

# User Manual



*English*



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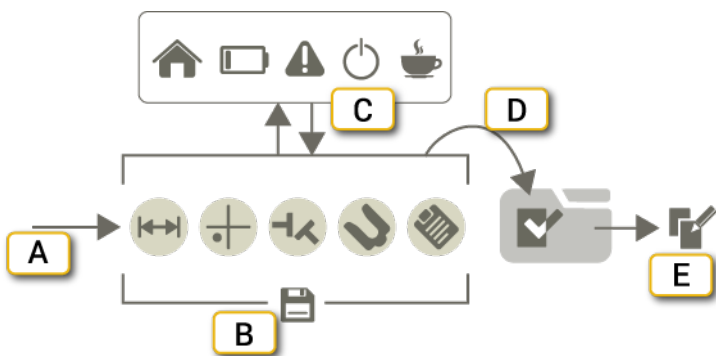


# GENERAL INFORMATION

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## NEW, CONTINUE AND SAVE

---



- A. Start a program.
- B. The measurement is saved automatically through the entire workflow.
- C. You can go to the home screen, have a coffee break, charge the batteries or even use another program. Even if you are interrupted, you are able to continue the same measurement session later on.
- D. When you select Finalize, the measurement file is added to the File manager. See "Finalize" on the next page.
- E. It is possible to create a editable copy of the finalized measurement. See "File manager" on page 9.

### New or Continue session

Tap the program icon to start a new measurement.

If you leave an ongoing measurement session, the next time you will start the same program you are asked if you want to start a new measurement or continue on the previous session.

...	Tap to continue the previous session.
+	Tap to start a new measurement. The ongoing session will be deleted.

### Save

The measurement is saved automatically through the entire workflow. When you select Finalize, the measurement file is added to the File manager. See "Finalize" on the next page.





## FINALIZE

---

The measurement is saved automatically through the entire workflow. When you have finished the measurement, you finalize it. When a measurement has been finalized, it is no longer editable. It is however possible to open a copy and continue working were the last session was ended. For information regarding copy and edit: See "File manager" on the facing page.


### Finalize a measurement

Usually, you select finalize when you have finished your measurement.

1. Tap  and .
2. Enter a new name, or leave the default name.
3. Tap  if you want to link a code to the measurement. See "QR and barcode" on page 13.
4. Tap . The file is finalized and no longer editable. The measurement file is added to the File manager.

It is possible to create a template of a measurement. See "Templates for measurements" on page 12.

### View a finalized measurement

1. Tap  to open the File Manager.
2. Tap the measurement you want to view. The distances are visible but not editable.

If you want to create a editable copy of the open measurement, tap  and  to open a copy of it.


## FILTER

---

If the laser beam passes through air with varying temperature, this may influence the direction of the laser beam. If measurement values fluctuate, this could mean unstable readings. Try to reduce air movements between laser and detector by, for instance, moving heat sources or closing doors. If the readings remain unstable, increase the filter value (more samples will become available to the statistical filter).

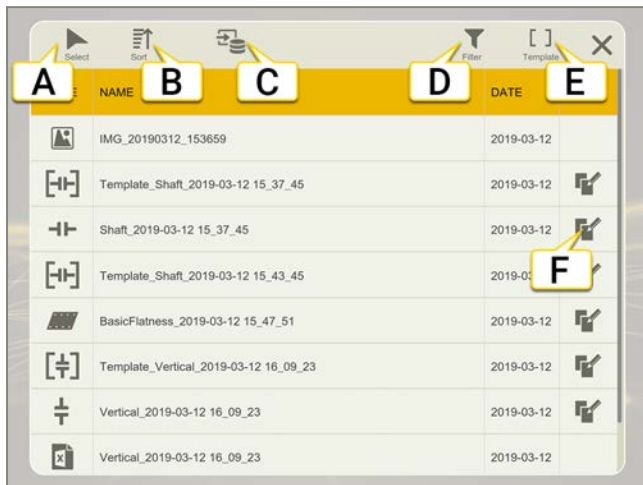
Filter is **not** available when you measure with the method Continuous Sweep.

### Select filter

Tap  to expand the filter tab. Use as low filter value as possible that still produces acceptable stability during the measurement. Default is set to 1. The filter value you choose, will be default next time you start the program. Select filter on the tab.



# FILE MANAGER

On the Start view, tap  to open the File Manager.





- A. Select files.
- B. Sort files.
- C. Source. Tap to show local files or files on a USB.
- D. Filter view. Use filters to easily find the files you are looking for. See "Filter files" on page 11.
- E. Templates. Quick access to your measurement templates. Tap to open the filter view displaying all your templates.
- F. Create a editable copy of the file. The file will be saved with a new name.

## Delete files


1. Tap  to activate check boxes.
2. Select one or many files.
3. Tap . You will be asked to confirm the deletion.

## Share files

1. Tap  to activate check boxes.
2. Select one or many files.
3. Tap . On the XT11 it is possible to share to mail or USB.




## Sort files

By default, the files are sorted by date.

1. Tap .
2. Select Type, Name or Date. It is possible to have rising or falling order.

## Copy and edit file





When a measurement has been finalized, it is no longer editable. It is however possible to open a copy and continue working were the last session was ended.

- Tap  to open a editable copy of the selected measurement. This measurement will be saved with a new name when you finalize it.
- If you have a finalized measurement open, tap  and  to open a copy of it.






## GENERAL INFORMATION

### Import files from USB

By default, the files saved in the Display unit are shown. If you want to import files from a USB, follow these steps:



1. Tap  to select source.
2. Tap  to show the files on the USB memory stick.
3. Tap  to activate check boxes. Select one or many files.
4. Tap  to import the selected files to the Display unit.

### File types

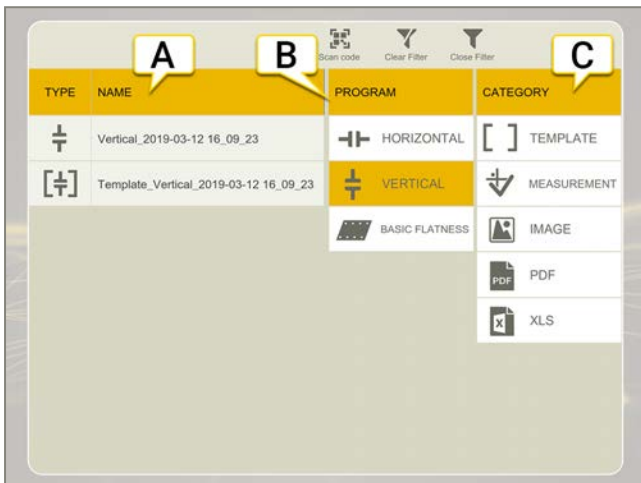
	Measurements. All <b>finalized</b> measurements are stored in File Manager and represented by the corresponding program icon. Tap a file to view it. See "Finalize" on page 8.
	Measurement icons with brackets are templates. Tap a file to open it. See "Templates for measurements" on page 12.
	Pdf-report. Tap a file to open it. Reports are stored as pdf-files. See "Report" on page 14.
	Excel file. It is not possible to view Excel files in the XT11 Display unit. To view it, share it to a USB memory stick.
	Photos, IR-photos and screenshots. Images are stored as .png-files. The files are named with the date and time they were created. Tap a file to open it. See "Camera" on page 24, See "Screenshot" on page 27.

## Filter files

Use filter to easily find the files you are looking for.










1. Tap  on the start view to open the File Manager.
2. Tap  to open the filter view.
3. Tap a Program and/or Category filter to filter out what you want to see. Tap again to deselect.
4. Select a file from the list to open it.

The filter you have selected will be active until you either close the File manager or tap  to clear the filter.



- A. Filtered file list with type and name. Tap a file to open it.
- B. Program filters. The example above show all files regarding the program Vertical.
- C. Category filters.

### Icons

	Clear all filters. Available when you have selected a Program and/or a Category filter.
	Close the filter view.
	Scan a QR code or barcode.
Category icons:	
	Show all templates.
	Show all measurement files.
	Show all images.
	Show all pdf reports.
	Show all excel reports.
	Show all files with a scanned code.





### Templates for measurements


Save a measurement as a template to easily reuse the information you enter. A template does not include any measurement data. What kind of information that is saved in the template depends on which program you are using.

Examples of saved information:

- Tolerances
- RPM
- Machine images
- Coupling type
- Locked feet
- Number of feet
- Name of the machines
- Distances
- Thermal compensation
- Report template

### Create a template





1. Tap  and .
2. Enter a new name or keep the default name.
3. Tap  if you want to link a code to the measurement. See "QR and barcode" on the facing page.
4. Tap  to create the template. The template is saved in the File manager.

In the File Manager, tap  to quickly access all your measurement templates.





## QR and barcode

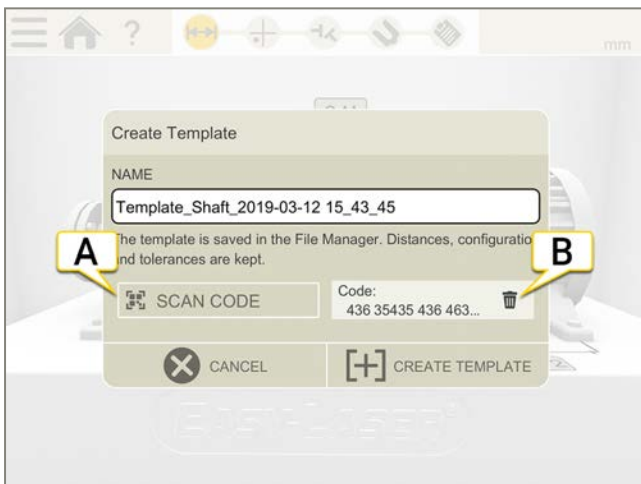
A code can be linked to measurements and templates. Use our new QR codes, or our older barcodes. Stick a QR (or barcode) on the machine and save the measurement together with the scanned code. Next time, all you need to do is scan the code and all machine data is read.

### Save a measurement with QR code

1. Tap  and .
2. Enter a new name, or leave the default name.
3. Tap  to open the scanner. The code is automatically scanned.
4. Tap . The file is finalized and no longer editable. The measurement file is added to the File manager.


### Save a template with QR code

1. Tap  and .
2. Enter a new name or keep the default name.
3. Tap  to open the scanner. The code is automatically scanned.
4. Tap  to create the template. The template is added to the File manager.




- A. Tap to scan a code.
- B. Tap to delete the code.

### Open a file with QR code

- From the Start view: Tap  to open the scanner. If only **one** template is linked to the scanned code, this template is opened directly. If several files are linked to the code, the File manager is opened.
- You can also open scanned files from the filter view in the File manager. See "Filter files" on page 11.





## REPORT

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The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



### Save a report

To save a report, you need to **finalize** the measurement. You can choose to save the report as a Pdf or an Excel file. The Excel file is not possible to view in the XT11 Display unit. To view it, share it to a USB memory stick.



1. Tap  and .
2. Enter a new name, or leave the default name.
3. Go to Report view.
4. Tap  or .

When saving as pdf, it is possible to select a file name. It is also possible to sign the report. The signature is visible in the report.

### Select a report template




1. Tap  to open the report.
2. Tap . A sidebar is displayed.
3. Select a template. Which templates that are available depends on which program you are using.

### Add a note

1. Tap  and .
2. Write a note and tap OK.




The note is visible in the report.

### Add photos

1. Tap  and . The camera is also available from the start view.
2. Tap  to take a photo. The photo is added to the report.



If you have an ongoing measurement and take a photo, the **latest** photo is added to the report automatically. If you are using a template that does not include photos, the photos you take are only visible in the File Manager.

#### Add several photos to a report

1. Tap  to open the report.
2. Tap .
3. Select the images you want to add.
4. Tap .



### Add user information

The information you enter will be visible in the reports that is using the template "Detailed".

1. Tap  on the startscreen to open the Settings menu.
2. Tap  and enter user information.

See "User information" on page 17


## Share a report to USB

1. Tap  in the workflow to open the Report view.
2. Insert a USB memory stick.
3. Tap  to share the file.

You can also share files from the File manager.




## SETTINGS

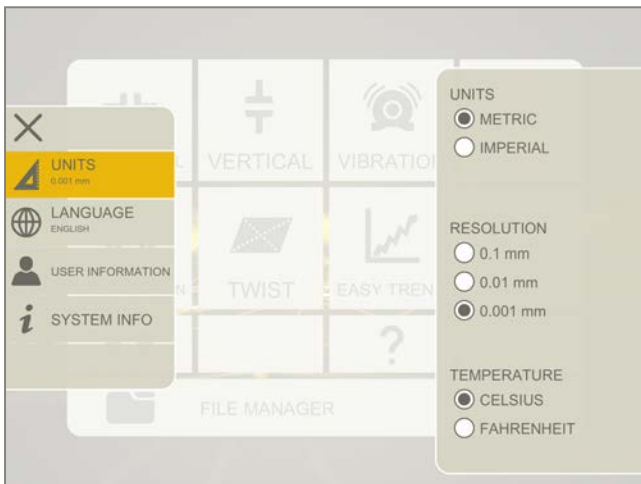
---

Tap  on the startscreen to open the Settings menu.




### Units

You can choose between metric or imperial units for your measurements. The selected unit is shown in the upper right corner of your screen during your measurements.

1. Tap  on the startscreen to open the Settings menu.
2. Tap  and select unit and resolution. Default is set to 0.01 mm.
3. Tap  to close the Settings view. Your new settings are saved.





### Language


1. Tap  on the startscreen to open the Settings menu.
2. Tap  and select a language.
3. Tap  to close the Settings view. Your new setting is saved.

## User information

The information you enter will be visible in the coming reports that is using the template "Detailed".

1. Tap  on the startscreen to open the Settings menu.
2. Tap  and enter user information.

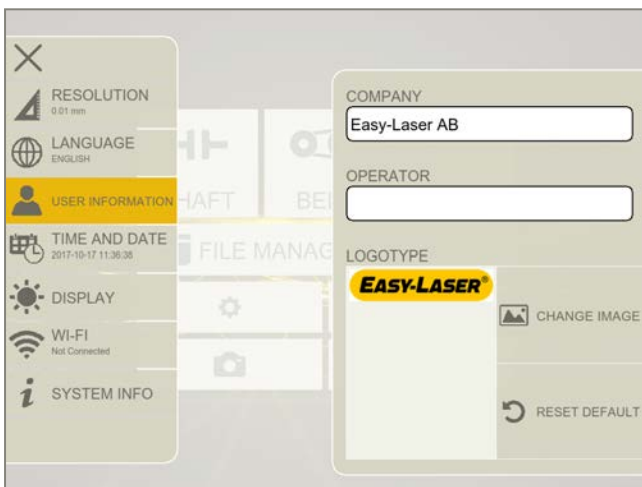
### Select logo

1. Insert a USB memory stick to the XT11.
2. Tap  and select an image. (If you are not using the XT11, the file manager of your device will be opened.)
3. Tap "Use selected logotype".




### Reset logo

Tap  to reset the logotype to standard Easy-Laser.

If you reset the logotype, you have to insert the USB memory stick if you want to select your logotype again.






### Time and date

1. Tap  on the startscreen to open the Settings menu.
2. Tap  to set the time and date.
3. Tap  to close the Settings view. Your new settings are saved.





### Display

Adjust the brightness to make it easier to read in bright sunlight for example. Remember however that a high contrast consume more battery power. Default is set to 40%



1. Tap  on the startscreen to open the Settings menu.
2. Tap  and adjust the brightness.
3. Tap  to close the Settings view. Your new setting is saved.



## System information




1. Tap  on the startscreen to open the Settings menu.
2. Tap  to show system information.

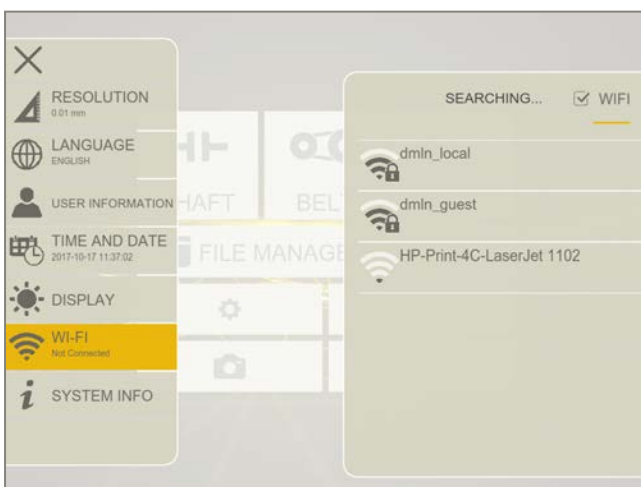
## Update software

1. Go to our website to check for software updates.
2. Download the updates to a USB.
3. Insert the USB stick.
4. Tap  on the startscreen to open the Settings menu.
5. Tap  to show system information.
6. Tap the file name to install.









## Wi-Fi

1. Tap  on the startscreen to open the Settings menu.
2. Tap  to open Wi-Fi settings.
3. Tap  to close the Settings view. Your new settings are saved.



GENERAL INFORMATION

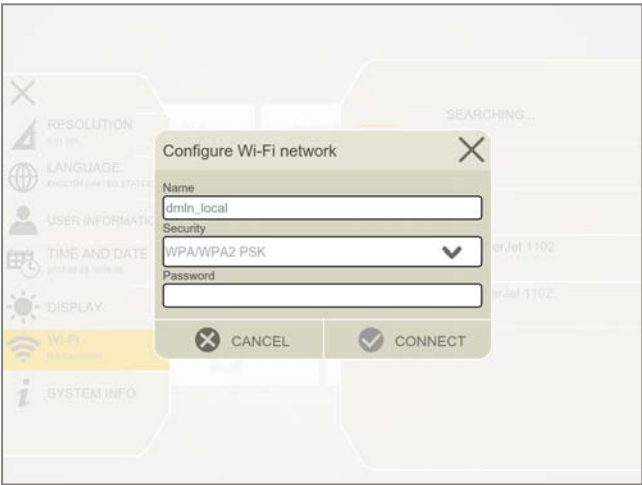
Icons

	Connected to a Wi-Fi network.
	A locked Wi-Fi. A password is requested.
	Wi-Fi is turned off. Turn off Wi-Fi if you are in an environment where Wi-Fi is not permitted.
	Remove the Wi-Fi network from the list.
	Connected to Wi-Fi, but no Internet connection is detected.
	Tap to display more information regarding the Wi-Fi network and connection.

Select Wi-Fi

Enter the password for the network.

Security options: Open, WEP, WPA/WPA2



# DISPLAY UNIT

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## XT11 STARTSCREEN

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- A. The info display show battery information. See "Info display on XT11" on the next page.
- B. On/Off button.
- C. Lock screen/Battery  
When the Display unit is off: Press to see the battery status.  
When the Display unit is on: Press to lock the touch function on the screen. Prevents unintentional clicks, for instance when moving between work positions.
- D. OK button.
- E. Tap the screen to open a program.

On the startscreen you will find the icons for the programs you have downloaded, plus some default icons:


	See "File manager" on page 9.
	See "Settings" on page 16.
	Opens the User Manual.
	See "Wi-Fi" on page 19.
	See "Camera" on page 24.
	IR camera, optional equipment.
	See "QR and barcode" on page 13.












For technical information regarding XT11, See "Display unit XT11" on page 189.

## INFO DISPLAY ON XT11



The info display gives information about the battery status for both the Display unit and the connected measuring units. When the Display unit is off, you can press  to show battery information.



- A. Battery information for the connected measuring units.
- B. Serial number for the measuring unit. This number is also found on the back of the measuring unit.
- C. The screen is locked. Press  to enable the touch function on the screen again.
- D. Battery information for Display unit XT11. (XT11 includes two separate battery packs)

	The remaining battery power is shown in percentage.
	Battery is low, less than 10%. Please charge.
	The battery is being charged. When fully charged it shows 100.
	No batteries, the Display unit is run via the adapter.
	The battery is hot. The charging capacity is limited.
	The battery is cold. The charging capacity is limited.
	The battery is empty, the Display unit will turn off shortly.
	System fail, try to restart the Display unit.
	Unbalanced battery. Remove the adapter, start the Display unit and wait. When the warning is gone, charge the Display unit.
	The battery cover is open. Close the cover.
	Inconsistent charging, this overrides all other warnings. One of the battery packs may be malfunctioning. Reconnect adapter. If the warning is persistent, contact Service center.

### Lock screen

When the Display unit is on: Press  lock the touch function on the screen. Prevents unintentional clicks, for instance when moving between work positions. To unlock, press  again.

## CHARGE XT11

---

Charge the display unit by plugging in the power adapter. For information about the battery status See "Info display on XT11" on the previous page. To fully charge the battery takes approximately 3 hours. It is possible to keep on using the equipment while it is charging.

**NOTE!** When finished working for the day, charge the whole system. Plug in the power adapter to the display unit.




### Switch battery

If the battery must be switched, it is recommended that you contact your service center.

## CAMERA

---

The camera is default in the XT11. It is possible to buy an XT11 without a camera. It cannot be retrofitted.





1. Tap  and . The camera is also available from the start view.
2. Tap  to take a photo.

The photo is saved in File manager as a .png file. It is named with current date and time. If you have an ongoing measurement (and using a layout that will include a photo), the **latest** photo is added to the report automatically. If a new photo is taken, the previous one will be overwritten.

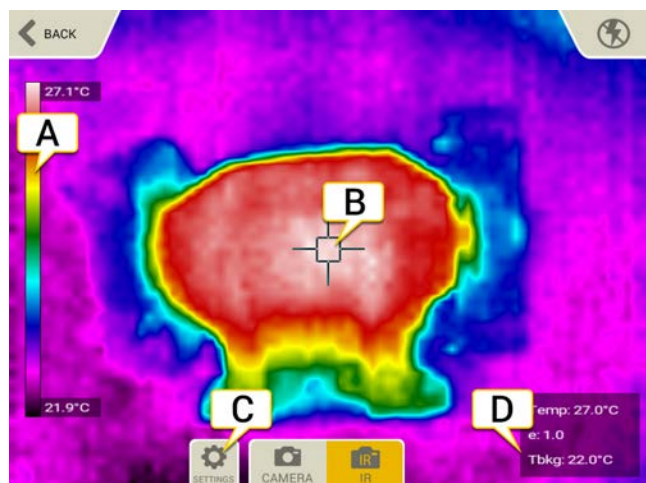
It is also possible to add several photos to a report. See "Report" on page 14.


## IR CAMERA

The IR (thermal) camera is optional equipment (Part No. 12-0968) and cannot be retrofitted.

