



MOVAX  
INFORMATION  
MANAGEMENT  
SYSTEM

---

mFLEET  
OPERATION  
MANAGEMENT



# INTRODUCTION

## mFLEET MANAGEMENT HARDWARE

The mFLEET MANAGEMENT hardware (HW) is utilised to collect the information related to the MOVAX piling fleet, The hardware is installed onto the carrier (excavator, rail roader or other carrier) and connected to the MOVAX Control System. The hardware can be connected to all MOVAX Controls Systems, including MCS Lite, MCS Pro and MCS Pro+auto.

The mFLEET MANAGEMENT HW consists of the following components:

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



The MOVAX Remote Module comes with a fully integrated 3G/GPS-system providing the remote connectivity and the information related to the location of the carrier and the MOVAX piling equipment. The system will automatically recognize the MOVAX piling equipment (type/model) connected to the carrier. The system collects the data and sends it automatically to the MOVAX mCLOUD data storage.

## MFLEET OPERATION MANAGEMENT DATA SUITE

The mFLEET Operation Management data suite provides basic operational information about the MOVAX piling equipment, including operating hours, rpm/frequency, work pressure, back pressure, and service related information. The integrated GPS-system provides the location of the carrier and the MOVAX piling equipment. The information is presented in an easy-to-view format and time for which the information is reviewed can be selected easily and flexibly.

In the addition to the operational and service related information, the mFLEET Operation Management Data Suite includes tools utilized for a more detailed analysis of the operation of the MOVAX piling equipment and diagnostics.

## FLEET OVERVIEW

14. Mar 2018 - 21. Mar 2018



Select country

Finland

Select customer

Movax office

### MOVAX EQUIPMENT

| MOVAX SERIAL NUMBER (N) | MODEL  | OPERATING STATUS                      | SERVICE STATUS                        | LAST CONNECTION              |
|-------------------------|--------|---------------------------------------|---------------------------------------|------------------------------|
| 1234                    | SG-75V | <span style="color: red;">A</span>    | <span style="color: green;">✓</span>  | 18. Apr 2018 13:27 (OFFLINE) |
| 2345                    | SG-75V | <span style="color: green;">✓</span>  | <span style="color: orange;">!</span> | 17. Apr 2018 00:27 (OFFLINE) |
| 3456                    | SG-75V | <span style="color: green;">✓</span>  | <span style="color: green;">✓</span>  | 17. Apr 2018 09:27 (OFFLINE) |
| 4567                    | SG-75V | <span style="color: orange;">!</span> | <span style="color: green;">✓</span>  | 16. Apr 2018 19:27 (OFFLINE) |
| 5678                    | SG-75V | <span style="color: green;">✓</span>  | <span style="color: green;">✓</span>  | 16. Apr 2018 09:27 (OFFLINE) |
| 6789                    | SG-75V | <span style="color: green;">✓</span>  | <span style="color: red;">A</span>    | 16. Apr 2018 19:27 (OFFLINE) |

### EXCAVATORS

| EXCAVATOR (S) | AVAILABLE DIAGNOSTICS   | LAST CONNECTION              |
|---------------|---|------------------------------|
| GAT 325       |   | 26. Mar 2018 13:44 (OFFLINE) |
| GAT 320       | MOVAX Serial: 0 Start time: 29. Mar 2018 10:10 End time: 11. Apr 2018 16:16<br>MOVAX Serial: 1411 Start time: 03. Apr 2018 13:26 End time: 04. Apr 2018 13:04<br>MOVAX Serial: 1412 Start time: 29. Mar 2018 10:11 End time: 10. Apr 2018 15:56 | 11. Apr 2018 16:46 (OFFLINE) |



## UNIT OVERVIEW

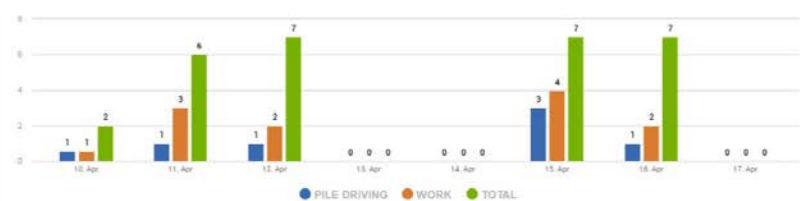
10. APRIL 2018 - 17. APRIL 2018



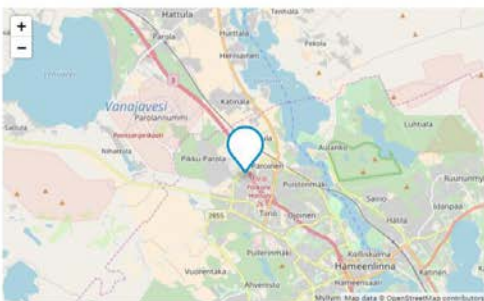
### BASIC INFORMATION

|  |                     |                      |
|--|---------------------|----------------------|
|  | Serial number       | 1234                 |
|  | Make                | Movax                |
|  | Model               | SG-75V               |
|  | Year of Manufacture | 2018                 |
|  | Last connection     | 16. APRIL 2018 11:21 |

### UTILIZATION HOURS



Details



### OPERATING STATUS

| Item            | Total                                | Info                                |
|-----------------|--------------------------------------|-------------------------------------|
| Back pressure   | <span style="color: green;">✓</span> | <span style="color: blue;">!</span> |
| RPM / Frequency | <span style="color: red;">A</span>   | <span style="color: blue;">!</span> |
| Drain pressure  | <span style="color: green;">✓</span> | <span style="color: blue;">!</span> |
| Work pressure   | <span style="color: green;">✓</span> | <span style="color: blue;">!</span> |

### SERVICE STATUS

| Item       | Operating hours | Service interval | Status                               |
|------------|-----------------|------------------|--------------------------------------|
| Gear oil   | 180 h           | 250 h            | <span style="color: green;">✓</span> |
| Oil filter | 180 h           | 250 h            | <span style="color: green;">✓</span> |



