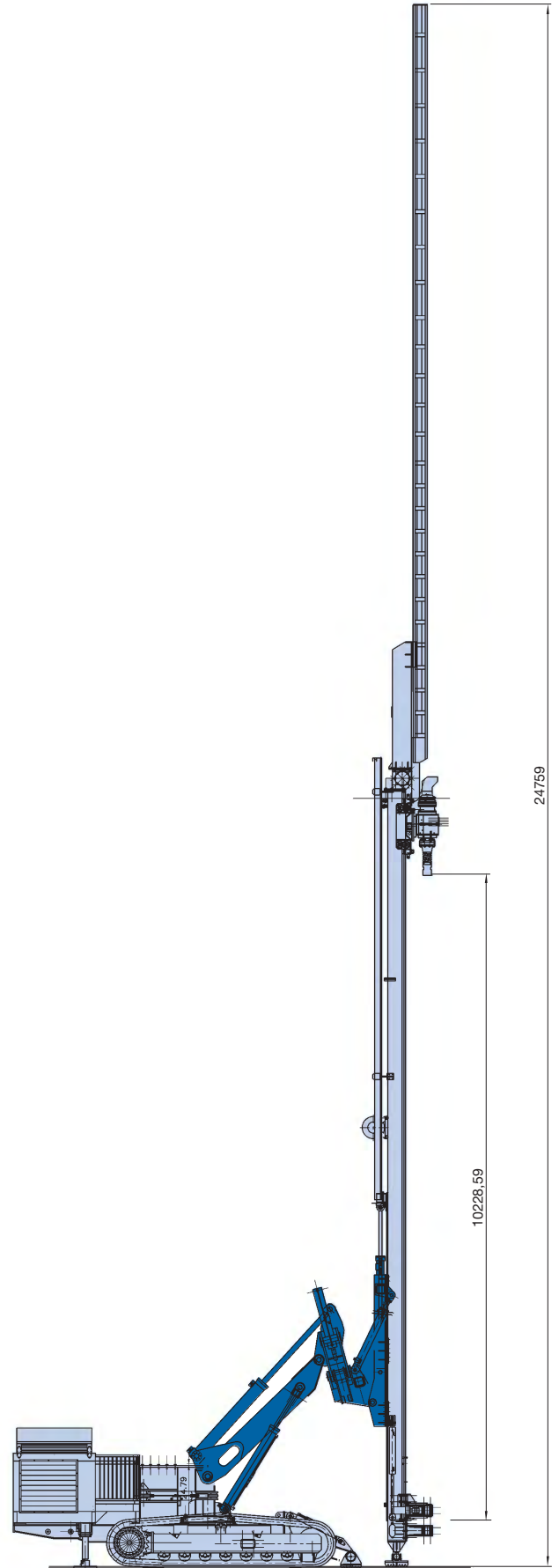
PSM-20

JET GROUTING - COMPLETE BOOM ARTICULATION

Closed version
with low rotary



Max version with rotary on top
(max treatment 21 m in monofluid version)



SM-21

JET GROUTING - COMPLETE BOOM ARTICULATION

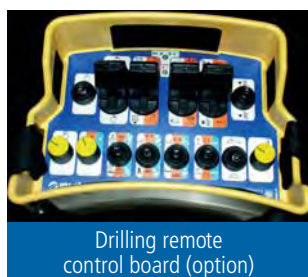
The new SM-21 is very versatile and particularly suitable for jet grouting, with an appropriate transformation kit.

- Max treatment depth: 20 m single passage and 51 m with rod carousel
- Systems for measuring and recording the drilling parameters can be fitted.

Max treatment	mm	20000	
Max rod diameter	mm	140	
Operative weight (jet grouting configuration)	kg	22000 ÷ 24000	
Engine	DEUTZ TCD 2013 L06 2V Tier 3		
Power	kW	188	
Rated power	kW	176	
Hydraulic System			
Main pump	l/min	266	
Service pump	l/min	17+64+64+26	
Rotary		HR-20	HR-37
Max torque	daNm	2025	3659
Rotation speed	rpm	179	127
Mast feed/hoist system		Cylinder	Gear motor
Standard cradle stroke	mm	4800	7000
Rod length	mm	3000	6000
Max hoist force	kN	141	113
Max feed force	kN	79	113
Max speed (slow/fast)	rpm	0-24	0-29
Clamp & Breaker		Standard	Optional
Clamping range	mm	50-315	60-415
Max clamping force	kN	266	266
Max breaking torque	daNm	5060	5060
Service winch			
Max line pull 1st layer	kN	20	
Rope diameter	mm	10	
Undercarriage			
Track shoe width	mm	500	
Overall length	mm	3631	
Overall width	mm	2500	
Travelling speed	km/h	2,48	
Weight			
Total weight	kg	21000	
Average pressure on ground	MPa	0,07	



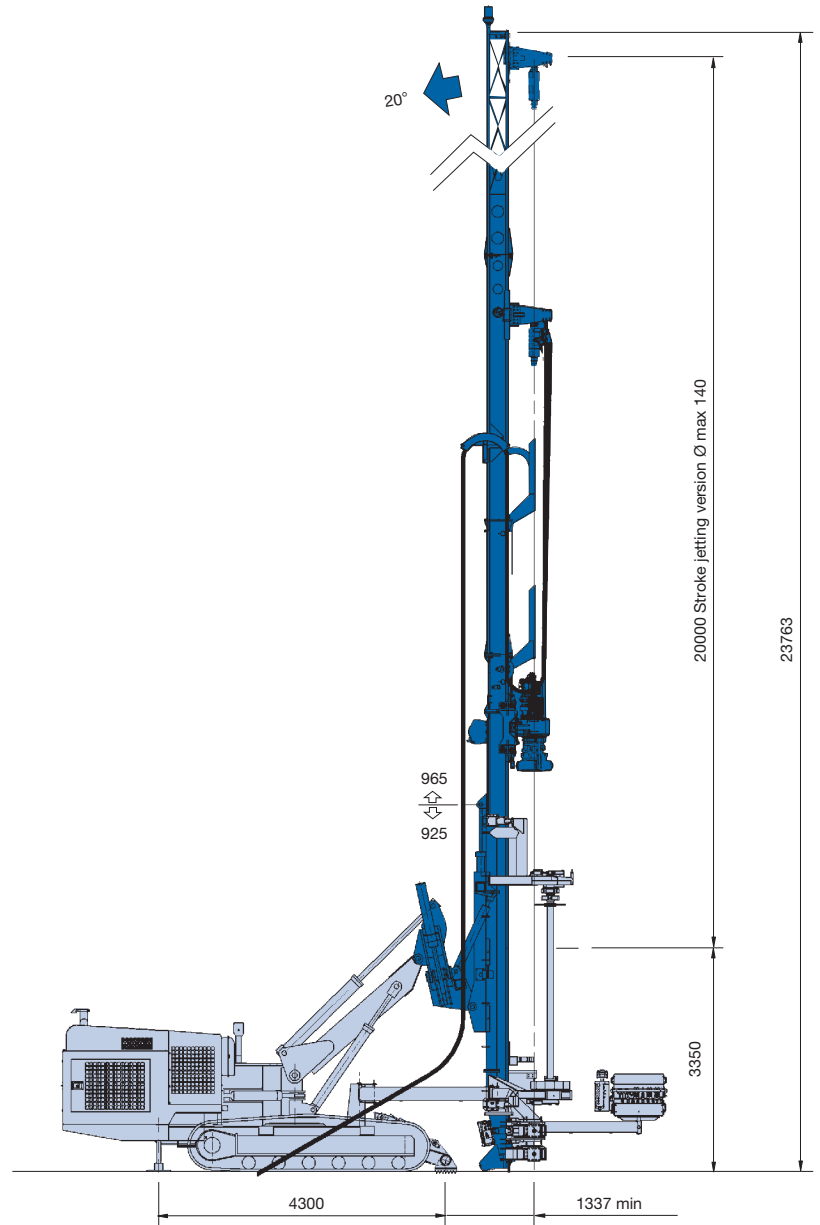
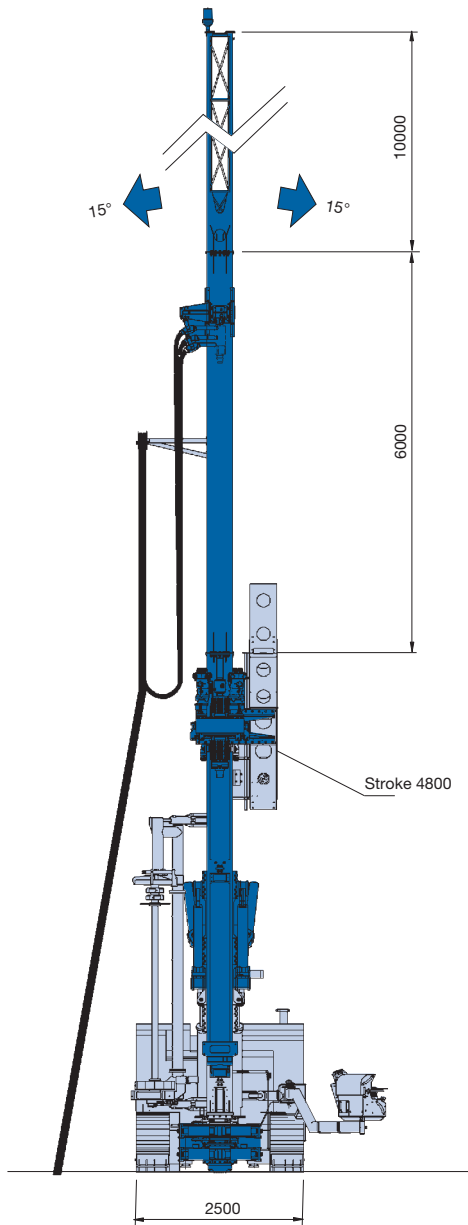
Drilling control board



Drilling remote control board (option)

SM-21

JET GROUTING - COMPLETE BOOM ARTICULATION



PSM-8G

JET GROUTING - FIXED KINEMATIC

The **PSM-8G** hydraulic drilling rig, with the relevant kit, lets you execute jetting treatments down to a depth of 12 m without the use of rod loaders. The jet grouting kit has a special telescopic extension.

The jet extension in fact, guided by the rotary head, slides on the main mast so you can transport the rig at the end of the job with the kit completely mounted and ready for use on another site.

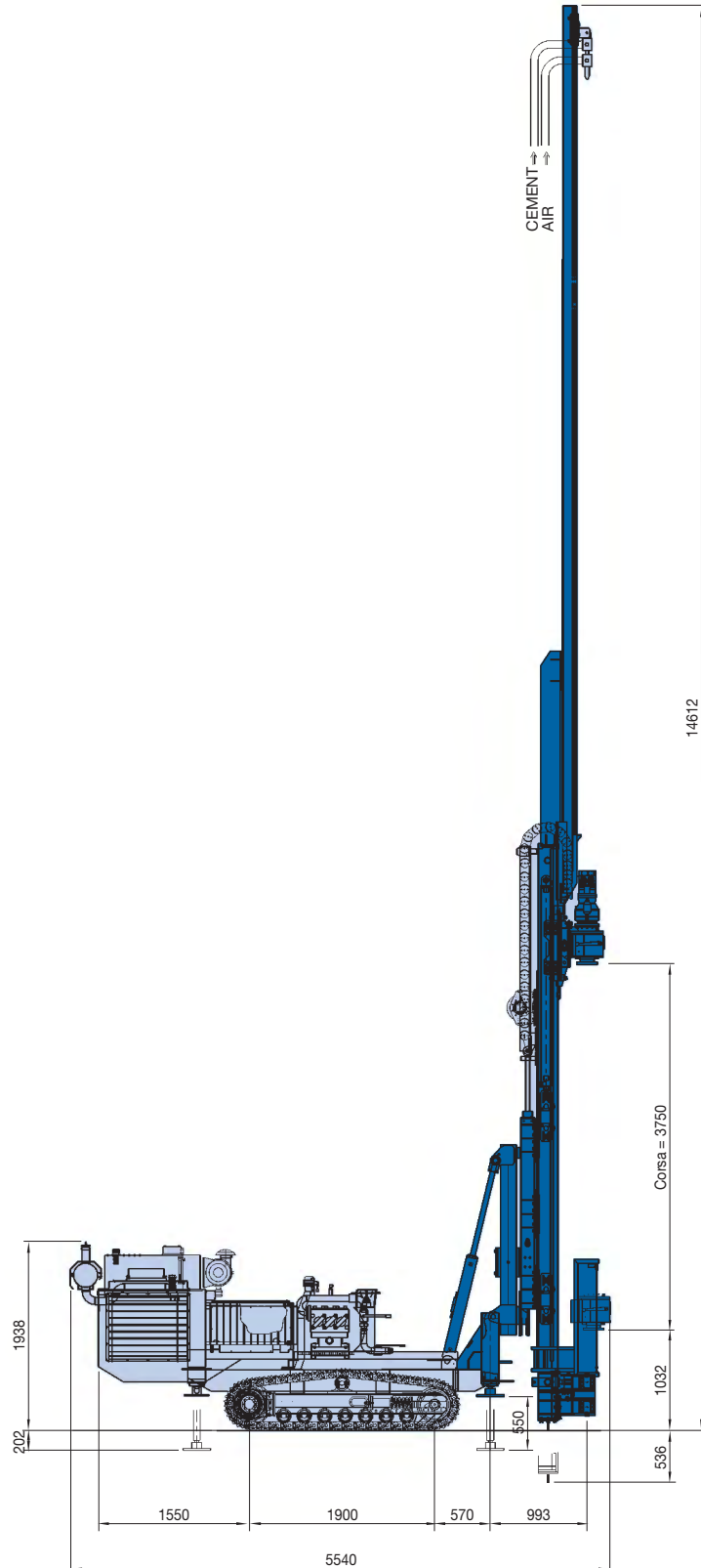
- 76 mm rods are used with the standard rotary
- To use 90 mm diameter rods the optional HR-9L coring rotary is required

Systems for measuring and recording the drilling parameters can be fitted

Max treatment	mm	12000
Max rod diameter	mm	76 (90)
Operative weight (jet grouting configuration)	kg	9200
Engine	DEUTZ TCD 2012 L04	
Power	kW	103 @ 2400 rpm
Rated power	kW	85
Hydraulic System		
Main pump	l/min	149
Service pump	l/min	71+46+29+23
Rotary	HR-9 coring	
Max torque	daNm@rpm	916 @ 52
Rotation speed	rpm	0-832
Mast feed/hoist system		
Standard cradle stroke	mm	3900
Rod lenght	mm	3000
Max hoist force	kN	98
Max feed force	kN	73,6
Max speed (slow/fast)	rpm	11 (14) - 32 (44)
Clamp & Breaker		
Clamping range	mm	60-260
Max clamping force	kN	110
Max breaking torque	daNm	3600
Service winch		
Max line pull 1st layer	kN	15
Rope diameter	mm	10
Undercarriage		
Track shoe width	mm	300
Overall lenght	mm	2474
Overall width	mm	1900
Travelling speed	km/h	2,36
Weight		
Total weight	kg	8200 ± 9000
Average pressure on ground	MPa	0,07

PSM-8G

JET GROUTING - FIXED KINEMATIC



PSM-16G

JET GROUTING - FIXED KINEMATIC

The PSM-16G drilling rig with the special kit can execute column jet grouting to a depth of 16 m (monofluid system).

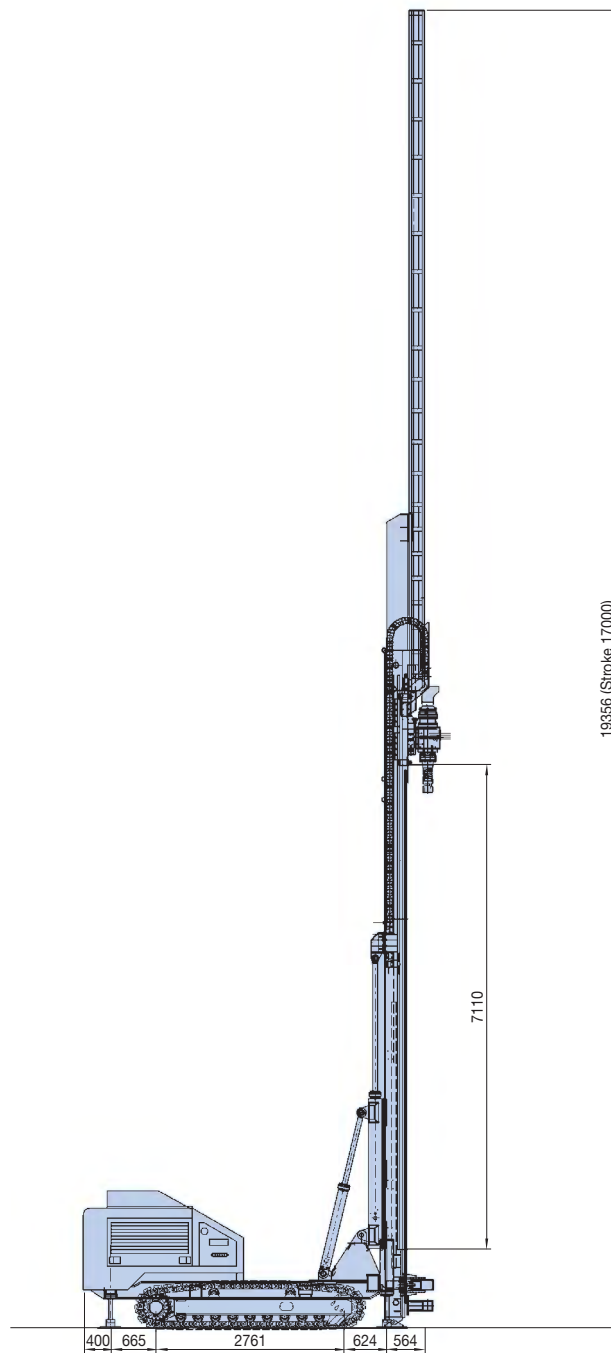
Optional tools:

- Thrust block with pistons on mast for drilling inclined piles
- Ready for systems to record drilling parameters

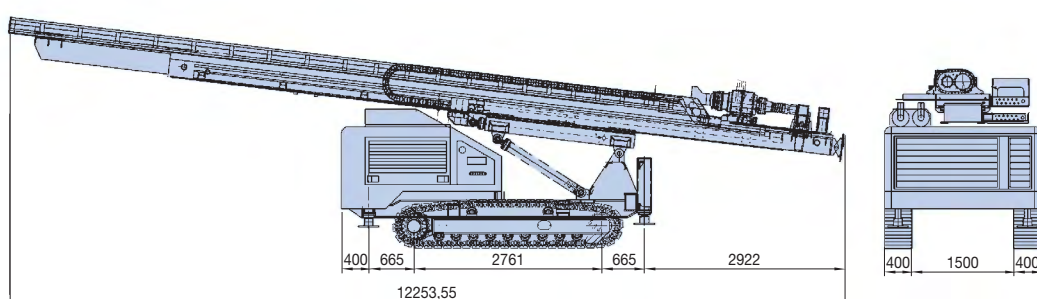
Max treatment	mm	90 (127)
Max rod diameter	mm	16
Operative weight (jet grouting configuration)	kg	15000 - 17000
Engine	DEUTZ TCD 2013 L06 2V	
Power	kW	200@2400 rpm
Rated power	kW	176 @ 1900 rpm
Hydraulic System		
Main pump	l/min	280
Service pump	l/min	142+64+44+22
Rotary	HR-10 coring	
Max torque	daNm@rpm	1024
Rotation speed	rpm	1000
Mast feed/hoist system		
Standard cradle stroke	mm	4000
Rod lenght	mm	3000
Max hoist force	kN	195
Max feed force	kN	130
Max speed (slow/fast)	rpm	0,14 - 0,58
Clamp & Breaker		
Clamping range	mm	60-320
Max clamping force	kN	340
Max breaking torque	daNm	8600
Service winch		
Max line pull 1st layer	kN	30
Rope diameter	mm	14
Undercarriage		
Track shoe width	mm	400
Overall lenght	mm	2760
Overall width	mm	2300
Travelling speed	km/h	23
Weight		
Total weight	kg	15000 - 17000
Average pressure on ground	MPa	0,7

PSM-16G

JET GROUTING - FIXED KINEMATIC



Transport conditions



SM-30

JET GROUTING - FIXED KINEMATIC

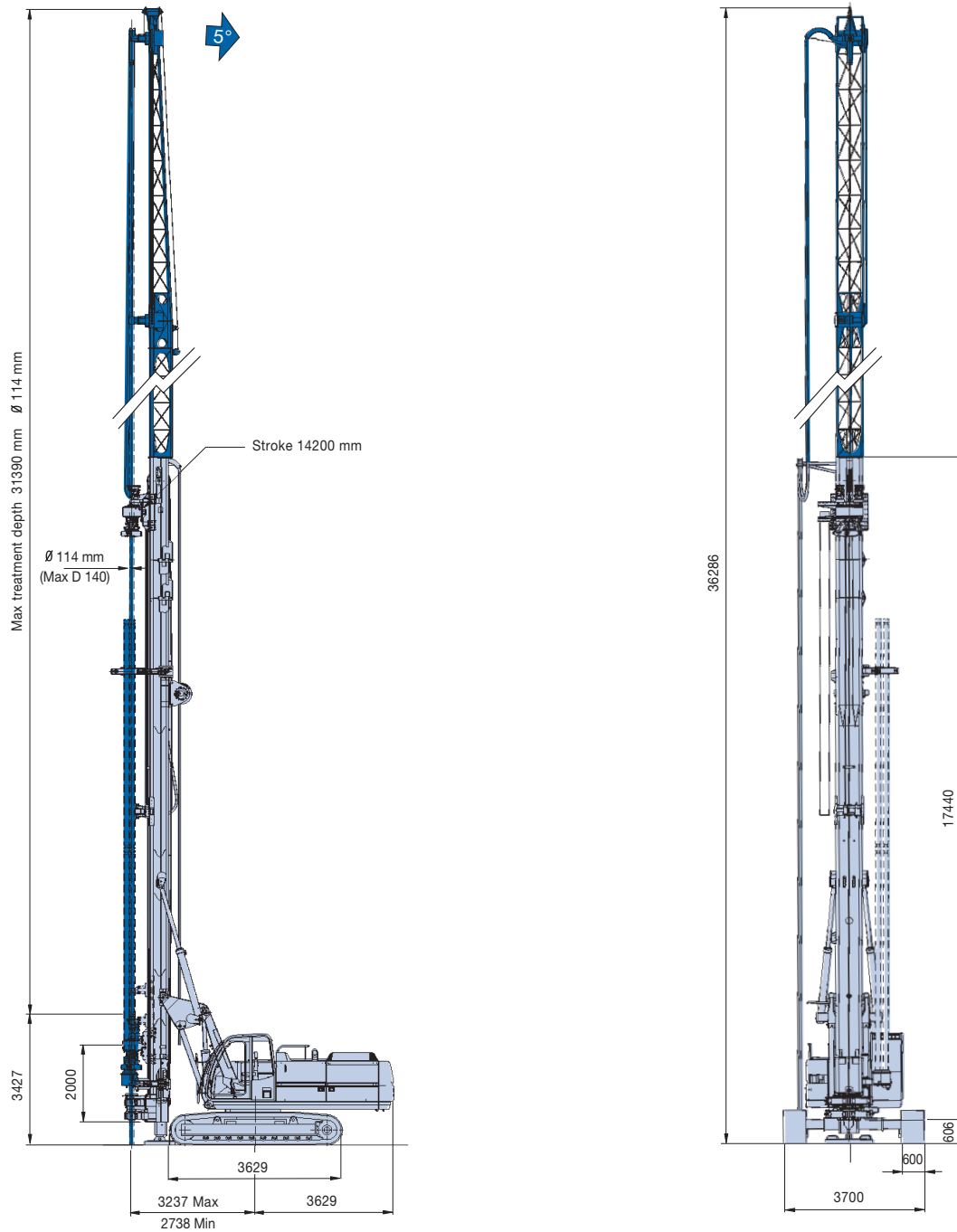
The SM-30 hydraulic drilling rig is designed for particularly difficult jobs working at great depth with excellent jetting performance.

- Depths of 55.5 m can be reached using 140 mm diameter rods with a rod loader
- Systems for measuring and recording the drilling parameters can be fitted
- Single jetting treatments can be executed to a depth of 31.5 m

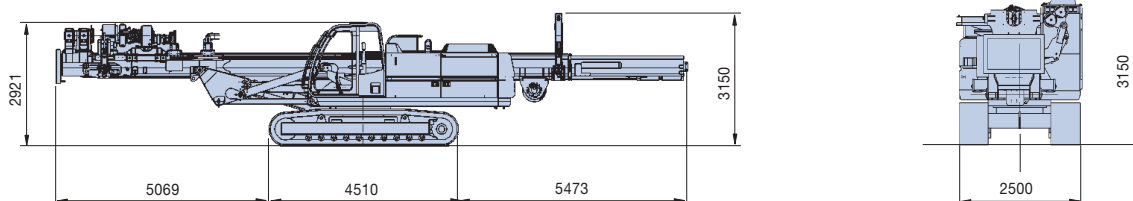
Single pass treatment	mm	31500		
Max treatment	mm	55000		
Max rod diameter	mm	140		
Operative weight (jet grouting configuration)	kg	34000		
Engine		CUMMINS QSB 6.7C Tier 3		
Power	kW	205		
Rated power	kW	164		
Hydraulic System				
Main pump	l/min	352		
Service pump	l/min	96+37+24+20		
Rotary		HR-20	HR-37	
Max torque	daNm	2025	3659	
Rotation speed	rpm	0-117	0-83	
Mast feed/hoist system				
Standard cradle stroke	mm	14200		
Rod length	mm	12000		
Max hoist force	kN	12		
Max feed force	kN	12		
Max speed (slow/fast)	rpm	0-28		
Clamp & Breaker		Standard	Optional	
Clamping range	mm	50-315	50-360	60-415
Max clamping force	kN	266	266	266
Max breaking torque	daNm	5060	5060	5060
Service winch				
Max line pull 1st layer	kN	65		
Rope diameter	mm	10		
Undercarriage				
Track shoe width	mm	600		
Overall length	mm	4510		
Overall width	mm	2550 - 3700		
Travelling speed	km/h	2,2		
Weight				
Total weight	kg	33000		
Average pressure on ground	MPa	0,082		

SM-30

JET GROUTING - FIXED KINEMATIC



Transport conditions



ST-15

JET GROUTING - TUNNELLING RIG

Designed for use in the tunnelling version, the new ST-15 can be executed jet grouting method with the relevant kit.

