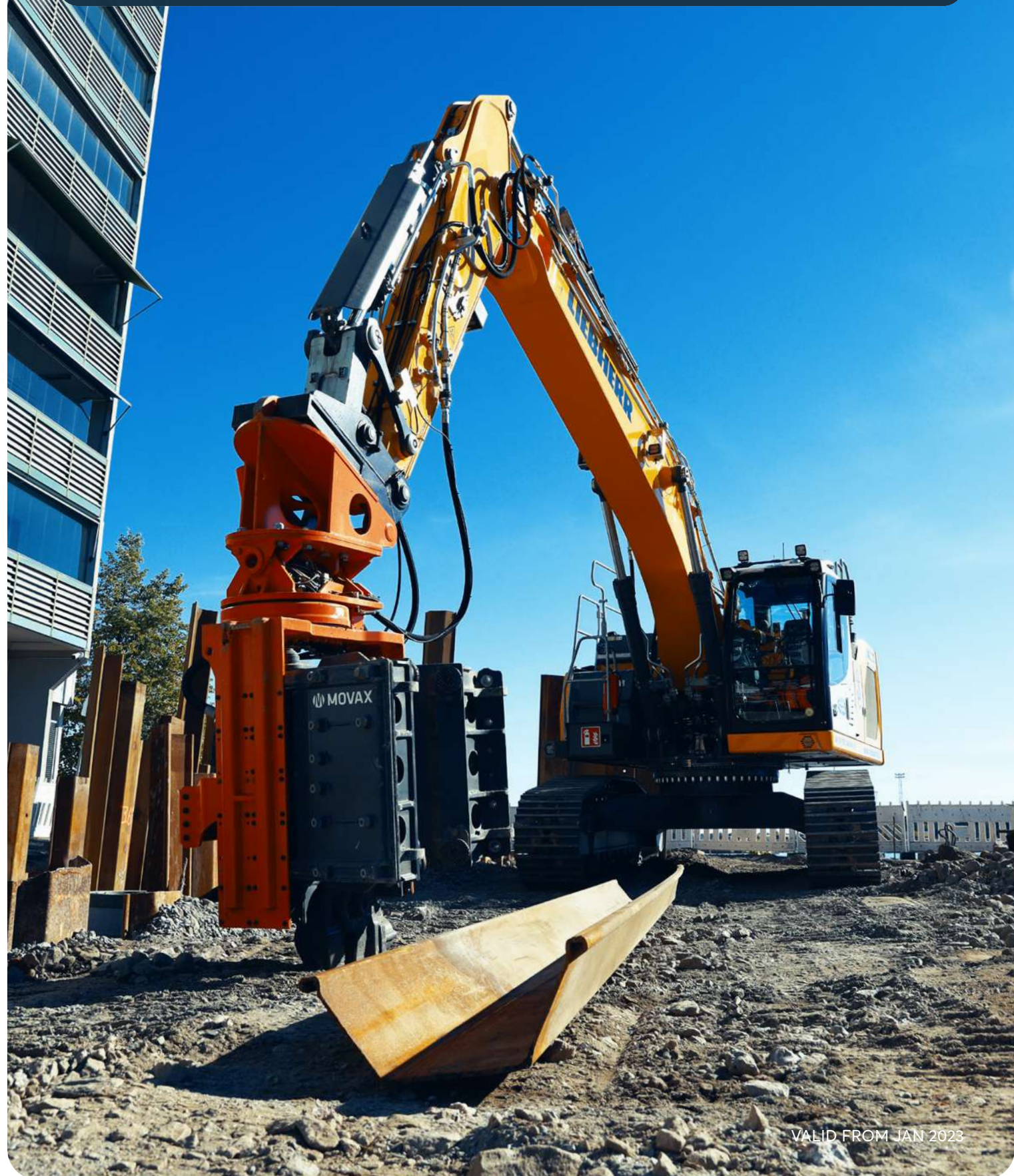




PRODUCT CATALOGUE 2023



VALID FROM JAN 2023

movax.com



total solution for
PILING & FOUNDATION



CIVIL



ROAD



RAIL



UTILITIES






ENERGY &
ENVIRONMENT



WATERWAYS

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PILING EQUIPMENT



CUSTOMISED SOLUTIONS





HIGHER PRODUCTIVITY – SIGNIFICANT SAVINGS

Efficient. Fast. Versatile. Accurate. Safe. Reliable.

MOVAX WAY-OF-PILING

INTRODUCTION

Movax Oy, established in 1993, is a Finnish-based, privately-owned world-leading innovator, developer and manufacturer of excavator-mounted piling and foundation equipment with highly advanced automatic control systems and information management solutions.

A TOTAL SOLUTION

Movax Oy focuses solely on solutions for the piling & foundation industry. The comprehensive range of excavator-mounted piling & foundation equipment and customized solutions cover a complete range of piling technologies - including both driven and bored piles.

UNIQUE, VALUE-ADDING TECHNOLOGY

Movax Oy's piling and foundation equipment provide the optimum way-of-working - **MOVAX WAY-OF-PILING™** - when constructing foundations, building retaining walls, both temporary and permanent, cofferdams and when performing trenching and excavation work and soil stabilisation in a wide range of applications.

QUALITY BUILT-TO-LAST

MOVAX is made with high-class materials, equipment and components – and modern, state-of-the-art production technologies and machinery ensuring the highest possible quality of manufacture. Movax Oy's Quality Management Systems is certified in accordance with ISO 9001:2015.

GLOBALLY PROVEN

With almost **30 years of experience** and more than **3000 units delivered** to all over the world and with a clear focus on the piling and foundation industry, MOVAX has a deep understanding and know-how of varying site and soil conditions - and of all kinds of different type of excavators and rail roaders. Movax Oy's experience also covers a wide range of applications ranging from Rail, Road and Civil to Waterways & Piers, Utilities and Environmental & Energy.

GLOBALLY LOCAL CUSTOMER CARE

Movax Oy focuses on superior customer service and support together with a world-wide network of local partners, established in more than 30 countries all over the world, performing trenching and excavation work in a wide range of applications from civil/structural, rail and road to waterways & piers, utilities and environmental.



INNOVATION & CONTINUOUS DEVELOPMENT

Movax Oy is the inventor of the modular, vibratory side grip pile driver technology. Movax Oy's inventions have resulted in numerous patents (50+) and its trademark, MOVAX®, is registered and well known for the quality it represents all over the world.

Movax Oy is strongly committed to continuously develop its products and services in close cooperation with its customers and local partners.



PRODUCTS & SERVICES

PILING & FOUNDATION EQUIPMENT

MOVAX piling equipment is available for different piling technologies, including driven and bored piles, for varying conditions and requirements and for all kinds of piles including sheet piles, H-beams, tubular steel piles, timber piles - and for cast-in-situ, concrete piling.



SIDE GRIP PILE DRIVERS

SIDE GRIP PILE DRIVERS (SG) are the optimum solution for a wide range of piling requirements and a variety of site and soil conditions – especially when a high-degree of precision is required, and for piling in sensitive environments and when limited space or access is available.

The same unit can handle, pitch and drive piles and is capable of accomplishing the whole process without the need of manual handling or assisting machinery.



PILING HAMMERS

Piling hammers (DH) are utilised to drive load-bearing piles and to assist in sheet pile driving, even in the most difficult soil conditions.

MOVAX piling hammers are the optimum solution to complete a pile installation after reaching refusal with a side grip pile driver or when load testing is required.

The piling hammers can be mounted directly onto the excavator, onto MOVAX Multi-tool piling leader, or a third-party piling rig or crane.



PILING DRILLS

Piling drills (TAD/KB) are designed for cast in-situ and other earth-removal tasks.

MOVAX piling drills are especially suitable for sites with confined spaces and when limited space or headroom is available.

SUITABLE PILES





MANIPULATORS

Manipulators (MPM) are designed for fast, flexible and efficient handling of different kinds of masts, gantries, and poles as well as a wide range of piles. Soft gripping surfaces are available to prevent damage of sensitive surfaces or coatings.

The MOVAX manipulator is designed for superior maneuverability, safety, precision and accuracy.

MOVAX CONTROL SYSTEM



The **MOVAX Control System (mControl+)** links the excavator with MOVAX's piling equipment. The system controls the auxiliary hydraulics of the excavator and all the functions of MOVAX's piling equipment.

INFORMATION MANAGEMENT



The **MOVAX Information Management System (MIMS)** provides essential information about the piling process and the pile installation – mLogbook - as well as about the MOVAX piling equipment itself – mFleet Management.

SUITABLE PROFILES



PRODUCTS & SERVICES

CUSTOMISED SOLUTIONS

MOVAX customised solutions include multi-tool piling leaders with tooling available for driven piles, pre-augering and CFA, and column stabilisation leaders.



MPL-200

Multi-tool piling leader, MPL-200, is a multi-purpose piling leader for micro piling designed for small and medium size excavators. Tooling alternatives include vibratory pile drivers, hydraulic hammers and rotary drives for pre-augering.

MPL-300

Multi-tool piling leader, MPL-300, is a multi-purpose piling leader designed for medium to large size excavators. Tooling alternatives include vibratory pile drivers, hydraulic impact type hammers and rotary drives for pre-augering and CFA (continuous flight auger) piling.

MPL-400

Multi-tool piling leader, MPL-400, is a heavy duty, multi-purpose piling leader designed for large size excavators. Tooling alternatives include vibratory pile drivers, hydraulic impact type hammers and rotary drives for pre-augering and CFA (continuous flight auger) piling.



MSL-300

Stabilisation leader, MSL-300, is an column stabilisation leader designed for medium to large size excavators. The MSL-300 can be operated with both wet and dry binder material.

MOVAX CONTROL SYSTEM



The **MOVAX Control System (mControl+)** links the excavator with MOVAX's piling equipment. The system controls the auxiliary hydraulics of the excavator and all the functions of MOVAX's piling equipment.

INFORMATION MANAGEMENT



The **MOVAX Information Management System (MIMS)** provides essential information about the piling process and the pile installation – mLogbook - as well as about the MOVAX piling equipment itself – mFleet Management.

MOVAX WAY-OF-PIILING



RAIL



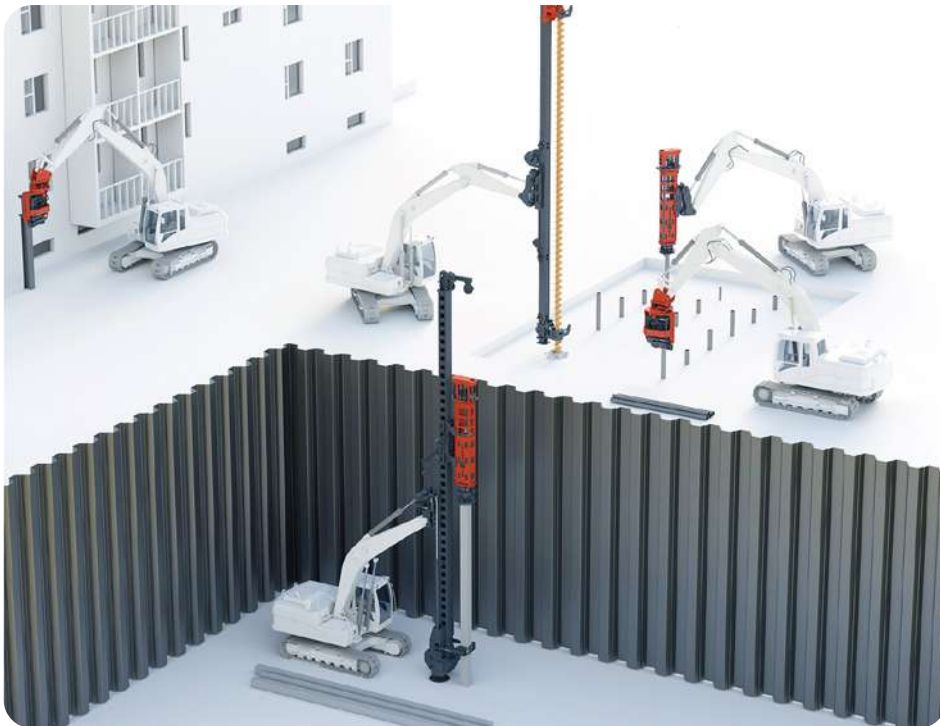
ROAD



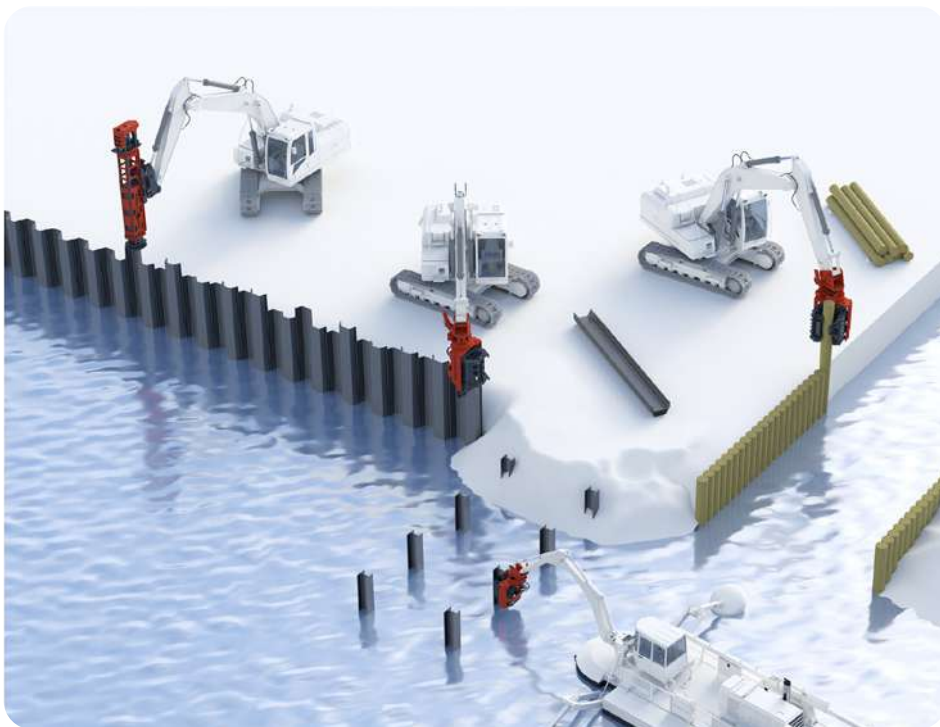
UTILITIES



ENERGY &



CIVIL



ENVIRONMENT



PIERS & WATERWAYS



PRODUCTS & SERVICES

VIBRATORY PILE DRIVERS

MOVAX Side grip pile drivers are excavator-mounted, high-frequency, vibratory-type pile drivers providing the optimum solution for a wide range of piling requirements – especially when a high degree of precision is required; and for piling in sensitive environments and when limited space, head room or access is available.

The same unit can handle, pitch and drive – and extract – different type of piles and is capable of accomplishing the entire piling process without the need of manual handling or assisting machinery.



FEATURES

- **Excavator-mounted**
Utilizing the hydraulic power and lifting capacity of the excavator or rail roader (carrier). Designed to work on any and all wheeled and crawler-type excavators and rail roaders by utilising and commanding the standard auxiliary hydraulics and/or by connecting to the electronic control of the excavator.
- **Comprehensive size range**
Available in different models, sizes and configurations for different piling requirements and different type of piles ranging sheet piles, trench sheets and, H-beams to tubular steel piles and timber piles; and for excavators ranging from 8 to 50 ton – thus always ensuring the optimum size and correct combination of vibratory pile driver and excavator.
- **Fixed or Variable**
Available with fixed eccentric moment (STD/LITE) or with resonance-free start/stop (V).
- **MOVAX Modular System**
Versatility based on the MOVAX Modular System™ which enables the use of the same unit for a wide range of different piling requirements, piling work and type of piles.
- **MOVAX Control System**
Controlled with the MOVAX Control System, mControl+ for productivity, precision and accuracy.
- **MOVAX Information Management System**
Available with the MOVAX MIMS Information Management System: mFleetManagement for monitoring MOVAX piling equipment operation, performance and condition; and mLogbook for monitoring and reporting the piling works.

Side grip vibratory pile drivers for
HANDLING, PITCHING, DRIVING AND EXTRACTING PILES



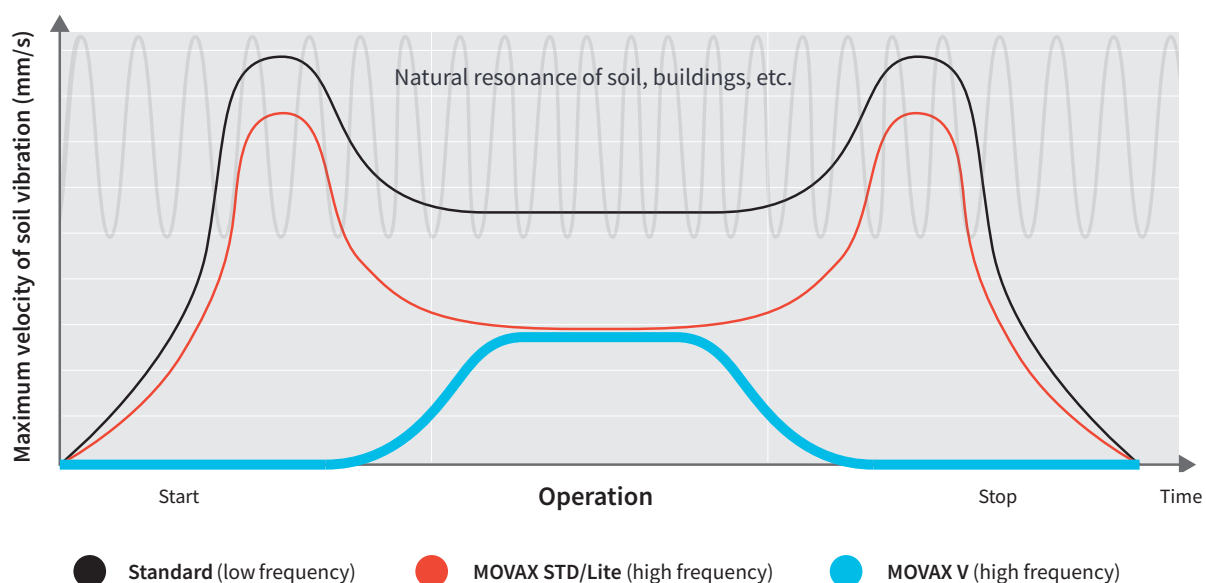
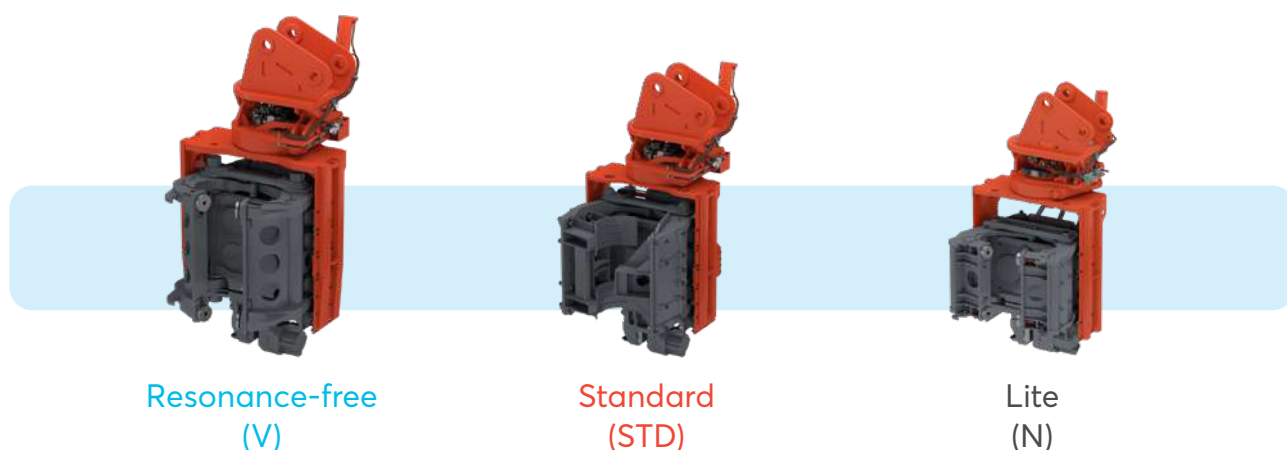
SIDE GRIP PILE DRIVERS

SELECTION

The suitable MOVAX side grip pile driver for a specific piling & foundation application is selected based on the soil & site conditions, the excavator and the main dimensions (weight & length) of the piles to be driven. The configuration ie. the arms, clamps and/or pads of the MOVAX side grip pile driver is then defined by the type of piles to be driven.

Model (vibro technology)

MOVAX side grip vibratory pile driver-models are available based on two different (vibro)technologies: fixed eccentric moment (STD/LITE) and with resonance-free start/stop (V). Standard (STD) and Lite (N) models are selected for a wide range of piling jobs whereas Resonance-free (V) models are selected for sensitive areas where disturbances to the surroundings are to be minimized. All MOVAX side grip pile drivers are high frequency-type vibratory pile drivers.



Excavator (carrier)

The excavator must be suitable – and match – the specific vibratory pile driver in question in regards to hydraulic power (oil flow @ pressure). Thus the excavator brand & model is needed for the correct selection of model.

Soil conditions

Vibratory pile drivers are suitable for a wide range of soil conditions & N-values (SPT). In order to make a detailed analysis of the suitability of a MOVAX model for a specific project a soil report is needed.

Type & dimension of piles

In order to select the correct MOVAX model, the type of piles (sheet pile, H-beam, tubular steel pile and/or timber pile) and their dimensions (length, width/depth, OD) are needed. Due to the modular design (*MOVAX Modular System*) the same MOVAX side grip pile driver can be used to drive different type of piles.

Site conditions

MOVAX side grip pile drivers are the optimum solution for sites with limited access, space or headroom. Standard (STD) and Lite models are selected for a wide range of piling jobs. Resonance-free (V) models are selected for sensitive areas where disturbances to the surroundings are to be minimized.

SELECTION CHART

EXCAVATOR CLASS/	33-50 t	28-32 t	23-28 t	20-24 t	17-21 t	13-16 t	7-11 t
PILE SIZE (length/weight)							
6 m x 2800 kg 12 m x 1900 kg 16 m x 1300 kg	SG-75 SG-75V						
8 m x 2300 kg 12 m x 1800 kg 16 m x 1200 kg		SG-60 SG-60V	SG-50 SG-50V	SG-45 SG-45V			
6 m x 1200 kg 12 m x 1000 kg 16 m x 900 kg					SG-40N	SG-30N	
4 m x 400 kg 6 m x 200 kg							SG-15N
SUITABLE PILES							
Sheet piles / (trench sheets)	width 400-1200 mm				width 400-1200 mm (330-600 mm)		width 400-600 mm (330-600 mm)
H-beams	H100-H500				H100-H400		H100-H140
Timber piles	Ø160-600 mm				Ø120-325 mm		Ø100-200 mm
Tube piles	Ø88.9-1220 mm				Ø88.9-508 mm		Ø88.9- 323.9 mm

PRELIMINARY!

When making the final selection the excavator engine size and hydraulic system design (oil pump arrangement, oil flow rate/pressure etc.), excavator lifting capacity and stability and soil and site conditions shall be taken into account.

SIDE GRIP PILE DRIVERS

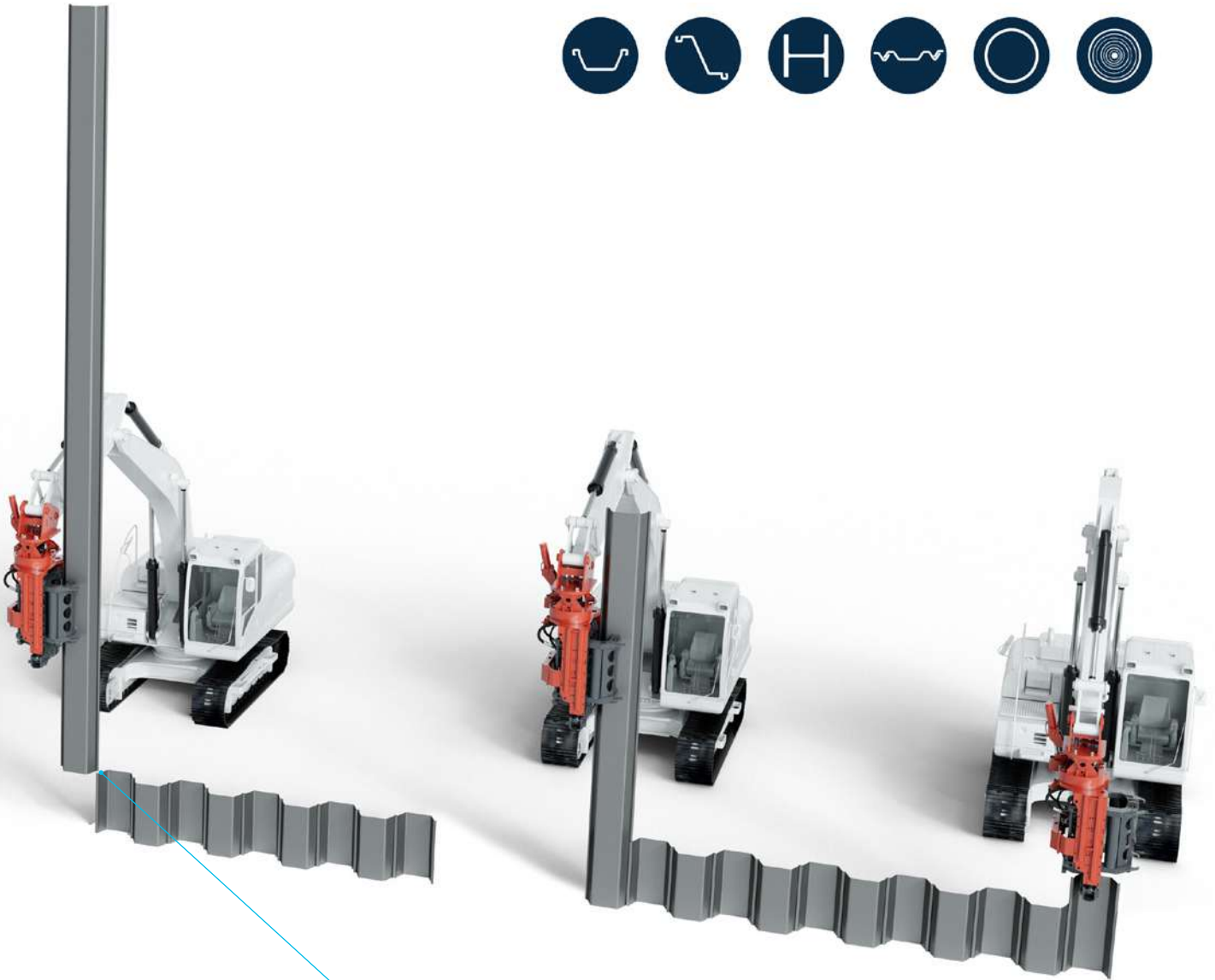
PILE HANDLING & DRIVING

MOVAX side grip pile drivers are capable of handling, pitching, driving and extracting a wide range of different piles including sheet piles, H-beams, tubular steel piles and timber piles without assisting machinery or manual handling and with the minimum number of assisting manpower. Furthermore there is no need for additional work, material and tools.

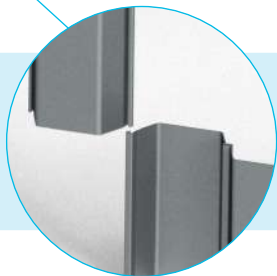


HANDLING

Suitable piles for
MOVAX WAY-OF-PILING



PITCHING

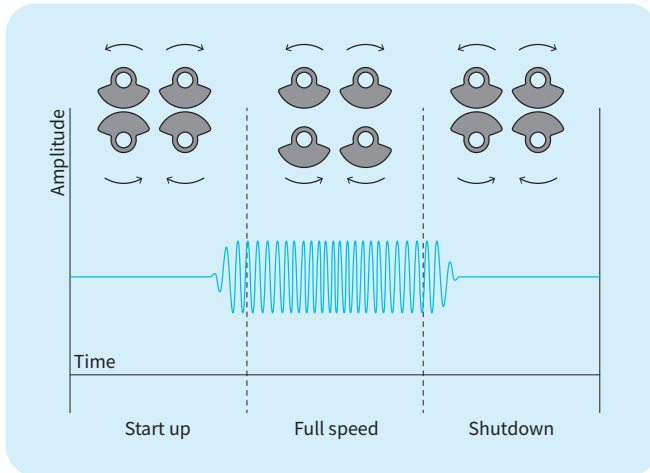


DRIVING/EXTRACTING

SIDE GRIP PILE DRIVERS, Resonance-free (V)

TECHNOLOGY

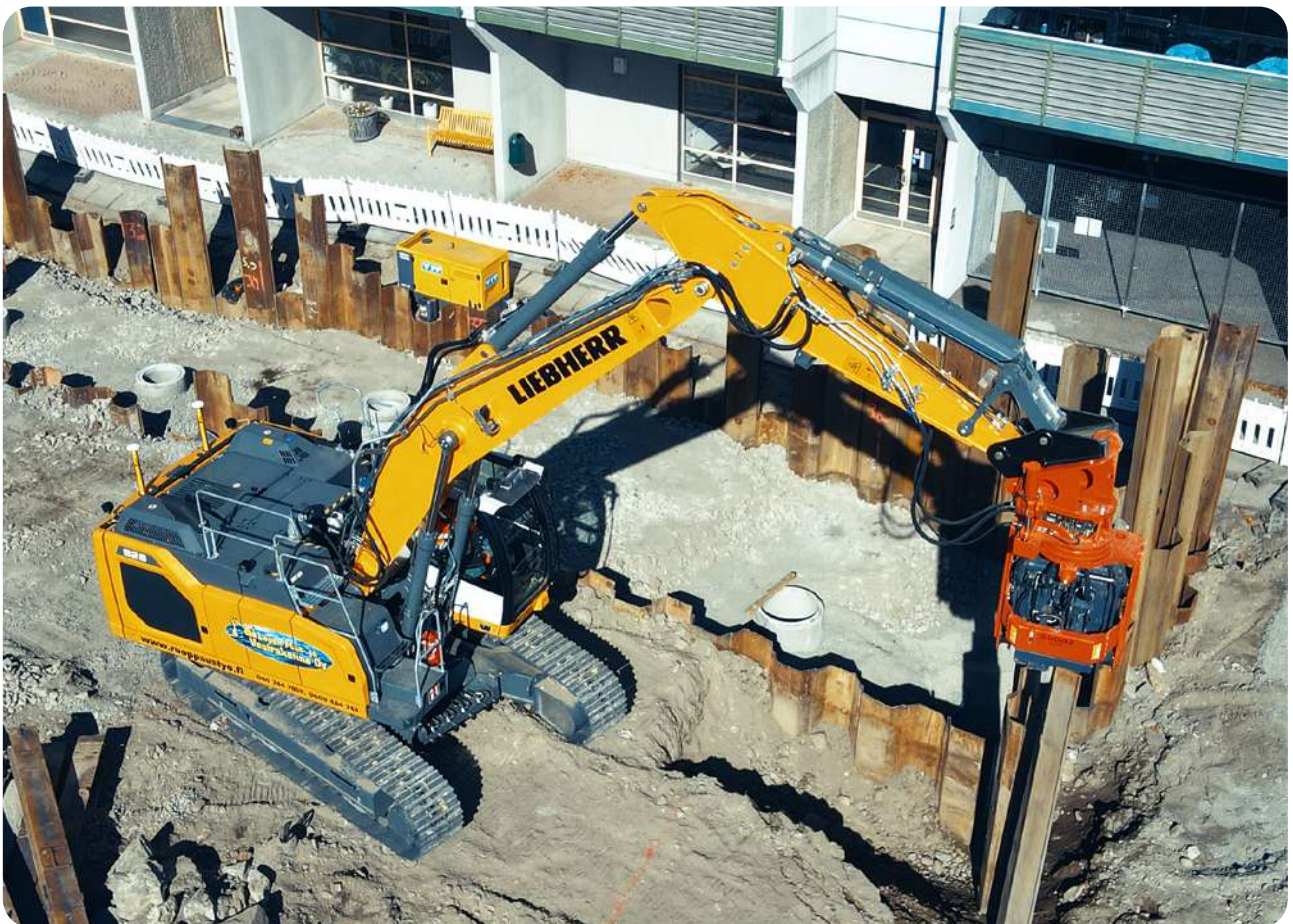
V-MODELS RESONANCE FREE



MOVAX V-models side grip vibratory pile drivers are high frequency (2300-300 rpm/38-50 Hz) vibratory pile drivers which enable resonance-free start-up and shutdown.