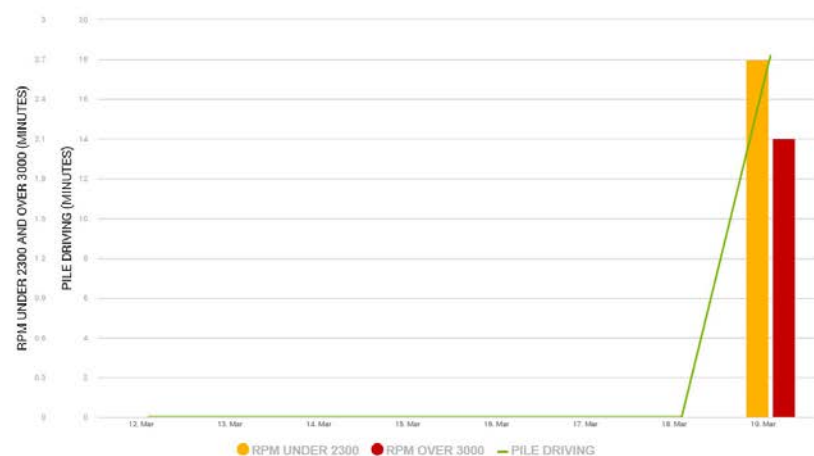
## RPM & FREQUENCY

MOVAX Serial number: 5678



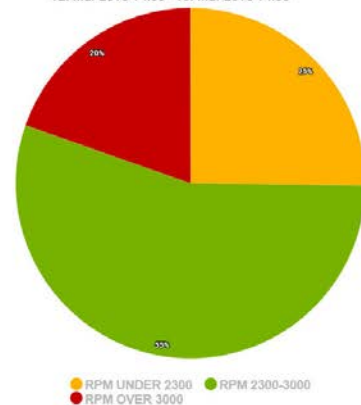
Select date

2018-03-19 14:00:00



### SUMMARY

12. Mar 2018 14:00 - 19. Mar 2018 14:00



# MOVAX PILING EQUIPMENT

## SIDE GRIP PILE DRIVERS

MOVAX side grip pile drivers are excavator-mounted, high frequency, vibratory-type pile drivers - available with fixed or variable eccentric moment.

MOVAX side grip pile drivers 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

MOVAX piling hammers are excavator-mounted, hydraulic, impact-type double-acting drop hammers.

MOVAX piling hammers 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 either excavator or excavator leader mast mounted.



# mFLEET OPERATION MANAGEMENT

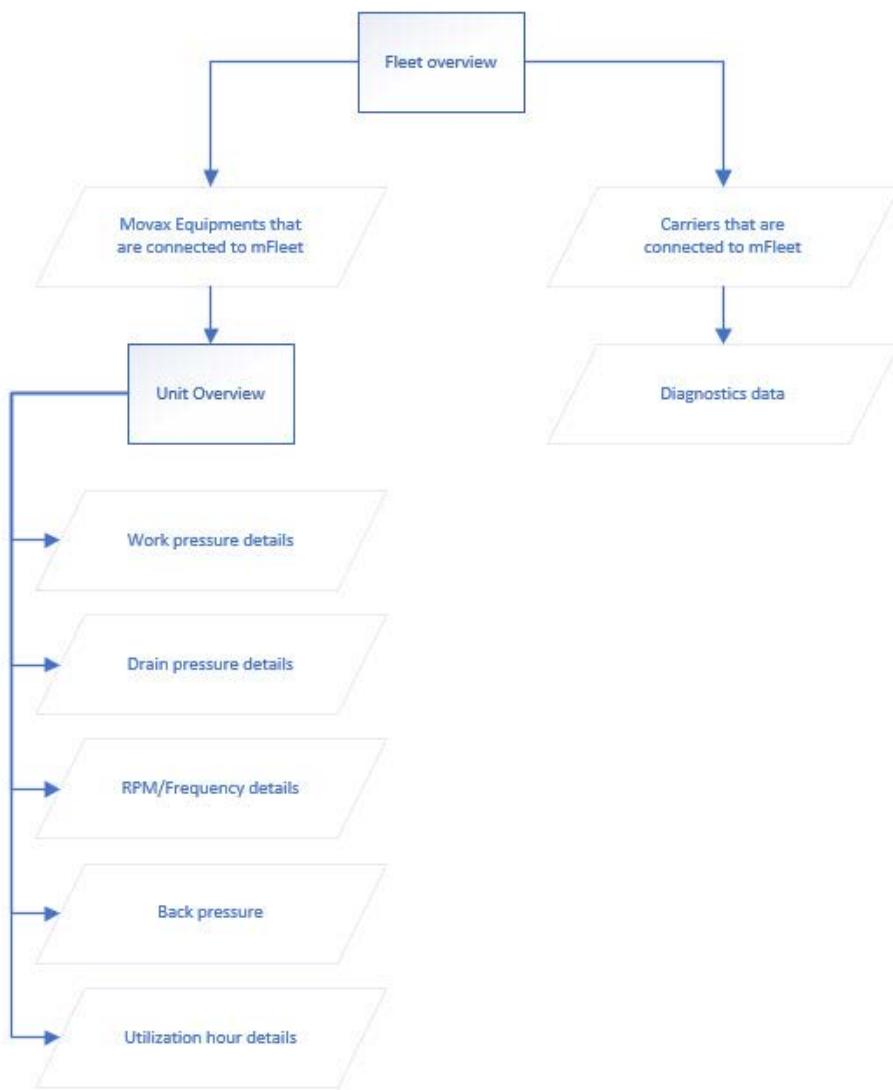
## LAYOUT

The mFleet Operation Management data suite consists of a set of ready-made reports related to the operation of the MOVAX piling equipment and diagnostic tools for a more detailed analysis of the operation.

The ready-made (fixed content) reports include the following:

- FLEET overview
- UNIT overview; for each individual MOVAX piling equipment
- Detailed reports; for each individual MOVAX piling equipment; including:
  - operating hours
  - rpm/frequency
  - work pressure
  - back pressure

With the diagnostics tool it is possible to make more detailed analysis of the operations of the MOVAX piling equipment by comparing several different parameters - such as pressures, operations, executed functions, etc. For example, if a certain joystick button is pressed did the machine execute all the functions it should have done?



# REPORTS

## FLEET OVERVIEW

The 'FLEET overview' provides an overview of the entire fleet of MOVAX piling equipment. The report shows which individual MOVAX piling equipment is currently connected to the mFLEET Operation Management- system and the Operating status (ie. if the operation is within recommended limits) and the Service status (ie. if service is overdue) of each individual MOVAX piling equipment.

The 'FLEET overview' includes also an overview of all carriers equipped with the mFleet management HW. The diagnostic tools are accessed through the Excavator-menu.

