

# **DIPMATE® PRO** **BACKHOE DREDGING** **MONITORING AND** **CONTROL SYSTEM**

Monitoring and control system for  
precision backhoe dredging





# Monitoring and control for maximum performance in the toughest of environments

The DipMate® Pro is an ultra-reliable backhoe dredging monitoring and control system for accurate visualization, registration, and controlling of backhoe dredging operations. With 60+ DipMate systems active in the field, DipMate® is the backhoe dredging monitoring and control system of choice for operators around the world. An achievement that is largely attributed to 16 years of field feedback processed in an ever-more capable system. As a result, the system contains a well-developed and operator-friendly MMI, including all available functionalities for effective backhoe dredger monitoring.

The DipMate Pro, designed to endure the harshest of dredging operations, can be executed with a number of operator assistance functionalities. These enable more efficient (e.g. bucket angle and boom control) and safer (e.g. cylinder and collision protection module) dredging operations. Thanks to the optional operator assistance functionalities, operators of all skill levels are now more accurate and more productive than ever before.



Backhoe dredger "Razende Bol" – van Oord

Backhoe dredger "Vitruvius" – Jan de Nul



## KEY FEATURES

### 1 Ultra-reliable system designed to endure tough conditions

Rugged hardware, combined with highly stable software and robust sensors, facilitate reliable dredging under the toughest of conditions.

### 2 Maximizes dredging performance and safety through operator assistance

Enabled by high system accuracies and operator assistance functionalities (such as bucket control), operators achieve maximum dredging efficiency, production, and safety.

### 3 Highly customizable

Combining the DipMate® open system architecture with flexibility on the part of our engineers and a comprehensive list of optional functionalities, Seatools is set to meet any client need and configure an appropriate dredging monitoring and control system for any excavator.



## OTHER FEATURES

- Wide range of (terrain) data exchange possibilities
- High update rate for accurate and smooth process visualization
- Online terrain data input
- Highly customizable MMI
- Executed with a range of safety notifications warnings for safe dredging
- 24/7 support for all systems in the field
- Remote access for effective troubleshooting
- Supports any excavator attachment, including buckets, clamshells, grabs, shears, and hammers