Disturbances to the surrounding environments can be minimised by operating at high frequencies (typically above 38 Hz) to avoid oscillation at the natural frequencies of the surrounding structures. MOVAX SG-V-models allow for starting up and shutting down the side grip pile driver without vibration. This is achieved by shifting the upper row eccentrics with respect to the lower row eccentrics. The total eccentric moment of the side grip pile driver can be switched from 0% during start-up to 100% during operation and back to 0% during shut down.

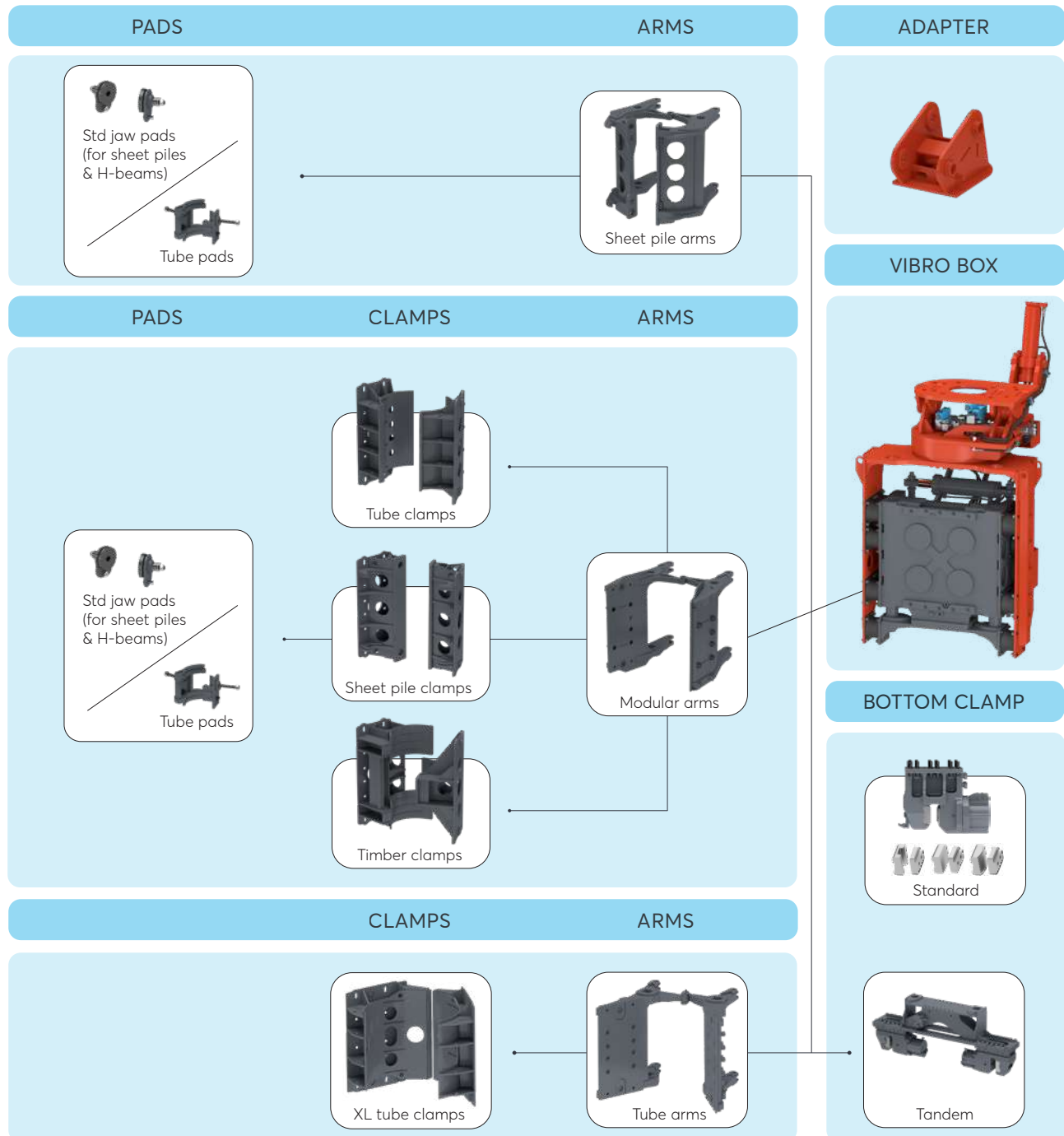
The resonance-free start-up and shutdown means that the SG-V-models are the ideal solution when working in urban areas or in sensitive environments. In addition to safer vibration, the SG-V-models also cause less noise and are faster and more comfortable to use.



SIDE GRIP PILE DRIVERS, Resonance-free (V)

MOVAX MODULAR SYSTEM

The MOVAX Modular System (MMS™) enables the use of the same MOVAX side grip pile driver for a wide range of different type of piles ranging from sheet piles, H-beams and tubular steel piles to timber piles. The MOVAX Modular System includes interchangeable arms, clamps and pads that can easily and efficiently be changed for the different pile types in question.



SIDE GRIP PILE DRIVERS, Resonance-free (V)

MOVAX MODULAR SYSTEM

The MOVAX Modular System (MMS™) enables the use of the same MOVAX side grip pile driver for different type of piles.

SHEET PILE ARMS



STD JAW PADS



TUBE PADS

MODULAR ARMS



SHEET PILE CLAMPS



STD JAW PADS



TUBE PADS



TUBE CLAMPS



TIMBER CLAMPS

TUBE ARMS





SIDE GRIP PILE DRIVERS, Resonance-free (V)

CONFIGURATIONS

SHEET PILE ARMS

Special sheet pile arms are the optimum solution when handling, pitching, driving and extracting only – or mainly – sheet piles and/or H-beams.

The special sheet pile arms can also be utilised to drive smaller diameter tubular steel piles or micropiles up to OD 273 mm. Each tubular steel pile size requires its own, individual tube pads of the same size as the tube.



SHEET PILE PADS
for sheet piles and H-beams

Standard sizes
w 400–1200 mm
/ H180–H500



TUBE PADS

for tubular steel piles
from OD 88.9 mm to OD 273 mm

Standard sizes

Ø 88.9	Ø 127	Ø 219.1
Ø 101.6	Ø 139.7	Ø 273
Ø 114.3	Ø 168.3	

Customised sizes and special types, for instance for rail tracks, are available by request.

SHEET PILE ARMS are designed for the optimum handling, pitching and driving/extraction of sheet piles, H-beams and tube piles.



Clamp hooks



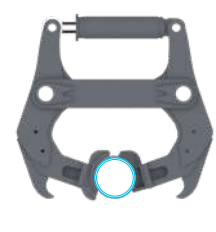
Clamping the web



Handling, pitching,
driving & extracting
H-beams



Handling, pitching,
driving & extracting
sheet piles



Handling, pitching,
driving & extracting
small OD tube piles



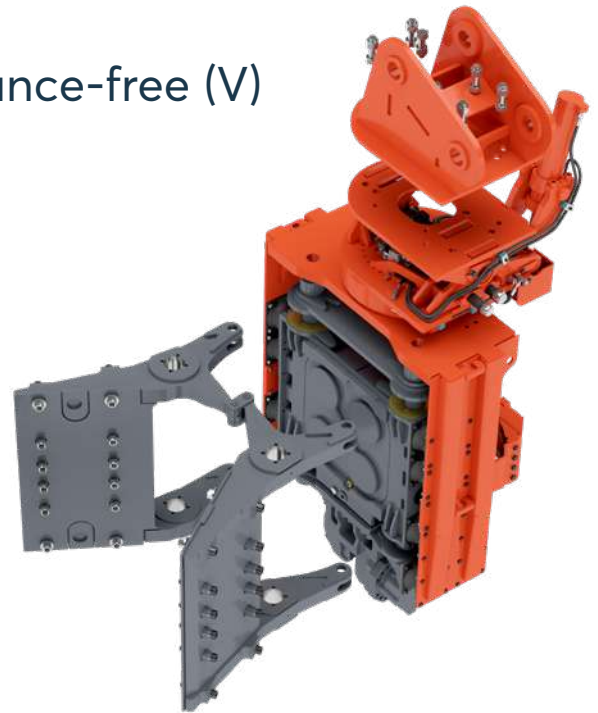
SIDE GRIP PILE DRIVERS, Resonance-free (V)

CONFIGURATIONS

TUBE ARMS

Special modular tube arms are utilised to handle and drive large diameter tubes from 508 mm up to OD 1220 mm. Each tube size requires its own tube clamp of matching size in order to ensure proper operation.

A tandem bottom clamp is available for the same tube sizes as the tube arms for optimised pile driving of large tubes. The same tandem bottom clamp can be used for the range of the different size tubular steel piles.



TUBE CLAMPS

for tubular steel piles from
OD 508 mm to OD 1220 mm

Standard sizes

Ø 508	Ø 762	Ø 1016
Ø 610	Ø 813	Ø 1220
Ø 711	Ø 914	

Customised sizes are
available by request.

TANDEM BOTTOM CLAMP



TUBE PADS

Standard sizes

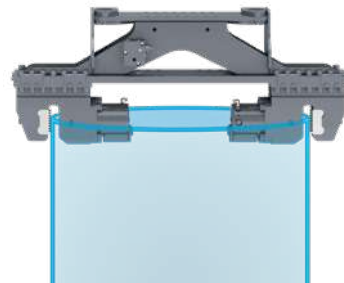
Tube pads for tandem
bottom clamp from
OD 508 mm up to
OD 1220 mm



TUBE ARMS are designed for the optimum handling, pitching and driving/extraction of large OD tubes.



Handling, pitching,
driving & extracting
large OD tube piles



Tandem bottom clamp
driving/extracting
large OD tube piles



V
SERIES

STD
SERIES

LITE
SERIES

SIDE GRIP PILE DRIVERS, Resonance-free (V)

CONFIGURATIONS

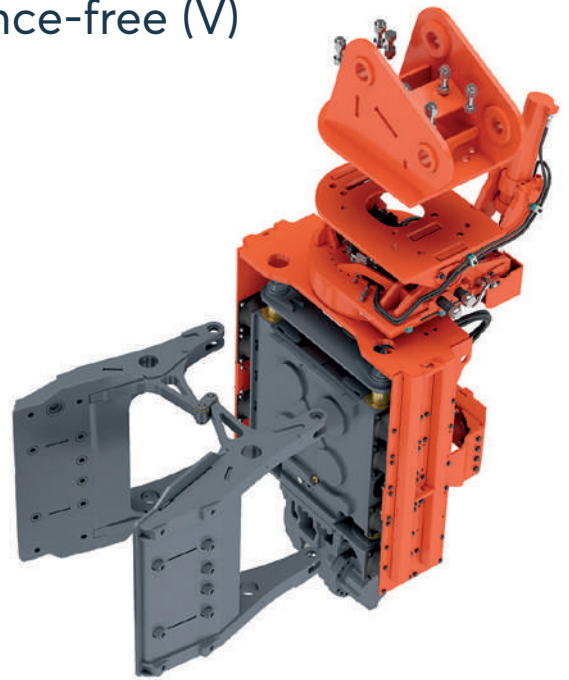
MODULAR ARMS

Modular arms are suitable for driving sheet piles, H-beams, tubular steel piles and timber piles.

Sheet pile clamps are utilised to drive sheet piles and H-beams. The sheet pile clamps can be equipped with tube pads for tubular steel piles up to OD 273 mm. Each tube size requires its own tube pads of matching size in order to ensure proper operation.

Tube clamps are utilised for tubular steel piles up to OD 762 mm. Each tube size requires also its own tube clamps.

Timber clamps are utilised to drive timber or wooden piles. A range of round timber piles can be driven with the same timber clamps whereas square timber piles requires clamps of the same size.





TUBE CLAMPS

for tubular steel piles from
OD 88.9 mm up to
OD 762 mm:

Standard sizes

Ø 88.9	Ø 168.3	Ø 457
Ø 101.6	Ø 219.1	Ø 508
Ø 114.3	Ø 273	Ø 610
Ø 127	Ø 323.9	Ø 711
Ø 139.7	Ø 406.4	Ø 762



SHEET PILE CLAMPS

for sheet piles and H-beams/
tubular steel piles from OD 88.9 mm
to OD 273 mm:

SHEET PILE PADS

w 400–1200 mm/H180-H500



TUBE PADS

Standard sizes

Ø 88.9	Ø 139.7
Ø 101.6	Ø 168.3
Ø 114.3	Ø 219.1
Ø 127	Ø 273



TIMBER CLAMPS

for timber piles from
OD 160 mm up to 600 mm:

A range of round timber pile sizes
can be driven with the same
timber clamps.

Standard sizes

M Ø 160-420 mm
L Ø 430-600 mm

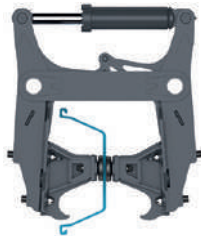
In addition clamps for square
timber piles are also available.
Each square timber pile size
requires clamps of matching size.

Customised sizes are available by request. (e.g. clamps for square timber piles or other special profiles).

**Modular arms are designed for versatility and to handle, pitch, drive and extract
sheet piles, tube piles or timber piles.**



Handling, pitching,
driving & extracting
tube piles



Handling, pitching,
driving & extracting
sheet piles



Handling, pitching,
driving & extracting
small OD tube piles



Handling, pitching,
driving & extracting
timber piles

SIDE GRIP PILE DRIVERS, Resonance-free (V)

CONFIGURATIONS

BOTTOM CLAMP incl. OPTIONS

The (standard) bottom clamp is utilised for the completion of the pile driving and is suitable for all kinds of piles including sheet piles, H-beams and tubular steel piles.

The bottom clamp is equipped with pads for the specific pile type in question, Sheet pile pads are utilised for sheet piles and H-beams, Double (sheet) pile pads are recommended when driving double sheet piles (both U and Z). Tube pads are available in two sizes, from OD 323,9 mm to 508 mm and OD 508 mm to OD 762 mm; both covering the entire range as specified.

Smaller OD tube piles (from 88,9 mm to 323,9 mm and timber piles require a top hitter. The same top hitter is suitable for the entire range.

An optional 4th jaw can be provided for added pile handling capabilities.



Top hitter (optional)

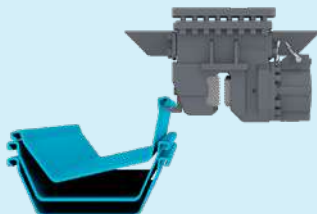
Smaller OD tube piles (from 88,9 mm to 323,9 mm and timber piles require a top hitter. The same top hitter is suitable for the entire range.

Top hitters for larger OD piles and f. ex. square timber piles are available by request.

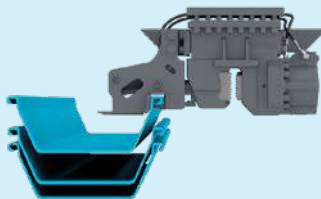


Lifting lever

The bottom clamp is equipped with a lifting lever for handling of sheet piles.



4th jaw (optional)



Sheet pile pads



Tube pads
OD 323,9...508 mm
OD 508...762 mm



Double (sheet)
pile pads
Available for double-Z
type sheet piles





V
SERIES

STD
SERIES

LITE
SERIES

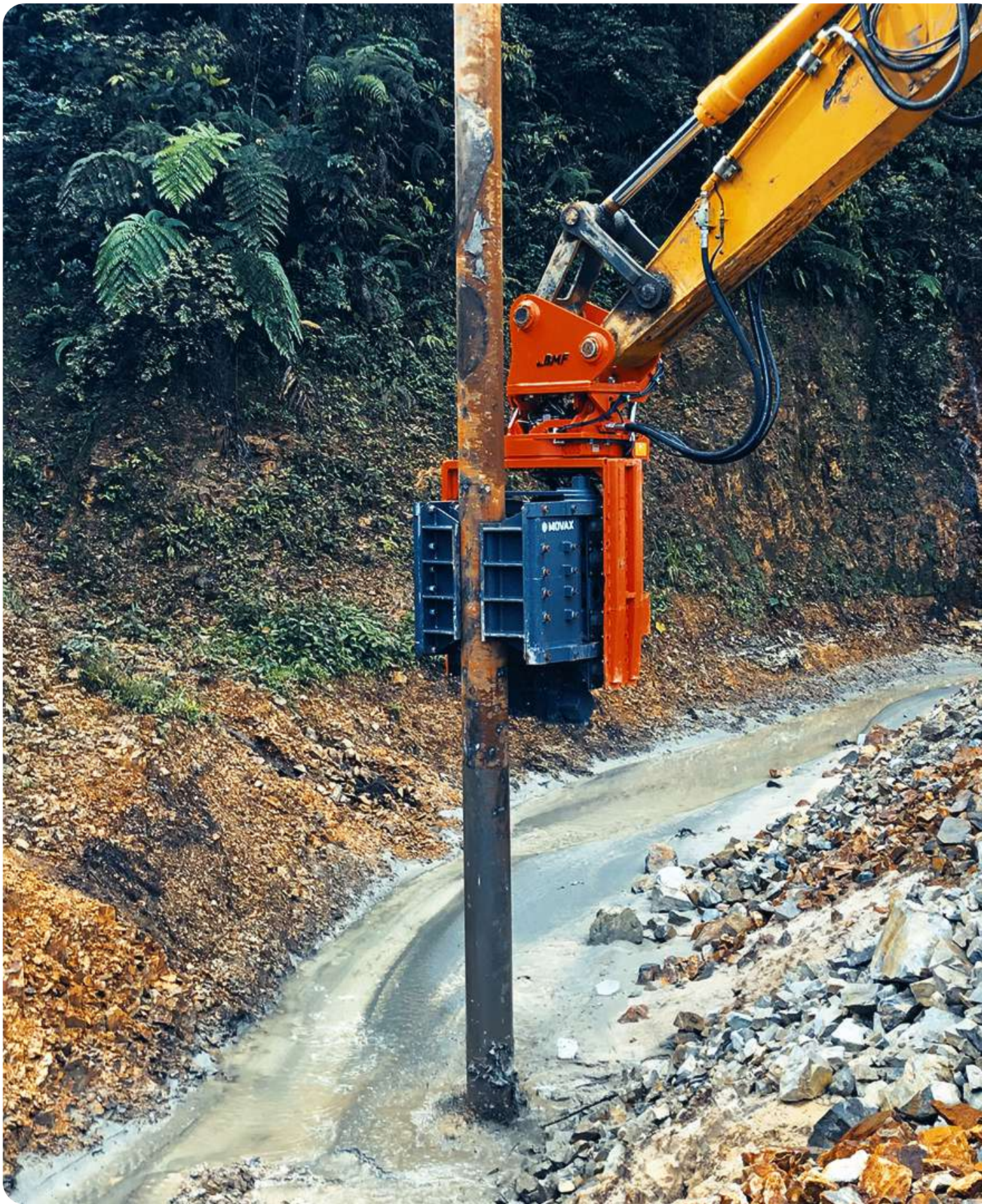
SIDE GRIP PILE DRIVERS, Resonance-free (V)

TECHNICAL DATA

Model		SG-75V	SG-60V	SG-50V	SG-45V
Weight	kg	3500 - 3750	2650 - 2950	2500 - 2800	2490 - 2790
Height	mm	2615	2550	2530	2530
Depth	mm	1115	1180 - 1436	1180 - 1436	1180 - 1436
Width	mm	1270	1193	1193	1193
Frequency	1/min	2300 - 3000	2300 - 3000	2300 - 3000	2300 - 3000
Eccentric moment	kgm	7,6	6,1	5,1	4,6
Centrifugal force, max	kN	750	600	500	450
Ground vibration		low	low	low	low
Resonance-free start/stop		yes	yes	yes	yes
Driving method		vibration	vibration	vibration	vibration
Swing/tilt angle	°	360/30	360/30	360/30	360/30
Return pressure, max	bar	5	5	5	5
Pressure setting	bar	350	350	350	350
Excavator class	t	33-50	28-32	23-28	20-24
Engine power, min., TIER III	kW	180	135	125	100
Engine power, min., TIER IV	kW	200	160	135	120

Suitable piles					
Length & weight		6 m x 2800 kg	8 m x 2300 kg	8 m x 2300 kg	8 m x 2300 kg
		12 m x 1900 kg	12 m x 1800 kg	12 m x 1800 kg	12 m x 1800 kg
		16 m x 1300 kg	16 m x 1200 kg	16 m x 1200 kg	16 m x 1200 kg
Length & weight					
Sheet piles	width	400-1200 mm			
	depth	265 mm			
H-beams	size	H100-H500			
Timber piles	size	Ø 160 - 420 mm			
Timber piles	size	Ø 430 - 600 mm			
Tubular steel piles, tubes	size	Ø 88,9 - 762 mm (1220 mm)			





V
SERIES

STD
SERIES

LITE
SERIES

SIDE GRIP PILE DRIVERS, Standard

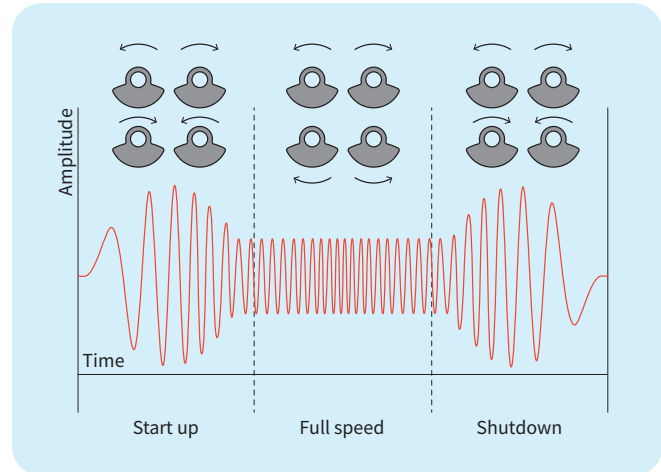
TECHNOLOGY

STANDARD-MODELS

FIXED ECCENTRIC MOMENT

MOVAX STD- and LITE-models side grip vibratory pile drivers are high frequency (2300-300 rpm/38-50 Hz) vibratory pile drivers with fixed eccentric moment.

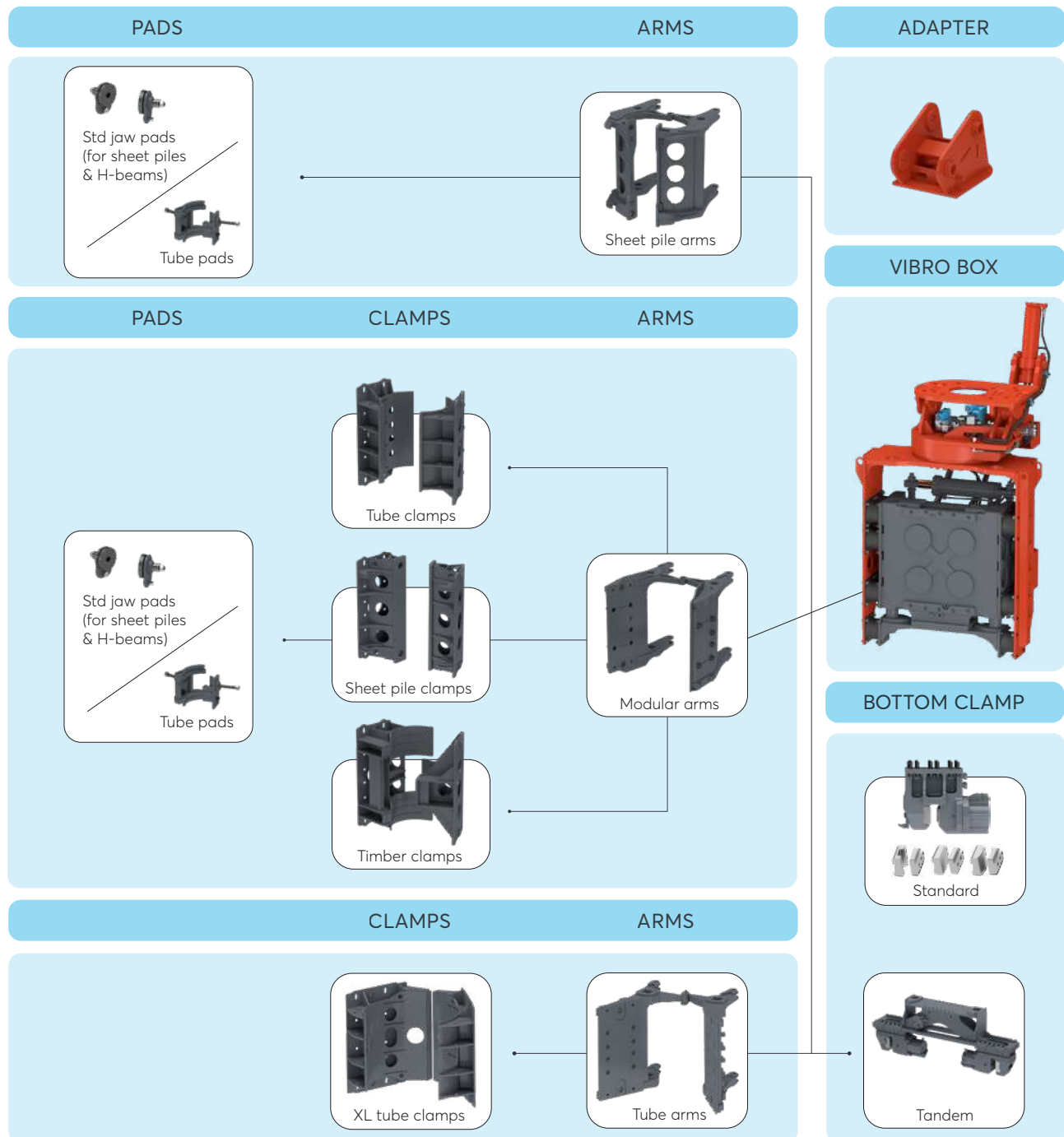
The STD- and LITE-models are suitable for a wide range of piling works in different soil and site conditions.



SIDE GRIP PILE DRIVERS, Standard

MOVAX MODULAR SYSTEM

The MOVAX Modular System (MMS™) enables the use of the same MOVAX side grip pile driver for a wide range of different type of piles ranging from sheet piles, H-beams and tubular steel piles to timber piles. The MOVAX Modular System includes interchangeable arms, clamps and pads that can easily and efficiently be changed for the different pile types in question.



SIDE GRIP PILE DRIVERS, Standard

MOVAX MODULAR SYSTEM

The MOVAX Modular System (MMS™) enables the use of the same MOVAX side grip pile driver for different type of piles.

SHEET PILE ARMS



STD JAW PADS



TUBE PADS

MODULAR ARMS



SHEET PILE CLAMPS



STD JAW PADS



TUBE PADS



TUBE CLAMPS



TIMBER CLAMPS

TUBE ARMS



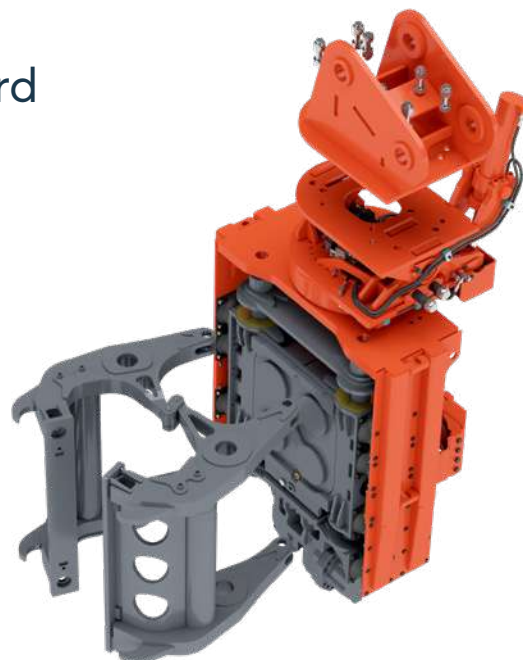


SIDE GRIP PILE DRIVERS, Standard CONFIGURATIONS

SHEET PILE ARMS

Special sheet pile arms are the optimum solution when handling, pitching, driving and extracting only – or mainly – sheet piles and/or H-beams.

The special sheet pile arms can also be utilised to drive smaller diameter tubular steel piles or micropiles up to OD 273 mm. Each tubular steel pile size requires its own, individual tube pads.



SHEET PILE PADS
for sheet piles and H-beams

Standard sizes
w 400–1200 mm
/ H180–H500



TUBE PADS
for tubular steel piles
from OD 88.9 mm to OD 273 mm

Standard sizes

Ø 88.9	Ø 127	Ø 219.1
Ø 101.6	Ø 139.7	Ø 273
Ø 114.3	Ø 168.3	

Customised sizes and special types, for instance for rail tracks, are available by request.

SHEET PILE ARMS are designed for the optimum handling, pitching and driving/extraction of sheet piles, H-beams and tube piles.



Clamp hooks



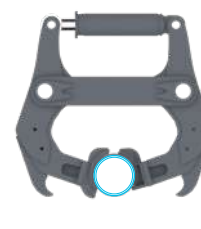
Clamping the web



Handling, pitching,
driving & extracting
H-beams



Handling, pitching,
driving & extracting
sheet piles



Handling, pitching,
driving & extracting
small OD tube piles



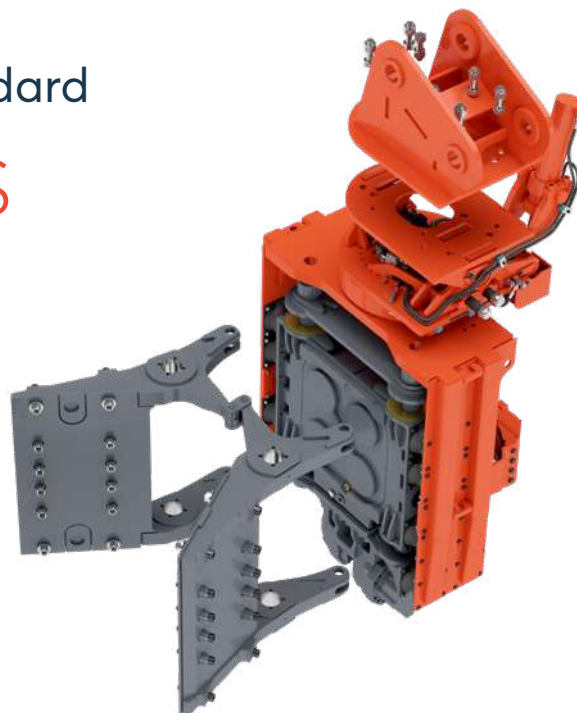
SIDE GRIP PILE DRIVERS, Standard

CONFIGURATIONS

TUBE ARMS

Special modular tube arms are utilised to handle and drive large diameter tubes from 508 mm up to OD 1220 mm. Each tube size requires its own tube clamp in order to ensure proper operation.