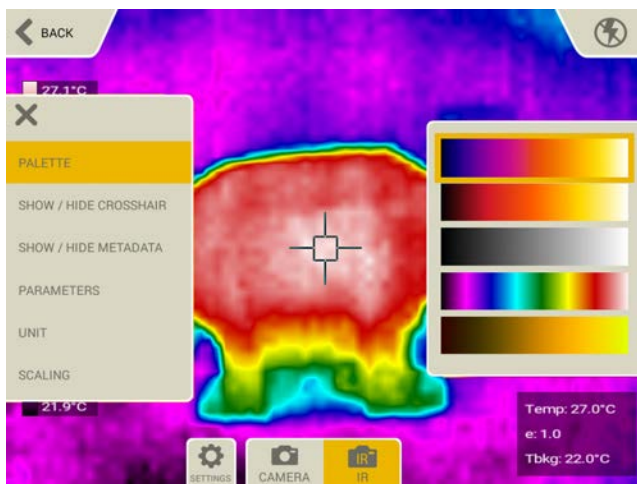
1. Tap  and . The camera is also available from the start view.
2. Tap  to start the IR camera. Allow the camera to acclimatise for about five minutes in the environment in which it is to be used. This will ensure an optimal IR measurement.
3. Press  to take a photo.

An IR photo is saved in the File manager as a .png file. It is named with current date and time. If you have an ongoing measurement, the photo is added to the report.



- A. Heat scale.
- B. Crosshair. This is where the temperature is registered (Temp, e and Tbkg).
- C. Tap  to open Settings.
- D. Temp: The average temperature.  
e: The emissivity value.  
Tbkg: The reflected background temperature.

## Settings



### Palette

Change the color presentation of the infrared images. Select between iron, glowbow, grey, rain or yellow.

### Show/hide

If you hide the crosshair and/or metadata, it will not be shown on the saved image either.

### Emissivity (e)

The emissivity value of the surface/object is captured by the crosshair. The correct emissivity value is important for an accurate calculation. Possible values: 0.01 - 1.00, but we do not recommend value below 0.6. The value is normally set from a list of emissivity values for some common materials.

- 1.00 for a perfect blackbody.
- 0.01 for a perfect shiny (in the infrared spectrum) object.

### Background temperature (Tbkg).

The reflected background temperature of the surface/object. Can normally be set to the ambient temperature. Value <382°C (720°F). Has no effect when e = 1.00

### Unit

Select Celsius or Fahrenheit.

### Scaling

By default, manual scaling is **not** used and the heat scale of the image will adjust automatically from the lowest temperature to the highest temperature of the IR image.



If you select manual scaling, you can decide which temperatures you want to visualize.

- Scale max: Enter a temperature (up to 450°C).
- Scale min: Enter a temperature (down to 0°C).

## SCREENSHOT

---

It is possible to take screenshots of what is currently displayed on the XT11 screen.

1. Press the  button.
2. Tap .
3. The screen dump is saved in File manager as a .png file. It is named with current date and time.

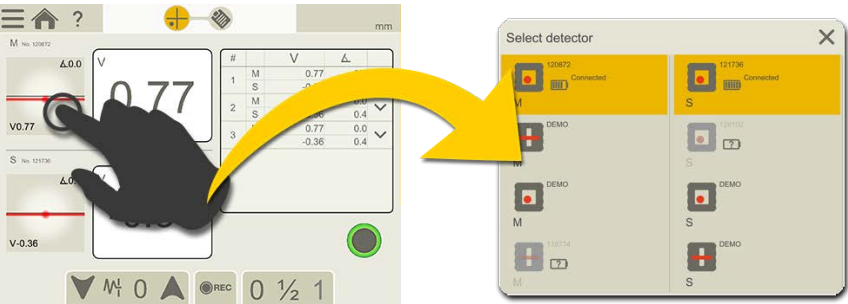


# MEASURING UNITS

## SELECT MEASURING UNITS

If you have used any measuring units before, these will automatically be connected. There are also demo detectors available.

1. Tap a target to display the detector list.
2. Select from the list.
3. Tap **X** to close.



Tap [FORGET] if you do **not** want to connect to the measuring unit automatically.

### Measuring units and programs

	XT70	XT60	XT50	XT40
Values	X	X	X	X
EasyTrend	X			
Horizontal (EasyTurn or 9-12-3)	X	X	X	X
Horizontal (Multi or Sweep)	X	X	X	
Machine Train (two couplings)	X	X	X	
Machine Train (two or more couplings)	X		X	
Vertical	X	X	X	X
Cardan	X			
Twist	X	X	X	

The live option "**Live360**" is only available when using **XT70**.

### Charge

Charge the measuring units by plugging in the power adapter intended for the measuring units.

To fully charge the battery takes approx. 2 hours. Operating time for XT40 and XT60 is up to 24 h.




It is possible to keep on using the equipment while it is charging.

## MEASURING UNITS

**NOTE!** When finished working for the day, charge the whole system. Plug in the power adapter to the measuring units.

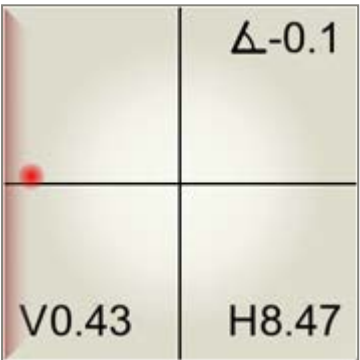
### Information in the Display unit

Information regarding the Measuring units is also shown in the Display unit. On the targets you can clearly see when the battery is running low and the inclinometer value for example.

	Battery information.
	No measuring unit is connected. Tap the target to find possible units.
	Inclinometer value.

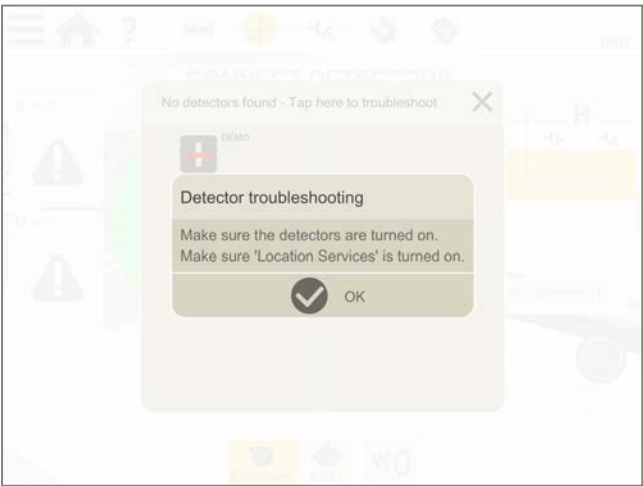
### Edge warning

When the laser beam is close to the edge, the edge is “lit up” as a warning. It is still possible to register values when the edge warning is active.



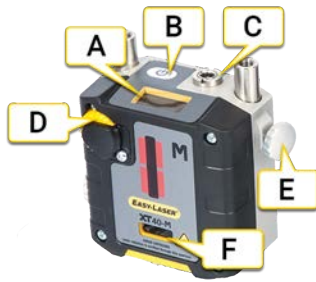
### Troubleshooting

- Make sure that the measuring units are turned on.
- Make sure that they are charged.
- Make sure that "Location services" is on. On a phone or tablet, this function is usually found under Settings > Connections.



## XT40











The XT40 measuring units utilize line-type laser and 30 mm PSD.



- A. Info display
- B. On/Off button
- C. Connection for charging cable
- D. Laser adjustment knob
- E. Locking knob
- F. Laser aperture

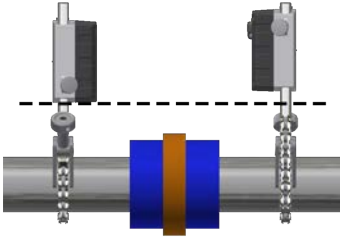
### Info display

The measuring unit is equipped with an info display showing the angle value and battery information. The info display becomes active when the measuring unit is started.

	During start up, the display shows the version of the equipment. Start up takes approximately 3 seconds.
	The battery icon shows, in percentage, how much battery power that remains.
	The battery is being charged. When fully charged the symbol shows 100.
	Less than 10 % of the battery capacity remains. Charge the unit.
	The unit is unable to give information about the battery. Charge the unit until the battery icon shows 100.
	Something is wrong with the battery. It may be missing or damaged.
	The unit is shutting down. Shutting down takes approximately 3 seconds.
	Malfunction. Restart the unit, if it does not help, please contact your service center.
	System failure. Note the error code and contact your service center. Turn off the unit, do not charge.
	This icon indicates that wireless communication is established between the Display unit and measuring unit.

### Set up XT40

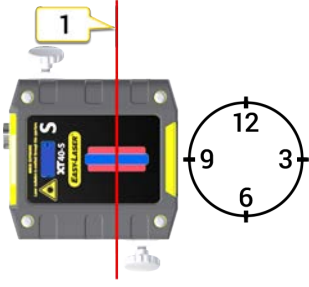
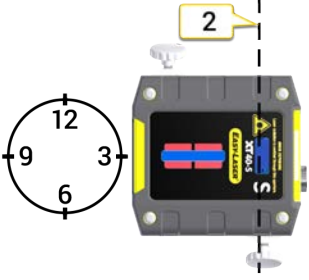
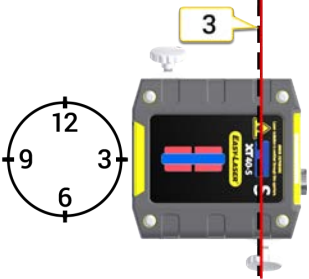
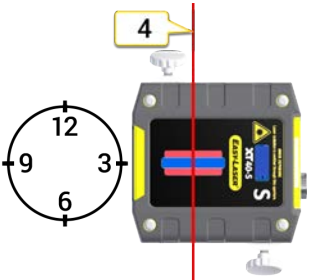
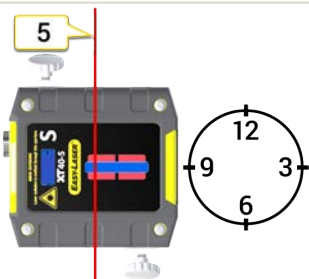
1. Mount the S-unit on the stationary machine and the M-unit on the movable machine. You can place the measuring units up to 10 m apart.
2. Mount the units facing each other. Make sure they are at the approximately same rotational angle and radius. You need to place the measuring units with an offset. See image.



*Place the measuring units with an offset*

## Rough align XT40

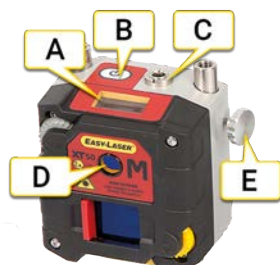
When making a new installation, a rough alignment can be necessary. Place the Measuring units on the rods, make sure they are at the approximately same rotational angle and radius. Also make sure that the adjustment knob is adjustable in both directions.

	<ol style="list-style-type: none"> <li>1. Place the Measuring units at 9 o'clock. Adjust the laser line to the center of both targets. Use the adjustment knob and/or move the detectors on the rods.</li> </ol>
	<ol style="list-style-type: none"> <li>2. Turn the shafts 180°. Make a mark on the rods or machine halfway between the laser line and center of both targets.</li> </ol>
	<ol style="list-style-type: none"> <li>3. Adjust the laser beams half way to the center of targets. Use the adjustment knobs and/or move the detectors on the rods.</li> </ol>
	<ol style="list-style-type: none"> <li>4. Adjust the movable machine until the laser beam hits the center of both targets.</li> </ol>
	<ol style="list-style-type: none"> <li>5. Turn the shafts 180°. Check if both laser lines hit the targets. If not, repeat step 3–5. Turn shafts to 12 o'clock. Repeat all steps for vertical adjustment.</li> </ol>

## XT50

The XT50 measuring units are ATEX approved for use potentially explosive environments. The units utilize dot-type laser and 1-axis square PSD surfaces.

XT50 is an intrinsically safe laser product, please read the safety instructions. See "XT550 Shaft" on page 201.



- A. Info display
- B. On/Off button
- C. Connection for charging cable
- D. Laser aperture
- E. Locking knob

### Info display

The measuring unit is equipped with an info display showing the angle value and battery information. The info display becomes active when the measuring unit is started.

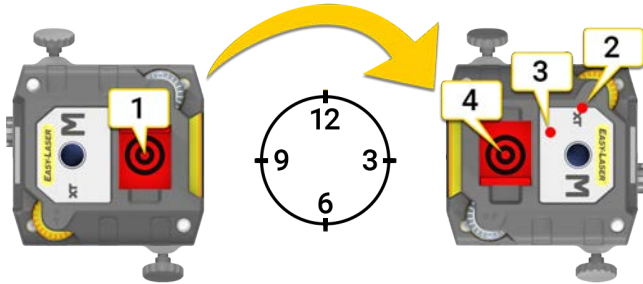
	During start up, the display shows the version of the equipment. Start up takes approximately 3 seconds.
	The battery icon shows, in percentage, how much battery power that remains.
	The battery is being charged. When fully charged the symbol shows 100.
	Less than 10 % of the battery capacity remains. Charge the unit.
	The unit is unable to give information about the battery. Charge the unit until the battery icon shows 100.
	Something is wrong with the battery. It may be missing or damaged.
	The unit is shutting down. Shutting down takes approximately 3 seconds.
	Malfunction. Restart the unit, if it does not help, please contact your service center.
	System failure. Note the error code and contact your service center. Turn off the unit, do not charge.
	This icon indicates that wireless communication is established between the Display unit and measuring unit.

## Set up XT50

1. Mount the S-unit on the stationary machine and the M-unit on the movable machine. You can place the measuring units up to 20 m apart.
2. Mount the units facing each other. Make sure they are at the approximately same rotational angle and radius.

## Rough align

When making a new installation, a rough alignment can be necessary. Place the measuring units on the rods, make sure they are at the approximately same rotational angle and radius. Also make sure that the adjustment knob is adjustable in both directions. The example below shows the M-unit, but the procedure is made on both units.



1. Place the units at 9 o'clock. Aim the laser beams at the centre of the targets.
2. Turn the shaft to position 3 o'clock. Note where the laser beams hit.
3. Adjust the laser beams half way to the centre of targets. Use the adjustment knobs.
4. Adjust the movable machine until the laser beam hits the centre of targets.

## XT60











The XT60 measuring units utilize dot-type laser and 1-axis square PSD surfaces.



- A. On/Off button
- B. Connection for charging cable
- C. Info display
- D. Laser adjustment knob
- E. Laser aperture
- F. Locking knob

### Info display

The measuring unit is equipped with an info display showing the angle value and battery information. The info display becomes active when the measuring unit is started.

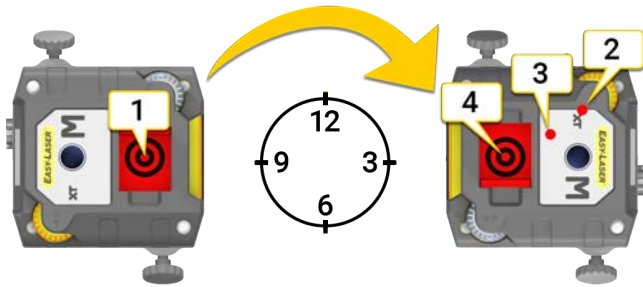
	During start up, the display shows the version of the equipment. Start up takes approximately 3 seconds.
	The battery icon shows, in percentage, how much battery power that remains.
	The battery is being charged. When fully charged the symbol shows 100.
	Less than 10 % of the battery capacity remains. Charge the unit.
	The unit is unable to give information about the battery. Charge the unit until the battery icon shows 100.
	Something is wrong with the battery. It may be missing or damaged.
	The unit is shutting down. Shutting down takes approximately 3 seconds.
	Malfunction. Restart the unit, if it does not help, please contact your service center.
	System failure. Note the error code and contact your service center. Turn off the unit, do not charge.
	This icon indicates that wireless communication is established between the Display unit and measuring unit.

## Set up XT60

1. Mount the S-unit on the stationary machine and the M-unit on the movable machine. You can place the measuring units up to 20 m apart.
2. Mount the units facing each other. Make sure they are at the approximately same rotational angle and radius.

## Rough align

When making a new installation, a rough alignment can be necessary. Place the measuring units on the rods, make sure they are at the approximately same rotational angle and radius. Also make sure that the adjustment knob is adjustable in both directions. The example below shows the M-unit, but the procedure is made on both units.



1. Place the units at 9 o'clock. Aim the laser beams at the centre of the targets.
2. Turn the shaft to position 3 o'clock. Note where the laser beams hit.
3. Adjust the laser beams half way to the centre of targets. Use the adjustment knobs.
4. Adjust the movable machine until the laser beam hits the centre of targets.

## XT70











The XT70 measuring units utilize dot-type laser and 2-axis square PSD surfaces.



- A. On/Off button
- B. Connection for charging cable
- C. Info display
- D. Laser adjustment knob
- E. Laser aperture
- F. Locking knob

### Info display

The measuring unit is equipped with an info display showing the angle value and battery information. The info display becomes active when the measuring unit is started.

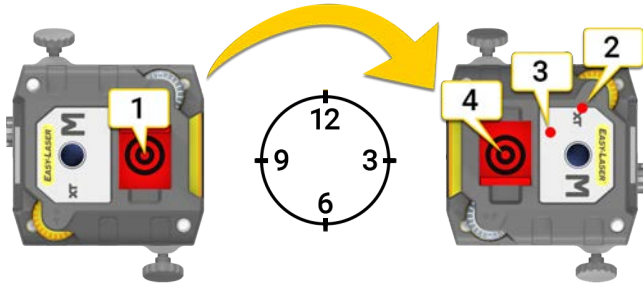
	During start up, the display shows the version of the equipment. Start up takes approximately 3 seconds.
	The battery icon shows, in percentage, how much battery power that remains.
	The battery is being charged. When fully charged the symbol shows 100.
	Less than 10 % of the battery capacity remains. Charge the unit.
	The unit is unable to give information about the battery. Charge the unit until the battery icon shows 100.
	Something is wrong with the battery. It may be missing or damaged.
	The unit is shutting down. Shutting down takes approximately 3 seconds.
	Malfunction. Restart the unit, if it does not help, please contact your service center.
	System failure. Note the error code and contact your service center. Turn off the unit, do not charge.
	This icon indicates that wireless communication is established between the Display unit and measuring unit.

## Set up XT70

1. Mount the S-unit on the stationary machine and the M-unit on the movable machine. You can place the measuring units up to 20 m apart.
2. Mount the units facing each other. Make sure they are at the approximately same rotational angle and radius.

## Rough align

When making a new installation, a rough alignment can be necessary. Place the measuring units on the rods, make sure they are at the approximately same rotational angle and radius. Also make sure that the adjustment knob is adjustable in both directions. The example below shows the M-unit, but the procedure is made on both units.



1. Place the units at 9 o'clock. Aim the laser beams at the centre of the targets.
2. Turn the shaft to position 3 o'clock. Note where the laser beams hit.
3. Adjust the laser beams half way to the centre of targets. Use the adjustment knobs.
4. Adjust the movable machine until the laser beam hits the centre of targets.

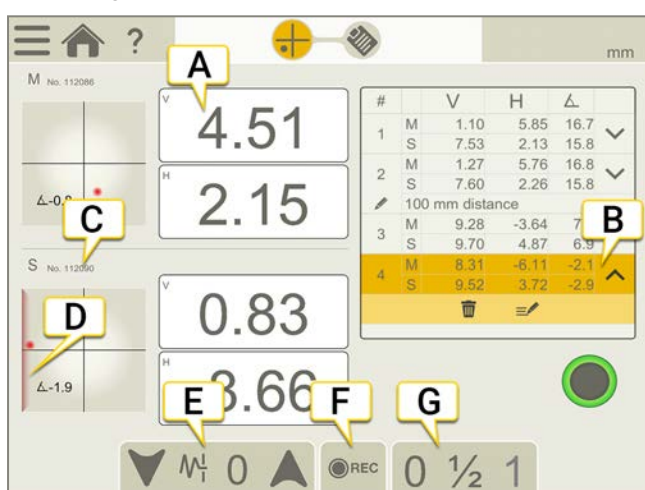


# VALUES

## OVERVIEW VALUES

With the program Values, you can see live readings from the detectors. On the start view, tap  $\begin{smallmatrix} V 0.00 \\ H 0.00 \end{smallmatrix}$  to open the program.

Measuring units that can be used: XT40, XT50, XT60 and XT70.



- A. M-unit values.
- B. Registered values. In the sub-menu you can **delete** a measurement **or add a note** to it.
- C. Detector serial number.
- D. Edge warning. When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.
- E. Filter. See "Filter" on page 8.
- F. Autorecord. See "Autorecord" on page 45.
- G. Zero set or halve value.

### Select measuring units

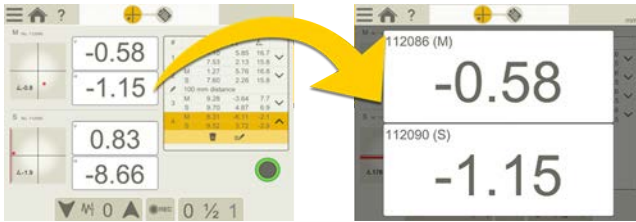
1. Tap a target.
2. Select a measuring unit and tap Close.

See "Select measuring units" on page 29



## VALUES

### Enlarge the value box

Tap the value box to make it bigger. This is useful when you need to read from a distance.







### Delete value




1. Tap  on the value you want to delete.
2. Tap  to delete the value.

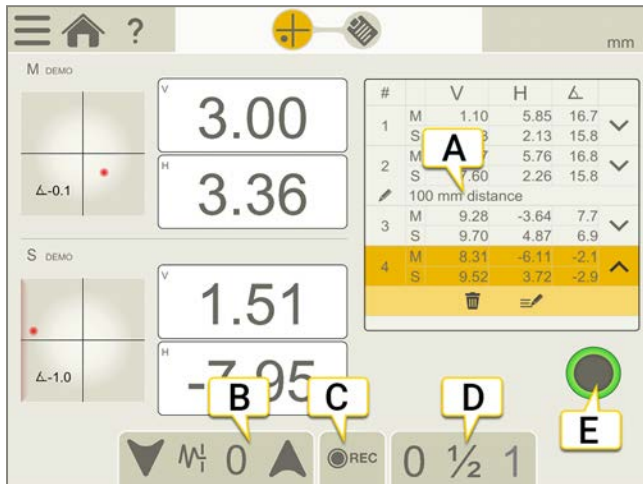
### Add a note

Notes are also visible in the report.

- Select  and  if you want to add a note for the **whole** measurement.
- Tap  on a value and then  to add a note for the selected value.

## MEASURE

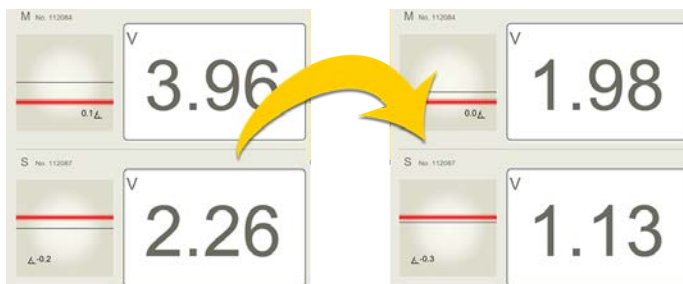
1. Tap  to register values.
2. Tap  and  to finalize the measurement. The measurement is saved in the File manager.



- A. A note has been added.
- B. Filter See "Filter" on page 8.
- C. Autorecord. See "Autorecord" on page 45.
- D. Halve or zero set value.
- E. Tap to register values.

