

THE MULTIPURPOSE PILING RIG



The **CH 23** is a multipurpose drilling rig mounted on a **dedicated excavator carrier with an operating weight of 70 tons (154,300 lbs)**. **The rig is self-erecting** and can be transported with minor disassembly of the machine, thus allowing for easy and fast rig-up.

Wide range of drilling technologies. The **CH 23** can be offered both in **CS (Cylinder System)** and **WS (Winch System)** configuration.

The **innovative rotary head** design adopted by Comacchio allows for the use of **Kelly bars** of various diameters, including **standard bars** and **heavy duty bars**, up to a **maximum length of 15 m (49' 2")**, with minor changes on the rotary head.

The **CH 23** can be also offered in **different LHR (Low Head Room)** configurations, **designed for the construction of bored piles in challenging access sites**.



TECHNOLOGIES



The **unique design** of the **CH 23** adapts to a wide range of drilling technologies that include:

| | | | | | | |
|---------------------------------|---|---|---|-------------|---|---|
| | BP (Bored Piles) CBP (Cased Bored Piles) | BP - Uncased Kelly Piles excavated by dry method or stabilized by fluid overpressure | | | | |
| | | CBP - Kelly Piles with Casing installation by rotary drive or optionally by hydraulic casing oscillator | | | | |
| | | | m.s. | i.s. | BP | CBP |
| | | Max. pile diameter CS | mm | ft-in | 2.500 ¹ 8' 2" ¹ | 1.900 ⁵ 6' 3" ⁵ |
| | | Max. pile diameter WS | mm | ft-in | 2.500 ¹ 8' 2" ¹ | 1.700 ⁵ 5' 7" ⁵ |
| | | Max. pile depth CS | mm | ft-in | 67.700 ^{2/4} 222' 1" ^{2/4} | 67.700 ^{2/3/4} 222' 1" ^{2/3/4} |
| | | Max. pile depth WS | mm | ft-in | 67.300 ^{2/4} 220' 10" ^{2/4} | 67.300 ^{2/3/4} 220' 10" ^{2/3/4} |
| | | Pile diam. with casing oscillator max. | mm | ft-in | | 1.500 4' 11" |
| | | NOTES | 1 - Tool below mast | | 2 - Using self mounting kelly bar | |
| | | | 3 - Drill depth; cased depth depending on soil conditions | | | |
| | 4 - With mast foot installed | | 5 - With casing locking keys | | | |
| | CFA (Continuous Flight Auger) | CFA - Piles that are drilled uncased by the use of a continuous hollow auger stem | | | | |
| | | | m.s. | i.s. | CFA | |
| | | Max. pile diameter | mm | ft-in | 1.000 3' 3" | |
| | | Max. pile depth (CFA/WS) | mm | ft-in | 15.500 + 7.000 = 22.500 50' 10" + 22' 11" = 73' 9" | |
| Max. pile depth (CFA T4) | mm | ft-in | 19.000 + 6.000 = 25.000 62' 4" + 19' 8" = 82" | | | |
| | DP (Displacement Piles) | DP - Piles installed without soil removal by advancing a special tool into the ground that causes the soil to be displaced radially and vertically | | | | |
| | | | m.s. | i.s. | DP | |
| | | Max. pile diameter | mm | ft-in | 600 1' 11" | |
| | | Max. pile depth | mm | ft-in | 14.500 + 7.000 = 21.500 47' 7" + 22' 11" = 70' 6" | |
| | SM (Soil Mixing) | SM - Piles constructed by mixing and partly replacing the existing soils with grout using a soil mixing tool | | | | |
| | | | m.s. | i.s. | SM | |
| | | Pile diameter | mm | ft-in | 400 - 2.000 ⁶ 1' 4" - 6' 7" ⁶ | |
| | | Max. pile depth | mm | ft-in | 14.500 + 7.000 = 21.500 47' 7" + 22' 11" = 70' 6" | |
| | | NOTES | 6 - According to the soil conditions; tool below mast | | | |

TECHNICAL DATA



| UNDERCARRIAGE | | m.s. | i.s. | | |
|---------------------------------------|----|-------|-------|----------------|--|
| Type | - | - | - | Variable gauge | |
| Track shoe width | mm | ft-in | 800 | 2' 8" | |
| Track shoe type | - | - | - | Triple grouser | |
| Overall width (retracted side frames) | mm | ft-in | 2.980 | 9' 10" | |
| Overall width (extended side frames) | mm | ft-in | 4.380 | 14' 1" | |
| Overall length | mm | ft-in | 5.885 | 19' 4" | |
| Centre idler to centre sprocket | mm | ft-in | 5.010 | 16' 5" | |

| UPPERFRAME | | m.s. | i.s. | | |
|---------------------|----|-------|-------|--|--|
| Width | mm | ft-in | 3.000 | 9' 10" | |
| Operators' cabin | - | - | - | TOPS & FOPS-1 certified, 1.040 mm (3' 5") wide | |
| Control system type | - | - | - | CAN-BUS | |
| User interface | - | - | - | 12" Touch Screen | |
| Tail swing radius | mm | ft-in | 3.535 | 11' 7" | |

| DIESEL ENGINE | | m.s. | i.s. | | | High Tech Line | |
|------------------------|----|-----------------|-------|------------------------------------|-------|-----------------------------|--|
| Make and model | - | - | - | CAT C9 | | CAT C9.3 | |
| Emission certification | - | - | - | EU stage IIIA / US EPA Tier 3 | | EU stage V / US EPA Tier 4f | |
| Aspiration | - | - | - | Turbocharged and charge air cooled | | | |
| Power rating | kW | hp | 261 | 350 | 234 | 314 | |
| | | rpm | 1.800 | | 1.550 | | |
| Displacement | cc | in ³ | 8.800 | 538 | 9.300 | 568 | |
| Fuel tank | l | gal | 600 | 158.5 | | | |

| HYDRAULIC SYSTEM | | m.s. | i.s. | | |
|-----------------------------|-------|---------|---------|--------|--|
| Main pumps flow | l/min | gal/min | 2 x 280 | 2 x 74 | |
| Service pump flow | l/min | gal/min | 90 | 24 | |
| Hydraulic oil tank capacity | l | gal | 375 | 99 | |