Optional devices:

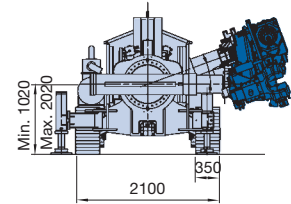
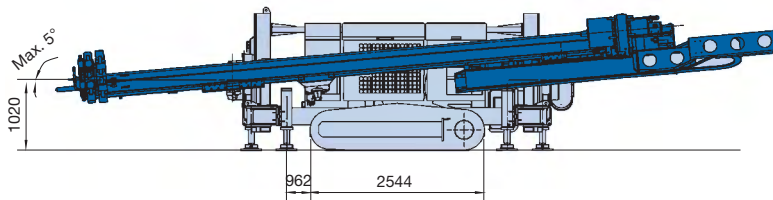
- Systems for measuring and recording the drilling parameters can be fitted

See the working area in the section Tunnelling pag. 66

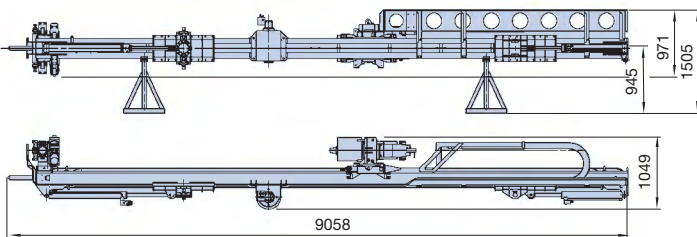
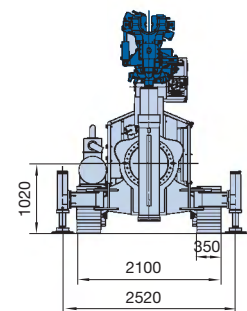
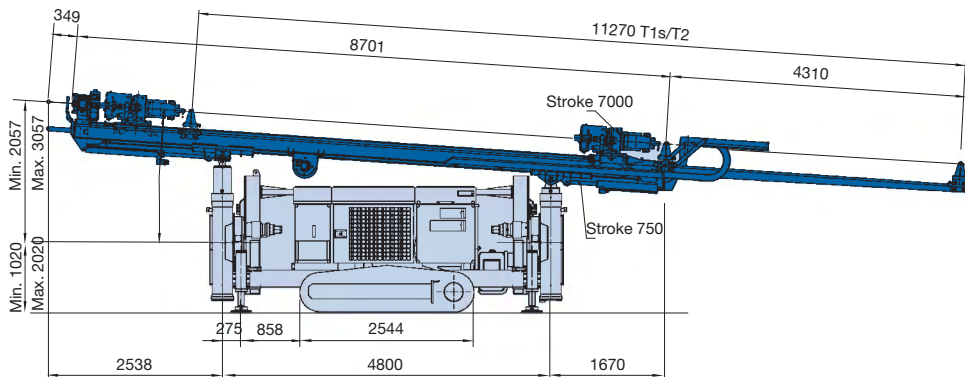
Max treatment	mm	11250
Max rod diameter	mm	90 (127)
Operative weight (jet grouting configuration)	kg	12750
Engine	DEUTZ BF4M 2012	
Power	kW	92
Rated power	kW	85
Electric motor (optional)	kW	90
Hydraulic System*		
Main pump	l/min	221 (28)
Service pump	l/min	54 (25)
Rotary	HR-10	
Max torque	daNm	1028
Rotation speed	rpm	147
Mast feed/hoist system	Winch	
Standard cradle stroke	mm	7000
Rod lenght	mm	6000
Max hoist force	kN	52
Max feed force	kN	52
Max speed (slow/fast)	rpm	7-25
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Undercarriage		
Track shoe width	mm	350
Overall lenght	mm	2544
Overall width	mm	2100
Travelling speed	km/h	2,1
Weight		
Total weight	kg	12250
Average pressure on ground	MPa	0,09

* double idraulic system (diesel+electric)

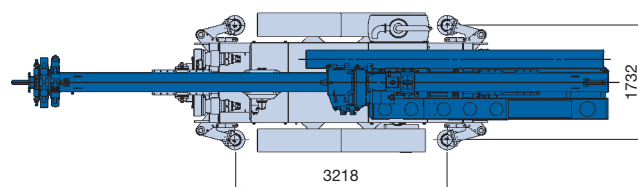
Working Condition Std



Working Condition with extension



Transport conditions (Standard version)



ST-20

JET GROUTING - TUNNELLING RIG

Designed for use in the tunnelling version, the new ST-20 can be executed the jet grouting method with the relevant kit.

- Systems for measuring and recording the drilling parameters can be fitted.

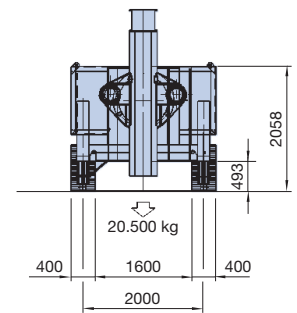
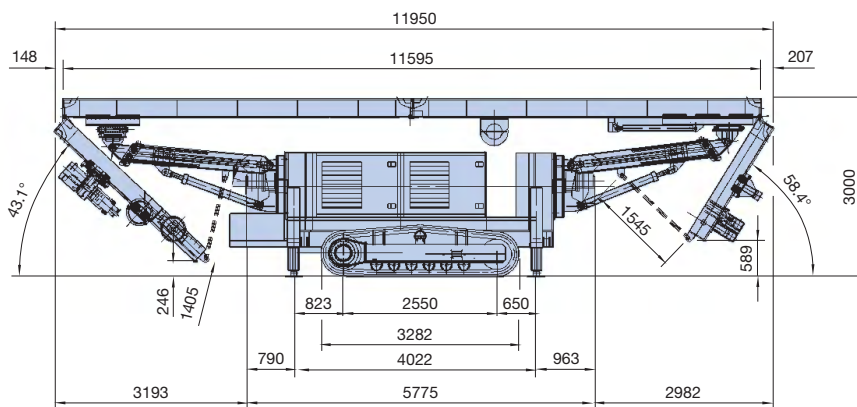
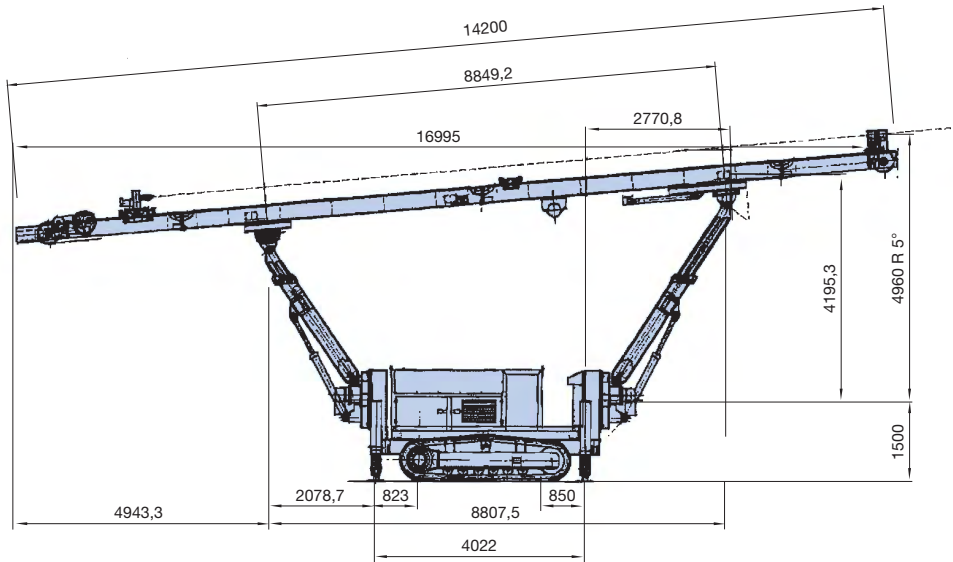
See the working area in the section Tunnelling pag. 66

Max treatment	mm	22000
Max rod diameter	mm	90 (127)
Operative weight (jet grouting configuration)	kg	12750
Engine	DEUTZ TCD 2013 L04 2V	
Power	kW	129@2400 rpm
Rated power	kW	116@1900 rpm
Electric motor	kW	90
Hydraulic System*		
Main pump	l/min	150
Service pump	l/min	86+86+34+22+22+12
Rotary	HR-10	
Max torque	daNm	1028
Rotation speed	rpm	147
Mast feed/hoist system	Winch	
Standard cradle stroke	mm	14200
Max hoist force	kN	67
Max feed force	kN	67
Max speed (slow/fast)	rpm	9 / 32
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	149
Max breaking torque	daNm	3830
Undercarriage		
Track shoe width	mm	400
Overall length	mm	3280
Overall width	mm	2490
Travelling speed	km/h	1,63
Weight		
Total weight	kg	21000
Average pressure on ground	MPa	0,10

* double idraulic system (diesel+electric)

ST-20

JET GROUTING - TUNNELLING RIG



ST-30

JET GROUTING - TUNNELLING RIG

Designed for use in the tunnelling version, the new ST-30 can be executed the jet grouting method with the relevant kit.

Optional device:

- Systems for measuring and recording the drilling parameters can be fitted.

See the working area in the section Tunnelling pag. 66



Control Parameters Display



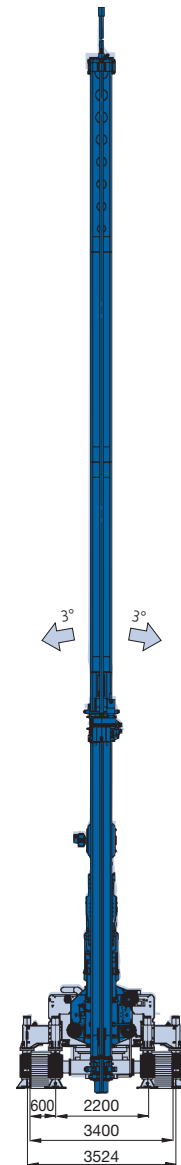
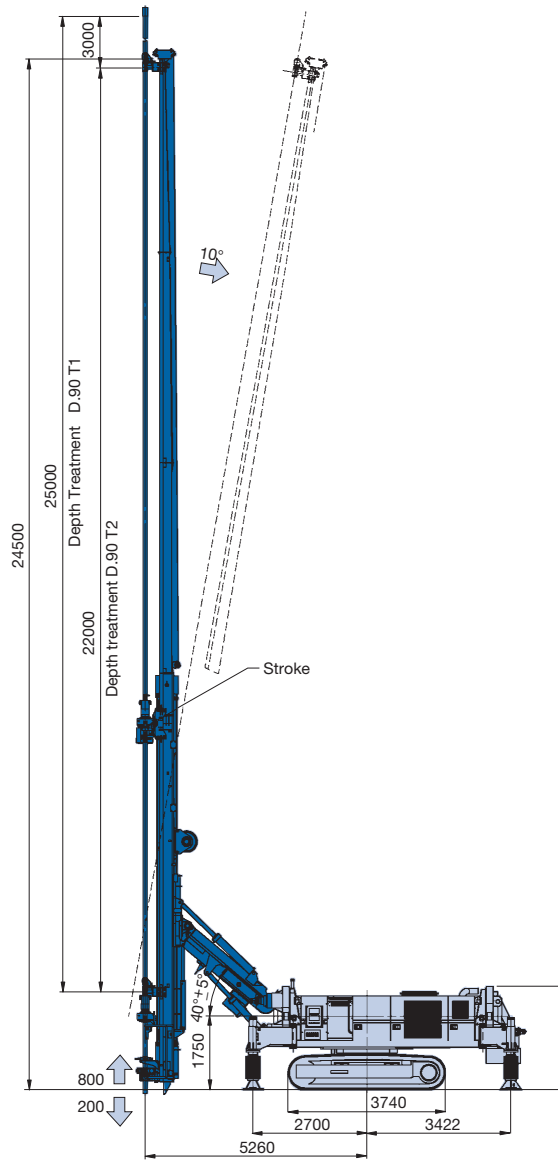
Radio Remote Control

Max treatment	mm	16000
Max rod diameter	mm	114
Operative weight (jet grouting configuration)	kg	28000-30000
Engine	DEUTZ TCD 2012 L06 2V	
Power	kW	153
Rated power	kW	143
Hydraulic System*		
Main pump	l/min	297
Service pump	l/min	55+25
Rotary	HR-12	
Max torque	daNm	1027
Rotation speed	rpm	221
Mast feed/hoist system		
Standard cradle stroke	mm	14000
Max hoist force	kN	84
Max feed force	kN	84
Max speed (slow/fast)	rpm	0-6-30
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Undercarriage		
Track shoe width	mm	600
Overall length	mm	3740
Overall width	mm	2500 - 3740
Travelling speed	km/h	1,5
Weight		
Total weight	kg	32000
Average pressure on ground	MPa	0,09

* double hydraulic system (diesel+electric)

ST-30

JET GROUTING - TUNNELLING RIG



PST-60

JET GROUTING - TUNNELLING RIG

Designed for use in the tunnelling version, the new PST-60 can be modified for the jet grouting method with the relevant kit.

Optional device:

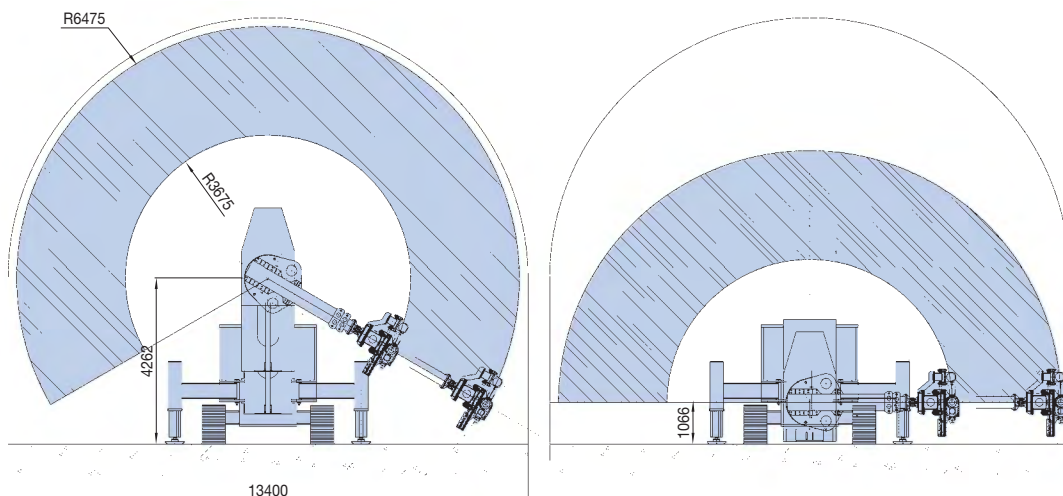
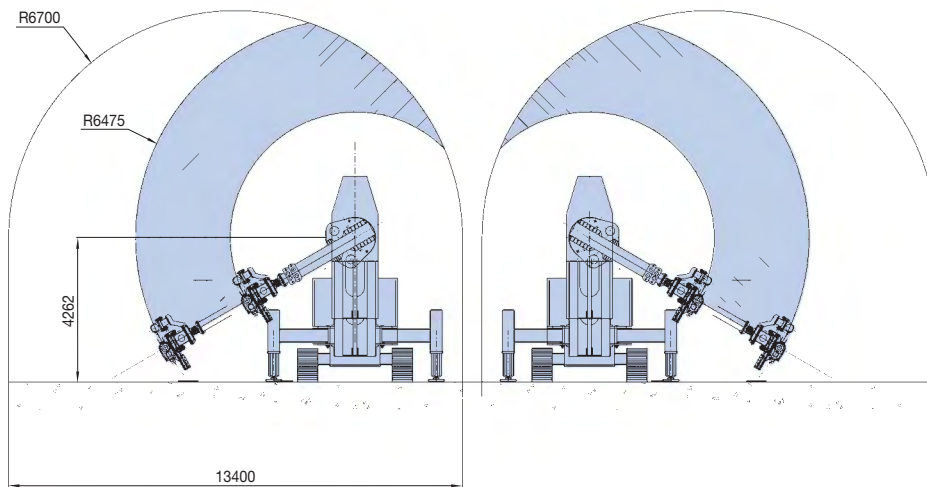
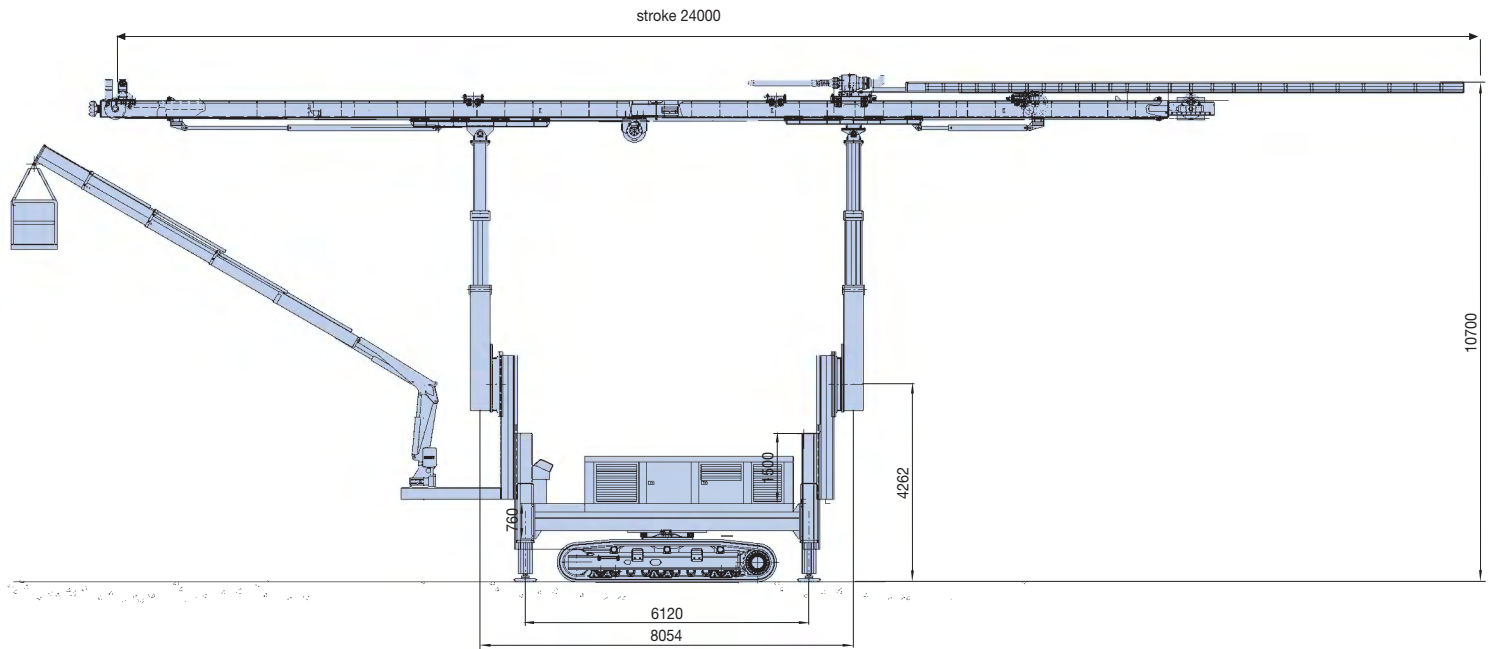
- System for adjusting drilling parameters.

Max treatment	mm	24000
Max rod diameter	mm	90 (127*)
Operative weight (jet grouting configuration)	kg	64000-66000
Engine	DEUTZ TCD 2012 L06	
Power	kW	155
Rated power	kW	135
Electric motor	kW	118
Hydraulic System		
Main pump	l/min	250
Service pump	l/min	90+50+30+30
Rotary		
Max torque	daNm	1747
Rotation speed	rpm	295
Mast feed/hoist system		
Standard cradle stroke	mm	19000 (24000 with ext.)
Max hoist force	kN	7
Max feed force	kN	7
Max speed (slow/fast)	rpm	26
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Undercarriage		
Track shoe width	mm	600
Overall length	mm	4510
Overall width	mm	2500 (3700)
Travelling speed	km/h	2,0
Weight		
Total weight	kg	64000 / 66000
Average pressure on ground	MPa	1,1

* ø 127 mm with optional rotary HR-21

PST-60

JET GROUTING - TUNNELLING RIG



ST-120

JET GROUTING - TUNNELLING RIG

Designed for use in the tunnelling version, the new ST-120 can be modified for the jet grouting method with the relevant kit.

Optional device:

- Systems for measuring and recording the drilling parameters can be fitted

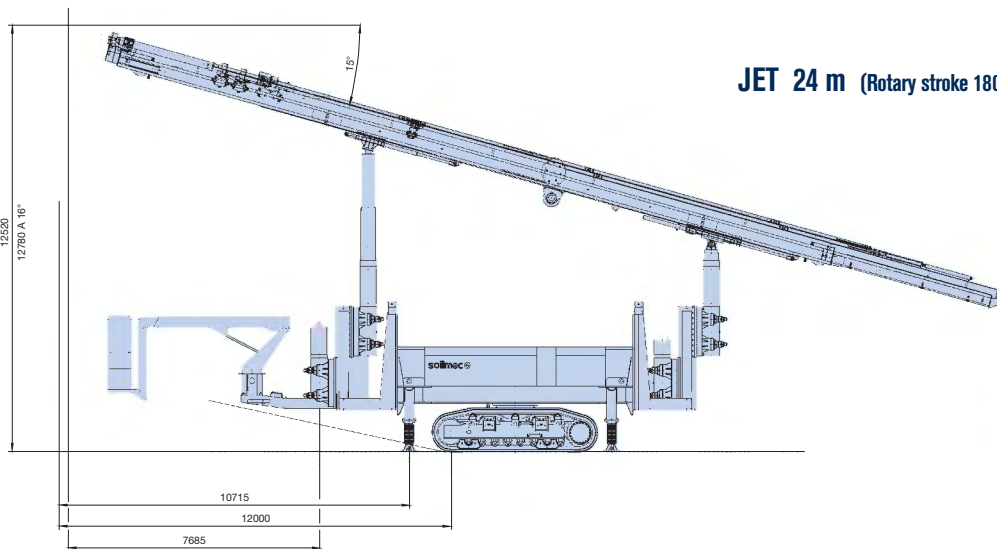
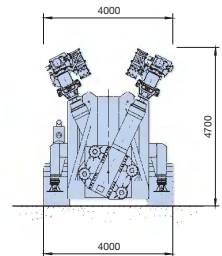
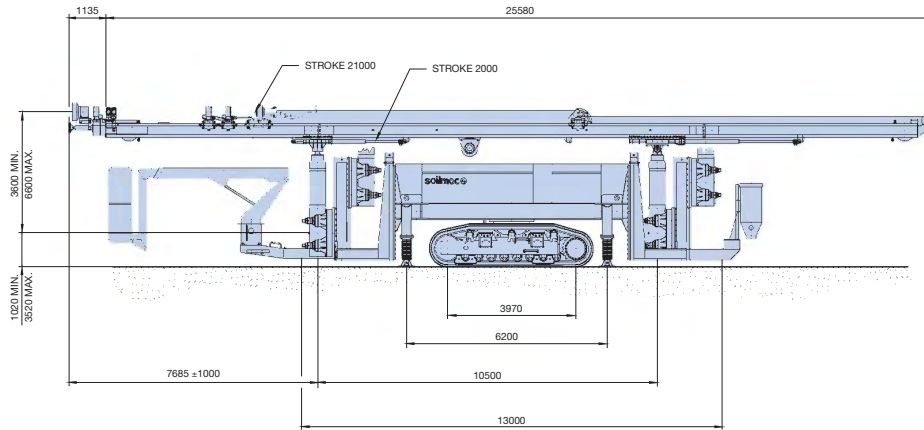
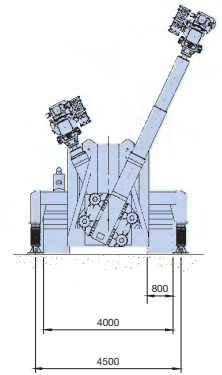
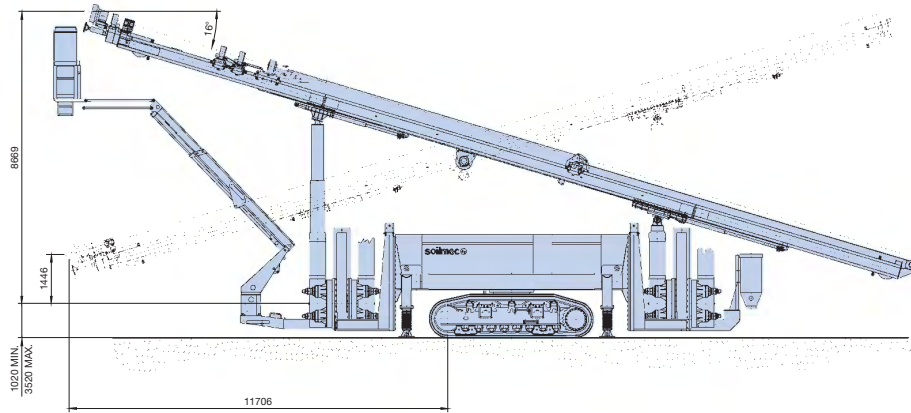
See the working area in the section Tunnelling pag. 66

Max treatment	mm	24000
Max rod diameter	mm	114
Operative weight (jet grouting configuration)	kg	11800
Engine		CUMMINS QSB 6.7
Power	kW	164
Rated power	kW	135
Electric motor	kW	90x2
Hydraulic System*		
Main pump	l/min	214x2
Service pump	l/min	142/2x(158+158)+2x+158
Rotary		HR-12
Max torque	daNm	1207
Rotation speed	rpm	221
Mast feed/hoist system		
Standard cradle stroke	mm	16000 / 18000 / 21000 / 24000
Max hoist force	kN	84
Max feed force	kN	84
Max speed (slow/fast)	rpm	5-30
Clamp & Breaker		
Clamping range	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Undercarriage		
Track shoe width	mm	800
Overall length	mm	5000
Overall width	mm	3900
Travelling speed	km/h	1,35 / 0,84
Weight		
Total weight	kg	115000
Average pressure on ground	MPa	0,19

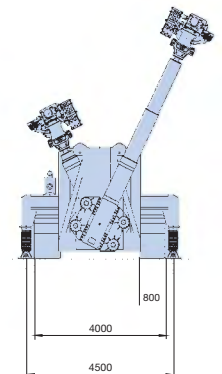
ST-120

JET GROUTING - TUNNELLING RIG

Working configuration
21 m



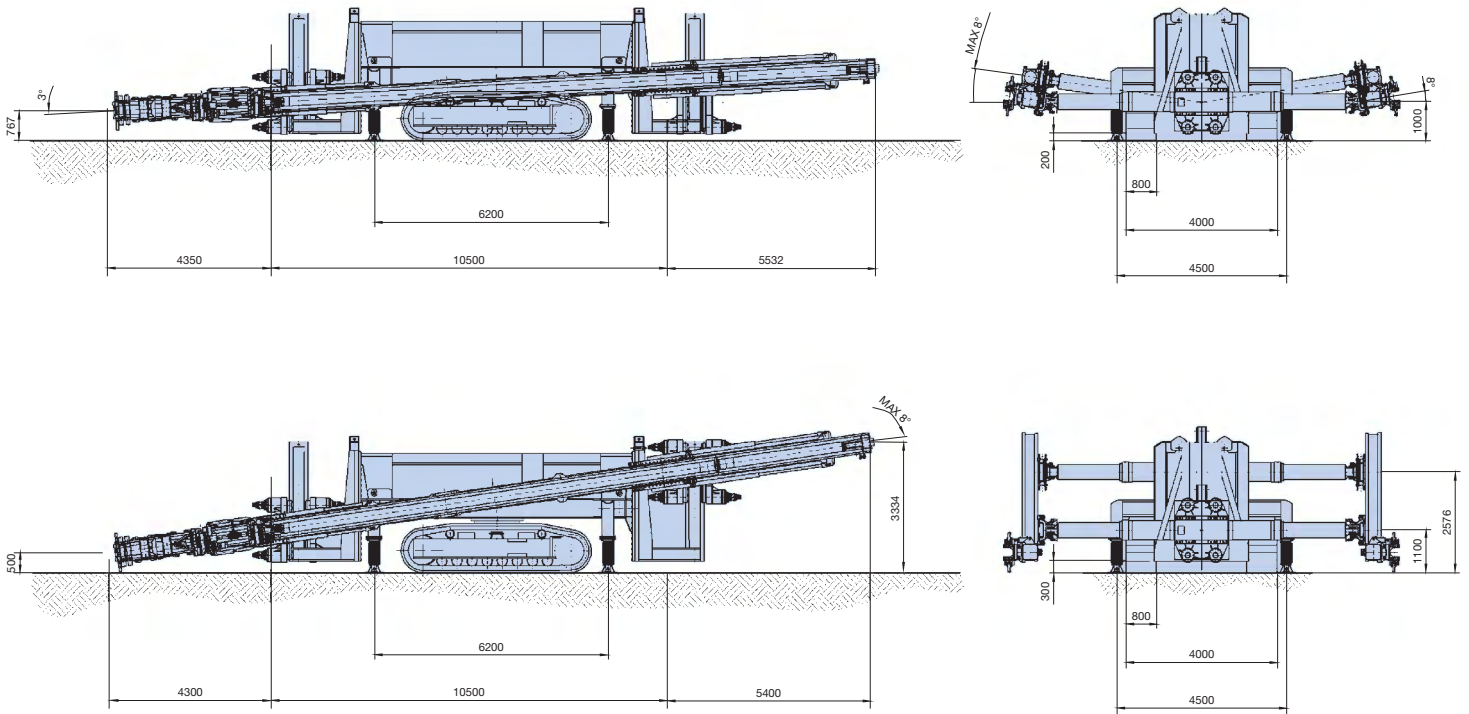
Working configuration
JET 24 m (Rotary stroke 18000 mm, with mandrino passante)