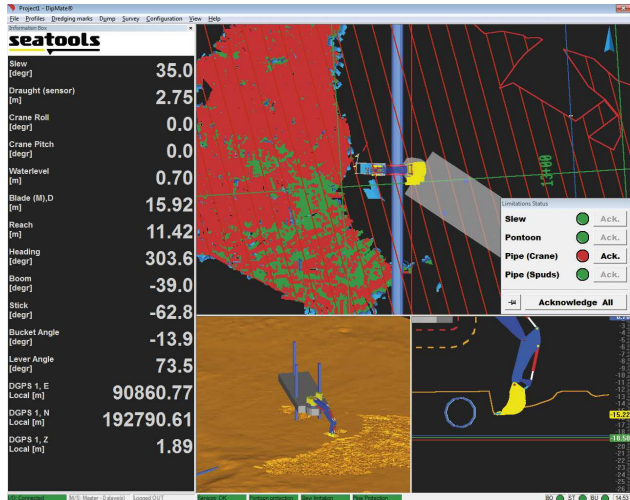


# INTEGRATION OF INTERVENTION AND OPERATOR ASSISTANCE MODULES

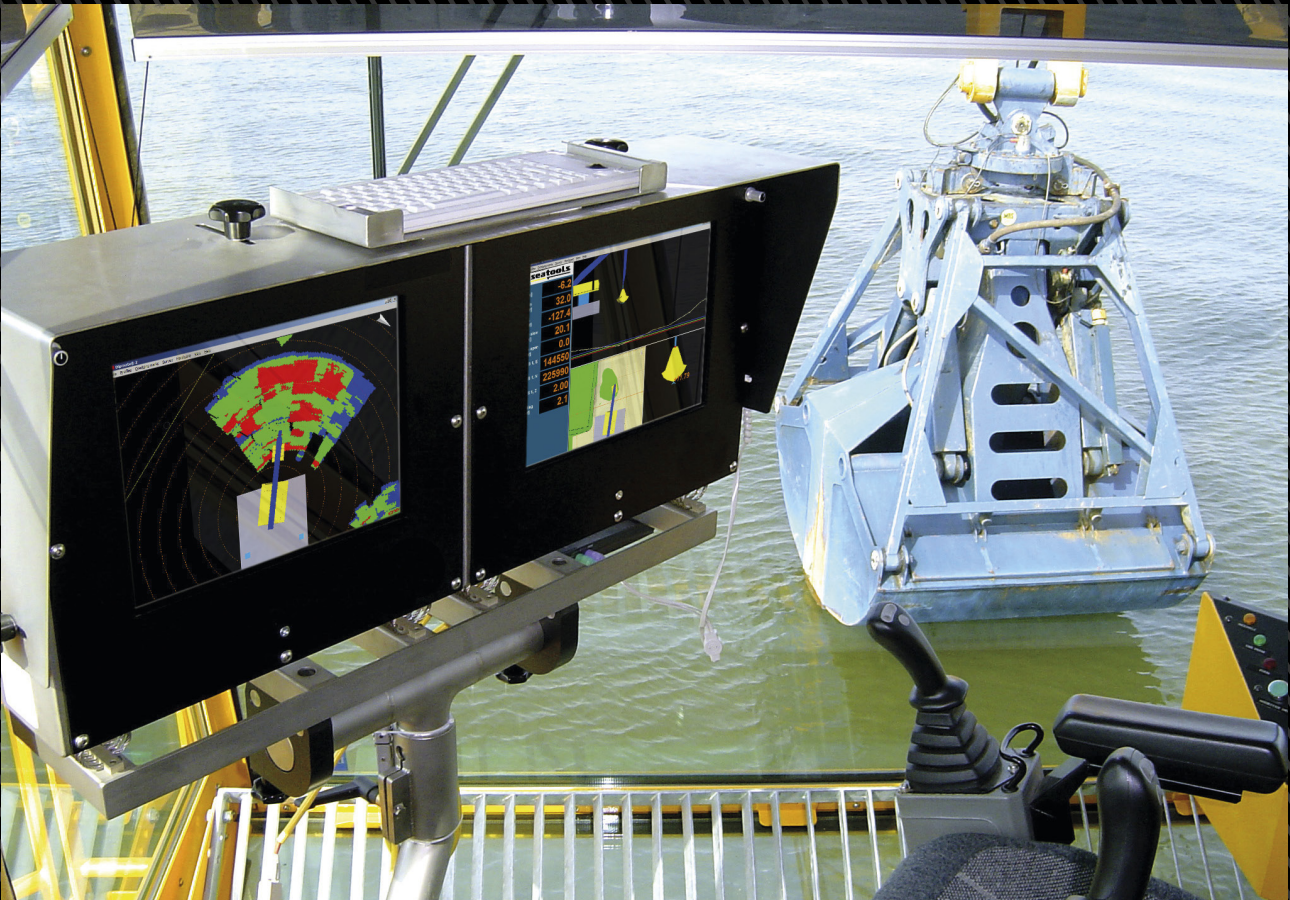
The DipMate® Pro can be executed with multiple intervention and operator assistance modules that facilitate enhanced dredging accuracy, productivity, and safety. To enable these functionalities, the system is extended with an advanced PLC, interfaced with the crane hydraulic system, and linked with the installed dredger sensors to determine the exact position of all dredger parts in real time. In case the motion of crane parts threatens to damage objects near the dredger or the dredger itself, the PLC intervenes by slowing down and eventually stopping dangerous movements.

To facilitate integration of the automation options, there are two possibilities to interface the DipMate with the hydraulic system of the crane: analog interfacing, or interfacing with the CAN bus of the dredger.

For additional information on the various available intervention and assistance modules and their advantages, please review the list of options. To learn more about the integration of these modules with your backhoe dredger, please contact our sales department.



Intervention and operator assistance modules can provide value in multiple ways. The collision protection module, for example, is an intervention module that enables safe and productive backhoe dredging near high-risk objects such as buried live pipelines.





# LIST OF OPTIONS

## The standard DipMate® Pro system includes:

- Stainless steel single monitor console with 15" TFT screen (other sizes available on request)
- Electronics box
- Sensors, including mounting materials
- Custom-size cables, including connectors
- Documentation
- Software license

## The following features are optional:

### HARDWARE OPTIONS

#### A Dual monitor console

A dual monitor console provides the operator with parallel additional views in high detail for optimal insight into the dredging process. A dual monitor console configuration, also, safeguards operational continuation in case the monitor, power supply, or computer fails.

