



Total Piling Solutions

CONTROL SYSTEM mControl+ PRO

TECHNICAL SPECIFICATION





mControl+ is always installed so that the original functionality of the excavator is maintained – ie. no changes are made to the excavator and it can be used for all its other intended or original usage.

INTRODUCTION

MOVAX CONTROL SYSTEM

The MOVAX Control System, **mControl+**, links the carrier (excavator, rail roader or equal) with the MOVAX piling equipment - and is a vital, inseparable part of MOVAX way-of-piling resulting in higher productivity, a high-quality end-result and the safety of the piling process – and in a maximum availability of the MOVAX piling equipment.

mControl+ is controlling the standard auxiliary pilot circuit of the excavator which in turn controls the excavator's auxiliary hydraulics - thus controlling all the functions of the MOVAX piling equipment. mControl+ utilizes inclination and pressure sensors to monitor and control the operation of the MOVAX piling equipment and the pile driving process.

The same mControl+ control system is used to operate all MOVAX piling equipment.

Productivity & efficiency

mControl+ enables the operator to efficiently and accurately control the MOVAX piling equipment for a higher productivity. mControl+ is available in two versions:

- mControl+ PRO with automatic control
- mControl+ LITE

mControl+ automatically optimises the flow to the different functions of both the MOVAX piling equipment and the excavator as required during the pile driving process. This also results in the highest possible fuel efficiency and economy.

Precision & accuracy

Smooth movements, precision and accuracy in the pile installation is achieved with the proportional control of mControl+.

mControl+ not only controls the operation of the MOVAX pile driving equipment - and thus ensures the precision and accuracy of the pile driving process – but it also displays vital information about the pile driving process which supports the operator to achieve not only efficiency but also precision and accuracy.