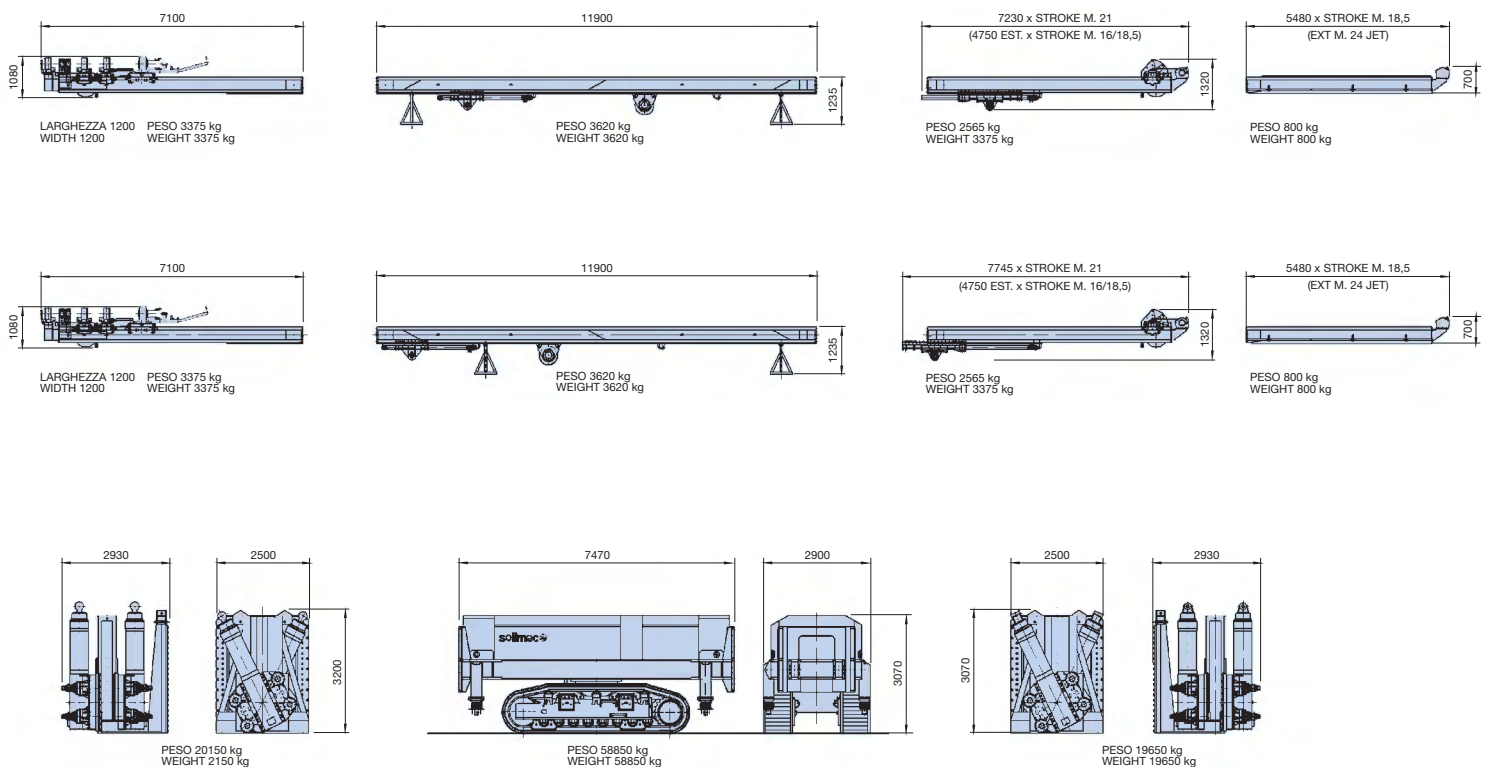
ST-120

JET GROUTING - TUNNELLING RIG

Tilting Configuration



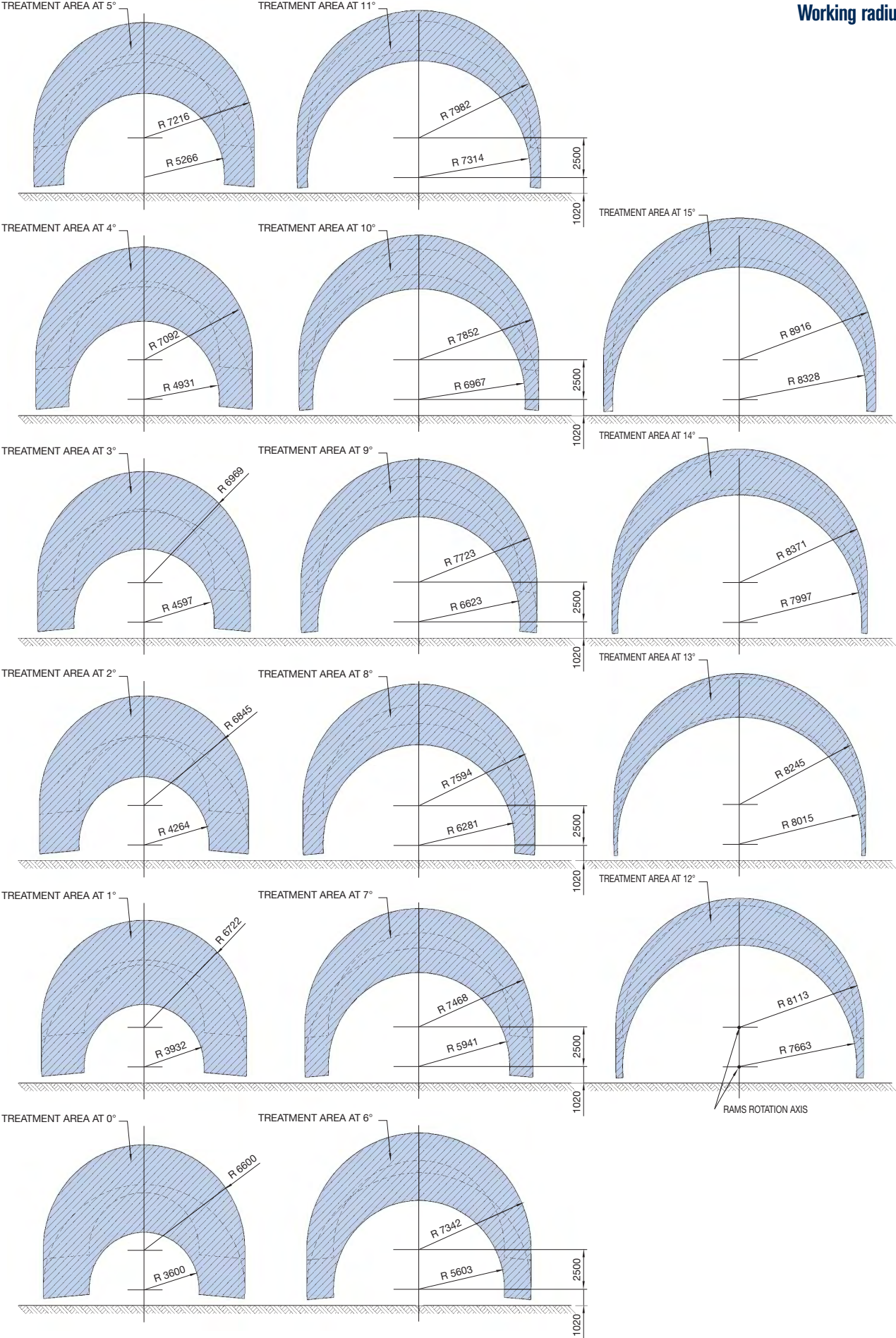
Transport conditions



ST-120

JET GROUTING - TUNNELLING RIG

Working radius



Soil Investigation

MICRODRILLING

Soilmec has created a range of hydraulic probes especially for soil investigation.

Operations performed for soil investigation can be broken down into three main categories:

- **Geo-technical investigation** (defining soil characteristics)
- **Geo-mechanical investigation** (analysis of the mechanical behaviour of rocky masses)
- **Geo-physical investigation** (analysis of the dynamic behaviour of soils and their deformability)

For all these main purposes, the use of appropriate core-boring systems is necessary when taking soil samples for subsequent analysis in a laboratory or onsite, in order to define the morphological stratigraphy of the soil under investigation.

The information thus acquired influences and makes it possible to choose the most appropriate type of foundations and the most suitable drilling technology, in both technical and economic terms and according to the way they are to be executed.

Geo-technical and geo-mechanical investigations are carried out using conventional or variable diameter wire-line core-boring.

Core-boring defined as **conventional** uses:

- Type B core barrels B (single)
- Type T2 double core barrels
- Type T6 double core barrels
- Type T6S double core barrels

Special additional sample-takers, such as Denison, Ostemberg, and Shelby may be requested.

When carrying out the job, the required depth is reached by joining additional sections of auger.

Wire-line core-boring uses double core barrels in which the internal tube, together with the sample in question, may be brought back to the surface by means of a steel cable raised by an auxiliary winch installed onboard the rig. This eliminates the need to assemble and dismantle the masts, thus making the process more rapid, efficient and economical. There are various international nomenclature systems for the different diameters, originating from the leading manufacturers, (series Q, series K).

When samples are required from weak or unstable soils, the Geobor series of triple-tube core-barrels are used.

Geophysical investigations

It's a method that measures onsite the longitudinal and transverse seismic wave speeds in order to identify the deformability parameters. The required values are obtained by measuring the time taken for the seismic impulses to travel from an emitter to a receiver placed inside the probe cavity and encased in the appropriate tubing.

The main common feature of the various core barrels, according to the nature of the soil to be sampled, is the use of a core bit in hard alloy, with tungsten carbide inserts, or impregnated or mounted diamond.

Drilling using fluids, such as muds or biodegradable polymers, requires a higher rotation speed than that required by conventional drilling for micro-piles and tie rods, as shown in the diagram below:

In order to avoid a diamond dill bit shattering, owing to the weight of the drill string, the special rigs constructed by Soilmec and PSM are all equipped with a special hydraulic balancing system, thus eliminating this risk.

The rigs in the current PSM range designed for soil investigation, all of which can be identified by the letter G, consist of two units, with weights of 8 and 16 ton respectively, in either crawler or truck-mounted versions, with special 700 to 1000 rpm rotary heads, a fixed kinetic mechanism for precision work and a hydraulic piston push-pull system with extraction values between 9.5 tons and 19.5 tons, all with a wide range of accessories.

Soil Investigation

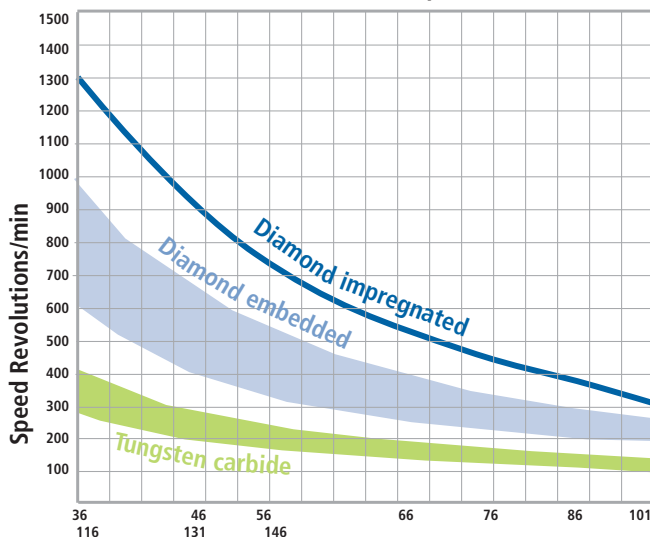
MICRODRILLING

CONVENTIONAL EQUIPMENT FOR GEO-MECHANICAL AND GEO-TECHNICAL INVESTIGATION

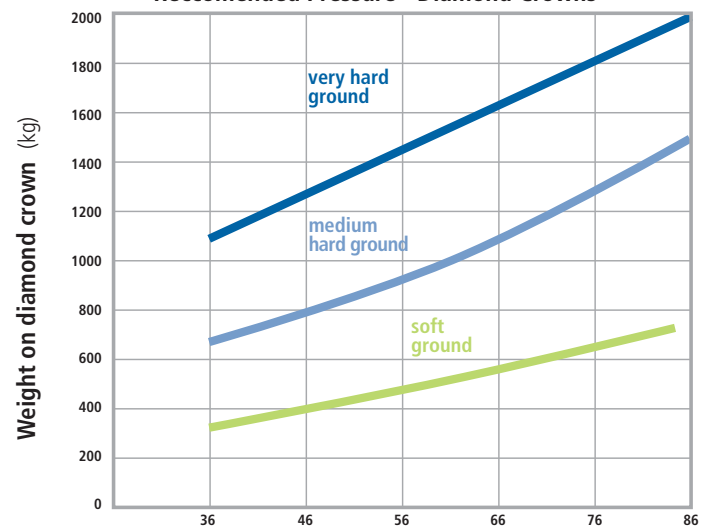
RODS • CASING • CORERS

		Ø hole	46	56	66	76	86	101	116	131	146		
CORERS	Simple	Core mm	32	42	52	62	72	83	96	109	120		
	T2	Core mm	32	42	52	62	72	84					
	T6	Core mm				57	67	79	93	108	123		
	T65	Core mm						72	56	101			
	T6 TRX	Core mm						76	90	103,5	118		
SAMPLE TAKERS	Ø ext. mm		OSTERBERG	101	DENISON	86	101	116	SHELBY	83	100	89	101
	inspection casing			inox		PVC	PVC	PVC		galvanized	galvanized	galvanized	galvanized
	Ø and thickness of sample taker			88,9/2		63/1,3	75/1,6	82/1,7		83/1,5	100/1,5	88,9/2	101,6/2
RODS	Type		42	50	70	76	90	114	140				
	Thickness mm		5	7	4	6,35	6,35	6,35	8,8				
	Weight Kg/3 mt		13,5	23,5	23,2	36	73	60	96				
CASINGS	STD	Ø e mm	44	54	64	74	84	98	113	128	143		
		Ø i mm	37	47	57	67	77	89	104	119	134		
		weight Kg/ml	3,1	4,4	5,2	6,2	6,9	10,6	12,6	14,3	15,5		
	HEAVY	Ø e mm	101	127	152	178	203	244	273				
		Ø i mm	85	107	134	162	183	244	253				
		weight Kg/ml	18,4	28,9	131	33,4	47,6	57,8	64,8				
WIRE LINE CORERS	x Type		AQ	BQ	NQ	HQ	PQ	SQ					
	RODS Ø e mm		44,5	55,6	69,9	88,9	114,3	139,7					
	RODS Ø i mm		34,9	46	60,3	77,8	103,2	125,4					
	HOLE Ø mm		48	60	75,8	96	112,6	146					
	CORE Ø mm		27	36,5	47,6	63,5	85	107					

Reccomended Rotation Speed



Reccomended Pressure - Diamond Crowns



PSM-8G

SOIL INVESTIGATION

The PSM-8G hydraulic drilling rig has been designed and built specifically for geognostic use. The high rotation speed of the hydraulic rotary allows continuous conventional core drilling both with hard alloy crowns and diamond crowns. Furthermore, it is suitable for wire-line core drilling down to a depth of 320 m.

The wide section mast with fixed kinematic mechanism houses a cylinder pull-push system for precision core drilling. Furthermore, the drilling rig has specific pressure gauges on the control panel for balancing the hydraulic drilling batteries to protect the diamond crowns.

Main features:

- Rotary head with 6-speed transmission and a maximum speed of 832 rpm.
- Fixed kinematic mechanism with +/- 13° mast inclination
- Extraction capacity: 9800 kg
- Hydraulic balancing

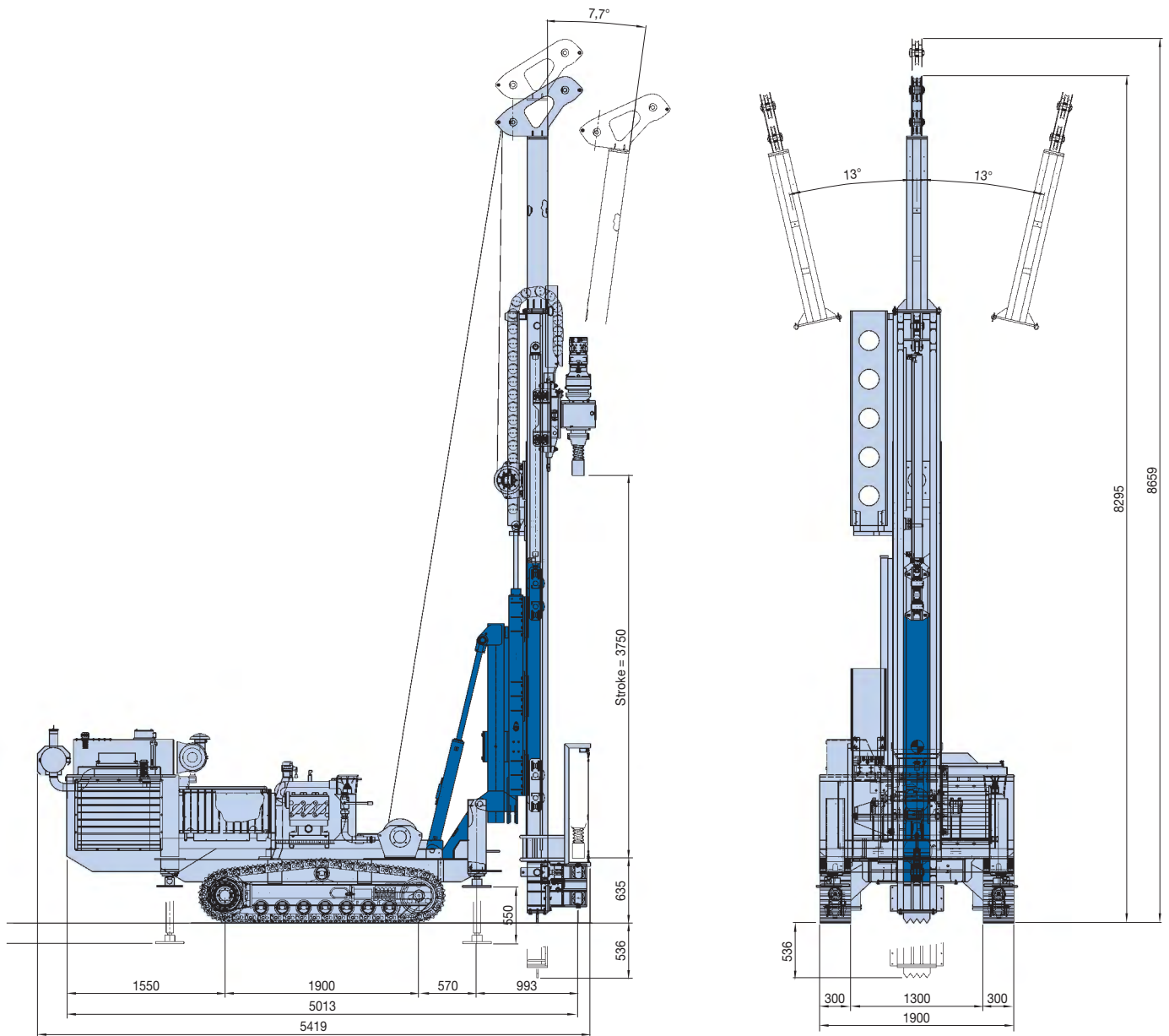
Optional:

- Triplex mud pump 185 L/45 bar
- Wire-line winch - capacity 320 m
- Thrust block with pistons for inclined drilling
- Jet-grouting kit: 12 m treatment

Engine		DEUTZ TCD 2012 L04
Power	kW	103
Rated power	kW	85
Hydraulic System		
Main pump	l/min	149
Service pump	l/min	71+46+29+23
Rotary		HR-9 coring
Max torque	daNm@rpm	916
Rotation speed	rpm	0 - 832
Mast feed/hoist system		
Standard cradle stroke	mm	3750
Rod length	mm	3000
Max hoist force	kN	98
Max feed force	kN	73
Max speed (slow/fast)	rpm	11 (14) - 32 (44)
Clamp & Breaker		
Clamping range	mm	60-260
Max clamping force	kN	11
Max breaking torque	daNm	3600
Service winch		
Max line pull 1st layer	kN	15
Rope diameter	mm	10
Wire-line winch (optional)		
Drum capacity	m	320
Rope diameter	mm	5
Mud pump		
Max delivery	l/min	185
Max pressure	bar	45
Undercarriage		
Track shoe width	mm	300
Overall length	mm	2474
Overall width	mm	1900
Travelling speed	km/h	2,36
Weight		
Total weight	kg	8200 ± 9000
Average pressure on ground	MPa	0,063

PSM-8G

SOIL INVESTIGATION



PSM-16G

SOIL INVESTIGATION

Specific equipment for Soil Investigation, designed for deep core drilling.

The high pull/push values and the high hydraulic power installed lets you use fast rotary speeds (over 1000 rpm) for conventional and wire-line diamond core drilling to great depths.

Main features:

- Rotary head with 6-speed transmission (maximum speed: 1000 rpm)
- Fixed kinematic mechanism
- Extraction capacity: 19500 kg
- Hydraulic balancing

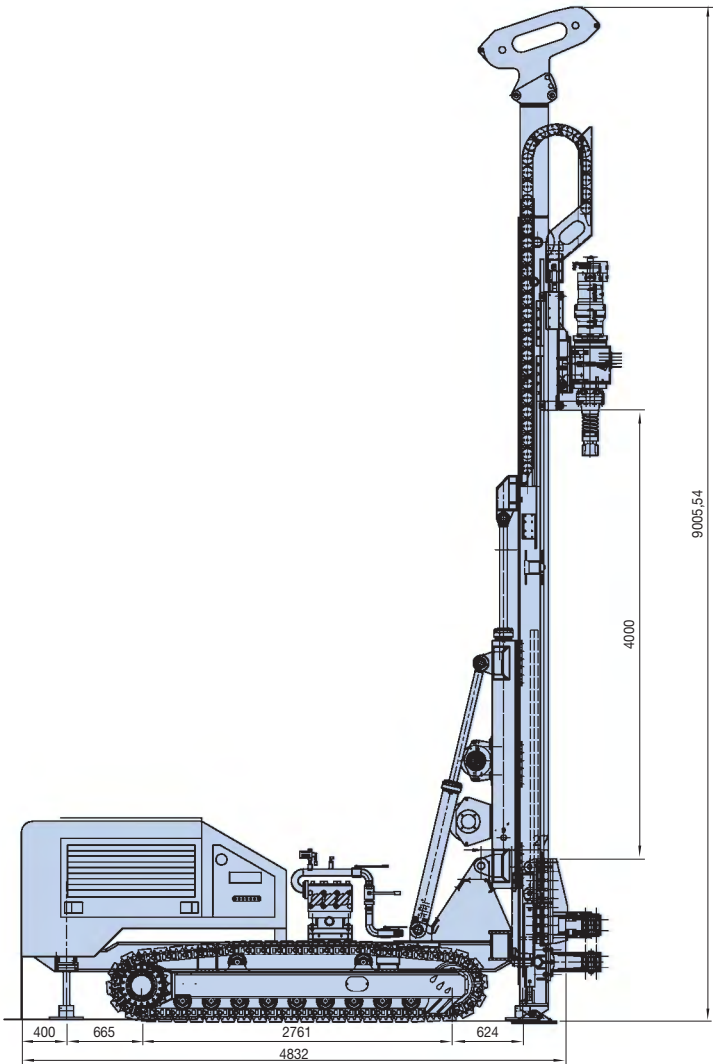
Optional devices:

- Triplex mud pumps 185/45 bar
- Wire-line winch, 800 m rope capacity
- Thrust block with pistons for inclined drilling
- Jet-grouting kit
- Double rotary

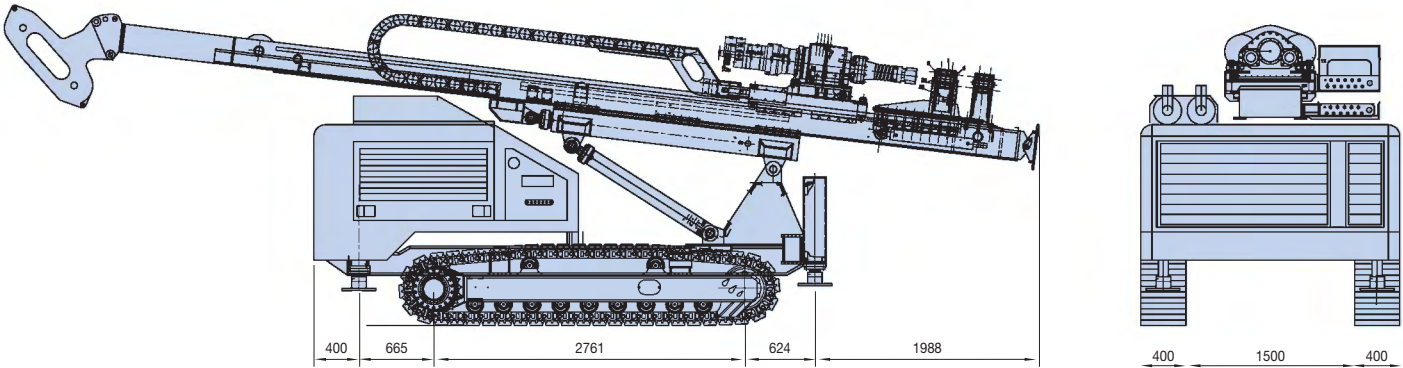
Engine		DEUTZ TCD 2013 L06 2V
Power	kW	200
Rated power	kW	176@1900 rpm
Hydraulic System		
Main pump	l/min	280
Service pump	l/min	142+(64+44+22)
Rotary		HR-10 coring
Max torque	daNm@rpm	1024
Rotation speed	rpm	1000
Mast feed/hoist system		
Standard cradle stroke	mm	4000
Rod length	mm	3000 (6000)
Max hoist force	kN	195
Max feed force	kN	130
Max speed (slow/fast)	rpm	0,14 / 0,58
Clamp & Breaker		
Clamping range	mm	60-320
Max clamping force	kN	3,4
Max breaking torque	daNm	8,6
Service winch		
Max line pull 1st layer	kN	30
Rope diameter	mm	14
Wire-line winch (optional)		
Drum capacity	m	800
Rope diameter	mm	6
Triplex mud pump (optional)		
Max delivery	l/min	185
Max pressure	bar	45
Undercarriage		
Track shoe width	mm	400
Overall length	mm	2760
Overall width	mm	2300
Travelling speed	km/h	2,3
Weight		
Total weight	kg	15000 - 17000
Average pressure on ground	MPa	0,07

PSM-16G

SOIL INVESTIGATION



Transport conditions



STM-8G

SOIL INVESTIGATION

Specific equipment for Soil Investigation, designed for deep core drilling, truck-mounted (preferability to Mercedes or Iveco trucks).