### Halve value

1. Tap  $\frac{1}{2}$  on the tab to halve the displayed value. Zero point of the target moves halfway towards the laser point.
2. Tap **1** on the tab to return to the absolute value. Zero point of the target returns to the center.



### Zero set value




1. Tap **0** on the tab to zero set the displayed value. Zero point of the target moves to the laser point.
2. Tap **1** on the tab to return to the absolute value. Zero point of the target returns to the center.

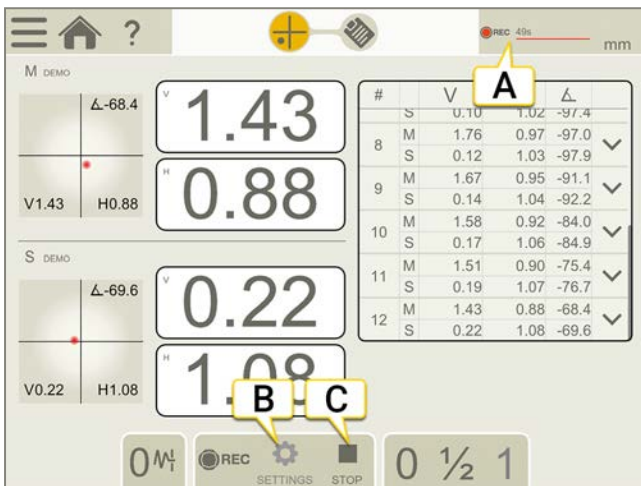
## VALUES



## AUTORECORD




In Values, it is possible to make automatic recording of values. This is very useful when you want to register values during a longer time period for example.

1. Tap  to open the Autorecord tab.
2. Tap  to start recording values.
3. The recording will start and you can follow the progress on screen.
4. Tap  to stop the measurement.




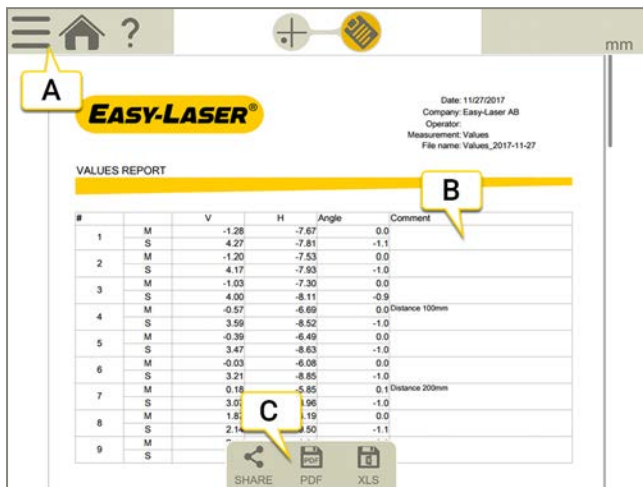
- A. Indicates that values are being recorded.
- B. Tap to set duration and interval.
- C. Stop the measurement.




### Duration and interval

1. Tap  to open Settings.
2. Tap  to set the interval. Default is set to one second.
3. Tap  to set the duration. Default is set to one minute.

## VALUES REPORT

The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- Comments made are visible here. To add a note for the whole measurement, tap .
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

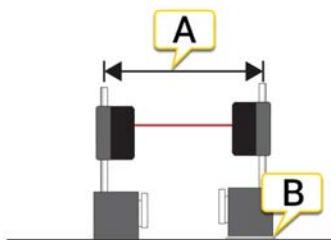
See "Report" on page 14.

## CALIBRATION CHECK

Use the program Values to check if the detector readings are within specified tolerances.

### Quick check

1. Tap **0** to zero set the value.
2. Place a shim under the magnet base to lift the M-unit 1 mm (100 mils). The M-unit's reading shall correspond to the movement within 1 % (1 mil  $\pm$  1 digit) (0.01 mm  $\pm$  1 digit).
3. Remove the shim from the M-unit.
4. Tap **0** to zero set value.
5. Make a mark to mark out the position of the detector.
6. Place the shim under the magnet base of the S-unit. The S-unit's reading shall correspond to the movement within 1 % (1 mil  $\pm$  1 digit) (0.01 mm  $\pm$  1 digit).

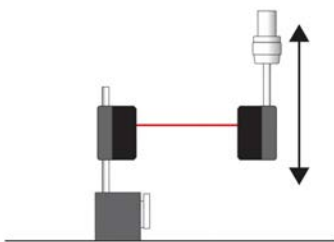


- A. Make sure that the distance is kept.
- B. Parallel lift to a known distance. Shim exactly 1 mm.

**NOTE!** The shim must be exactly 1 mm. In this example it is only the M-unit that is checked.

### Precision check

1. Fasten one of the measuring units in a machine tool.
2. Tap **0** to zero set value.
3. Move the unit a known distance. Use the movement of a machine tool spindle.
4. The fastened unit's reading shall correspond to the movement within 1 % (1 mil  $\pm$  1 digit) (0.01 mm  $\pm$  1 digit).



*Move the unit a known distance.*

**NOTE!** In this example it is only the unit fastened in the machine that is checked.



# EASYTREND

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## OVERVIEW EASYTREND



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Makes it possible to keep track of machine movement over time. You can check for example thermal expansion and pipe strain issues.

Measuring units that can be used: only XT70.

### Workflow EasyTrend



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

See "Templates for measurements" on page 12.

## DM BRACKET

The DM bracket (art. no 12-1130) can be used to measure dynamic movements. The bracket is fastened on the machine with glue or screws.

### Mount the bracket

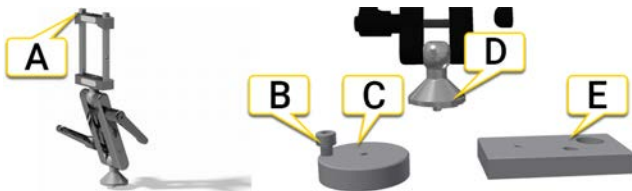
1. Mount a measurement unit in the bracket.
2. Fasten the unit with the screws on the rods. (Do not use the screws on the measuring units.)
3. Decide where to place the bracket. Place it on the same height as the shaft centre.
4. Use a bolt or glue mounting plate to fasten the bracket.

#### Glue

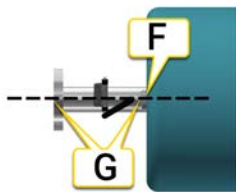
5. Remove paint on the machine.
6. Clean the surface.
7. Put on gloves and protective glasses.
8. Apply glue (Loctite HY4070 or similar) on the bracket and place it on the machine.

Fixing time 5 minutes. Full strength after 24 hours.

**NOTE!** Handle the glue with precaution, read the instruction delivered together with the DM bracket.




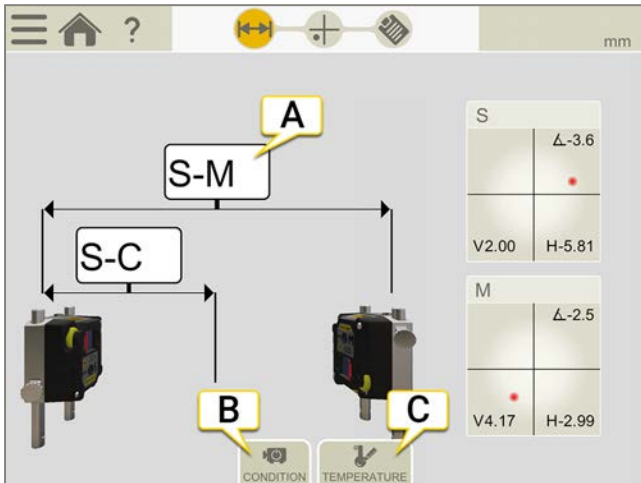
- A. Screws to fasten the measurement unit.
- B. Use this to break away the glue mounting plate.
- C. Glue mounting plate.
- D. Fasten on glue OR bolt mounting plate.
- E. Bolt mounting plate.



- F. Remove paint and clean the surface
- G. Place the bracket on the same height as the shaft centre.

## PREPARE

1. Tap the target to connect the measuring units. See "Select measuring units" on page 29.
2. Enter distances.
3. Tap  to go to Measure.



- A. Tap to enter distances.
- B. Machine condition.
- C. Machine temperature.

### Machine condition

- Offline to running. Default setting. The machine is offline when you start the measurement, you start it and stop measuring when the value has stabilized.
- Running to offline. The machine is running when you start the measurement.
- Not specified.



### Machine temperature


You can enter start and stop temperature. The information is optional and shown in the report.

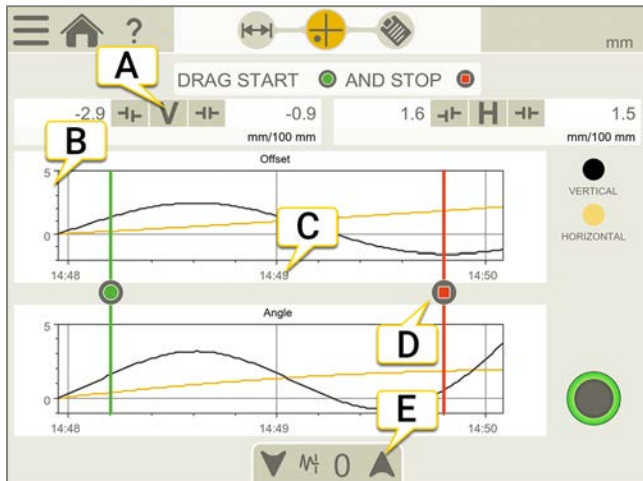
**NOTE!** This information is only used for documentation and is not used for any calculations.

To change between Celsius or Fahrenheit, See "Units" on page 16

## MEASURE

1. Tap  to start a measurement.
2. Tap  to stop.
3. The result shows the difference between the first and last measurement.

It is not possible to restart the measurement when it has been stopped. If you tap , you will start a new measurement.



- A. Vertical and horizontal result.
- B. Starts with showing  $\pm 0.1\text{mm}$ . It will scale when needed.
- C. Time axis is marked with one minute interval.
- D. Start and stop icons.
- E. See "Filter" on page 8

### Change start and stop time

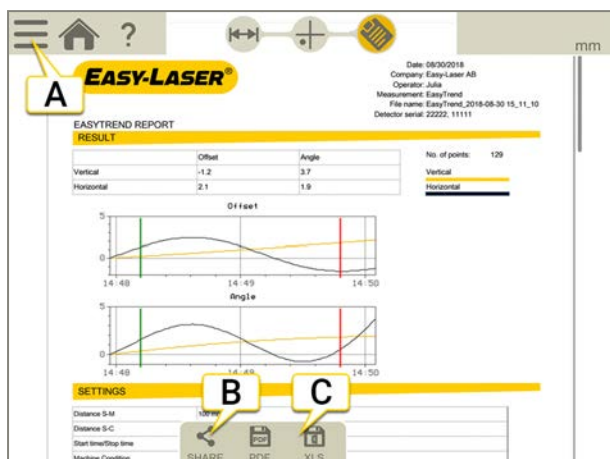
When you have stopped the measurement, it is possible to change the start and stop time.



If you move the start and stop, the result will change. The result shows the difference between the first and last measurement.



*Start and stop icons*

# EASY TREND REPORT



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- Share the report.
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

## For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See "Report" on page 14.



# HORIZONTAL

## OVERVIEW HORIZONTAL





This program is used for horizontally mounted machines.

### Measuring units that can be used


	XT70	XT60	XT50	XT40
Horizontal (EasyTurn or 9-12-3)	X	X	X	X
Horizontal (Multi or Sweep)	X	X	X	



The live option "Live360" is only available when using **XT70**.

### Measuring methods

	<b>EasyTurn™</b> The EasyTurn™ function allows you to begin the measurement process from anywhere on the turn. You can turn the shaft to any three positions with as little as 20° between each position to register the measurement values. An easier-to-use version of the 9–12–3 method.
	<b>9-12-3</b> Measurement points are recorded at fixed points 9, 12 and 3 o'clock. This is the classic three-point method which can be used in most cases.
	<b>Multipoint</b> Multipoint is basically the same as EasyTurn™, but instead you can record multiple points on the sector rotated. This will provide an optimized calculation basis. Perfect for e.g. turbine and sliding bearing applications.
	<b>Sweep</b> Automatic recording of measurement values during continuous sweeping of the shaft. Hundreds of points are registered. You can start anywhere on the turn. Quality check of measurement is provided.

### Workflow Horizontal



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

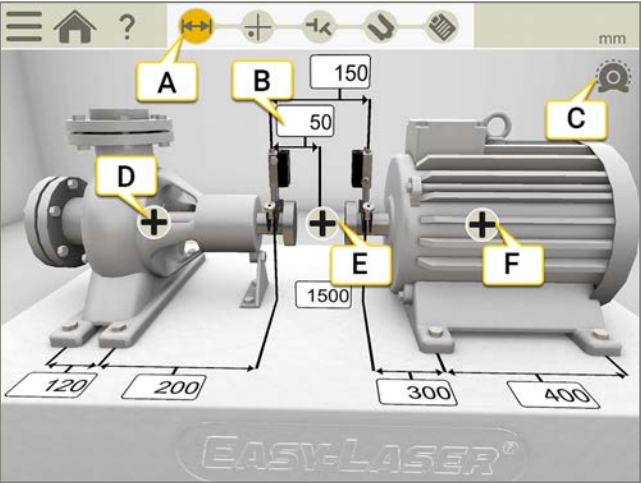
See "Templates for measurements" on page 12.

# PREPARE

First you need to set up and rough align the measuring units:

- See "Set up XT40" on page 32
- See "Set up XT50" on page 35
- See "Set up XT60" on page 37
- See "Set up XT70" on page 39

On the Prepare view, you enter machine and coupling properties. It is possible to go back to the Prepare view later and enter/alter information. Tap **+** to display a property menu for the Coupling or the Machine.



- A. The Prepare icon is active in the workflow.
- B. Tap any input field to enter distance.
- C. Thermal compensation has been set.
- D. Machine properties. (name, machine setup, lock feet and show distances for S.)
- E. Coupling properties. (rpm, tolerance, thermal compensation, coupling diameter and coupling type.)
- F. Machine properties. (name, machine setup and lock feet.)
- G. Tap any input field to enter distance.

**NOTE!** Make sure that the measuring units are changed.

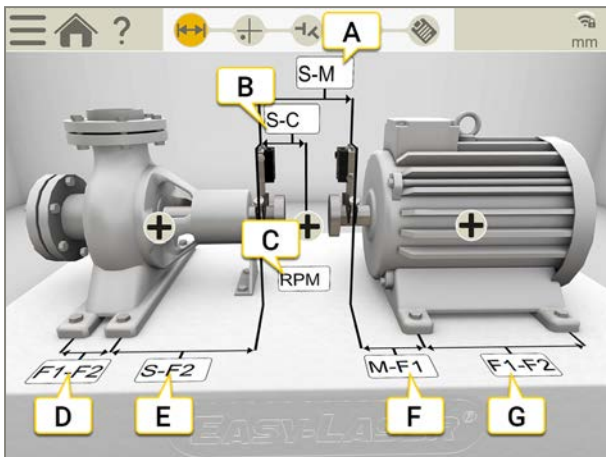
## Menu icons

Tap to open the menu.

	Mirror the machines.
	Show Gap. If you want the result based on the gap of the coupling instead of angle, it is necessary to enter the coupling diameter.
	Add a note to the report.
	See "Camera" on page 24.
	Finalize the measurement. See "Finalize" on page 8.

## Enter distances

Tap any distance input field to enter distance. The field is zoomed in and the keyboard is displayed.



- A. Distance between S-unit and M-unit. Measure between the rods.
- B. Distance between S-unit and center of coupling.
- C. RPM. When you enter rpm, a corresponding tolerance is automatically selected.
- D. Distance between first and second feet pair. To enter distances on the S-machine, tap **+** and **↔** to display the fields.
- E. Distance between second feet pair and S-unit.
- F. Distance between M-unit and feet pair one. It is possible to enter a negative value here.
- G. Distance between feet pair one and feet pair two.

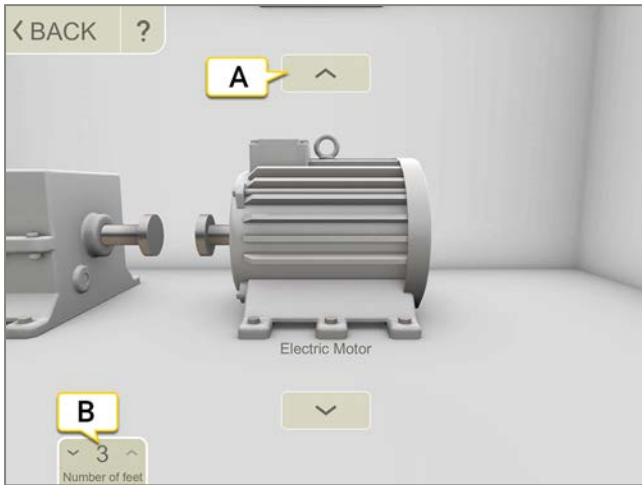
### Required distances

It is possible to skip all distances and go directly to Measure view. If you change a distance later on, the result is recalculated.

- To calculate an offset and angle result, you need to enter at least the distances between S and M.
- Feet values can only be calculated if you have entered the distance between the feet pairs.

## Machine setup


On the machine, tap **+** and  to open the Machine set-up view.



- A. Tap arrows change the machine image.
- B. Tap to change the number of feetpair. The possible number of feetpair varies depending on machine.



## Name the machine

Use if you want to change the default names on the machines. The name is visible in the report.

1. Tap **+** on the machine.
2. Tap .
3. Tap the text input field to change the name.



## Coupling setup

### Coupling type



1. On the coupling, tap .
2. Tap .
3. Select coupling type.

### Coupling diameter

If you want the result based on the gap of the coupling instead of angle, it is necessary to enter the coupling diameter. The coupling diameter is visible in the report.

1. On the coupling, tap .
2. Tap .
3. Enter the diameter.



### Gap

To show the result as gap, tap  and .

## RPM Horizontal

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.

The higher the rpm of a machinery is, the tighter the tolerance must be.



1. Tap the RPM field to enter a value. Or tap  and  on the coupling.
2. Enter RPM. A tolerance is automatically set to match the RPM you entered.

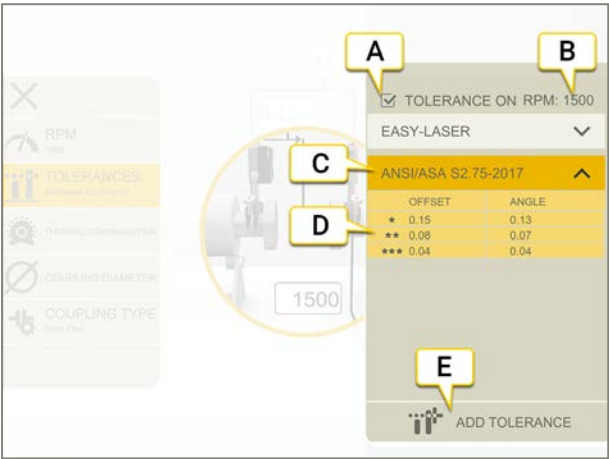
See "Tolerance" on the next page

Tolerance

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.

The higher the rpm of a machinery is, the tighter the tolerance must be.

- 1. On the coupling, tap .
- 2. Tap  to display the tolerance menu.






- A. Turn tolerance on/off.
- B. Current RPM.
- C. Selected tolerance.
- D. Tolerance levels.
- E. Add custom tolerance.

Easy-Laser



This tolerance is default. When you set an RPM value, the Easy-Laser tolerance is activated. The tolerance level "good" is used for re-alignments on non-critical machinery. New installations and critical machines should always be aligned within the tolerance level "excellent".

There are two tolerance levels:

	Indicates not within tolerance. Red background.
	Good. Yellow background.
	Excellent. Green background.



ANSI standard

The ANSI/ASA S2.75-2017 standard is available. This standard has three tolerance levels:

	Indicates not within tolerance. Red background.
	Minimal. Orange background.
	Standard. Yellow background.
	Precision. Green background.

Custom tolerance

Many machines must be aligned very accurately even if they have a lower rpm. You can add your own user defined tolerance.

1. Tap .
2. Enter offset and angle values.
3. Tap  to add the custom tolerance.





There are two tolerance levels for custom tolerances.

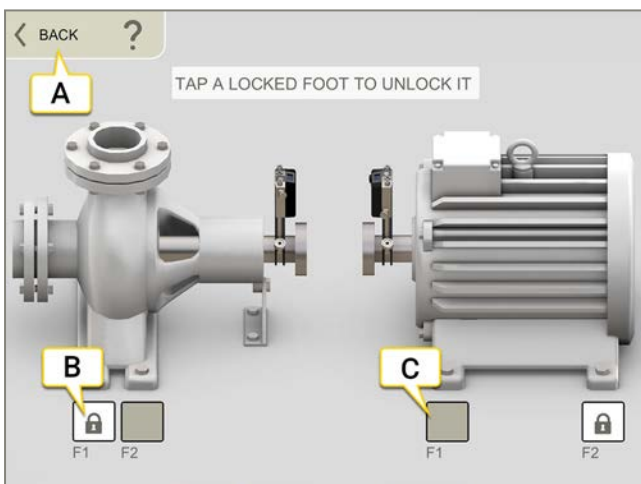
### Spacer shaft tolerance


If you have selected spacer shaft, no offset tolerance is used. Both angles (A and B) are compared and have to be within tolerance.

## Locked feet

This function is useful in cases when a feetpair is difficult or impossible to adjust. The Lock feet function allows you to select which feet that are locked and which that are adjustable. This way you can also choose which machine is to be used as stationary and which as movable. To display feet values on a machine with locked feet, you need to enter the distances.

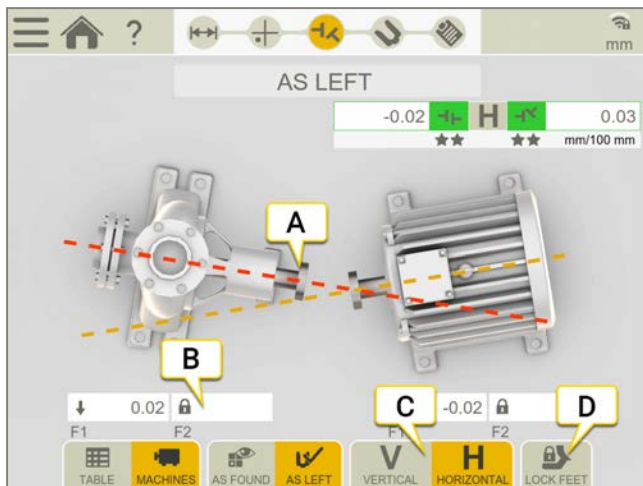
1. Tap  on the S-machine and enter the distances.
2. Tap  on a machine.
3. Tap  to display the Lock feet view.
4. Tap in any two fields to lock the corresponding feetpair. If you want to move a lock, simply tap it to unlock and then tap in another field.
5. Tap  to go back to Prepare view.