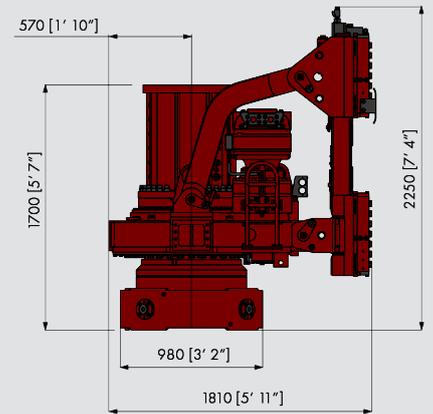
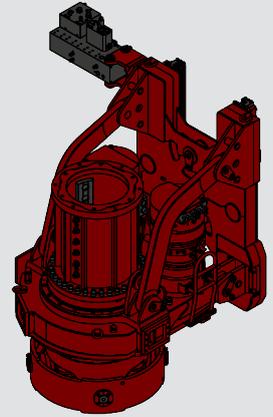
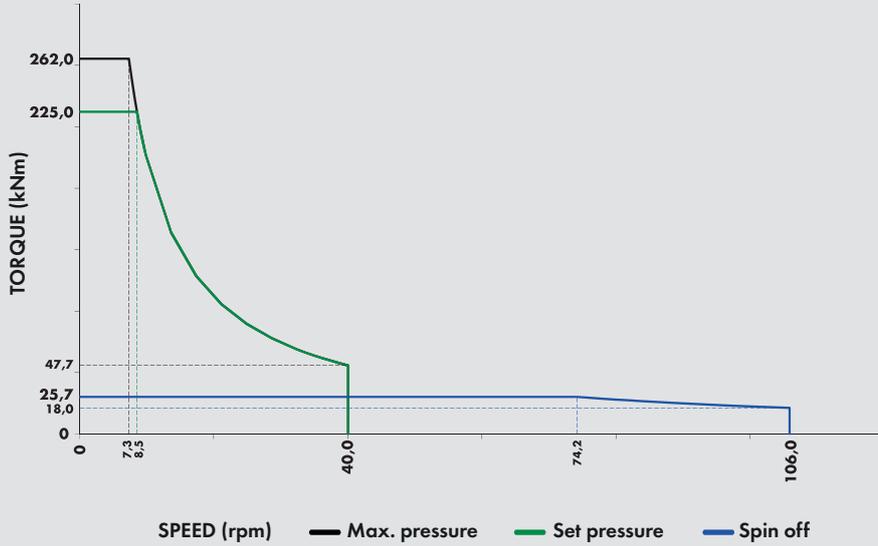
| MAIN WINCH | | m.s. | i.s. | | |
|----------------------------------|--------|--------|--------|--------------------|--|
| Type | - | - | - | Controlled descent | |
| 1 st layer line pull | kN | lbs | 250 | 56,200 | |
| 1 st layer rope speed | mm/min | ft/min | 76.000 | 249' | |
| Rope diameter | mm | in | 28 | 1" 1/8 | |
| Rope layers | - | - | - | 2 | |
| FEM classification | - | - | - | M5-L2-T5 | |

| SERVICE WINCH | | m.s. | i.s. | | |
|----------------------------------|--------|--------|--------|--------------------|--|
| Type | - | - | - | Controlled descent | |
| 1 st layer line pull | kN | lbs | 133 | 29,900 | |
| 1 st layer rope speed | mm/min | ft/min | 64.000 | 210 | |
| Rope diameter | mm | in | 20 | 3/16" | |
| Rope layers | - | - | - | 3 | |
| FEM classification | - | - | - | M5-L2-T5 | |

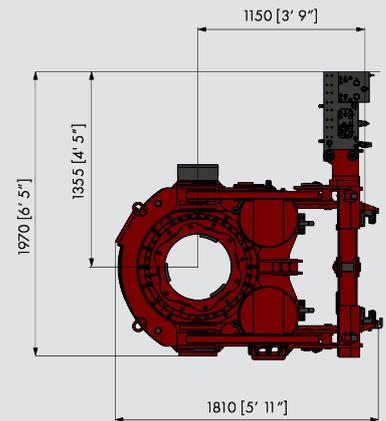
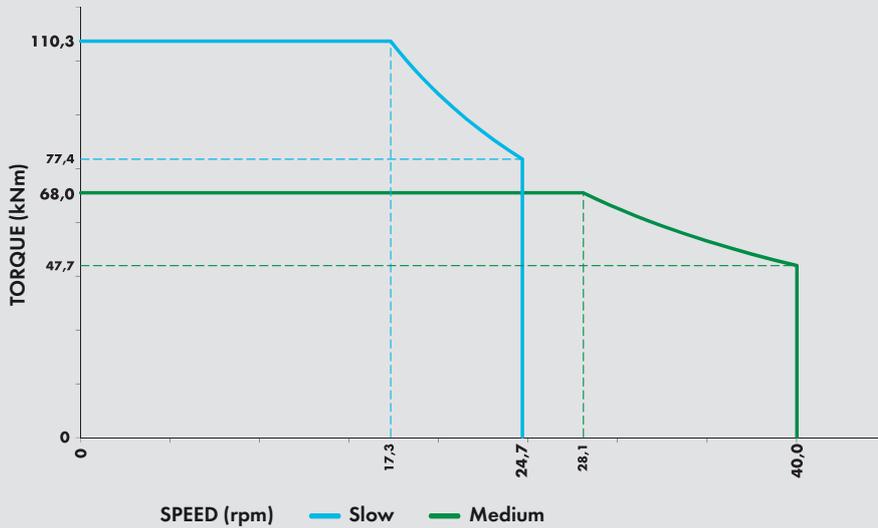
ROTARY HEAD