The high pull/push values and the high hydraulic power installed lets you use fast rotary speeds for conventional and wire-line diamond core drilling to great depths.

Main features:

- Rotary head with 6-speed transmission and a maximum speed of 832 rpm.
- Fixed kinematic mechanism with +/- 13° mast inclination
- Extraction capacity: 9800 kg
- Hydraulic balancing
- Mast stroke: 7200 (x 6000 mm rods)

Optional devices:

- Triplex mud pump 185 l/45 bar
- Wire-line winch, 320 m capacity
- Thrust block with pistons for inclined drilling
- Special rotary heads for water well
- PTO air compressor

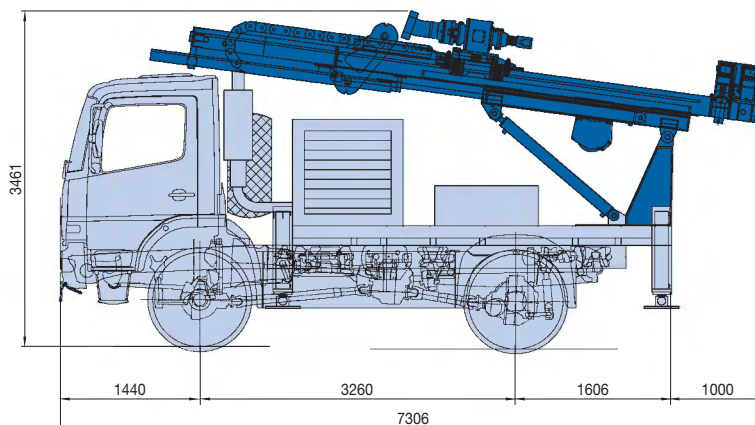
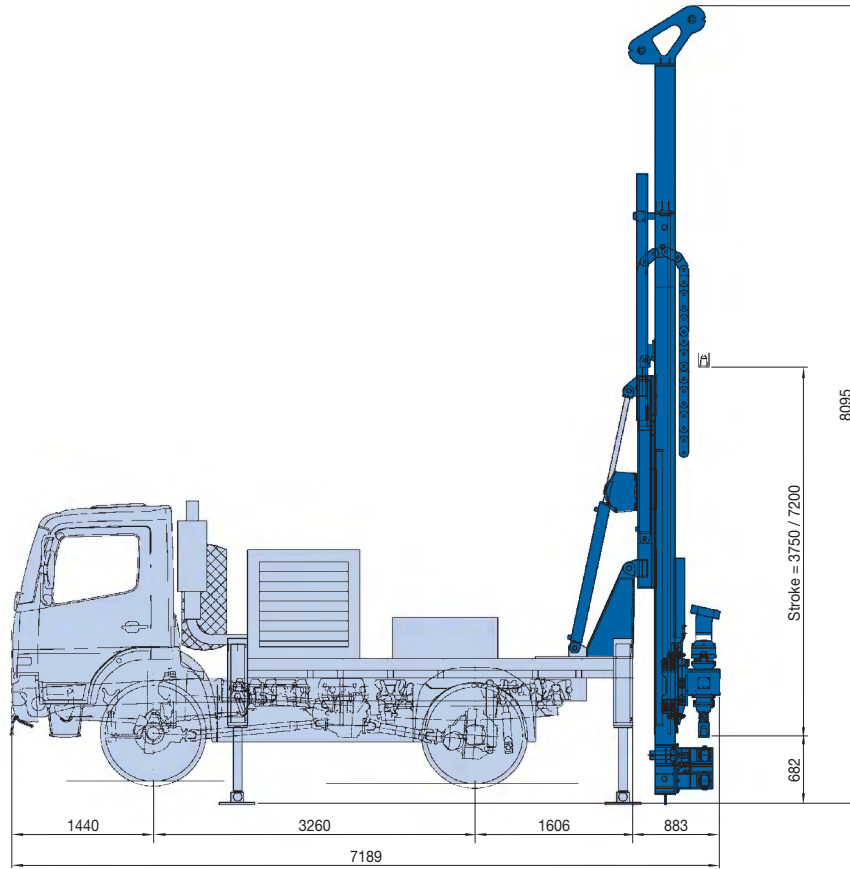
Engine		DEUTZ TCD 2012 L04
Power	kW	103@2400 rpm
Rated power	kW	85@1900rpm
Hydraulic System		
Main pump	l/min	149
Service pump	l/min	71+46+29+23
Rotary		
Max torque	daNm@rpm	916
Rotation speed	rpm	0-832
Mast feed/hoist system		
Standard cradle stroke	mm	3750 / 7200
Rod lenght	mm	3000
Max hoist force	kN	98
Max feed force	kN	73
Max speed (slow/fast)	rpm	0-17 / 35
Clamp & Breaker		
Clamping range	mm	60-260
Max clamping force	kN	100
Max breaking torque	daNm	3000
Service winch		
Max line pull 1st layer	kN	15
Rope diameter	mm	10
Wire-line winch (optional)		
Drum capacity	m	320
Rope diameter	mm	5
Triplex mud pump (optional)		
Max delivery	l/min	185
Max pressure	bar	45
Weight		
Total weight*	kg	8200

* without truck

STM-8G

SOIL INVESTIGATION

Available mast stroke 7200 mm



STM-16G

SOIL INVESTIGATION

Specific equipment for Soil Investigation, designed for deep core drilling, truck-mounted.

The high pull/push values and the high hydraulic power installed lets you use fast rotary speeds (over 1000 rpm) for conventional and wire-line diamond core drilling to great depths.

Main features:

- Rotary head with 6-speed transmission and a maximum speed of 1000 rpm
- Fixed kinematic mechanism with +/- 13° mast inclination
- Extraction capacity: 9800 kg
- Hydraulic balancing
- Mast stroke: 7200 (x 6000 mm rods)

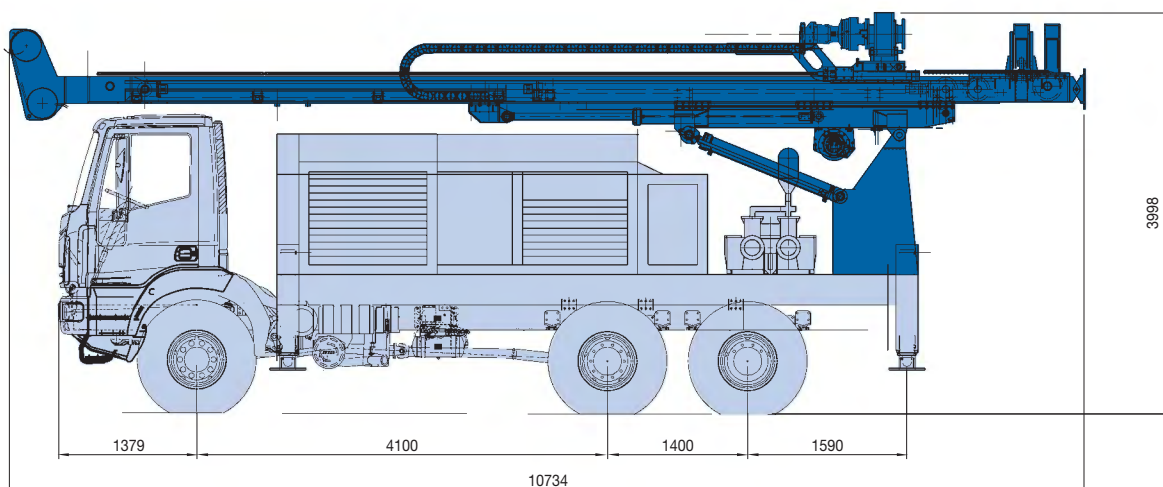
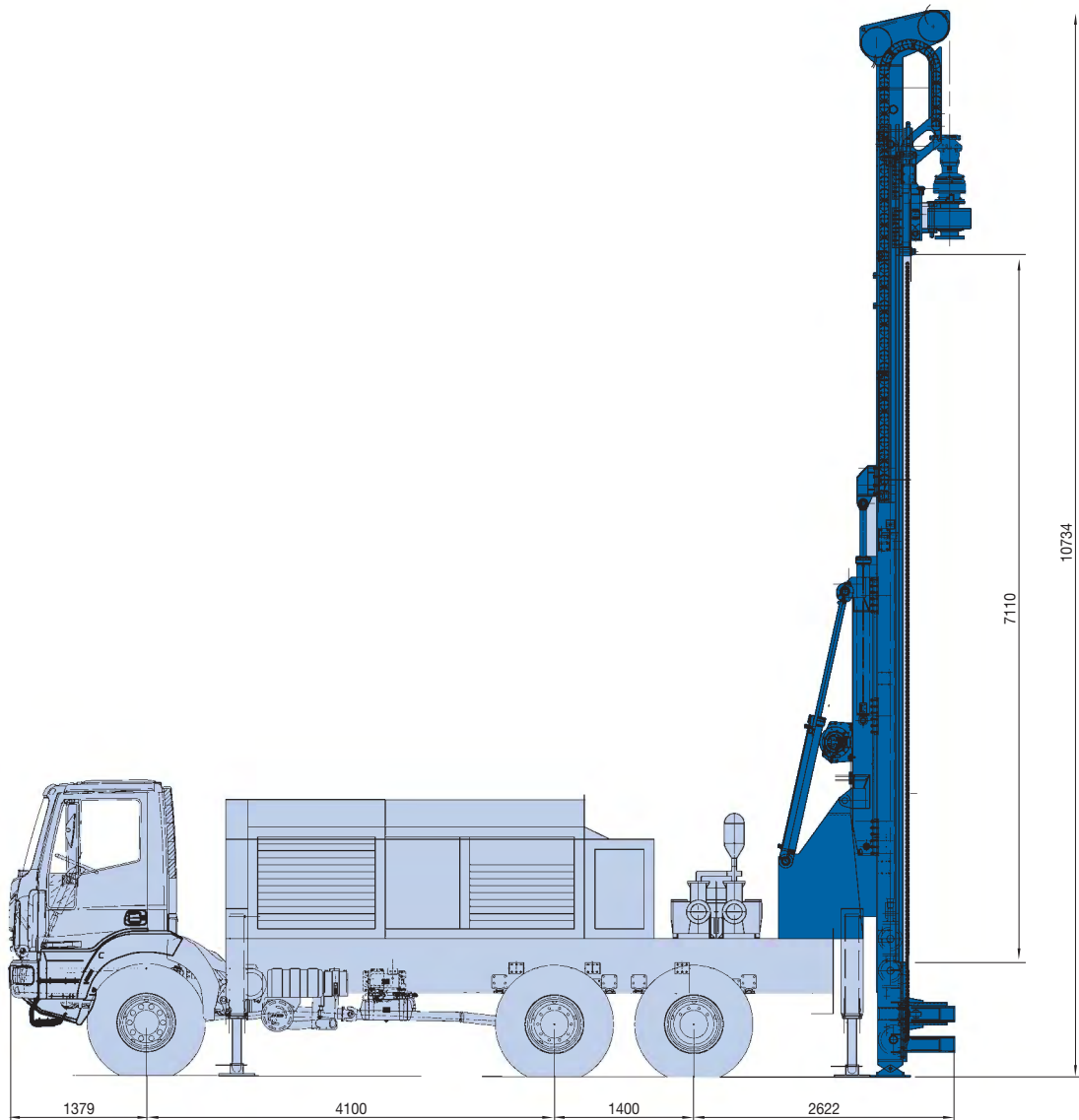
Optional devices:

- Triplex mud pump 185 l/45 bar
- Wire-line winch, 800 m capacity
- Thrust block with pistons for inclined drilling
- Double rotary
- Special rotary head for water well application
- PTO air compressor for water well application

Engine		DEUTZ TCD 2013 L06 2V
Power	kW	200
Rated power	kW	176@1900 rpm
Hydraulic System		
Main pump	l/min	280
Service pump	l/min	142+64+44+22
Rotary		HR-10 coring
Max torque	daNm@rpm	1024
Rotation speed	rpm	1000
Mast feed/hoist system		
Standard cradle stroke	mm	7110 / 3900
Rod length	mm	6000 / 3000
Max hoist force	kN	195
Max feed force	kN	130
Max speed (slow/fast)	rpm	12,6 - 51,6
Clamp & Breaker		
Clamping range	mm	60-320
Max clamping force	kN	23,7
Max breaking torque	daNm	11500
Service winch		
Max line pull 1st layer	kN	30
Rope diameter	mm	14
Wire-line winch (optional)		
Drum capacity	m	800
Rope diameter	mm	6
Triplex mud pump (optional)		
Max delivery	l/min	185
Max pressure	bar	45
Weight		
Total weight	kg	15000 / 17000

STM-16G

SOIL INVESTIGATION



Tunnel Consolidation

MICRODRILLING

Method

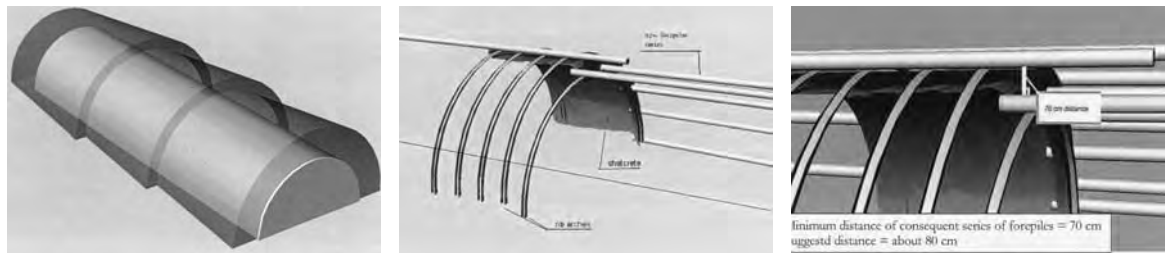
Nowadays, the increasing need and demand of transferring a series of infrastructures to the underground has brought about an impressive rise in the numbers of tunnels to be constructed, regardless of the nature of the soil to be penetrated. The excavation of tunnels in loose soils, in presence of unstable formations or in presence of soils prone to landslide, requires the use of preventive consolidation of the arch and, if needed, of the walls and invert before the final lining is completed.

This has created a scenario of constant developing of technologies and machinery able to tackle any kind of situations.

The final aim is to reach the tunnel stability before the excavation through soil consolidation, avoiding expensive temporary supporting devices.

The Trevi Group has designed and successfully applied a tunnel consolidation technology known as RPUM (Reinforced Protective Umbrella System). The method finds its way in those tunnels with an unstable or short term stable core face condition. The technology envisages in the installation of a series of sub-horizontal elements aiming at consolidating the soil beyond the face of the tunnel before carrying out safely and speedily the excavation under the protection of the arch-like shell by using specially designed forepiling machinery.

Once such an operation is completed, a quite popular one especially in Europe, the tunnel is excavated usually in two stages (top heading and bench) or full face opening, under the protection provided by the consolidation and by installing a temporary lining consisting of steel ribs and shotcrete.



The length of each excavation step will be few meters shorter than the length of the protective umbrella forepiles, so as to allow an overlapping with the following series of forepiles.

As might be understood, the above mentioned operations require pretty long execution times.

In order to avoid interruptions and delays in the working cycle, the operations must be performed to an extremely exact time schedule. That means the consolidation tasks must be completed in the shortest possible time and at a constant rate.

The technological development has therefore pursued two major ways:

- The study and design of the right equipment able to efficiently operate in confined spaces, to be quickly set up in the required drilling position and finally able to execute longer and longer sub-horizontal consolidation in one single stage, thus dramatically reducing the cycle time.
- Design of the most suitable consolidation grout treatment for stabilizing the excavation and featured by mechanical strength to allow for the excavation and to reduce the number of supporting ribs to be installed.

Equipment

Model	Max (rated) power installed kW	Working radius at 0° mm	Max extension height at 0° mm	Weight t
ST-15	92 (85) 90 electric	1880 ÷ 2550	4570	12,5
ST-20	129 (116) 90 electric	1700 ÷ 4696	6196	21
ST-30	153 (143) 90 electric	1528 ÷ 5037	6787	33
PST-60	155 (135) 118 electric	3700 ÷ 6500	10700	64 - 66
ST-120	164 (135) 90 electric x 2	3600 ÷ 6600	10200	115

Tunnel Consolidation

MICRODRILLING

R.P.U.M. Techniques

RPUM technique is the result of such developments and the Execution Phases involves the installation of either suitable reinforcing steel pipes or of consolidated columns by using the JET GROUTING system:



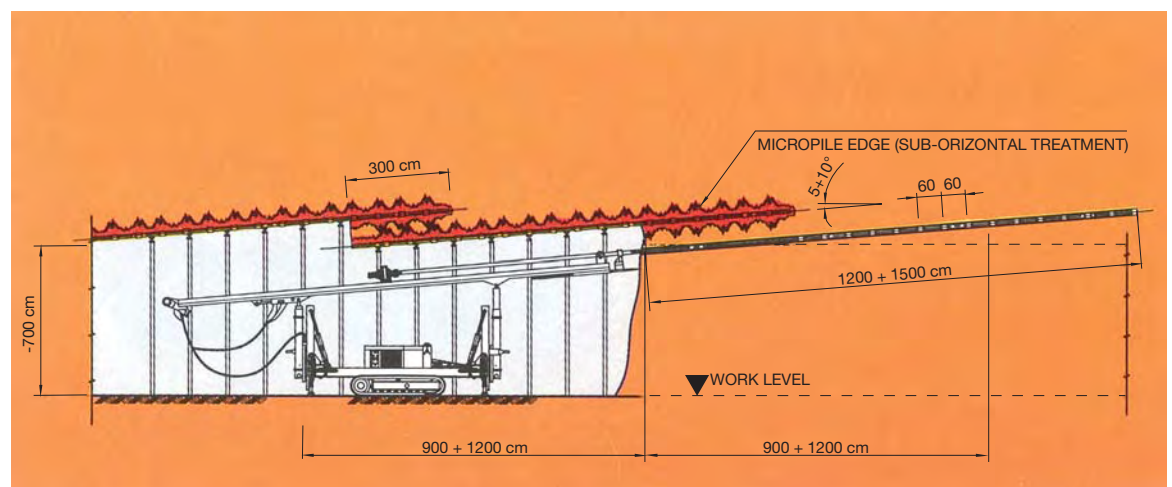
The method consists in the installation of manchette-type steel pipes acting as reinforcement support for the next installation of the steel ribs. At the same time they are also used as grouting pipes thus forming a continuous canopy of consolidated soil.



1. Drilling phase: The drilling can be performed either by rotation or rotopercussion (TUBEX-ODEX-like)

In the first case, the drilling string itself, fitted with a drag bit at its end, is left in place whilst in the roto-percussion is the casing to be left in place.

In both cases, the drilling string or the casing, acting as reinforcing steel of the consolidation treatment, are fitted with special non-return valves, which are built within the wall thickness of the steel pipes and are such as not to suffer damages during the penetration of the soil.

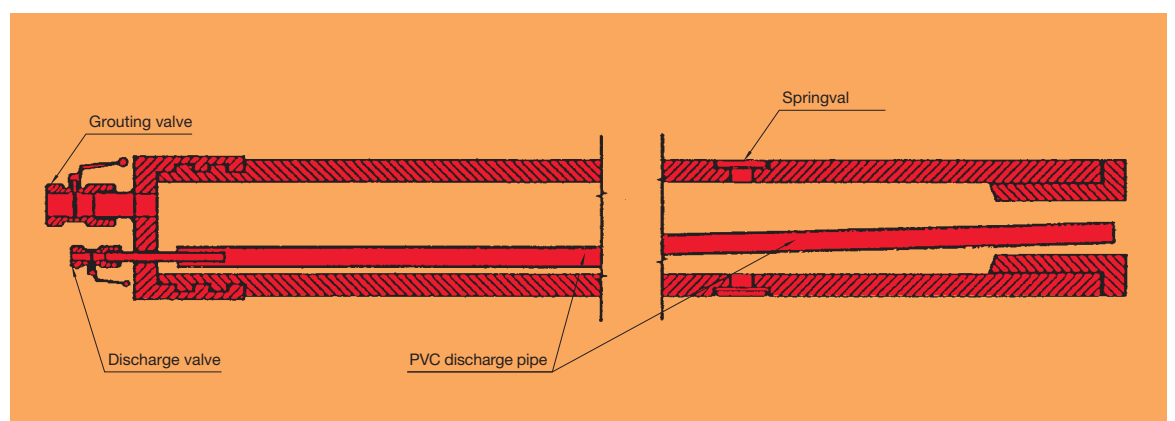
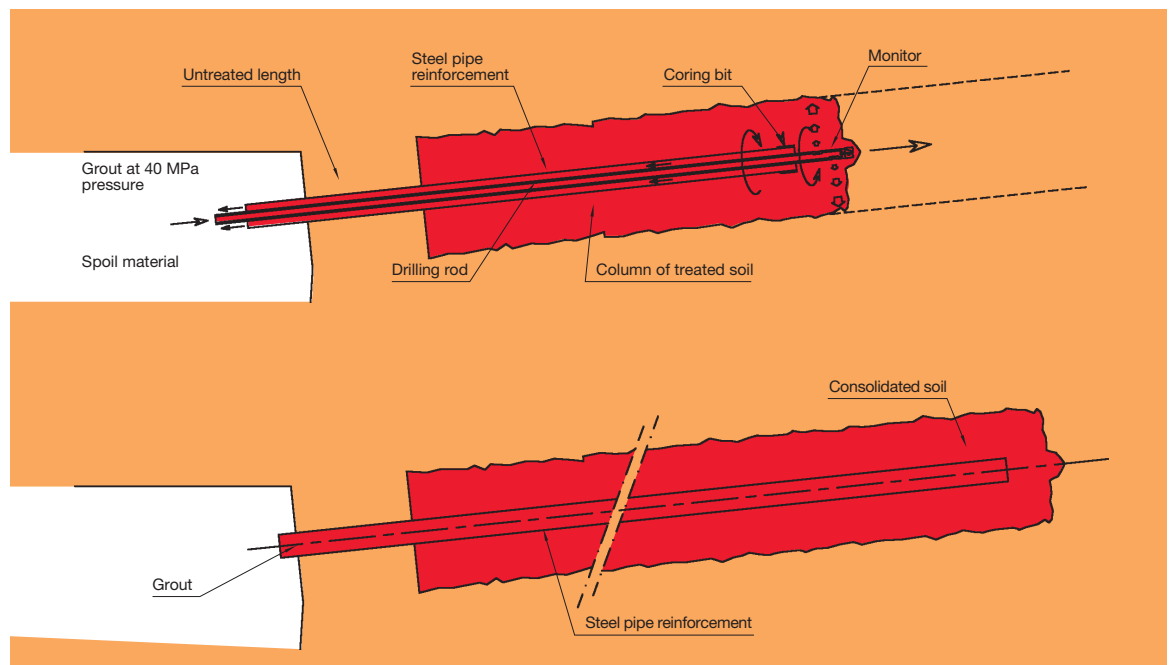
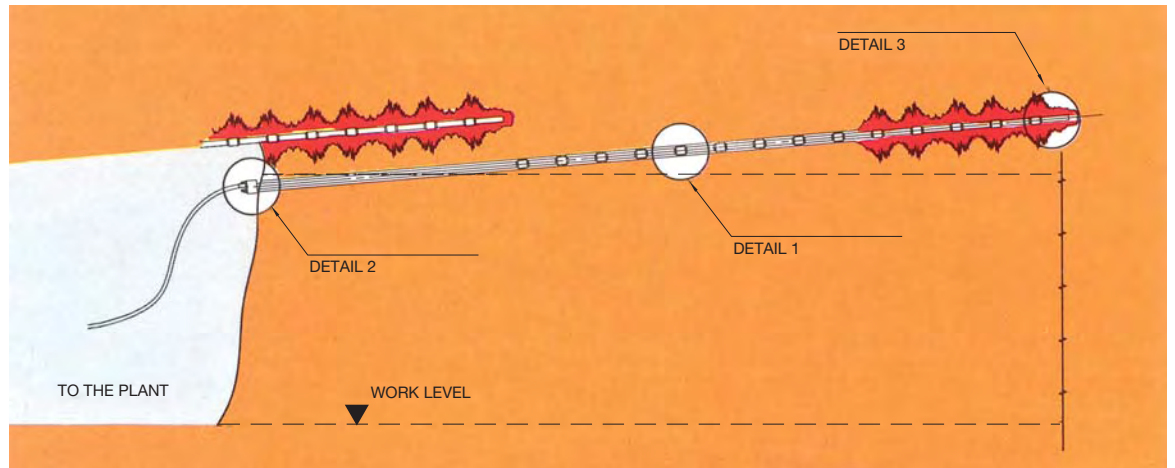


Tunnel Consolidation

MICRODRILLING

2. **Grouting phase:** basically we have two grouting techniques:

- The single valve injection technique by means of which each individual valve is pressurized using a double packer placed across to each valve.
- The one-shot technique for each individual forepile by using a packer placed at the top of the pipe



Tunnel Consolidation

MICRODRILLING

Jet Grouting

JET GROUTING method is also widely employed today thanks to its suitability in a variety of soil ranging from gravel to clay but especially in very difficult conditions where both weak soils and thin overburden are there. In fine soils, the column has a static function while where there is water inflow it works as a barrier against the water.

The execution phase of the so called Trevi Reinforced Jet Grouting in Progress (normally T1 single fluid is suggested) is the following:

- Drilling is carried out by using a rod string fitted with a monitor and a drilling tool, either by rotation or roto-percussion.
- During the drilling phase, the inside fluid escapes from the tool tip, easing therefore the soil penetration and keeping the drilling tool blades clean.
- When the drilling is over, the jet is diverted by closing the bottom valve and the grout escapes at high speed through the side nozzles, disaggregating and mixing the soil with the grout and thus creating the consolidated column. During this phase the drilling string is rotated and withdrawn at a pre-set rate.
- The peculiarity of this system is that the reinforcing steel pipe is installed together with the placing of the jet grouting column. The jetting string and the casing rotates in opposite senses.
- The jetting string itself, fitted with the monitor, is located inside while about 20 cm back the reinforcement pipe is fitted.
- The treatment is performed by driving both the rod and the casing simultaneously and performing the jetting during the penetration phase. The space between the rods and the pipe allows the jetting spoil to escape. On completion of the drilling/treatment, the jetting string is extracted from the casing which remains in place to serve as reinforcement.
- This type of consolidation obviously requires the use of a double head.
- The grouts used are generally binary Cement/Water following a ratio of 0.8 to 1.3 with, in case, the use of admixtures. The High Pressure Jetting is carried out by suitable High Pressure Pumps.