- A. Tap  to go back to Prepare view.
- B. Tap if you want to unlock and move the lock.
- C. The field is disabled. If you want to lock this feetpair, you need to unlock and move another lock. It is only possible to have two locked feetpairs.

## HORIZONTAL

### Locked feet in Result view



- A. Both the S- and M-machine are visible when you have locked feet.
- B. This feetpair has been locked.
- C. Toggle between showing horizontal or vertical result.
- D. Tap to display the Lock feet view.

**NOTE!** To display feet values on a machine with locked feet, you need to enter the distances.

## Thermal compensation



During normal operation, machinery is influenced of different factors and forces. The most common of these changes is the change in the temperature of the machine. This will cause the height of the shaft to increase. This is called thermal growth. To compensate for thermal growth, you enter values for cold condition compensation. It can be necessary to place the offline (cold) machine a bit lower to allow thermal growth.

To compensate for thermal growth, offset and angle values are used. The offset and angle values are based on a calculation point:

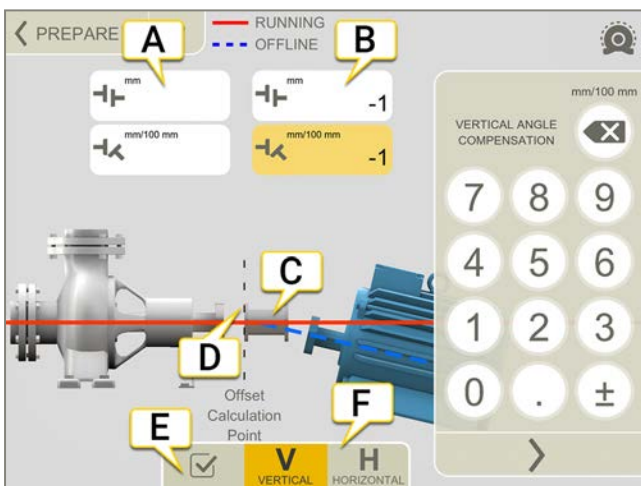
- For short flex, the calculation point is in the center of the coupling.
- For spacer shaft, the calculation point is on the left side of the spacer.

It is **not** possible to have both coupling and feet compensation on the same machine.

### Set compensation on the coupling

1. Tap **+** on the coupling.
2. Tap  to open the Thermal Compensation view.
3. Enter values for Vertical and/or Horizontal compensation. When you enter compensation values, the machine turns blue.
4. Tap  to return to Prepare view.

The compensation values are visible in the report.





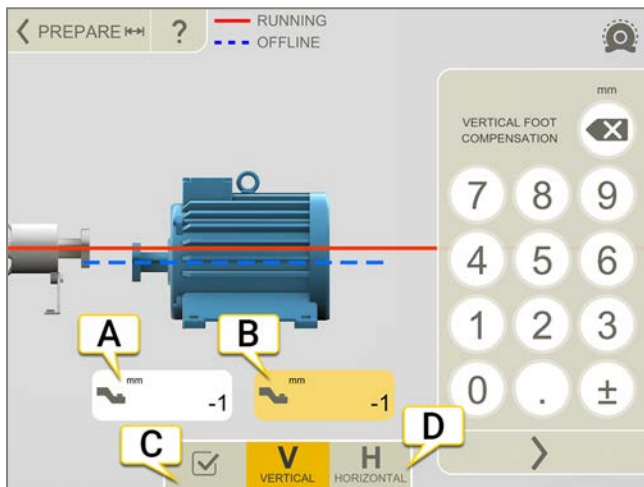
- A. Offset and angle values for the left machine.
- B. Offset and angle values for the right machine.
- C. Spacer shaft.
- D. Calculation point is on the left side of the spacer.
- E. Turn Thermal compensation on/off. If you turn it off, the values are saved but will not be used. In Machine train, this will affect **all** couplings in the train.
- F. Show V (vertical) or H (horizontal) view.

**NOTE!** It is **not** possible to have both coupling and feet compensation on the same machine.

## Set compensation on feet

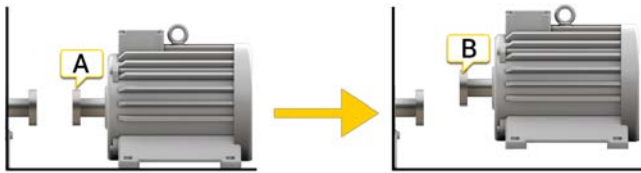
Values are entered on first and last feet pair on the machine. If the machine has more than two feet pair, calculated values on these are presented in the report.

1. Enter distances.
2. Tap **+** on the machine.
3. Tap  to open the Thermal Compensation view.
4. Enter values for Vertical and/or Horizontal compensation. When you enter compensation values, the machine turns blue.
5. Tap  to return to Prepare view.



- A. Feet value for the first feet pair.
- B. Feet value for the last feet pair.
- C. Turn Thermal compensation on/off. If you turn it off, the values are saved but will not be used. In Machine train, this will affect **all** couplings in the train.
- D. Show V (vertical) or H (horizontal) view.

**NOTE!** It is **not** possible to have both coupling and feet compensation on the same machine.

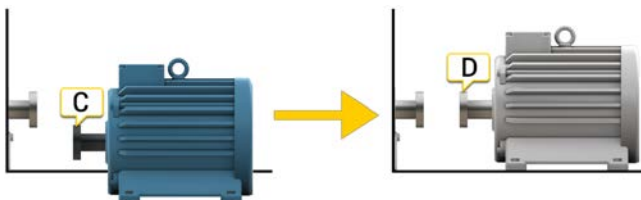
**Example without compensation**

A. Offline, no compensation set. The machines are aligned.

B. Running, the machine "grows" 5 mm, and is no longer aligned.

**Example with compensation**

In this example we assume a thermal growth of +5 mm in HOT condition. Therefore we compensate with -5 mm in off-line condition.



C. Offline, a -5 mm compensation has been set.

D. Running, the machine grows and will be perfectly aligned!

## MEASURE USING EASYTURN™

Measuring units that can be used: XT40, XT50, XT60 and XT70

With EasyTurn™, it is possible to measure with as little as 40° spread between the measurement points. However, for an even more accurate result, try to spread the points as much as possible.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

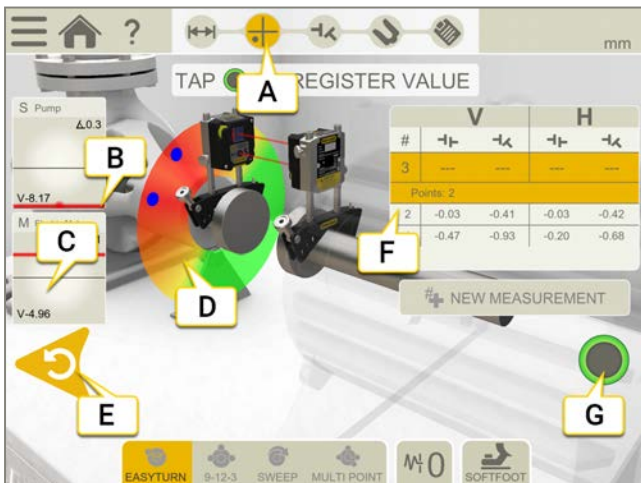
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.

### Measure

It is possible to switch measuring method before you have registered a value.

1. Tap  on the tab to select the method EasyTurn.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to register the first position. A red marking is displayed.
4. Turn the shafts at least 20°.
5. Tap  to register the second position.
6. Turn the shafts at least 20°.
7. Tap  to register the third position.
8. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. The Measure icon is active in the workflow.
- B. Edge warning. When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.
- C. Tap to display detector information.
- D. Red = turn shafts outside the red marking.  
Green = turn shafts to green area.  
Blue = registered position.

- E. Delete registered value.
- F. Measurement table. If you have selected spacer shaft, see information below.
- G. This icon is gray when it not possible to register a value.

#	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

### Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

## MEASURE USING 9-12-3

Measuring units that can be used: XT40, XT50, XT60 and XT70.

The measuring positions are registered at positions 9, 12, 3 o'clock. The inclinometers are not used.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

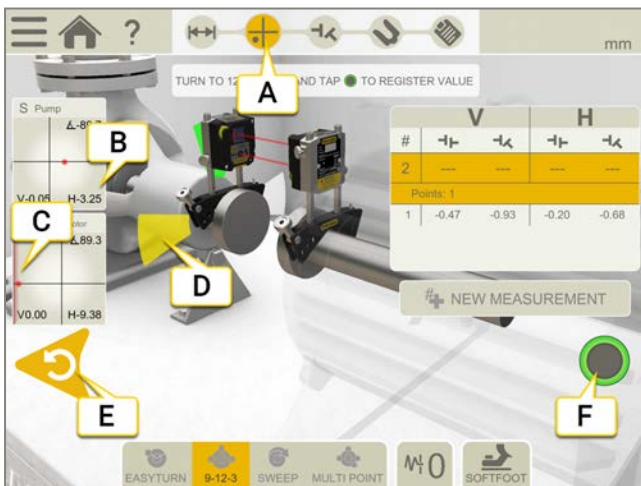
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot, go to Softfoot.

### Measure

It is possible to switch measuring method before you have registered a value.

1. Tap  on the tab to select the method 9-12-3.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Turn shafts to 9 o'clock.
4. Tap  to register the first position.
5. Turn shafts to 12 o'clock.
6. Tap  to register the second position.
7. Turn shafts to 3 o'clock.
8. Tap  to register the third position.
9. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. The Measure icon is active in the workflow.
- B. Tap to display detector information.
- C. Edge warning. When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.
- D. Yellow = registered position.  
Green = turn shafts to green area.

E. Delete registered value.

F. Tap to register value.

#+	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

### Spacer shaft in measurement table



A. Vertical values for angle A and B

B. Horizontal values for angle A and B

## MEASURE USING MULTIPOINT

Measuring units that can be used: XT50, XT60 and XT70

## Preparations






Before you start measuring, make sure you have done the preparations you need.

- Mount the measuring units. "Multipoint" is available when you use XT60 measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.

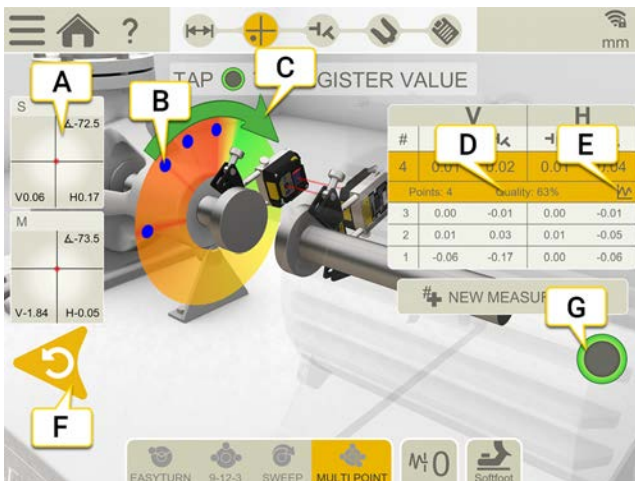
## Measure


It is possible to switch measuring method before you have registered a value.

For a more accurate result, try to spread the points as much as possible. The colours indicates where the optimum positions to measure are. Green is best place to measure. Always turn the shaft in the same direction for a more accurate result.

1. Tap  on the tab to select the method Multipoint.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to register the first position. The first position is automatically set to zero.
4. Tap  to register as many positions as you wish. After three points a result is available.
5. Tap  to go to the Result view, or tap  to measure again.

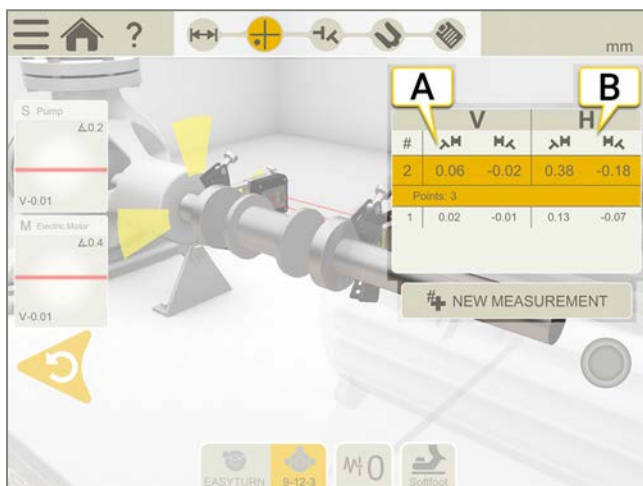
The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Registered measurement point.
- C. Measurement direction.
- D. Quality assessment.
- E. Tap  to show detailed information. See "Result details" on page 78.
- F. Delete registered value.
- G. Tap to register values.

#+	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

### Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

### Edge warning

When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.

## MEASURE USING CONTINUOUS SWEEP

Measuring units that can be used: XT50, XT60 and XT70

Automatic recording of measurement values during continuous sweeping of the shaft.

There is no limit on the number of points.






### Preparations

Before you start measuring, make sure you have done the preparations you need.

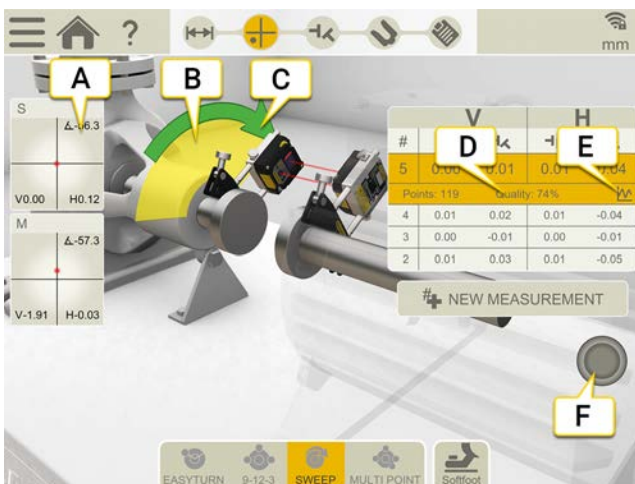
- Mount the measuring units. "Continuous sweep" is available when you use XT60 measuring units.
- To calculate results, you need to enter at least the distance between the measuring units, see "Enter distances" on page 57.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.


### Measure






It is possible to switch measuring method before you have registered a value. Filter is **not** available when you measure with Sweep.

1. Tap  on the tab to select the method Continuous sweep.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to start the measurement.
4. Turn the shafts. Turn the shafts as much as possible for a more accurate result.
5. Tap  to stop the measurement.
6. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Yellow area is where points have been registered.
- C. Measurement direction. If you change direction during the measurement, the arrow turns red.
- D. Quality assessment.
- E. Tap  to show detailed information. See "Result details" on page 78.
- F. Tap to start and stop the measurement.

#	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Measure Softfoot.

### Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

### Edge warning

When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.






## SOFTFOOT

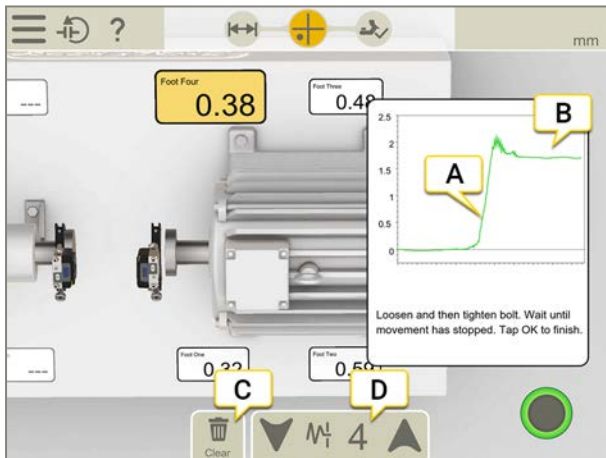
Perform a softfoot check to ensure that the machine is resting evenly on all its feet. A softfoot can be angular and/or parallel. Softfoot can be caused by:

- Twisted machinery foundations.
- Twisted or damaged machinery feet.
- Improper amount of shims under machine feet.
- Dirt or other unwanted materials under machine feet.

### Measure

Softfoot can be checked on all machines on which you have entered distances.

1. Enter distances between the measuring units and the feet pairs. This is done on the Prepare view.
2. On the Measure view, tap  on the tab.
3. Place the detectors at 12 o'clock and rough align if needed.
4. Tap  in the workflow.
5. Tap any of the feet value boxes.
6. Loosen bolt and wait for movement. Check the graph to see when the value has stabilized.
7. Tighten the bolt and wait for the value to stabilize again.
8. Tap  to register value.
9. Tap another foot to measure. Tap  to show the Softfoot result.
10. Tap  to return to the Measure view.




- A. Loosen bolt and wait for movement.
- B. Movement has stabilized. Tighten the bolt.
- C. Tap if you want to clear all softfoot values.
- D. Filter.

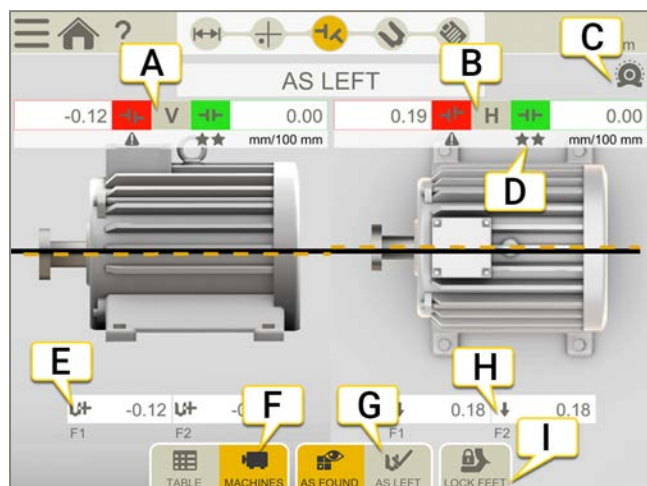
### Filter


If you have a low filter, the detector filter is increased to filter 4 when you measure Softfoot. If you increase the filter setting while measuring Softfoot, the new filter will be default next time you start Softfoot.

## RESULT

On the Result view, the offset, angle and feet values are clearly displayed. Both horizontal and vertical directions are shown. You can go back and forth between the views Measure, Result and Adjust.

Tap  if you want to adjust the machine. After you have adjusted, it is possible to go back to the Result view.

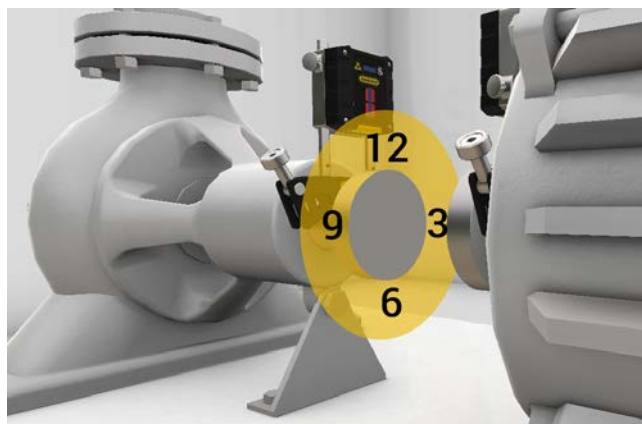


- A. Vertical offset and angle values. For spacer shaft: See "Spacer shaft result" on the next page.
- B. Horizontal offset and angle values.
- C. Thermal compensation has been set.
- D. Tolerance indicators.
- E. Vertical feet values. If you have locked a feetpair, this is visualized with a lock .
- F. Show Table or Machine view. See "Result table" on page 77.
- G. Show "As found" or "As left" values.
- H. Horizontal feet values.
- I. Lock feet. See "Locked feet" on page 61.

**NOTE!** When you have locked feet, both machines are displayed and you have to toggle between V and H values.

### How to read the values

When reading the values, face the stationary machine (S) from the movable machine (M). Then 9 o'clock is to the left, as in the measuring programs.



HORIZONTAL

As found or As left

On the tabs, it is possible to toggle between showing As found or As left values.

	As found is the latest measurement you made before making an adjustment.
	As left is the latest adjusted result. Available if you have gone to the Adjust view (and shown live values) and returned to Result view.

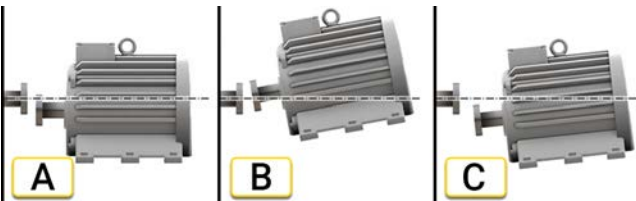
Show Gap

By default, angular error/100 mm is displayed. To show gap, you need to set the coupling diameter.

To show the result as gap, tap and .

Offset and angle values

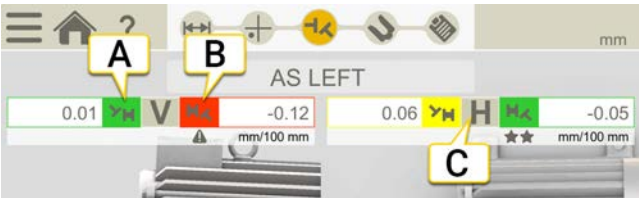
The offset and angle value indicate how well the machine is aligned at the coupling. They appear in both horizontal and vertical direction. These values are important to get within tolerance.



- A. Offset. The center lines of two axis are not concentric but parallel. This is measured at the coupling centers. In this example, a negative offset is shown.
- B. Angular misalignment. The center lines of two axis are not parallel. In this example, a positive angle is shown.
- C. Offset and angular misalignment. Misalignment is often a combination of both offset and angular misalignment.

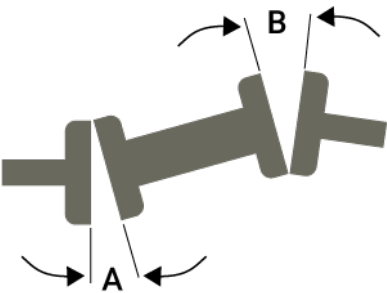
Spacer shaft result

If you have selected spacer shaft, values for angle A and B are displayed. They appear in both horizontal and vertical direction.



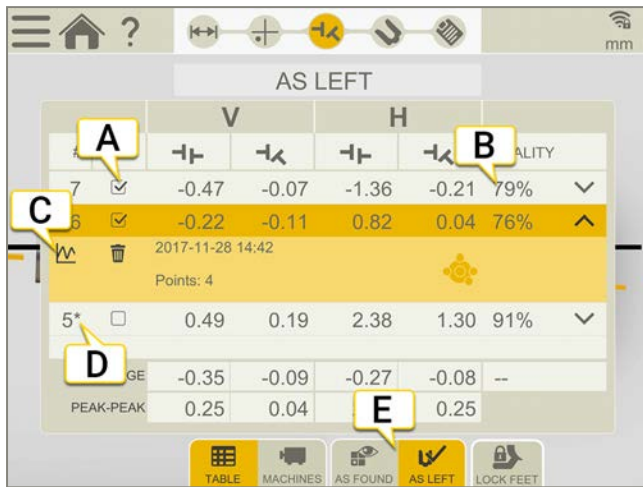
- A. Vertical values for angle A.
- B. Vertical values for angle B.
- C. Horizontal values.