A tandem bottom clamp is available for the same tube sizes as the tube arms for optimised pile driving of large tubes.



TUBE CLAMPS

for tubular steel piles from
OD 508 mm to OD 1220 mm

Standard sizes

Ø 508	Ø 762	Ø 1016
Ø 610	Ø 813	Ø 1220
Ø 711	Ø 914	

Customised sizes are
available by request.

TANDEM BOTTOM CLAMP



TUBE PADS

Standard sizes

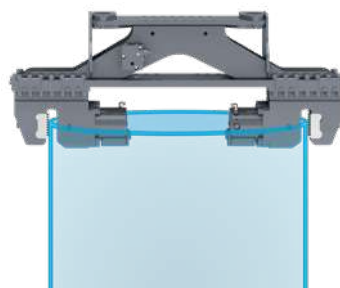
Tube pads for tandem
bottom clamp from
OD 508 mm up to
OD 1220 mm



TUBE ARMS are designed for the optimum handling, pitching and driving/extraction of large OD tubes.



Handling, pitching,
driving & extracting
large OD tube piles



Tandem bottom clamp
driving/extracting
large OD tube piles



SIDE GRIP PILE DRIVERS, Standard CONFIGURATIONS

MODULAR ARMS

Modular arms are suitable for driving sheet piles, H-beams, tubular steel piles and timber piles.

Sheet pile clamps are utilised to drive sheet piles and H-beams. The sheet pile clamps can be equipped with tube pads for tubular steel piles up to OD 273 mm. Each tube size requires its own tube pads in order to ensure proper operation.

Tube clamps are utilised for tubular steel piles up to OD 762 mm. Each tube size requires also its own tube clamps.

Timber clamps are utilised to drive timber or wooden piles. A range of round timber piles can be driven with the same timber clamps whereas square timber piles requires clamps of the same size.





TUBE CLAMPS

for tubular steel piles from
OD 88.9 mm up to OD 762 mm:

Standard sizes

Ø 88.9	Ø 168.3	Ø 457
Ø 101.6	Ø 219.1	Ø 508
Ø 114.3	Ø 273	Ø 610
Ø 127	Ø 323.9	Ø 711
Ø 139.7	Ø 406.4	Ø 762



SHEET PILE CLAMPS

for sheet piles and H-beams/
tubular steel piles from OD 88.9 mm
to OD 273 mm:

SHEET PILE PADS

w 400–1200 mm/H180-H500



TUBE PADS

Standard sizes

Ø 88.9	Ø 139.7
Ø 101.6	Ø 168.3
Ø 114.3	Ø 219.1
Ø 127	Ø 273



TIMBER CLAMPS

for timber piles from
OD 160 mm up to 600 mm:

A range of round timber pile sizes
can be driven with the same
timber clamps.

Standard sizes

M Ø 160-420 mm
L Ø 430-600 mm

In addition clamps for square
timber piles are also available.
Each square timber pile size
requires clamps of matching size.

Customised sizes are available by request. (e.g. clamps for square timber piles or other special profiles).

MODULAR ARMS are designed for versatility and to handle, pitch, drive and extract
sheet piles, tube piles or timber piles.



Handling, pitching,
driving & extracting
tube piles



Handling, pitching,
driving & extracting
sheet piles



Handling, pitching,
driving & extracting
small OD tube piles



Handling, pitching,
driving & extracting
timber piles

SIDE GRIP PILE DRIVERS, Standard CONFIGURATIONS

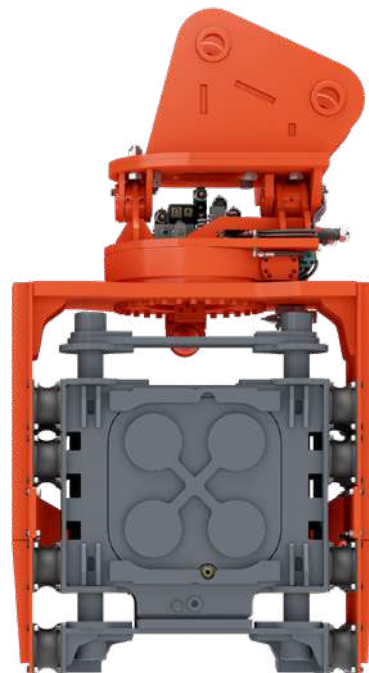
BOTTOM CLAMP incl. OPTIONS

The (standard) bottom clamp is utilised for the completion of the pile driving and is suitable for all kinds of piles including sheet piles, H-beams and tubular steel piles.

The bottom clamp is equipped with pads for the specific pile type in question, Sheet pile pads are utilised for sheet piles and H-beams, Double (sheet) pile pads are recommended when driving double sheet piles (both U and Z). Tube pads are available in two sizes, from OD 323,9 mm to 508 mm and OD 508 mm to OD 762 mm; both covering the entire range as specified.

Smaller OD tube piles (from 88,9 mm to 323,9 mm and timber piles require a top hitter. The same top hitter is suitable for the entire range.

An optional 4th jaw can be provided for added pile handling capabilities.



Top hitter (optional)

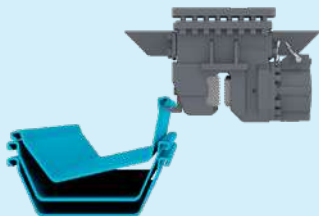
Smaller OD tube piles (from 88,9 mm to 323,9 mm and timber piles require a top hitter. The same top hitter is suitable for the entire range.

Top hitters for larger OD piles and f. ex. square timber piles are available by request.

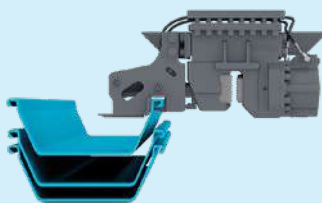


Lifting lever

The bottom clamp is equipped with a lifting lever for handling of sheet piles.



4th jaw (optional)



Sheet pile pads



Tube pads
OD 323,9...508 mm
OD 508...762 mm



Double (sheet)
pile pads
Available for double-Z
type sheet piles





SIDE GRIP PILE DRIVERS, Standard

TECHNICAL DATA

Model		SG-75	SG-60	SG-50	SG-45
Weight	kg	3330 - 3620	2550 - 2850	2400 - 2700	2390 - 2690
Height	mm	2615	2550	2530	2530
Depth	mm	1115	1180 - 1436	1180 - 1436	1180 - 1436
Width	mm	1270	1193	1193	1193
Frequency	1/min	2300 - 3000	2300 - 3000	2300 - 3000	2300 - 3000
Eccentric moment	kgm	7,6	6,1	5,1	4,6
Centrifugal force, max	kN	750	600	500	450
Ground vibration		normal	normal	normal	normal
Resonance-free start/stop		no	no	no	no
Driving method		vibration	vibration	vibration	vibration
Swing/tilt angle	°	360/30	360/30	360/30	360/30
Return pressure, max	bar	5	5	5	5
Pressure setting	bar	350	350	350	350
Excavator class	t	33-40	28-32	23-28	20-24
Engine power, min., TIER III	kW	180	135	125	100
Engine power, min., TIER IV	kW	200	160	135	120

Suitable piles					
Length & weight		6 m x 2800 kg	8 m x 2300 kg	8 m x 2300 kg	8 m x 2300 kg
		12 m x 1900 kg	12 m x 1800 kg	12 m x 1800 kg	12 m x 1800 kg
		16 m x 1300 kg	16 m x 1200 kg	16 m x 1200 kg	16 m x 1200 kg
Length & weight					
Sheet piles	width	400-1200 mm			
	depth	265 mm			
H-beams	size	H100-H500			
Timber piles	size	Ø 160 - 420 mm			
Timber piles	size	Ø 430 - 600 mm			
Tubular steel piles, tubes	size	Ø 88,9 - 762 mm (1220 mm)			





V
SERIES

STD
SERIES

LITE
SERIES

SIDE GRIP PILE DRIVERS, LITE

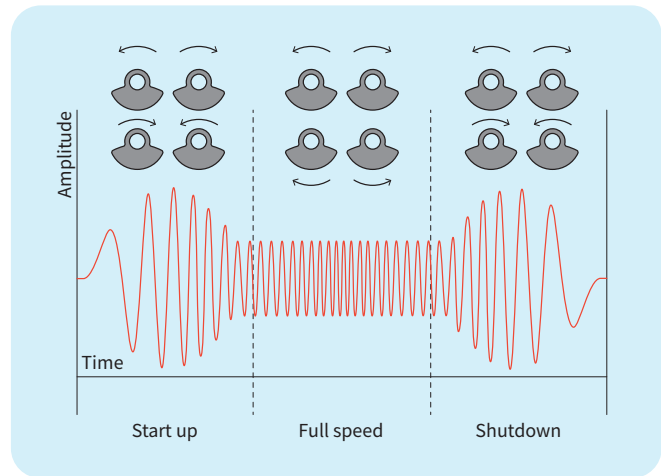
TECHNOLOGY

LITE-MODELS

FIXED ECCENTRIC MOMENT

MOVAX LITE-models side grip vibratory pile drivers are high frequency (2300-3000 rpm/38-50 Hz) vibratory pile drivers with fixed eccentric moment.

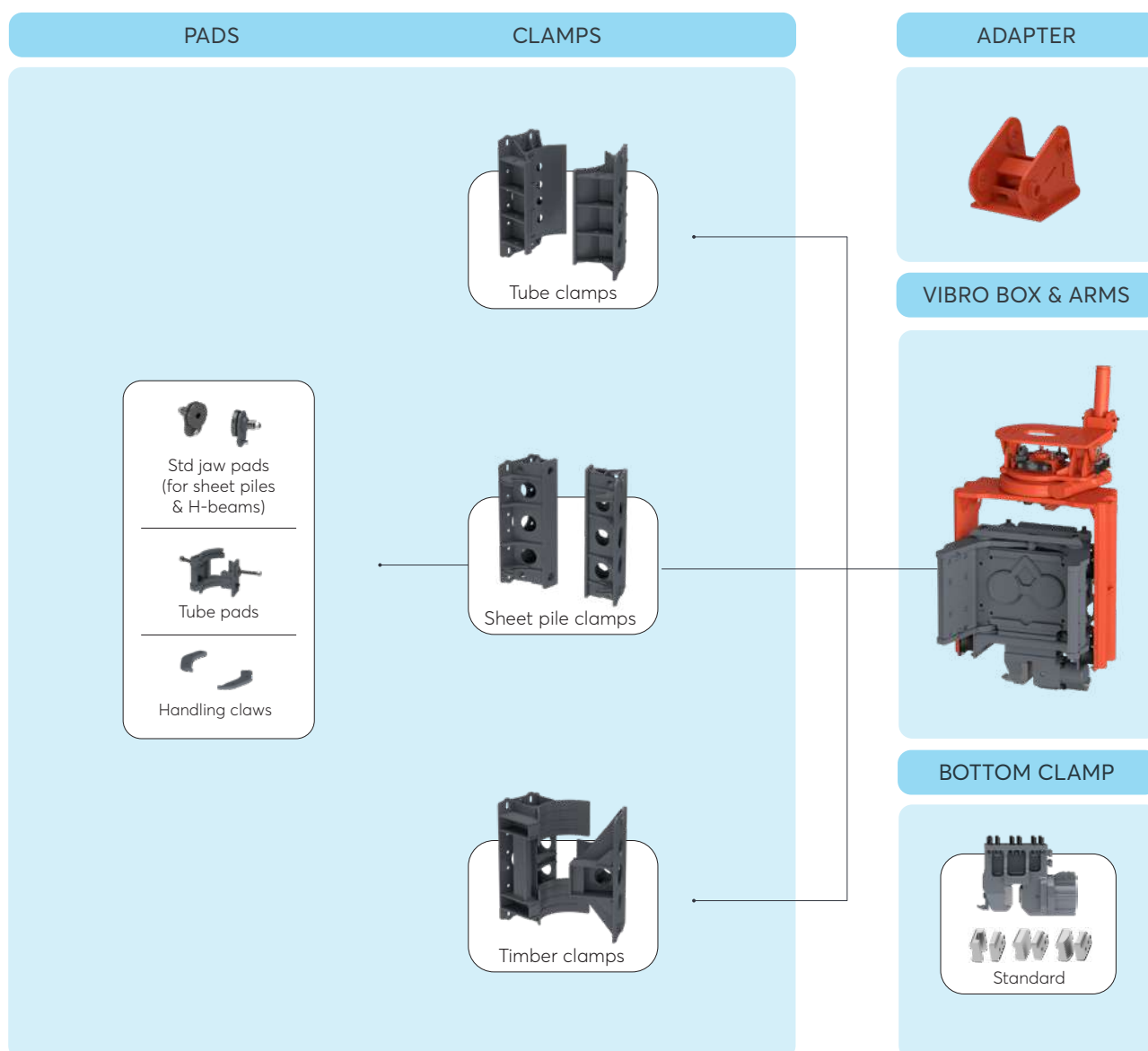
The LITE-models are suitable for a wide range of piling works in different soil and site conditions.



SIDE GRIP PILE DRIVERS, LITE

CONFIGURATIONS

The MOVAX Modular System (MMS™) enables the use of the same MOVAX side grip pile driver for a wide range of different type of piles ranging from sheet piles, H-beams and tubular steel piles to timber piles. The MOVAX Modular System includes interchangeable clamps and pads that can easily and efficiently be changed for the different pile types in question.



SIDE GRIP PILE DRIVERS, LITE

CONFIGURATIONS

MODULAR ARMS

Modular arms are suitable for driving sheet piles, H-beams, tubular steel piles and timber piles.

Sheet pile clamps are utilised to drive sheet piles and H-beams. The sheet pile clamps can be equipped with tube pads for tubular steel piles up to OD 273 mm. Each tube size requires its own tube pads of matching size in order to ensure proper operation.

Tube clamps are utilised for larger tubular steel piles. Each tube size requires also its own tube clamps.

Timber clamps are utilised to drive timber or wooden piles. A range of round timber piles can be driven with the same timber clamps whereas square timber piles requires clamps of the same size.



SIDE GRIP PILE DRIVERS, LITE

CONFIGURATIONS



TUBE CLAMPS

for tubular steel piles from
OD 88.9 mm up to
OD 323.9/508 mm:

SG-30N...SG-40N

Ø 88.9–508 mm

SG-15N

Ø 88.9–323.9 mm

Standard sizes

Ø 88.9	Ø 168.3
Ø 101.6	Ø 219.1
Ø 114.3	Ø 273
Ø 127	Ø 323.9
Ø 139.7	Ø 406.4
Ø 457	Ø 508



SHEET PILE CLAMPS

for sheet piles and H-beams and
tubular steel piles from OD 88.9 mm
to OD 273 mm:

SHEET PILE PADS

SG-30N...SG-40N

w 400–1200 mm/H120-H400

SG-15N

w 400–600 mm/H120-H140



TUBE PADS

Standard sizes

Ø 88.9	Ø 139.7
Ø 101.6	Ø 168.3
Ø 114.3	Ø 219.1
Ø 127	Ø 273



HANDLING CLAWS



TIMBER CLAMPS

for timber piles from
OD 100/120 mm up to
OD 300/325 mm:

A range of round timber pile sizes
can be driven with the same
timber clamps.

Standard sizes

SG-30N & SG-40N

S Ø 120-250 mm

M Ø 220-325 mm

SG-15N

S Ø 100-200 mm

M Ø 200-300 mm

In addition clamps for square
timber piles are also available.
Each square timber pile size
requires clamps of matching size.

Customised sizes are available by request. (e.g. clamps for square timber piles or other special profiles).

MODULAR ARMS are designed for versatility and to handle, pitch, drive and extract
sheet piles, tube piles or timber piles.



Handling, pitching,
driving & extracting
tube piles



Handling, pitching,
driving & extracting
sheet piles



Handling, pitching,
driving & extracting
small OD tube piles



Handling, pitching,
driving & extracting
timber piles

SIDE GRIP PILE DRIVERS, LITE

CONFIGURATIONS

BOTTOM CLAMP incl. OPTIONS

The (standard) bottom clamp is utilised for the completion of the pile driving and is suitable for all kinds of piles including sheet piles, H-beams and tubular steel piles, as well as timber piles.

The bottom clamp is equipped with pads for the specific pile type in question, Sheet pile pads are utilised for sheet piles and H-beams, Double (sheet) pile pads are recommended when driving double sheet piles (both U and Z). Tube pads are available from OD 323,9 mm to 508 mm; covering the entire size range as specified.

Smaller OD tube piles and timber piles require a top hitter. The same top hitter is suitable for the entire range.



Top hitter (optional)

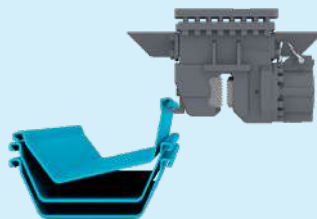
Smaller OD tube piles (from 88,9 mm to 323,9 mm and timber piles require a top hitter. The same top hitter is suitable for the entire range.

Top hitters for larger OD piles and f. ex. square timber piles are available by request.



Lifting lever (SG-30N, SG-40N only)

The bottom clamp is equipped with a lifting lever for handling of sheet piles.



Sheet pile pads



Tube pads*
OD 323,9...508 mm



Double (sheet)
pile pads*
Available for double-Z
type sheet piles

* Available for SG-30N & SG-40N.





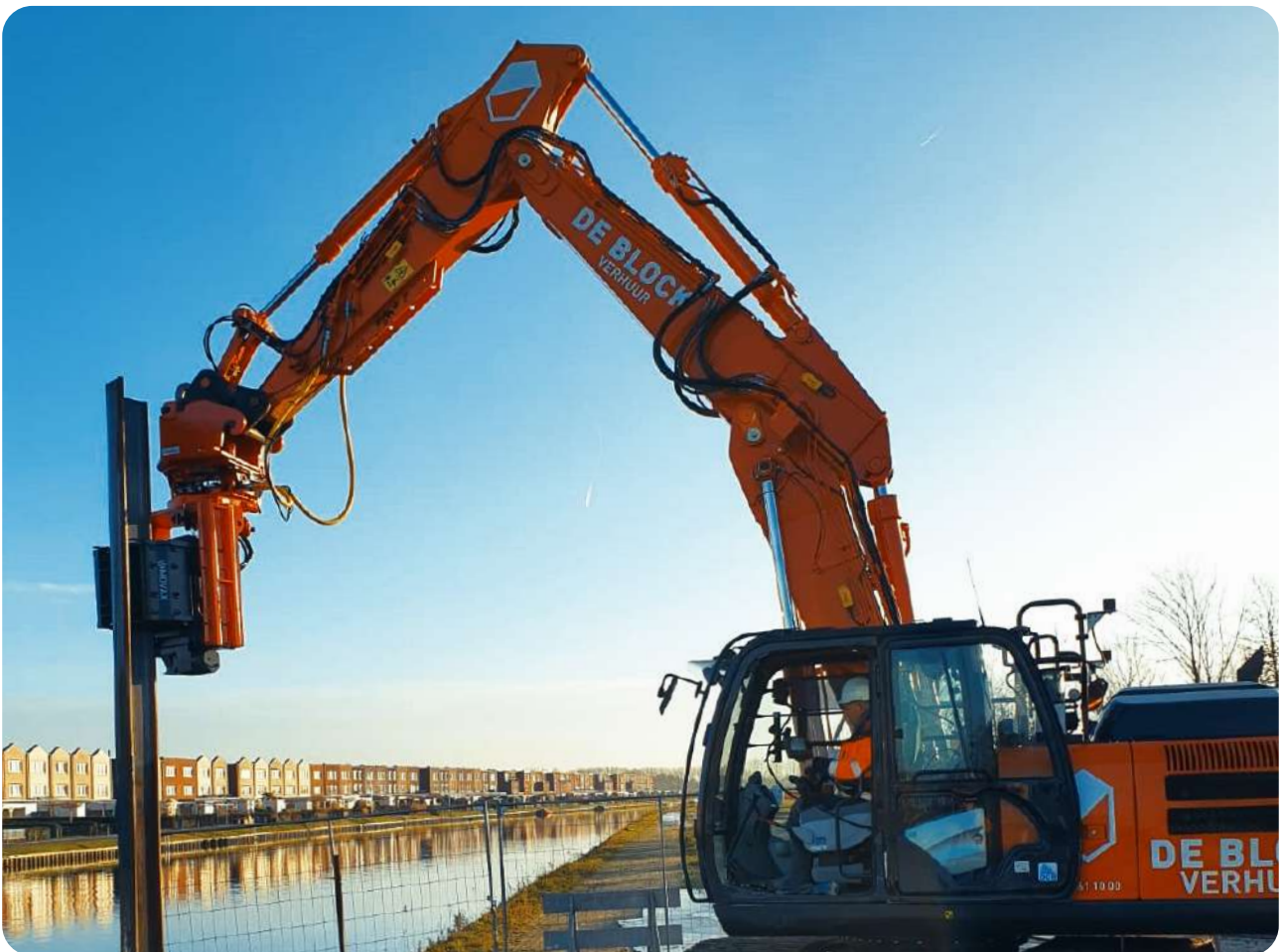
SIDE GRIP PILE DRIVERS, LITE

TECHNICAL DATA

Model		SG-40N	SG-30N	SG-15N
Weight	kg	1505	1485	760
Height	mm	2042	2042	1500
Depth	mm	1138	1138	900
Width	mm	1030	1030	850
Frequency	1/min	2300 - 3000	2300 - 3000	2300 - 3000
Eccentric moment	kgm	4,1	3,1	1,6
Centrifugal force, max	kN	400	300	150
Ground vibration		normal	normal	normal
Resonance-free start/stop		no	no	no
Driving method		vibration	vibration	vibration
Swing/tilt angle	°	360/30	360/30	360/30
Return pressure, max	bar	5	5	5
Pressure setting	bar	350	350	300
Excavator class	t	17-21	13-16	7-12
Engine power, min., TIER III	kW	85	65	38
Engine power, min., TIER IV	kW	90	70	38

Suitable piles				
Length & weight		6 m x 1200 kg 8 m x 1000 kg 10 m x 900 kg	6 m x 1200 kg 8 m x 1000 kg 10 m x 900 kg	4 m x 400 kg 6 m x 200 kg
Length & weight				
Sheet piles	width	400 - 1200 mm	400 - 1200 mm	400 - 600 mm
	depth	260 mm	260 mm	140 mm
Trench sheets	width	330 - 600 mm	330 - 600 mm	330 - 600 mm
H-beams	size	H100-H400	H100-H400	H100-H140
Timber piles	size	Ø 120 - 250 mm	Ø 120 - 250 mm	Ø 100 - 200 mm
Timber piles	size	Ø 220 - 325 mm	Ø 220 - 325 mm	Ø 200 - 300 mm
Tubular steel piles, tubes	size	Ø 88,9 - 508 mm	Ø 88,9 - 508 mm	Ø 88,9 - 323,9 mm







PRODUCTS & SERVICES

PILING HAMMERS

MOVAX Piling Hammers are hydraulic, double acting impact-type, piling hammers utilised for driving load-bearing piles or assisting in sheet pile driving in even the most difficult soil conditions.

MOVAX piling hammers can be utilised to complete a pile installation after reaching refusal with a side grip pile driver or when load testing is required. MOVAX piling hammers can further be utilised independently for driving a wide range of piles including sheet piles, H-beams, tubular steel piles, timber piles or pre-cast concrete piles.

FEATURES

- **Excavator-mounted**

Utilizing the hydraulic power and lifting capacity of the excavator or rail roader (carrier). Designed to work on any and all wheeled and crawler-type excavators and rail roaders by utilising and commanding the standard auxiliary hydraulics and/or by connecting to the electronic control of the excavator.

- **Comprehensive size range**

Available in different models, sizes and configurations for different piling requirements and different type of piles ranging sheet piles and H-beams to tubular steel piles, precast concrete piles and timber piles; and for excavators ranging from 20 (23) to 50 ton – thus always ensuring the optimum size and correct combination of piling hammer and excavator.

- **MOVAX Modular System**

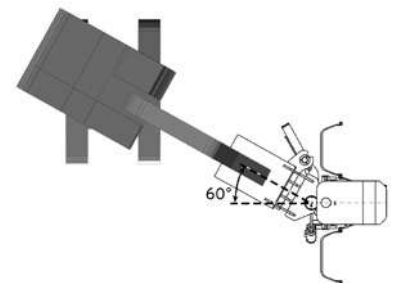
- Standard mounting with pin adapter and +/- 15° tilt. Bolt-on plate mounted rotation device +/- 60° available for optimum sheet pile driving (note! Models DH-15 and DH-25 only).
- Versatility based on the MOVAX Modular System™ which enables the use of the same unit for a wide range of different piling requirements and type of piles. The modular system includes a wide range of pile caps.
- The same MOVAX piling hammer can be used on different carriers; mounting options include excavator-, MOVAX multi-tool piling leader-, (third party) piling rig- or crane.
- Available with 2,5 ton capacity pile handler for handling of different type of piles. Pile handler can be retrofitted on an existing MOVAX piling hammer.

- **MOVAX Control System**

Controlled with the MOVAX Control System, mControl+ for precision and accuracy.

- **MOVAX Information Management System**

Available with the MOVAX MIMS Information Management System: mFleetManagement for monitoring MOVAX piling equipment operation, performance and condition; and mLogbook for monitoring and reporting the piling works.



Tilt/rotation device

Hydraulic, impact-type piling hammers for
DRIVING LOAD BEARING PILES AND ASSISTING IN SHEET PILE DRIVING



PILING HAMMERS

SELECTION

The suitable MOVAX piling hammer-model is selected based on the soil & site conditions, the excavator and the main dimensions (weight & length) of the piles to be driven. The configuration is then defined by the type of piles.

Excavator (carrier)

The excavator must be suitable – and match – the specific piling hammer in question in regards to hydraulic power (oil flow @ pressure) and have the sufficient handling capacity for stable operation. Thus the excavator brand & model is needed for the correct selection of model.

Mounting options

The same MOVAX piling hammer can be used on different carriers; mounting options include excavator-, MOVAX multi-tool piling leader-, (third party) piling rig- or crane. For the suitability of mounting onto MOVAX multi-tool piling leaders refer to the Product Catalogue section in question. The suitability of a MOVAX piling hammer for third party piling rig or crane installation shall always be checked by MOVAX.

Site and soil conditions

Piling hammers are suitable for a wide range of sites and soil conditions (N-values/SPT). In order to make a detailed analysis of the suitability of a MOVAX model for a specific project a soil report is needed.

Type & dimension of piles

In order to select the correct MOVAX model, the type of piles (sheet pile, H-beam, tubular steel pile, precast concrete and/or timber pile) and their dimensions (length, width/depth, OD) are needed. Due to the modular design the same MOVAX piling hammer can be used to drive different type of piles.

SELECTION CHART

EXCAVATOR CLASS	(38) 40-50 ton	(33) 35-50 ton	(28) 30-50 ton	(20) 23-50 ton
PILE SIZE (length/weight)				
Max. pile length and weight based on excavator reach and stability.	DH-45	DH-35	DH-25	DH-15
SUITABLE PILES				
Sheet piles	width 400-700 mm			
H-beams	H180-H700		H180-H500	
Precast concrete piles (max)	508 mm x 508 mm			
Timber piles	Ø 90-510 mm			
Tube piles	Ø 88.9-1200 mm		Ø 88.9-762 mm	

NOTE!

Preliminary. When making the final selection the excavator engine size and hydraulic system design (oil pump arrangement, oil flow rate/pressure etc), excavator lifting capacity and stability and soil and site conditions shall be taken into account.

PILING HAMMERS

PILE CAPS

MOVAX piling hammers can be equipped with the following standard type of pile caps (customized pile caps are available upon request):

SHEET PILES / H BEAMS



DH-15, DH-25, DH-35 and DH-45 (S)

for PU and GU sheet piles 600 mm /
H-beam < 500 mm



DH-15, DH-25, DH-35 and DH-45 (M)

for AU sheet piles > 700 mm / H-beams < 700 mm

TUBULAR STEEL PILES, MICROPILES



DH-15 and DH-25

XS Ø 88,9–273 mm



DH-35 and DH-45

XS Ø 88,9–323,9 mm

TUBULAR STEEL PILES

Pile caps are available flat or with either internal or external guidance;

S Ø 273-508 mm

M Ø 406,4-762 mm

(L Ø 762-1220 mm)



PRE-CAST CONCRETE PILES



XS 225 x 225 mm L 350 x 350 mm
S 250 x 250 mm XL 450 x 450 mm
M 300 x 300 mm

Customised, pile caps are available from 180 x 180 mm to 508 x 508 mm.

TIMBER PILES



DH-15, DH-25

Round

XS Ø 90–220
S Ø 220–510

Square

XS 225 x 225 mm
S 250 x 250 mm
M 300 x 300 mm
L 350 x 350 mm



DH-35, DH-45

Round

XS Ø 90–325
S Ø 270–510

Square

XS 225 x 225 mm
S 250 x 250 mm
M 300 x 300 mm
L 350 x 350 mm

NOTE! A single pile cap can handle the given range.

PILING HAMMERS

MOUNTING OPTIONS

The MOVAX piling hammers can be mounted directly onto the excavator (stick), onto MOVAX Multi-tool piling leader, or a third-party piling rig or crane.



Excavator-mounted



MOVAX multi-tool piling leader-mounted



Piling rig-mounted



Crane-mounted

Due to the modular design the same MOVAX piling hammer can be used on all the various carriers with minimum modifications. The mounting bracket, top cover and lower frame must be selected in accordance with the mounting option.

MOUNTING BRACKET

Each mounting option requires its own mounting bracket (except crane-mounting which do not require a mounting bracket).



Excavator-mounted



MPL-mounted



Piling rig-mounted

TOP COVER

The top cover is the same for the excavator- and multi-tool piling leader (MPL)- mounted DH piling hammer. When mounting the DH on a third party piling rig or on a crane a top cover with lifting lugs is required.



Excavator- &
MPL-mounted



Piling rig-/crane
-mounted

LOWER FRAME

The lower frame is the same for the excavator-, multi-tool piling leader (MPL)- and piling rig-mounted DH piling hammer. The crane-mounted piling hammer is equipped with a pile sleeve ("bell") with pile guides available separately for tubular steel piles and sheet piles.



Excavator-, MPL- &
piling rig-mounted



Crane mounted
(with Bell)



PILING HAMMERS

PILE HANDLER

The MOVAX DH piling hammers without rotation device can be equipped with a pile handler for added pile handling capabilities. The pile handler can also be added to existing MOVAX DH piling hammers by simply changing the top cover and adding the pile handler winch and guide.



PILE HANDLER

Technical data		
Lifting capacity	kg	2500
Wire rope length	m	36
Total weight (winch, rope, guide)	kg	160



PILING HAMMERS

TECHNICAL DATA

Model		DH-45	DH-35	DH-25	DH-15
Total weight*	kg	6700	5750	4400/4700**	3500/3800**
Ram weight	kg	4000	3100	2060	1360
Blows per minute	1/min	0-100	0-100	0-100	0-100
Impact energy	kNm	0-45	0-35	0-25	0-15
Drop height	m	0-1,2	0-1,2	0-1,2	0-1,2
Pressure relief set, max.	bar	350	350	350	350
Operating pressure	bar	280	250	200	150
Oil flow rate	l/min	80-120	80-120	80-120	80-120
Tilt angle	°	+/-15	+/-15	+/-15	+/-15
Rotation angle	°	N/A	N/A	+/-60	+/-60
Leader	m	1,3	1,3	1,3	0,7
Leader, type		floating	floating	floating	floating
Total height	mm	4930	4460	4460	3850
Frame width	mm	650	650	500	500
Transport width	mm	1200	1200	1200	1200
Transport depth	mm	1870	1870	1870	1870
Excavator class	t	(38) 40-50	(33) 35-50	(28) 30-50	(20) 23-50

The MOVAX DH-25 model can be supplied with a modular ram assembly enabling the use of the same DH piling hammer with a ram weight of 2 or 3 tons.