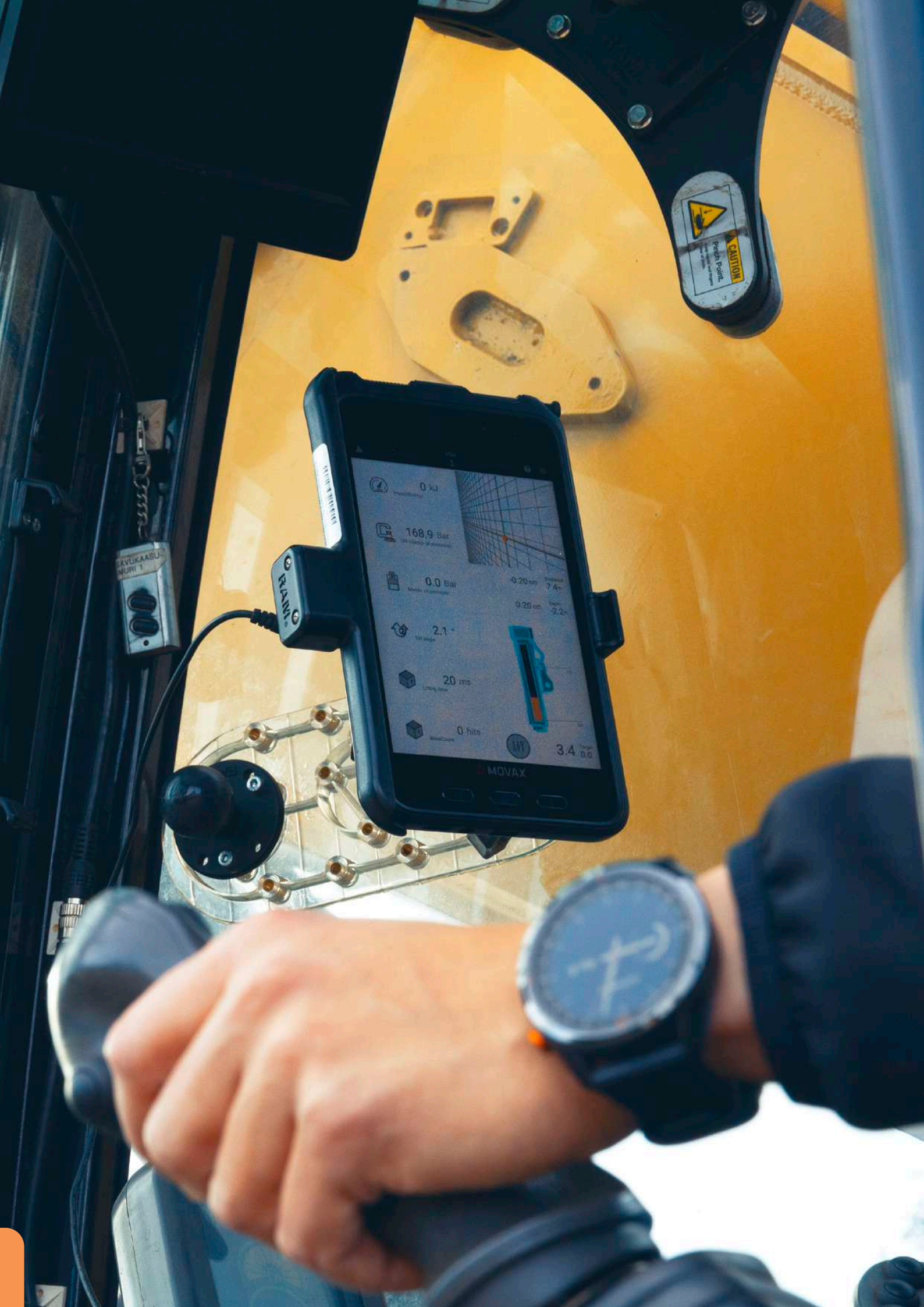
Safety

mControl+ is further utilized to set and monitor operational and safety related parameters related to the MOVAX piling equipment ensuring the utmost safety in the pile driving process.



MOVAX Multi-tool piling leaders require mControl+ PRO





mControl+

FEATURES

EXCAVATOR MOUNTED

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

STATE OF THE ART, ADVANCED CONTROL SYSTEM

Based on proportional control for speed, precision and accuracy;

- **mControl+ PRO**, Automatic control system with tip-control
- **mControl+ LITE**, Basic control system

note! MOVAX MPL Multi-tool piling leaders require mControl+PRO

EASY AND EFFICIENT DIAGNOSTICS

Available directly on the mControl+ display.

ERGONOMIC AND INFORMATIVE USER INTERFACE

- Provides valuable information related to operation, performance, safety and availability
- Color display
- Easy-to-read graphical symbols
- User-friendly menus for calibration and performance optimization
- All functions are effortlessly controlled using switches and thumb wheels on the control grips

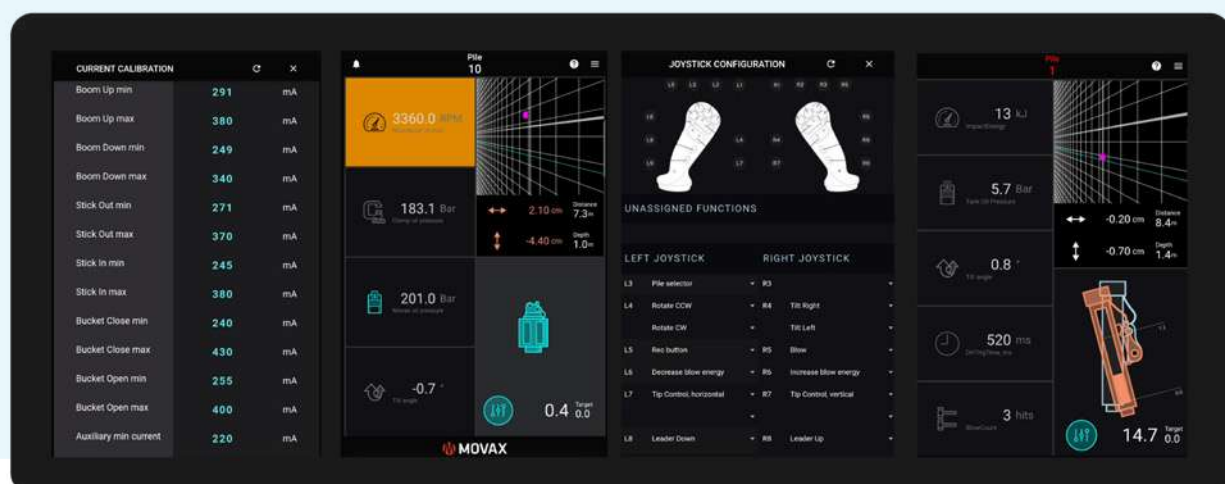
SAFETY

Integrated safety features.