Angle A and angle B





## Result table

In the Result view, tap  to display the table view.



	V	H	QUALITY
7	-0.47	-0.07	-1.36
6	-0.22	-0.11	0.82
5*	0.49	0.19	2.38
4	-0.35	-0.09	-0.27
PEAK-PEAK	0.25	0.04	0.25

- A. Select to use the measurement in the calculations.
- B. Quality assessment for the measurement. Available if you have used the method Continuous Sweep or Multipoint.
- C. Open detailed view See "Result details" on the next page
- D. This measurement has been adjusted.
- E. Toggle between showing As found or As left values.

If you want delete a measurement, tap  and .

### Use

By default, all measurements are included in the calculations. If you deselect measurements, the values for Average and Peak to Peak are updated. The excluded measurements are not included in the calculations, but still visible. The report will not be affected if you hide any measurements, in the report it is always the latest measurements that are shown.

**NOTE!** It is always the latest measurement and adjustment that are shown in the report.


### Average

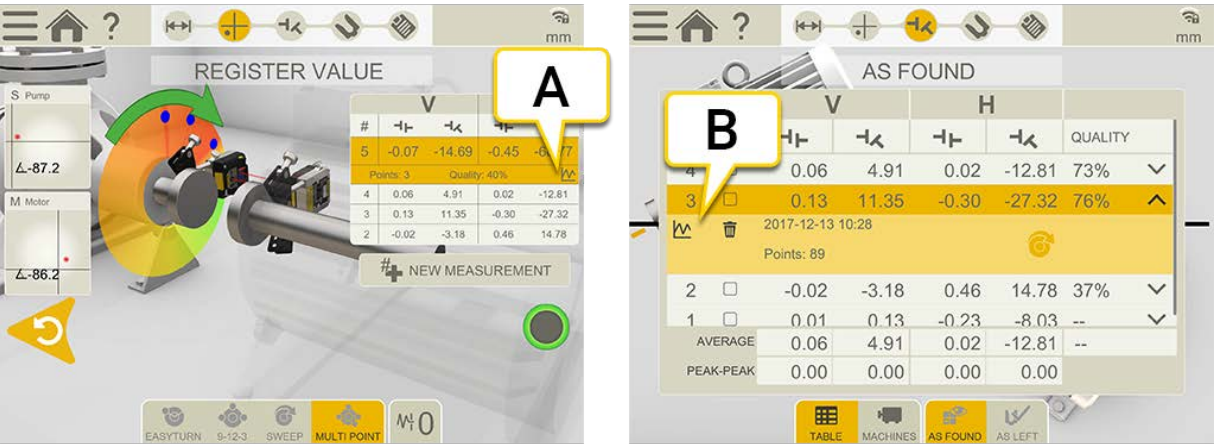
The average offset and angle values. Calculations are based on the measurements marked as "Use".

### Peak to peak

The total variation in offsets and angles. Calculations are based on the measurements marked as "Use".

Result details

When you have measured using Sweep or Multipoint, you can view details regarding the measurement. Tap  to open the Detailed view. This information is available from the table on the Measurement view, or from the Result table.



- A. Measurement view
- B. Result table

Sweep details

Measurement error



This graph shows the error of each measurement compared to the whole measurement. The standard deviation of the error is the basis for the quality number "Aquired accuracy". Turbulence, distance between the measuring units and coupling backlash all affect the measurement error.

Shown in mils or mm.

## Rotation speed



This graph shows how fast the measurement units are rotated during the measurement. This is the basis for the quality number "Speed and evenness".

## Quality

The quality assessment is a sum of the following quality factors:

- **Rotation angle.** How much of the turn that is measured. For an accurate result, try to have as large rotation angle as possible.
- **Acquired accuracy.** Actual accuracy of the measured values from the units. If the acquired accuracy is low, it may depend on for example air turbulence or bearing clearance.
- **Temperature stability.** Measured temperature variation in the measuring units. If the stability is low, remeasure when the temperature has stabilized.
- **Speed and evenness.** Speed of the rotation.
- **Measurement direction.** Indicates the consistency in your measurement direction. It is better to move the measurement units in the same direction during the entire measurement. A low value indicates the direction has changed during measurement, which may hurt the measurement quality.

## Multipoint details

### Measurement error



This graph shows the error of each measurement compared to the whole measurement. The error of each measurement point is how much it deviate from the whole measurement. Shown in offset and angle.

HORIZONTAL

Values

Measurement Error						Values	Quality
#	M-Angle	M-PadY	S-Angle	S-PadY	Offset Error	Angular Error	
1	-3.7°	7.87	-4.5°	6.96	0.01	0.17	🗑
2	-30.8°	8.20	-31.0°	6.76	0.01	0.07	🗑
3	-68.5°	8.49	-70.4°	6.55	0.00	0.12	🗑
4	-108.5°	8.75	-108.9°	6.33	0.00	0.02	🗑
5	-135.4°	8.90	-135.7°	6.17	0.00	0.05	🗑
6	-158.5°	9.02	-158.1°	6.04	0.00	0.09	🗑
7	170.5°	9.14	170.4°	5.85	0.00	0.04	🗑
8	141.2°	9.22	139.4°	5.66	0.00	0.11	🗑

V

H

-0.04 -0.79 0.07 -0.21

TABLE MACHINES AS FOUND AS LEFT

All registered values.

Quality

Measurement Error		Values	Quality
Measure	Quality		
Attainable Accuracy	94%		
Acquired Accuracy	54%		
Temperature stability	97%		
Measurement direction	95%		
Quality assessment	54%		

V

H

-0.04 -0.79 0.07 -0.21



TABLE MACHINES AS FOUND AS LEFT

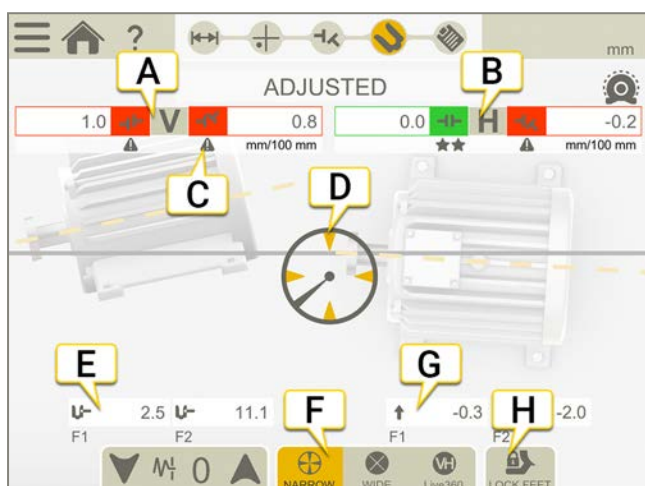
The quality assessment is a sum of the following quality factors:

- **Attainable accuracy.** The maximum accuracy that can be attained. Many measurement points that also have a good spread, will statistically ensure a high accuracy.
- **Acquired accuracy.** Actual accuracy of the measured values from the units. If the acquired accuracy is low, it may depend on for example air turbulence or bearing clearance.
- **Temperature stability.** Measured temperature variation in the measuring units. If the stability is low, remeasure when the temperature has stabilized.
- **Measurement direction.** Indicates the consistency in your measurement direction. It is better to move the measurement units in the same direction during the entire measurement. A low value indicates the direction has changed during measurement, which may hurt the measurement quality.

## ADJUST

In the Adjust view, live values are displayed. When reading the values, face the stationary machine from the movable machine. For information how to read the values, See "Result" on page 75. Values within tolerance are green.

1. Shim the machine according to the vertical feet values.
2. Adjust the machine sideways according to the live horizontal values.
3. Tighten the feet.
4. Tap  to remeasure or tap  to view the report.






- A. Vertical offset and angle values.
- B. Horizontal offset and angle values.
- C. Tolerance indicators. See "Tolerance" on page 60.
- D. Turn to live.
- E. Add or remove shims.
- F. Select narrow, wide or 360 live sectors.
- G. Arrow show how to adjust the horizontal values.
- H. Lock feet. See "Locked feet" on page 61.

## Live values with inclinometer

With the programs EasyTurn, Sweep and Multipoint, the inclinometer controls when live values are shown.


Select one of the corresponding live options:

	Narrow, live values are shown when the units are positioned within ( $\pm 2^\circ$ ) of the clock positions.
	Wide, live values are shown when the units are positioned within ( $\pm 44^\circ$ ) of the clock positions.
	Live360, live values are shown in both vertical <b>and</b> horizontal direction. Only available when using XT70. When you select Live360, make sure that you have not moved the measuring units after registering the last measurement point. If you have, please remeasure to ensure an accurate result.






**NOTE!** The live option 360 is sensitive for movements/backlash. Ensure that backlash will not influence the measurement.

## Live values without inclinometer


With the program 9-12-3 the inclinometer is not used, instead you manually show in which position your measurement units are.

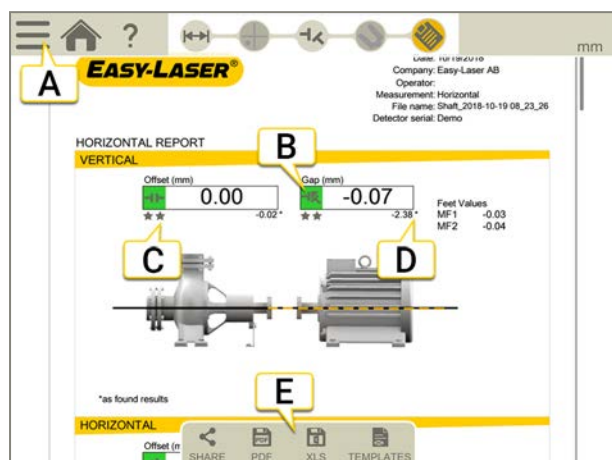
1. Turn the shafts with detectors to a live position.
2. Tap the corresponding live option, see below.
3. Tap  before you leave the live position.



Live options:

	Not live. If you want to change live position, you need to select this first and then the new position.
	Live at 9 o'clock.
	Live at 12 o'clock.
	Live at 3 o'clock.
	Live at 6 o'clock.

## HORIZONTAL REPORT

The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- Green = within tolerance.
- In this example the angle result is shown as Gap.
- The "As found" result is marked with an asterisk (\*).
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See "Report" on page 14.



# MACHINE TRAIN

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## OVERVIEW MACHINE TRAIN

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### Measuring two couplings or more

Build your own machine train with theoretically as many machines as you like. You can pick the reference machine manually, or let the program choose one that will minimize the need for adjustments.

Measuring units that can be used:

XT50, XT60 and XT70


The live option "Live360" is only available when using **XT70**.


### Measuring two couplings

For alignment of machine trains with three machines. You can pick the reference machine manually, or let the program choose one that will minimize the need for adjustments.

Measuring units that can be used: XT60.

### Workflow Machinetrain



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.




*Prepare view is active in the workflow*

### Create a template

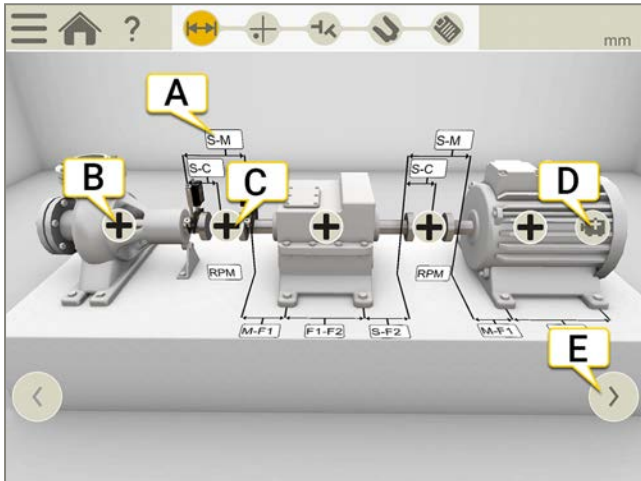
1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

See "Templates for measurements" on page 12.

## PREPARE




1. Set up and rough align the measuring units. XT50 and XT60 measuring units can be used.
2. Make sure that the measuring units are charged.
3. Set up and rough align the measuring units.
4. Enter distances.
5. Enter machine and coupling properties.
6. Tap  to continue to measure view.

It is possible to go back to the Prepare view later and enter/alter information.



- A. Tap any field to enter distances. See "Enter distances" on the facing page.
- B. Tap to display Machine setup. See "Machine setup" on page 132.
- C. Tap to display Coupling setup. See "Coupling setup" on page 59.
- D. Tap to add a machine.
- E. Tap to display other part of the train (if the train is longer than three machines).

### Add or remove a machine

- Tap  to add a machine. A generic machine is added at the end of the train.
- Tap  and  to remove a machine. It is only possible to remove the last machine of the train.

### See also

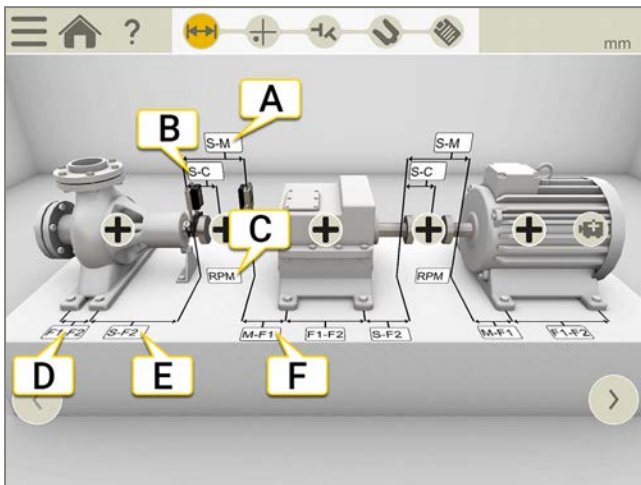
See "RPM Horizontal" on page 59

See "Thermal compensation " on page 63

See "Tolerance" on page 60

## Enter distances

Tap any distance input field to enter distance. The field is zoomed in and the keyboard is displayed.




- A. Distance between S-unit and M-unit. Measure between the rods.
- B. Distance between S-unit and center of coupling.
- C. RPM. When you enter rpm, a corresponding tolerance is automatically selected.
- D. Distance between first and second feet pair. To enter distances on the S-machine, tap **+** and **↔** to display the fields.
- E. Distance between second feet pair and S-unit.
- F. Distance between M-unit and feet pair one. It is possible to enter a negative value here.
- G. Distance between feet pair one and feet pair two.

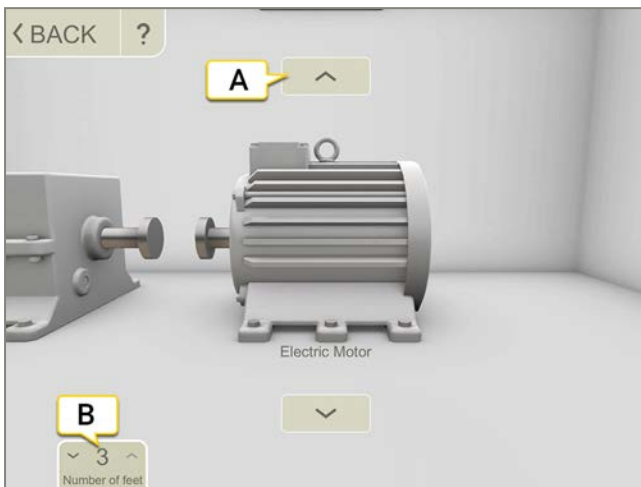
### Required distances

It is possible to skip all distances and go directly to Measure view. If you change a distance later on, the result is recalculated.

- To calculate an offset and angle result, you need to enter at least the distances between S and M.
- Feet values can only be calculated if you have entered the distance between the feet pairs.

### Machine setup



On the machine, tap  to open the Machine set-up view. It is possible to change the image and change the number of feetpair.



- A. Tap arrows change the machine image.
- B. Tap to change the number of feetpair. The possible number of feetpair varies depending on machine.



### Name the machine

Use if you want to change the default names on the machines. The name is visible in the report.

1. Tap  on the machine.
2. Tap .
3. Tap the text input field to change the name.



## Coupling setup

### Coupling type


1. On the coupling, tap .
2. Tap .
3. Select coupling type.

### Coupling diameter

If you want the result based on the gap of the coupling instead of angle, it is necessary to enter the coupling diameter. The coupling diameter is visible in the report.

1. On the coupling, tap .
2. Tap .
3. Enter the diameter.



### Gap

To show the result as gap, tap  and .

## RPM Machine Train

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.



The higher the rpm of a machinery is, the tighter the tolerance must be.

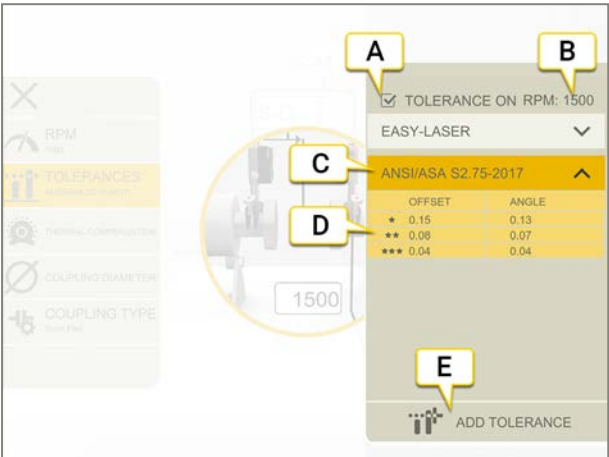
1. Tap the RPM field to enter a value. Or tap  and  on the coupling.
2. Enter RPM. A tolerance is automatically set to match the RPM you entered.

## Tolerance

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.

The higher the rpm of a machinery is, the tighter the tolerance must be.

1. On the coupling, tap .
2. Tap  to display the tolerance menu.






- A. Turn tolerance on/off.
- B. Current RPM.
- C. Selected tolerance.
- D. Tolerance levels.
- E. Add custom tolerance.

### Easy-Laser





This tolerance is default. When you set an RPM value, the Easy-Laser tolerance is activated. The tolerance level "good" is used for re-alignments on non-critical machinery. New installations and critical machines should always be aligned within the tolerance level "excellent".

There are two tolerance levels:

	Indicates not within tolerance. Red background.
	Good. Yellow background.
	Excellent. Green background.



### ANSI standard

The ANSI/ASA S2.75-2017 standard is available. This standard has three tolerance levels:

	Indicates not within tolerance. Red background.
	Minimal. Orange background.
	Standard. Yellow background.
	Precision. Green background.

### Custom tolerance

Many machines must be aligned very accurately even if they have a lower rpm. You can add your own user defined tolerance.

1. Tap .
2. Enter offset and angle values.
3. Tap  to add the custom tolerance.

There are two tolerance levels for custom tolerances.

**Spacer shaft tolerance**

If you have selected spacer shaft, no offset tolerance is used. Both angles (A and B) are compared and have to be within tolerance.

## Thermal compensation




During normal operation, machinery is influenced of different factors and forces. The most common of these changes is the change in the temperature of the machine. This will cause the height of the shaft to increase. This is called thermal growth. To compensate for thermal growth, you enter values for cold condition compensation. It can be necessary to place the offline (cold) machine a bit lower to allow thermal growth.

To compensate for thermal growth, offset and angle values are used. The offset and angle values are based on a calculation point:

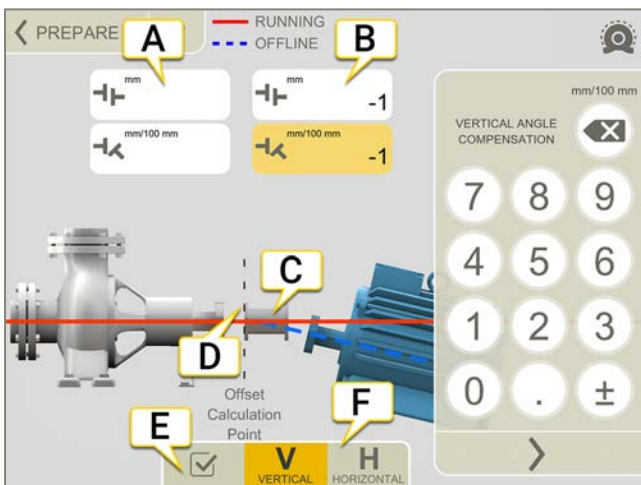
- For short flex, the calculation point is in the center of the coupling.
- For spacer shaft, the calculation point is on the left side of the spacer.

It is **not** possible to have both coupling and feet compensation on the same machine.

### Set compensation on the coupling

1. Tap  on the coupling.
2. Tap  to open the Thermal Compensation view.
3. Enter values for Vertical and/or Horizontal compensation. When you enter compensation values, the machine turns blue.
4. Tap  to return to Prepare view.

The compensation values are visible in the report.





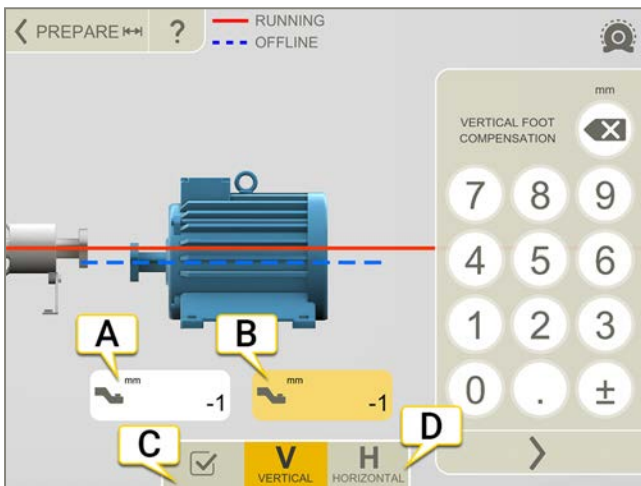
- A. Offset and angle values for the left machine.
- B. Offset and angle values for the right machine.
- C. Spacer shaft.
- D. Calculation point is on the left side of the spacer.
- E. Turn Thermal compensation on/off. If you turn it off, the values are saved but will not be used. In Machine train, this will affect **all** couplings in the train.
- F. Show V (vertical) or H (horizontal) view.

**NOTE!** It is **not** possible to have both coupling and feet compensation on the same machine.

### Set compensation on feet

Values are entered on first and last feet pair on the machine. If the machine has more than two feet pair, calculated values on these are presented in the report.

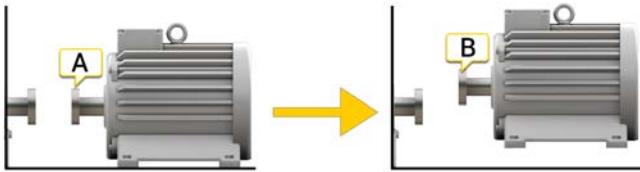
1. Enter distances.
2. Tap **+** on the machine.
3. Tap  to open the Thermal Compensation view.
4. Enter values for Vertical and/or Horizontal compensation. When you enter compensation values, the machine turns blue.
5. Tap  to return to Prepare view.