Model		DH-25 modular
Total weight*	kg	5750***
Ram weight	kg	2060/3000
Blows per minute	1/min	0-100
Impact energy	kNm	25-35
Drop height	m	0-1,2
Pressure relief set, max.	bar	350
Operating pressure	bar	200-250
Oil flow rate	l/min	80-120
Tilt angle	°	+/- 15
Rotation angle	°	+/-60
Leader	m	1,3
Leader, type		floating
Total height	mm	4460/5310
Frame width	mm	500
Transport width	mm	1200
Transport depth	mm	1870
Excavator class	t	(33) 35-50

NOTE!

* excluding adapter/mounting bracket

** with tilt/rotation

*** with tilt only

Technical data for MPL-, piling rig (third party)- and crane-mounted DH piling hammers are provided by request.







PRODUCTS & SERVICES

PILING DRILLS

MOVAX Piling drills are excavator-mounted, telescopic/kelly bar-type auger drive attachments for cast in-situ (concrete) piling. MOVAX Piling drills are explicitly designed for soil removal tasks. MOVAX piling drills are especially suitable for work in confined spaces while still being good at reaching over obstacles. The telescopic/kelly bar design keeps the drill height low and allows working on sites with limited headroom without compromising on drilling depth.

FEATURES

- **Excavator-mounted**

Utilizing the hydraulic power and lifting capacity of the excavator or rail roader (carrier). Designed to work on any and all wheeled and crawler-type excavators and rail roaders by utilising and commanding the standard auxiliary hydraulics and/or by connecting to the electronic control of the excavator.

- **Comprehensive size range***

Available in four different models for different piling requirements and applications;

- **TAD-32 and TAD-51** are lighter weight piling drills with a maximum drilling depth of 9 meters intended primarily for rail roaders and smaller excavators.
- **KB-70S** is a heavy duty piling drill (kelly bar) with a maximum drilling depth of 15 meters. The KB-70S is intended for larger rail roaders and excavators.
- **KB-70L** is a heavy duty piling drill (kelly bar) with a maximum drilling depth of 20 meters. The KB-70S is intended for large excavators.

- **MOVAX Modular System**

Versatility based on the MOVAX Modular System™ which enables the use of the same unit for a wide range of different piling requirements. The modular system includes a wide range lead augers in different sizes and for different soil conditions. MOVAX KB-piling drill-models can further be equipped with a service winch (optional) and with a casing adapter (optional).

- **MOVAX Control System**

Controlled with the MOVAX Control System, mControl+.

- **MOVAX Information Management System**

Available with the MOVAX MIMS Information Management System: mFleetManagement for monitoring MOVAX piling equipment operation, performance and condition; and mLogbook for monitoring and reporting the piling works.

*suitability of carrier shall always be confirmed by Movax Oy.



KB-70S with casing adapter (optional) and service winch (optional)

Telescopic, kelly-bar type piling drills for
CAST-IN SITU PILING



PILING DRILLS

TECHNICAL DATA

KELLY-BAR SERIES

Model		KB-70L	KB-70S
Drilling depth*	m	20	9-15
Weight**	kg	6700	5300-5800
Height**	mm	5550	4500
Oil flow rate	l/min	100-200	100-200
Oil pressure	bar	350	350
Hole diameter	mm	420-1500	420-1500
Drill speed range	rpm	10-120	10-120
Side tilt angle	°	±15	±15
Torque	kNm	70	70
Extraction force	kN	75	57
Crowd force	kN	190	190
Excavator class***		35-50	(30) 35-50

Lead augers		
Model		clay, rock or heavy duty
Outer diameter	mm	420-1500

Accessories (optional)	
Service winch	2,5 ton for handling rebar or reinforcement steel
Casing adapter	tailor-made according to customer specifications
Cardan joint	tailor-made according to customer specifications

NOTE!

* drilling depth dependent on length of kelly bar

** excluding adapter and lead auger

*** stick or boom mounted; excavator suitability to be checked



Service winch



Casing adapter



KB-70S



TELESCOPIC SERIES

Model		TAD-32	TAD-51
Drilling depth	m	9	9
Weight*	kg	3200	3200
Height*	mm	3855	3855
Oil flow rate	l/min	75-250	75-120
Oil pressure	bar	350	350
Hole diameter	mm	400-1000	400-1000
Drill speed range	rpm	11-74	11-74
Side tilt angle	°	±30	±30
Torque	kNm	30	50
Extraction force	kN	30	60
Crowd force	kN	15	15
Excavator class**		24-35	24-35
Lead augers			
Model		clay, rock or heavy duty	
Outer diameter	mm	400-1000	

NOTE!

* excluding adapter and lead auger

** stick or boom mounted; excavator suitability to be checked



TAD-32





PRODUCTS & SERVICES

MANIPULATORS

MOVAX manipulators are designed for fast, flexible and efficient handling of different kinds of masts, gantries, and poles as well as a wide range of piles. Based on the patented side grip technology, the MOVAX manipulator is designed for superior maneuverability, safety and accuracy.

The manipulator has a 360 degree continuous rotary gear for unlimited and precise handling and positioning and is capable of handling different type of profiles ranging from double-U-, U-, H-, and I- to rectangular- and tubular-shapes as well as sheet piles, tubular steel piles, timber piles and precast concrete piles. Soft gripping surfaces prevent efficiently damaging sensitive masts, gantries or poles.

FEATURES

- **Excavator-mounted**

Utilizing the hydraulic power and lifting capacity of the excavator or rail roader (carrier). Designed to work on any and all wheeled and crawler-type excavators and rail roaders by utilising and commanding the standard auxiliary hydraulics and/or by connecting to the electronic control of the excavator.

- **MOVAX Modular System**

Available for masts, poles gantries and different type of piles and with gripping surfaces tailor-made for the profiles to be handled.

- **MOVAX Control System**

Controlled with the MOVAX Control System, mControl+.

- Easy & exact pile positioning with integrated inclination sensor and mControl+ display
- Smooth movements with thumb wheel operated proportional control valves
- Clamping pressure shown on screen
- Integrated safety lock valves on cylinders
- Safety switch for clamp opening
- Adjustable gripping force to prevent damage of for instance galvanized poles or other sensitive profiles



Manipulators for
HANDLING DIFFERENT PROFILES



MANIPULATORS

CONFIGURATIONS

The MOVAX Modular System enables the use of the same Manipulator for the handling of a wide range of different type of profiles ranging from double-U-, U-, H-, and I- to rectangular- and tubular-shapes as well as sheet piles, tubular steel piles, timber piles and precast concrete piles. Gripping surfaces are available for different type of materials and surfaces.

Standard MOVAX Manipulator clamps are available for sheet piles, tubes and square sections. Also customised clamps are available upon request.



SHEET PILE CLAMPS

For sheet piles,
H-beams and similar
W400–1600 mm,
H100–1000 mm.



TUBE CLAMPS

For tubular steel pipes
OD 88.9–1220 mm.



CUSTOM CLAMPS

For round, square, hexagonal,
etc. OD up to 1220 mm.
Also conical shapes.
With soft gripping surfaces to
protect the surface coating.



MANIPULATORS

TECHNICAL DATA

Technical data		MPM-4000
Weight (excl. adapter)	kg	1550 - 1750
Height	mm	1562
Depth*	mm	1700 - 2300
Width*	mm	960 - 1400
Rotation angle	°	+/-60
Tilting angle	°	360
Tilting torque	Nm	20000
Relief valve pressure max	bar	350
Minimum pressure required	bar	180
Required oil flow	l/min	85
Excavator class	t	18-35
Maximum working load	kg	4000

*the exact dimension depends on the selected clamp type

Suitable profiles		
Square sections and H-beams	size	H100-H1000
		100x100
		up to 650x650
Tubular/hexagonal sections	size	88,9-1220 mm
Sheet piles	size	max depth 265 mm
Timber poles and piles	size	160-420 mm





CUSTOMIZED SOLUTIONS

MULTI-TOOL PILING LEADERS

The excavator-mounted MOVAX multi-tool piling leader provides a versatile, multi-tool solution for a wide range of piling requirements in a variety of site and soil conditions, and for different types of piles and piling technologies.

MOVAX MPL multi-tool piling leaders are available with a wide range of tooling for different piling and foundation applications ranging from driven piles to CFA and pre-augering. The leader and its tooling are designed to work on a standard excavator with normal auxiliary hydraulics and are controlled with the MOVAX Control System. An optional stability monitoring system is available upon request.

The MOVAX Information Management System (MIMS) provides essential information about the piling process and the pile installation as well as about the MOVAX piling equipment itself.

MOVAX MPL multi-tool piling leaders are based on a modular concept and always customised to meet customer-specific requirements. MOVAX customises and manufactures three (3) different size MPL multi-tool piling leaders to provide the solution for a wide range of carriers and applications.

Multi-tool piling leader model	MPL-400	MPL-300	MPL-200
Type	Heavy duty, multi-purpose piling leader	Multi-purpose piling leader	Micropiling multi-tool leader (incl. solar piling)
Effective piling length/drilling depth	12 m	12 m	6 m
Tools	Vibratory pile driver Impact-type piling hammer Rotary drive for pre-augers CFA	Vibratory pile driver Impact-type piling hammer Rotary drives for pre-augers CFA DTH	Hydraulic hammer Rotary drive for pre-auger Vibratory pile driver
Mounting (excavator class)	Boom (35-50 ton)	Boom (30-50 ton) Stick (35-50 ton)	Chassis (8-20 ton) Boom (16-30) Stick (23-35)
Control	mControl+ Pro	mControl+ Pro	mControl+ Pro
Information management	mFleetManagement mLogbook	mFleetManagement mLogbook	-

NOTE!

In addition to the multi-tool piling leaders with a standardised effective length/depth, tailor-made leaders are available for vibratory pile driver operation up to a maximum effective pile length of 16 meters. The maximum leader length is dependent on the excavator size and stability.

Multi-tool piling leaders with tooling for MULTIPLE PILING TASKS



MULTI-TOOL PILING LEADERS

MPL-400

FEATURES

- Excavator boom-mounted, heavy duty Multi-tool piling leader
- Tooling alternatives include vibratory pile driver, hydraulic double-acting impact-type piling hammer and rotary drives for pre-augering and CFA
- Suitable for a wide range of piling applications, including driven piles (sheet piles, tubular steel piles, H-beams and precast concrete piles) and bored piles (CFA)
- Multi-tool piling leader and tooling designed to work on a standard excavator with normal auxiliary and bucket hydraulics. All leader related hydraulics are integrated onto the leader itself
- Equipped with a fully integrated service winch for handling of piles and tooling
- Scalable to effective pile lengths/CFA & pre-augering depths between 6 and 12 meters by optional leader section and corresponding augers, pile/auger guides, etc.
- Tooling can be easily changed and the leader can also be attached and detached enabling other usage of the excavator
- Multi-tool piling leader and tooling controlled and operated with the MOVAX Control System, mControl+ Pro
- Stability Monitoring System available as an option
- MOVAX Information Management System for reporting piling works (mLogbook) and monitoring equipment (mFleetManagement)

DISCLAIMER

MPL Multi-tool piling leaders are customised solutions. Hence the features and technical data of a specific MPL delivery might differ from the data presented in this catalogue.



Multi-tool piling leaders for DRIVEN, BORED AND DRILLED PILES



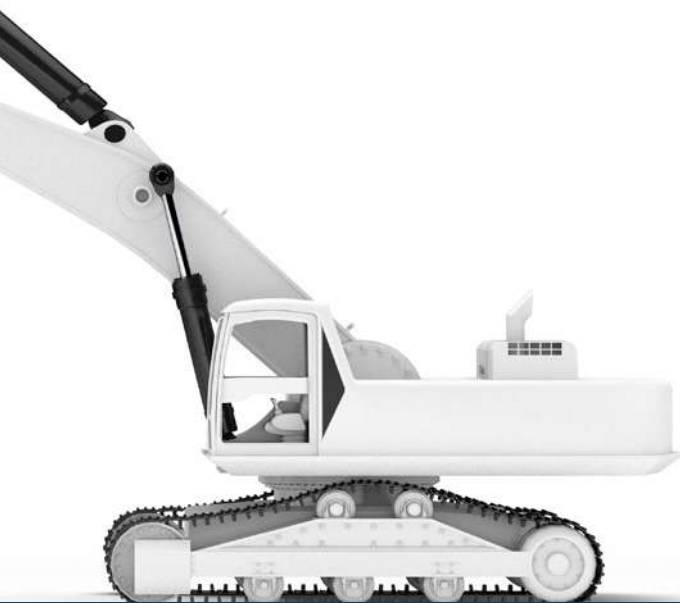
MULTI-TOOL PILING LEADERS, MPL-400

TECHNICAL DATA

Model		MPL-400
Weight (without adapter & tool)	kg	7000–8000
Height	m	15
Forward inclination	°	20
Backward inclination	°	20
Tilt	°	8
Rotation (optional)	°	60
Winches		
Main winch line pull	kN	120
Aux winch line pull	kN	57
Crowd system		
Pull down force	kN	120
Extraction force	kN	120/360
Transport (w/o excavator)		
Length	mm	8700
Width	mm	2900
Height	mm	2900
Weight (w/o tool)	kg	7000–8000
Excavator class*	t	35–50

NOTE!

* depending on tooling; additional counterweight might be required depending on excavator brand & model.



MULTI-TOOL PILING LEADERS, MPL-400 Tooling

TECHNICAL DATA

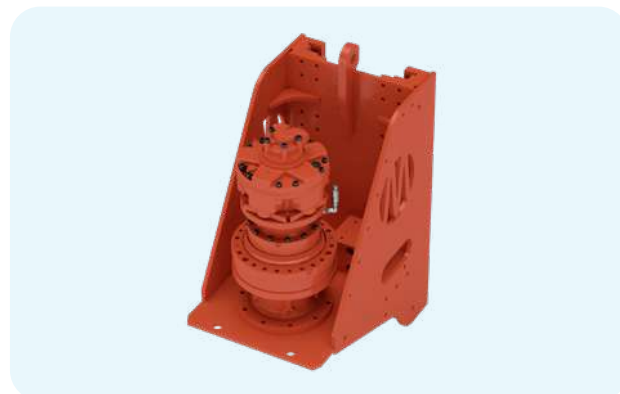
Piling hammer

Model		DH-35	DH-45
Total weight	kg	4900	5850
Ram weight	kg	3100	4000
Blows per minute	1/min	0-100	0-100
Impact energy	kNm	0-35	0-45
Drop height	m	0-1,2	0-1,2
Total height	mm	4460	4930
Frame width	mm	650	650
Transport width	mm	1200	1200
Transport depth	mm	1870	1870
Oil flow	l/min	80-120	80-120
Operating pressure	bar	250	280
Pressure relief set, max	bar	350	350
Suitable piles			
Sheet piles	U and Z, max length 12 m		
H-beams	up to HEB500, max length 12 m		
Tubular steel piles	up to Ø 508 mm, 12 m		
	up to Ø 762 mm, 12 m		
Precast concrete	up to 250x250 mm, max length 12 m		



Rotary drive for pre-augering

Model		PD-100
Total weight	kg	1000
Torque, max	kNm	100
Drilling speed	rpm	0-40
Connecting pin, hexagonal	mm	130
Oil flow	l/mm	240
Maximum pressure	bar	350
Pre-augering		
Depth	m	12
Hole diameter	mm	300-800



Vibratory pile drivers

Model		TG-120	TG-160
Total weight (transport)	kg	2460	2775
Total weight (operating)	kg	2385	2700
Dynamic weight	kg	1810	2100
Dynamic weight (excl. clamp)	kg	1230	1280
Height	mm	2500	2500
Depth	mm	1330	1330
Width	mm	460/410*	460/410*
Eccentric moment	kgm	12,6	16
Frequency	1/s	2300	2300
Line pull, max	kN	200	200
Amplitude	mm	14,5/20**	15,2/25**
Centrifugal force	kN	718	912
Oil flow	l/min	240	300
Operating pressure, max	bar	350	350
Excavator class	ton	35-50	42-50
Suitable piles			
Sheet piles	U and Z, max length 12 m		
H-beams	up to HEB500, max length 12 m		
Tubular steel piles	up to Ø 508 mm, 12 m		
	up to Ø 762 mm, 8 m		

NOTE!

* total/along piling line

** with/without bottom clamp



Rotary drive for CFA

Model		RHP-10
Total weight	kg	1800
Torque, max	kNm	100
Drilling speed	rpm	0-50
Connecting pin, hexagonal	mm	N/A
Oil flow	l/mm	250
Maximum pressure	bar	320
CFA		
Depth	m	12
Hole diameter	mm	300-800



MULTI-TOOL PILING LEADERS, MPL-400

TOOLING & OPTIONS

The MOVAX Multi-tool piling leader MPL-400 is of a modular design and thus suitable for a wide range of applications and piling technologies, including driven piles, pre-augering and CFA. The tooling can be easily and quickly changed and the leader can be modified for any given pile length or pre-augering/CFA depth between 6 and 12 meters to allow for low head room operation.

Tool mounting bracket
for fast and easy change
of tooling.



Piling hammers

MOVAX DH-35 or DH-45
0-35/0-45 kNm
0-100 blows/min
0-1,2 m drop height



Vibratory pile driver

MOVAX TG-120
718 kN | 12,6 kgm
2300 1/s | 14,5/20 mm
MOVAX TG-160
912kN | 16 kgm
2300 1/s | 15,2/25 mm



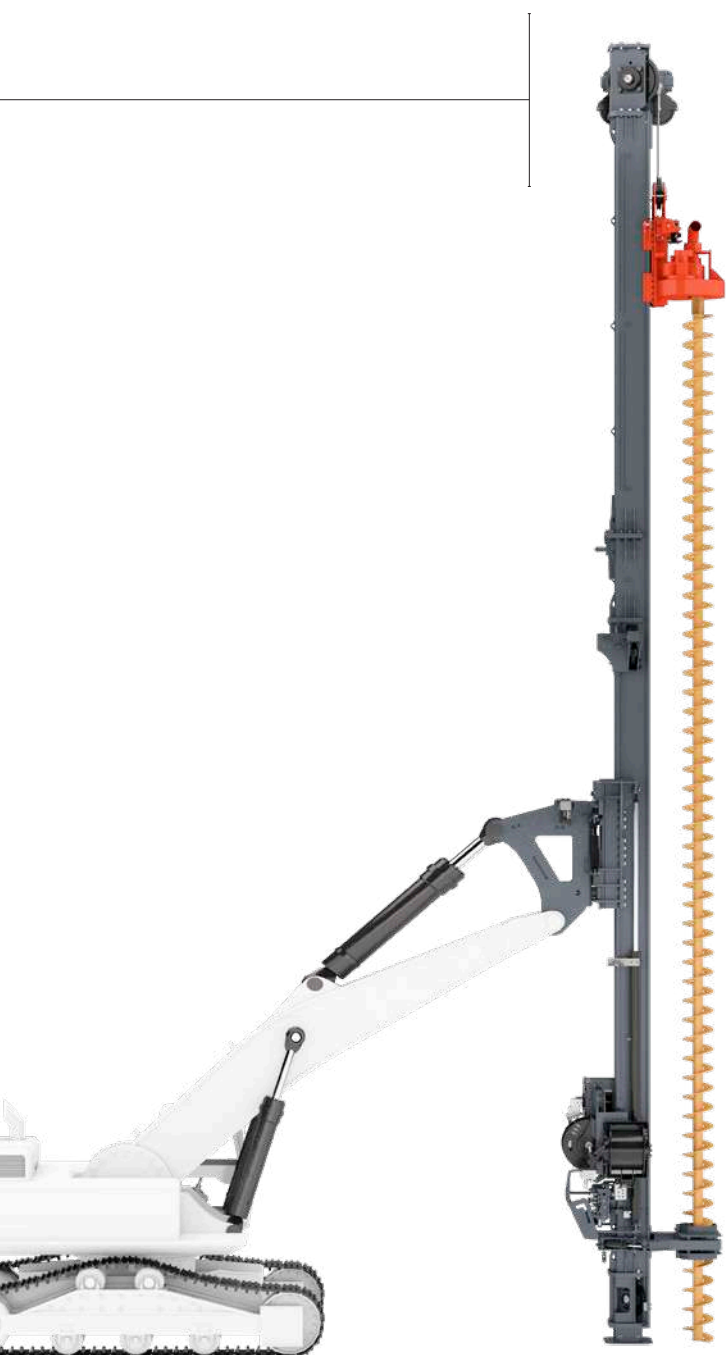
Pre-auger

PD-100
100 kNm
0-40 rpm



CFA Rotary drive

RHP-10
100 kNm
0-50 rpm



The MOVAX MPL-400 is always customised to meet customer-specific requirements. Technical parameters can be tailored and accessories are available for various tooling and applications.



Main winch 120 kN, available with 12 or 36 ton lifting force (*1x or 3x winch line pull*).

Available with optional 5,7 ton service winch for lifting piles, augers and reinforcements.

Mounted directly onto excavator, stick or onto main boom (*depending on excavator class*).
Excavator- and mounting-specific adapter included in the delivery.



Available with tool specific accessories; for example CFA auger star cleaner

Available with pile or auger guide for accurate positioning and verticality.
Pile clamps either mechanical or hydraulic.



Lead augers and augers are available for different soil conditions and with different diameters.

MULTI-TOOL PILING LEADERS

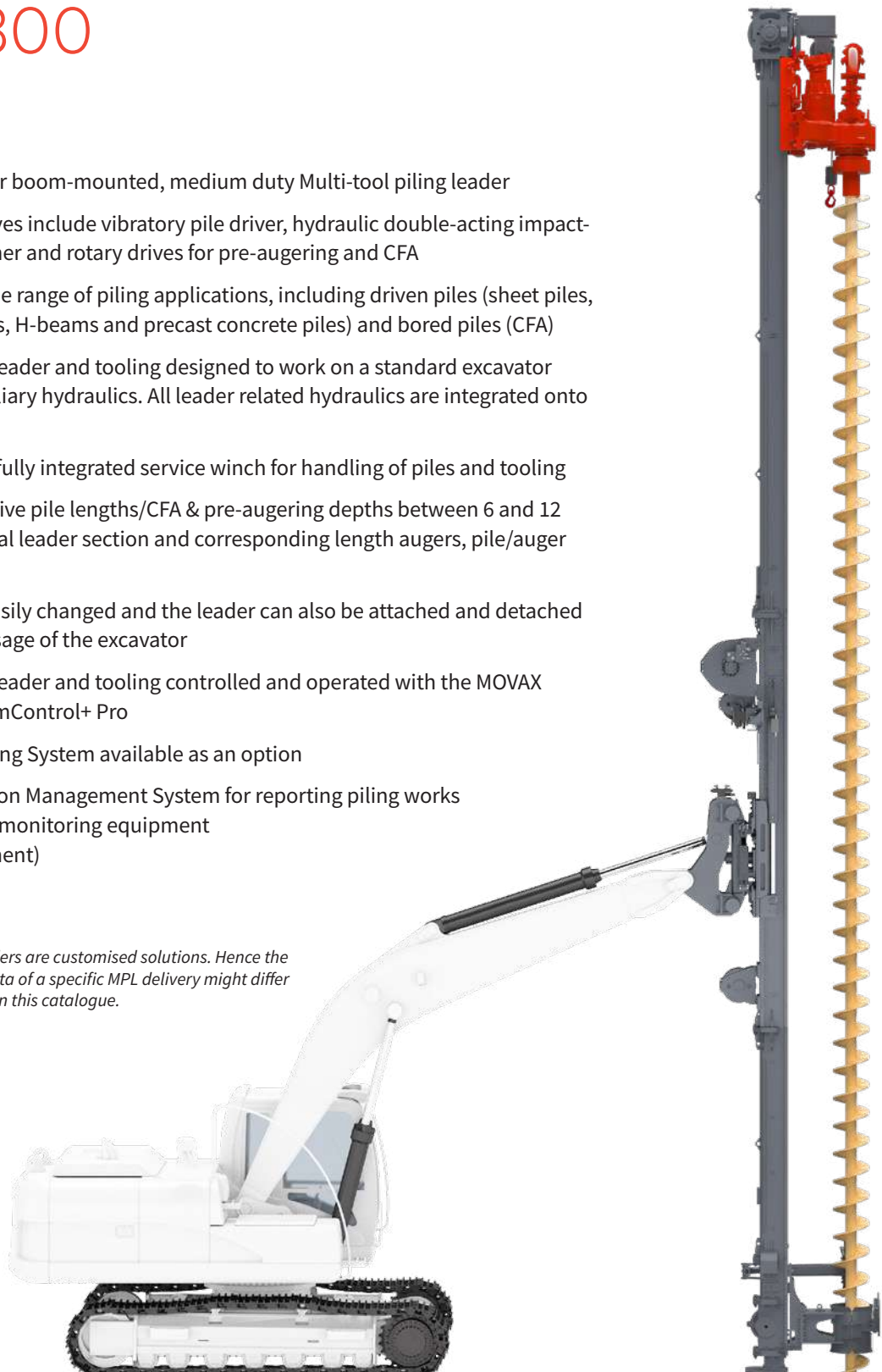
MPL-300

FEATURES

- Excavator stick- or boom-mounted, medium duty Multi-tool piling leader
- Tooling alternatives include vibratory pile driver, hydraulic double-acting impact-type piling hammer and rotary drives for pre-augering and CFA
- Suitable for a wide range of piling applications, including driven piles (sheet piles, tubular steel piles, H-beams and precast concrete piles) and bored piles (CFA)
- Multi-tool piling leader and tooling designed to work on a standard excavator with normal auxiliary hydraulics. All leader related hydraulics are integrated onto the leader itself
- Equipped with a fully integrated service winch for handling of piles and tooling
- Scalable to effective pile lengths/CFA & pre-augering depths between 6 and 12 meters by optional leader section and corresponding length augers, pile/auger guides, etc.
- Tooling can be easily changed and the leader can also be attached and detached enabling other usage of the excavator
- Multi-tool piling leader and tooling controlled and operated with the MOVAX Control System; mControl+ Pro
- Stability Monitoring System available as an option
- MOVAX Information Management System for reporting piling works (mLogbook) and monitoring equipment (mFleetManagement)

DISCLAIMER

MPL Multi-tool piling leaders are customised solutions. Hence the features and technical data of a specific MPL delivery might differ from the data presented in this catalogue.



Multi-tool piling leaders for DRIVEN, BORED AND DRILLED PILES



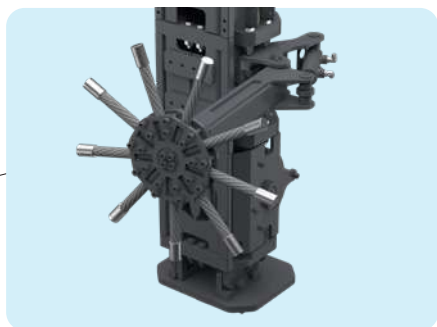
MULTI-TOOL PILING LEADERS, MPL-300

TECHNICAL DATA

Model		MPL-300
Weight (without adapter & tool)	kg	5000-5250
Height	m	15
Forward inclination	°	20
Backward inclination	°	20
Tilt	°	8
Winches		
Main winch	kN	57
Crowd winch	kN	57
Aux winch	kN	25
Crowd system		
Max. pull down force	kN	114
Max. extraction force	kN	171
Depth*	m	9/12
Hole diameter	mm	600
Transport (w/o excavator)		
Length	mm	8600
Width	mm	1800
Height	mm	2000
Weight (w/o tool)	kg	5300-5550
Excavator class	t	30-50
Accessories		
Mechanical auger guide		
Star (auger) cleaner		
Pulley system		

NOTE!

* depending on tooling; additional counter weight might be required depending on excavator brand & model.



Optionally available for CFA - star auger cleaner.



MULTI-TOOL PILING LEADERS, MPL-300 Tooling

TECHNICAL DATA

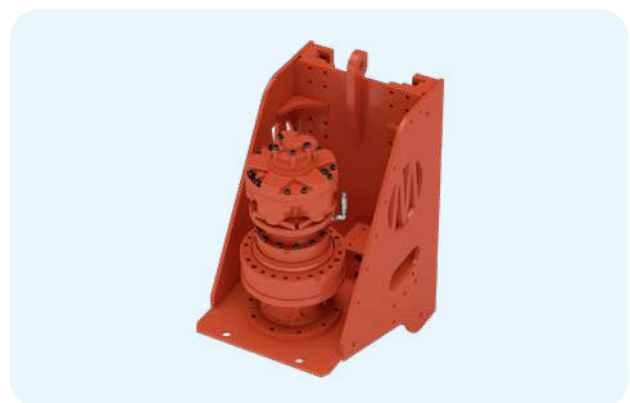
Piling hammer

Model		DH-15	DH-25
Total weight	kg	2800	3700
Ram weight	kg	1360	2060
Blows per minute	1/min	0-100	0-100
Impact energy	kNm	0-15	0-25
Drop height	m	0-1,2	0-1,2
Total height	mm	3850	4460
Frame width	mm	500	500
Transport width	mm	1200	1200
Transport depth	mm	1870	1870
Oil flow	l/min	80-120	80-120
Operating pressure	bar	150	200
Pressure relief set, max	bar	350	350
Suitable piles			
Sheet piles	U and Z, max length 12 m		
H-beams	up to HEB500, max length 12 m		
Tubular steel piles	up to Ø 508 mm, 12 m up to Ø 762 mm, 8 m		
Precast concrete	up to 250x250 mm, max length 12 m		



Rotary drive for pre-augering

Model		PD-50
Total weight	kg	600
Torque, max	kNm	50
Drilling speed	rpm	0-40
Connecting pin, hexagonal	mm	70
Oil flow	l/mm	240
Maximum pressure	bar	350
Pre-augering		
Depth	m	12
Hole diameter	mm	300-600



Vibratory pile drivers

Model		TG-90	TG-120
Total weight (transport)	kg	2400	2460
Total weight (operating)	kg	2325	2385
Dynamic weight	kg	1750	1810
Dynamic weight (excl. clamp)	kg	1170	1230
Height	mm	2500	2500
Depth	mm	1330	1330
Width	mm	460/410*	460/410*
Eccentric moment	kgm	9,6	12,6
Frequency	1/s	2300	2300
Line pull, max	kN	200	200
Amplitude	mm	11,5/16**	14,5/20**
Centrifugal force	kN	544	718
Oil flow	l/min	200	240
Operating pressure, max	bar	350	350
Excavator class	ton	30-45	35-50
Suitable piles			
Sheet piles	U and Z, max length 12 m		
H-beams	up to HEB500, max length 12 m		
Tubular steel piles	up to Ø 508 mm, 12 m		
	up to Ø 762 mm, 8 m		

NOTE!