CONNECTIVITY TO MOVAX INFORMATION MANAGEMENT SYSTEM

- mFleetManagement
- mLogbook

note! mLogbook requires mControl+PRO



INTRODUCTION

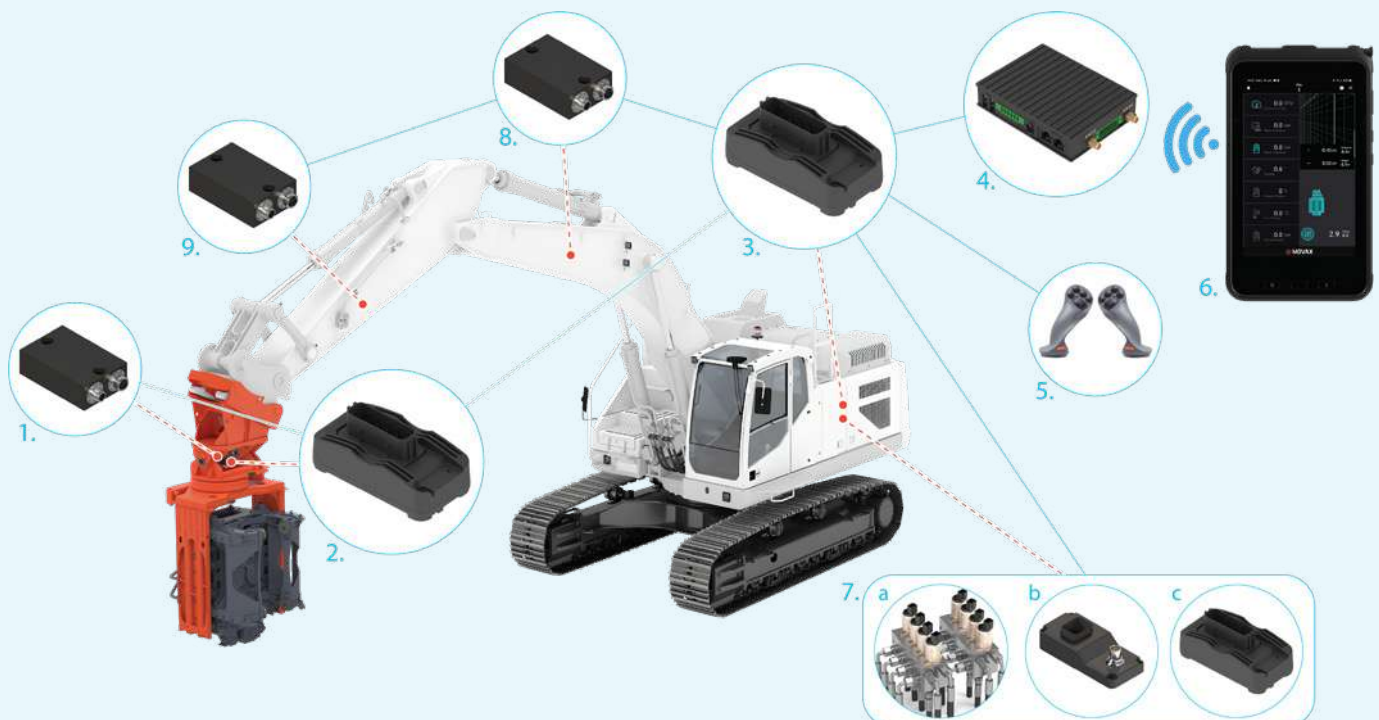
mControl+ PRO

mControl+ PRO is a state-of-the-art automatic control system based on advanced 'tip'-control 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. mControl+ PRO is installed onto the excavator without making any changes to the original functionality of the excavator whatsoever.

The *automatic control* 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.

mControl+ PRO is utilised to control all MOVAX piling equipment - including SG side grip pile drivers, DH piling hammers, TAD/KB piling drills and MPM manipulators – and MPL multi-tool piling leaders and MSL column stabilisation leaders.

mControl+ PRO



1. MOVAX Angle sensor (MxS)
2. MOVAX Module (MxM)
3. Excavator module (ExM)
4. MIMS Module
5. Control grips

6. mControl+ Display
7. Pilot circuit control
 - a) Hydraulic valve block
 - b) PWM Control
 - c) CAN Interface

8. Boom angle sensor
In case of two-piece boom one additional sensor is required
9. Stick angle sensor

mControl+ PRO

FEATURES

Automatic Control System

- Controls all the main functions of the MOVAX piling equipment and MOVAX customised solutions
- Automatic control for MOVAX SG side grip pile drivers and DH piling hammers based on state-of-the-art tip control technology

Informative Control & Monitoring System

- Comprehensive information about the pile driving process - from verticality to refusal
- Detailed information for monitoring of equipment operation, performance and condition

Display

- Android tablet, 8"
- Color display
- Ergonomic user interface for set-up/input data, monitoring and operation



Control grips

- Ergonomic control grips with 2- or 3-rollers and buttons which allow complete operation with a single grip.
- Extra buttons and rollers are provided for accommodating functions from the excavator's original handles, as necessary.