- A. Feet value for the first feet pair.
- B. Feet value for the last feet pair.
- C. Turn Thermal compensation on/off. If you turn it off, the values are saved but will not be used. In Machine train, this will affect **all** couplings in the train.
- D. Show V (vertical) or H (horizontal) view.

**NOTE!** It is **not** possible to have both coupling and feet compensation on the same machine.

### Example without compensation

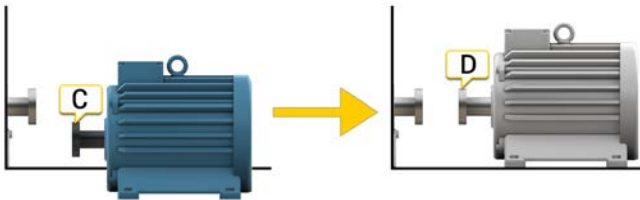


A. Offline, no compensation set. The machines are aligned.

B. Running, the machine "grows" 5 mm, and is no longer aligned.

### Example with compensation

In this example we assume a thermal growth of +5 mm in HOT condition. Therefore we compensate with -5 mm in off-line condition.



C. Offline, a -5 mm compensation has been set.

D. Running, the machine grows and will be perfectly aligned!

## MEASURE USING EASYTURN™

With EasyTurn™, it is possible to measure with as little as 40° spread between the measurement points. However, for an even more accurate result, try to spread the points as much as possible.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

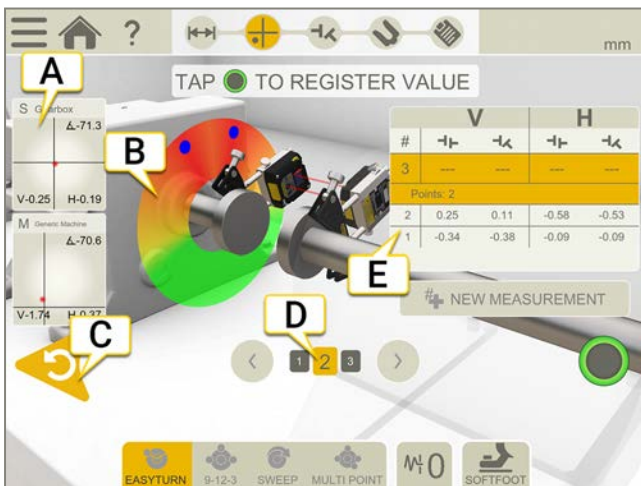
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.

### Measure

It is possible to switch measuring method before you have registered a value.

1. Tap  on the tab to select the method EasyTurn.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to register the first position. A red marking is displayed.
4. Turn the shafts at least 20°.
5. Tap  to register the second position.
6. Turn the shafts at least 20°.
7. Tap  to register the third position.
8. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Red = turn shafts outside the red marking.  
Green = turn shafts to green area.  
Blue = registered position.
- C. Delete registered value.
- D. Active coupling is yellow. Tap the arrows to move to other couplings.
- E. Measurement table. If you have selected spacer shaft, see information below.

#	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

## Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

## Edge warning

When the laser beam is close to the edge, the edge is “lit up” as a warning. It is still possible to register values when the edge warning is active.

## MEASURE USING 9-12-3

The measuring positions are registered at positions 9, 12, 3 o'clock. The inclinometers are not used.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

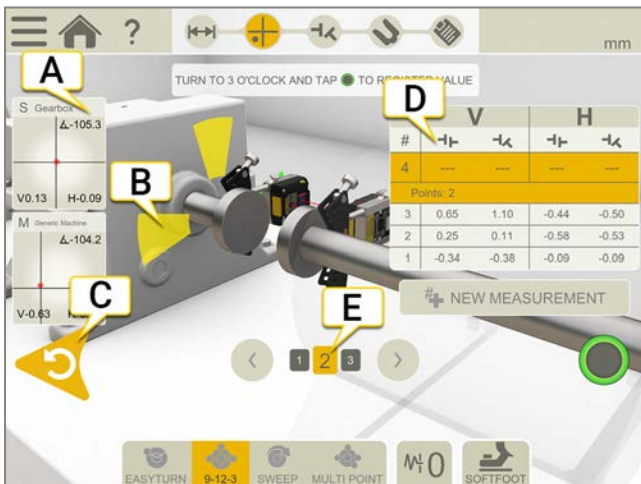
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot, go to Softfoot.

### Measure

It is possible to switch measuring method before you have registered a value.

1. Tap  on the tab to select the method 9-12-3.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Turn shafts to 9 o'clock.
4. Tap  to register the first position.
5. Turn shafts to 12 o'clock.
6. Tap  to register the second position.
7. Turn shafts to 3 o'clock.
8. Tap  to register the third position.
9. Tap  to go to the Result view, or tap  to measure again.







The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Yellow = registered position.  
Green = turn shafts to green area.
- C. Delete registered value.
- D. Measurement table.
- E. Active coupling is yellow. Tap arrows to move to other couplings.



Make a new measurement. This makes it possible to check the repeatability of the measurement.

	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

## Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

## Edge warning

When the laser beam is close to the edge, the edge is “lit up” as a warning. It is still possible to register values when the edge warning is active.

# MEASURE USING MULTIPOINT

## Preparations






Before you start measuring, make sure you have done the preparations you need.

- Mount the measuring units. "Multipoint" is available when you use XT60 measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.

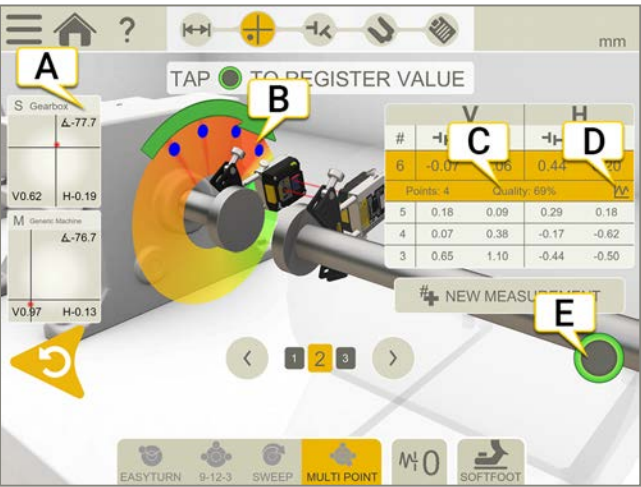
## Measure


It is possible to switch measuring method before you have registered a value.




For a more accurate result, try to spread the points as much as possible. The colours indicates where the optimum positions to measure are. Green is best place to measure. Always turn the shaft in the same direction for a more accurate result.

1. Tap  on the tab to select the method Multipoint.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to register the first position. The first position is automatically set to zero.
4. Tap  to register as many positions as you wish. After three points a result is available.
5. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Registered measurement point.
- C. Quality assessment.
- D. Tap  to show detailed information. See "Result details" on page 78.
- E. Tap to register values.

	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.

	Measure using Multipoint.
	Measure using Continuous sweep.
	Set Filter value.
	Measure Softfoot.

## Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

## Edge warning

When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.

# MEASURE USING CONTINUOUS SWEEP

Automatic recording of measurement values during continuous sweeping of the shaft.

There is no limit on the number of points.






## Preparations

Before you start measuring, make sure you have done the preparations you need.

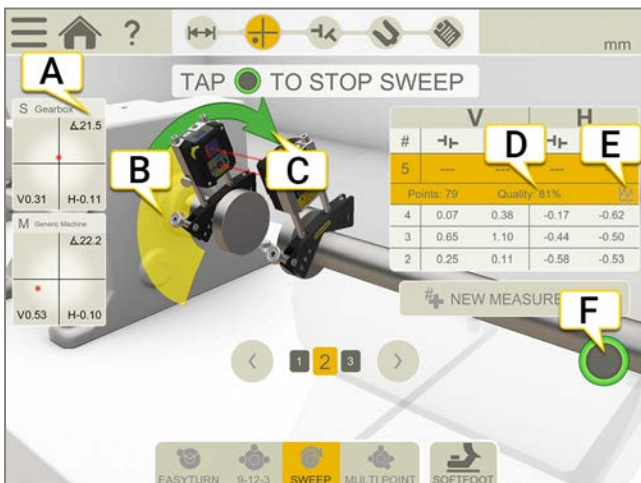
- Mount the measuring units. "Continuous sweep" is available when you use XT60 measuring units.
- To calculate results, you need to enter at least the distance between the measuring units, see "Enter distances" on page 57.
- Connect measurement units.
- If needed, perform a rough alignment.
- If needed, measure Softfoot. Go to Softfoot.


## Measure






It is possible to switch measuring method before you have registered a value. Filter is **not** available when you measure with Sweep.

1. Tap  on the tab to select the method Continuous sweep.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to start the measurement.
4. Turn the shafts. Turn the shafts as much as possible for a more accurate result.
5. Tap  to stop the measurement.
6. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Yellow area is where points have been registered.
- C. Measurement direction. If you change direction during the measurement, the arrow turns red.
- D. Quality assessment.
- E. Tap  to show detailed information. See "Result details" on page 78.
- F. Tap to start and stop the measurement.

#+	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Measure using Continuous sweep.
	Measure Softfoot.

## Spacer shaft in measurement table



- A. Vertical values for angle A and B
- B. Horizontal values for angle A and B

## Edge warning

When the laser beam is close to the edge, the edge is “lit up” as a warning. It is still possible to register values when the edge warning is active.






# SOFTFOOT

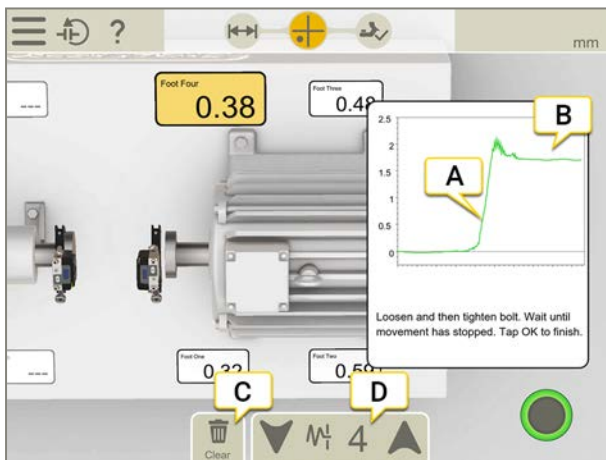
Perform a softfoot check to ensure that the machine is resting evenly on all its feet. A softfoot can be angular and/or parallel. Softfoot can be caused by:

- Twisted machinery foundations.
- Twisted or damaged machinery feet.
- Improper amount of shims under machine feet.
- Dirt or other unwanted materials under machine feet.

## Measure

Softfoot can be checked on all machines on which you have entered distances.

1. Enter distances between the measuring units and the feet pairs. This is done on the Prepare view.
2. On the Measure view, tap  on the tab.
3. Place the detectors at 12 o'clock and rough align if needed.
4. Tap  in the workflow.
5. Tap any of the feet value boxes.
6. Loosen bolt and wait for movement. Check the graph to see when the value has stabilized.
7. Tighten the bolt and wait for the value to stabilize again.
8. Tap  to register value.
9. Tap another foot to measure. Tap  to show the Softfoot result.
10. Tap  to return to the Measure view.




- A. Loosen bolt and wait for movement.
- B. Movement has stabilized. Tighten the bolt.
- C. Tap if you want to clear all softfoot values.
- D. Filter.





## Filter

If you have a low filter, the detector filter is increased to filter 4 when you measure Softfoot. If you increase the filter setting while measuring Softfoot, the new filter will be default next time you start Softfoot.


# RESULT

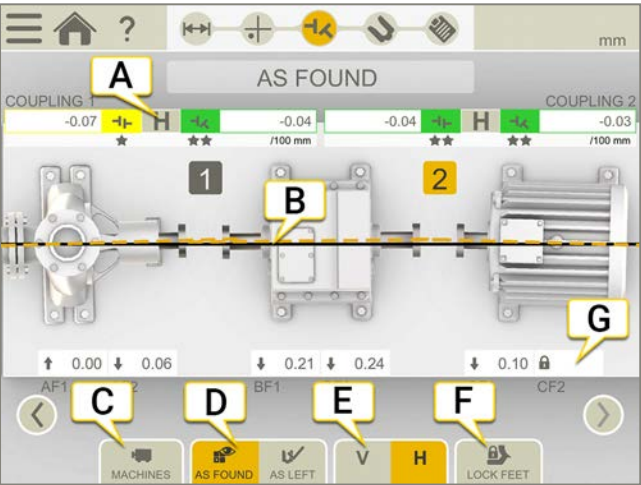
On the Result view, the offset, angle and feet values are clearly displayed. You can toggle between showing horizontal or vertical values. You can go back and forth between the views Measure, Result and Adjust.


Tap  if you want to adjust the machine. After you have adjusted, it is possible to go back to the Result view. There are four different result views:







	Machine view.
	Graph view. See "Graph view" on page 107
	Train table. See "Train table" on page 108
	Coupling table. See "Coupling table" on page 109

## Machine view

Tap  to view the machine view.

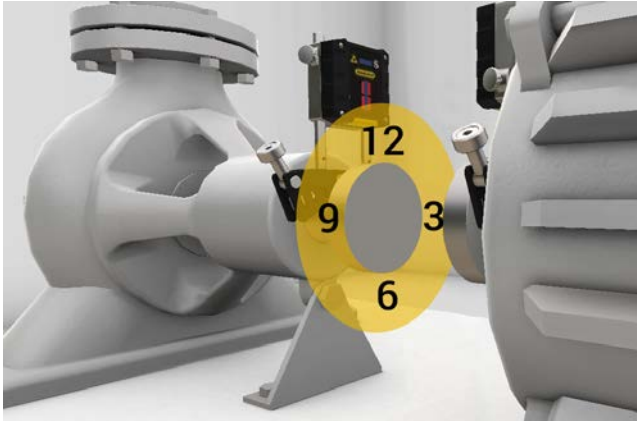


- A. Offset and angle values.
- B. Reference line.
- C. Tap to change result view.
- D. Show "As found" or "As left" values.
- E. Show the vertical or horizontal result.
- F. Lock feet.
- G. Feet values. If you have locked a feetpair, this is visualized with a lock .

	Coupling number.
	This coupling has been adjusted.
	Uncertain coupling. When you adjust one coupling, it might affect the next coupling in the machine train. This coupling needs to be remeasured.
	Thermal compensation.
	Indicates not within tolerance.
	Within tolerance. 1-3 stars depending on which tolerance is used.

### How to read the values

When reading the values, face the stationary machine (S) from the movable machine (M). Then 9 o'clock is to the left, as in the measuring programs.



### As found or As left

On the tabs, it is possible to toggle between showing As found or As left values.

	As found is the latest measurement you made before making an adjustment.
	As left is the latest adjusted result. Available if you have gone to the Adjust view (and shown live values) and returned to Result view.

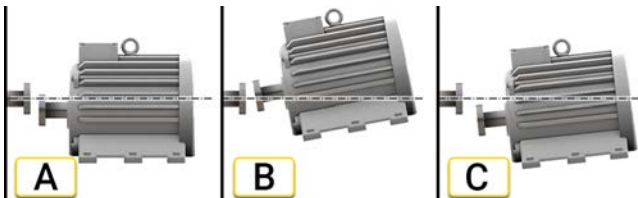
### Show Gap

By default, angular error/100 mm is displayed. To show gap, you need to set the coupling diameter.

To show the result as gap, tap and .

### Offset and angle values

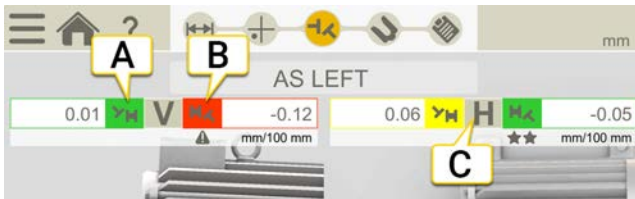
The offset and angle value indicate how well the machine is aligned at the coupling. They appear in both horizontal and vertical direction. These values are important to get within tolerance.



- A. Offset. The center lines of two axis are not concentric but parallel. This is measured at the coupling centers. In this example, a negative offset is shown.
- B. Angular misalignment. The center lines of two axis are not parallel. In this example, a positive angle is shown.
- C. Offset and angular misalignment. Misalignment is often a combination of both offset and angular misalignment.

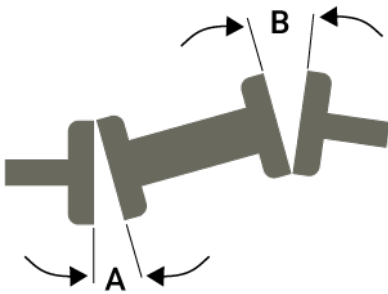
## Spacer shaft result

If you have selected spacer shaft, values for angle A and B are displayed. They appear in both horizontal and vertical direction.




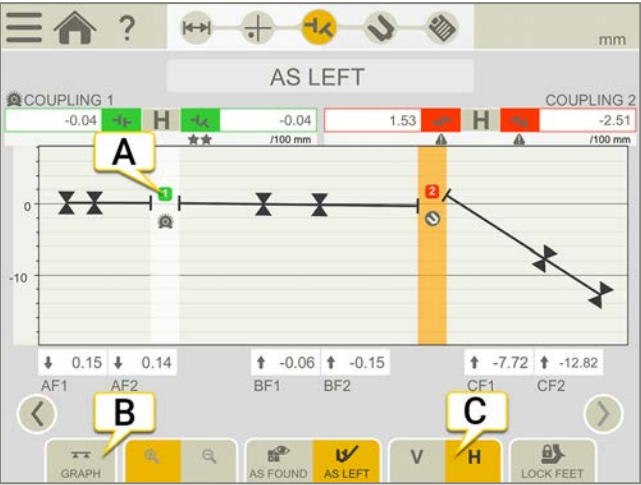
- A. Vertical values for angle A.
- B. Vertical values for angle B.
- C. Horizontal values.

*Angle A and angle B*









Graph view


Tap  to show the graph.

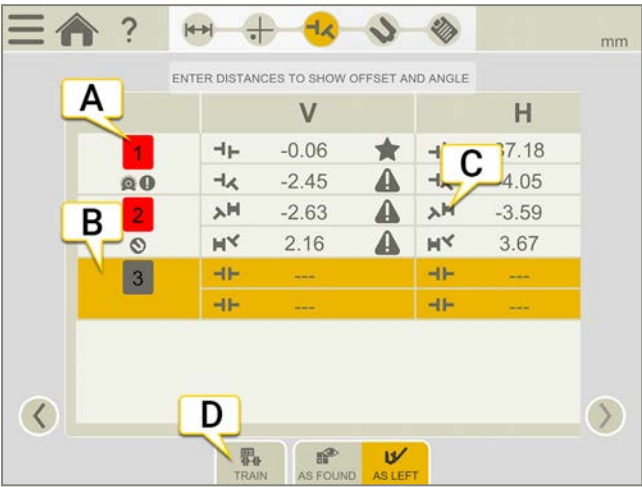


- A. Coupling number. Green = within tolerance, red = not within tolerance.
- B. Tap to change result view.
- C. Tap to show Horizontal view.







	Coupling number.
	This coupling has been adjusted.
	Uncertain coupling. When you adjust one coupling, it might affect the next coupling in the machine train. This coupling needs to be remeasured.
	Thermal compensation.
	Indicates not within tolerance.
	Within tolerance. 1-3 stars depending on which tolerance is used.

Train table


Tap  to show the train table.



- A. Coupling number. Green = within tolerance, red = not within tolerance
- B. Selected coupling.
- C. Spacer shaft.
- D. Tap to change result view.


	Coupling number.
	This coupling has been adjusted.
	Uncertain coupling. When you adjust one coupling, it might affect the next coupling in the machine train. This coupling needs to be remeasured.
	Thermal compensation.
	Indicates not within tolerance.
	Within tolerance. 1-3 stars depending on which tolerance is used.



## Coupling table

Tap  to view the coupling table. Shows the full result for one coupling at a time.



AS FOUND						
#		V		H		QUALITY
4	<input checked="" type="checkbox"/>	-0.14	-0.74	-0.06	-0.36	92%
3	<input type="checkbox"/>	0.11	0.62	0.07	0.38	88%
2019-03-12 09:24 Points: 99						
2	<input type="checkbox"/>	-0.05	-0.47	0.00	0.12	92%
1	<input type="checkbox"/>	-0.02	0.30	0.07	-0.24	--
AVERAGE		-0.14	-0.74	-0.06	-0.36	92%
PEAK-PEAK		0.00	0.00	0.00	0.00	

- A. Current coupling. Full result is shown for this coupling.
- B. Tap  to open the Detailed view. See "Result details" on page 78.
- C. Tap to change result view.
- D. Quality assessment for the measurement. Available if you have used the method Continuous Sweep or Multi-point.
- E. Tap to show another coupling.

If you want delete a measurement, tap  and .

### Use

By default, all measurements are included in the calculations. If you deselect measurements, the values for Average and Peak to Peak are updated. The excluded measurements are not included in the calculations, but still visible. The report will not be affected if you hide any measurements, in the report it is always the latest measurements that are shown.

**NOTE!** It is always the latest measurement and adjustment that are shown in the report.

### Average

The average offset and angle values. Calculations are based on the measurements marked as "Use".



### Peak to peak

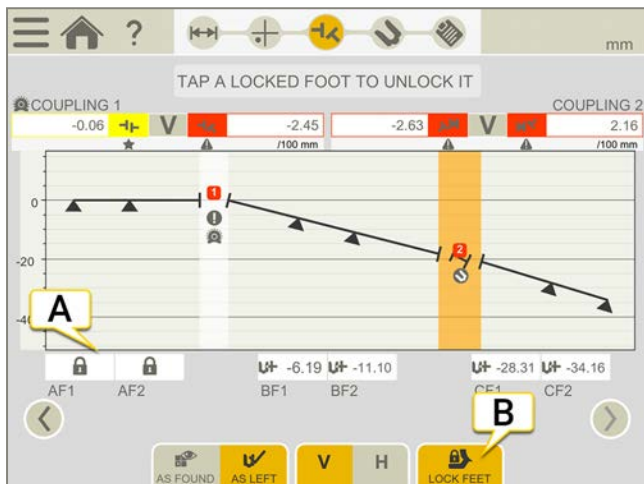
The total variation in offsets and angles. Calculations are based on the measurements marked as "Use".

## Locked feet

Locked feet is available in the result view, both from Machine och Graph view.

This function is useful in cases when a feetpair is difficult or impossible to adjust. The Lock feet function allows you to select which feet that are locked and which that are adjustable. To display feet values on a machine with locked feet, you need to enter the distances.





1. Tap  on the tab in the result view.
2. Tap one or two fields to lock the corresponding feetpair. If you want to move a lock, simply tap it to unlock and then tap in another field.
3. Tap  when you are done.