* total/along piling line

** with/without bottom clamp



Rotary drive for CFA

Model		RHP-5
Total weight	kg	1400
Torque, max	kNm	50
Drilling speed	rpm	0-50
Connecting pin, hexagonal	mm	N/A
Oil flow	l/mm	250
Maximum pressure	bar	320
CFA		
Depth	m	12
Hole diameter	mm	300-600

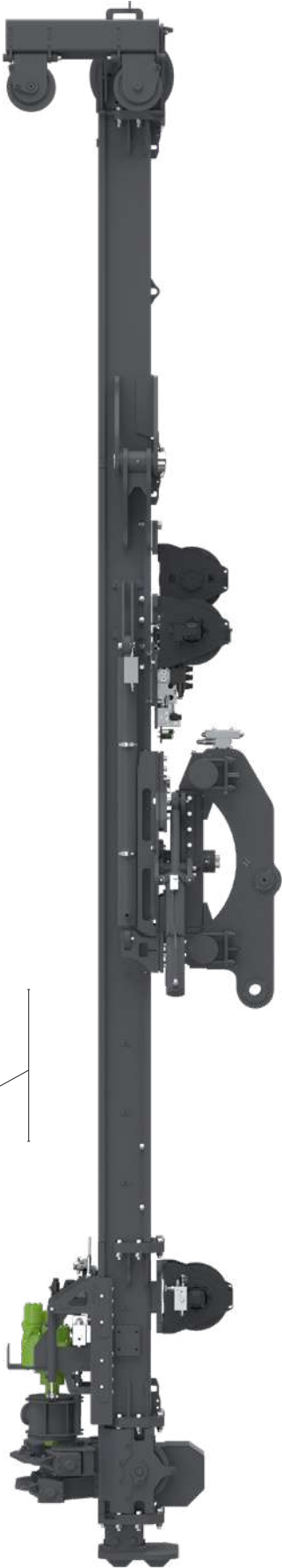
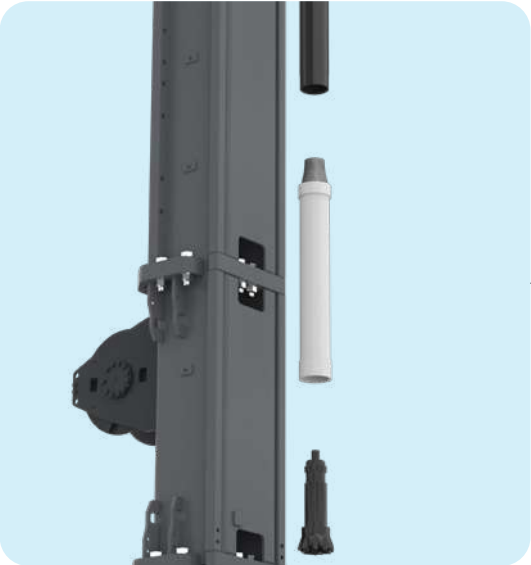


Rotary drives for DTH

Model		GEONEX GR15	GEONEX GR50
Max. casing diameter	mm	323,9	610
Weight	kg	200	650
Length	mm	363	520
Width	mm	400	580
Height	mm	370	615
Thread connection		Api Reg 2 3/8" F, Api Reg 3 1/2" F, Api Reg 4 1/2" F	Api Reg 3 1/2" F, Api Reg 4 1/2" F, Api Reg 6 5/8" F, Hex heads
Max. oil flow	l/min	270	300
Max. oil pressure	bar	250	250
Max. torque, slow gear	kNm	min 7,5 / max 15	min 14 / max 55
Max. torque, fast gear	kNm	min 5 / max 10	min 9,3 / max 37,5
Max. rotation speed, slow gear	rpm	min 60 / max 30	min 57 / max 14
Max. rotation speed, fast gear	rpm	min 90 / max 45	min 85 / max 21

Suitable DTHs (Down-the-Hole-Hammers)

Model		DTH size	DTH size
139,7	mm	4"	4"
168,3	mm	5"	5"
219,1	mm	6"/7"	6"/7"
273	mm	8"	8"
323,9	mm	10"	10"
406,4	mm	NA	12"
508	mm	NA	15"
610	mm	NA	18"





MULTI-TOOL PILING LEADERS, MPL-300

TOOLING & OPTIONS

The MOVAX Multi-tool piling leader MPL-300 is of a modular design and thus suitable for a wide range of applications and piling technologies, including driven piles, pre-augering and CFA. The tooling can be easily and quickly changed and the leader can be modified for any given pile length or pre-augering/CFA depth between 6 and 12 meters to allow for low head room operation.

Tool mounting bracket
for fast and easy change
of tooling.



Piling hammers
MOVAX DH-15 or DH-25
0-15/0-25 kNm
0-100 blows/min
0-1,2 m drop height



Vibratory pile driver
MOVAX TG-90
544 kN | 9,6kgm
2300 1/s | 11,5/16 mm
MOVAX TG-120
718 kN | 12,6 kgm
2300 1/s | 14,5/20 mm



Pre-auger
PD-50
50 kNm
0-40 rpm



CFA Rotary drive
RHP-5
50 kNm
0-50 rpm



The MOVAX MPL-300 is always customised to meet customer-specific requirements. Technical parameters can be tailored and accessories are available for various tooling and applications.



Main winch 57 kN, available with 5,7 or 17,1 ton lifting force (1x or 3x winch line pull).

Available with optional 2,5 ton service winch for lifting piles, augers and reinforcements.

Mounted directly onto excavator, stick or onto main boom (depending on excavator class).
Excavator- and mounting-specific adapter included in the delivery.



Available with tool specific accessories; for example CFA auger star cleaner

Available with pile or auger guide for accurate positioning and verticality.
Pile clamps either mechanical or hydraulic.



Lead augers and augers are available for different soil conditions and with different diameters.

MULTI-TOOL PILING LEADERS

MPL-200

FEATURES

- Excavator stick-, boom- or chassis-mounted Multi-tool piling leader, designed especially for micropiling and solar piling applications. Mounting option depends upon tooling and excavator class
- Tooling alternatives include vibratory pile driver, hydraulic hammer and rotary drives for pre-augering
- Suitable for a wide range of piling applications, including pre-augering and driven piles (sheet piles, tubular steel piles, H-beams and precast concrete piles) Effective pile length six (6) meters (for driven piles per single pile section)
- Multi-tool piling leader and tooling designed to work on a standard excavator with normal auxiliary hydraulics. All leader related hydraulics are integrated onto the leader itself. Tooling can be changed easily and fast and the Multi-tool piling leader can also easily, fast and flexibly be attached and detached enabling other usage of the excavator
- The Multi-tool piling leader and the tooling is controlled with the MOVAX Control System mControl+ Pro

DISCLAIMER

MPL Multi-tool piling leaders are customised solutions. Hence the features and technical data of a specific MPL delivery might differ from the data presented in this catalogue.



Multi-tool piling leaders for DRIVEN PILES



MULTI-TOOL PILING LEADERS, MPL-200

TECHNICAL DATA

Multi-tool piling leader, MPL-200

Model		MPL-200
Weight (excl. adapter & tooling)	kg	1800
Height	m	7,8
Excavator class	t	8-30

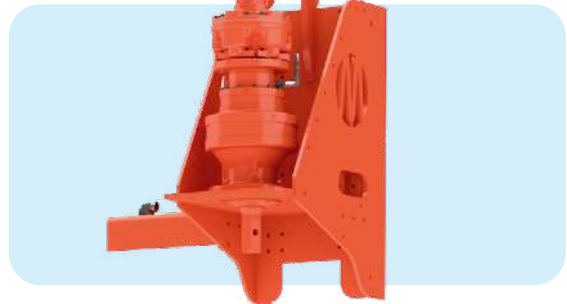
Vibratory pile driver

Model		TG-15
Frequency	Hz	50
Eccentric moment	kgm	1,6
Centrifugal force, max	kN	150
Excavator class, min	t	
Chassis mounted*		8
Boom mounted		16
Stick mounted		23
Suitable piles		
Sheet piles	size	U and Z piles / 6 m
H-beams	size	up to H200 / 6 m
Tubular steel piles	size	up to Ø 220 mm / 6 m



Rotary drive for pre-augering

Model		PD-6
Rotation speed	rpm	20-43
Torque		12
Excavator class	t	
Chassis mounted*		8
Boom mounted		16
Stick mounted		23



Hydraulic hammers

Model		IH-1200	IH-2500	IH-3400
Blows per minute	1/min	570-1180	460-940	400-870
Energy	Nm	1200	2500	3400
Excavator class, min	t			
- Chassis mounted		8	16	18
- Boom mounted		16	20	20
- Stick mounted		23	26	30
Suitable piles				
Sheet piles	size	U and Z piles / 6 m		
H-beams	size	up to H200 / 6 m		
Tubular steel piles	size	up to Ø 220 mm / 6 m		



NOTE! excavator class is limited by hydraulic power rather than excavator lifting capacity



CUSTOMISED SOLUTIONS

COLUMN STABILISATION LEADERS

MOVAX excavator-mounted stabilisation leader provides a versatile solution for column stabilisation utilising both dry and wet binder material.

MOVAX column stabilisation leader and its tooling are designed to work on a standard excavator with normal auxiliary hydraulics and are controlled with the MOVAX Control System.

MOVAX column stabilisation leaders are based on a modular concept and always customised to meet customer-specific requirements.



Column stabilisation leaders for SOIL IMPROVEMENT



MOVAX Oy & ALLU Oy from Finland cooperate in order to provide a total, excavator mounted solution for mass and column stabilisation. The solution includes the mechanical equipment for the storage and feed of the binder, the mixing of the binder into the soil in question and the fully integrated control and information management (3D/reporting) systems.

COLUMN STABILISATION LEADERS

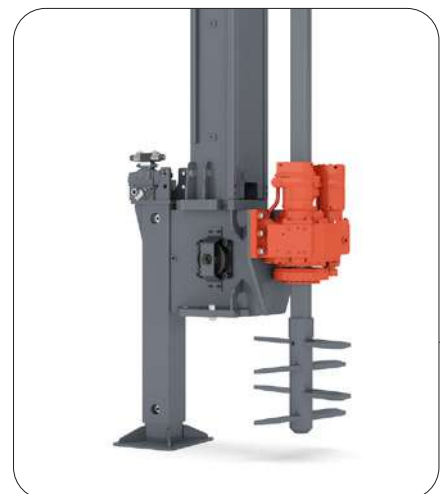
MSL-300

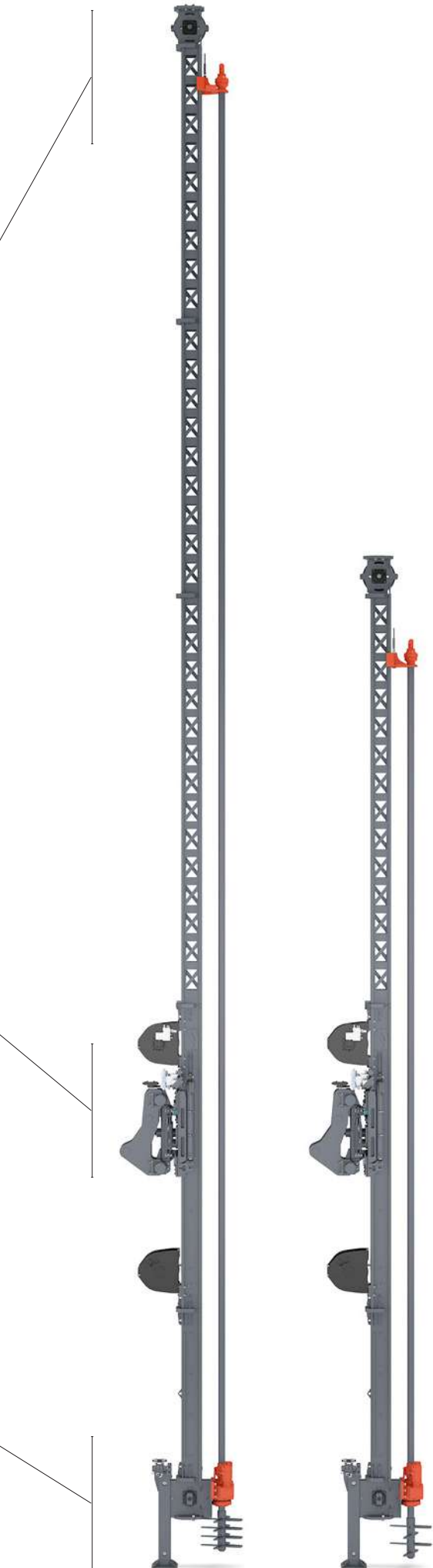
FEATURES

- Excavator mounted stabilisation leader
- The leader and its tooling are designed to work on a standard excavator with normal auxiliary hydraulics; all required hydraulics is integrated into the leader itself
- Maximum depth 20-25 meters depending on excavator size; due to the modular design the leader can be shortened to 12 or 16 meter effective depth
- Column diameters between Ø500–800 mm due to interchangeable mixer tip
- Mixer tip vertical movement is achieved with two hydraulic winches
- Binder feed at the top of the mixing rod to which a rotating joint for the binder hose is integrated.
- Roller mechanism on the rotary drive to apply torque and simultaneously allow feedthrough of the mixing tube
- Integrated rotary drive and telescopic bottom foot at the end of the leader
- Additional support for binder feed hoses and electric cables along the leader

DISCLAIMER

MPL Multi-tool piling leaders are customised solutions. Hence the features and technical data of a specific MPL delivery might differ from the data presented in this catalogue.





TECHNICAL DATA

Column stabilisation leader

Model MSL-300		
Column depth	m	20–25
Column diameter	mm	500–800
Weight (w/o adapter)	kg	6500
Height	m	23–28
Tilt angle	°	+/- 8
Winches		
· number	pcs	2
· pull down/extraction force	kN	57/57
· speed	m/min	0–30

Rotary drive		
Torque	kNm	20
Rotational speed	rpm	180–200
Features/instrumentation		
<ul style="list-style-type: none"> · rotation speed · rotation torque · column depth/ascent rate · driving angle 		

Mixer/mixer tip		
Mixer tip levels	pcs	4
Diameter	mm	500-800, nominal
Binder feed	kg/s	3,0
Compressed air, pressure	bar	10
Compressed air, flow rate	m³/min	6,5
Ascent rate	mm/r	20
Rotational velocity	rpm	180–200
Injection pipe length	m	21,3–26,3
inner diameter	mm	34
Support pipe length	m	21,3–26,3
size / wall thickness	mm	100 x 100 mm square/8 mm

NOTE! Preliminary data.

Detailed technical data to be provided on case by case basis.

Column depth and other technical data dependent on excavator size.

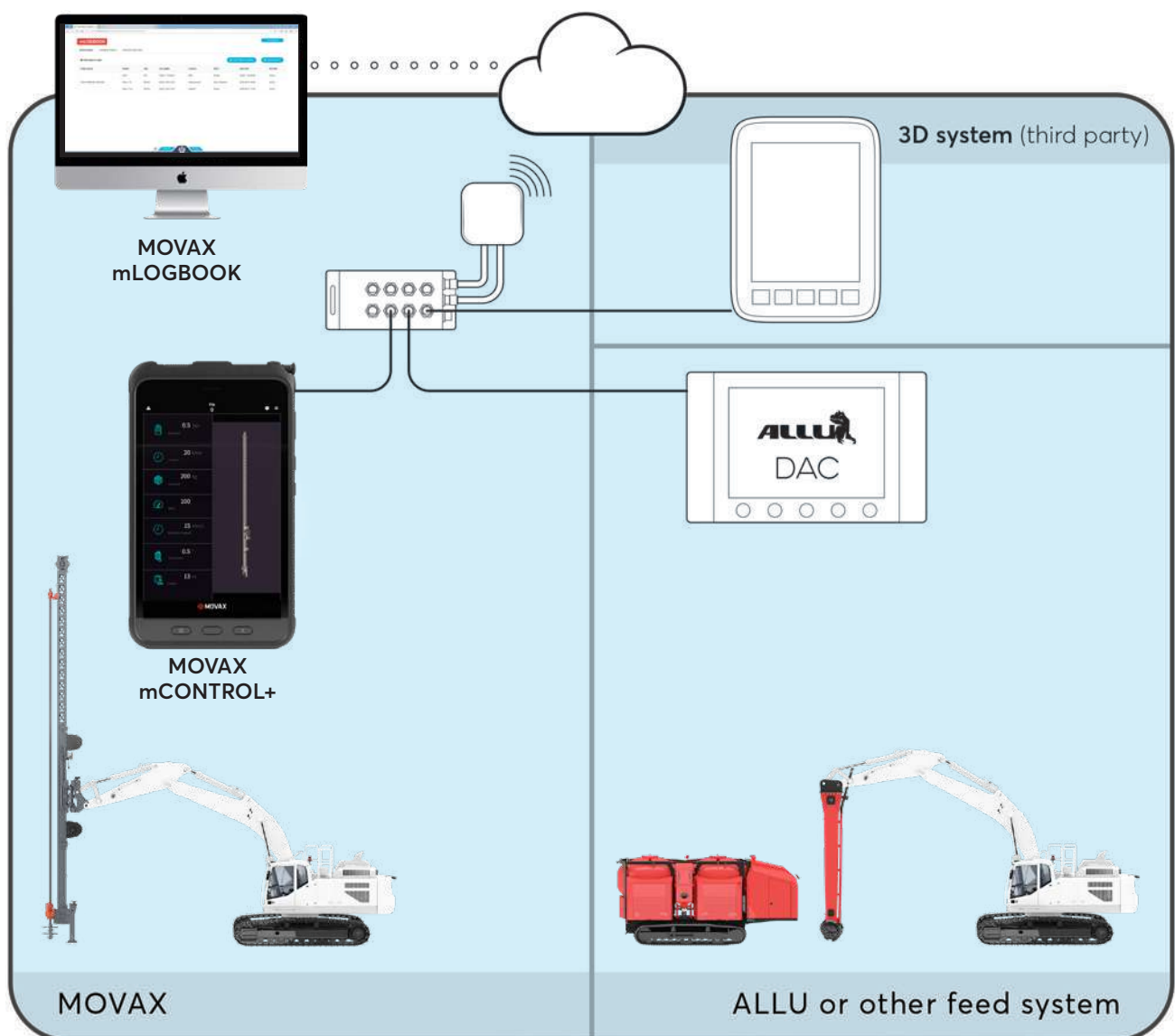
COLUMN STABILISATION LEADERS

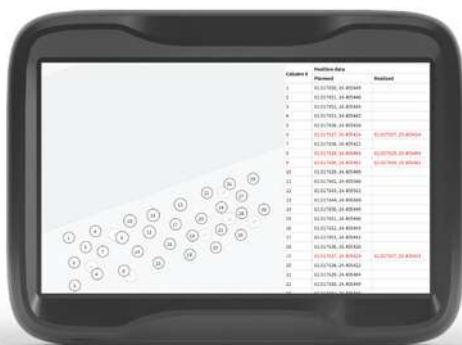
MONITORING & REPORTING

The Column stabilisation process is controlled and the work is monitored using the MOVAX mControl+ PRO control system. The mControl+ PRO is designed to communicate with external systems such as ALLU's DAC control system and different 3D systems (the connectivity will be developed on a case-by-case basis).

The control, monitoring and reporting system consists of the following systems which communicate with each other over the CAN-bus:

- MOVAX mCONTROL+ control system
- MOVAX mLogbook reporting system
- ALLU DAC control system or other feed system
- Third party 3D system connectivity





PLANNING

The stabilisation drawings and plans are accessed through the 3rd party 3D system. From the display the operator can see the planned location of the mass stabilisation fields or the stabilisation columns.

MONITORING

The work flow is monitored utilizing MOVAX mCONTROL+ and the 3rd Party 3D-system. The location and positioning data is monitored utilizing the 3rd Party 3D system display. The mCONTROL+ -display is utilized to monitor all other stabilisation parameters such as;

- column stabilisation; for example binder quantity per column, ascent rate and rotational speed
- mass stabilisation; for example binder quantity, feed and mixing times

The operator can view the result of the stabilisation work on the displays of the MOVAX mCONTROL+ and the 3rd Party 3D-system. The realised positioning data is shown in the 3rd Party 3D system whereas all other reported parameters can be found in the MOVAX mCONTROL+-system.



REPORTING

The mass and column stabilisation work is reported utilizing the 3rd Party 3D-system as well as MOVAX mLogbook reporting system.

The MOVAX mCONTROL+ system sends the data to a cloud-based server (mCLOUD) where all the information is stored. The user can access the information and ready made reports through a password protected web-based interface.

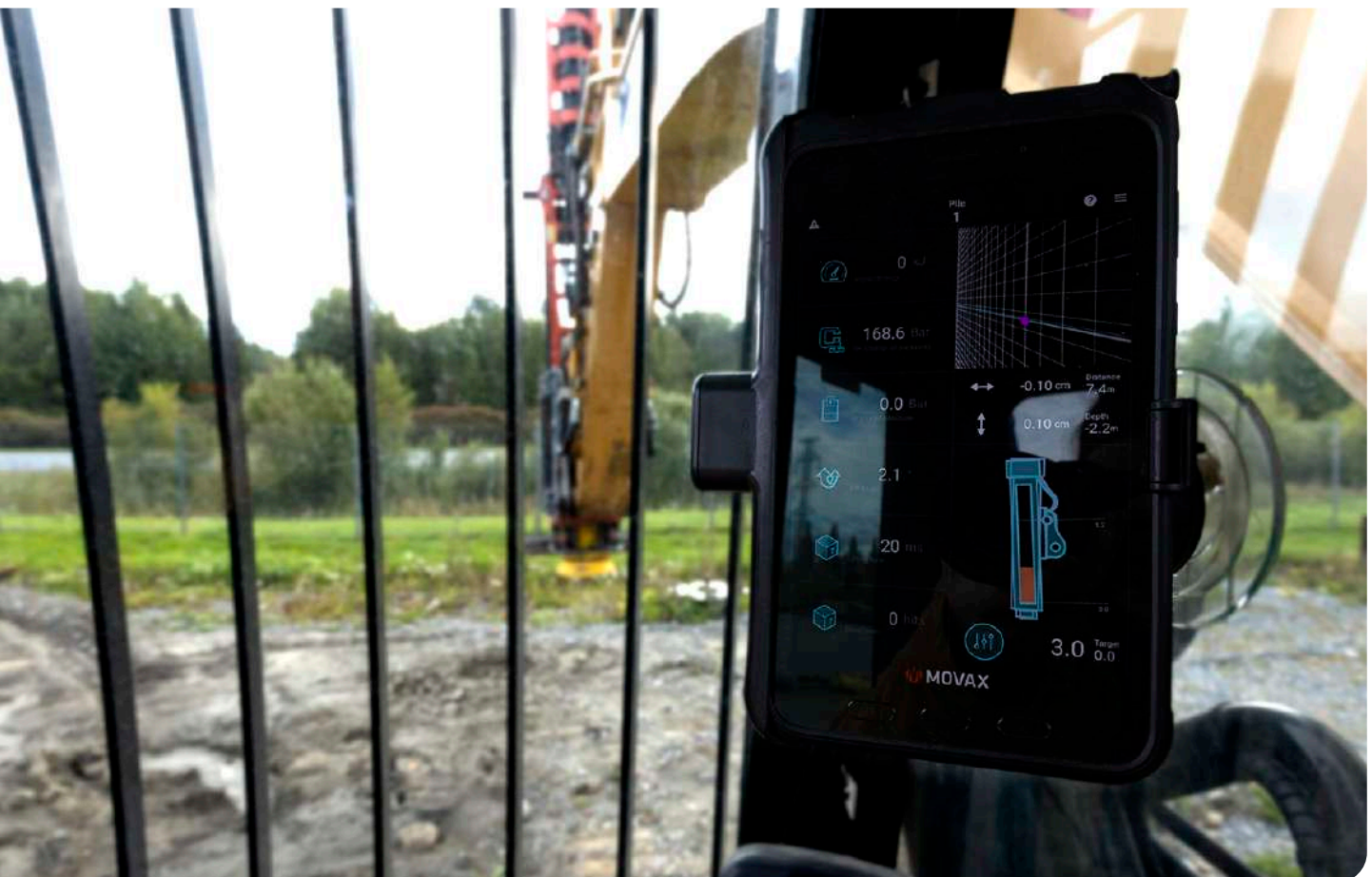
In addition to ready made reports the MOVAX mLogbook-reporting system also includes efficient tools for printing (pdf-format) and to transfer the data to for instance Microsoft Excel.

PRODUCTS & SERVICES

MOVAX CONTROL SYSTEM

The MOVAX Control System, **mControl+**, links the carrier (excavator, railroader or equal) with the MOVAX piling equipment and customised solutions. The system controls the auxiliary hydraulics of the excavator which in turn is utilised to control the MOVAX piling equipment, the MOVAX multi-tool piling leaders including the tooling connected to the leader and the MOVAX column stabilisation leader.

The excavator's auxiliary hydraulics is controlled by the standard auxiliary pilot circuit of the excavator which is controlled by mControl+. The mControl+ control system utilizes inclination and pressure sensors to monitor the operation and the pile driving and stabilisation processes - thus effectively and efficiently assisting the operator in performing all the required control functions and tasks.



Control system for
MOVAX PILING EQUIPMENT & CUSTOMISED SOLUTIONS

FEATURES

- **Advanced MOVAX control system available in two different versions:**
 - Automatic control system with autoT™ tip-control, **mControl+ PRO**
 - Manual control system, **mControl+ LITE**
- **Commanding the standard auxiliary hydraulic circuit of the excavator.**
The excavator's auxiliary pilot circuit is controlled optionally:
 - Hydraulically, with a hydraulic valve block
 - Electronically, with a PWM-module
 - Through a CAN interface
- **Ergonomic and informative user interface**
 - Easy-to-read graphical symbols for different functions
 - User-friendly menus for calibration and performance optimisation
 - Colour display
 - All functions are effortlessly controlled using switches and thumb wheels on the control grips
- **System diagnostics - available directly on the mControl+ display**
 - Available (optional) with connectivity to MOVAX Information Management System, mFleetManagement and mLogbook



NOTE!

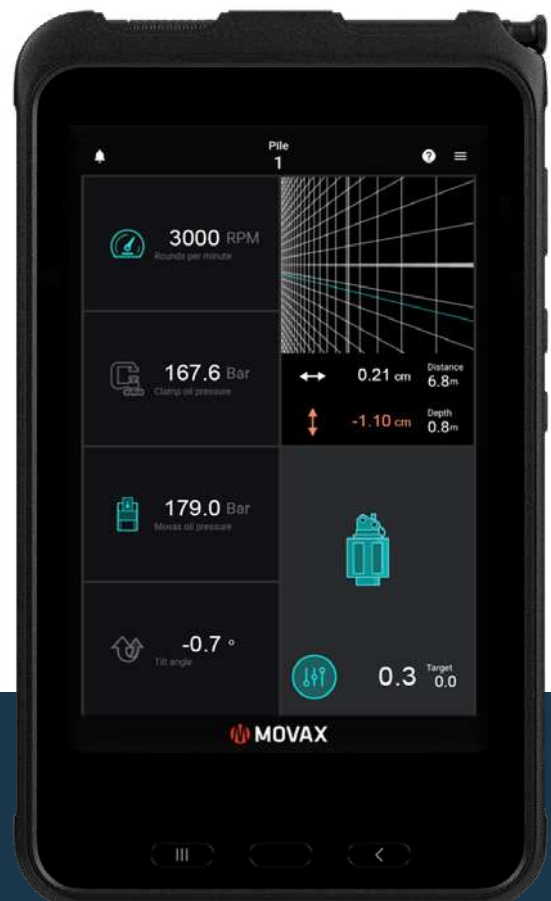
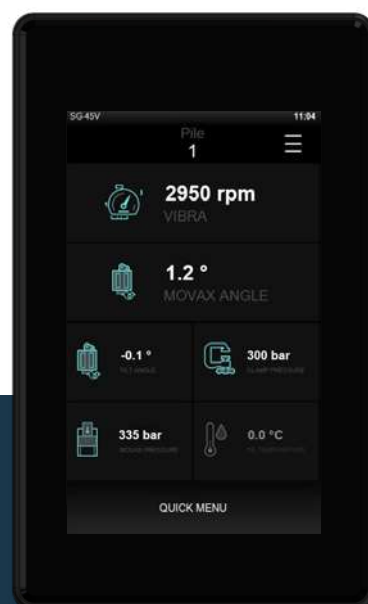
mLogbook requires mControl+ PRO.

The pilot circuit control is dependent on the excavator brand & model (year). For excavators with the CAN interface currently available, please contact Movax Oy.

mControl+ PRO is compatible with all MOVAX piling equipment and customized solutions, including MOVAX multi-tool piling leaders and MOVAX column stabilisation leaders.

mControl+ LITE is utilised to control the MOVAX piling equipment.

mControl+ LITE can be upgraded to mControl+ Pro.

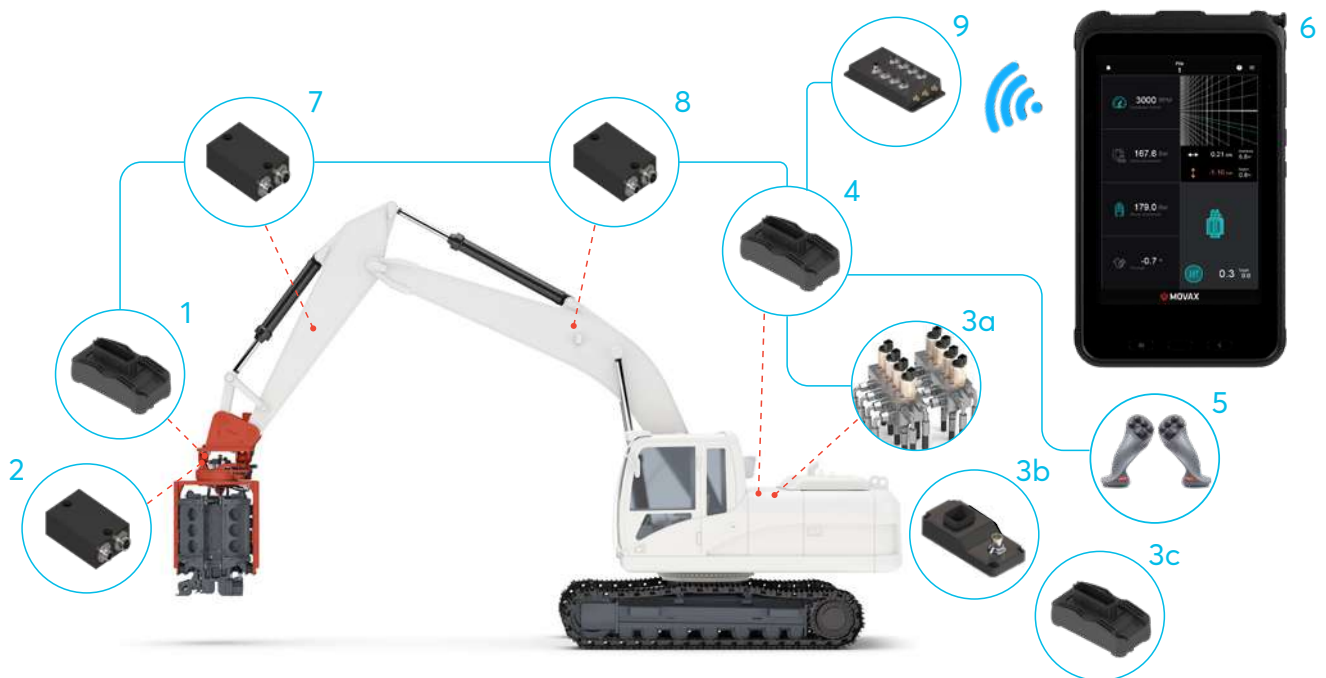


MOVAX CONTROL SYSTEM

mControl+ PRO

mControl+ PRO is a state-of-the-art automatic control system based on advanced 'tip'-control (autoT™) computing technology and angle sensors mounted onto the excavator's boom and stick which utilises either proportional pilot valves, a PWM controller or a CAN pilot circuit/interface for the control of the excavator's auxiliary hydraulics.