Control modules

- Excavator cab-mounted EXM controls the excavator's auxiliary hydraulics with either proportional valves, a PWM controller or a CAN bus control circuit.
- Factory installed MXM delivered with the MOVAX equipment, controls the hydraulic valves on the MOVAX piling equipment.

Angle sensors

- Highly accurate angle and distance information designed for extreme vibration conditions.
- nextGen 360° angle sensors with gyroscopes for maximal accuracy.
- Additional sensor(s) for excavators with a two-piece boom

mControl+ PRO

FEATURES

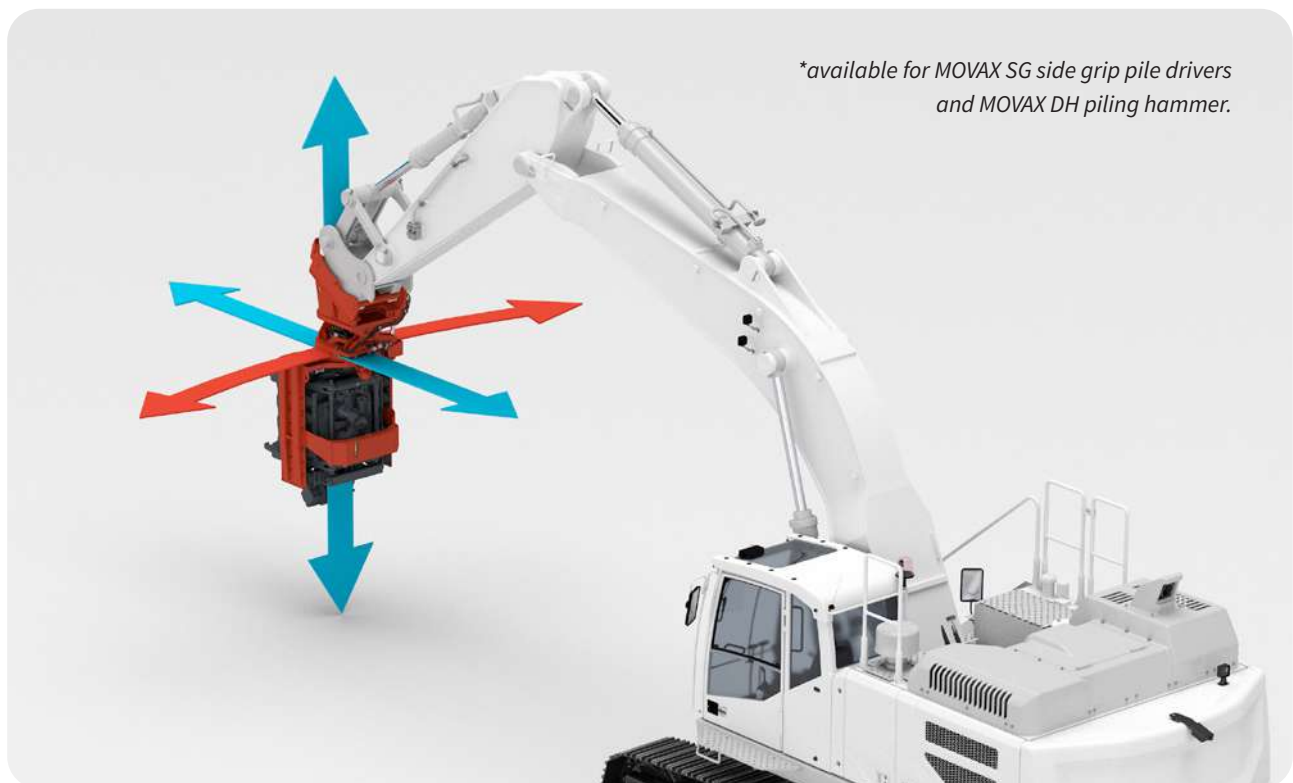
Automatic control

mControl+ PRO is equipped with the advanced, automatic, tip-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.

MOVAX mControl+ automatic tip-control utilizes 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 auto-functionality is based on angle sensors mounted onto the carrier's boom and stick, and the MOVAX piling equipment* and the proportional pilot control of the excavator's auxiliary hydraulics.