FLEET OVERVIEW

14. Mar 2018 - 21. Mar 2018

Select country

Finland

Select customer

Movax office

MOVAX EQUIPMENT

| MOVAX SERIAL NUMBER (6) | MODEL  | OPERATING STATUS | SERVICE STATUS | LAST CONNECTION              |
|-------------------------|--------|------------------|----------------|------------------------------|
| 1234                    | SG-75V |                  |                | 16. Apr 2018 15:27 (OFFLINE) |
| 2345                    | SG-75V |                  |                | 17. Apr 2018 00:27 (OFFLINE) |
| 3456                    | SG-75V |                  |                | 17. Apr 2018 09:27 (OFFLINE) |
| 4567                    | SG-75V |                  |                | 16. Apr 2018 19:27 (OFFLINE) |
| 5678                    | SG-75V |                  |                | 16. Apr 2018 09:27 (OFFLINE) |
| 6789                    | SG-75V |                  |                | 16. Apr 2018 19:27 (OFFLINE) |

EXCAVATORS

| EXCAVATOR (3) | AVAILABLE DIAGNOSTICS  | LAST CONNECTION              |
|---------------|--|------------------------------|
| CAT 325       |  | 26. Mar 2018 13:44 (OFFLINE) |
| CAT390        | MOVAX Serial: 0 Start time: 26. Mar 2018 10:10 End time: 11. Apr 2018 16:16<br>MOVAX Serial: 1411 Start time: 05. Apr 2018 19:56End time: 04. Apr 2018 13:04<br>MOVAX Serial: 1412 Start time: 26. Mar 2018 10:11 End time: 10. Apr 2018 19:56 | 11. Apr 2018 16:48 (OFFLINE) |

### MOVAX Piling equipment

Traffic lights indicate if the operation of the individual MOVAX piling equipment is within the recommended limits (green), approaches the limit (yellow) or deviates/exceeds (red) from the set parameters or recommended limits.

The service status traffic lights indicate whether service of the MOVAX Piling equipment is due within the near future (yellow) or already overdue (red).





FLEET OVERVIEW

10. APRIL 2018 - 17. APRIL 2018

MOVAX EQUIPMENT

| MOVAX SERIAL NUMBER (6) | MODEL  | OPERATING STATUS | SERVICE STATUS | LAST CONNECTION              |
|-------------------------|--------|------------------|----------------|------------------------------|
| 1234                    | SG-75V |                  |                | 16. Apr 2018 15:27 (OFFLINE) |
| 2345                    | SG-75V |                  |                | 17. Apr 2018 00:27 (OFFLINE) |
| 3456                    | SG-75V |                  |                | 17. Apr 2018 09:27 (OFFLINE) |
| 4567                    | SG-75V |                  |                | 16. Apr 2018 19:27 (OFFLINE) |
| 5678                    | SG-75V |                  |                | 16. Apr 2018 09:27 (OFFLINE) |
| 6789                    | SG-75V |                  |                | 16. Apr 2018 19:27 (OFFLINE) |



| STATUS traffic lights |    |  |        |    |
|-----------------------|---|---|---|---|
| Operating status      | Machine does not have operating data from the last week or the connected tool is not supported by mFleet (see preface)  | All of the monitored operational parameters are within recommended limits.        | One or several of the operational parameters is approaching the set or recommended limit. | A deviation from the set or recommended operational parameters is detected. Attention is needed.<br><br>For details please check UNIT overview. |
| Service status        | Machine has not been connected to mFleet in last 30 days and service status has not been updated (see preface) or the connected tool is not supported by mFleet (see preface) | No actions are required.  | Service is approaching.   | Service is required (overdue).  |



#### Monitored parameters

SG side grip pile drivers: back pressure, drain pressure, working pressure and RPM/Frequency

DH piling hammer: back pressure, work pressure

Pre augers: back pressure, work pressure

If one or more of the monitored values do not fulfill the set or recommended criteria the red indicator is shown. To check which value does not fulfill the set or recommended criteria, please go to the UNIT overview.

#### Carrier


Carriers equipped with the mFleet management system HW are listed in the FLEET overview/excavators-menu. The availability of diagnostics data for more detailed operational analysis is indicated and accessed individually for each excavator through this menu. When diagnostics data is collected for analyzing the excavator shall be online.

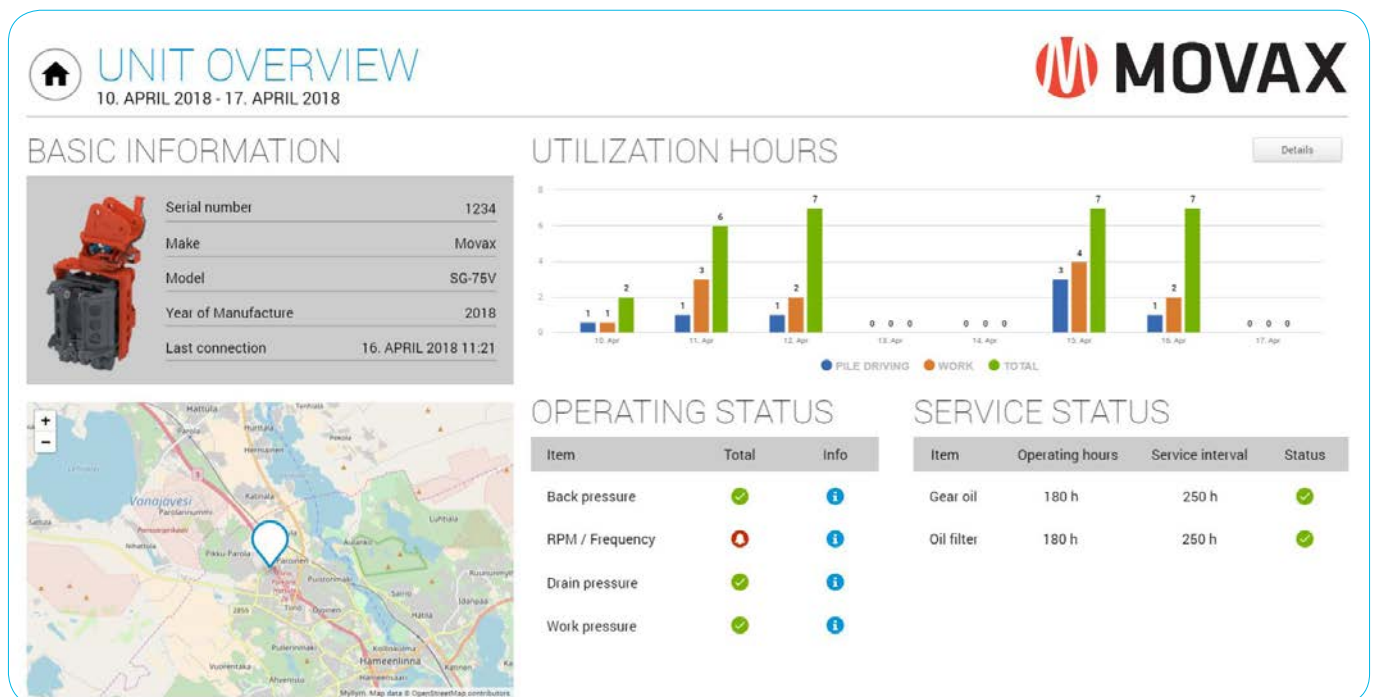
## EXCAVATORS

| Name filter   |   |                              |
|---------------|---|------------------------------|
| EXCAVATOR (3) | AVAILABLE DIAGNOSTICS   | LAST CONNECTION              |
| CAT 325       |   | 26. Mar 2018 13:44 (OFFLINE) |
| CAT330        | MOVAX Serial: 0 Start time: 29. Mar 2018 10:10 End time: 11. Apr 2018 16:16<br>MOVAX Serial: 1411 Start time: 03. Apr 2018 13:26 End time: 04. Apr 2018 13:04<br>MOVAX Serial: 1412 Start time: 29. Mar 2018 10:11 End time: 10. Apr 2018 15:56 | 11. Apr 2018 16:46 (OFFLINE) |