The autoT™-feature of the mControl+ PRO effectively assists the operator in achieving a faster and more efficient, high quality piling installation. The mControl+ PRO also provides valuable information which further assists the operator in achieving a higher production rate and quality. The information also ensures the highest possible availability by providing information protecting the MOVAX piling equipment.



1. MOVAX module (MXM) / 2. MOVAX angle sensor (MXS) / 3. Pilot circuit control a) hydraulic valve block, b) PWM control, c) CAN interface / 4. Excavator module (EXM) / 5. Control grips / 6. mControl+ PRO display / 7. Stick angle sensor / 8. Boom angle sensor.
(In case of two-piece boom one additional sensor is required.) / 9. MIMS module

The mControl+ PRO is installed onto the excavator without making any changes to the original functionality of the excavator whatsoever. mControl+ PRO is utilised to control all MOVAX piling equipment, multi-tool piling leaders and column stabilisation leaders.

FEATURES

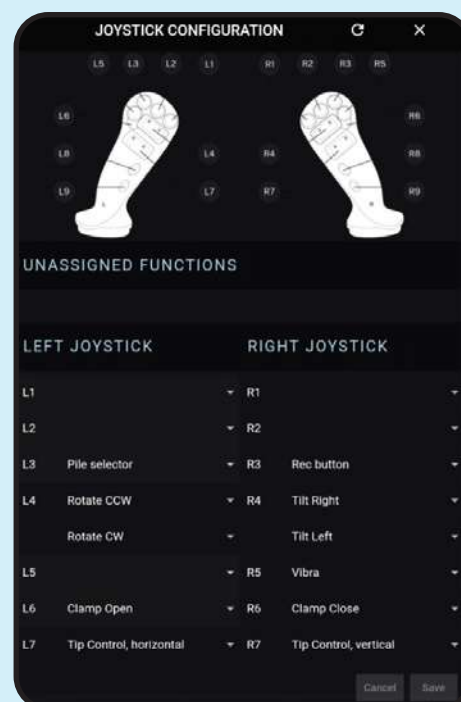
Display

mControl+ PRO is equipped with an independent 8" Android tablet that is used as the control system display. The ergonomic user interface is utilised to monitor and control the MOVAX piling equipment and customised solutions. The display is also utilised, for instance, to input user data related to the pile set criterion (mLogbook) and the angle for raked piles when using autoT™.



Control grips

The ergonomic mControl+ PRO control grips are equipped with multiple rollers and buttons which allow complete operation with a single grip. The control grips include extra buttons and rollers for accommodating functions from the excavator's original handles.



Control modules

mControl+ PRO is equipped with two electronic control modules, one Excavator module (EXM) and MOVAX module (MXM). The excavator cab-mounted EXM controls the excavator's auxiliary hydraulics with either proportional valves, a PWM controller or a CAN bus control circuit. The type of pilot circuit control is dependent on the excavator brand and model. The MXM, installed and delivered with the MOVAX equipment, controls the hydraulic valves on the MOVAX piling equipment, Multi-tool piling leaders and Column stabilisation leaders, and monitors the operation with angle- and pressure sensors.

NOTE!

The MOVAX module is always supplied with the MOVAX piling equipment, Multi-tool piling leaders or Column stabilisation leaders.

The MOVAX module is factory installed onto the MOVAX equipment.



Excavator module

PWM controller

Angle sensors

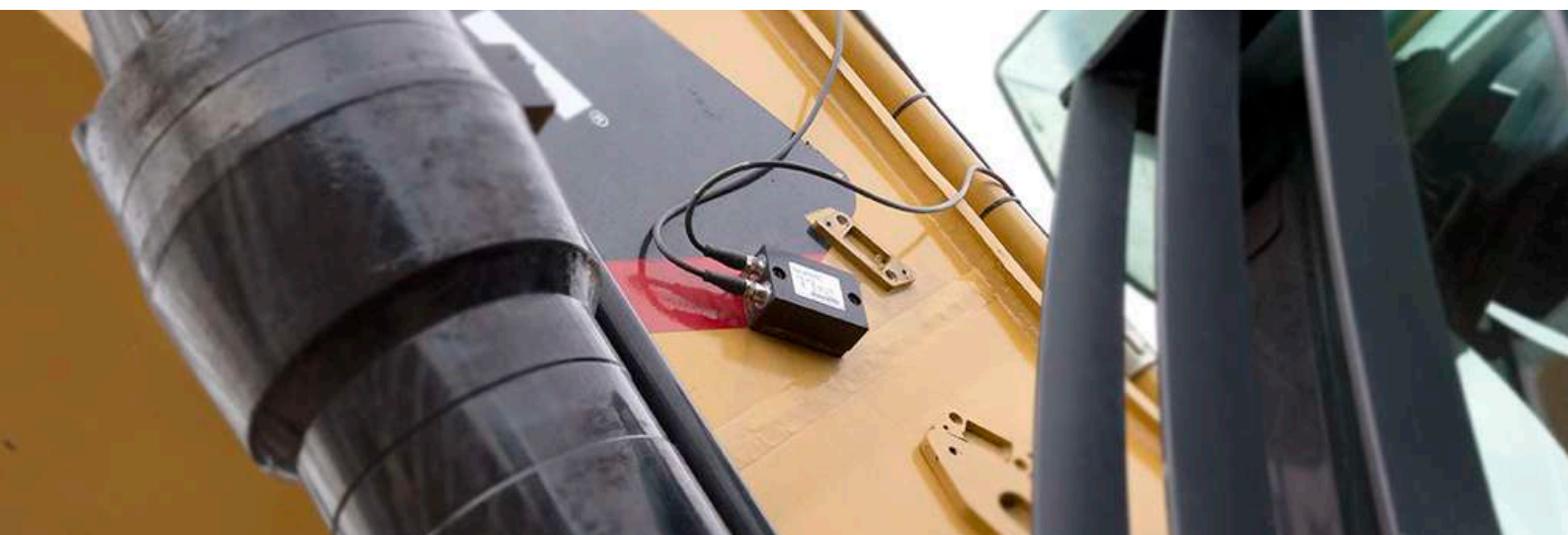
mControl+ PRO system provides highly accurate angle and distance information under extreme vibration conditions. The measurement is based on next-gen 360° angle sensors. These sensors are also equipped with gyroscope to provide maximal accuracy.

OPTIONS

mControl+ PRO is available with the following options:

Information	Additional sensor(s) for excavators with a two-piece boom Software licenses for mFleetManagement and mLogbook
Control grips	Ergonomic control grips with 3-rollers

Update kits are available to connect existing MOVAX side grip pile drivers and piling hammers to mControl+ PRO.



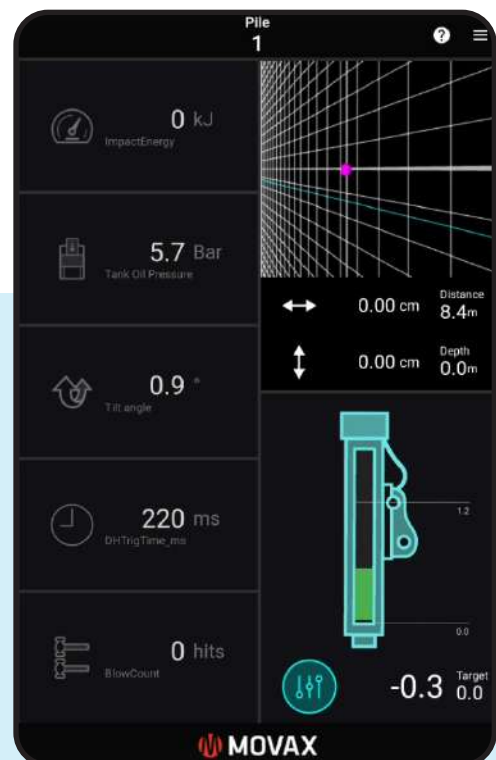
INFORMATION

mControl+ PRO provides comprehensive and essential information about the operation of the MOVAX piling equipment, Multi-tool piling leaders and Column stabilisation leaders and the piling process allowing the operator to monitor and optimize the operation for the best possible overall performance.

mControl+ PRO includes the hardware required for the connectivity to the MOVAX Information Management System and the necessary sensors for a mono-boom excavator - also as required for the MOVAX mLogbook documentation and reporting tool. The same sensors are utilised to for instance provide information about the 'refusal'.



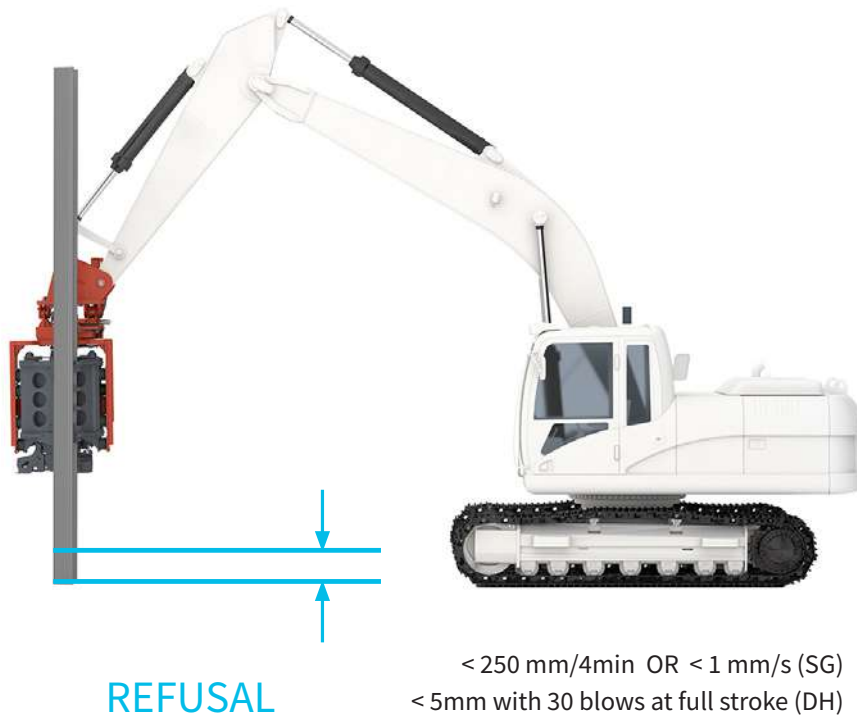
mControl+ PRO, main screen with SG, overvibration warning



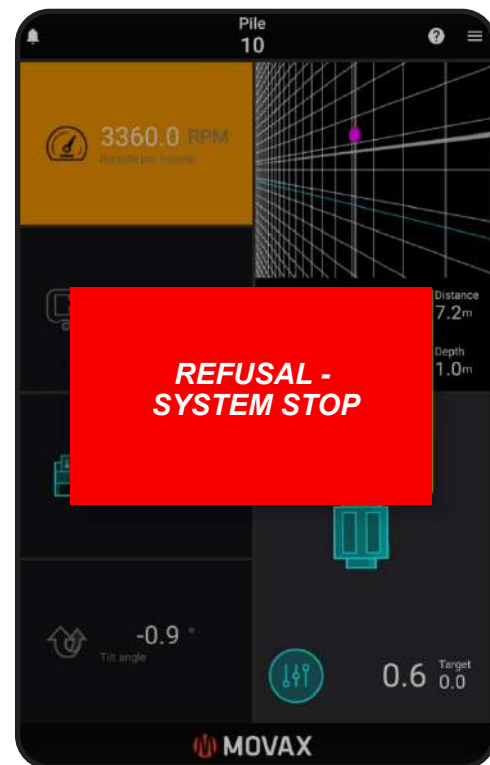
mControl+ PRO, main screen with DH piling hammer

Refusal

mControl+ PRO is designed to secure the maximum availability of the MOVAX side grip vibratory pile drivers and piling hammers. The mControl+ PRO REFUSAL™ -feature assists the operator by displaying a clear and visible warning when the refusal is reached during the pile driving process thus protecting the MOVAX piling equipment.



mControl+ PRO, main screen with SG, refusal warning



mControl+ PRO, main screen with refusal system stop

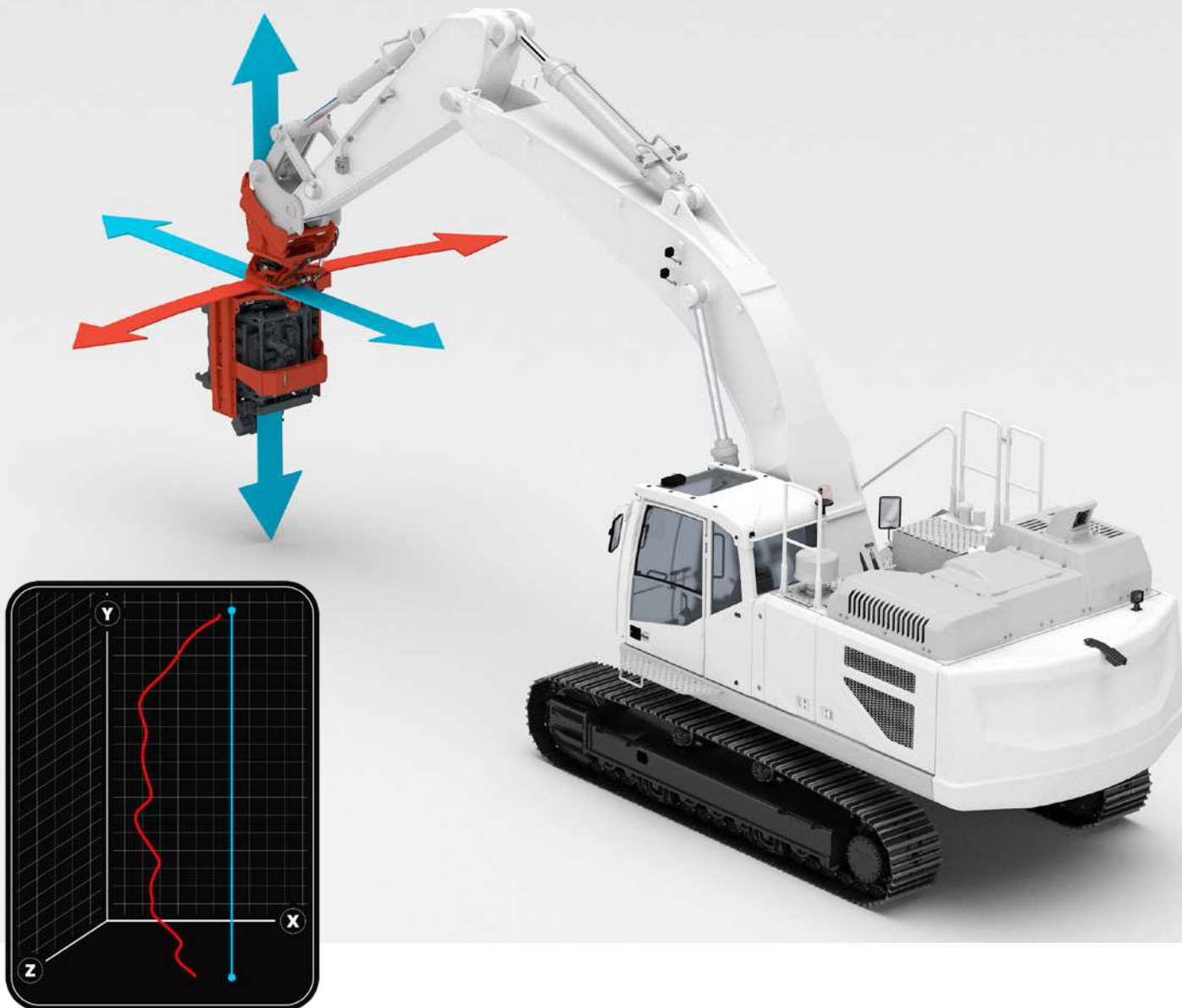
AUTOMATIC CONTROL - autoT™

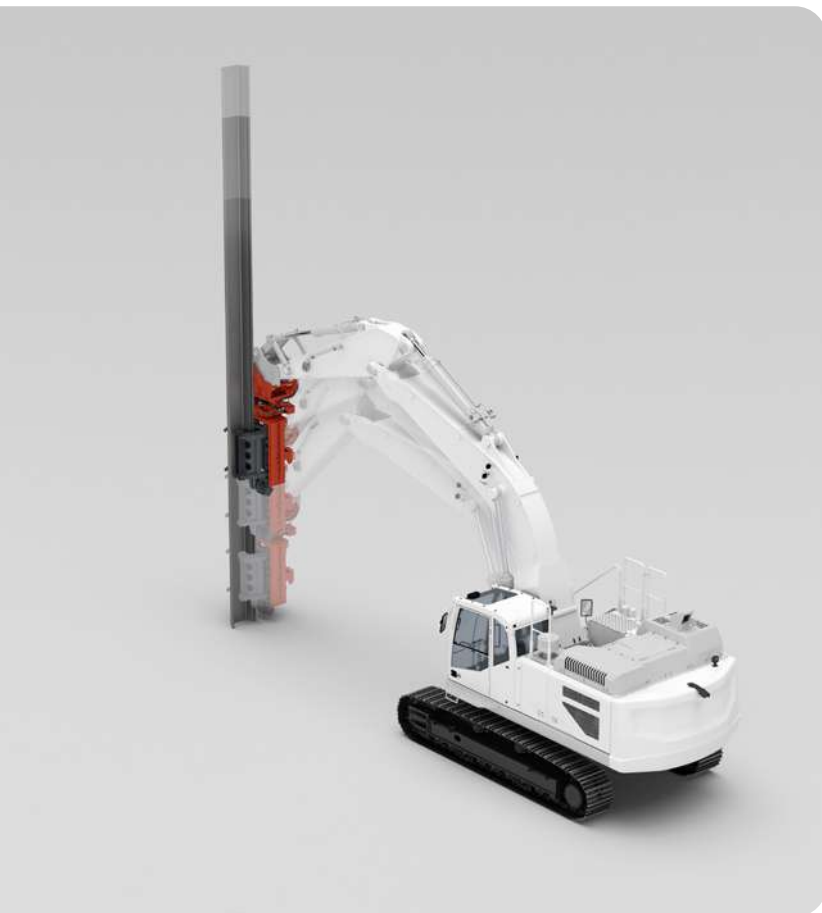
mControl+ PRO is equipped with the advanced, state-of-the-art autoT™ control feature assisting the operator in achieving a faster and more precise piling process and ultimately resulting in higher production rates and increased quality of installation. autoT™ is available for MOVAX side grip pile drivers and piling hammers.

MOVAX mControl+ PRO autoT™-tip control uses the power of computing, pre-programming and sensors in such a manner that a single action by the operator affects multiple movements at the same time. The basic functionality of the autoT™ makes the MOVAX side grip pile driver or MOVAX piling hammer travel in a straight line by taking over demanding parts of the excavator's boom control.

The mControl+ PRO tip autoT™-control feature, which makes the MOVAX side grip pile driver or MOVAX piling hammer travel vertically in a straight line, can principally be divided into two parts: Vertical Tip Control [Y-AXIS] and Horizontal Tip Control [X-AXIS].

The autoT™ functionality itself is based on angle sensors mounted onto the carrier's boom and stick, and the MOVAX side grip pile driver or piling hammer, and proportional pilot control of the excavator's auxiliary hydraulics.





Vertical movement with a stationary excavator.

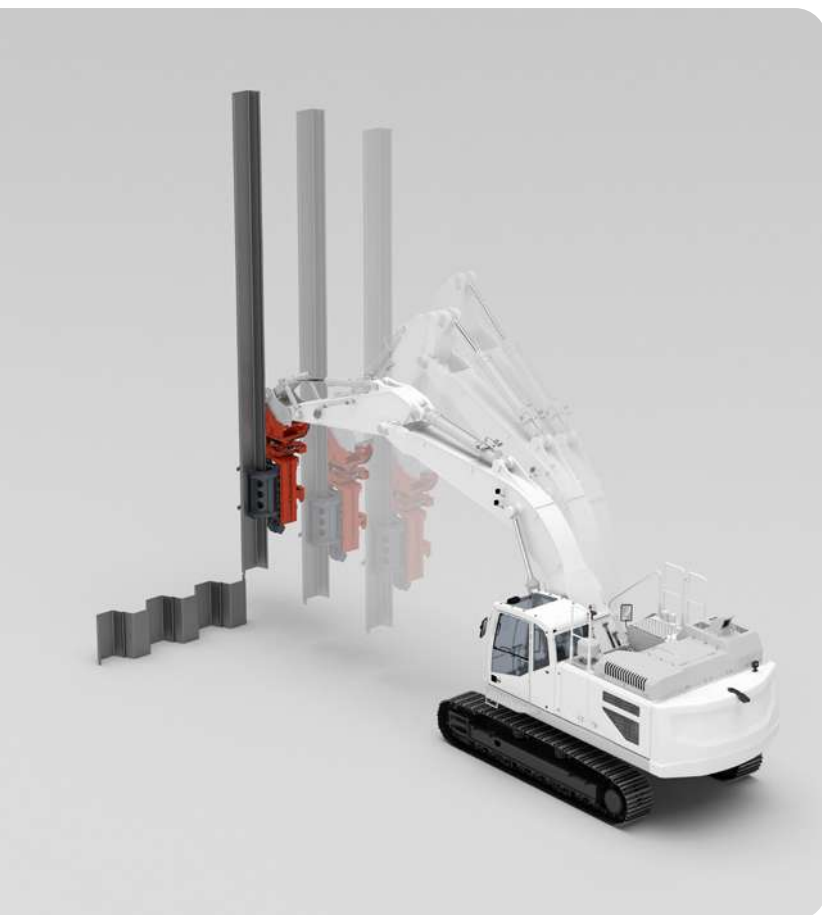
autoT™ - automatic control, Y-AXIS

The operator can pilot the boom assembly of the excavator in both directions, up and down, with a single control grip roller command – with a horizontally constant distance position, and the MOVAX side grip pile driver or MOVAX piling hammer parallel to the pile at all times.

The speed of the action can be adjusted fly-by with the proportional roller when the movement occurs.

Highly accurate calibrations can be done in the mControl+Pro application, based on operator preference.

The autoT™ -feature is used when driving or extracting piles with the MOVAX Side grip pile driver, or to change the position of the MOVAX side grip pile driver along the pile for the purpose of re-gripping the pile.



Horizontal movement with a stationary excavator.

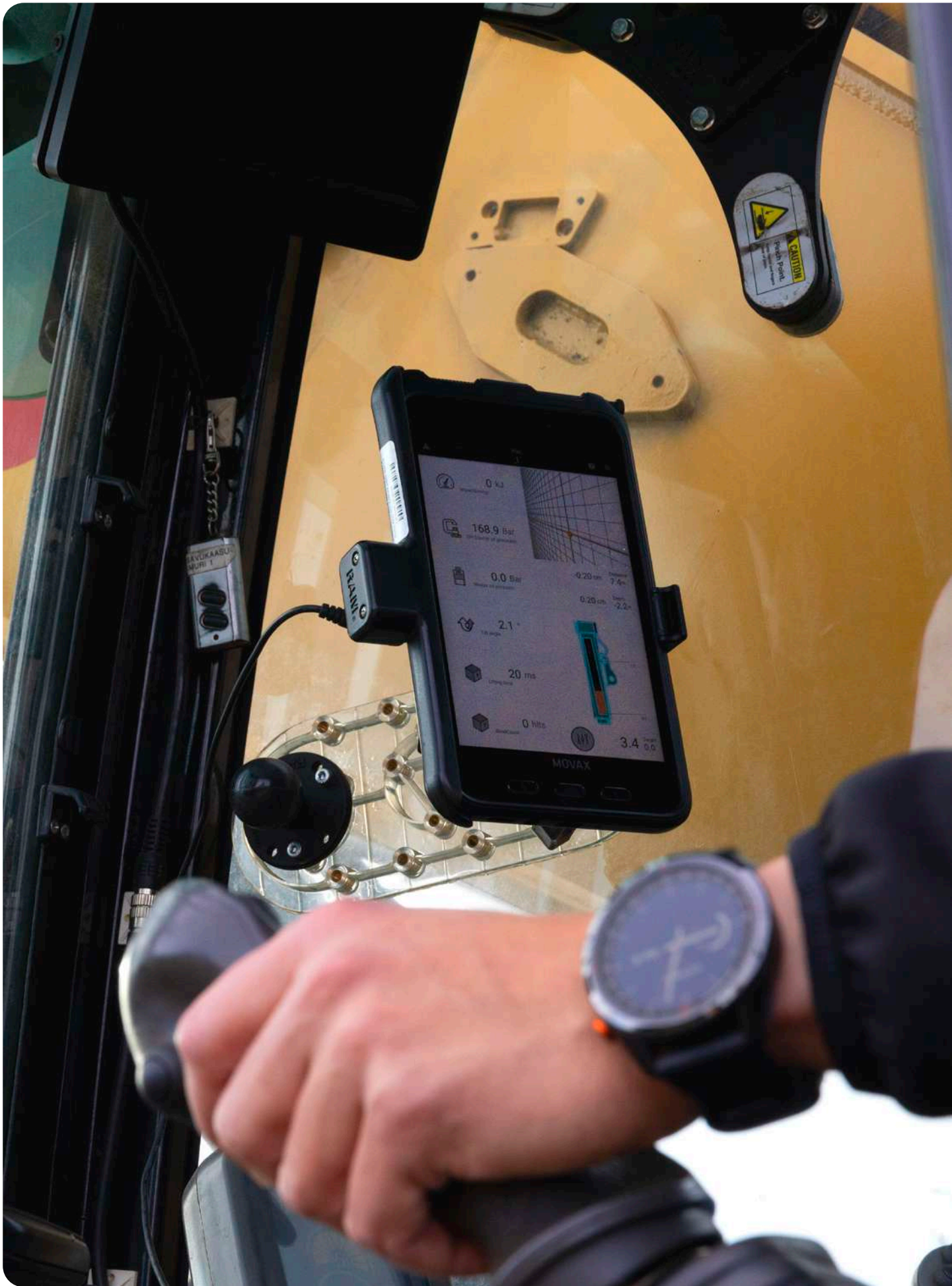
autoT™ - automatic control, X-AXIS

The operator can pilot the boom assembly of the excavator in both directions, forward and backwards, with a single control grip roller command – with a horizontally constant distance position, and the MOVAX side grip pile driver or MOVAX piling hammer parallel to the pile at all times.

The speed of the action can be adjusted fly-by with proportional roller when the movement occurs.

Highly accurate calibrations can be done in mControl+Pro application, based on operator preference.

The autoT™ -feature is used when accurate and steady horizontal movement is required – a particularly good example is sheet pile pitching: Guiding the pile into the lock insert is faster when the MOVAX side grip pile driver and the pile are in zero level and the MOVAX side grip pile driver motion only happens in the X-axis of the coordinate system.



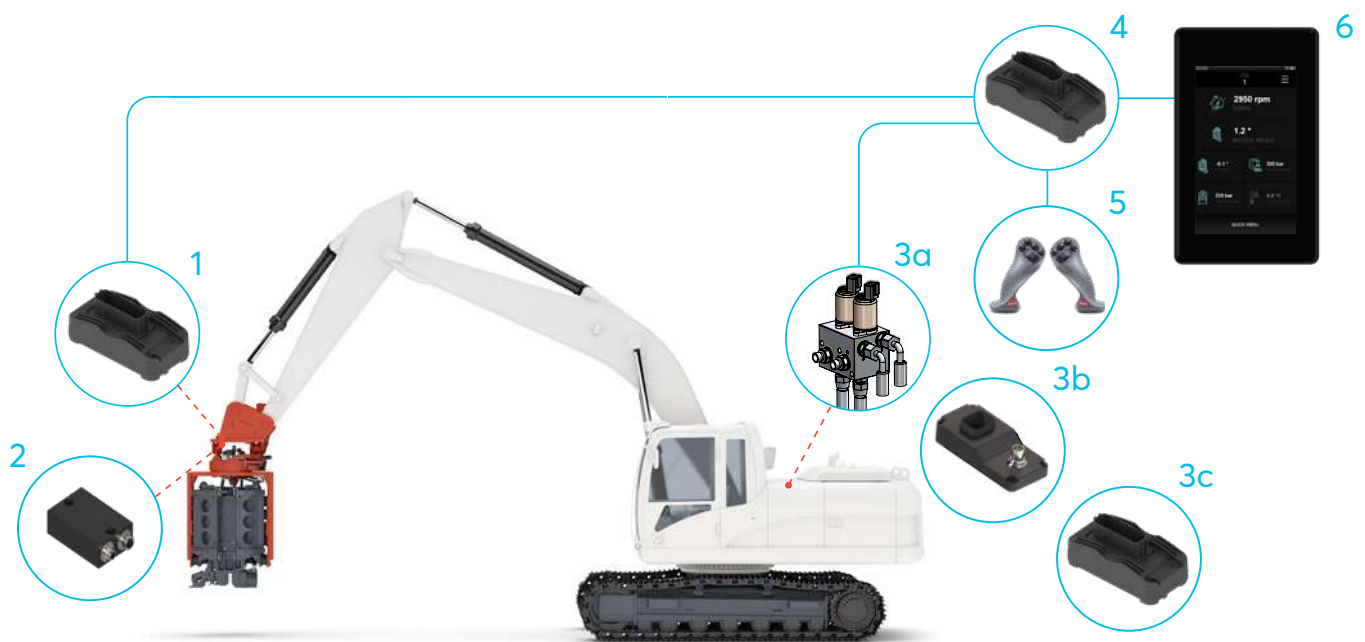
MOVAX CONTROL SYSTEM

mControl+ LITE

The **mControl+ LITE** is a state-of-the-art control system which utilises either proportional pilot valves, a PWM controller or a CAN pilot circuit/interface for the control of the excavator's auxiliary hydraulics.

The mControl+ LITE is installed onto the excavator without making any changes to the original functionality of the excavator whatsoever. mControl+ LITE is utilised to control all MOVAX piling equipment, including side grip pile drivers, piling hammers, piling drills and manipulators.

mControl+ LITE provides basic information about the operation thus assisting the operator in the piling process.



1. MOVAX module (MXM) / 2. MOVAX angle sensor (MXS) / 3. Pilot circuit control a) hydraulic valve block, b) PWM control c) CAN interface / 4. Excavator module (EXM) / 5. Control grips / 6. mControl+ LITE display

The mControl+ LITE is installed onto the excavator without making any changes to the original functionality of the excavator whatsoever. mControl+ LITE is utilised to control all MOVAX piling equipment, including side grip pile drivers, piling hammers, piling drills and manipulators.

FEATURES

Display

The mControl+ LITE is equipped with an independent 5" display.

Control grips

The mControl+ LITE is equipped with ergonomic control grips with multiple rollers and buttons which allow complete operation with a single grip. The control grips include extra buttons and rollers for accommodating functions from the excavator's original handles.

Control modules

mControl+ LITE is equipped with two electronic control modules, one Excavator module (EXM) and one MOVAX module (MXM). The excavator cab-mounted EXM controls the excavator's auxiliary hydraulics with either proportional valves, a PWM controller or a CAN bus control circuit. The type of pilot circuit control is dependent on the excavator brand and model. The MXM, installed and delivered with the MOVAX equipment, controls the hydraulic valves on the MOVAX piling equipment, Multi-tool piling leaders and Column stabilisation leaders, and monitors the operation with angle- and pressure sensors.

NOTE!