#### B Slave station, including monitor

A slave station panel PC facilitates remote monitoring of the dredging process in real time, such as from an office or a vessel's bridge. The setup allows for efficient cooperation between the crane operator and other involved personnel, such as a surveyor or barge master.

#### C Power master

The DipMate system can be powered by the excavator's battery as an alternative to powering from the ship's UPS. In order to run the excavator's battery, a power master, containing a static converter and UPS, is required. The converter converts 24V DC of excavator battery power into 230V AC, while the UPS secures power when starting the excavator's engine or in case of power irregularities or disruptions. The box is made from stainless steel 316L, is damped by wire rope isolators, and has an IP65 protection grade.

#### D Sensor cable protection

To ensure additional protection of sensor cables on the boom, stick, and lever/bucket, cables can be covered in hydraulic hoses.

#### E Spud pole height measurement

This option provides accurate measurement of the distance between the spud pole and the pontoon deck. As such, it provides accurate insight into the pontoon's anchoring operation. Measurement is performed by installing a rugged Seatools wire length measurement sensor or by a digital rotation sensor.

#### F Spud carrier position measurement

This measurement system provides accurate measurement of the horizontal position of the spud carriers. The option is based on a rugged Seatools wire length measurement sensor.

#### G Draft sensor

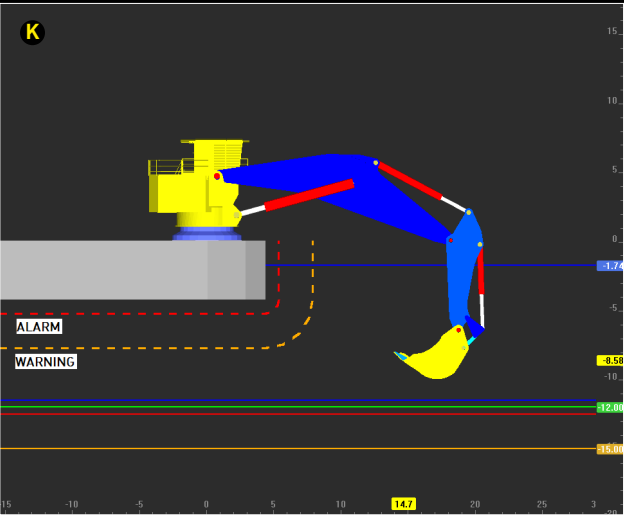
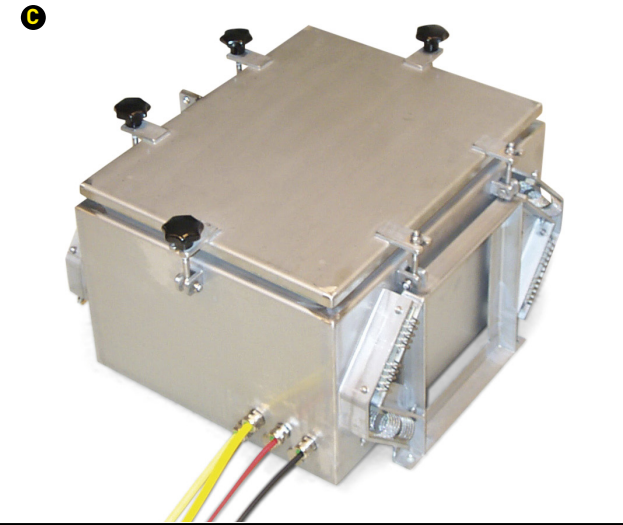
A draft sensor can be fitted for accurate pontoon draft measurement. This entails a 0-1600 mBar absolute pressure transmitter mounted in a stainless steel 316L housing, to which a certified (DNV) bronze slide valve is added.

#### H Pontoon roll and pitch sensor

To ensure system accuracy in case the GPS antenna is not fitted to the crane itself, a roll and pitch sensor can be mounted on the pontoon.

#### I Slew sensor

In case crane heading cannot be derived from the DGPS positioning system, a slew sensor can provide accurate heading determination.