Soilmec Tunneling rigs have been specially designed and adapted to complete this type of work in the most efficient and effective way where speed and precision are demanded.

In addition such a process allows easier and more cost effective treatment of either soft soil or fractured and soft rock.

Today Soilmec can offer a wide range of equipment capable of covering radius of consolidations from 1500 mm to 6800 mm at 0° thus applicable both in large tunnelling sections for High Speed Railways and highways projects and in those tunnels thought for the city underground systems which consists normally of small sections.

[See the tunnelling rigs in jet grouting version pag. 22](#)



ST-15

TUNNELLING RIGS

The market increasing demand for tunnelling equipment able to consolidate the weak/unstable soil ahead of the tunnel face before the excavation has brought Soilmec to again widen and complete its range including a very compact tunnelling machine named ST-15.

Especially designed for easily enter and work in narrow spaces keeping all the main features and high performances of the larger machines for tunnelling consolidation. Brilliantly designed to be exceptionally valuable for Metro tunnels, Service tunnels, etc. and yet in all that cases in which the machine needs to be often and quickly moved from one narrow place to another and lowered down in very narrow shafts.

Main features:

- Overall width: 2100 mm
- Overall length: 2780 mm
- Front and rear fixed telescopic rams
- Front and rear hydraulic slewing rings
- Diesel engine and electric motor interchangeable
- Rotary head achieving a max. torque of 1207 daNm
- Jet grouting optional by mast extension
- Class of the machine: 12 ton

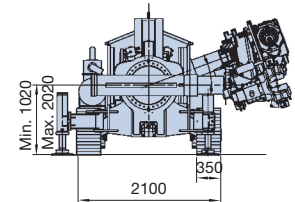
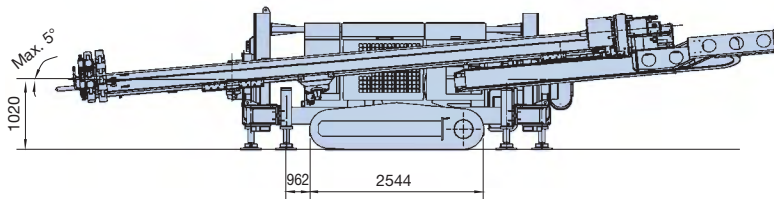
Performances			
Max height of consolidation treatment a 0°	mm	4570	
Max height of consolidation treatment a 5°	mm	5157	
Radius of consolidation treatment a 0° (min/max)	mm	1880	2550
Radius of consolidation treatment a 5° (min/max)	mm	2131 (2712)	3137 (3387)
Height from working level of slew ring rotation axis	mm	1020-2020	
Hoist and feed system		Tunnel	Tunnel Jet
Feed stroke	mm	7000	11250
Max hoist force	kN	52	52
Max feed force	kN	52	52
Max speed (feed/hoist)	rpm	25-7	25-7
Rod diameter	mm		
Diesel engine		DEUTZ TCD 2012 L04	
Max power	kW	92	
Rated power	kW	85	
Electric motor		SIEMENS 4 POLS 50 Hz 380/660 V	
Power	kW	90 @ 1485 rpm	
Hydraulic System*			
Main pump (variable displacement axial pumps)	l/min	221	
Auxiliary pump (gear pumps)	l/min	54+24+40+27	
Rotary			
Max torque	daNm	1207	
Drilling speed	rpm	221	
Clamp & hydraulic joint breaker			
Size	mm	60-225	
Max clamping force	kN	159	
Max breaking torque	daNm	3830	
Undercarriage			
Track shoe width	mm	350	
Overall length	mm	2544	
Overall width	mm	2100	
Travelling speed	km/h	2,4	
Weight			
Total weight	kg	12250 (standard) 12750 (jet)	
Average pressure on ground	MPa	0,09	

* double idraulic system (diesel+electric)

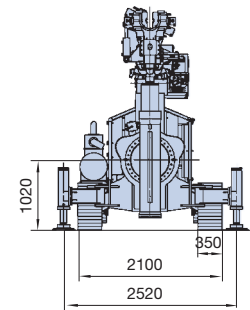
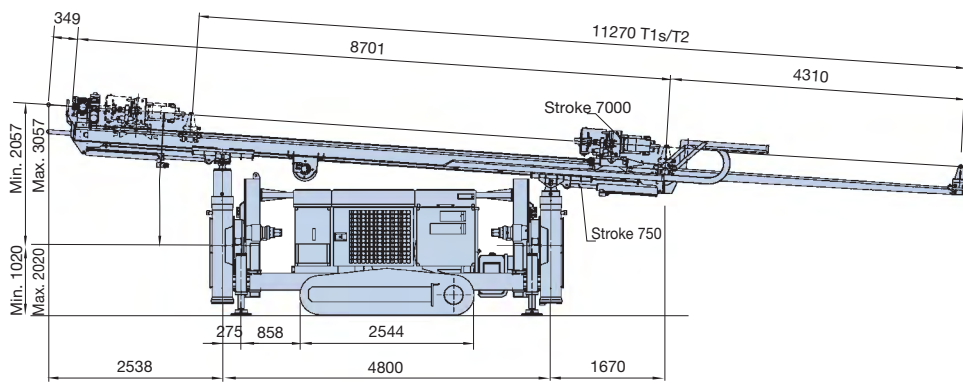
ST-15

TUNNELLING RIGS

Working condition Std



Working condition with extension



Consolidation Height

alfa (°)	H max (m)	H min (m)
0	4570	2900
1	4706	2933
2	4841	2965
3	4976	2997
4	5106	3035
5	5157	3151
6	5207	3267
7	5258	3383
8	5308	3499
9	5357	3616
10	5407	3732
11	5456	3849
12	5504	3966
13	5553	4083
14	5600	4201
15	5648	4319

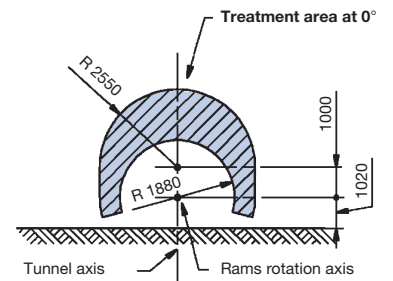
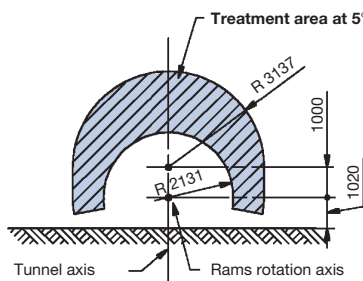
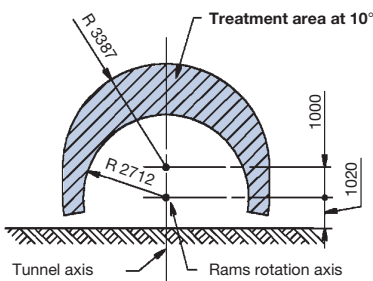
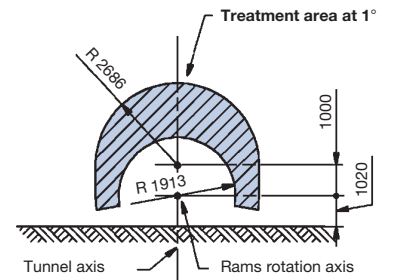
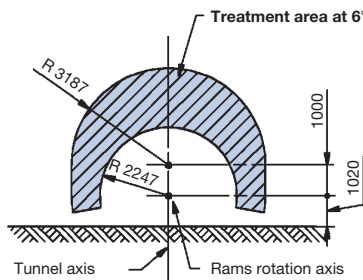
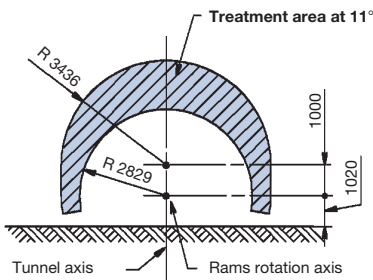
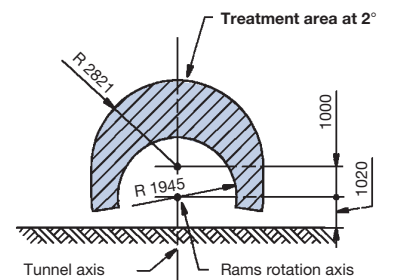
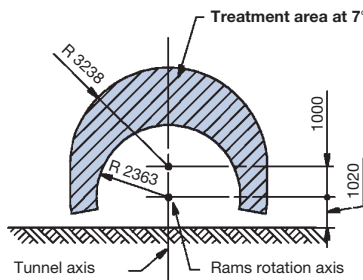
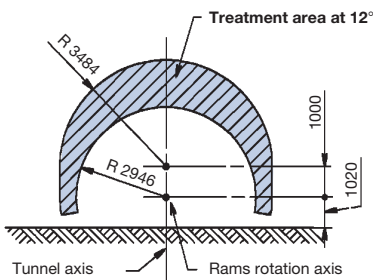
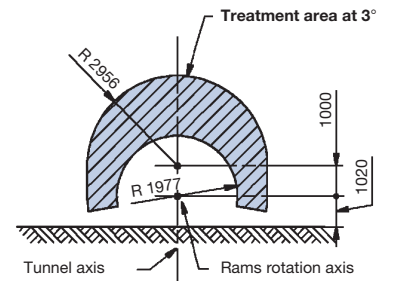
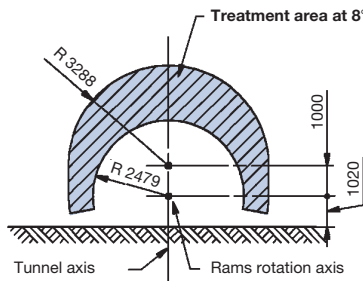
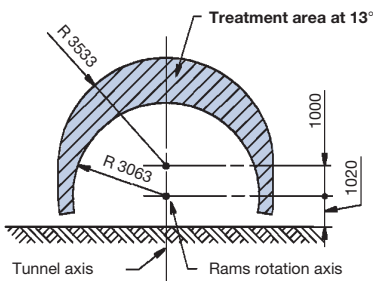
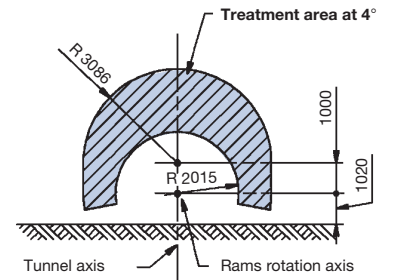
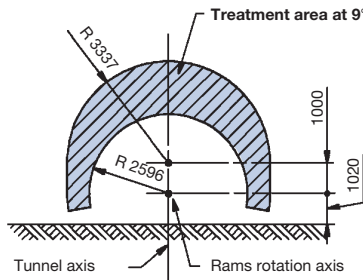
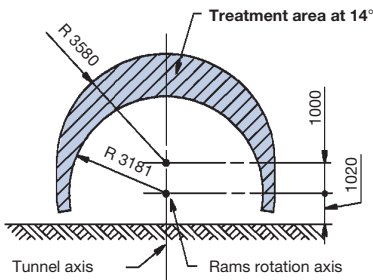
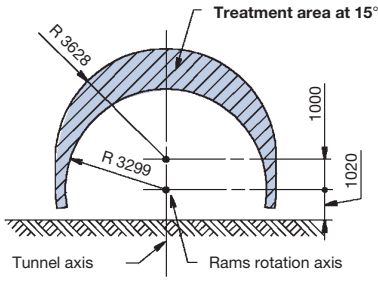
Radius of Consolidation

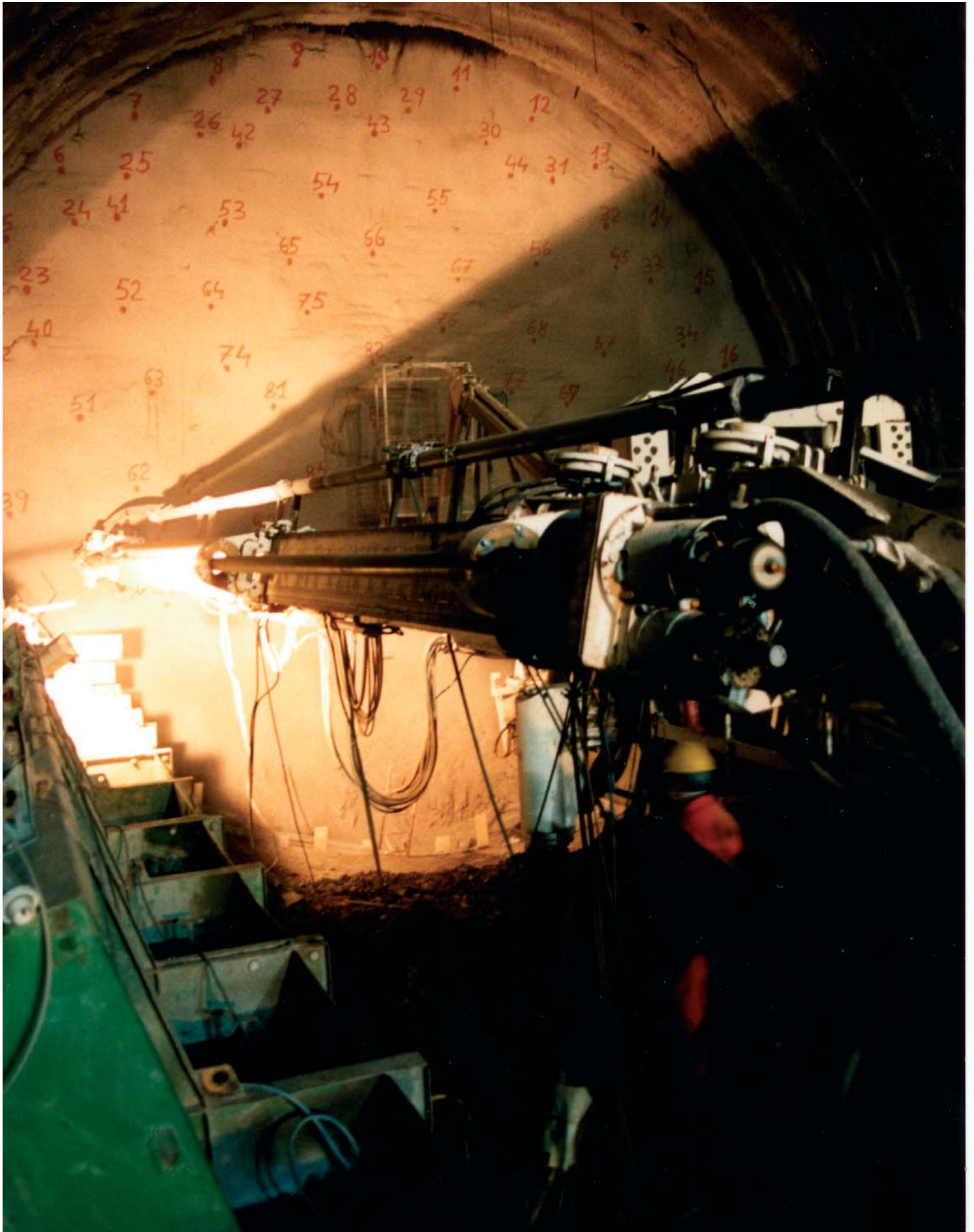
alfa (°)	R max (m)	R min (m)
0	2550	1880
1	2686	1913
2	2821	1945
3	2956	1977
4	3092	2015
5	3137	2131
6	3187	2247
7	3238	2363
8	3288	2479
9	3337	2596
10	3387	2712
11	3436	2829
12	3484	2946
13	3533	3063
14	3580	3181
15	3628	3299



ST-15

TUNNELLING RIGS





ST-20

TUNNELLING RIGS

The ST-20 tunnelling rig is ideal for sub-horizontal consolidation in tunnels with a work radius of between 1512 mm and 4696 mm (with the drilling mast horizontal at 0°). The useful stroke of the rotary allows treatments of up to 14 m (16 with the optional extension).

The drilling mast can be folded in at both ends, reducing the overall dimensions, to make the rig easier to transport both underground and on the road at the end of the job.

The machine has two motors (diesel and electric) of a suitable size for each single motor to perform all the drilling, traversing and positioning operations of the crawler.

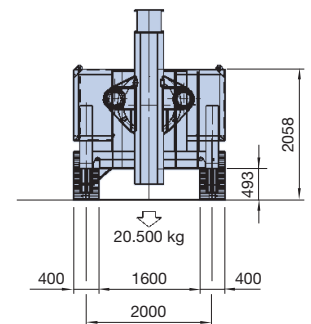
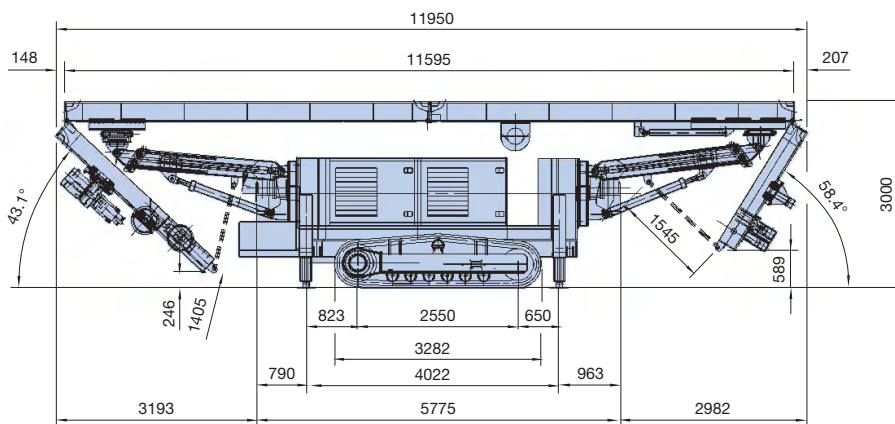
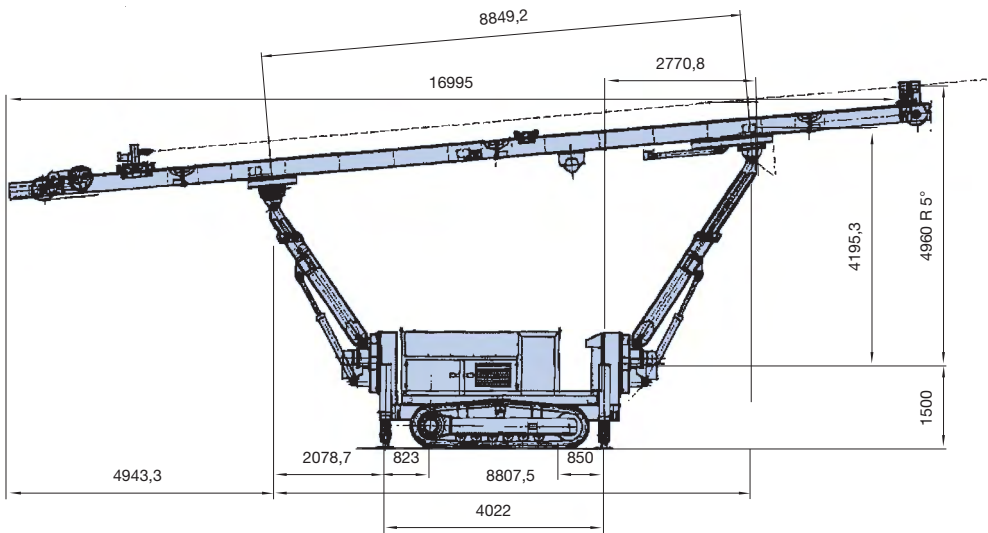
The following drilling techniques can be applied using the ST-20:

- Rotation (with or without casing)
- Rotopercussion by means of Top Hammer (with or without casing)
- Rotopercussion by means of Down the Hole Hammer (with Tubex, Odex or Simmetrix superjaws system)

Performances			
Max height of consolidation treatment a 0°	mm	6200	
Max height of consolidation treatment a 5°	mm	6470	
Radius of consolidation treatment a 0° (min/max)	mm	1700	4696
Radius of consolidation treatment a 5° (min/max)	mm	2100-2850	4960
Height from working level of slew ring rotation axis	mm	1500 (fixed)	
Hoist and feed system			
Feed stroke	mm	14200	16000
Max hoist force	kN	67	67
Max feed force	kN	67	67
Max speed (feed/hoist)	rpm	32-9	-
Rod diameter	mm	114	90
Diesel engine		DEUTZ 2013 L04 2V	
Max power	kW	129	
Rated power	kW	116@1900 rpm	
Electric motor			
Power	kW	90	
Hydraulic System			
Main pump (variable displacement axial pumps)	l/min	150	
Auxiliary pump (gear pumps)	l/min	86+86+34+(22+22+12)	
Rotary			
Max torque	daNm	1350@48 rpm	
Drilling speed	rpm	460	
Clamp & hydraulic joint breaker			
Size	mm	60-260	
Max clamping force	kN	159	110
Max breaking torque	daNm	3830	3600
Rod carousel (optional)			
Rod diameter	mm	114	90
Rod length n° rod		13	15
Undercarriage			
Track shoe width	mm	400	
Overall length	mm	3280	
Overall width	mm	2490	
Travelling speed	km/h	1,63	
Weight			
Total weight	kg	21000	
Average pressure on ground	MPa	0,100	

ST-20

TUNNELLING RIGS



ST-30

TUNNELLING RIGS

The ST-30 tunnelling rig is suitable for the sub-horizontal consolidation of medium-size tunnels, with a drilling radius of between 1528 mm and 5037 mm (drilling mast inclination 0°) and max. heading stroke heights of 6767 mm.

It can be used in tunnels with a greater section, using the so-called "half-section" method with the first phase envisaging the reinforcement of the upper heading, and the following excavation of the invert in the second phase.

The machine has two motors (diesel and electric) of a suitable size for each single motor to perform all the drilling, traversing and positioning operations of the crawler.

The following drilling techniques can be applied using the ST-30:

- Rotation (with or without casing)
- Rotopercussion by means of Top Hammer (with or without casing)
- Rotopercussion by means of Down the Hole Hammer (with Tubex, Odex or Simmetrix superjaws system)

Performances			
Max height of consolidation treatment a 0°	mm	6787	
Max height of consolidation treatment a 5°	mm	7197	
Radius of consolidation treatment a 0° (min/max)	mm	1528	5037
Radius of consolidation treatment a 5° (min/max)	mm	2550	5447
Height from working level of slew ring rotation axis	mm	1750	
Hoist and feed system		Horizontal	Vertical
Feed stroke	mm	13000/14000	7000
Max hoist force	kN	84	
Max feed force	kN	84	
Max speed (feed/hoist)	rpm	0-30	
Diesel engine		CUMMINS QSB Tier 3	
Max power	kW	153	
Rated power	kW	143	
Electric motor			
Power	kW	90	
Hydraulic System*			
Main pump (variable displacement axial pumps)	l/min	297	
Auxiliary pump (gear pumps)	l/min	55-25	
Rotary			
Max torque	daNm	1350	
Drilling speed	rpm	461	
Clamp & hydraulic joint breaker			
Size	mm	60-260	
Max clamping force	kN	159	
Max breaking torque	daNm	3830	
Undercarriage			
Track shoe width	mm	600	
Overall length	mm	3740	
Overall width	mm	2300 / 3400	
Travelling speed	km/h	1,5	
Weight		Horizontal	Vertical
Total weight	kg	30000/32000	28000
Average pressure on ground	MPa	0,09	

* double idraulic system (diesel+electric)



Control parameter display

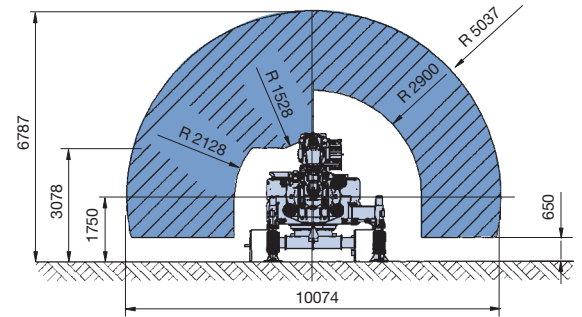
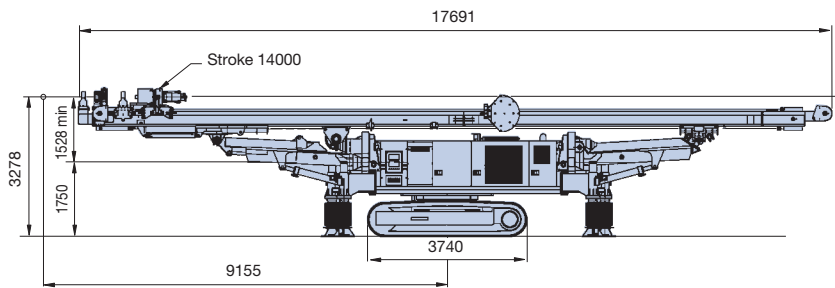


Radio Control Panel

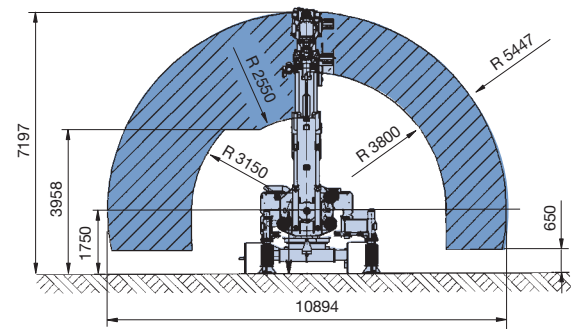
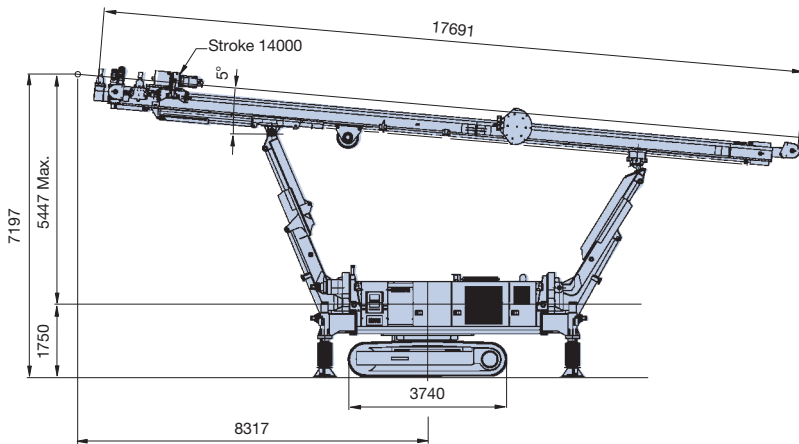
ST-30