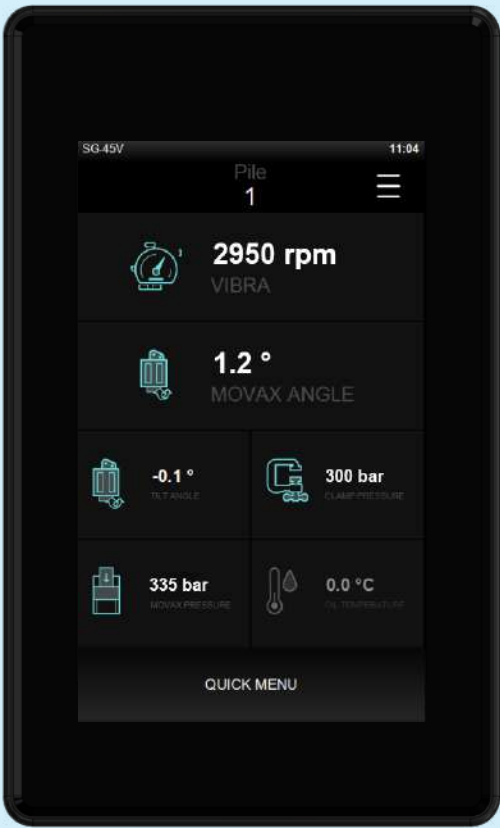
MOVAX piling equipment are always supplied with the MOVAX module factory installed.

OPTIONS

mControl+ LITE is available with the following options:

Information	Software licenses for mFleetManagement
Control grips	Ergonomic control grips with 3-rollers
autoT™ -automatic control	Upgrade kit for upgrading the mControl+ LITE to mControl+ PRO

Update kits are available to connect existing MOVAX side grip pile drivers and piling hammers to mControl+ LITE.



Control grips



Angle sensor



PWM module

PRODUCTS & SERVICES

MOVAX INFORMATION MANAGEMENT SYSTEM (MIMS)

The MOVAX Information Management System (MIMS) provides essential information about the piling process and the pile installation, and about the MOVAX piling equipment itself. The information is intended for maintenance personnel and for the owners, operators and engineers designing and overseeing a piling or foundation project.

The goal is increase the availability of the MOVAX piling equipment and to improve the quality of the piling project and to save costs in reporting and testing.

The **MIMS hardware (HW)** which is included with mControl+ PRO and optional in case of mControl+ LITE is provided for data collection, initial storage and transfer. The MIMS HW is connected to mControl+ from which the data is collected automatically.

MIMS data suites (SW) provide detailed real-time information, documentation and reports which are accessed through a web-based user interface



mFleet Management

provides essential information about the operation, performance and condition of the MOVAX piling equipment. mFleetManagement is designed to assist in troubleshooting, diagnostics and analysis - and for fast and efficient customer technical support.

mLogbook

is a documentation and reporting tool which provides essential data related to the piling process and the piling or foundation project.

ID	Pile name	Date	Pile type	Pile dimensions (mm)	Pile length (m)	Total depth (m)	Depth (m)	Blows	Depth (m)	Blows	Energy	Cost
01	1	2017-03-09 10:06	Sheet pile	600	12	7.817	6.142	56	1.734	10710	12526.18800	6.2010.0.0
02	2	2017-03-09 13:58	Sheet pile	600	12	8.274	6.186	90	1.685	10710	12526.18800	6.2010.0.0
03	3	2017-03-09 14:38	Sheet pile	600	12	11.826	18.121	930	1.805	10710	12526.18800	6.2010.0.0
04	4	2017-03-09 14:40	Sheet pile	600	12	7.982	6.167	48	0.905	10710	12526.18800	6.2010.0.0
05	5	2017-03-09 14:48	Sheet pile	600	12	6.907	6.703	36	2.184	10710	12526.18800	6.2010.0.0
06	6	2017-03-09 15:08	Sheet pile	600	12	6.368	5.920	13	0.447	10710	12526.18800	6.2010.0.0
07	7	2017-03-09 15:18	Sheet pile	600	12	9.956	9.168	86	0.786	10710	12526.18800	6.2010.0.0
08	8	2017-03-09 15:37	Sheet pile	600	12	6.640	6.527	208	2.214	10710	12526.18800	6.2010.0.0

MIMS HARDWARE

DATA COLLECTION AND -TRANSFER

The MIMS hardware (HW), which is connected to the MOVAX Control System and installed onto the excavator (or other carrier) is utilised for automatic data collection and data transfer. The same HW is utilised for all MIMS data suites (SW), The MIMS HW includes a fully integrated 3G/GPS-system providing the remote connection as well as the general location of the excavator and the MOVAX piling equipment.

The MIMS module will automatically recognize the specific MOVAX piling equipment (SG vibratory pile driver, DH piling hammer, MPL Multi-tool piling leader etc.) connected to the excavator and collect the data accordingly.

MOVAX Information Management System is compatible with third-party global positioning systems such as Novatron/MOBA, Trimble and Leica. When connected to a third party global positioning system it is possible to obtain also the exact location of the pile to be driven. In addition, independent global positioning sensors (RTK GNSS) compatible with the MOVAX Information Management System are also available for pile specific precise GPS information.

The MIMS HW includes the following;

- MOVAX MIMS module (MRM) with GPS and 3G- antennas
- Cabling, connectors
- Mounting kit



DATA STORAGE AND USER INTERFACE

The information is sent to and stored in the MOVAX mCLOUD data storage. The information stored in the mCLOUD data storage is accessed through a web-based user interface. The information can also be accessed through the mFleetCare app.



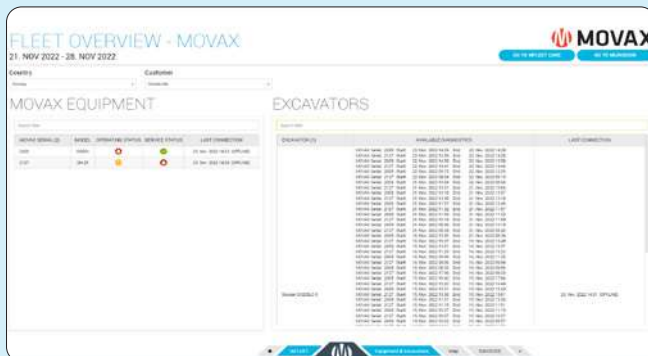
MOVAX Information Management System 'log-in'

mFleet Management

The mFleetManagement-data suite provides basic operational, real-time information about the MOVAX piling equipment as well as the general global positioning (GPS) data of the MOVAX piling equipment and the excavator it is connected to. The information can be accessed remotely for adjustment and calibration – and for instance to provide operational guidance and support – as well as for trouble-shooting and quick problem-solving.

mFleetManagement also provides information for the prediction of maintenance requirements thus enabling preventive maintenance with the intent to maximize the availability of the MOVAX piling equipment.

The information can furthermore be utilised for instance for invoicing purposes, etc.



The **'Fleet Overview'** presents an overview of all the MOVAX piling equipment including all the excavators the MOVAX piling equipment is connected to. The 'Fleet overview' also provides a quick overview of the operating and service status of the entire fleet.

The MOVAX piling equipment to be monitored or analysed in more detail is selected from the 'Fleet Overview'.

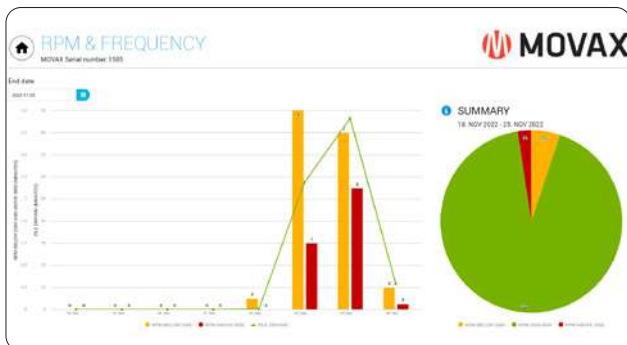
The main **'Unit Overview'** provides the general information about the specific MOVAX piling equipment in question, its general geographical location, overall utilization hours, operating and service status.

More detailed information is obtained by moving from the 'unit overview' to the ready-prepared reports.

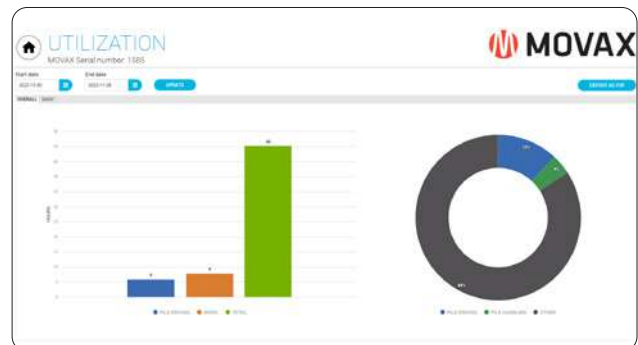


REPORTS

The operational information is presented in an illustrative, easy-to-view and -browse format. The point-in-time or time interval to be reviewed or analysed can be selected flexibly. The information presented is providing a fast and flexibly overview of the operation, how the unit has been operated – especially in regards to the limits of some of the key operational parameters.



SG rpm/frequency

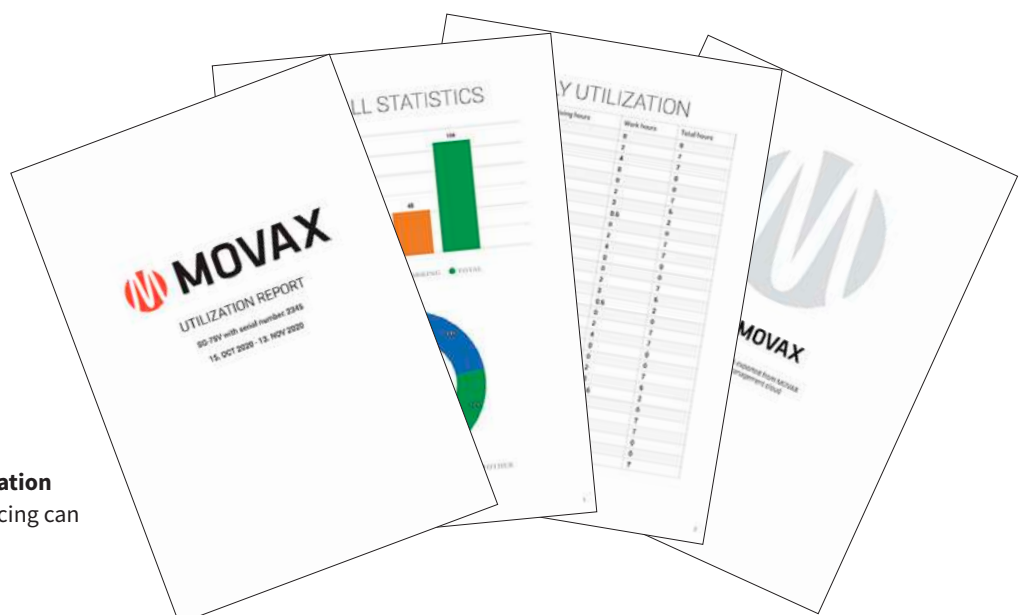


SG utilization

The ready-made reports include the following:

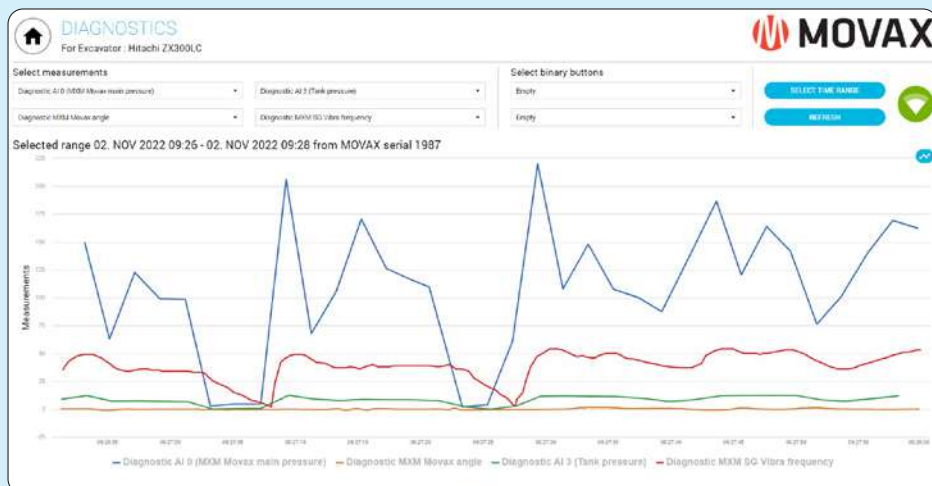
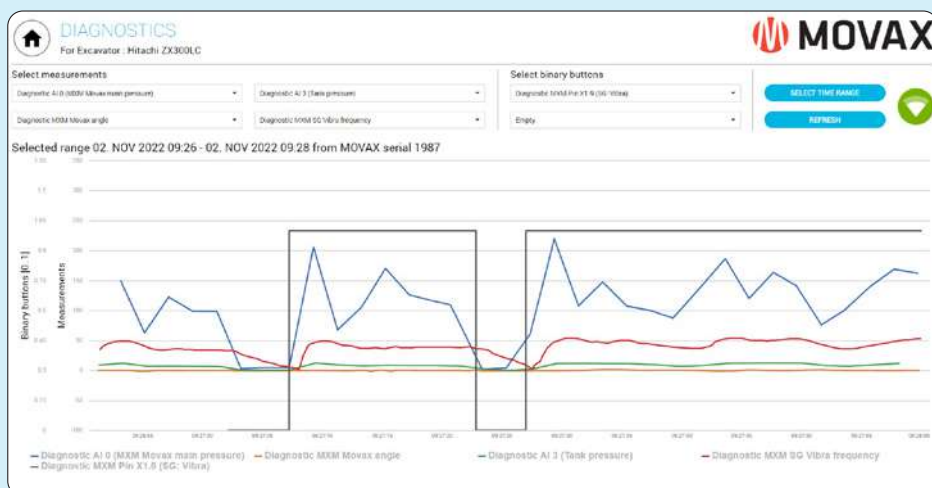
MOVAX SG Side grip pile drivers	MOVAX DH Piling hammers	MOVAX PA Pre-augers	MOVAX KB/TAD Piling drills	MOVAX MPL Multi-tool piling leaders
Utilization hours	Utilization hours	Utilization hours	Utilization hours	Utilization hours
RPM/Frequency	Back pressure	Working pressure	RPM	Working pressure
Working pressure	Refusal*	Back pressure	Working pressure	Back pressure
Back pressure	Service checks	Drain pressure	Back pressure	Service checks
Drain pressure		Service checks	Drain pressure	
Clamp pressure			Service checks	
Refusal*				
Service checks				

*requires mControl+ PRO



Based on for instance the '**Utilization hours**' a pdf-document for invoicing can be generated.

With the mFleetManagement it is possible to prevent failures, predict maintenance requirements and analyse and solve any unexpected problems. mFleetManagement includes versatile tools which enables analysis of the entire work cycle and makes it possible to find deviations and abnormalities. The amount of data varies based on the MOVAX piling equipment in question.

[illegible]

mLOGBOOK

mLogbook is a documentation and reporting tool which provides essential data related to the piling process and the piling or foundation project.

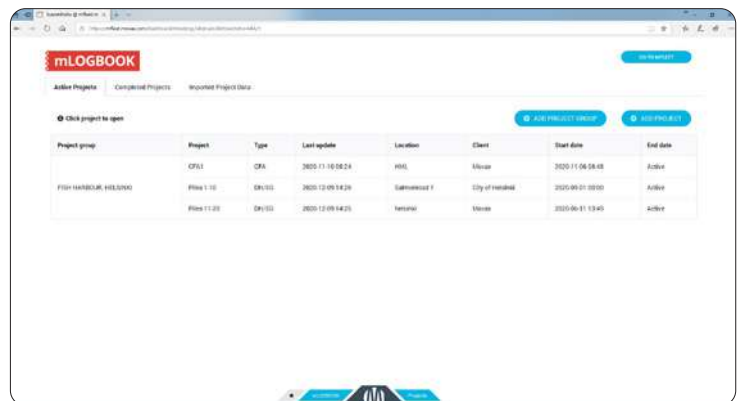
The piling information is collected by the MOVAX Control System and stored in the MOVAX Control System's excavator module. To report the piling works the operator only has to input the pile number, the system will take care of the rest. Data concerning site and pile information is added by the user (engineer or equal) and the system will generate automatically illustrative, ready-made reports - including both measured and calculated data - which provide essential information about the piling process and its quality.

mLogbook is compatible with commonly used global positioning systems such as Trimble, Novatron and Leica which adds also the positioning data to the pile reports. Optionally independent global positioning sensors (RTK GNSS) can also be provided to allow for the addition of the exact pile positioning data without a third party global positioning system.

PROJECT OVERVIEW

Specific reports are generated for MOVAX piling equipment including MOVAX side grip pile drivers, MOVAX piling hammers, MOVAX piling drills and MOVAX multi-tool piling leaders including the associated tooling,

The 'Project overview' provides the information of all main projects and also sub-projects.



The screenshot shows the mLOGBOOK web application interface. At the top, there's a navigation bar with 'Active Projects', 'Completed Projects', and 'Important Project Data'. Below this, there's a table titled 'Project group' with columns for Project, Type, Last update, Location, Client, Start date, and End date. The table lists three projects: 'CP11', 'Pile 1.10', and 'Pile 1.11'. Each project has a corresponding 'Last update' date and 'Start date'.

Project group	Project	Type	Last update	Location	Client	Start date	End date
	CP11	CPA	2020-11-10 08:28	HSL	Möller	2020-11-04 08:48	Active
	Pile 1.10	DP/10	2020-12-09 14:29	Garmisch 1	City of Garmisch	2020-09-01 10:00	Active
	Pile 1.11	DP/10	2020-12-09 14:25	Garmisch	Möller	2020-09-01 13:40	Active



SG PROJECT REPORT

The mLogbook 'project report' includes all the information related to the piling or foundation project including pile type & dimensions, the depth to which the pile has been driven with the various tools and for instance in the case of load bearing piles also information related to the pile set.

Different parameters are reported for the different MOVAX piling equipment.

mLOGBOOK

PROJECT REPORT SG

Main project	Bridge construction	MOVAX piling equipment	SG-60, sn1462	Operator	Tom Jackson
Sub project	SE Exit			Start date	2020-05-12
Location	Islington, London	Pile type	Sheet piles	End date	2020-05-31
Customer	Road constructors ltd	Note!			
Contract number	923000-A1				

Pile#	Position data	Pile type	Pile dimensions [mm]	Pile length [m]	Total depth [m]	Depth [m]	Angle (avg) [°]	Date
1	53°26'54.036"N 2°12'47.012"W	AZ 13-770	770	12	7.877	6.143	0,0	2020-05-13 13:25
2	53°26'54.037"N 2°12'47.012"W	AZ 13-770	770	12	9.274	8.189	-0,1	2020-05-13 13:58
3	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,4	2020-05-13 14:38
4	53°26'54.039"N 2°12'47.012"W	AZ 13-770	770	12	7.062	6.157	0,2	2020-05-13 14:58
5	53°26'54.040"N 2°12'47.012"W	AZ 13-770	770	12	6.907	4.763	0,0	2020-05-13 15:05
6	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,0	2020-05-13 15:19
7	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	-0,3	2020-05-13 14:38
8	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,0	2020-05-13 15:19
9	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,1	2020-05-13 14:38
10	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	-0,1	2020-05-13 15:19
11	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,2	2020-05-13 14:38
12	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,0	2020-05-13 15:19
13	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,1	2020-05-13 14:38
14	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	-0,1	2020-05-13 15:19
15	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,2	2020-05-13 14:38
16	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,2	2020-05-13 15:19
17	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,3	2020-05-13 14:38
18	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,1	2020-05-13 15:19
19	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,1	2020-05-13 14:38
20	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	5.921	0,3	2020-05-13 15:19
21	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	10.121	0,0	2020-05-13 14:38

The individual, pile specific reports for the MOVAX SG include the following information:
Penetration rate, Centrifugal force, Working pressure, Eccentric moment, RPM, Inclination

DH PROJECT REPORT

The mLogbook 'project report' includes all the information related to the piling or foundation project including pile type & dimensions, the depth to which the pile has been driven with the various tools and for instance in the case of load bearing piles also information related to the pile set.

Different parameters are reported for the different MOVAX piling equipment.

mLOGBOOK

PROJECT REPORT DH

Main project	Bridge construction	MOVAX piling equipment	DH-25, sn1574	Operator	Tom Jackson
Sub project	SE Exit			Start date	2020-05-12
Location	Islington, London	Pile type	Sheet piles	End date	2020-05-31
Customer	Road constructors ltd	Note!			
Contract number	923000-A1				

Pile#	Position data	Pile type	Pile dimensions [mm]	Pile length [m]	Total depth [m]	Depth DH [m]	Blows DH [no]	Angle (avg) [°]	Pile set criterion			Date
									Energy [kJm]	Blows	Set [mm]	
1	53°26'54.036"N 2°12'47.012"W	AZ 13-770	770	12	7.877	1.734	56	0,0	21,9/20	10/10	19,1/20	2020-05-13 13:25
2	53°26'54.037"N 2°12'47.012"W	AZ 13-770	770	12	9.274	1.085	90	-0,1	20,8/20	10/10	13,6/20	2020-05-13 13:58
3	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,4	20,0/20	10/10	20,2/20	2020-05-13 14:38
4	53°26'54.039"N 2°12'47.012"W	AZ 13-770	770	12	7.062	0.905	64	0,2	21,3/20	10/10	14,8/20	2020-05-13 14:58
5	53°26'54.040"N 2°12'47.012"W	AZ 13-770	770	12	6.907	2.144	86	0,0	21,5/20	8/10	17,7/20	2020-05-13 15:05
6	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,0	20,1/20	10/10	17,6/20	2020-05-13 15:19
7	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	-0,3	22,0/20	10/10	18,9/20	2020-05-13 14:38
8	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,0	22,2/20	9/10	16,3/20	2020-05-13 15:19
9	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,1	21,1/20	10/10	14,6/20	2020-05-13 14:38
10	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	-0,1	22,3/20	10/10	18,6/20	2020-05-13 15:19
11	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,2	22,2/20	10/10	17,1/20	2020-05-13 14:38
12	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,0	21,8/20	10/10	17,7/20	2020-05-13 15:19
13	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,1	21,2/20	10/10	15,3/20	2020-05-13 14:38
14	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	-0,1	20,1/20	6/10	17,4/20	2020-05-13 15:19
15	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,2	21,1/20	10/10	14,6/20	2020-05-13 14:38
16	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,2	22,0/20	10/10	15,4/20	2020-05-13 15:19
17	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,3	21,9/20	10/10	21,0/20	2020-05-13 14:38
18	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,1	19,7/20	10/10	13,1/20	2020-05-13 15:19
19	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,1	21,6/20	10/10	13,2/20	2020-05-13 14:38
20	53°26'54.041"N 2°12'47.012"W	AZ 13-770	770	12	6.368	0.447	13	0,3	21,7/20	10/10	20,1/20	2020-05-13 15:19
21	53°26'54.038"N 2°12'47.012"W	AZ 13-770	770	12	11.926	1.805	125	0,0	22,4/20	5/10	14,8/20	2020-05-13 14:38

The individual, pile specific reports for the MOVAX DH include the following information:
Penetration rate, Rate per blow, Drop height, Energy, Inclination

CFA PROJECT REPORT

The mLogbook **'project report'** includes all the information related to the piling or foundation project including pile type & dimensions, the depth to which the pile has been driven with the various tools and for instance in the case of load bearing piles also information related to the pile set.

Different parameters are reported for the different MOVAX piling equipment.

mLOGBOOK

PROJECT REPORT

Main project	Bridge construction	MOVAX piling equipment	MPL-400/CFA, sn 1255	Operator	Tom Jackson
Sub project	SE Exit			Start date	2020-05-12
Location	Islington, London	Pile type	CFA	End date	2020-05-31
Customer	Road constructors ltd	Note!			
Contract number	923000-A1				

Pile#	Position data	Pile type	Pile dimensions [mm]	Pile depth [m]	Angle [°]	Torque (average) [kNm]	Concrete volume [m³]	Concrete pressure (average) [bar]	Start time	End time	Elapsed time	Date
1	53°26'54.036"N 2°12'47.012"W	CFA	400	10	0,1	41,1	5,39	68	12:04:40	12:45:34	0:40:54	2020-05-12
2	53°26'54.037"N 2°12'47.012"W	CFA	400	10	-0,3	36,2	5,55	37	8:42:24	8:55:55	0:13:31	2020-05-13
3	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,4	36,4	5,33	21	9:44:22	9:59:20	0:14:58	2020-05-13
4	53°26'54.039"N 2°12'47.012"W	CFA	400	10	0,1	35,5	5,72	48	10:55:33	11:34:22	0:38:49	2020-05-13
5	53°26'54.040"N 2°12'47.012"W	CFA	400	10	-0,1	38,9	5,11	24	12:04:40	12:45:34	0:40:54	2020-05-13
6	53°26'54.041"N 2°12'47.012"W	CFA	400	10	0,2	39,7	5,64	28	13:07:22	13:30:22	0:23:00	2020-05-13
7	53°26'54.038"N 2°12'47.012"W	CFA	400	10	0,4	36,8	5,21	79	13:45:55	13:59:22	0:13:27	2020-05-13
8	53°26'54.041"N 2°12'47.012"W	CFA	400	10	-0,2	36,3	5,03	27	14:15:00	14:26:22	0:11:22	2020-05-13
9	53°26'54.038"N 2°12'47.012"W	CFA	400	10	0,0	39,9	5,20	73	14:47:44	15:13:20	0:25:36	2020-05-13
10	53°26'54.041"N 2°12'47.012"W	CFA	400	10	0,0	37,6	5,79	64	14:15:00	14:26:22	0:11:22	2020-05-14
11	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,3	36,5	5,87	33	13:07:22	13:30:22	0:23:00	2020-05-15
12	53°26'54.041"N 2°12'47.012"W	CFA	400	10	0,1	37,4	5,73	60	12:04:40	12:45:34	0:40:54	2020-05-16
13	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,3	39,3	5,24	59	8:42:24	8:55:55	0:13:31	2020-05-17
14	53°26'54.041"N 2°12'47.012"W	CFA	400	10	-0,1	41,0	5,91	76	9:44:22	9:59:20	0:14:58	2020-05-18
15	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,3	41,6	5,44	58	10:55:33	11:34:22	0:38:49	2020-05-18
16	53°26'54.041"N 2°12'47.012"W	CFA	400	10	-0,1	40,1	5,44	78	12:04:40	12:45:34	0:40:54	2020-05-25
17	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,1	38,2	5,67	75	8:42:24	8:55:55	0:13:31	2020-05-26
18	53°26'54.041"N 2°12'47.012"W	CFA	400	10	0,1	37,4	5,41	30	9:44:22	9:59:20	0:14:58	2020-05-26
19	53°26'54.038"N 2°12'47.012"W	CFA	400	10	-0,1	37,6	5,07	35	10:55:33	11:34:22	0:38:49	2020-05-26

The individual, pile specific reports for the MOVAX MPL CFA include the following information:

Position data, Pile type, Pile dimensions, Pile depth, Angle, Torque, Concrete volume, Concrete pressure, Start time, End time, Elapsed time, Date

MSL PROJECT REPORT

The mLogbook 'project report' includes all the information related to the piling or foundation project including pile type & dimensions, the depth to which the pile has been driven with the various tools and for instance in the case of load bearing piles also information related to the pile set.