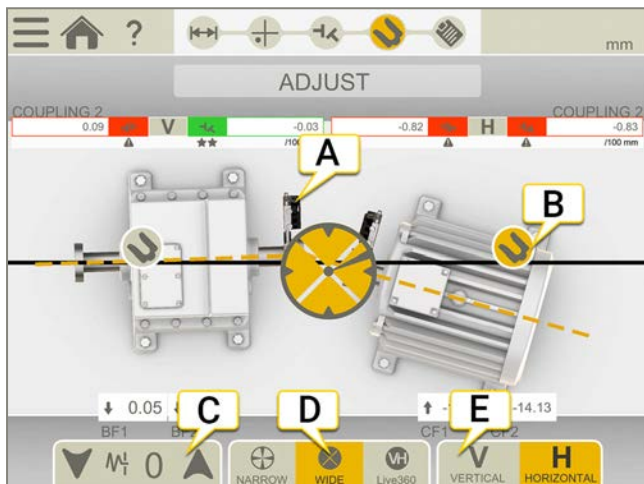


- A. Tap lock to unlock.
- B. Tap to finish.

## ADJUST MACHINE TRAIN

In the Adjust view, live values are displayed.




1. Tap  in the workflow. The two machines where the measuring units are mounted will be zoomed in.
2. Tap  on the machine that you want to adjust.
3. Shim the machine according to the vertical feet values.
4. Adjust the machine sideways according to the live horizontal values.
5. Tighten the feet.
6. Tap  to remeasure or tap  to view the report.



- A. The measuring units are placed on the coupling that was measured last.
- B. This machine is being adjusted.
- C. See "Filter" on page 8
- D. Select how to display the live values.
- E. Display vertical or horizontal view.

### Adjust another coupling




You need to measure or remeasure a coupling before you can adjust it. If you want to adjust another coupling than the last measured:

1. Move the measuring units to the coupling that you want to adjust.
2. Tap  in the workflow to display the Measure view.
3. Use arrows  to show the correct coupling.
4. Measure the coupling.
5. Tap  in the workflow and adjust the coupling.

## Live values with inclinometer

With the programs EasyTurn, Sweep and Multipoint, the inclinometer controls when live values are shown.


Select one of the corresponding live options:

	Narrow, live values are shown when the units are positioned within ( $\pm 2^\circ$ ) of the clock positions.
	Wide, live values are shown when the units are positioned within ( $\pm 44^\circ$ ) of the clock positions.
	Live360, live values are shown in both vertical <b>and</b> horizontal direction. Only available when using XT70. When you select Live360, make sure that you have not moved the measuring units after registering the last measurement point. If you have, please remeasure to ensure an accurate result.






**NOTE!** The live option 360 is sensitive for movements/backlash. Ensure that backlash will not influence the measurement.

## Live values without inclinometer


With the program 9-12-3 the inclinometer is not used, instead you manually show in which position your measurement units are.

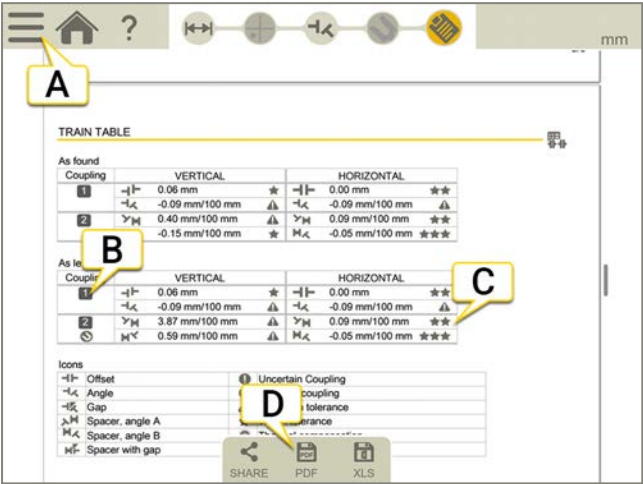
1. Turn the shafts with detectors to a live position.
2. Tap the corresponding live option, see below.
3. Tap  before you leave the live position.



Live options:




	Not live. If you want to change live position, you need to select this first and then the new position.
	Live at 9 o'clock.
	Live at 12 o'clock.
	Live at 3 o'clock.
	Live at 6 o'clock.

# MACHINE TRAIN REPORT

The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



- A. Tap  and  to finalize the measurement. See "Finalize" on page 8
- B. Coupling number.
- C. Tolerance indicators.
- D. Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

	This coupling has been adjusted.
	Uncertain coupling. When you adjust one coupling, it might affect the next coupling in the machine train. This coupling needs to be remeasured.
	Thermal compensation.

**For information on how to:**

- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See " Report" on page 14.



# VERTICAL

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## OVERVIEW VERTICAL

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For measurement and alignment of vertically and flange mounted machines.

Measuring units that can be used: XT40, XT50, XT60, XT70.

### Workflow Vertical



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

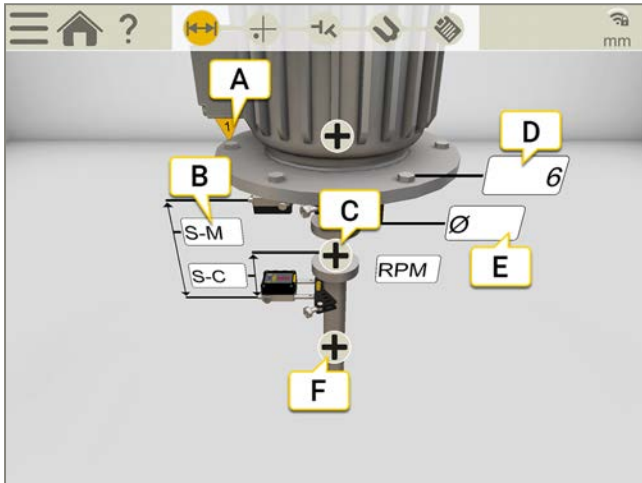
See "Templates for measurements" on page 12.

## PREPARE

First you need to set up and rough align the measuring units:

- See "Set up XT40" on page 32
- See "Set up XT60" on page 37

On the Prepare view, you enter machine and coupling properties. It is possible to go back to the Prepare view later and enter/alter information. Tap **+** to display a property menu for the Coupling or Machine.





- A. The first bolt. Placed at 9 o'clock.
- B. Tap field to enter distance.
- C. Tap to open coupling properties. (RPM, tolerance and coupling diameter.)
- D. Number of bolts, default is set to 6. Four, six, eight and ten are possible values.
- E. Tap to enter the diameter of the bolt circle.
- F. Tap to enter machine name.

**NOTE!** Make sure that the measuring units are changed.



## Coupling setup

### Coupling diameter

If you want the result based on the gap of the coupling instead of angle, it is necessary to enter the coupling diameter. The coupling diameter is visible in the report.

1. On the coupling, tap .
2. Tap .
3. Enter the diameter.



### Gap

To show the result as gap, tap  and .

## RPM Vertical

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.

The higher the rpm of a machinery is, the tighter the tolerance must be.



1. Tap the RPM field to enter a value. Or tap  and  on the coupling.
2. Enter RPM. A tolerance is automatically set to match the RPM you entered.

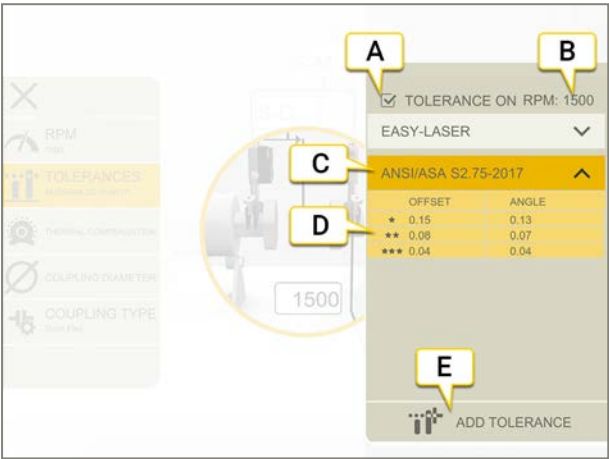
See "Tolerance" on the next page

# Tolerance

The rotation speed of the shafts will decide the demands on the alignment. When you select a rpm value, a matching tolerance is set automatically.

The higher the rpm of a machinery is, the tighter the tolerance must be.

- 1. On the coupling, tap .
- 2. Tap  to display the tolerance menu.






- A. Turn tolerance on/off.
- B. Current RPM.
- C. Selected tolerance.
- D. Tolerance levels.
- E. Add custom tolerance.

## Easy-Laser





This tolerance is default. When you set an RPM value, the Easy-Laser tolerance is activated. The tolerance level "good" is used for re-alignments on non-critical machinery. New installations and critical machines should always be aligned within the tolerance level "excellent".

There are two tolerance levels:

	Indicates not within tolerance. Red background.
	Good. Yellow background.
	Excellent. Green background.



## ANSI standard

The ANSI/ASA S2.75-2017 standard is available. This standard has three tolerance levels:

	Indicates not within tolerance. Red background.
	Minimal. Orange background.
	Standard. Yellow background.
	Precision. Green background.

## Custom tolerance



Many machines must be aligned very accurately even if they have a lower rpm. You can add your own user defined tolerance.

1. Tap .
2. Enter offset and angle values.
3. Tap  to add the custom tolerance.

There are two tolerance levels for custom tolerances.

## Name the machine

Use if you want to change the default names on the machines. The name is visible in the report.

1. Tap  on the machine.
2. Tap .
3. Tap the text input field to change the name.

## MEASURE






The measuring positions are registered at positions 9, 12, 3 o'clock.

### Preparations

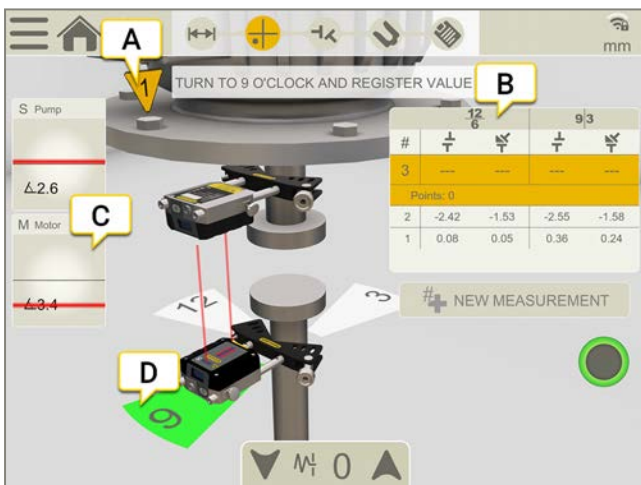
Before you start measuring, make sure you have done the preparations you need.

- Mount the measuring units.
- To calculate results, you need to enter the distance between the measuring units.
- If needed, perform a rough alignment.

### Measure

1. Position the units at 9 o'clock, at bolt number one. Make sure that it is possible to also position the units at 12 and 3 o'clock.
2. Tap  to register the first position.
3. Turn shafts to 12 o'clock.
4. Tap  to register the second position.
5. Turn shafts to 3 o'clock.
6. Tap  to register the third position.
7. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.




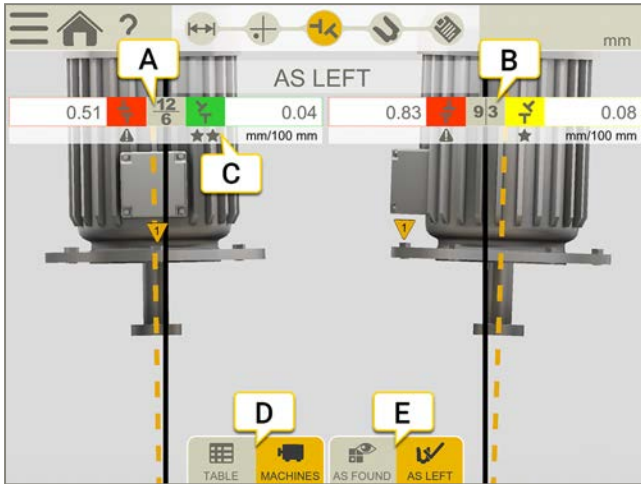
- A. The first bolt. Placed at 9 o'clock.
- B. The table displays offset and angle values in the directions 12-6 and 9-3 o'clock.
- C. Tap to display detector information.
- D. Yellow = registered position.  
Green = turn shafts to green area.

### Edge warning

When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.

## RESULT



The result is displayed as sideways offset in the coupling and angular error between shafts. In the directions 12-6 and 9-3. Tap  if you want to adjust the machine. After you have adjusted, it is possible to go back to the Result view.



- A. Values are displayed live in the direction 12-6.
- B. Values are displayed live in the direction 9-3.
- C. Tolerance indicators. See "Tolerance" on page 118.
- D. Show Table or Machine view. See "Result table" on the next page.
- E. Show "As found" or "As left" values.



### As found or As left

On the tabs, it is possible to toggle between showing As found or As left values.

	As found is the latest measurement you made before making an adjustment.
	As left is the latest adjusted result. Available if you have gone to the Adjust view (and shown live values) and returned to Result view.

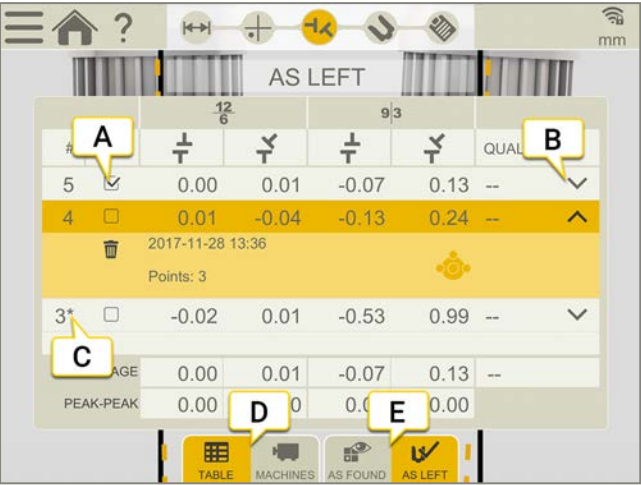
### Show Gap

By default, angular error/100 mm is displayed. To show gap, you need to set the coupling diameter.



To show the result as gap, tap  and .

# Result table

In the Result view, tap  to display the table view.



- A. Select to use the measurement in the calculations.
- B. Tap to display more information.
- C. This measurement has been adjusted.
- D. Toggle between showing machine or table view.
- E. Toggle between showing As found or As left values.

If you want delete a measurement, tap  and .

## Use

By default, all measurements are included in the calculations. If you deselect measurements, the values for Average and Peak to Peak are updated. The excluded measurements are not included in the calculations, but still visible. The report will not be affected if you hide any measurements, in the report it is always the latest measurements that are shown.

**NOTE!** It is always the latest measurement and adjustment that are shown in the report.

## Average

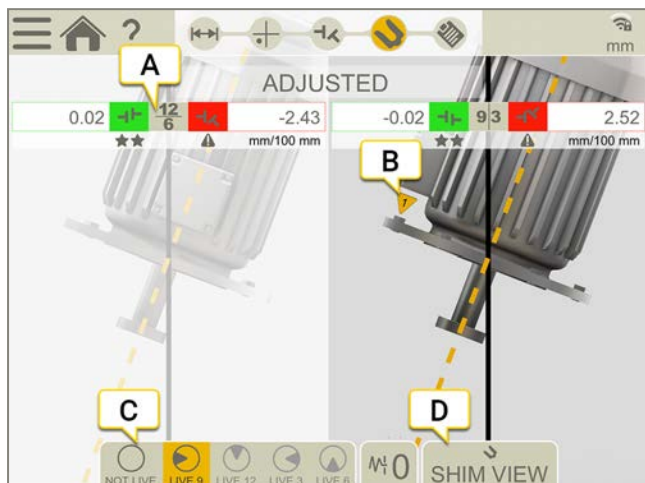
The average offset and angle values. Calculations are based on the measurements marked as "Use".

## Peak to peak

The total variation in offsets and angles. Calculations are based on the measurements marked as "Use".


## ADJUST

1. Compare the offset and angular error to the tolerance demands.
2. If the angular error need to be adjusted, please shim the machine first, then adjust the offset.
3. Tighten the bolts and remeasure.








- A. Values are displayed live in the direction 12-6 or 9-3.
- B. The first bolt is placed at 9 o'clock.
- C. Live positions.
- D. Open the Shim view. See "Shim values" on the next page.

### Live positions



1. Turn the shafts with detectors to a live position.
2. Tap the corresponding live option, see below.
3. Tap  before you leave the live position.

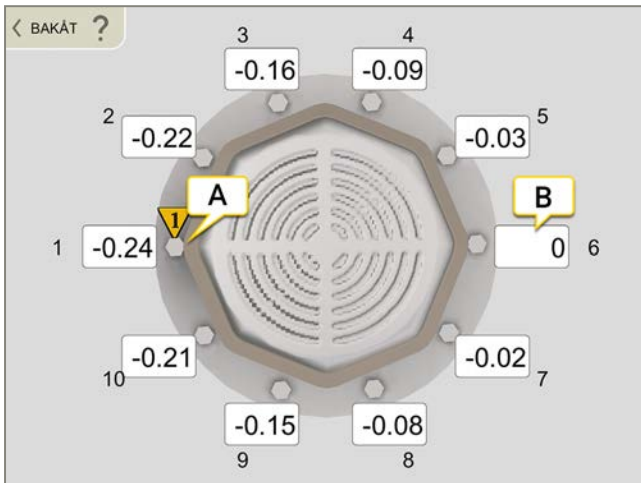
Live options:

	Not live. If you want to change live position, you need to select this first and then the new position.
	Live at 9 o'clock.
	Live at 12 o'clock.
	Live at 3 o'clock.
	Live at 6 o'clock.

## Shim values

To view this, you need to enter number of bolts and diameter of bolt circle on the Prepare view.


1. Select  to open Shim value view. The values are not live.
2. Read the values. The highest bolt is calculated as 0.00. Values below zero indicates that the bolt is low and need shimming.
3. Select  to return to the Result view. If you have adjusted the machine, you need to remeasure the coupling.

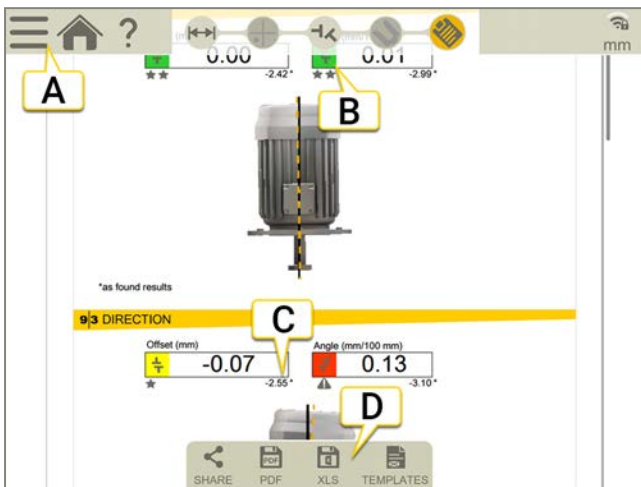




- A. First bolt at 9 o'clock.
- B. The highest bolt is calculated as 0.00.

**NOTE!** If you shim the machine, remeasure from position 9 o'clock to update all measurement values.

## VERTICAL REPORT

The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- Green = within tolerance.
- The "As found" result is marked with an asterisk (\*).
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See "Report" on page 14.



# CARDAN




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## OVERVIEW CARDAN


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The Cardan program is used for alignment of cardan-shaft-coupled/centreoffset machines.  
Measuring units that can be used: XT70

### Measuring methods

	<b>EasyTurn™</b> The EasyTurn™ function allows you to begin the measurement process from anywhere on the turn. You can turn the shaft to any three positions with as little as 20° between each position to register the measurement values. An easier-to-use version of the 9–12–3 method.
	<b>9-12-3</b> Measurement points are recorded at fixed points 9, 12 and 3 o'clock. This is the classic three-point method which can be used in most cases.
	<b>Multipoint</b> Multipoint is basically the same as EasyTurn™, but instead you can record multiple points on the sector rotated. This will provide an optimized calculation basis. Perfect for e.g. turbine and sliding bearing applications.

### Workflow Cardan



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

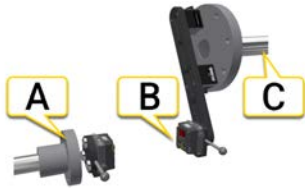
### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

See "Templates for measurements" on page 12.

## PREPARE

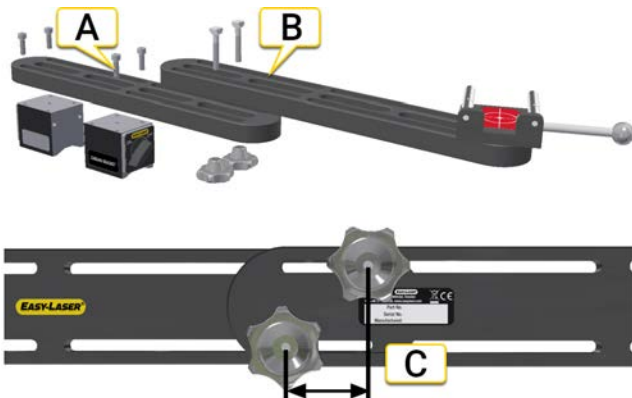
Remove the cardan shaft and mount the measurement units.



- A. M-unit on the movable (M) machine. This is the adjustable shaft.
- B. S-unit on arm bracket.
- C. Stationary (S) machine. This is the non adjustable shaft.

### Mount the equipment

1. Remove the cardan shaft.
2. Mount the arm bracket on the S machine. You can use the magnet bases or the mount the bracket directly on the flange.
3. Mount the S-unit on the arm bracket.
4. Mount the magnetic M bracket on the movable machine.
5. Mount the M-unit on the bracket.
6. Cone the laser beams. See "Cone the laser beam" on the facing page



*Arm bracket for the S-unit*

- A. Mount the magnet bases.
- B. Use two arm brackets for large offsets. The arm bracket has an offset range of 0 - 800mm.
- C. At least 40mm between the screws.

**NOTE!** Make sure that the measuring units are charged.

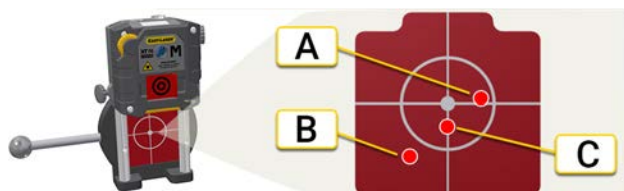
## Cone the laser beam

If needed, perform a "rough coning" using a piece of paper.

1. Place both brackets at 12 o'clock.
2. Place a piece of paper between the rods and the target on the M bracket.
3. Make a mark where the laser beam hits the paper.
4. Rotate the S-unit 180°. Use the handle.
5. Make a mark where the laser beam hits the paper.
6. Adjust the laser beam to the middle between the two marks. Use the screws on the S-unit.
7. Repeat the procedure with the M-unit.

### Cone from S to M

1. Place both units at 12 o'clock.
2. Move the M-unit upwards to show the target on the bracket, see image below.
3. Note where the laser beam hit the target on position **A**.
4. Rotate the S-unit 180°. Use the handle.
5. Note where the laser beam hits the target on position **B**.
6. Draw a line between the positions and mark the middle point between position A and B.
7. Adjust the laser beam to the middle point, **C**. Use the screws on the S-unit.