TUNNELLING RIGS

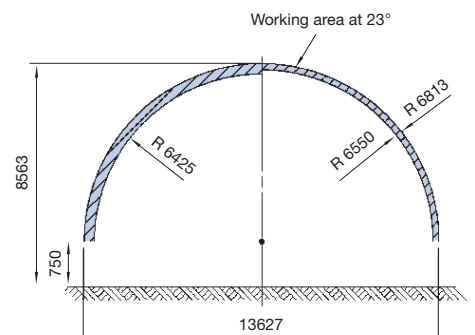
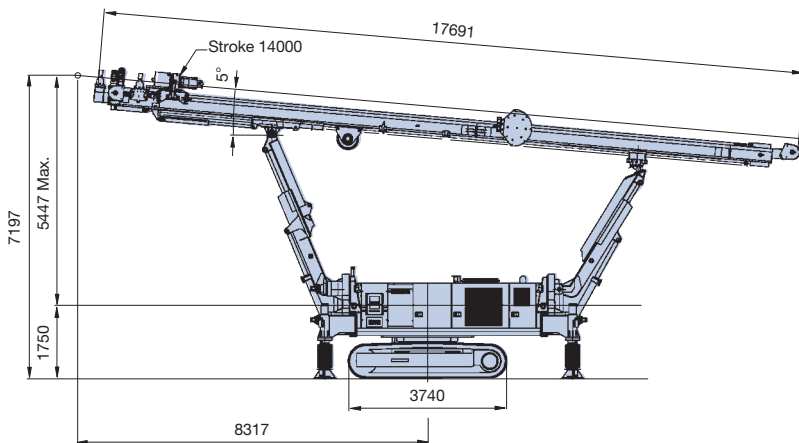
Working radius at 0°



Working radius at 5°



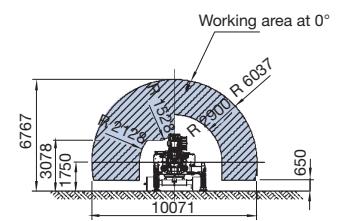
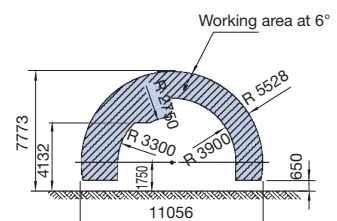
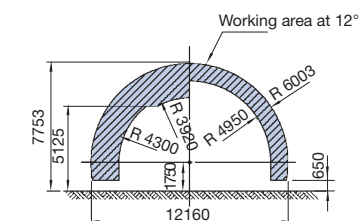
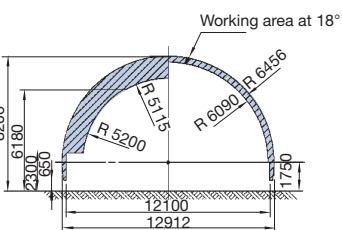
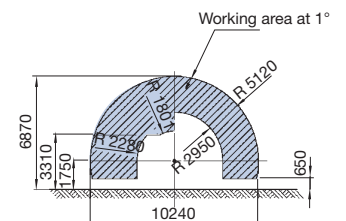
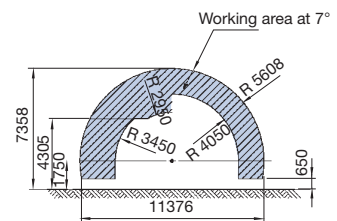
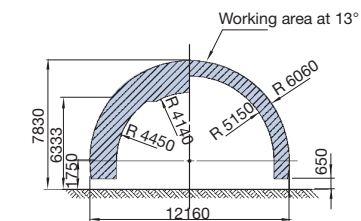
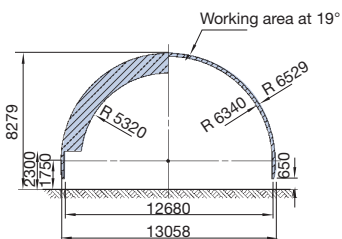
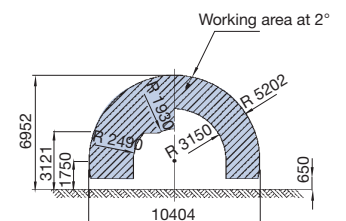
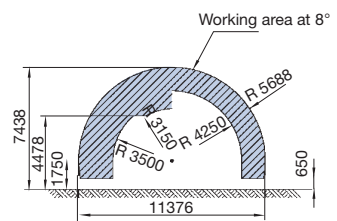
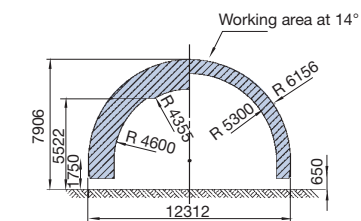
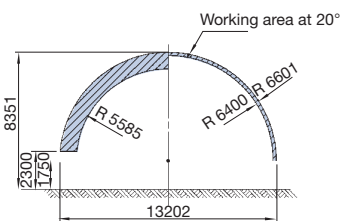
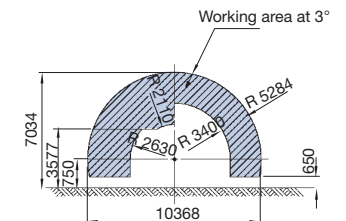
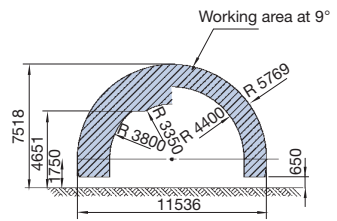
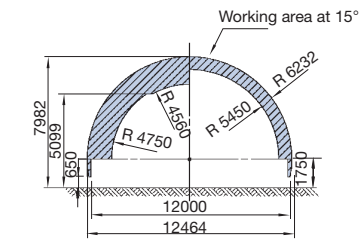
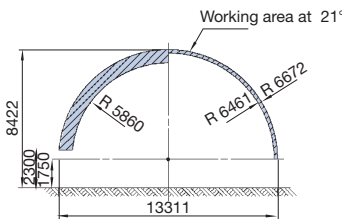
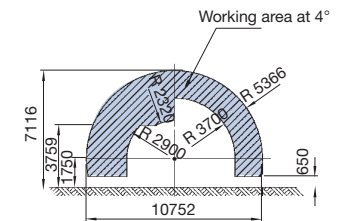
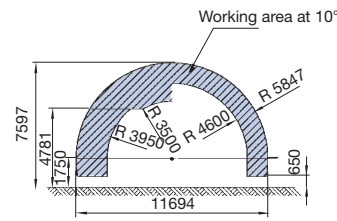
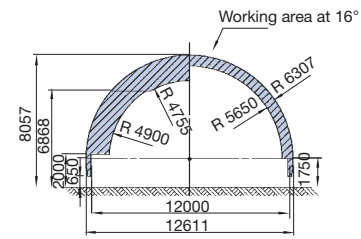
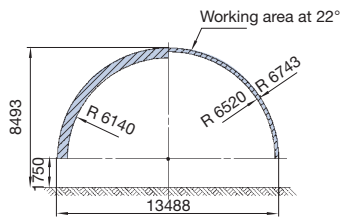
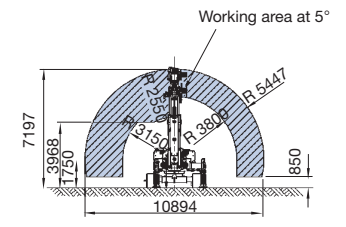
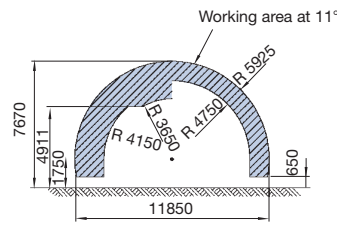
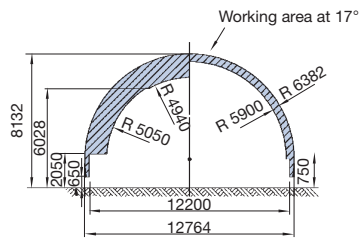
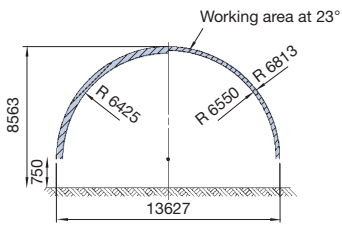
Working radius at 23°



ST-30

TUNNELLING RIGS





PST-60

TUNNELLING RIGS

The tunnelling rig project was developed to meet the growing need for sub-horizontal consolidation in large-section tunnels using single-boom equipment working with the full section method as an excellent alternative to the double-boom type system traditionally used for this type of job.

The equipment, with an overall weight of between 62 and 65 tonnes is very flexible and fast to use, also in relation to the importance of the treatments to perform. To reach the maximum heading stroke points with respect to ground level, a special system of thrust blocks and sliding blocks was designed to reach these points in total safety. The machine has a mast for 19000 mm treatments in one pass and 24000 m treatments with matching chuck and optional extensions.

The maximum extension height at 0° with respect to ground level is 10700 mm.

The variability of the height of the thrust block axis of rotation from 850 mm to 4250 mm combined with the column extension allows a work radius of from 3700 mm to 6500 mm. Tunnel lining is over 180°.

Fitted with two motors (diesel and electric) for both drilling and traversing, guaranteeing performance also in case of a breakdown of one of the two units.

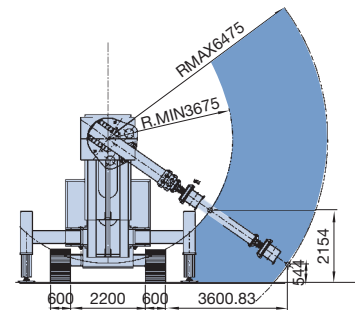
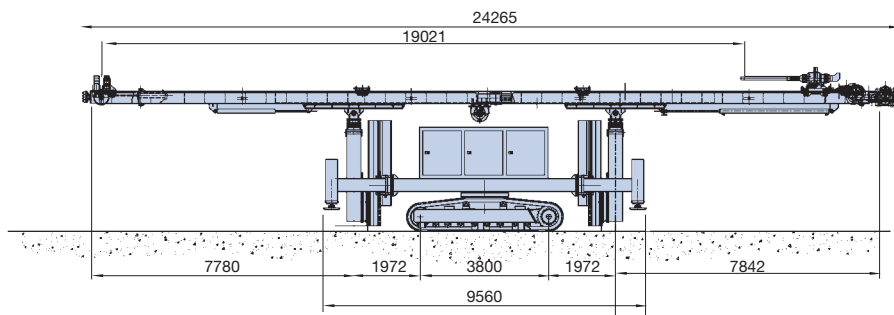
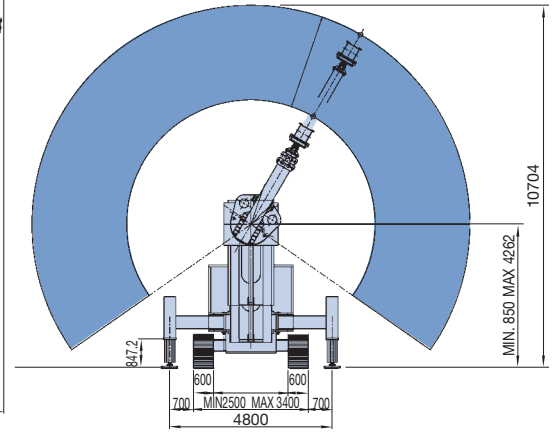
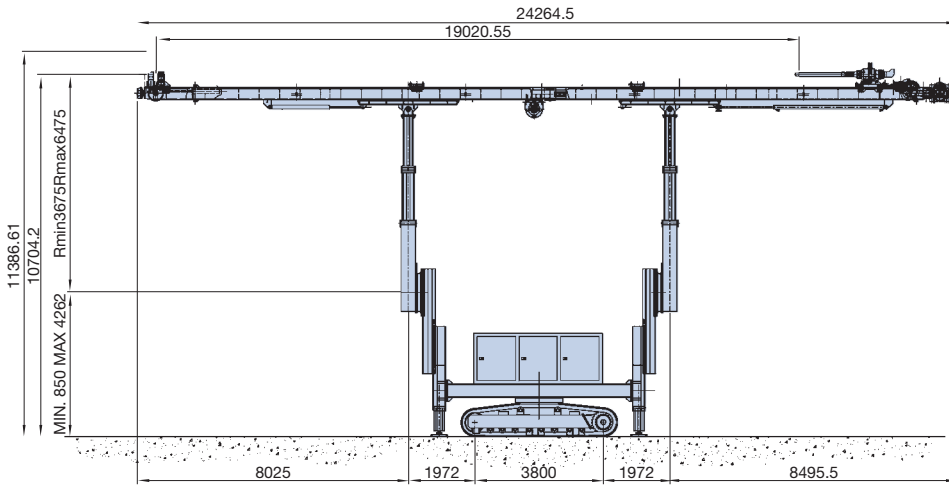
The following drilling techniques can be applied using the PST-60:

- Rotation (with or without casing)
- Rotopercussion by means of Top Hammer (with or without casing)
- Rotopercussion by means of Down the Hole Hammer (with Tubex, Odex or Simmetrix superjews system)

Performances		
Max height of consolidation treatment a 0°	mm	20
Max height of consolidation treatment a 5°	mm	10700
Radius of consolidation treatment a 0° (min/max)	mm	3675 6475
Radius of consolidation treatment a 5° (min/max)	mm	3675 7147
Height from working level of slew ring rotation axis	mm	850-4262
Hoist and feed system		
Feed stroke	mm	19000 (24000 optional kit)
Max hoist force	kN	70
Max feed force	kN	70
Max speed (feed/hoist)	rpm	26
Diesel engine		
		DEUTZ 2012 L06
Max power	kW	155
Rated power	kW	135
Electric motor		
		SIEMENS 4 POLS 50 Hz 380V
Power	kW	110
Hydraulic System		
Main pump (variable displacement axial pumps)	l/min	250
Auxiliary pump (gear pumps)	l/min	50+90+30x2
Rotary		
		HR-17
Max torque	daNm	1747
Drilling speed	rpm	295
Clamp & hydraulic joint breaker		
Size	mm	60-250
Max clamping force	kN	159
Max breaking torque	daNm	3830
Rod carousel (optional)		
Rod diameter	mm	114-90
Rod lenght n° rod		18000x1
Undercarriage		
Track shoe width	mm	600
Overall lenght	mm	4510
Overall width	mm	2500 (3700)
Travelling speed	km/h	1,5
Weight		
Total weight	kg	62000/65000
Average pressure on ground	MPa	0,12

PST-60

TUNNELLING RIGS



ST-120

TUNNELLING RIGS

The ST-120 tunnelling rig is the top of the Soilmecc tunnelling range.

Designed for the consolidation of large section tunnels it can be used for treatments up to a maximum of 21000 mm in one pass and 24000 mm with matching chuck. Heights of 10100 mm can be reached at the heading with the arms perfectly horizontal at 0°.

The main feature of the ST120 positioner is the geometry of the two cradles that house the system of sliding blocks and telescopic arms, letting you work far from the face to consolidate (12000 mm) guaranteeing the greatest safety in operations underground. Furthermore, each of the single drilling arms is fully independent, driven by two separated power and remote control units.

The weight of the rig in operational layout, depending on the optional devices fitted and the configuration used, is between 110 and 120 tonnes.

The following drilling techniques can be applied using the ST-120:

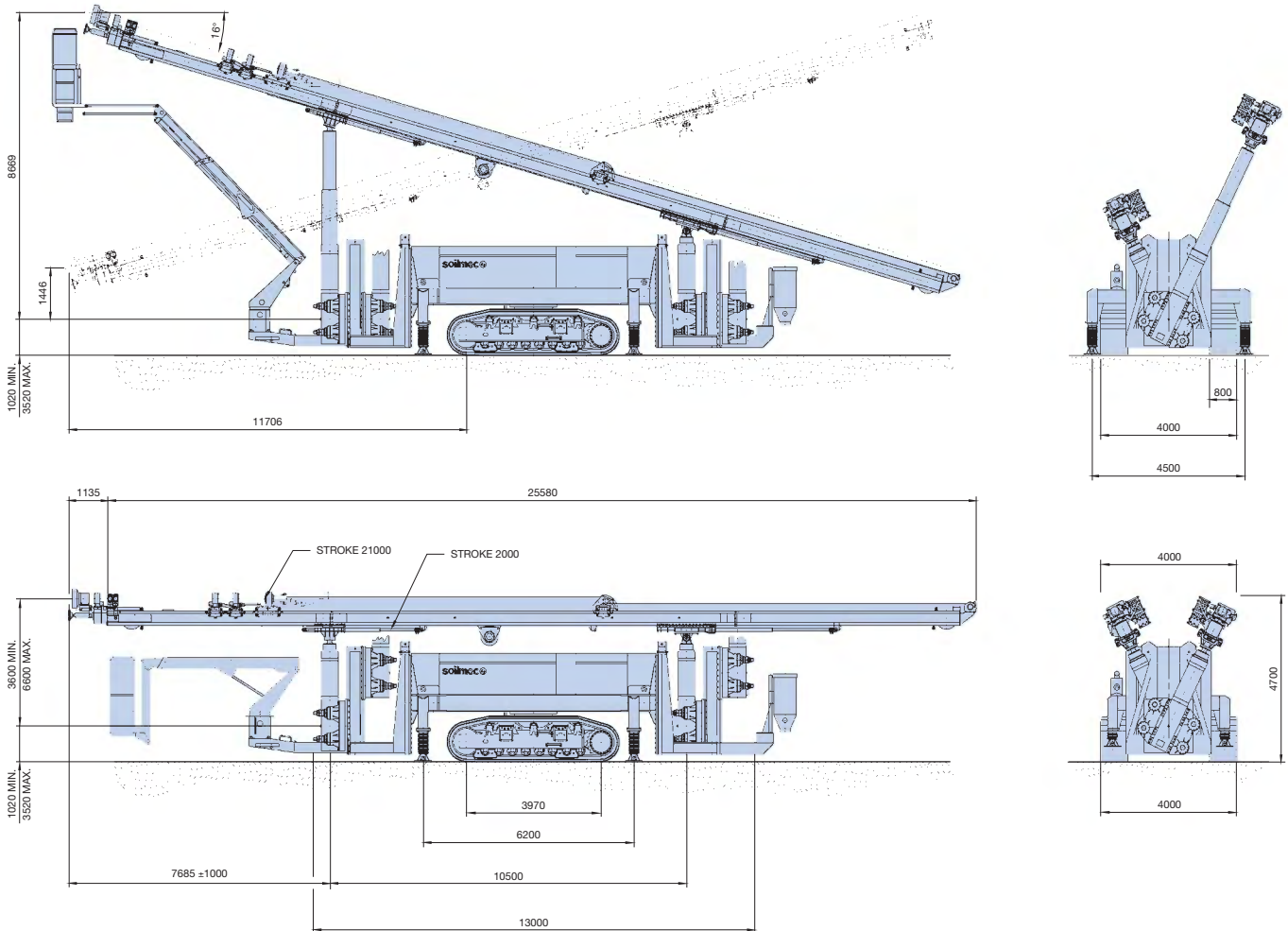
- Rotation (with or without casing)
- Rotopercussion by means of Top Hammer (with or without casing)
- Rotopercussion by means of Down the Hole Hammer (with Tubex system or without casing)

Performances		
Max height of consolidation treatment a 0°	mm	10120
Max height of consolidation treatment a 5°	mm	10736
Radius of consolidation treatment a 0° (min/max)	mm	3600 6600
Radius of consolidation treatment a 5° (min/max)	mm	5266 7216
Height from working level of slew ring rotation axis	mm	1000-3500
Hoist and feed system		
Feed stroke	mm	16000-18000-21000
Rod lenght	mm	12000
Max hoist force	kN	8400
Max feed force	kN	8400
Max speed (feed/hoist)	rpm	30-5
Diesel engine		
		CUMMINS 6 CTA A 8.3
Max power	kW	164
Rated power	kW	135
Electric motor		
		SIEMENS 4 POLS 50 Hz
Power	kW	90
Hydraulic System		
Main pump (variable displacement axial pumps)	l/min	(214+214)+142 / 2x(158+158)+2x158
Auxiliary pump (gear pumps)	l/min	47 / 2x(46+24)
Rotary		
		HR-14
Max torque	daNm	1363
Drilling speed	rpm	457
Clamp & hydraulic joint breaker		
Size	mm	60-225
Max clamping force	kN	159
Max breaking torque	daNm	3830
Rod carousel (optional)		
Rod diameter	mm	114
Rod lenght n° rod	m	18
Undercarriage		
Track shoe width	mm	800
Overall lenght	mm	5041
Overall width	mm	3900
Travelling speed	km/h	1,36
Weight		
Total weight	kg	110000 / 120000
Average pressure on ground	MPa	0,17

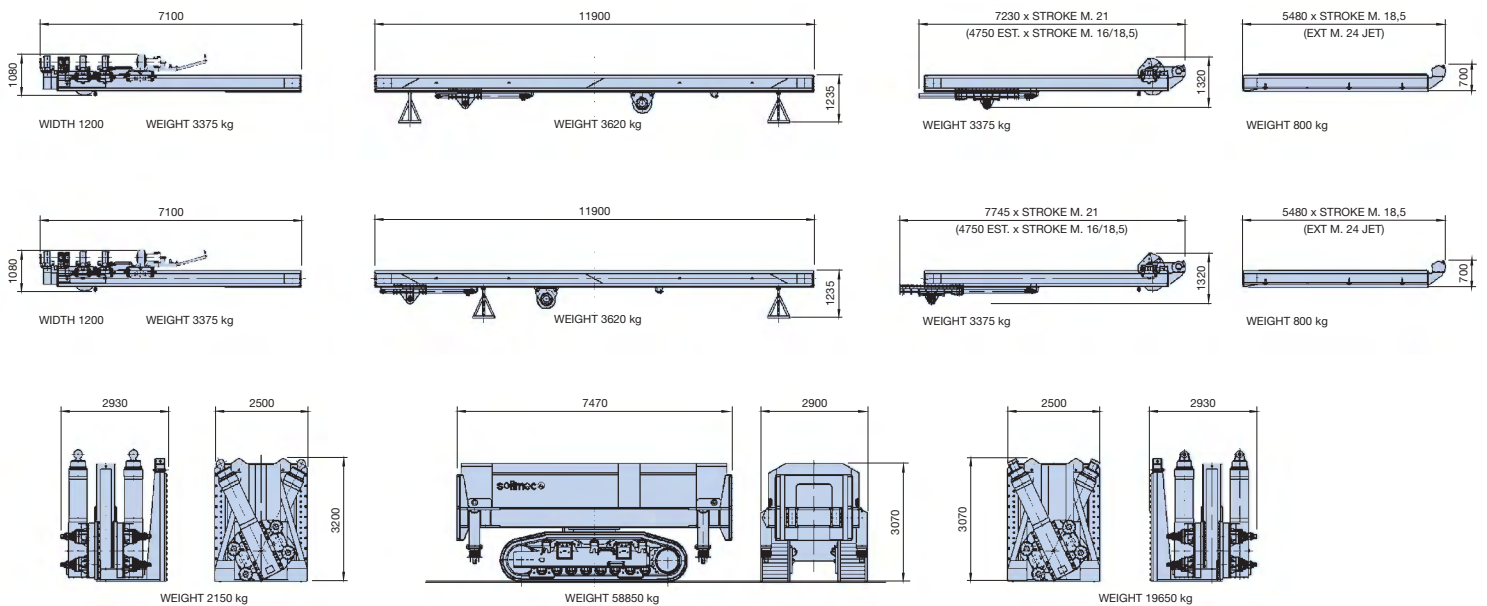
ST-120

TUNNELLING RIGS

Working configuration
21 m



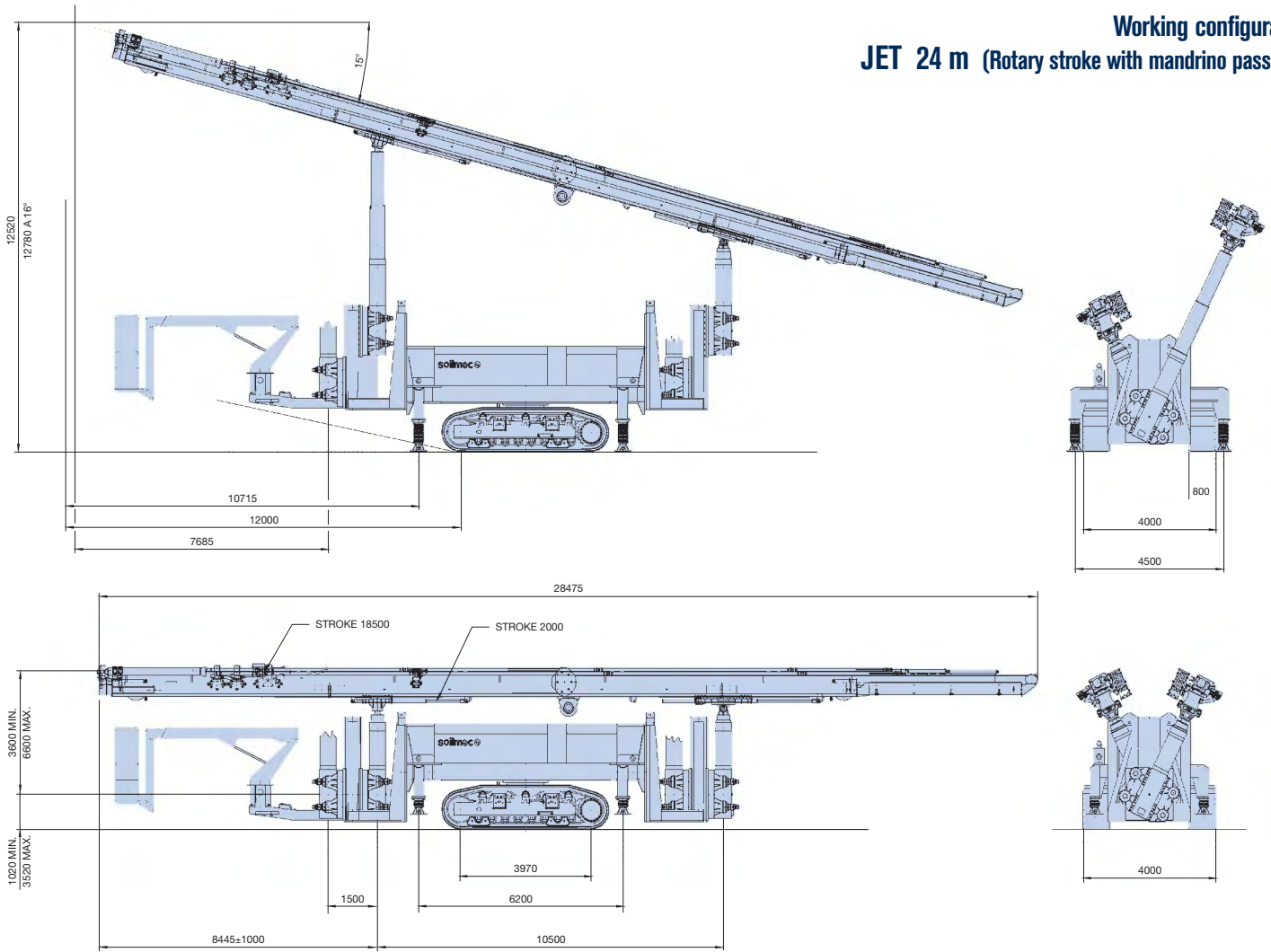
Transport conditions



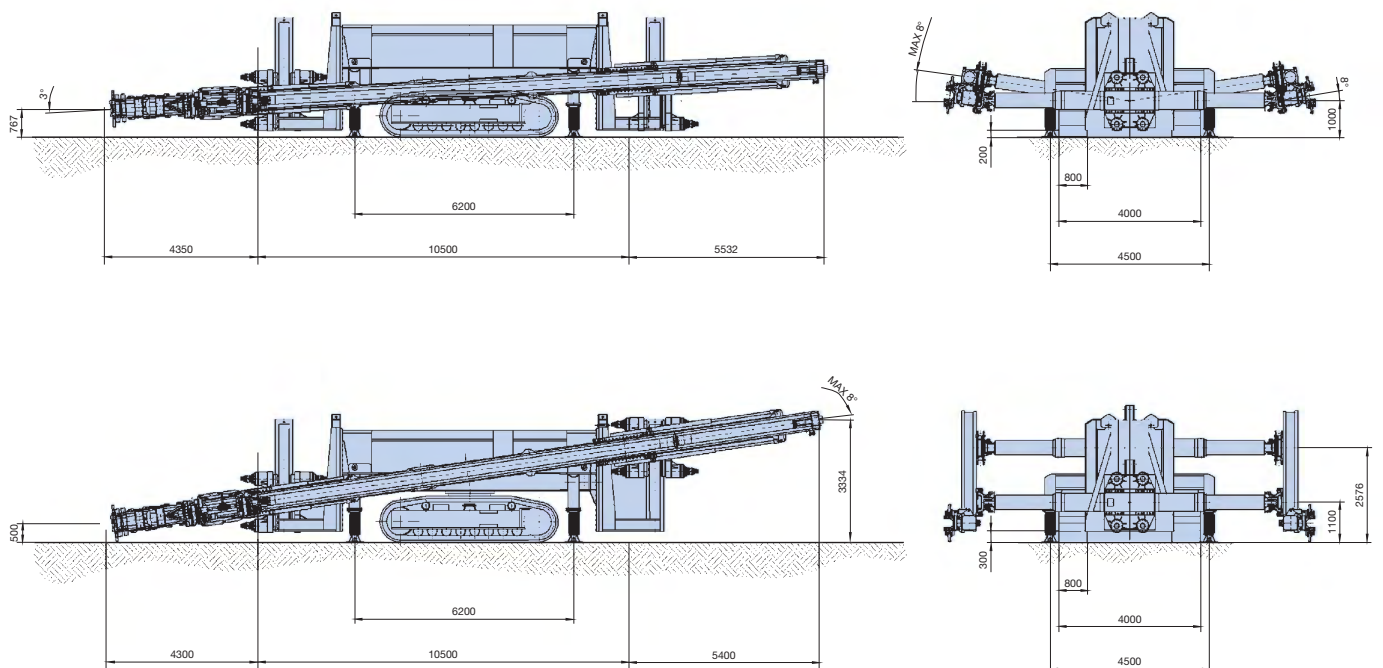
ST-120

TUNNELLING RIGS

Working configuration
JET 24 m (Rotary stroke with mandrino passante)



Tilting configurations



ST-120

TUNNELLING RIGS



Special Applications

PRE-BORE / CFA

The company's widespread penetration of international markets, has made it possible to identify and meet the special requirements that emerge from individual markets.