TORQUE DIAGRAM



MIX



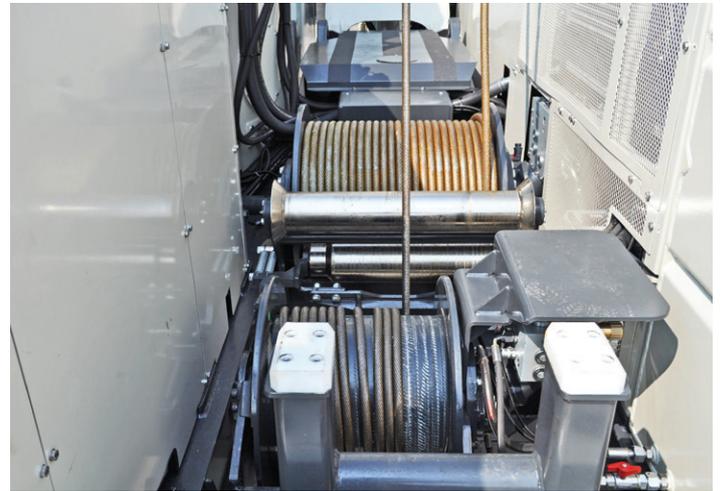
| ROTARY HEAD | m.s. | i.s. | CR 26 | |
|--------------------------|------|--------|---------------|----------------------|
| Nominal max. torque | kNm | lbf-ft | 262 at 35 MPa | 193,200 at 5,080 psi |
| Max. torque | kNm | lbf-ft | 225 at 30 MPa | 166,000 at 4,350 psi |
| Max. drilling speed | rpm | | 40 | |
| Hydraulic power | kW | hp | 200 | 268 |
| Spin-off speed | rpm | | 106 | |
| Replaceable drive sleeve | - | - | Yes | |
| Replaceable drive keys | - | - | Yes | |
| Weight (as shown) | kg | lbs | 5.500 | 12,125 |

OPTIONS AND ACCESSORIES



STANDARD EQUIPMENT

| | |
|---|---|
| Main winch with special grooving | Automatic lubrication kit for rotary sliding guides |
| Hoist and lowering limit switches on main and service winches | Transport securing lugs on crawler unit |
| Swivel for main and service winch rope | Work lights |
| Service rope parking point | Electric refuelling pump and hydraulic oil refill system |
| Mast inclination measurement on X & Y axes (digital and analog display) | Diagnostic panel for hydraulic, engine, electrical and electronic functions |
| Automatic vertical mast alignment | Front and top cabin protective grate (FOPS-1 certified) |
| Depth measuring device on main winch | Radio with bluetooth |
| Rpm measuring device on rotary | Phone charger |
| Crowd pressure setting | CCS Comacchio Controlling System - Touch Screen 12" |
| Oscillator attachment brackets | Adjustable spin-off and shaker tool discharge systems |
| Heating & air conditioning system | Rotary auto speed management & interactive multiple gear system |
| Emergency mode of operation for engine | Tool box |
| Video cameras set | Diesel engine diagnostics system |
| Rotary quill with interchangeable kelly ribs | Automatic stop of the main winch at the end of the hole |



| OPTIONAL EQUIPMENT | |
|-----------------------------------|---|
| Free-fall service winch | Flange for casing driving |
| Biodegradable oil | Welding equipment & generator |
| Main and service winch load cells | Air compressor kit |
| Custom painting winch | Washing kit |
| Central lubrication system | Hydraulic provision for casing oscillator |
| Custom painting | Casing oscillator |
| CFA cleaner (star type) | Vibrator for steel reinforcement cage |
| Flange for bucket opening | Data logger |
| Cardan joint | ComNect system |



| CE CONFORMITY KIT | |
|---|-----------------------------|
| Remote radio control for machine travel | CFA cleaner |
| Main and service winch load cells | Rubber strip on auger guide |
| Side walkways with handrails | |



INNOVATIVE KELLY BAR SYSTEM

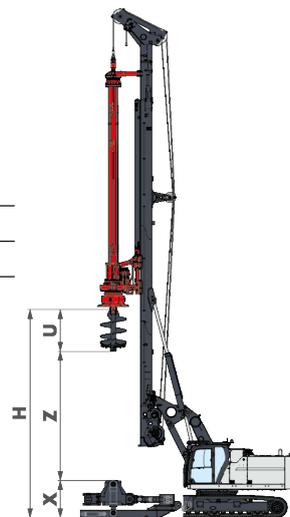


Three bar sizes are **available with minor changes** on the rotary head.

| KELLY BAR SIZES | m.s. | i.s. | Outer diameter | |
|-----------------|------|------|----------------|---------|
| | | | mm | in |
| Standard | mm | in | 406 | 16" |
| Optional | mm | in | 394 | 15" 1/2 |
| Heavy duty | mm | in | 419 | 16" 1/2 |

| | | | | |
|-------------|----|-------|-------|--------|
| X (approx.) | mm | ft-in | 1.500 | 4' 11" |
| U (approx.) | mm | ft-in | 1.500 | 4' 11" |