## UNIT OVERVIEW

The 'UNIT Overview' provides the overview of the specific MOVAX piling equipment in question. The UNIT overview provides the following information;

- MACHINE INFO**
  - Serial no. Serial number of selected MOVAX Piling equipment
  - Make MOVAX piling equipment (e.g. MOVAX side grip pile driver)
  - Model MOVAX piling equipment model (e.g. SG-60V)
- GLOBAL POSITIONING DATA**
- UTILIZATION HOURS**
  - Total hours MOVAX Control System overall operating time
  - Work hours Combination of time used to handle and vibrate
  - Pile driving hours Time used to vibrate (only)
- OPERATING STATUS**
*more detailed information can be found by selecting *
  - Back pressure
  - RPM/frequency
  - Drain pressure
  - Work pressure
- SERVICE STATUS**
*Service status is maintained in the MOVAX Control System*
  - Gear oil
  - Oil filter



### Operating status

Vibrating above 3000 rpm can harm the MOVAX side grip pile driver. A red indicator will show if the MOVAX side grip pile driver has been operated at a too high frequency (or rpm).




### Service status

Regular maintenance is required to ensure the condition and availability of the MOVAX piling equipment. A red indicator will show if service or maintenance is overdue.





## UNIT DETAILED REPORTS

More detailed information about the specific MOVAX piling equipment in question (UNIT) can be accessed through the details-button (Utilization hours) or the information button  located next to each of the monitored parameters (back pressure, RPM/frequency, Drain pressure, Work pressure).

Each UNIT detailed reports-page will display the information from the previous seven (7) days starting from the selected date. The date selection can be changed through the calendar.

### Select date






Apr

▼

2018

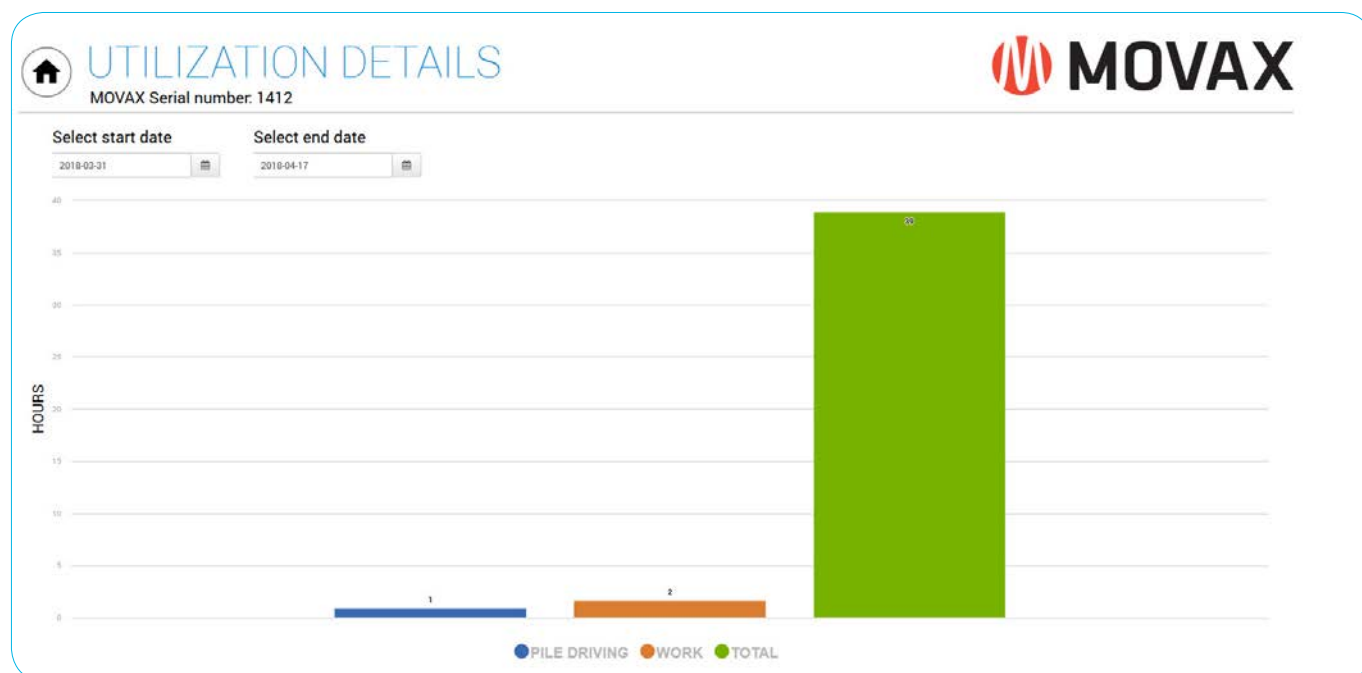
▼



| Mo | Tu | We | Th | Fr | Sa | Su |
|----|----|----|----|----|----|----|
|    |    |    |    |    |    | 1  |
| 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| 9  | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 |    |    |    |    |    |    |