The company has developed rigs that not only meet the demands of industrial standardisation, but are also able to respond to the individual requirements of our customers, for higher performance for some types of operating processes peculiar to their own countries.

PRE-BORE

In some European countries, the use of driven pre-stressed piles is particularly highly-developed and widespread, giving rise to the pre-bore technique, the result of recent technology, making it possible to improve the operating cycle on sites of great complexity.

Primary bores of 450-510-600mm, using lightweight, fast-moving equipment, are drilled to a depth of 6/8 metres, to facilitate the subsequent operation of the heavier rigs equipped with vibrating drivers that guarantee better placement in the cavity. The increase in speed has considerably improved operating cycles.

Low-headroom CFA

Soilmec is the overall market leader in the development of the hydraulic rotary rig for continuous flight auger (CFA) drilling. Work on the CFA technology has been going on within the Trevi Group since 1970, in England at Soilmec UK, and this has subsequently been exported to other countries. This method is ideal for laying large-diameter piles (max 1000 mm diam.) in soils with a high sand, silt or clay content, and it is based on the principle of jetting in the concrete as the resulting material is being extracted, by keeping the cavity under pressure.

The minimum weight of the rigs is 40 tons and they use long masts in order to perform the jet grouting in a single pass.

The growing demand for this type of pile to be used for rebuilding existing structures and in the construction of industrial buildings, has led to the development of the low-headroom CFA, with the jet grouting proceeding in progressive sections using lightweight equipment (max. 18 tons), giving complete onsite flexibility.

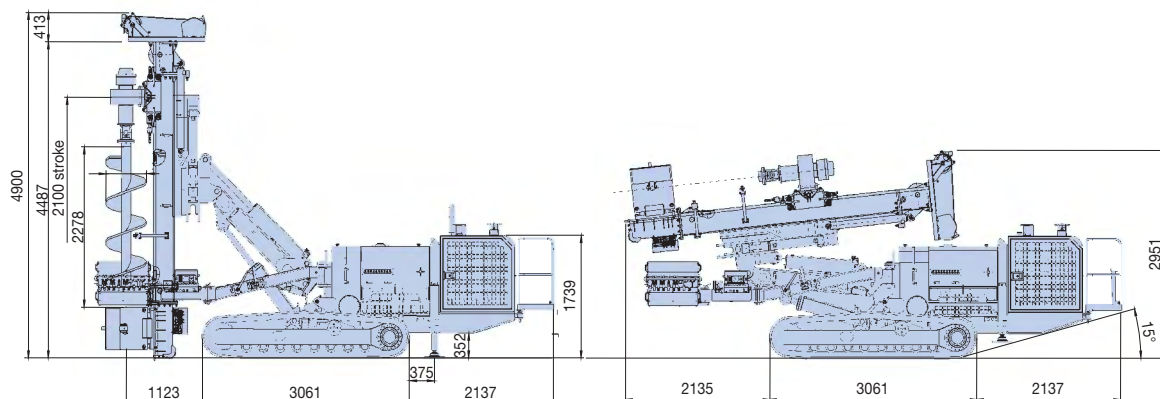


SM-14PB/CFA

SPECIAL APPLICATIONS

The SM-14, the most widely used model in the range, is equipped with a special rotary head that is capable of reaching a torque of 2500 daNm, ideal for the auger drilling required for areas in which plastic clays are present. It also has a special 600mm diameter auger guidance system and a universal joint, to guarantee that the work is carried out with precision, something highly unusual in a rig of this size.

- Concrete injection kit with rotary and 4" injection head
- 600 mm bottom auger guide



Undercarriage with oscillating tracks

Track shoe width	mm	400
Overall length	mm	3062
Overall width	mm	2300
Travelling speed	km/h	2,7
Average ground pressure	MPa	0,07

Diesel engine

Make and model		CUMMINS QSB 4.5 - Tier III
Max (rated) diesel engine power	kW	123 (119) @ 2000 rpm

Electric motor (on request)

Make and model		SIEMENS 4 POLS 50 Hz
Rated power	kW (BHp)	90 (119) @ 1485 rpm

Hydraulic System

Oil tank capacity	l	400
-------------------	---	-----

Rotary head

		HR-25
Gear box type		variable
Max nominal torque	daNm	2547
Max drilling speed	rpm	0-52
Inner passage	mm	140

Mast hoist & feed system

		Standard	Optional
Feed type		Cylinder	Gear motor
Feed stroke	mm	2100-4000	7000
Max hoist pull	daN	8900	8700
Max feed force	daN	4500	8700
Max speed (fast operation)	rpm	28	28

Clamp & Breaker

		Standard	Optional	Auger
Clamping range	mm	50-315	50-360	600
Max clamping force	kN	266	266	-
Max breaking torque	daNm	5060	5060	-

Service winch

Max line pull (1st layer)	kN	20
Max rope speed (4st or 5st layer)	m/min	60
Rope diameter	mm	10

SM-16PB/CFA

SPECIAL APPLICATIONS

The PSM-16 was studied and designed specifically to be extremely compact, with an impressive power output, to use a double rotary head with a fixed kinematic mechanism and a mast positioned with a 19.5 ton hydraulic piston. It is particularly suitable for transformation and use with the most demanding CFA technology.

This led to the PSM-16 CFA with a 4500 daNm rotary head and guide system for 600 mm diameter augers. With special accessories it can be used for auger drilling with 450-500 mm diameter casings.

The PSM-16PB is based on the PSM-16GT drilling rig (designed for geothermal operations).

The Pre-Bore application envisages the use of a special mast with a maximum height of 25 m.

- Concrete injection kit with rotary and 4" injection head
- 660 mm clamp with 600 mm guide

Engine			
Model	kW	DEUTZ TCD 2013 L06 2V	
Max power	kW	200 (272) @ 2400 rpm	
Hydraulic System			
Main pump and service pumps	l/min	280	
Max work pressure	MPa	28	
Rotary head			HR-45
Max torque (28 Mpa)	daNm@rpm	4500	
Rotation speed	rpm	0-100	
Mast feed/hoist system			
Standard cradle stroke	mm	2500	7000
Max hoist force	daN	19500	19500
Max feed force	daN	13000	13000
Max speed (slow/fast)	m/min	0,14 / 0,58	
Clamp & Breaker			
Clamping range	mm	320 - 510 (660 auger)	
Max clamping force	daN	24	
Max breaking torque	daNm	12000	
Service winch			
Max line pull 1st layer	daN	2000	
Rope max speed in 4th layer	m/min	43	
Rope diameter	mm	14	
Undercarriage			
Shoe	mm	400	
Overall length	mm	2760	
Overall width	mm	2300	
Max speed	km/h	2,3	
Weight			
Total weight	kg	15000-17000	
Average pressure on ground	MPa	0,07	

GEOHERMAL ENERGY

MICRODRILLING

Geothermal energy is a natural resource. In fact, the earth contains an inexhaustible supply of heat. As the depth increases, so does the temperature thanks to the geothermal energy coming from the earth's core and rising towards the surface. What's more the earth's crust absorbs over 40% of solar energy. This makes geothermal energy inexhaustible, constantly available, and a free and renewable source of energy; homes, offices, shopping areas, and whole residential complexes can be heated and air-conditioned at a much lower cost than when using traditional energy sources.

Applications

The extraction of heat from the ground and the distribution of the same to heat and air-condition environments can be done using various types of plants.

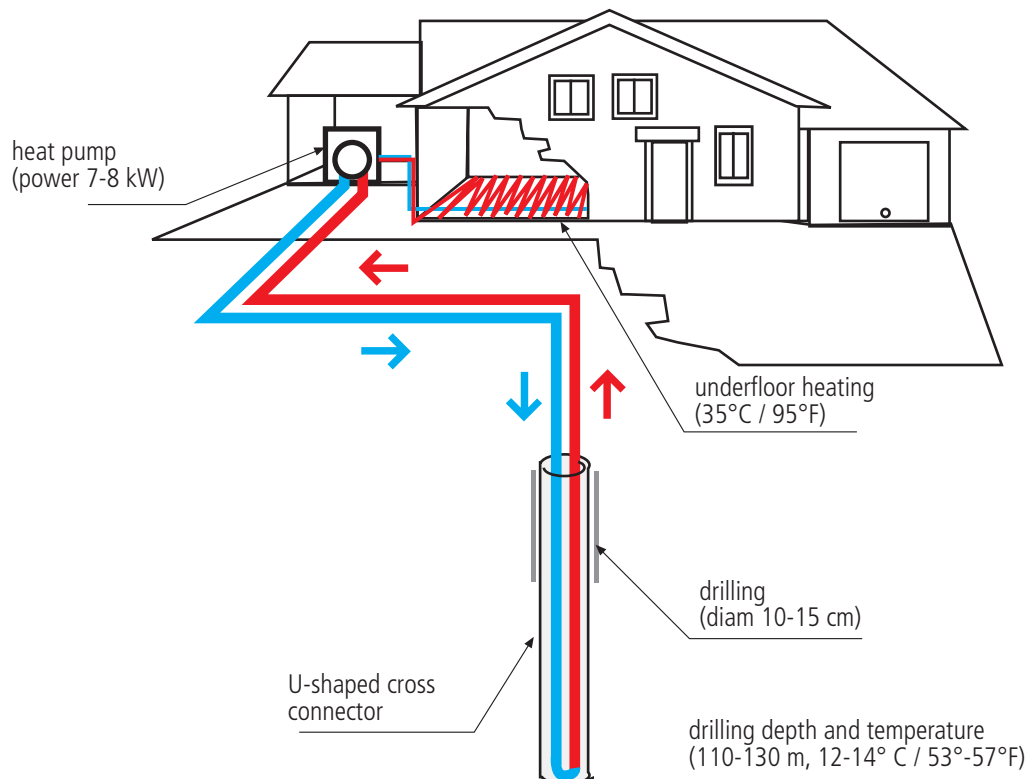
Applications of this type, called "low enthalpy", are most often used in residential buildings and commercial areas (Ecoconstruction).

The drilling depth to install the "Ground Source Heat Pump (GSHP)" varies from 50 to 200 metres.

Model	twin rotary kNm	pull force kW	Max (rated) engine power kW	clamp & breaker kNm
PSM-8GT	upper 8 lower 16	98	129 (116)	60 - 260
PSM-16GT	upper 11 lower 32	195	200 (176)	60 - 320

The traversing system and the compact dimensions are the strong points of our machines, which can be equipped with:

- (BOP) automatic greasing
- Magnetic loading system for rods and casings
- Triple clamp and breaker
- Double rotary (or hammer at the head for rods and bottom rotary)
- Mud pump
- Rubber tracks



GEOHERMAL ENERGY

MICRODRILLING



PSM-8GT

GEOTHERMAL ENERGY

The new PSM-8GT is a hydraulic drilling rig designed specifically for geothermal drilling.

The fixed kinematic mechanism, wide section mast, and the pull-push system with a 98 kN hydraulic cylinder means drilling deep, precise bores.

The rubber tracked undercarriage and low specific pressure on the ground make this machine ideal for operating in gardens and private courtyards, typical in this kind of application, reducing the impact of the site.

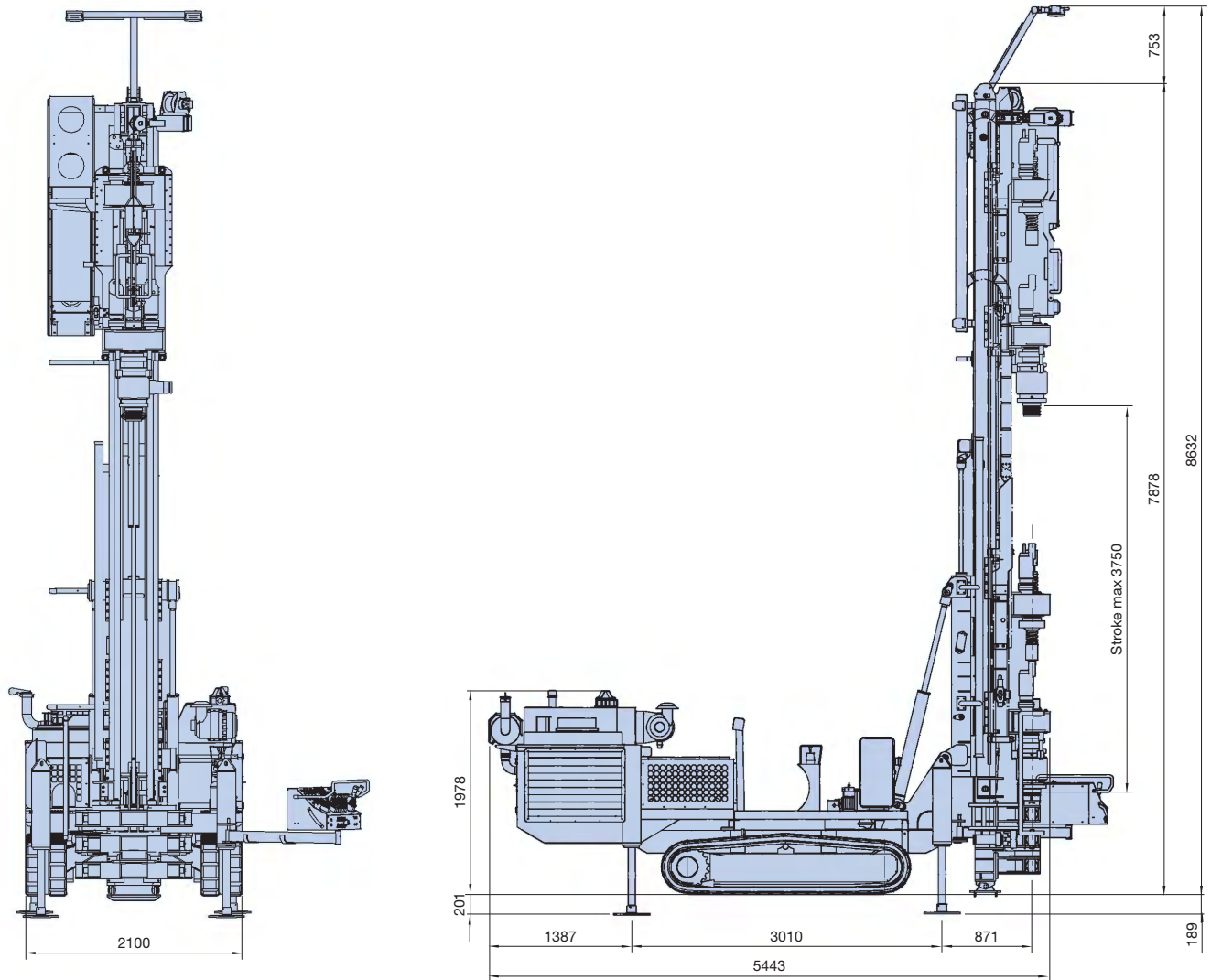
The drilling rig has a hydraulic clamp and breaker suitable for breaking drilling rods and an additional support for manoeuvres during feeding and recovery of the casings.

The drilling battery loading (rods and casings) is fast and safe thanks to a special winch system with magnetic lifting.

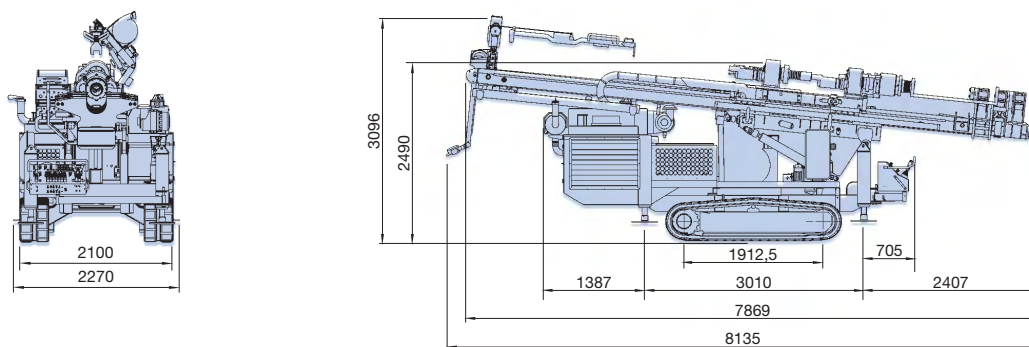
Engine		DEUTZ TCD 2013 L04 2V	
Power	kW	129	
Rated power	kW	116	
Hydraulic System			
Main pump	l/min	273	
Service pump	l/min	111 + (57+36+28)	
Double rotary		TR-816	
Lower	Max torque	daNm	1663@26
	Rotation speed	rpm	816@53
Upper	Max torque	daNm	816@53
	Rotation speed	rpm	408@106
Mast feed/hoist system			
Standard cradle stroke	mm	3750	
Rode lenght	mm	3000	
Max hoist force	kN	98,1	
Max feed force	kN	73,6	
Clamp & Breaker			
Clamping range	mm	60-260	
Max clamping force	daN	196	
Max breaking torque	daNm	3500	
Undercarriage			
Track shoe width	mm	400	
Overall lenght	mm	2420	
Overall width	mm	2100	
Travelling speed	km/h	2,5	
Weight			
Total weight	kg	9000	
Average pressure on ground	MPa	0,057	

PSM-8GT

GEOTHERMAL ENERGY



Transport conditions



PSM-16GT

GEOHERMAL ENERGY

The new project responds to the demand of geothermal systems drilling between 100 and 250 metres. The equipment's characteristics mean it can satisfy 70% of demand from the low-enthalpy geothermal sector. The compact drilling rig has a rubber tracked, 2300 mm-wide carriage and very low ground bearing pressure (0.65 Kg/cm²), thereby minimising damage to private property (gardens and courtyards) where domestic geothermal energy is used.

The drilling rig is equipped with fixed kinematic mechanism with a wide section mast, half-cylinder pull/push and a 19.5 ton pull capacity and 9.8 ton push power.

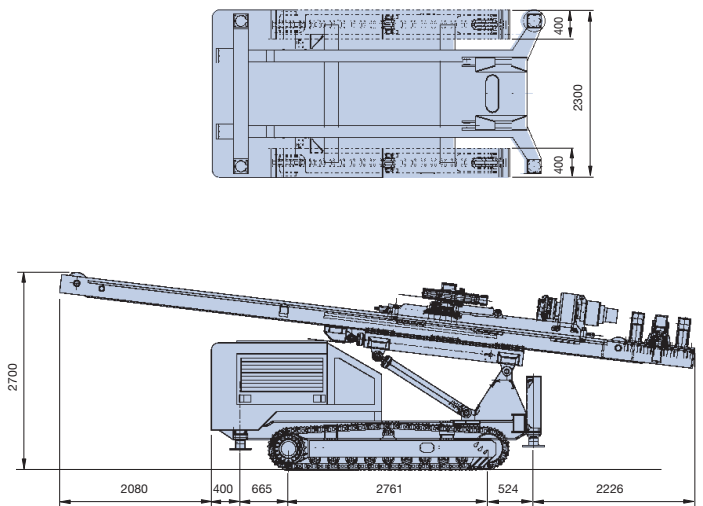
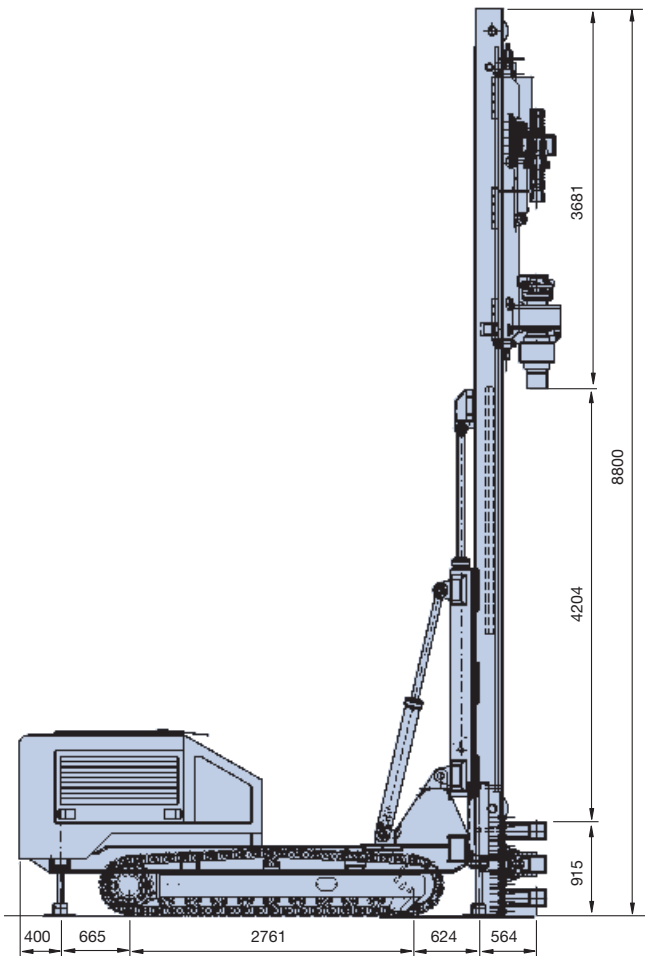
The rig is designed for rapid manoeuvring (0.2÷0,6 m/sec) and has a 200 kW, 2400 rpm diesel engine adapted to power the double rotary (upper 1100 daNm - bottom 3200 daNm), triple clamp and magnetic loading system to simultaneously manoeuvre rods/casings.

To keep weight to a minimum the drilling rig is not fitted with heavy and bulky casing/rod storage and is instead accompanied by an autonomous motorised rack system during operation.

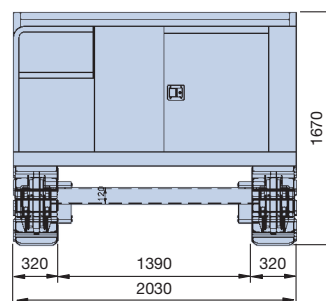
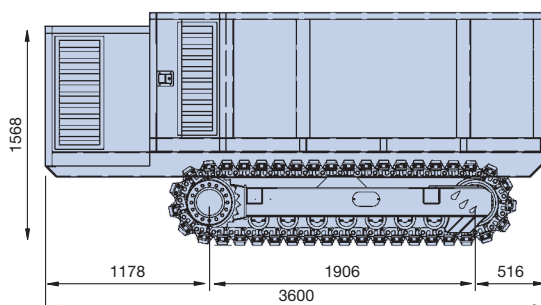
Engine		DEUTZ TCD 2013 L06 2V	
Power	kW	200	
Rated power	kW	176	
Hydraulic System			
Main pump	l/min	280	
Service pump	l/min	142+(64+44+22)	
Double rotary			
Lower	Max torque	daNm	3200
	Rotation speed	rpm	56
Upper	Max torque	daNm	1100
	Rotation speed	rpm	80
Mast feed/hoist system			
Standard cradle stroke	mm	4000	
Rode lenght	mm	3000	
Max hoist force	kN	195	
Max feed force	kN	130	
Max speed (slow/fast)	rpm	0,14 / 0,58	
Clamp & Breaker			
Clamping range	mm	60-320	
Max clamping force	daN	24	
Max breaking torque	daNm	1200	
Undercarriage			
Track shoe width	mm	400	
Overall lenght	mm	2760	
Overall width	mm	2300	
Travelling speed	km/h	2,3	
Weight			
Total weight	kg	15000-17000	
Average pressure on ground	MPa	0,7	

PSM-16GT

GEOHERMAL ENERGY



Geothermal Rack



Vibrodrilling Technology

ROTARY

VR Rotary - Vibrodrilling Technology combines rotary drilling with driving that uses eccentric vibrating masses. Together these two energy sources can extend the drilling range of head and down-the-hole percussion.

The vibrorotary consists of a vibrator and rotary mechanically coupled to permit simultaneous operation. During normal rotation, the rotary provides torque by rotating the drill string via the shank. Vibrator start-up causes axial oscillation that moves the drill string within a predetermined amplitude. The combined rotary and vibrating movement generate drill string motion that reduces the friction coefficient with the soil and produces a "slackening" effect which decreases drilling resistance. This facilitates penetration while cutting down on drilling time and the amount of push/pull required.

EQUIPMENT

The vibrator is fixed to the cradle through elastic connectors, which dampen vibration on the rest of the machine. The vibrating part is axially guided and connected to the bottom rotary via a mechanical connection known as a joint swivel.

The rotary (anchored to the same cradle as the vibrator) imparts torque and rotation via the shank.

A swivel is mounted on the end to allow for the addition of drilling fluids (air, water, polymers, muds and cement).

A diverter (ejection bell) is available when using double drill strings for the removal of drilling detritus that rises inside the casing.

The drill string and instruments have been specifically designed for use with this technology.

TECHNOLOGY COMPARING

VR Technology can ensure efficient feed and high productivity in all applications that use percussion.

Compared with similar technologies, VR offers the possibility of applying heavy force on drill strings in a continuous manner (through vibration) rather than in impulse, as is the case for head percussion or down-the-hole drilling.

The vibrating energy and centrifugal forces are higher than for similar traditional percussion systems.

In addition, the drill string can be vibrated during both feed and extraction, thus eliminating the risk that drill strings become stuck.