$$Z = H - X - U$$



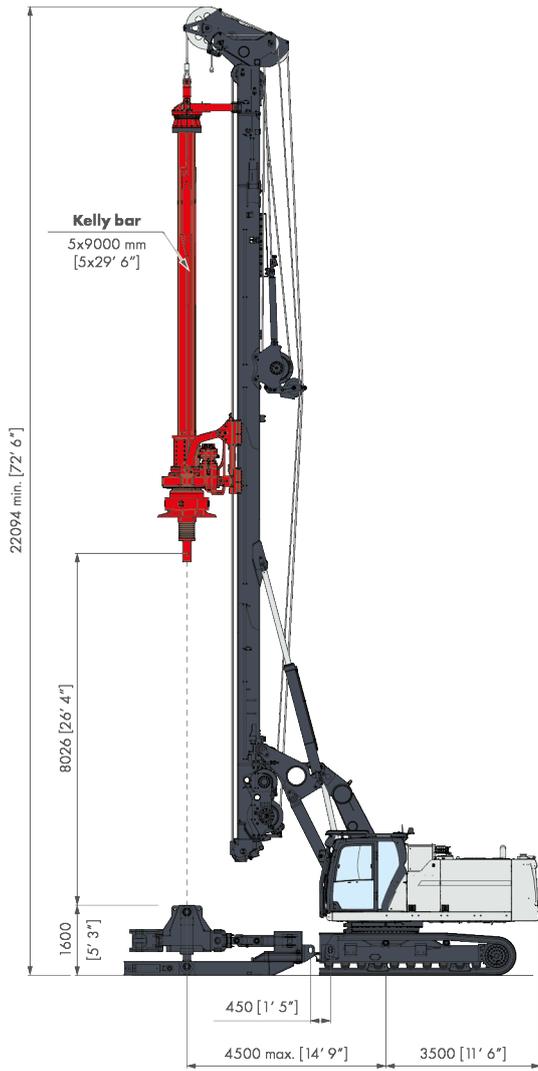
| N. | KELLY BARS | | | WS (Winch System) | | | | CS (Cylinder System) | | | | |
|---------------------|------------|---------------------|---------------------|-------------------|--------|--------------------|--------|----------------------|--------|----------|-------|--------|
| | Length | Weight ² | Depth ³ | H ⁴ | | Depth ⁵ | | H ⁴ | | | | |
| | | | | mm | ft-in | mm | ft-in | mm | ft-in | mm | ft-in | |
| Locking or friction | 4 | 8.000 | 26' 2" | 5,71 | 27.600 | 90' 7" | 10.600 | 34' 9" | 28.000 | 91' 10" | 8.960 | 29' 4" |
| | 4 | 9.000 | 29' 6" | 6,32 | 31.600 | 103' 8" | 9.600 | 31' 5" | 32.000 | 105' | 8.960 | 29' 4" |
| | 4 | 10.500 | 34' 5" | 7,17 | 37.400 | 122' 8" | 8.100 | 26' 6" | 37.800 | 124' | 8.100 | 26' 6" |
| | 4 | 12.000 | 39' 4" | 7,75 | 43.000 | 141' 1" | 6.600 | 21' 7" | 43.300 | 142' 1" | 6.600 | 21' 7" |
| | 4 | 13.000 | 42' 7" | 8,24 | 46.700 | 153' 3" | 5.600 | 18' 4" | 47.000 | 154' 2" | 5.600 | 18' 4" |
| | 4 | 13.500 | 44' 3" | 8,48 | 48.500 | 159' 1" | 5.100 | 16' 8" | 48.900 | 160' 5" | 5.100 | 16' 8" |
| | 4 | 14.000 | 45' 11" | 8,73 | 50.400 | 165' 4" | 4.600 | 15' 1" | 50.700 | 166' 4" | 4.600 | 15' 1" |
| | 4 | 14.500 ¹ | 47' 6" ¹ | 8,97 | 52.200 | 171' 3" | 4.100 | 13' 5" | 52.600 | 172' 7" | 4.100 | 13' 5" |
| | 4 | 15.000 ¹ | 49' 2" ¹ | 9,22 | 54.100 | 177' 6" | 3.600 | 11' 9" | 54.400 | 178' 6" | 3.600 | 11' 9" |
| Friction | 5 | 8.000 | 26' 2" | 5,81 | 34.300 | 112' 6" | 10.600 | 34' 9" | 34.700 | 113' 10" | 8.960 | 29' 4" |
| | 5 | 9.000 | 29' 6" | 6,29 | 39.300 | 128' 11" | 9.600 | 31' 5" | 39.700 | 130' 3" | 8.960 | 29' 4" |
| | 5 | 10.500 | 34' 5" | 7,02 | 46.600 | 152' 1" | 8.100 | 26' 6" | 47.000 | 154' 2" | 8.100 | 26' 6" |
| | 5 | 12.000 | 39' 4" | 7,75 | 53.500 | 175' 6" | 6.600 | 21' 7" | 53.900 | 176' 10" | 6.600 | 21' 7" |
| | 5 | 13.000 | 42' 7" | 8,24 | 58.100 | 190' 7" | 5.600 | 18' 4" | 58.500 | 191' 11" | 5.600 | 18' 4" |
| | 5 | 13.500 | 44' 3" | 8,48 | 60.400 | 198' 2" | 5.100 | 16' 8" | 60.800 | 199' 6" | 5.100 | 16' 8" |
| | 5 | 14.000 | 45' 11" | 8,73 | 62.700 | 205' 9" | 4.600 | 15' 1" | 63.100 | 207' | 4.600 | 15' 1" |
| | 5 | 14.500 ¹ | 47' 6" ¹ | 8,97 | 65.000 | 213' 3" | 4.100 | 13' 5" | 65.400 | 214' 7" | 4.100 | 13' 5" |
| | 5 | 15.000 ¹ | 49' 2" ¹ | 9,22 | 67.300 | 220' 10" | 3.600 | 11' 9" | 67.700 | 222' 1" | 3.600 | 11' 9" |

| | | |
|-------|--|--|
| NOTES | 1 - Self-mounting only if mast foot is installed | 2 - Kelly Diameter 406 mm (1' 4") |
| | 3 - Depth to be reduced by 1.300 mm (4' 3") in case mast foot is not installed | |
| | 4 - Max. height of bottom kelly pin above ground | 5 - Depth to be reduce by 1.600 mm (5'3") in case mast foot is not installed |