### SOFTWARE OPTIONS

#### J Dredging marks exchange module

By means of a wireless link, this module facilitates real-time dredging data exchange between different dredgers operating in the same area. Real-time, collective insight in the dredging terrain increases efficiency of subsequent dredging operations, or operations that run in parallel. This option requires a wireless connection between cranes. This connection is not included in the module, but can be delivered on request.

#### K Safety warning module

This module facilitates safe backhoe dredging by enabling the operator to set limits on the operational range of the dredger and its components. The module warns the operator in case he threatens to exceed pre-set limits. By applying this module, the possibility of exceeding the maximum operational range is profoundly reduced. Limits can be set

for virtually any crane member (rotational) position, including boom, slew, heading, crane roll and pitch, pontoon roll and pitch, and bucket-pontoon distance.

#### L Grid conversion module

This software module enables flexible conversion from the Lat/Long grid to the Northing/Easting grid.

#### M Remote access module for effective troubleshooting

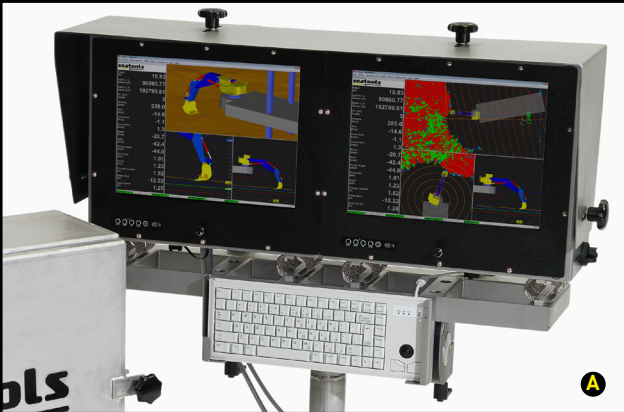
Seatools' DipMate systems can be executed with a remote access module for cost-effective and rapid troubleshooting. From our head office in the Netherlands, we assist operators on any system, anywhere in the world.

#### N Languages

The standard DipMate software can be delivered in English, German, Spanish, Portuguese, Chinese, Russian, and Dutch.



Equipped with shock absorbers to withstand severe shocks and vibrations





LIST OF OPTIONS (CONTINUED)

INTERVENTION AND OPERATOR ASSISTANCE OPTIONS

O Cylinder protection module

The cylinder protection module intervenes when a boom, stick, or bucket cylinder threatens to hit its end stops too hard. As such, the module extends the cylinder’s lifespan and avoids time-consuming replacement of cylinder seals.

P Pontoon protection module

The pontoon protection module facilitates safe backhoe dredging by preventing the bucket teeth from puncturing the pontoon. To protect the pontoon, the operator can set a virtual safety shield around the pontoon, which the bucket is unable to enter.

Q Pontoon auto-leveling module

The pontoon auto-leveling module secures a constant pontoon draft by controlling the spud pole winches. The module increases safety when dredging in areas with strong tidal fluctuations. By controlling the spud pole winches, the system also levels the pontoon in two directions, keeping the pontoon horizontal in both directions.

R Collision protection module

The collision protection module enables safe and productive backhoe dredging near high-risk objects such as wharves, buried pipe sections and/or cables, and other submerged objects. The collision protection module will guard these objects by encapsulating them in a virtual safety shield. Any dredger part motion is slowed down and will eventually be interrupted should it approach the safety shield too closely.

S Bucket angle control module

With the bucket angle control module, the operator can set the desired bucket angle. Based on a pre-set angle, the system automatically adjusts in order to maintain the exact cutting angle until a cut has been completed. A constant and optimal bucket angle not only optimizes dredging efficiency, but also facilitates the creation of very accurate and consistent slopes for operators at all skill levels.

T Boom control module

The boom control module controls the boom elevation, thus dredging depth, preventing under- and over-dredging as a result. When the bucket nears a pre-defined dredging depth, the control module is activated and automatically adjusts the boom elevation so that it maintains the desired dredging depth. Both dredging accuracy and consistency are significantly improved for operators at all skill levels.

U Slew limitation module

By preventing the bucket from approaching objects (e.g. wharves) too closely, the slew limitation module facilitates safe backhoe dredging by limiting the slew angle. The module also ensures safe bucket transfer to its storage position by preventing spud pole contact. When the excavator turns beyond pre-set safety limits, the module will intervene by disabling control and, in some cases (depending on crane), apply a brake that prevents further turning of the excavator.