VR productivity therefore compares favourably with percussive systems and can be operated at depths of over 100 m.

ADVANTAGES

VR Technology can be used to perform single drilling or casing drilling with the circulation of fluids and maximises efficiency on soft soil layers (sand, gravel, rocks, general cover soil - OD drilling).

The technology can be used for both vertical and inclined drilling (stay rods and anchoring).

The main advantages are:

- Reduced friction between drill string and soil
- Decreased extraction pull required for stuck drill string
- Reduced torque required for drilling
- Reduced drilling time (compared to rotary drilling)
- Increased efficiency (compared to percussive systems)
- Reduced drill string wear as a result of continuous non-impact vibration
- Reduced noise emissions (compared to percussive systems)



Drilling cutting



Soft soil layers

Vibrodrilling Technology

ROTARY

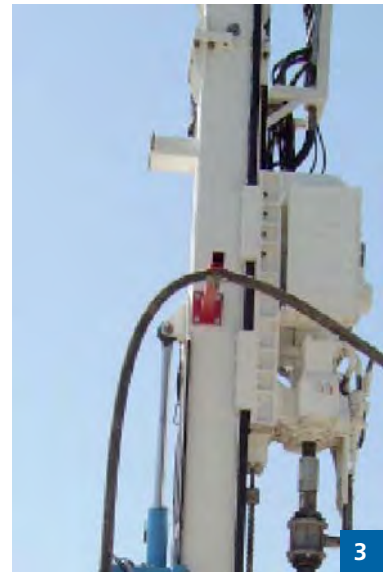
Two models are available: **VR-108** and **VR-212**

VD 108 is ideal for operation between 50-80 m with a drill string up to 2500 kg.

VD 212 is recommended for operation over 100 m with a drill string up to 3500 kg.

VIBRO ROTARY SM-14		VR-108	VR-212
Drilling performance			
Rod Diameter range	mm	76 - 224	76 - 224
Operative rod weight	kg	2500	3500
Depth	m	80 (according to soil type)	100 (according to soil type)
Drilling angle	°	0 - 90°	0 - 90°
Hydr. exciter block			
Type		HV-1	HV-2
Frequency	Hz (rpm)	41 (2460) 57 (3400)	60 (3600) 53 (3180)
Centrifugal force	kN	70 90	242 189
Hydr. power	kW	38.5 47.6	50 44
Max amplitude	mm	8.9 9.3	8.1 8.1
Hydr. rotary head			
Type		HD-800G	HD-1200V
Hydr. power	kW	38.5	70
Ranging torque	daNm	780 - 390	1270 - 302
Max speed	rpm	80	221
VD dimension	mm	1760x1065x720	1050x620x1700
VD total weight	kg	1250	1320

We can also supply single or double cement injection swivels (single or double fluid), casings and rod drill strings ranging in diameter from D76 mm to D244 mm and specific tools for different soil types.



RODS	Single rod	Rod and Casing
	90	76 and 114
	101	90 and 133
	114	90 and 152
	133	114 and 178
	152	114 and 203
	178	133 and 203
	219	133 and 219

	VR-108	VR-212
SM-14	●	
PSM-20		●
SM-21		●

1. Double swivel for jet grouting
2. Double swivel for drilling fluids
3. Single swivel for jet grouting

Modular options

ROTARY

The range of hydraulic rotary rigs is wide and complete enough to meet the most diverse drilling needs.

All the designs are based on the modular principle thus making it possible to fit the most suitable and most high performance rotary head to any of the SOILMEC/PSM rigs, taking into account the hydraulic power and the technology installed onboard the rig.

To achieve the best results for auger and tri-cone rotary drilling and for DTH hammers, different degrees of torque and drilling speed must be used, depending on the diameters required and the soil morphology.

Soilmec can offer:

- Variable rotaries, without gears, whose torque and rpm values can be selected by the operator in situ. These are the most universal machines, with a max. rpm of 221.
- Rotaries with manual gearing, with two or more three ratios, making it possible to work up to 429 rpm. These are identified by the letters G (gear variable).
- Geared rotaries designed for soil investigation. These are equipped with six ratios between 832 and 1000 rpm for operating with diamond core barrels. Identified by the word coring.

	PSM-8 PSM-8B	PSM-8G	SM-14	PSM-16G	PSM-20	SM-21	SM-30
HR-9 Coring	●	●	●	●			
HR-10 Coring				●			
HR-14 Coring				●			
HR-10 G	●	●		●			
HR-12			●				
HR-13 G			●				
HR-16 G			●				
HR-17 G			●		●		
HR-20						●	●
HR-21 G					●		
HR-25			●	●			
HR-37						●	●
HR-45				●			●

Modular options

ROTARY

HR-9 Coring		
Gearbox	type	6 gear box
Max torque	daNm	916
Speed	rpm	0-832
Inner rod passage	mm	90
HR-10 Coring		
Gearbox	type	6 gear box
Max torque	daNm	916
Speed	rpm	0-832
Inner rod passage	mm	90
HR-14 Coring		
Gearbox	type	6 gear box
Max torque	daNm	1300
Speed	rpm	0-1000
Inner rod passage	mm	90
HR-10 G		
Gearbox	type	4 gear box
Max torque	daNm	1024
Speed	rpm	0-381
Inner rod passage	mm	90
HR-12		
	type	variable
Max torque	daNm	1207
Speed	rpm	0-221
Inner rod passage	mm	114
HR-13 G		
Gearbox	type	6 gear box
Max torque	daNm	1290
Speed	rpm	0-429
Inner rod passage	mm	114
HR-16 G		
Gearbox	type	4 gear box
Max torque	daNm	1560
Speed	rpm	0-184
Inner rod passage	mm	90
HR-17 G		
Gearbox	type	4 gear box
Max torque	daNm	1747
Speed	rpm	0-295
Inner rod passage	mm	90
HR-20		
	type	variable
Max torque	daNm	2025
Speed	rpm	0-179
Inner rod passage	mm	127
HR-21 G		
Gearbox	type	4 gear box
Max torque	daNm	2154
Speed	rpm	0-315
Inner rod passage	mm	127
HR-25		
	type	variable
Max torque	daNm	2047
Speed	rpm	0-52
Inner rod passage	mm	150
HR-37		
Gearbox	type	variable
Max torque	daNm	3659
Speed	rpm	0-127
Inner rod passage	mm	140
HR-45		
	type	variable
Max torque	daNm	4500
Speed	rpm	0-100
Inner rod passage	mm	140

N.B.
The indicated values are based on pressure 280 bar
Different regulation are available please contact microdrilling department

Modular options

DOUBLE ROTARY

In order to drill using casings, SOILMEC/PSM has developed a range of double rotaries that can be fitted to the lightest rig, the PSM 8GT and to the most specialised, the SM 30. The possible diameters and depths depend on the nature of the soil and the type of rig to be used.

DR-816			
Upper rotary	Torque	daNm	816
	Speed	rpm	0-106
Lower rotary	Torque	daNm	1633
	Speed	rpm	0-53
DR-812			
Upper rotary	Torque	daNm	828
	Speed	rpm	0-323
Lower rotary	Torque	daNm	1207
	Speed	rpm	0-221
DR-1018			
Upper rotary	Torque	daNm	1000
	Speed	rpm	0-100
Lower rotary	Torque	daNm	1800
	Speed	rpm	0-46
DR-1220			
Upper rotary	Torque	daNm	1207
	Speed	rpm	0-221
Lower rotary	Torque	daNm	2025
	Speed	rpm	0-179
DR-1725			
Upper rotary	Torque	daNm	1747
	Speed	rpm	0-295
Lower rotary	Torque	daNm	2547
	Speed	rpm	0-52

	PSM-8GT	SM-14	PSM-20	SM-21	SM-30
DR-816	●				
DR-812		●			
DR-1018		●	●		
DR-1220				●	
DR-1725					●

N.B.
Other double rotary are in progress

Modular Options

MECHANISED LOADING SYSTEMS

Mechanised loading systems using either the carousel method or lateral positioning by means of the hydraulic piston, only depend on the auger used.

Compact design loaders with a variety of load capacities can be supplied with the whole range of the smaller rigs, from the PSM-8, that uses the elliptical three-auger loader for automatic manoeuvres up to 12 m in depth, to the SM-30 with the piston loader that can reach greater depths.

The Group has opted for cranes coupled with hydraulic clamps or special magnetic clamps for automatic loading of augers and casing tubes.

This choice makes it possible not to weight down the drill which would otherwise limit its flexibility and its operating sites, and above all, this means that there are no limitations on the drilling depth.

• Loader for elliptical three-auger rigs:

This has been designed specially for operation near supporting walls or escarpments in order to create "Berlin wall" supports. The bulk of the loader is contained within the geometry of the rotary.

- Diam. 76/90/114 mm L= 3000
(mounted on a PSM-8)

- Diam. 140 mm L= 3000
(mounted on a PSM-20)

• Piston loader:

housing two augers

- 2 x 6000 x 140 mm
(mounted on a PSM-20)

- 2 x 7500 x 127 mm
(mounted on a PSM-20)

• Carousel loader

- 10 x 3000 x 114 mm
(mounted on SM-14)

- 6 x 4500 x 140 mm
(mounted on PSM-20 and SM-21)

- 6 x 3000 x 140 mm
(mounted on SM-21)

- 8 x 4500 x 114 mm
(mounted on PSM-20)

- 10 x 4500 x 140 mm
(mounted on SM-21)

- 10 x 3000 x 140 mm
(mounted on SM-21 and PSM-20)



Drilling Foundation Tools

RODS

Hydraulic drilling rigs for use in the microdrilling sector have been designed to allow for the use of different drilling technologies.

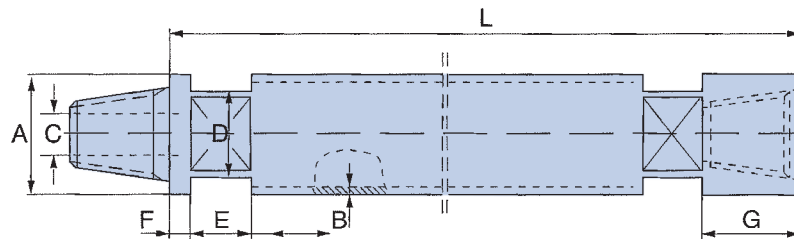
Different parameters must be considered in choosing the most suitable hydraulic rig for the technology involved.

The technical limit for hydraulic drilling rigs depends on:

- the rig's hydraulic and geometric potential
- the type of technology used and the soil to be drilled/consolidated

The flexibility and multi-use features of each drilling rig allows, depending on the machine, for operation outside these limits; operators and drillers should use common sense and experience to monitor such operations in terms of safety and machine life.

The attached tables aim to help the operator or driller correctly dimension the equipment as recommended by the manufacturer.



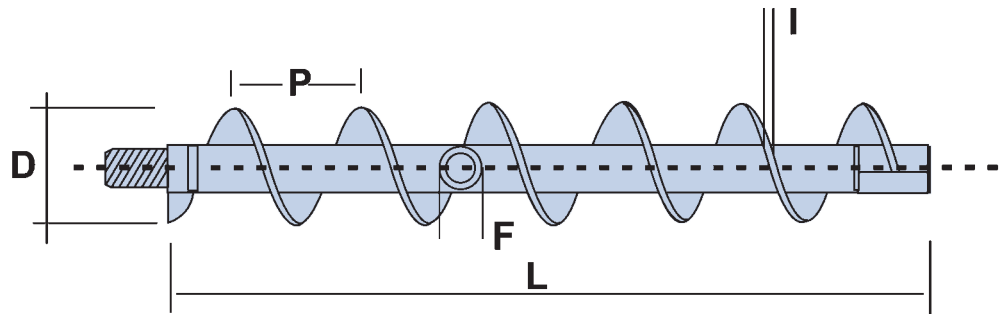
Diam. (mm) A	Length (mm) B	Thickness B	Weight kg.	Thread	Measures				
					C	D	E	F	G
76	1000	4	13	2.3/8 API	30	65	40	25	65
76	1500	4	17	2.3/8 API	30	65	40	25	65
76	2000	4	20	2.3/8 API	30	65	40	25	65
76	3000	4	24	2.3/8 API	30	65	40	25	65
76	1000	6,3	17	2.3/8 API	30	65	40	25	65
76	1500	6,3	23	2.3/8 API	30	65	40	25	65
76	2000	6,3	28	2.3/8 API	30	65	40	25	65
76	3000	6,3	39	2.3/8 API	30	65	40	25	65
89	1000	6,3	17	2.3/8 API	43	65	40	25	77
89	1500	6,3	24	2.3/8 API	43	65	40	25	77
89	2000	6,3	30	2.3/8 API	43	65	40	25	77
89	3000	6,3	43	2.3/8 API	43	65	40	25	77
89	1500	8,8	28	2.3/8 API	43	65	40	25	77
89	2000	8,8	35	2.3/8 API	43	65	40	25	77
89	3000	8,8	51	2.3/8 API	43	65	40	25	77
114	1000	6,3	26	3.1/2 API	43	95	50	30	75
114	1500	6,3	35	3.1/2 API	43	95	50	30	75
114	2000	6,3	43	3.1/2 API	43	95	50	30	75
114	3000	6,3	60	3.1/2 API	43	95	50	30	75
114	6000	6,3	110	3.1/2 API	43	95	50	30	75
114	1000	8,8	31	3.1/2 API	43	95	50	30	75
114	1500	8,8	42	3.1/2 API	43	95	50	30	75
114	2000	8,8	54	3.1/2 API	43	95	50	30	75
114	3000	8,8	77	3.1/2 API	43	95	50	30	75
114	6000	8,8	136	3.1/2 API	43	95	50	30	75
114	7620	8,8	173	3.1/2 API	43	95	50	30	75
127	1000	8,8	38	3.1/2 API	43	95	50	30	80
127	1500	8,8	51	3.1/2 API	43	95	50	30	80
127	2000	8,8	63	3.1/2 API	43	95	50	30	80
127	3000	8,8	90	3.1/2 API	43	95	50	30	80
127	6000	8,8	167	3.1/2 API	43	95	50	30	80
140	1000	8,8	45	4.1/2 API	58	120	50	30	100
140	1500	8,8	59	4.1/2 API	58	120	50	30	100
140	2000	8,8	73	4.1/2 API	58	120	50	30	100
140	3000	8,8	102	4.1/2 API	58	120	50	30	100
140	6000	8,8	187	4.1/2 API	58	120	50	30	100
140	7500	8,8	229	4.1/2 API	58	120	50	30	100
168	1500	8,8 (10)	92	4.1/2 API	on request				
168	3000	8,8 (10)	140	4.1/2 API					
168	4500	8,8 (10)	190	4.1/2 API					

Different type of thread are available

Drilling Foundation Tools

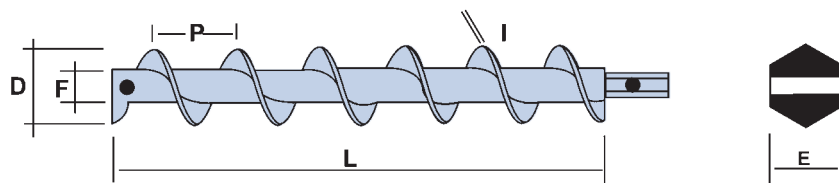
AUGERS

Auger with thread connection



Diam. (mm)	Pitch p	I-Thick. I	Tube dim. F	Attachment	L=1000 Weight (kg)	L=1500 Weight (kg)	L=3000 Weight (kg)
150	150	8	60	2-3/8A.R.	20	29	58
180	180	8	60	2-3/8A.R.	23	34	68
200	200	10	76	2-3/8A.R._2-7/8A.R.	30	43	86
220	220	10	76	2-3/8A.R._2-7/8A.R.	31	46	92
250	250	10	76	2-3/8A.R._2-7/8A.R.	34	49	98
280	250	10	76	2-3/8A.R._2-7/8A.R.	36	53	106
300	250	10	76	2-3/8A.R._2-7/8A.R.	38	55	110
350	300	10-12	89	3-1/2A.R.	45	68	136
400	350	10-12	89	3-1/2A.R.	55	75	150

Auger exagonal pin connection



Diam. (mm)	Pitch p	I-Thick. I	Tube dim. F	Attachment	L=1000 Weight (kg)	L=1500 Weight (kg)	L=3000 Weight (kg)
150	150	8	60	41	20	29	58
180	180	8	60	41	23	34	68
200	200	10	76	55	30	43	86
220	220	10	76	55	31	46	92
250	250	10	76	55	34	49	98
280	250	10	76	55	36	53	106
300	250	10	76	55	38	55	110
350	300	10-12	89	55	45	68	136
400	350	10-12	89	55	55	75	150

Tools information

BITS AND TRI-CONES

Drilling tools such as blade bits or tri-cones are used for single rotary drilling with drilling polymers or muds or compressed-air drainage; instrument design and material depend on the materials to be drilled.

Blade bits

Blade bits perform best in unconsolidated formations e.g. clay, sand and marl. Usually manufactured from high quality alloy steel, the blades are reinforced with tungsten carbide inserts.

Tooth tri-cones

Tooth tri-cones are used for soft, medium-soft and medium-hard formations. The tool's shoulders are usually reinforced. Teeth vary in form and layout to optimise feed in different soil types.

Tri-cones with tungsten carbide inserts

These are used for hard and abrasive soil and can perform for longer periods and at different penetration speeds than tooth models, as they can bear higher weights.

Bit type	Applicable formations	Weight per inch	Recommened rotary speed
Blade	Clay, sand, marl	-	min 60 - max 150
Tooth tri-cone	Soft and medium-soft	Min 450 kg - Max 1300 kg	min 60 - max 110
	Medium-hard	Min 450 kg - Max 1800 kg	min 50 - max 100
	Hard	Min 900 kg - Max 2200 kg	min 40 - max 80
Tri-cone with tungsten carbide inserts	Medium soft	Min 450 kg - Max 1800 kg	min 45 - max 80
	Medium-hard	Min 1200 kg - Max 2800 kg	min 40 - max 80
	Abrasive hard	Min 1800 kg - Max 3100 kg	min 30 - max 60

Tools information

DTH DRILLING - APPLICABLE DIAMETERS AND COMPRESSED AIR CONSUMPTION

DTH (Down-the-hole) technology using a DTH hammer performs best for drilling rocky, medium rocky or alluvial material. Drilling is achieved using the hammer and an energy source (compressed air). Performance depends on the hammer and compressed air and the hydraulic rig is only used to transmit motion and execute drilling manoeuvres.

However, it is important to take into account the stresses on the drilling rigs and the correct DRILLING RIG - COMPRESSED AIR - DTH HAMMER relationship.

DTH Hammer type	Attachment	Reccomended rods (diam.) mm	Diameter range	Air consumption 7 bar l/min	Air consumption 10.5 bar l/min	Air consumption 14 bar l/min	Air consumption 17.6 bar l/min	Air consumption 21 bar l/min	Air consumption 24 bar l/min	SM/PSM drill range reccomended
3"	2-3/8	76	90-102	/	3500	5200	7200	9200	11800	PSM-8 / PSM-8B PSM-8G / SM-30 SM-14 / PSM-20 SM-21 / PSM-8GT PSM-16GT
4"	2-3/8	(76)-90	105-127	/	4700	6700	8500	10900	13500	
5"	3-1/2		130-165	/	6800	9200	12000	15300	18700	
6"	3-1/2	(90)-114-(140)	152-203	/	8800	12200	15600	19800	24600	
6" HD	3-1/2	114-140 (168)	152-216 (229-305) <small>(without bit guarantee)</small>	/	10000	14000	17000	20500	26000	SM-14 SM-21 SM-30 PSM-20 PSM-16GT
8"	4-1/2	140-168	204-270 (302-305) <small>(without bit guarantee)</small>	/	16000	20400 (23400)	26000 (31000)	31500 (38000)	36000 (45300)	PSM-20 / PSM-16GT SM-21 / SM-30 <small>(shock absorber reccomended)</small>
10"	6-5/8	/	251-312	/	24100	34300	45600	/	/	PSM-20 / PSM-16GT SM-21 / SM-30 <small>(shock absorber reccomended)</small>
12"	6-5/8	/	312-445 (508-556) <small>(without bit guarantee)</small>	22100	30200	42500	53800	/	/	SM-30 <small>(shock absorber reccomended)</small>
12" HD	6-5/8 (N-25)	/	/	24000	36800	5100	65000	/	/	
18"	8-5/8 (C-180)	C-180	/	38300	58700	77900	/	/	/	

The tables below are intended as user guides.

Tools information

DTH CASING DRILLING

Hole instability requires drilling with casings.
The most common systems are:

DUPLEX: The casing is rotated by the rotary head using a special twisting system.

A shoe is welded to the end of the tube at the bottom of the hole to facilitate feed. A drill string rotates (powered by the same upper rotary head) inside the casings, consisting of the drilling rods with a DTH hammer extending a few centimetres beyond the drill shoe.

This type of drilling is always performed using single rotary hydraulic drilling rigs and may also be used for rotary drilling with drilling fluids.

TUBEX; ODEX; SIMMETRIX; SUPERJAWS: These drilling systems have different characteristics depending on the manufacturer and use an eccentric bit with casing drawn by devices placed in the hole floor. The upper rotary head of the hydraulic drilling rig is used only to rotate the drill string, which operates wholly within the casings.

The double rotary drilling system allows for rotary-only operation with mud circulation as well as DTH hammer drilling. In both technologies, drilling is performed by the upper rotary head, which turns the rod/tri-cone or rod/DTH hammer drill string in a clockwise direction.

The bottom rotary turns the casing in an anti-clockwise direction.

Torque values are higher for the bottom rotary (which is subject to greater stresses) than for the upper rotary (which operates within the casing and is exposed to less friction and stress).

The fact that the two rotary heads turn in opposite directions has two benefits:

- a) It avoids unscrewing the casing;
- b) Inverse rotation provides the sum of two relative speeds. This results in increased hole-clearing as the spiral effect facilitates the drainage of drilling detritus.



Casing twisters

Diameters	Weight kg	Inner passage mm	Weight kg
D.114,3	8	76 2"3/8 API REG.	10
D.127	9	76 2"3/8 API REG.	10
D.139,7	11	76 2"3/8 API REG. 90 2"3/8 API REG.	10 14
D.152,4	12	76 2"3/8 API REG. 90 2"3/8 API REG.	10 14
D.168,3	16	90 2"3/8 API REG. 114 3 " 1/2 API REG.	14 22
D.177,8	17	90 2"3/8 API REG. 114 3 " 1/2 API REG.	14 22
D.193,7	18	90 2"3/8 API REG. 114 3 " 1/2 API REG.	14 22
D.203	19	90 2"3/8 API REG. 114 3 " 1/2 API REG.	14 22
D.219,1	21	114 3 " 1/2 API REG. 127 3 " 1/2 API REG. 140 4 " 1/2 API REG.	22 24 27
D.244,5	24	140 4 " 1/2 API REG.	27
D.273	27	140 4 " 1/2 API REG.	27
D.300	30	140 4 " 1/2 API REG.	27

Tools information

DTH CASING DRILLING



N.B.: When assembling drill string, check thread and rotation direction of the casings and drilling rods.

Casings			
Diameters	Wall thickness mm	Inner passage mm	Weight kg
D.114,3 L=1000	8,8	94	24
D.114,3 L=1500	8,8	94	35
D.114,3 L=3000	8,8	94	69
D.127 L=1000	8,8	107	26
D.127 L=1500	8,8	107	39
D.127 L=3000	8,8	107	77
D.139,7 L=1000	8,8	120	30
D.139,7 L=1500	8,8	120	44
D.139,7 L=3000	8,8	120	86
D.152,4 L=1000	8,8	133	31,5
D.152,4 L=1500	8,8	133	47
D.152,4 L=3000	8,8	133	94
D.168,3 L=1000	8,8	147	36
D.168,3 L=1500	8,8	147	53
D.168,3 L=3000	8,8	147	105
D.177,8 L=1000	8,8	158	38
D.177,8 L=1500	8,8	158	56
D.177,8 L=3000	8,8	158	110
D.193,7 L=1000	8,8	172	41
D.193,7 L=1500	8,8	172	61
D.193,7 L=3000	8,8	172	121
D.203 L=1000	8,8	178	44
D.203 L=1500	8,8	178	65
D.203 L=3000	8,8	178	128
D.219,1 L=1000	8,8	197	47
D.219,1 L=1500	8,8	197	70
D.219,1 L=3000	8,8	197	138
D.244 L=1000	10	222	58
D.244 L=1500	10	222	87
D.244 L=3000	10	222	174
D.273 L=1000	10	248	65
D.273 L=1500	10	248	97
D.273 L=3000	10	248	195
D.300 L=1000	10	275	73
D.300 L=1500	10	275	109
D.300 L=3000	10	275	216

Shoes							
Diameters	Length mm			Inserts n°	Inner passage mm	Weight kg	Type
114,3	117	93	160	12	10	3	KAL G.2
127	130	105	160	12	10	3,5	KAL G.2
139,7	143	119	160	14	10	4	KAL G.2
152,4	155	131	160	14	10	4,5	KAL G.2
168,3	170	146	160	16	10	4,7	KAL G.2
177,8	180	157	160	16	10	4,9	KAL G.2
193,7	195	172	160	18	10	5,5	KAL G.2
203	204	177	160	18	10	6	KAL G.2
219,1	222	196	160	20	10	7	KAL G.2
244	245	222	160	24	10	8	KAL G.2
273	274	248	160	26	10	9	KAL G.2
300	300	274	160	28	10	9,5	KAL G.2



Tools information

REMEMBER

Drilling with duplex down-the-hole system: rod thread right / casings right

Drilling with duplex muds system: rod thread right / casings right

Drilling with odex/ tubex system: rod thread right / driven tubes welded

Drilling with double rotary system: rod thread right / casings left

SOILMEC distributes machinery and structures all over the world, supported by SOILMEC subsidiary companies and representative offices as:

SOILMEC LTD - Peterborough - U.K.
SOILMEC MISR S.A.E. Co. - Il Cairo - Egypt
SOILMEC (H.K.) Limited - Hong Kong
SOILMEC JAPAN CO LTD - Tokio - Japan
SOILMEC S.P.A. - Beijing Repr. Office - P.R. China
SOILMEC FAR EAST PTE.LTD - Singapore
SOILMEC ARABIA LLC - Jeddah - Saudi Arabia
SOILMEC EMIRATES - Dubai - U.A.E.
SOILMEC GULF - Dubai - U.A.E.
SOILMEC FRANCE S.A.S. - Paris - France
SOILMEC INDIA - Mumbai - India
SOILMEC S.P.A. - Moscow Repr. Office - Russia
SOILMEC DEUTSCHLAND GmbH - Drolshagen - Deutschland
SOILMEC NORTH AMERICA - Boston - U.S.A.
SOILMEC AUSTRALIA - Sydney - Australia
PSM S.R.L. - Treviso - Italy
WATSON INC. - Texas - U.S.A.

CERTIFIED QUALITY SYSTEM

In 1990 Soilmec was awarded with the certification of its Quality System complying with ISO 9001:2000 and ISO 14001:2004 standards.



SOILMEC S.p.A.

Drilling and Foundation Equipment

5819, via Dismano

47522 Cesena (FC) - Italy

tel. +39-0547-319111

fax +39-0547-318548

[http:// www.soilmec.it](http://www.soilmec.it)

e-mail: soilmec@soilmec.it

All technical data are purely indicative and subject to change without notice.
 Drawings are not to scale.

soilmec 
 Drilling and Foundation Equipment