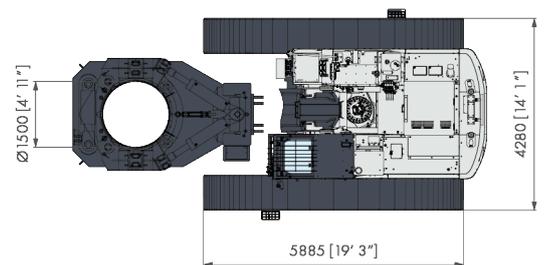
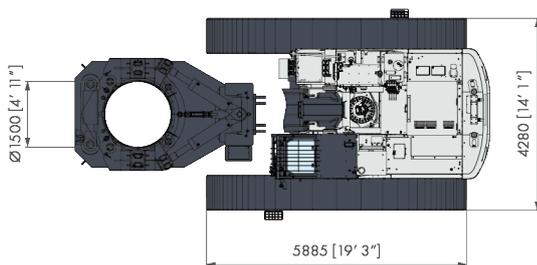
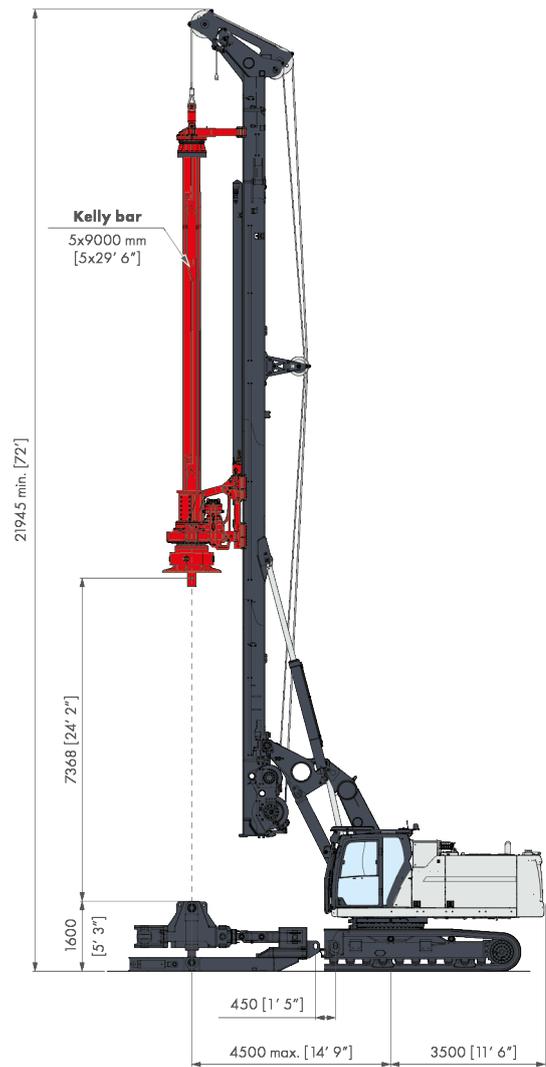
CASING OSCILLATOR ARRANGEMENT