### Utilization hours

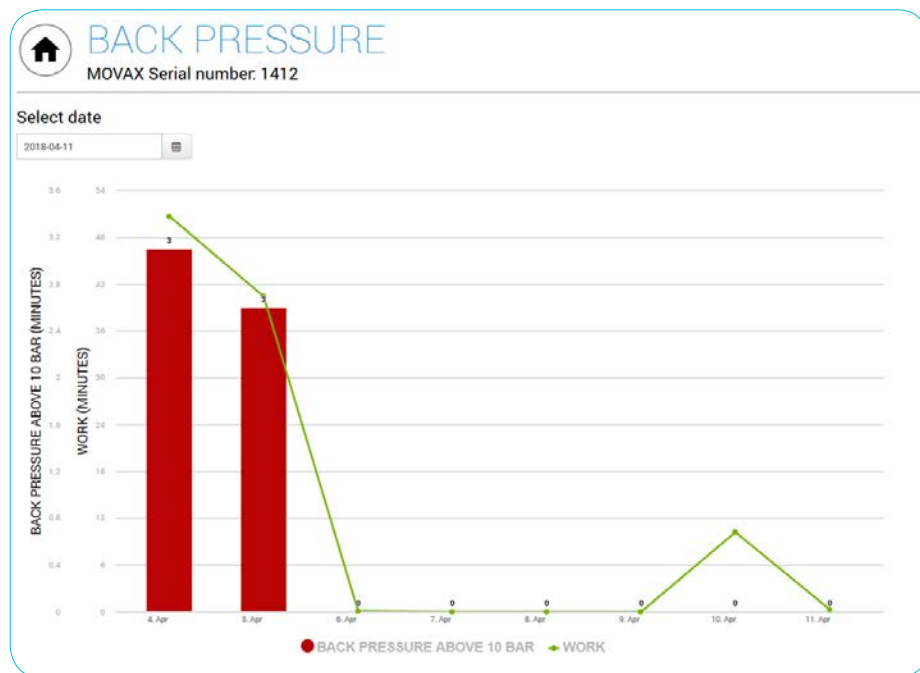
The Utilization hours-report can be used for detailed analysis of the operation; including overall hours, working hours (e.g. pile driving+handling) and actual pile driving hours.



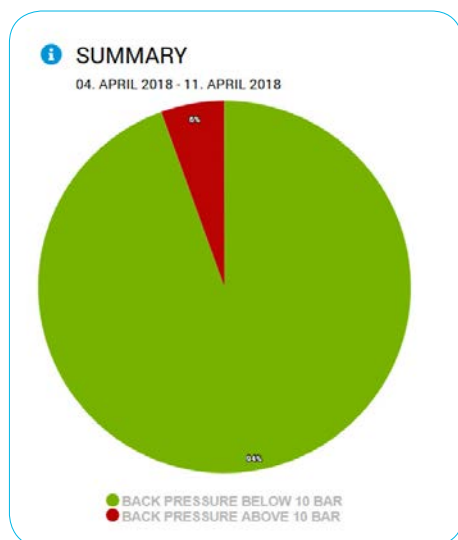
## Back pressure

The bar chart displays the behaviour of the back pressure during the selected pile driving time interval.

- The green line [2] displays the duration of pile driving in minutes (min) during the last seven (7) days starting from the selected date
- The red bar indicates that the back pressure has exceeded a pressure of 10 bar during the pile driving, and also shows cumulatively how long (in minutes) the 10 bar limit has been exceeded.



The pie chart provides a summary of the back pressure for the selected time period and the proportion of the time (%) the back pressure has exceed the 10 bar limit.

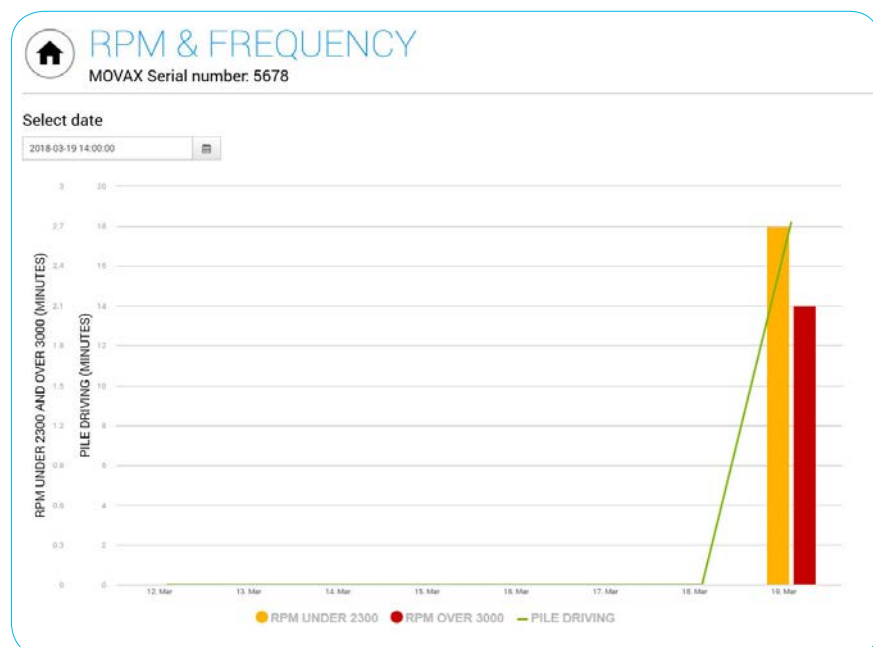


If the back pressure exceeds 10 bar it may cause permanent damage to the MOVAX side grip pile driver.

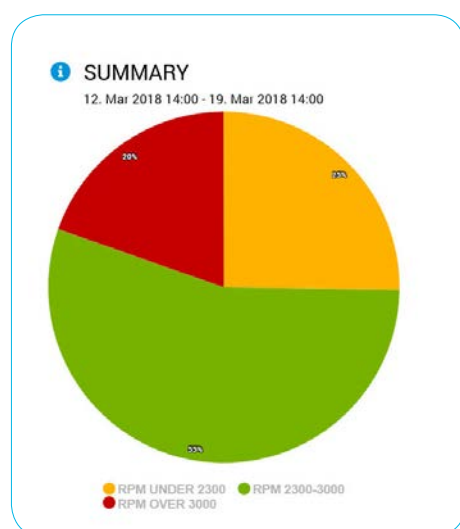
## RPM/frequency

The bar chart displays the behaviour of the RPM/frequency during the selected pile driving time interval.

- The green line [2] displays the duration of pile driving in minutes (min) during the last seven (7) days starting from the selected date
- The yellow bar indicates that the RPM/frequency has been below 2300 rpm during the pile driving work, and also shows cumulatively how long (in minutes) the RPM/frequency has been below 2300 rpm.
- The red bar indicates that the RPM/frequency has been above 3000 rpm during the pile driving work, and also shows cumulatively how long (in minutes) the RPM/frequency has exceeded 3000 rpm.



The pie chart provides a summary of the RPM/frequency for the selected time period and the proportion of the time (%) the RPM/frequency has either been above 3000 rpm or below 2300 rpm.



If the RPM/Frequency exceeds 3000 rpm it may cause permanent damage to the MOVAX Side grip pile driver.