The automatic control makes the MOVAX piling equipment travel in a straight line by taking over demanding parts of the excavator's boom control.

The mControl+ PRO tip-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].



**available for MOVAX SG side grip pile drivers and MOVAX DH piling hammer.*

mControl+ PRO

FEATURES

The operator can pilot the boom assembly of the excavator in both directions, up and down (Y-axis) and forwards and backwards (X-axis), with single control grip roller commands – with a horizontally constant distance position, and the with 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.

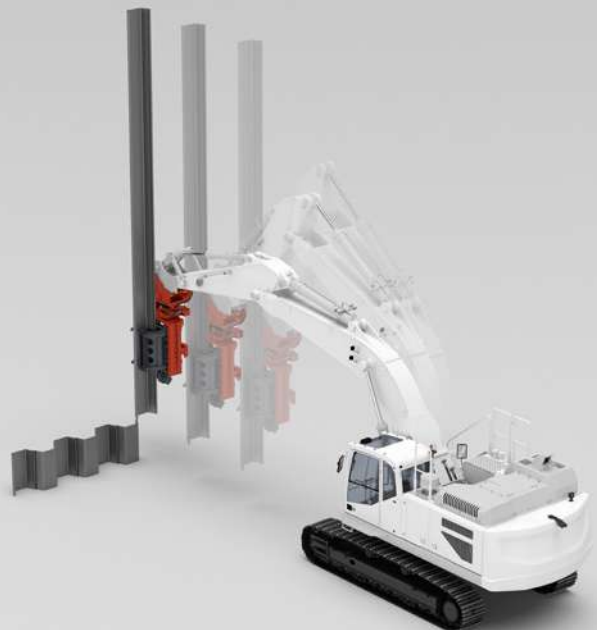
The tip control-feature (**Y-axis**) is used when driving or extracting piles with the MOVAX Side grip pile driver, or to change the position of the MOVAX side grip pile driver along the pile for the purpose of re-gripping the pile.

The tip control-feature (**X-axis**) 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.

Vertical movement with a stationary excavator.



Horizontal movement with a stationary excavator.



mControl+ PRO

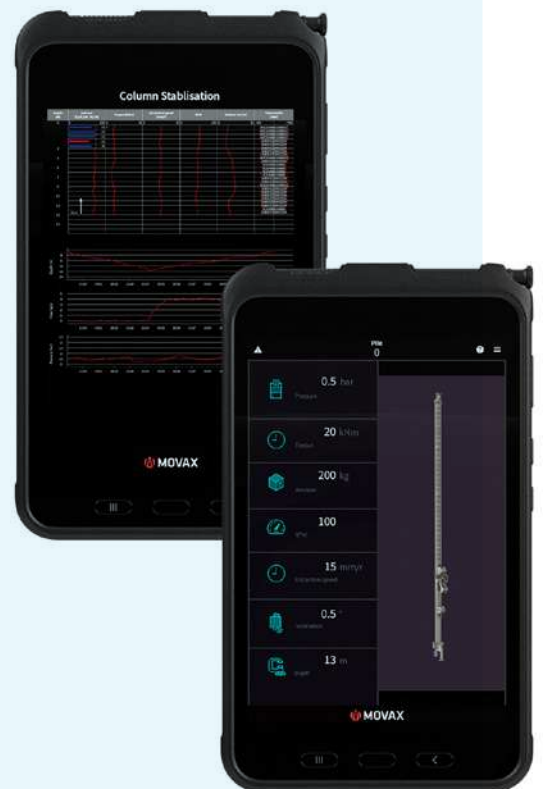
FEATURES

Information

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

The mControl+ PRO provides the following key information (MOVAX SG side grip pile driver):

- **Angle.** Providing information about the verticality.
- **Frequency,** to help the operator keep the performance on the optimum level
- **Oil pressures** with warnings, to ensure the correct operation of the machine
- **Clamp pressure,** providing extra safety to handling and driving process
- **Gear oil temperature** with warnings, to monitor bearing temperatures and maintain the bearing lifetime
- **Eccentric position,** provides information of the current eccentric moment on VA-models
- **Position,** horizontal and vertical distances from the zero point, to increase the operators ability to perform
- **Target angle,** for non-vertical driving
- **Refusal.** Displays a clear and visible warning when the refusal is reached during the pile driving process and ultimately stops the operation, thus protecting the MOVAX piling equipment.
- **Pile ID-number,** when using mLogbook.



The information displayed is dependent on the MOVAX piling equipment in question.







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

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