WS



CS



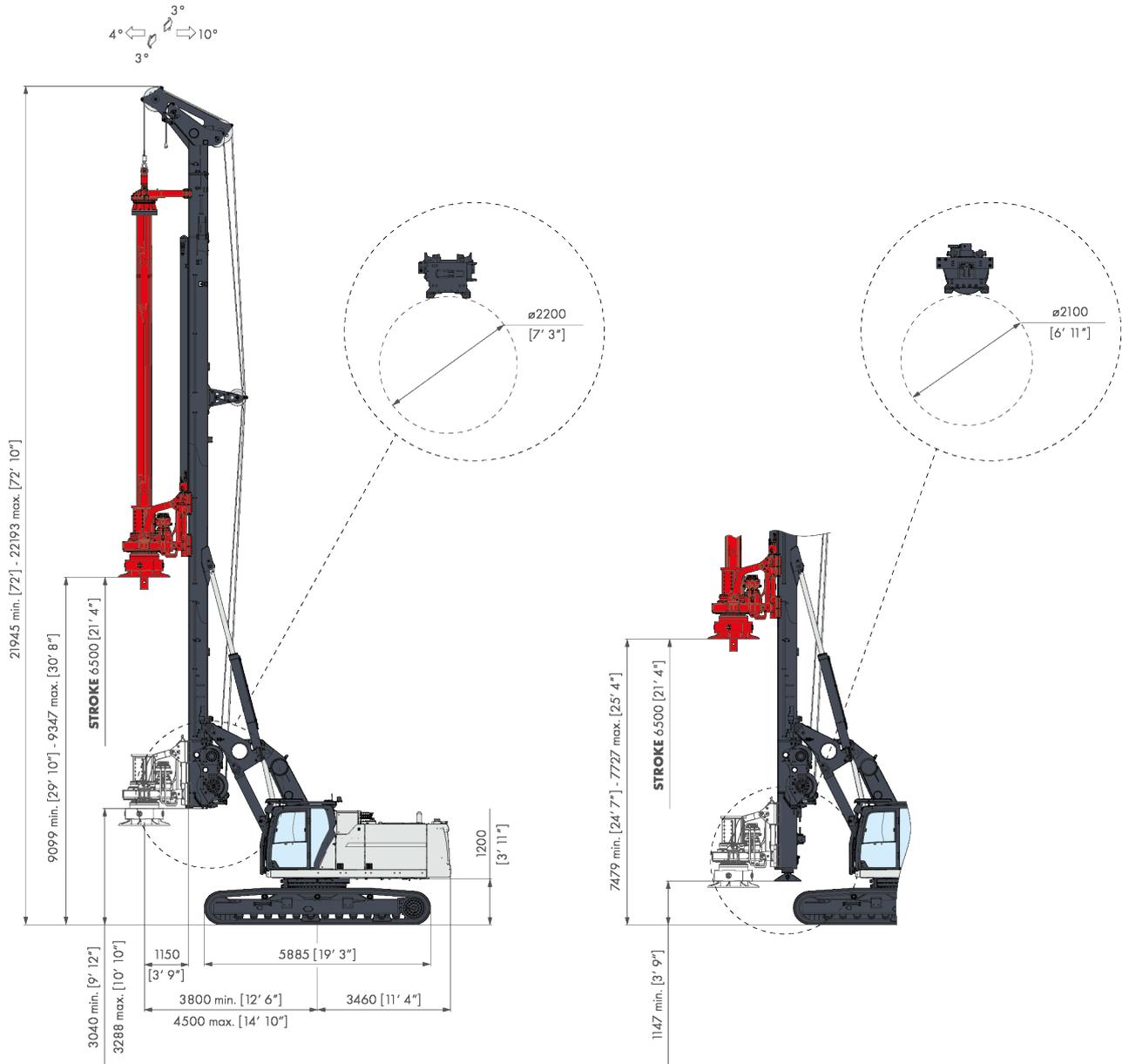
BORED PILES



CH 23 - CS



OVERALL DIMENSIONS



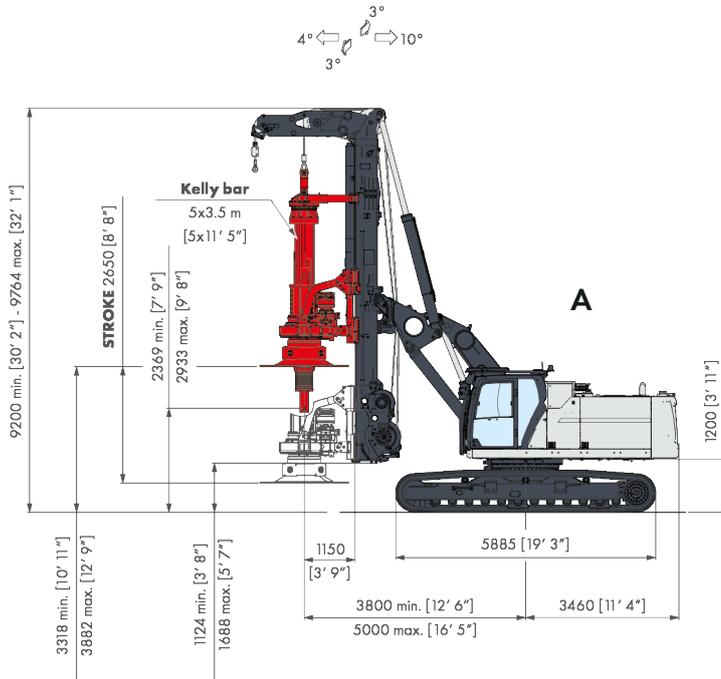
| CS (Cylinder System) | m.s. | i.s. | | |
|---------------------------|--------|--------|---|---------------------|
| Stroke | mm | ft-in | 6.500 | 21' 4" |
| Max. pull up force | kN | lbs | 280 | 63,000 |
| Max. pull down force | kN | lbs | 232 | 52,200 |
| Speed down | mm/min | ft/min | 25.000 | 82 |
| Max. pile diameter | mm | ft-in | 2.200 ^{1/3} / 2.500 ² | 7' 3" 1/3 / 8' 2" 2 |
| Operating weight w/o tool | ton | | 67,8 ⁴ | |

| NOTES | 1 - Tool in front of mast | 2 - Tool below mast | 3 - 2.100 mm (6' 10") with mast foot |
|-------|---|---------------------|--------------------------------------|
| | 4 - c/w kelly bar 4 x 10.500 mm (4 x 34' 5") Ø 406 (16") and bucket opening flange; w/o bottom mast element | | |

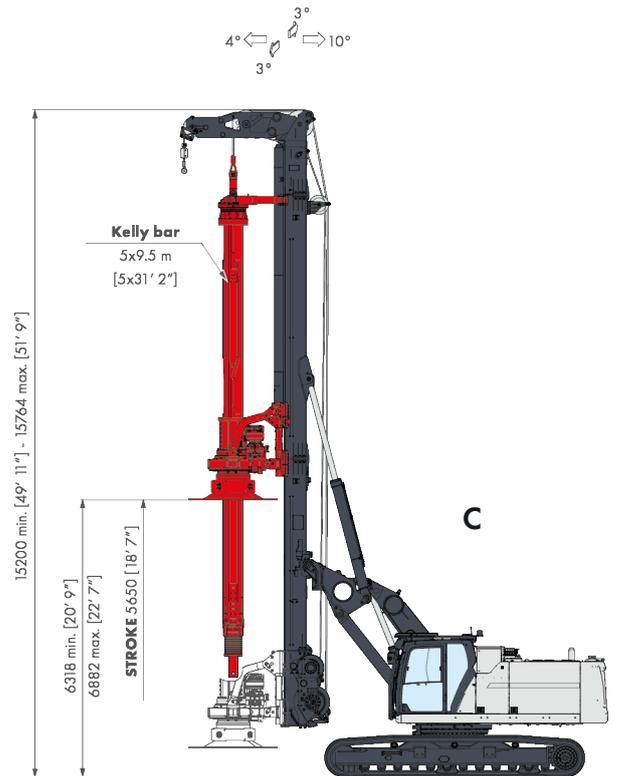
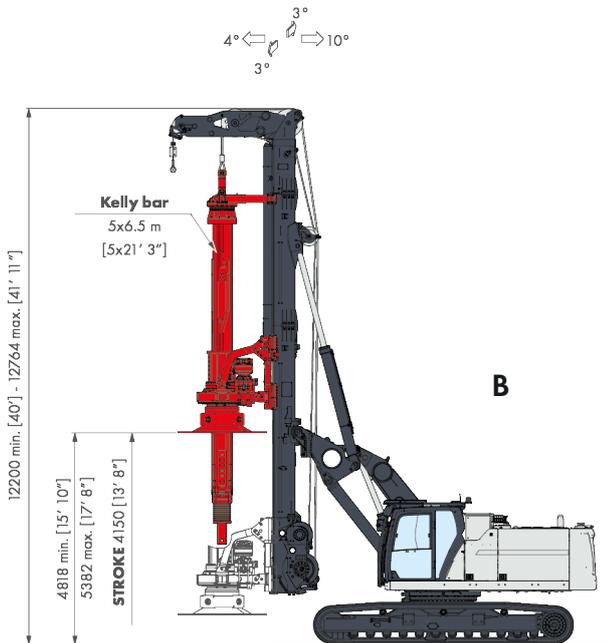
CH 23 - LHR