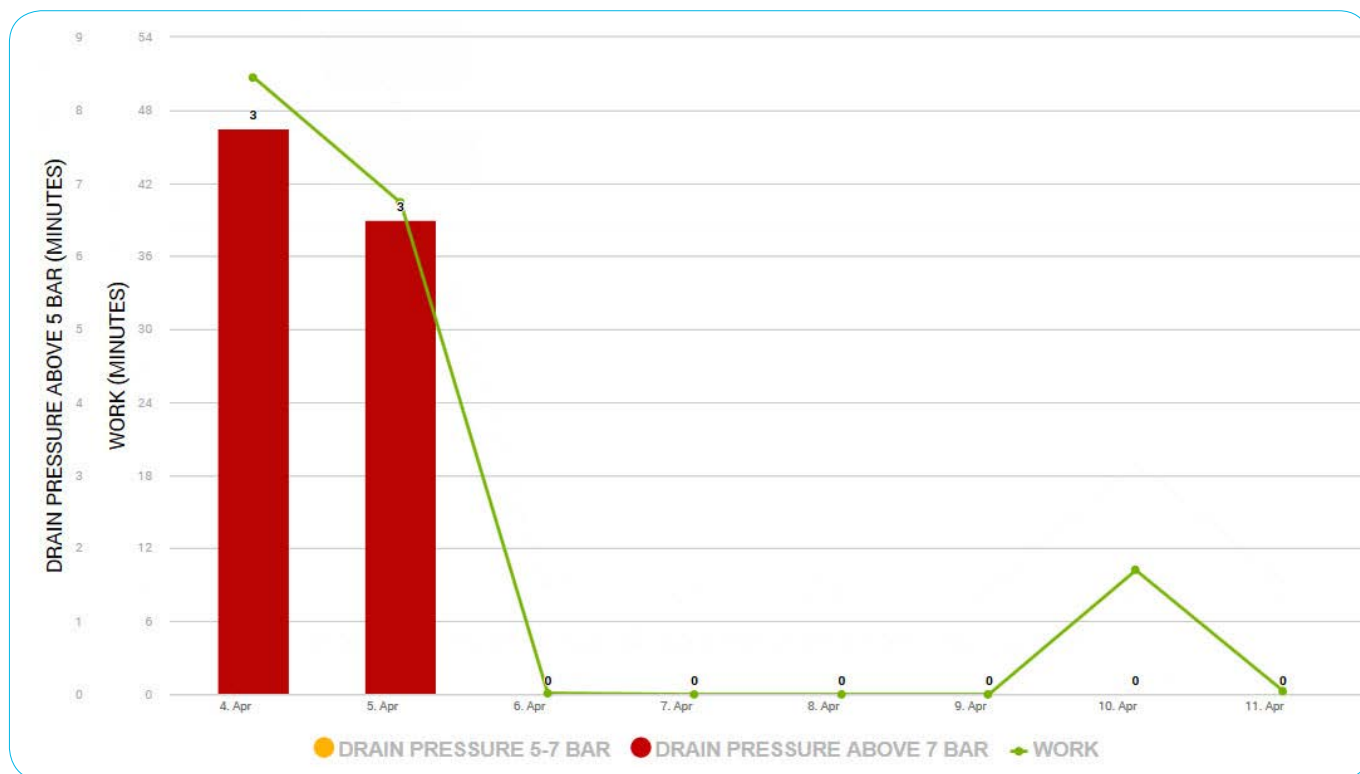


Working with low frequencies (below 2300 rpm) may cause disturbances or even damage to the surroundings.

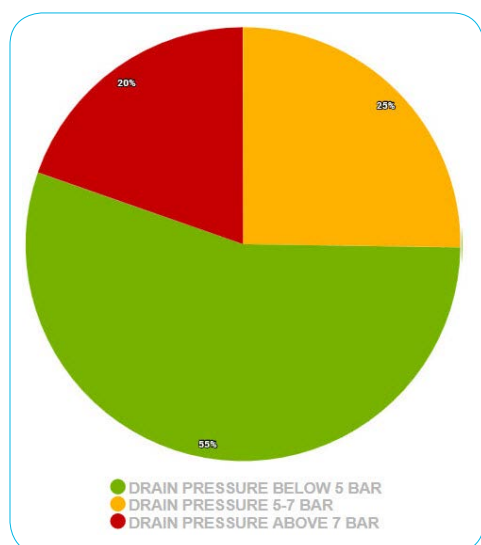
## Drain pressure

The bar chart displays the behavior of the drain pressure during the selected pile driving time interval.

- The green line [2] displays the duration of pile driving in minutes (min) during the last seven (7) days starting from the selected date
- The red bar indicates that the drain pressure has exceeded a pressure of 7 bar during the pile driving work, and also shows cumulatively how long (in minutes) the drain pressure has been above 7 bar.
- The yellow bar indicates that the drain pressure has been between 5-7 bar during the pile driving work, and also shows cumulatively how long (in minutes) the drain pressure has been between 5-7 bar.



The pie chart provides a summary of the drain pressure for the selected time period and the proportion of the time (%) the drain pressure has been above 7 bar and between 5-7 bar.