Different parameters are reported for the different MOVAX piling equipment.

mLOGBOOK

PROJECT REPORT Column stabilisation

Main project	Bridge construction	Stabilization method	column stabilization	Operator	Tom Jackson
Sub project	SE Exit	Binder material	Cement	Start date	2020-05-12
Location	Islington, London	Jobsite data (measured) Total mass 2328 kg Total volume 32 m³		End date	2020-05-31
Customer	Road constructors ltd			Note!	
Contract number	923000-A1				

Column #	Column ID	Position data	PF ID	Section dimensions [mm]	Total depth [m]	Binder [kg/m³]	Total amount [kg]	Total volume [m³]	Pressure [bar]	Flow [kg/s]	Feeding time [hh:min:ss]	Mixing time [hh:min:ss]	Date
1	1,1	53°26'54.036"N 2°12'47.012"W	K7R234	800	15	88	530	5,39	0,2	2,9	0:07:45	0:08:34	2020-05-12
2	1,2	53°26'54.037"N 2°12'47.012"W	K7R234	800	15	89	510	5,55	0,3	2,7	0:06:45	0:07:34	2020-05-13
3	1,3	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	87	540	5,33	0,2	3,1	0:08:34	0:07:45	2020-05-13
4	1,4	53°26'54.039"N 2°12'47.012"W	K7R234	800	15	85	525	5,72	0,4	3,2	0:07:34	0:06:45	2020-05-13
5	1,5	53°26'54.040"N 2°12'47.012"W	K7R234	800	15	86	530	5,11	0,2	3,1	0:07:45	0:08:34	2020-05-13
6	1,6	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	83	525	5,64	0,2	3,3	0:06:45	0:08:34	2020-05-13
7	1,7	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	84	530	5,21	0,2	2,6	0:08:34	0:07:34	2020-05-13
8	2,1	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	89	510	5,03	0,3	2,9	0:07:34	0:07:45	2020-05-13
9	2,2	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	88	540	5,20	0,2	2,9	0:07:45	0:06:45	2020-05-13
10	2,3	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	89	525	5,79	0,4	2,7	0:06:45	0:08:34	2020-05-14
11	2,4	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	87	530	5,87	0,2	3,1	0:08:34	0:08:34	2020-05-15
12	2,5	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	85	525	5,73	0,2	3,2	0:07:34	0:07:34	2020-05-16
13	2,6	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	86	530	5,24	0,2	3,1	0:07:45	0:07:45	2020-05-17
14	2,7	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	83	510	5,91	0,3	3,3	0:06:45	0:06:45	2020-05-18
15	3,1	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	84	540	5,44	0,2	2,6	0:08:34	0:08:34	2020-05-18
16	3,2	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	89	525	5,44	0,4	2,9	0:07:34	0:08:34	2020-05-25
17	3,3	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	88	530	5,67	0,2	2,9	0:07:45	0:07:34	2020-05-26
18	3,4	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	89	525	5,41	0,2	2,7	0:06:45	0:07:45	2020-05-26
19	3,5	53°26'54.038"N 2°12'47.012"W	K7R234	800	15	88	530	5,07	0,2	3,1	0:08:34	0:06:45	2020-05-26
20	3,6	53°26'54.041"N 2°12'47.012"W	K7R234	800	15	89	510	5,86	0,3	3,2	0:07:34	0:08:34	2020-05-26

The individual, pile specific reports for the MOVAX MSL include the following information:

Position data, Pile type, Pile dimensions, Pile depth, Angle, Torque, Binder amount, Feed pressure
Ascent rate, Start time, End time, Elapsed time, Date

SG PILE REPORT

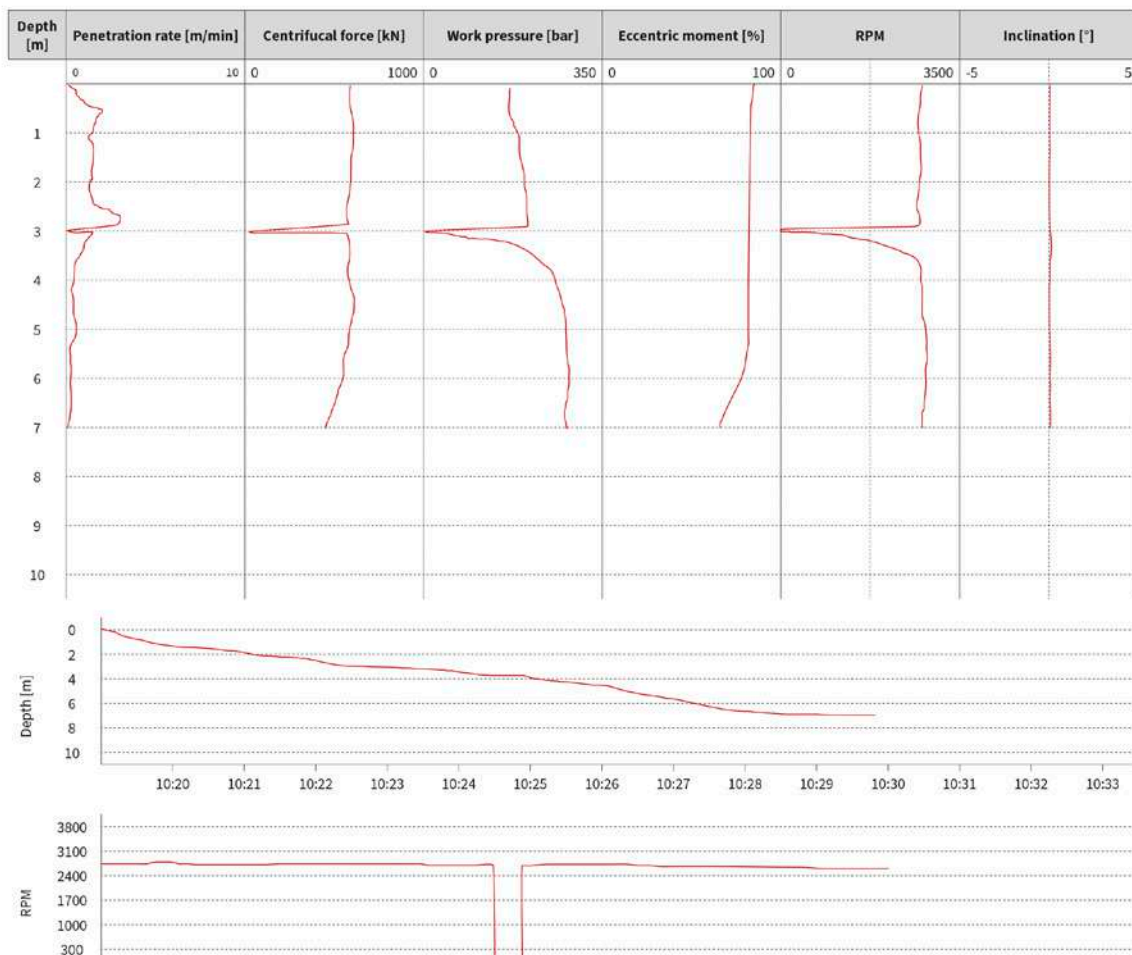
Based on the project report it is possible to generate pile specific reports for each individual pile; and for each individual MOVAX piling equipment.

mLOGBOOK

PILE REPORT SG

Pile# 12

Main project	Bridge construction	Operator	Tom Jackson	MOVAX piling equipment	SG-60, sn 7354
Sub project	SE Exit	Date	2020-05-12		
Location	Islington, London	Start time	10:19:00	Piling technology	Vibratory pile driver
Customer	Road constructors ltd	End time	10:30:10	Vibration time	09:45
Contract number	923000-A1	Elapsed time	10:10	Pile type & dimensions	AZ 13-770 / 770 mm
Note!				Total depth	7.0 m



The individual, pile specific reports for MOVAX SG include the following information:
Penetration rate, Centrifugal force, Working pressure, Eccentric moment, RPM, Inclination

DH PILE REPORT

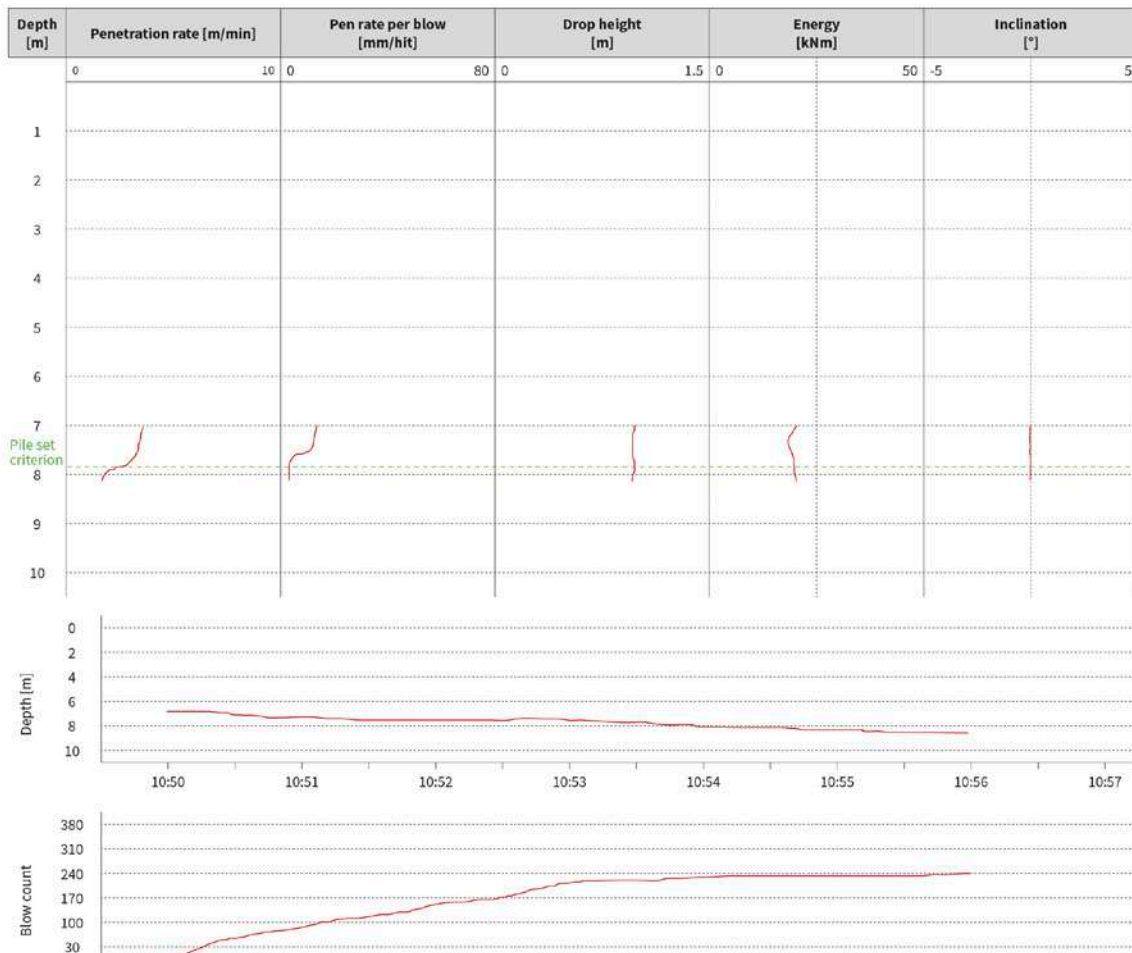
Based on the project report it is possible to generate pile specific reports for each individual pile; and for each individual MOVAX piling equipment.

mLOGBOOK

PILE REPORT DH

Pile# **12**

Main project	Bridge construction	Operator	Tom Jackson	MOVAX piling equipment	DH-25, sn 8743
Sub project	SE Exit	Date	2020-05-12		
Location	Islington, London	Start time	10:49:05	Piling technology	Hydraulic hammer
Customer	Road constructors ltd	End time	10:56:10	Blow count	240
Contract number	923000-A1	Elapsed time	07:05	Pile type & dimensions	AZ 13-770 / 770 mm
Note!				Pile type	8.1 m
				Pile set criterion	20 kJ, 10 blows, 20 mm



The individual, pile specific reports for MOVAX DH include the following information:
Penetration rate, Rate per blow, Drop height, Energy, Inclination

CFA PILE REPORT

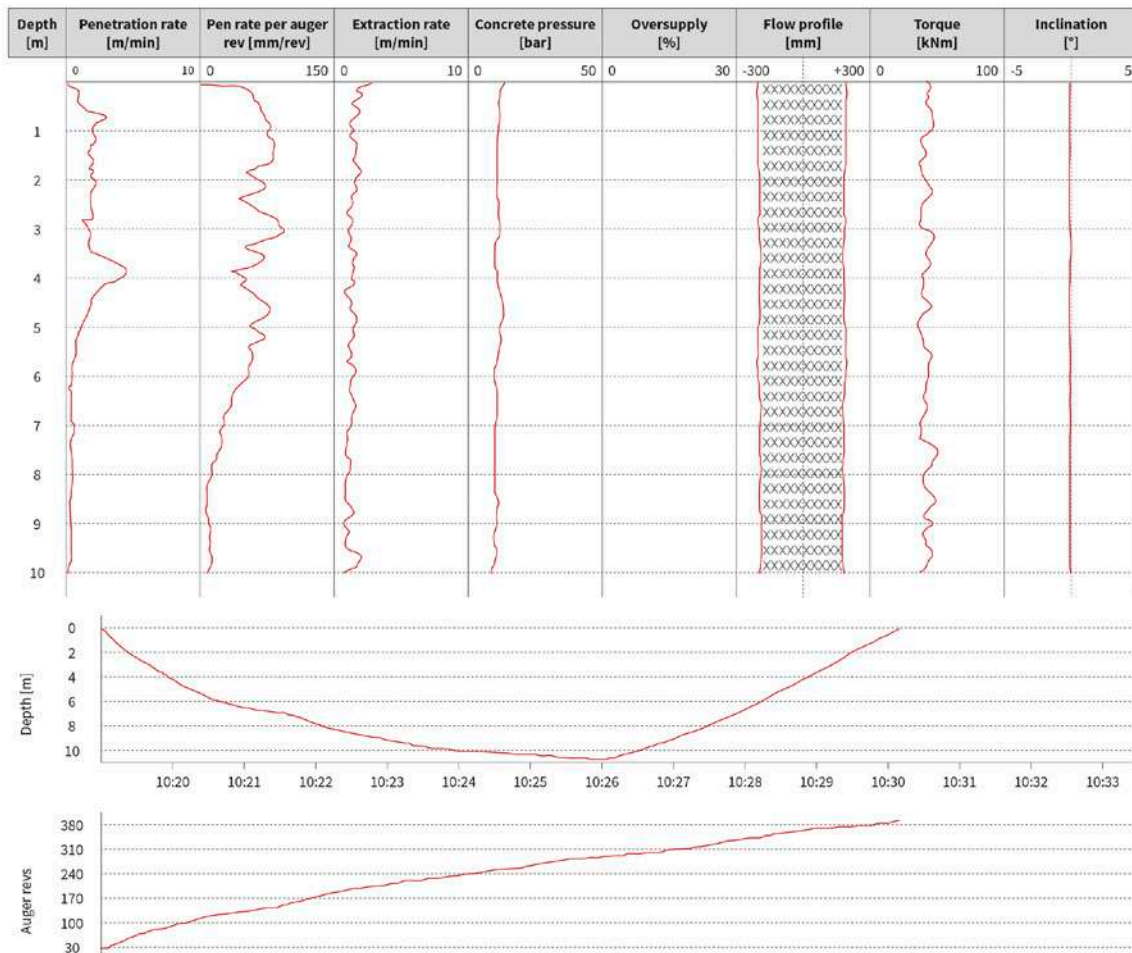
Based on the project report it is possible to generate pile specific reports for each individual pile; and for each individual MOVAX piling equipment.

mLOGBOOK

PILE REPORT CFA

Pile# **12**

Main project	Bridge construction	Operator	Tom Jackson	MOVAX piling equipment	MPL-400/CFA, sn 1255
Sub project	SE Exit	Date	2020-05-12		
Location	Islington, London	Start time	12:50:00	Pile type	CFA
Customer	Road constructors ltd	End time	12:53:10	Auger rev's	384
Contract number	923000-A1	Elapsed time	03:10	Pile dimensions/depth	dia 400 mm / 10 m
Note!				Concrete volume	6 m³
				Oversupply	25%



The individual, pile specific reports for MOVAX MPL CFA include the following information:

Position data, Pile type, Pile dimensions, Pile depth, Angle, Torque, Concrete volume, Concrete pressure, Start time, End time, Elapsed time, Date

MSL COLUMN REPORT

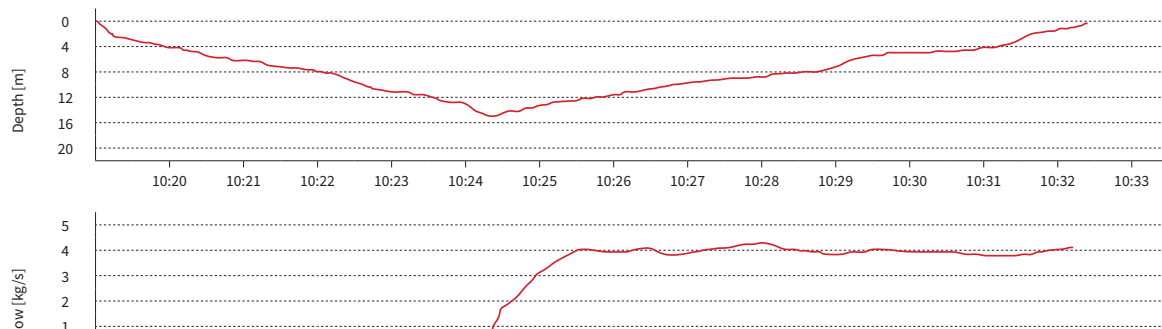
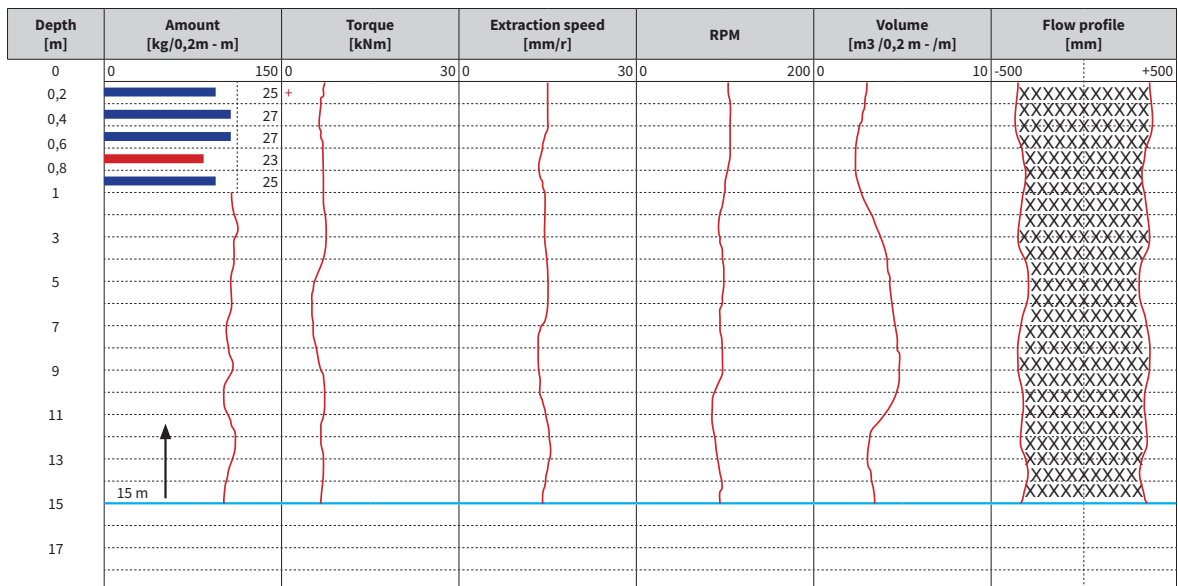
Based on the project report it is possible to generate pile specific reports for each individual pile; and for each individual MOVAX piling equipment.

mLOGBOOK

COLUMN REPORT Column stabilisation

COLUMN ID 3,4

Main project	Bridge construction	Operator	Tom Jackson	Stabilization method	column
Sub project	SE Exit	Date	2020-05-12	Total depth	15 m
Location	Islington, London	Start time	12:50:00	Total mass [kg]	525
Customer	Road constructors ltd	End time	12:53:10	Column dimension	600 mm
Contract number	923000-A1	Elapsed time	03:10	Total volume	5,34 m³
Note!					



The individual, pile specific reports for MOVAX MSL include the following information:

Position data, Pile type, Pile dimensions, Pile depth, Angle, Torque, Binder amount, Feed pressure, Ascent rate, Start time, End time, Elapsed time, Date

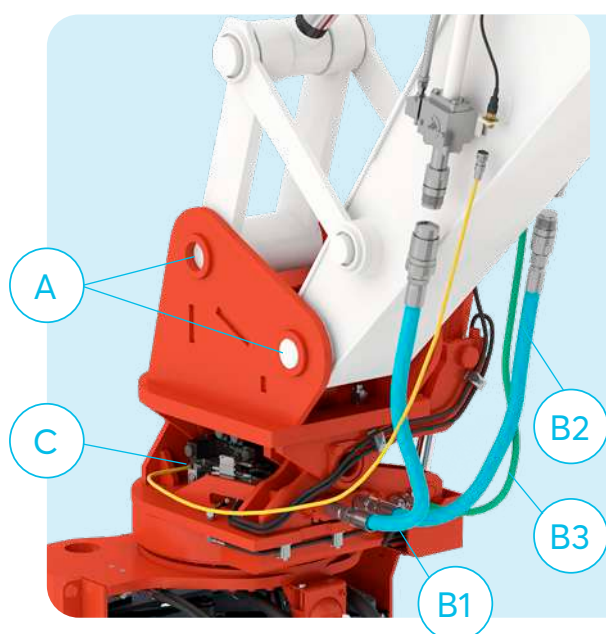
PRODUCTS & SERVICES

ADAPTERS

MOVAX piling equipment is connected to the excavator acting as carrier mechanically, hydraulically and electronically.

MOVAX Adapters are utilized to connect the MOVAX piling equipment – **SG-side grip pile drivers, DH-piling hammers, PA-pre-augers and TAD/KB-piling drills** – mechanically to the excavator. Each MOVAX piling equipment and model requires its own adapter. All adapters are furthermore excavator brand and model specific.

MOVAX Adapters are available for all types of couplers used on excavators ranging from pin connectors to mechanical and automatic quick couplers. The MOVAX Adapter is always customised for the excavator brand and model in question.



CONNECTIONS

- A. Mechanical connection
- B. Hydraulic connection
 - B1 Pressure
 - B2 (tank) Return
 - B3 Drain
- C. Electrical connection

PIN-CONNECTORS

Pin connectors consist of a welded adapter bracket with removable pins (Note! Pins are not included in Movax Oy's delivery, unless separately agreed upon). When connecting the MOVAX piling equipment to the excavator all mechanical, hydraulic and electrical connections are made manually.

Pin-connectors are based on the excavator brand and model. MOVAX Adapters are manufactured to match the specific dimensions of the excavator's bucket connection.



(MECHANICAL) QUICK COUPLERS

Quick couplers allow for a faster change of the MOVAX piling equipment or other tooling than for instance traditional pin connectors. When connecting the MOVAX piling equipment to the excavator, the mechanical connection is made by connecting the MOVAX adapter with the excavator's quick coupler. The hydraulic and electrical connections are made manually. MOVAX Adapters are custom-made in accordance with the dimensions of the excavator's quick coupler.



Typical mechanical quick couplers are, for example:

- **S-series** – S60, S70 etc. Note! MOVAX piling equipment and excavator specific MOVAX Adapters are customised according to the S-series standard.
- **Pin Grabber** – Miller etc.
- **CW-series** – Verachter etc.
- **SW-series** – Liebherr etc.

AUTOMATIC QUICK COUPLERS

Automatic quick couplers allow for an even faster change of MOVAX piling equipment and other tooling. When connecting the MOVAX piling equipment to the excavator all connections including the mechanical, hydraulic and electrical connections are made automatically.

MOVAX Adapters are manufactured according to the quick coupler brand and model and its specific dimensions.

Typical automatic quick couplers are, for example:

- **OilQuick** – OQ60, OQ70, OQ80 etc.
- **Likufix** – SW33, SW48 etc.



OTHER COUPLERS AND CONNECTORS

MOVAX Adapters for other type of couplers are manufactured according to the excavator's coupler or connector and its specific dimensions.

Typical couplers/connectors are, for example:

- **NTP**
- **Atlas**
- **Lehnhoff**
- **Liebherr 900**
- **Gjerstad**
- etc.

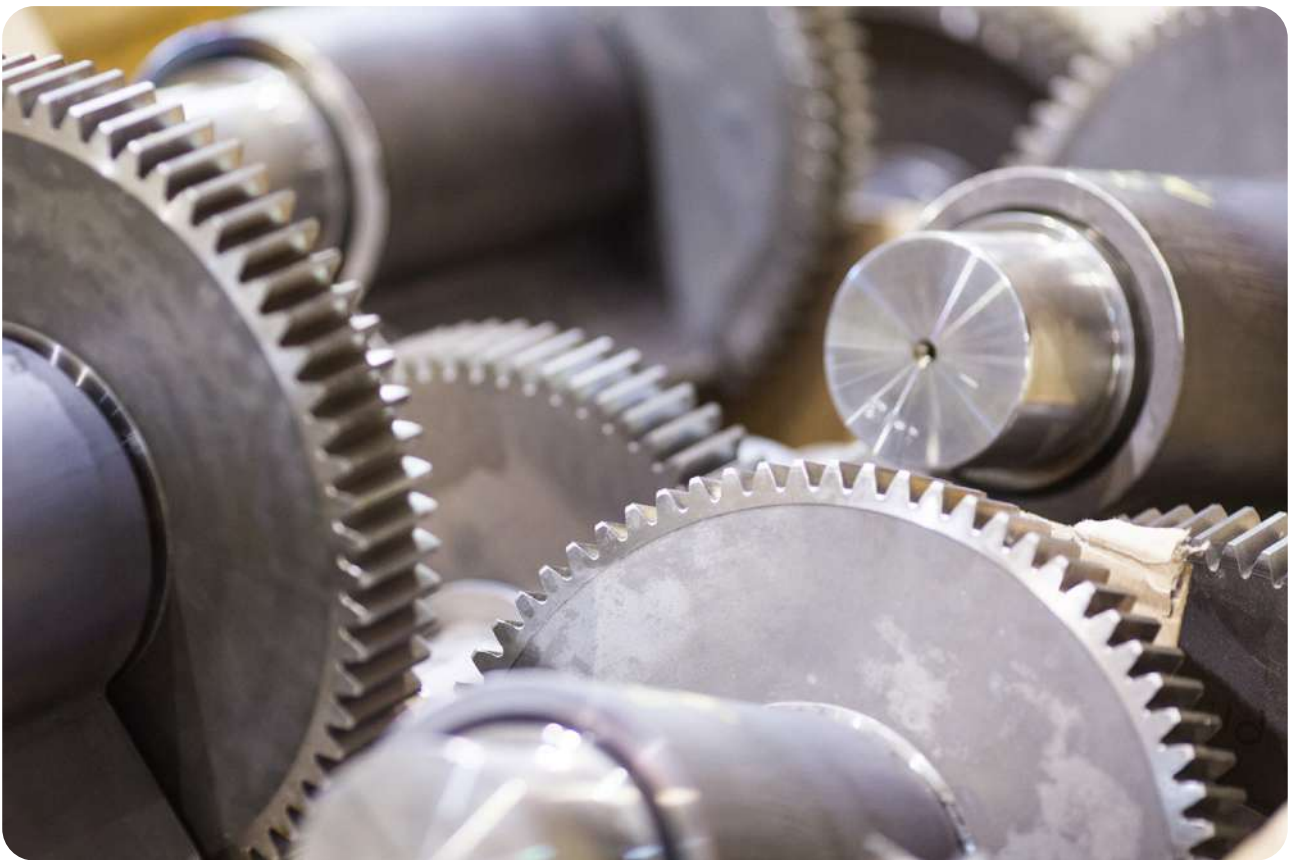


STATE-OF-THE ART MANUFACTURING

QUALITY

MOVAX is made in Hämeenlinna, Finland utilising high-class materials, equipment and components – and modern, state-of-the-art production technologies and machinery ensuring the highest possible quality of manufacture.

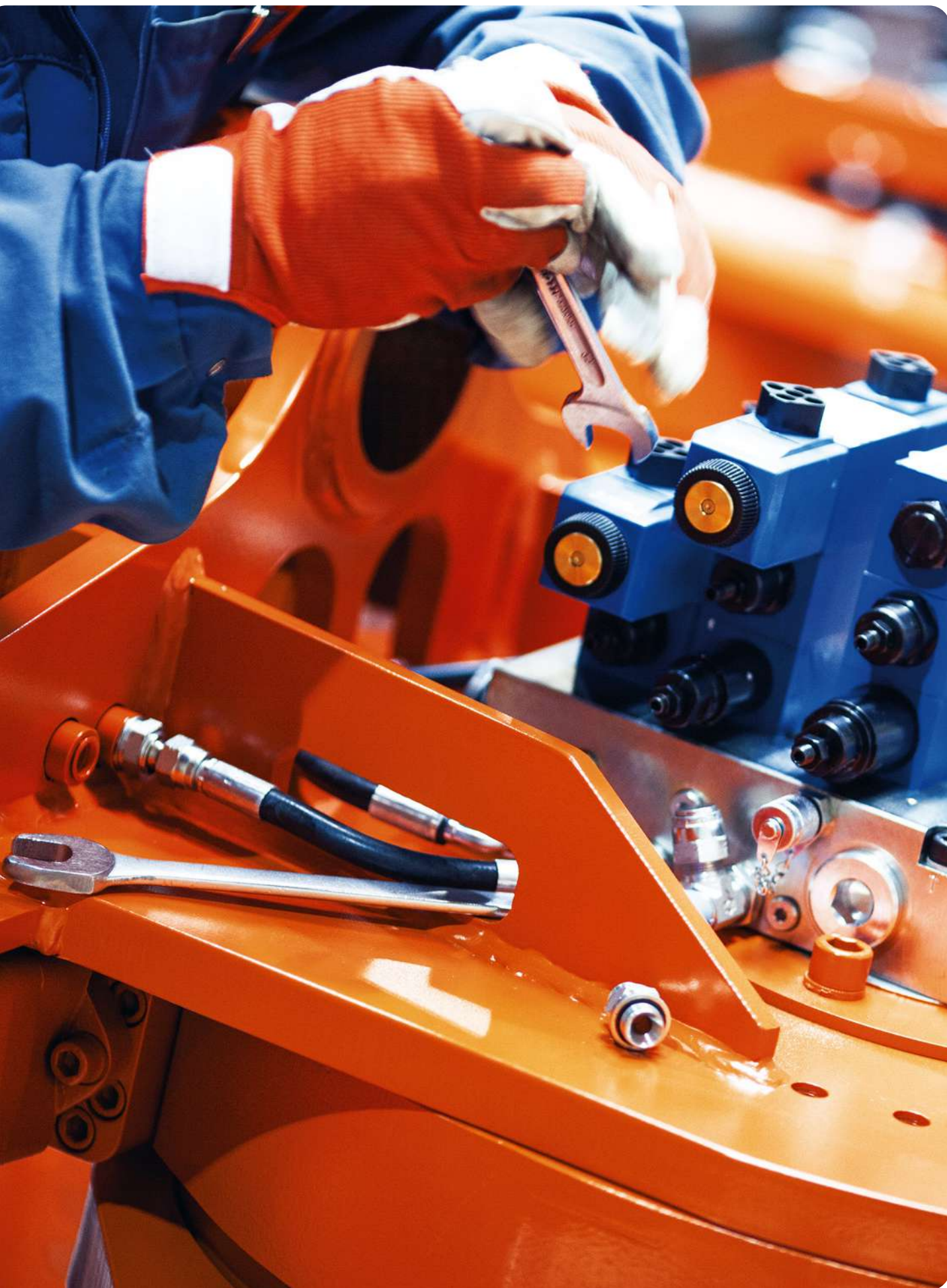
Movax Oy's own production is supported by a proven, high quality network of partners. The state-of-the-art production facilities & machinery, long-term, established and reliable partners combined with optimized logistics ensure both quality and cost-efficiency – as well as fast, on-time deliveries.



CERTIFIED MANAGEMENT SYSTEM

Movax Oy's Quality Management System is certified in accordance with ISO 9001-2015.





SERVICES

MOVAX mFleetCare

MOVAX mFleetCare™ is a total service solution intended to maximise the productivity and the quality of the piling work when using MOVAX piling equipment. The goal of MOVAX mFleetCare is to ensure the maximum availability of the MOVAX piling equipment and to provide the operator with the required skills and best practices - and with superior support in all conditions and at all times – thus enabling the operator to perform the work with the highest productivity, accuracy and quality .

MOVAX mFleetCare addresses all aspects of ensuring the highest possible availability and the best use of MOVAX piling equipment. mFleetCare covers audits and inspections, preventive and corrective maintenance, training services for the continued growth of expertise and skills, efficient and fast on-site and remote support, installation and calibration services, as well as engineering and spare parts services.

MOVAX mFleetCare services are provided world wide by Movax Oy's own specialists and by a trained and certified network of partners. In addition, Movax Oy utilises the most modern IT-based solutions to provide support anywhere in the world, always and at any time.



MOVAX mFleetCare



Audits



Preventive
maintenance



Corrective
maintenance



Training
services



Installation
services



Engineering
services



Spare parts



SERVICES

GLOBALLY LOCAL

MOVAX supports its world wide customers centrally from the factory and engineering office located in Hämeenlinna, Finland AND through a network of local partners all over the world.

MOVAX local partners are both trained and certified, and thus highly skilled, in providing the necessary support and after sales services to local customers in order to ensure the highest possible availability and reliability of the MOVAX piling equipment at all times and under all circumstances.

MOVAX also cooperates continuously with end-users as well as with its local partners to continuously develop the MOVAX piling technology. The global coverage and expertise ensures that varying conditions and requirements are truly taken into consideration in an optimised manner.



WORLD-WIDE LOCAL SUPPORT IN MORE THAN 30 COUNTRIES

for MOVAX world wide partners kindly refer to:

www.movax.com -> Contact us

MOVAX WAY-OF-PILING

UNIQUE, INNOVATIVE & VALUE-ADDING SOLUTIONS

MOVAX way-of-piling™ provides a most efficient, fast, flexible and versatile, accurate, safe and reliable way-of-working which results in a higher productivity and thus significant overall time and cost savings in a wide range of piling and foundation – soil improvement - applications.

THE MANY BENEFITS OF MOVAX WAY-OF-PILING

- **A total piling & foundation solution**
A complete range of piling equipment and customised solutions for driven, bored and drilled piles
- **Unique, value-adding technology**
Fast. Efficient. Versatile. Accurate. Safe. Reliable.
- **Globally proven technology & solutions**
 - Since 1993
 - Over 3000 deliveries
 - All over the world
 - Site & soil conditions from the arctic to the tropic
 - Numerous applications from rail, road and civil to waterways & piers, environmental & utilities
- **Globally supported sales and service**



HIGHER PRODUCTIVITY – SIGNIFICANT SAVINGS

Efficient. Fast. Versatile. Accurate. Safe. Reliable.



CIVIL



ROAD



RAIL



UTILITIES



ENERGY &
ENVIRONMENT



WATERWAYS



HIGHER PRODUCTIVITY - SIGNIFICANT SAVINGS
fast. efficient. versatile. accurate. safe. reliable.

Movax Oy

Tölkkiäentie 10
FI-13130 Hämeenlinna, Finland

Tel. +358 3 628 070

Fax +358 3 616 1641

marketing@movax.fi | movax.com

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