OVERALL DIMENSIONS



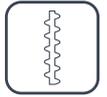
MODULAR



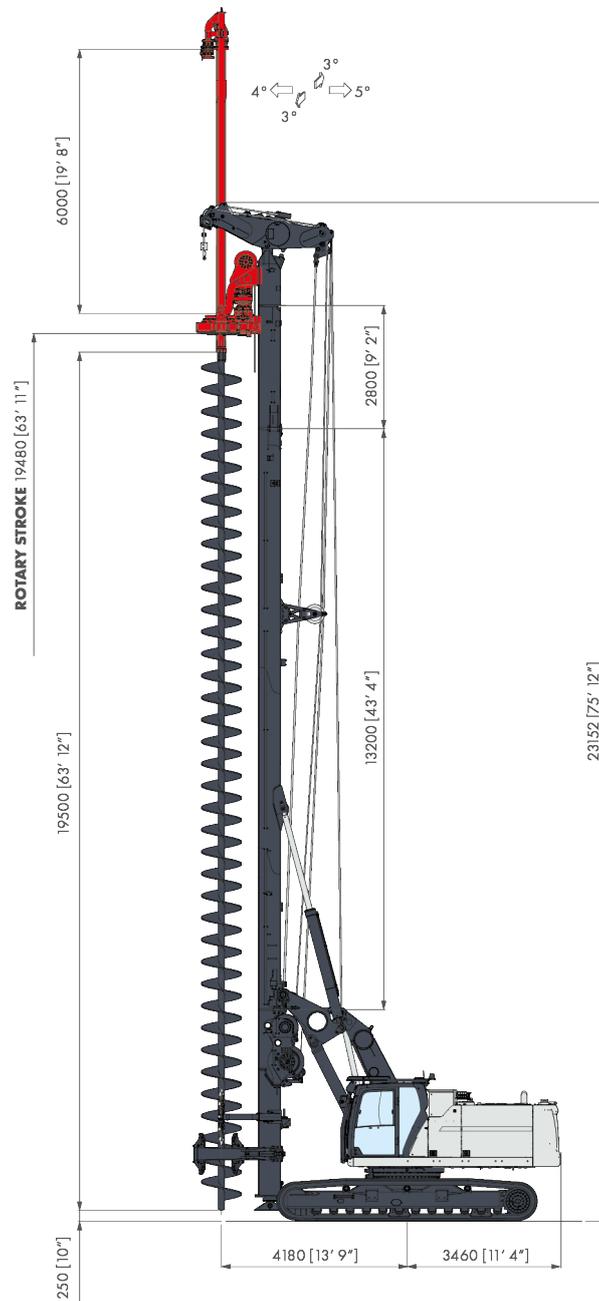
| LHR (Low Head Room) | m.s. | i.s. | A | | B | | C | |
|-------------------------------------|------|-------|-----------------------------|-----------------------|-----------------------------|------------------------|-----------------------------|------------------------|
| Height | mm | ft-in | 9.200 | 30' 2" | 12.200 | 40' | 15.200 | 49' 10" |
| Stroke of pull down cylinder | mm | ft-in | 2.650 | 8' 8" | 4.150 | 13' 8" | 5.650 | 18' 7" |
| Max. pile diameter | mm | ft-in | | | 2.200¹ | 7' 3" ¹ | | |
| Max. pile depth | mm | ft-in | 13.000^{2/3} | 42' 8" ^{2/3} | 28.000^{2/4} | 91' 10" ^{2/4} | 43.000^{2/5} | 141' 1" ^{2/5} |
| Operating weight w/o tool | ton | | 60,55³ | | 64,75⁴ | | 67,65⁵ | |

| NOTES | 1 - 2.100 mm (6' 10") with mast foot | 2 - Tool height 1.500 mm (4' 11") |
|-------|---|-----------------------------------|
| | 3 - c/w Kelly bar 5 x 3.500 mm (5 x 11' 5") Ø 419 (16" 1/2) and bucket opening flange | |
| | 4 - c/w Kelly bar 5 x 6.500 mm (5 x 21' 4") Ø 419 (16" 1/2) and bucket opening flange | |
| | 5 - c/w Kelly bar 5 x 9.500 mm (5 x 31' 2") Ø 419 (16" 1/2) and bucket opening flange | |

CH 23 - CFA



OVERALL DIMENSIONS



| CFA (Continuous Flight Auger) | m.s. | i.s. | T4 | |
|-----------------------------------|------|-------|-------------------------|-----------------------|
| Max. pile diameter | mm | ft-in | 1.000 | 3' 3" |
| Max. length of augers | mm | ft-in | 19.500 | 63' 11" |
| Max. length of auger extension | mm | ft-in | 6.000 | 19' 8" |
| Max. pile depth | mm | ft-in | 19.000 + 6.000 = 25.000 | 62' 4" + 19' 8" = 82' |
| Extraction force | kN | lbs | 700 | 157,366 |
| Crowd force on auger (Optional) | kN | lbs | 100 | 22,500 |
| Operating weight w/o drill string | ton | | 62,4 ¹ | |