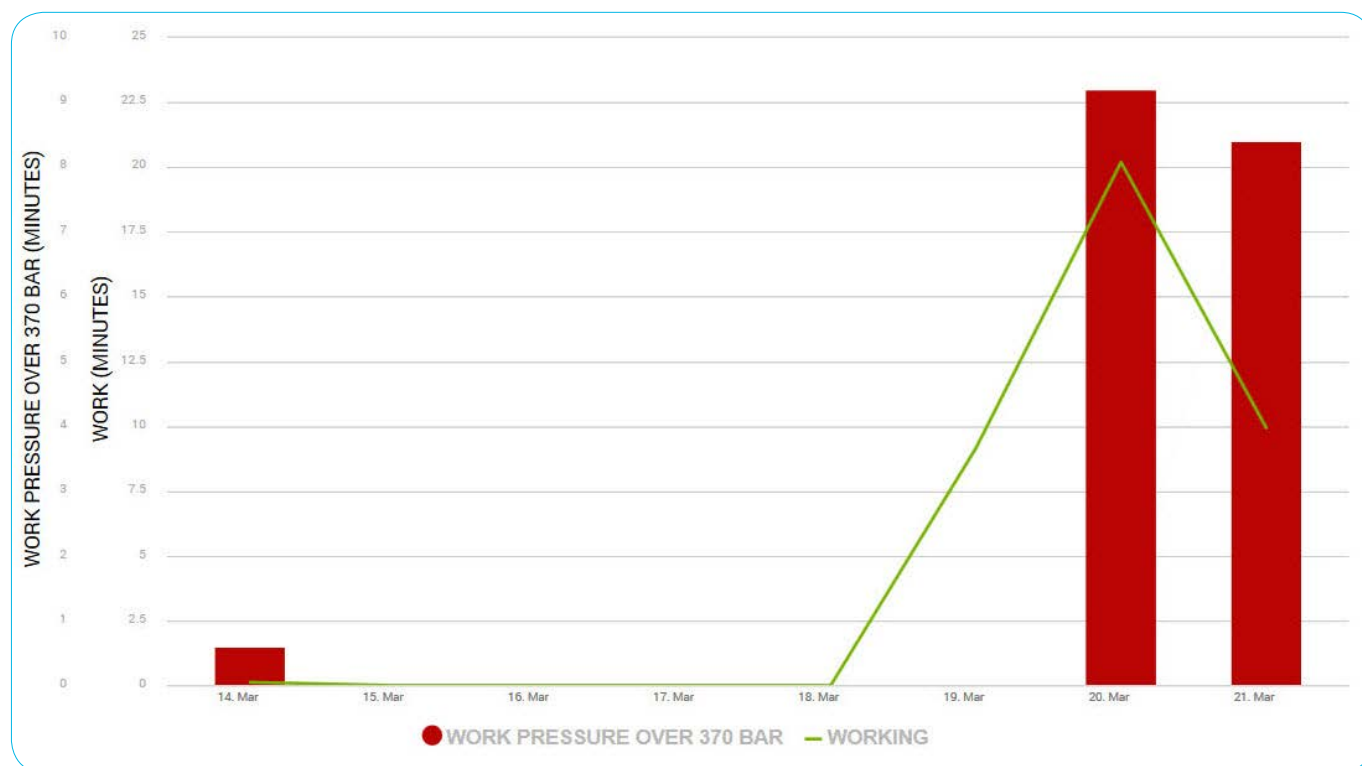


If the drain pressure exceeds 5 bar it may cause damage to the MOVAX side grip pile driver.

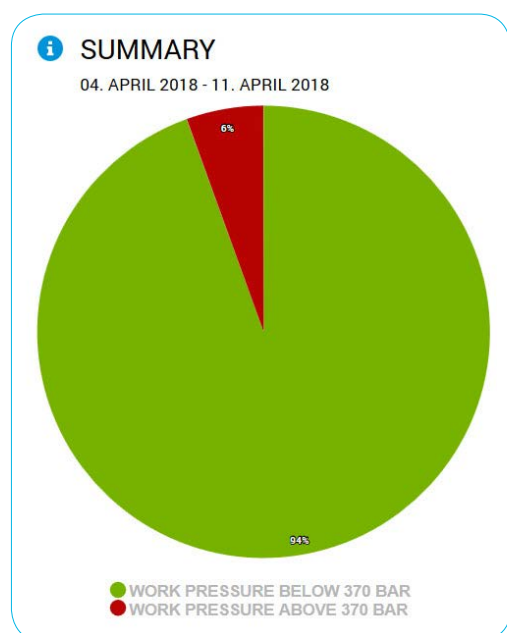
## Work pressure

The bar chart displays the behaviour of the working pressure during the selected pile driving time interval.

- The green line [2] displays the duration of pile driving in minutes (min) during the last seven (7) days starting from the selected date
- The red bar indicates that the working pressure has exceeded a pressure of 370 bar during the pile driving, and also shows cumulatively how long (in minutes) the 370 bar limit has been exceeded.



The pie chart provides a summary of the back pressure for the selected time period and the proportion of the time (%) the working pressure has exceed the 370 bar limit.



If the working pressure exceeds 370 bar it may cause permanent damage to the MOVAX Side grip pile driver.

# DIAGNOSTICS

A more detailed analysis of the operation can be done by utilizing the diagnostics tools. The MOVAX Piling equipment for which detailed data is available is shown in the fleet overview page ('Available diagnostics'). The diagnostics is started by selecting the carrier (excavator, rail road-er or equal) to which the MOVAX piling equipment is connected.

EXCAVATORS

Name filter

| EXCAVATOR (3) | AVAILABLE DIAGNOSTICS   | LAST CONNECTION              |
|---------------|---|------------------------------|
| CAT 325       |   | 26. Mar 2018 13:44 (OFFLINE) |
| CAT330        | MOVAX Serial: 0    Start time: 29. Mar 2018 10:10    End time: 11. Apr 2018 16:16<br>MOVAX Serial: 1411    Start time: 03. Apr 2018 13:26    End time: 04. Apr 2018 13:04<br>MOVAX Serial: 1412    Start time: 29. Mar 2018 10:11    End time: 10. Apr 2018 15:56 | 11. Apr 2018 16:46 (OFFLINE) |

After the carrier is selected, the diagnostics tool will show the time periods for which the detailed data is available. The selected time interval can be downloaded by choosing the start time and duration and by pressing the 'Activate range' button.

Diagnostics to show

TIME RANGE TO SHOW

Start time

2018-04-11 06:43:00

Duration

30 minutes

Activate range

AVAILABLE DIAGNOSTICS

| MOVAX Serial number | Start time           | End time             |
|---------------------|----------------------|----------------------|
| 1412                | 06. APRIL 2018 15:50 | 06. APRIL 2018 16:06 |
| 1412                | 05. APRIL 2018 11:07 | 05. APRIL 2018 16:20 |
| 1412                | 05. APRIL 2018 09:07 | 05. APRIL 2018 09:41 |
| 1412                | 04. APRIL 2018 13:04 | 04. APRIL 2018 16:03 |
| 1411                | 04. APRIL 2018 12:23 | 04. APRIL 2018 13:04 |
| 1411                | 03. APRIL 2018 13:26 | 03. APRIL 2018 15:35 |
| 1412                | 03. APRIL 2018 08:30 | 03. APRIL 2018 13:26 |
| 1412                | 29. MARCH 2018 12:26 | 29. MARCH 2018 14:26 |
| 1412                | 29. MARCH 2018 10:11 | 29. MARCH 2018 10:13 |

The selected time interval has to be within the range for which data is available and shown in the 'available diagnostics' chart.

Retrieving data

The carrier to which the MOVAX piling equipment has been connected, must be online when the data is retrieved for the first time.