Cylinder protection

seatools

Cylinder: Stick

Current length: 2.73 m Auto...

Stick extended

Enabled

Length, Min: 3.00 m Take over

Warning limit: 0.20 m

Alarm limit: 0.05 m

Stick retracted

Enabled

Length, Max: 4.93 m Take over

Warning limit: 0.20 m

Alarm limit: 0.05 m

Apply OK Cancel

Auto leveling

seatools

Set auto leveling parameters

Draught: 1.53 m

Desired: 1.60 m

Roll: 0.4 °

Pitch: 0.5 °

Control Limits

Altitude Direction

Absence of Change

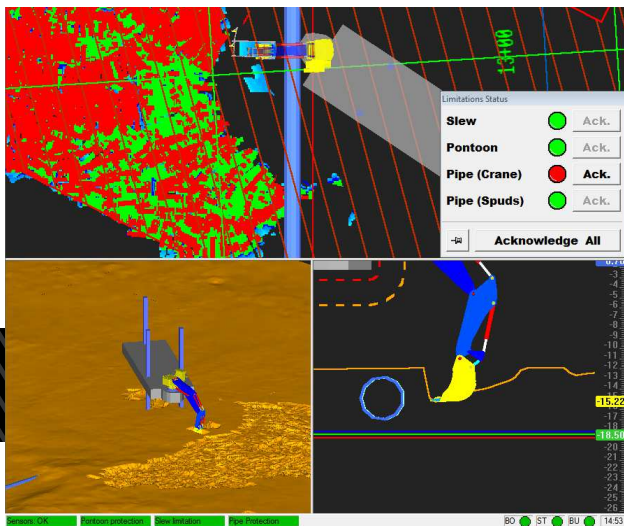
PS Aft SB

Up: ON ON ON

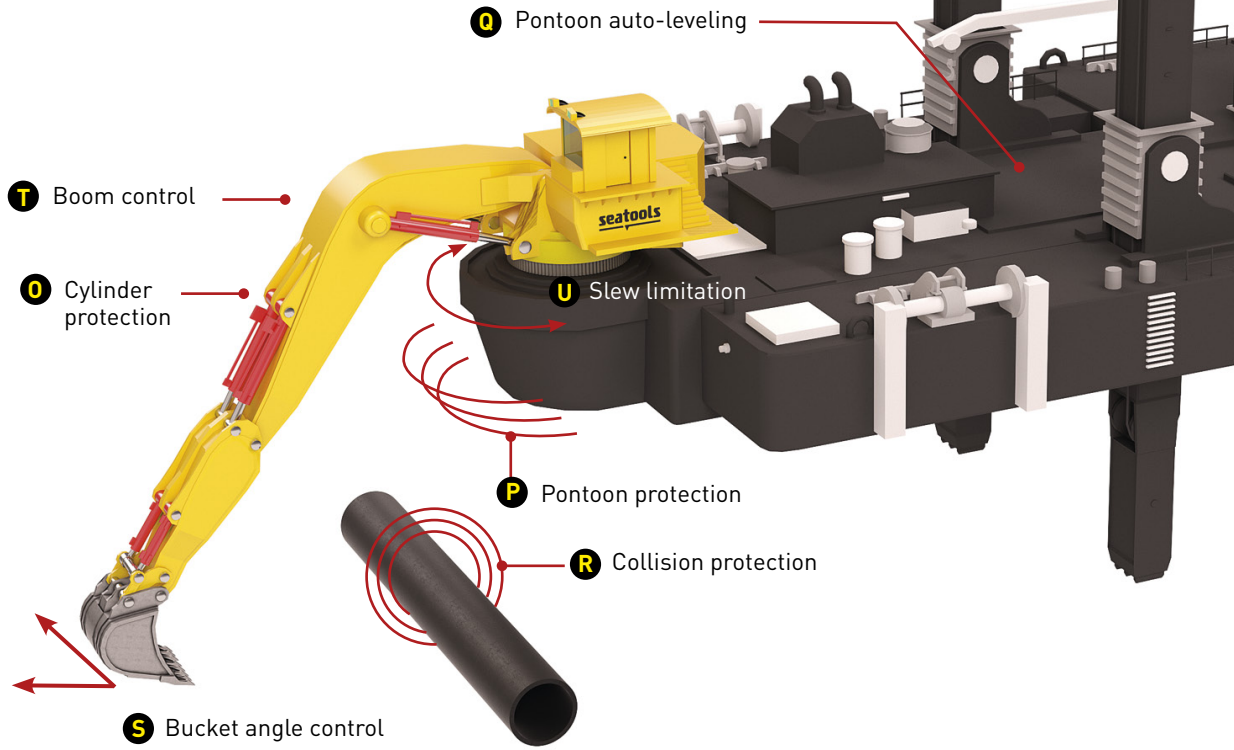
Down: OFF OFF OFF

Center

Acknowledge Alarms



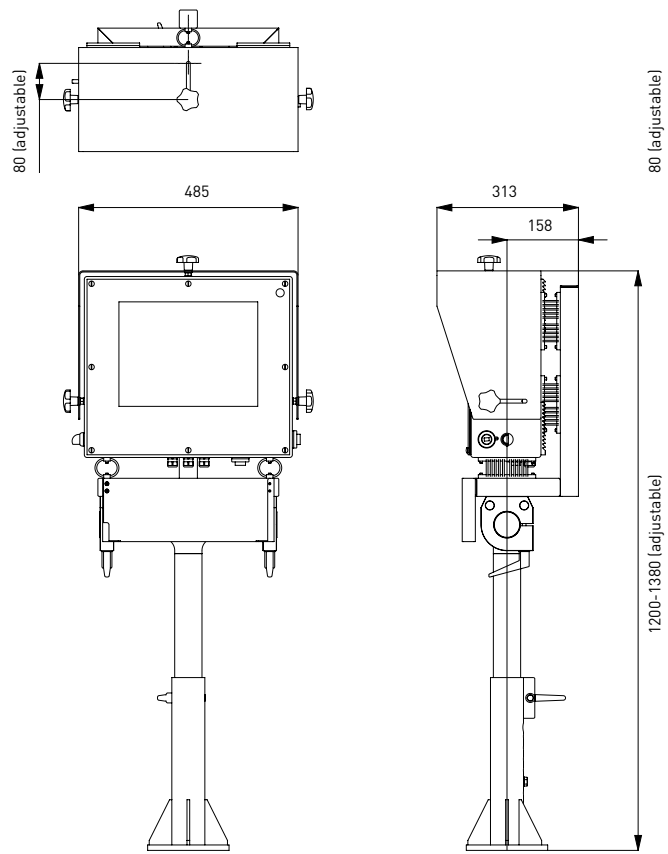
INTERVENTION AND OPERATOR ASSISTANCE OPTIONS