NOTE 1 - c/w auger extension, auger cleaner, swivel and swan neck

DP/SM



CH 23



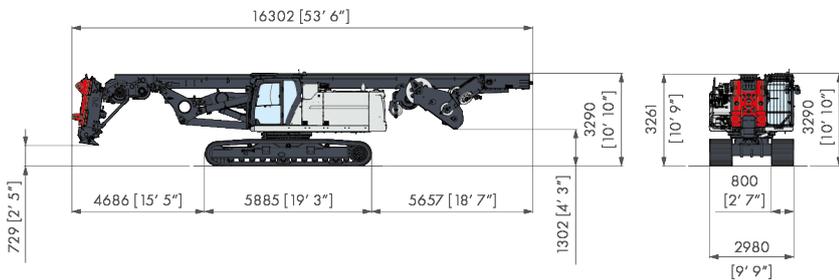
OVERALL DIMENSIONS



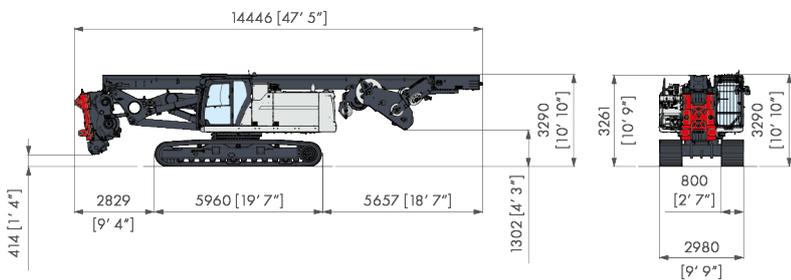
| WS (Winch System) / DP-SM | m.s. | i.s. | DP (Displacement Piles) | | SM (Soil Mixing) | |
|---------------------------------------|-------------------------|---------------------------|--------------------------|----------------------------|------------------|-------|
| | | | mm | ft-in | mm | ft-in |
| Max. pile diameter | 600 | 1' 11" | 400 - 2.000 ¹ | 1' 4" - 6' 7" ¹ | | |
| Max. drill string length | 17.500 | 57' 5" | | | | |
| Max. length of drill string extension | 7.000 | 22' 11" | | | | |
| Max. pile depth | 14.500 + 7.000 = 21.500 | 47' 7" + 22' 11" = 70' 6" | | | | |
| Extraction force | 580 | 130,400 | | | | |
| Max. pull down force | 140 | 31,500 | | | | |
| Operating weight w/o tool | 58 ² | | | | | |

| | | |
|--------------|---|---|
| NOTES | 1 - In base alle condizioni del suolo; utensile sotto all'antenna | 2 - c/w auger extension, swivel e swan neck |
|--------------|---|---|

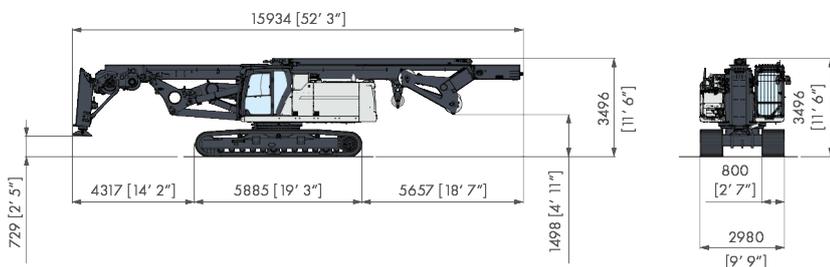
TRANSPORT DIMENSIONS



| | m.s. | WS |
|-------------------------|------|------|
| Transport weight | ton | 58,5 |

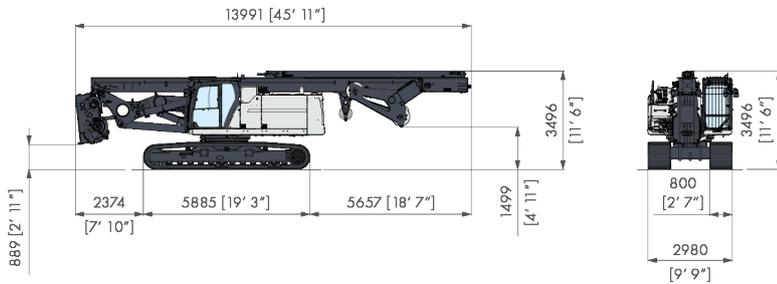


| | m.s. | WS w/o mast foot |
|-------------------------|------|------------------|
| Transport weight | ton | 57,4 |

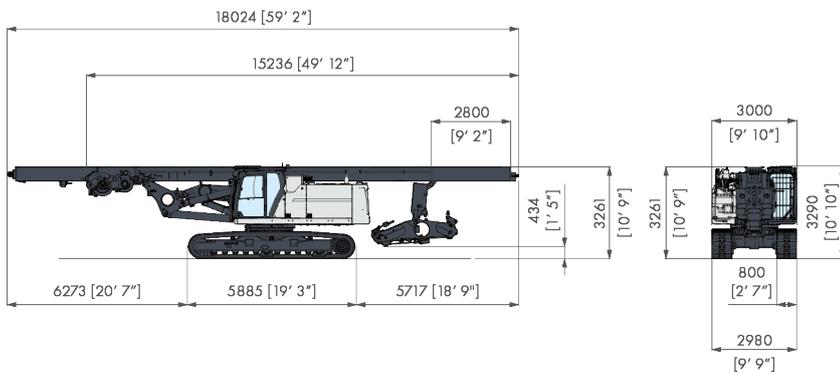


| | m.s. | CS |
|-------------------------|------|-------|
| Transport weight | ton | 57,60 |

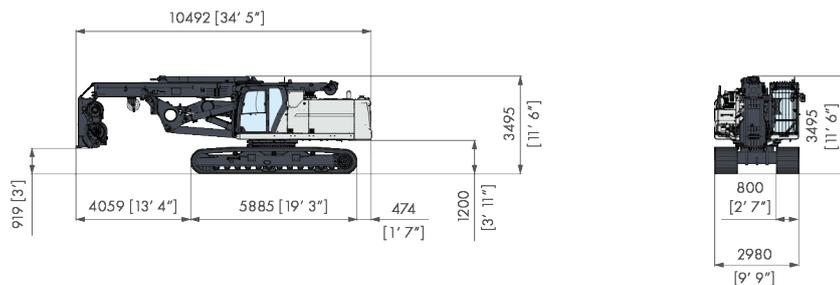
CH 23



| | m.s. | CS w/o mast foot |
|-------------------------|------------|---------------------|
| Transport weight | ton | 56,60 |



| | m.s. | CFA |
|-------------------------|------------|-------------|
| Transport weight | ton | 57,4 |



| | m.s. | LHR (short mast version) |
|-------------------------|------------|-----------------------------|
| Transport weight | ton | 51,5 |



SELF-ERECTING HYDRAULIC PILING RIG



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