14

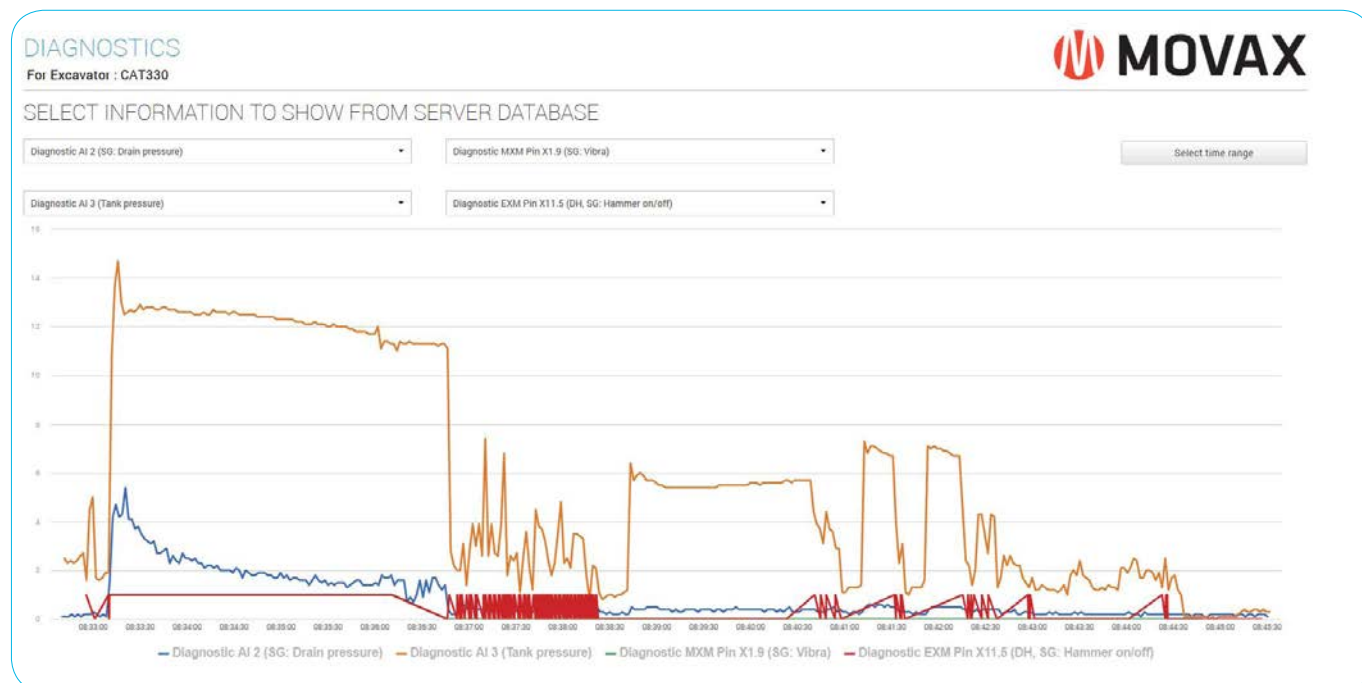


After the data is retrieved it will be shown on the chart. The parameters to be analyzed and compared can be changed from the drop menus. Zooming is done by framing the desired time interval ie. by keeping the left mouse button pressed down. The zoom can be reset by pressing the 'reset zoom' button. By clicking the legend text under the chart the selected parameter is either shown or hidden.



### Using historic data

Once the data is downloaded to the MOVAX mCLOUD data storage it can be accessed at all times and the carrier does not have to be online when using the data.



The detailed information which can be accessed include the following parameters:

|  |  |
|--|--|
| Diagnostic AI0 (MXM Movax main pressure)                           | Diagnostic MXM Pin X1.4 (DH, SG: Tilt left)                      |
| Diagnostic DSS Angle   | Diagnostic MXM Pin X1.5 (DH: Main on/off valve, SG: Lock open)   |
| Diagnostic EXM Pin X10.23 (DH, SG: Rotate L4)                      | Diagnostic MXM Pin X1.6 (DH: Leader down, SG: Lock close)        |
| Diagnostic EXM Pin X10.24 (DH, SG: Tilt R4)                        | Diagnostic MXM Pin X1.7 (DH: Sensor supply, SG: Variable moment) |
| Diagnostic EXM Pin X10.2 (DH: Leader down L8)                      | Diagnostic MXM Pin X1.8 (DH: Speed sensor upper)                 |
| Diagnostic EXM Pin X10.3 (DH, SG: Distance lock L3)                | Diagnostic MXM Pin X1.9 (DH: Speed sensor lower)                 |
| Diagnostic EXM Pin X10.6 (DH: Leader up R8)                        | Diagnostic MXM Pin X1.9 (SG: Vibra )                             |
| Diagnostic EXM Pin X11.16 (DH: Trigger down L6, SG: Clamp open L6) | Diagnostic MXM SG Vibra frequency                                |
| Diagnostic EXM Pin X10.4 (DH, SG: Vibra R5)                        | Diagnostic All 1 (DH: Leader laser sensor)                       |
| Diagnostic EXM Pin X10.25 (DH: Auto activate L5)                   | Diagnostic All 1 (SG: Clamp oil pressure)                        |
| Diagnostic EXM Pin X11.17 (DH: Trigger up R6, SG: Clamp close R6)  | Diagnostic All 1 (TAD: Torque pressure)                          |
| Diagnostic MBS Angle   | Diagnostic All 2 (DH: Hammer laser sensor)                       |
| Diagnostic MXM Movax 90 degree angle                               | Diagnostic All 2 (IH: Gas pressure)                              |
| Diagnostic MXM Movax angle   | Diagnostic All 2 (SG: Drain pressure)                            |
| Diagnostic MXM Pin X1.10 (DH: Main valve close, SG: Clamp open)    | Diagnostic All 3 (Tank pressure)                                 |
| Diagnostic MXM Pin X1.11 (DH: Leader up, SG: Clamp close)          | Diagnostic EXM Pin X11.13 (DH, SG: Stick out auto control)       |
| Diagnostic MXM Pin X1.13 (DH: Empty impact sensor)                 | Diagnostic EXM Pin X11.1 (DH, SG: Bucket in auto control)        |
| Diagnostic MXM Pin X1.1 (DH, SG: Rotate CW)                        | Diagnostic EXM Pin X11.20 (DH, SG: Boom in auto control)         |
| Diagnostic MXM Pin X1.2 (DH, SG: Rotate CCW)                       | Diagnostic EXM Pin X11.21 (DH, SG: Boom out auto control)        |
|  | Diagnostic EXM Pin X11.22 (DH, SG: Power pack)                   |
|  | Diagnostic EXM Pin X11.2 (DH, SG: Bucket out auto control)       |
|  | Diagnostic EXM Pin X11.3 (DH, SG: Hammer propo                   |
|  | Diagnostic EXM Pin X11.5 (DH, SG: Hammer on/off)                 |
|  | Diagnostic EXM Pin X11.7 (DH, SG: Stick in auto control)         |

# THE MOVAX WAY-OF-PILING

Higher productivity and  
significant savings

MOVAX Oy is represented by partners all over the world. Please refer to [www.movax.com](http://www.movax.com) for detailed contact information.



Movax Oy

Tölkkimäentie 10

FI-13130 Hämeenlinna, Finland

Tel. +358 3 628 070

Fax +358 3 616 1641

[marketing@movax.fi](mailto:marketing@movax.fi)

[www.movax.com](http://www.movax.com)