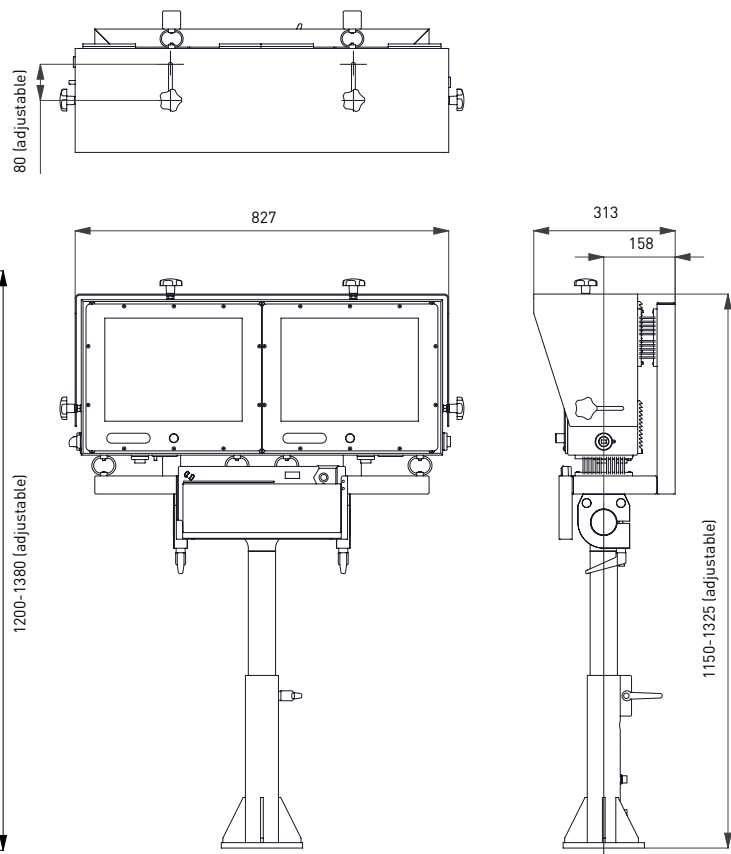


# DIMENSIONS

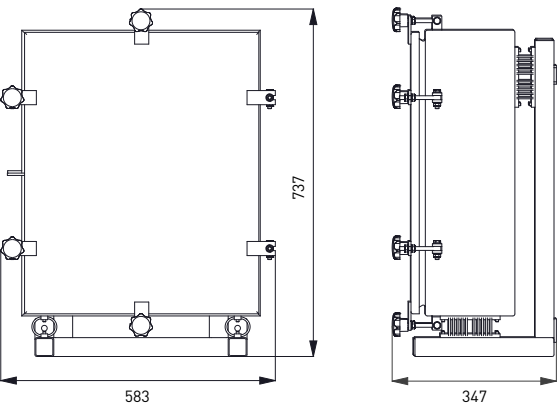
SINGLE MONITOR CONSOLE



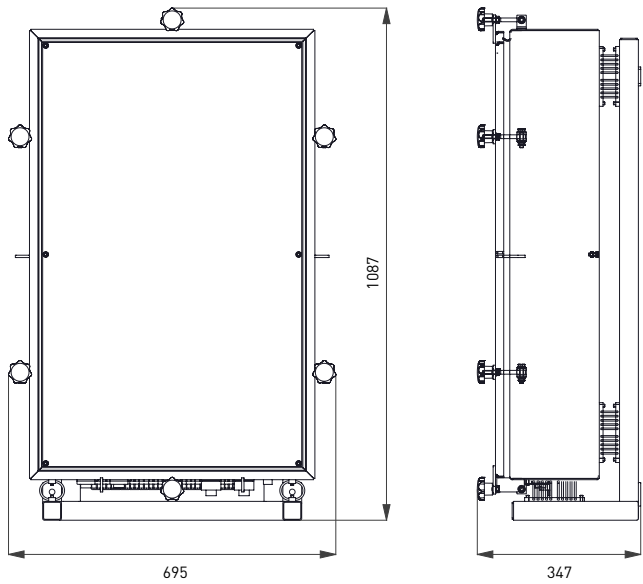
DOUBLE MONITOR CONSOLE (OPTIONAL)



ELECTRONICS BOX REGULAR<sup>1,2</sup> / POWER MASTER<sup>2</sup>



ELECTRONICS BOX LARGE<sup>1,2</sup>



<sup>1</sup> Depending on selected options an appropriate electronic box will be selected  
<sup>2</sup> Electronics boxes and Power Master can be installed in- or outside the cabin

# SPECIFICATIONS

## KEY SPECIFICATIONS DIPMATE® PRO

Power supply	230V AC 50 HZ, 110 V AC 60 HZ, or 24 V DC (only with Power master)
Power consumption	Approx. 350 W (depending on configuration)
IP grade	
Electronics box	IP 68
Sensors	100 m.s.w. depth rating
Additional data supply interfaces	Serial (4X), Ethernet (2X), USB (2X)
Power master capacity	Approx. 30 minutes at full load
Main dimensions	See detailed drawings



## DIPMATE® ESSENTIAL

In addition to our DipMate® Pro system, Seatools offers the DipMate® Essential dredging monitoring system. The DipMate® Essential is a cost-competitive backhoe dredging monitoring and registration system, and makes for an excellent choice when equipping light- to medium-duty excavators. Thanks to its compact size, the Essential system is also suitable for land-based excavators. Learn more about the DipMate® 4 Essential system on [www.seatools.com](http://www.seatools.com), or contact our sales department.





Edisonstraat 67  
3281 NC Numansdorp  
The Netherlands  
Tel. +31 (0) 186 68 00 00  
[www.seatools.com](http://www.seatools.com)  
[info@seatools.com](mailto:info@seatools.com)

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