*M-machine. The target is visible on the bracket.*

8. Rotate the S-unit 180° again. If the laser beam does not move when you rotate, it is correctly coned. If it moves more than 3mm, repeat step 3 – 7.
9. Loosen the screws on the bracket and adjust until the laser beam hits the **centre** of the target on the M-bracket.



*Loosen screws to adjust the S-bracket*

### Cone from M to S

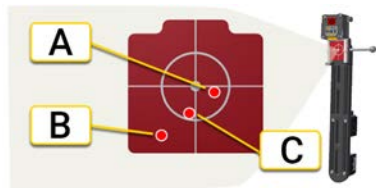
1. Place both units at 12 o'clock.
2. Move the M-unit down on the rods to place it in measuring position.
3. Move the S-unit upwards to show the target, see image below.
4. Note where the laser beam hit the target on position **A**.
5. Rotate the M-unit 180°. Use the handle.
6. Note where the laser beam hit the target on position **B**.
7. Draw a line between the positions and mark the middle point between position A and B.
8. Adjust the laser beam to the middle point, **C**. Use the screws on the M-unit.
9. Rotate the M-unit 180° again. Use the handle. If the laser beam does not move when you rotate, it is correctly coned.

## CARDAN

If it moves more than 3mm, repeat step 4 – 8.

10. Adjust the movable machine until the laser beam hits the **centre** of the target on the S bracket.

Make sure that the laser beams hit the target centres on **both** brackets.



*S-machine. The target is visible on the **bracket**.*

## Adjust laser beams

Now you will adjust the laser beam to the centres of the target on the **measuring units**.

1. Move both units down on the rods to measuring position.
2. Place both units at 12 o'clock.
3. Adjust the laser beam until it hits the centre of the M target (**A** in image below). Use the screws on the S-unit.
4. Adjust the laser beam until it hits the centre of the S target (**B** in image below). Use the screws on the M-unit.

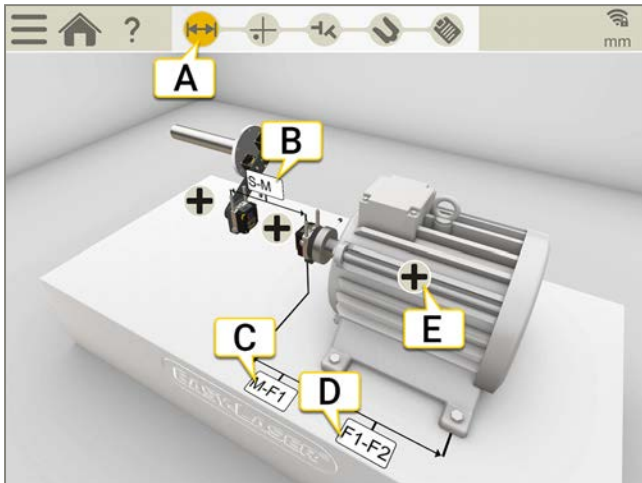


- A. Adjust S-unit to centre of the M target.
- B. Adjust M-unit to centre of the S target.

## Enter distances

On the Prepare view, you enter machine and coupling properties. It is possible to go back to the Prepare view later and enter/alter information.

Tap any distance input field to enter distance. The field is zoomed in and the keyboard is displayed. It is possible to skip all distances and go directly to Measure view. If you change a distance later on, the result is recalculated.

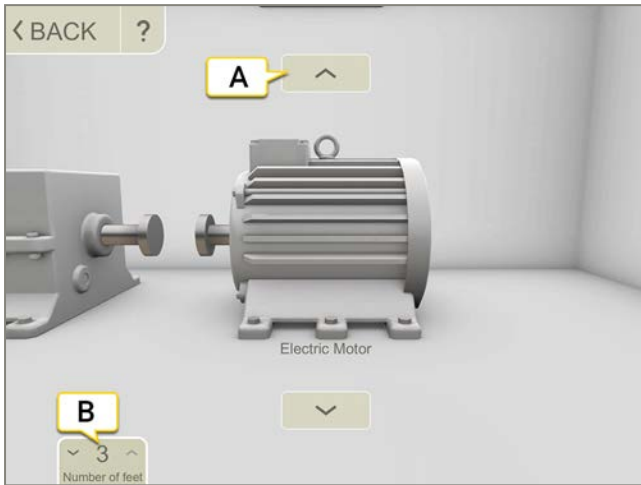


- A. Prepare view is active in the workflow.
- B. Distance between S-unit and M-unit. Measure between the rods. Required if you want to calculate an angle result.
- C. Distance between M-unit and feet pair one. It is possible to enter a negative value here.
- D. Distance between first and second feet pair. Required if you want to calculate feet values.
- E. Tap **+** to display a property menu for the Coupling or Machine.

**NOTE!** All distances are required if you want to measure Softfoot.

## Machine setup



On the machine, tap **+** and  to open the Machine set-up view.

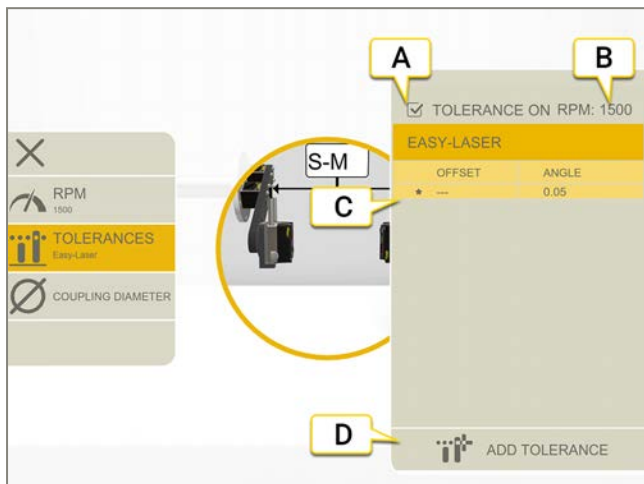


- A. Tap arrows change the machine image.
- B. Tap to change the number of feetpair. The possible number of feetpair varies depending on machine.

## Tolerance

By default, a tolerance is set. You can add your own tolerance if needed.



1. On the coupling, tap .
2. Tap  to display the tolerance menu.



- A. Turn tolerance on/off.
- B. Current RPM.
- C. Selected tolerance.
- D. Add custom tolerance.



### Easy-Laser

This tolerance is default.

	Indicates not within tolerance. Red background.
	Good. Green background.

### Custom tolerance



You can add your own user defined tolerance.

1. Tap .
2. Enter offset and angle values.
3. Tap  to add the custom tolerance.

There are two tolerance levels for custom tolerances.

## Name the machine

Use if you want to change the default names on the machines. The name is visible in the report.

1. Tap  on the machine.
2. Tap .
3. Tap the text input field to change the name.

## MEASURE USING EASYTURN™

Measuring units that can be used: XT70

With EasyTurn™, it is possible to measure with as little as 40° spread between the measurement points. However, for an even more accurate result, try to spread the points as much as possible.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

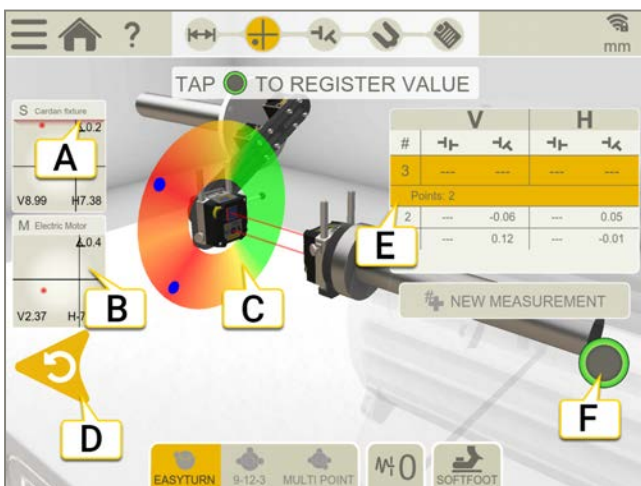
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- Cone the laser beam. See "Cone the laser beam" on page 129.
- If needed, measure Softfoot. See "Softfoot" on page 74.

### Measure

It is possible to switch measuring method before you have registered a value. Make sure to turn the measuring units equally much. If the angle between them differs more than  $\pm 2^\circ$ , you will be prompted to align the units.






1. Tap  on the tab to select the method EasyTurn.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Tap  to register the first position. A red marking is displayed.
4. Turn both units at least 20° (spread the points as much as possible).
5. Tap  to register the second position.
6. Turn both units at least 20°.
7. Tap  to register the third position.
8. Tap  to go to the Result view, or tap  to measure again.

The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Edge warning. When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.
- B. Tap to display detector information.

- C. Red = turn shafts outside the red marking.  
Green = turn shafts to green area.  
Blue = registered position.
- D. Delete registered value.
- E. Measurement table.
- F. This icon is gray when it not possible to register a value.

	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Set Filter value.

## MEASURE USING 9-12-3

Measuring units that can be used: XT70

The measuring positions are registered at positions 9, 12, 3 o'clock. The inclinometers are not used.







### Preparations

Before you start measuring, make sure you have done the preparations you need.

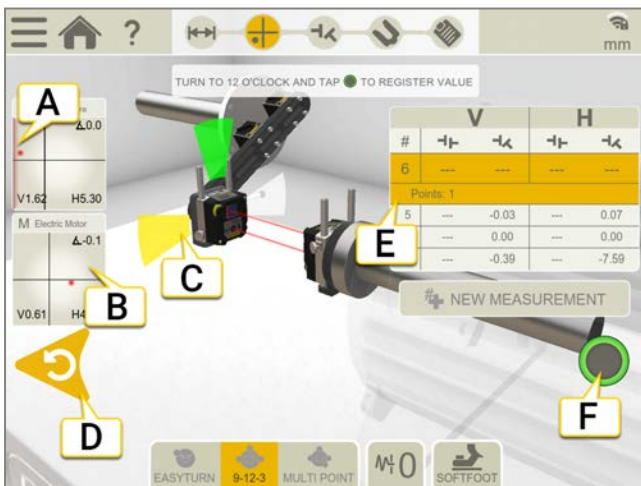
- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Cone the laser beam. See "Cone the laser beam" on page 129.
- If needed, measure Softfoot. See "Softfoot" on page 74.

### Measure

It is possible to switch measuring method before you have registered a value.

1. Tap  on the tab to select the method 9-12-3.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Turn both measuring units to 9 o'clock.
4. Tap  to register the first position.
5. Turn both measuring units to 12 o'clock.
6. Tap  to register the second position.
7. Turn both measuring units to 3 o'clock.
8. Tap  to register the third position.
9. Tap  to go to the Result view, or tap  to measure again.







The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Edge warning. When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.
- B. Tap to display detector information.
- C. Yellow = registered position.  
Green = turn shafts to green area.
- D. Delete registered value.

E. Measurement table.

F. This icon is gray when it not possible to register a value.

	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Set Filter value.
	Measure Softfoot.

## MEASURE USING MULTIPOINT

Measuring units that can be used: XT70

### Preparations






Before you start measuring, make sure you have done the preparations you need.

- Mount the measuring units.
- To calculate results, you need to enter at least the distance between the measuring units.
- Connect measurement units.
- Cone the laser beam. See "Cone the laser beam" on page 129.
- If needed, measure Softfoot. See "Softfoot" on page 74.

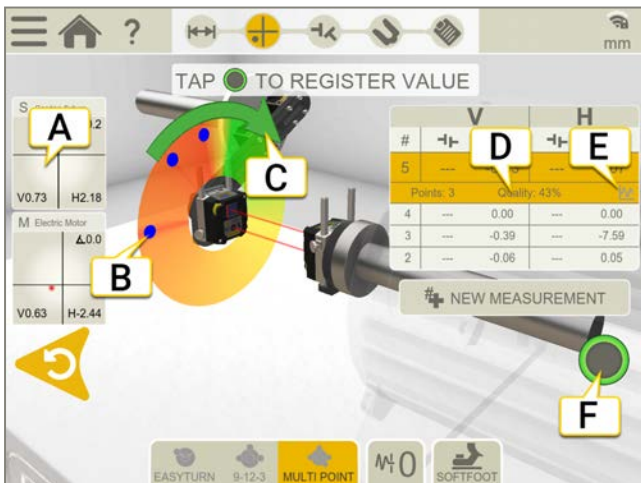
### Measure

It is possible to switch measuring method before you have registered a value.


For a more accurate result, try to spread the points as much as possible. The colours indicates where the optimum positions to measure are. Green is best place to measure.

1. Tap  on the tab to select the method Multipoint.
2. Adjust laser to the center of the targets. If needed, adjust the units on the rods, then use laser adjustments knobs.
3. Make sure that both units are placed at the same angle.
4. Tap  to register the first position. The first position is automatically set to zero.
5. Turn both units to the same angle. If the angle between the units differs too much, it is not possible to register values.
6. Tap  to register as many positions as you wish. After three points a result is available.
7. Tap  to go to the Result view, or tap  to measure again.







The registered values are saved when you leave the Measure view. If you return to the Measure view, it is possible to do a new measurement.



- A. Tap to display detector information.
- B. Registered measurement point.
- C. Measurement direction.
- D. Quality assessment.


E. Tap  to show detailed information. See "Result details" on page 78.

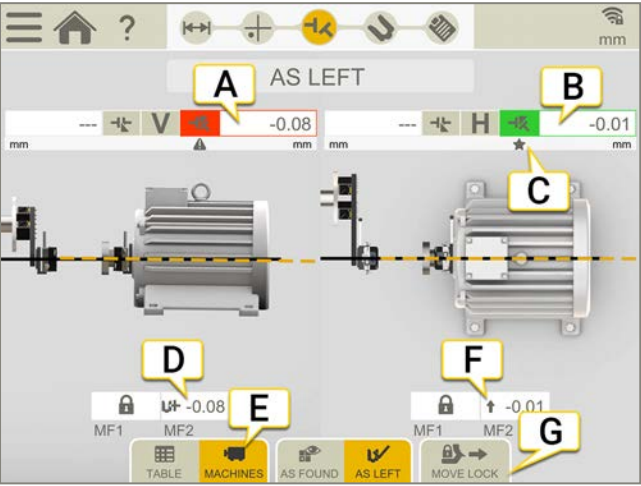
F. Tap to register values.


	Make a new measurement. This makes it possible to check the repeatability of the measurement.
	Measure using EasyTurn™.
	Measure using 9-12-3.
	Measure using Multipoint.
	Set Filter value.
	Measure Softfoot.

# RESULT

On the Result view, the offset, angle and feet values are clearly displayed. Both horizontal and vertical angle are shown, no offset. You can go back and forth between the views Measure, Result and Adjust.

Tap  if you want to adjust the machine. After you have adjusted, it is possible to go back to the Result view.





- A. Vertical angle values.
- B. Horizontal angle values.
- C. Tolerance indicators.
- D. Vertical feet values. The locked a feetpair is visualized with a lock .
- E. Show Table or Machine view. See "Result table" on the facing page.
- F. Horizontal feet values.
- G. Move feet lock.

## Lock feet

When measuring Cardan couplings, one feetpair is always locked on the movable machine. It is possible to move the lock. The Move lock function allows you to select which feet that are locked and which that are adjustable.

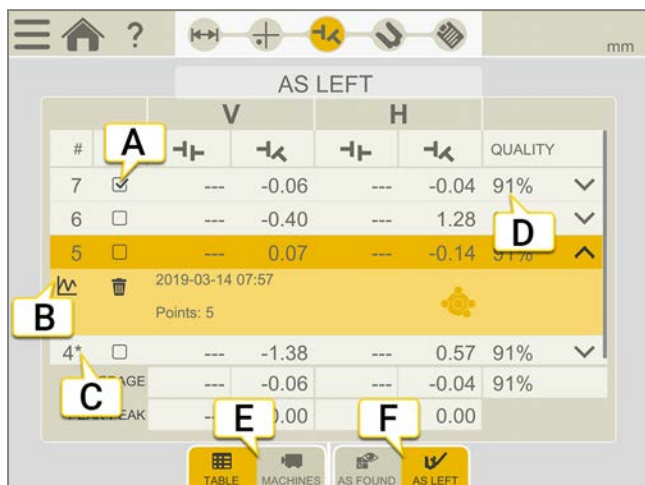
## As found or As left

On the tabs, it is possible to toggle between showing As found or As left values.

	As found is the latest measurement you made before making an adjustment.
	As left is the latest adjusted result. Available if you have gone to the Adjust view (and shown live values) and returned to Result view.



## Result table

In the Result view, tap  to display the table view.



AS LEFT						
#		V		H		QUALITY
		↔	↘	↔	↘	
7	<input checked="" type="checkbox"/>	---	-0.06	---	-0.04	91% ✓
6	<input type="checkbox"/>	---	-0.40	---	1.28	91% ✓
5	<input type="checkbox"/>	---	0.07	---	-0.14	91% ✓
2019-03-14 07:57 Points: 5						
4*	<input type="checkbox"/>	---	-1.38	---	0.57	91% ✓
AVERAGE		---	-0.06	---	-0.04	91%
PEAK TO PEAK		---	0.00	---	0.00	

- A. This measurement is used in the calculations.
- B. Open detailed view See "Result details" on page 78
- C. This measurement has been adjusted.
- D. Quality assessment for the measurement. Available if you have used the method Multipoint.
- E. Toggle between showing As found or As left values.

If you want delete a measurement, tap  and .

### Use

By default, all measurements are included in the calculations. If you deselect measurements, the values for Average and Peak to Peak are updated. The excluded measurements are not included in the calculations, but still visible. The report will not be affected if you hide any measurements, in the report it is always the latest measurements that are shown.

**NOTE!** It is always the latest measurement and adjustment that are shown in the report.

### Average



The average angle values. Calculations are based on the measurements marked as "Use".

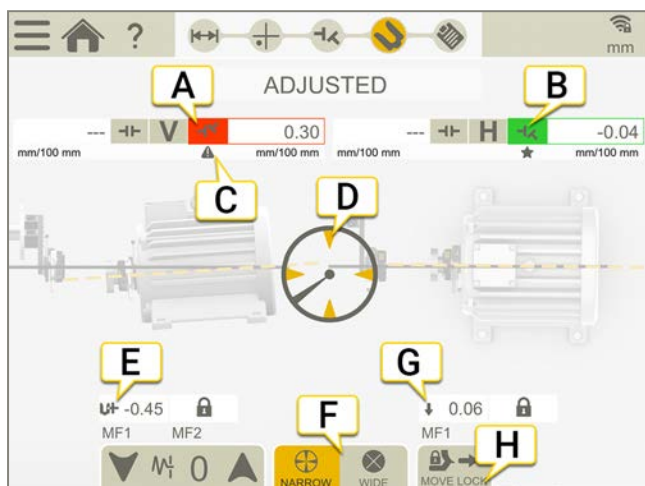
### Peak to peak

The total variation in angles. Calculations are based on the measurements marked as "Use".

## ADJUST CARDAN

Check the machine according to the tolerance and adjust the machine if needed. No offset adjustment is made.

1. Adjust the machine vertically by shimming according to the vertical feet values.
2. Adjust the machine sideways according to the live horizontal values.
3. Tighten the feet.
4. Tap  to remeasure or tap  to view the report.





- A. Vertical angle values.
- B. Horizontal angle values.
- C. Tolerance indicators.
- D. Turn to live.
- E. Add or remove shims.
- F. Live options, narrow or wide.
- G. Arrow show how to adjust the horizontal values.
- H. Move feet lock.

## Live values with inclinometer


With the programs EasyTurn and Multipoint, the inclinometer controls when live values are shown.

Select one of the corresponding live options:






	Narrow, live values are shown when the units are positioned within ( $\pm 2^\circ$ ) of the clock positions.
	Wide, live values are shown when the units are positioned within ( $\pm 44^\circ$ ) of the clock positions.

## Live values without inclinometer


With the program 9-12-3 the inclinometer is not used, instead you manually show in which position your measurement units are.

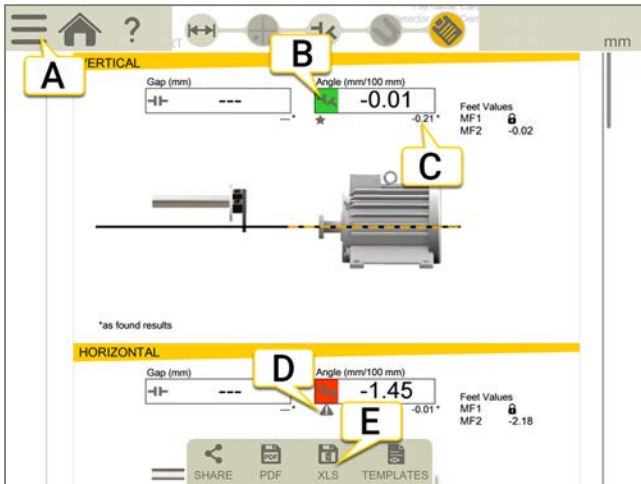
1. Turn the shafts with detectors to a live position.
2. Tap the corresponding live option, see below.
3. Tap  before you leave the live position.



Live options:

	Not live. If you want to change live position, you need to select this first and then the new position.
	Live at 9 o'clock.
	Live at 12 o'clock.
	Live at 3 o'clock.
	Live at 6 o'clock.

## CARDAN REPORT

The report covers all details from the measurement. The report is constantly being filled out while the session is carried out. To see the report at its current state, tap  in the workflow.



- A. Tap  and  to finalize the measurement. See "Finalize" on page 8
- B. Green = within tolerance.
- C. The "As found" result is marked with an asterisk (\*).
- D. Tolerance indicator.
- E. Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See " Report" on page 14.

# TWIST

---


## OVERVIEW TWIST



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Program to measure flatness/twist of, for example, machine foundation, machine tables, etc.

Measuring units that can be used: XT50, XT60, XT70.

### Overview Twist



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

### Create a template


1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

See "Templates for measurements" on page 12.

## PREPARE

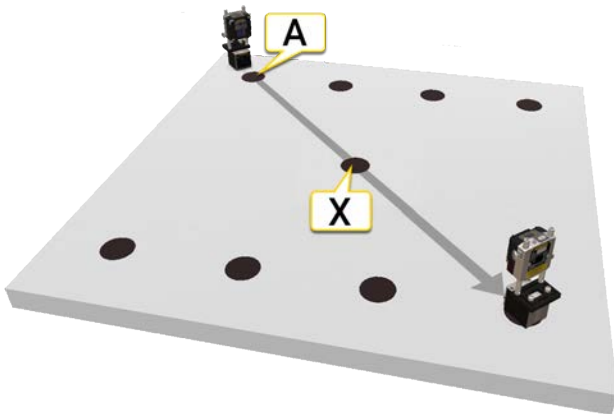
---

If you want to measure a machine foundation made of two beams you can build a temporary reference block at the centre point (marked with X in the program).

1. Make a rough alignment and enter distances.
2. Tap  to continue to Measure view.

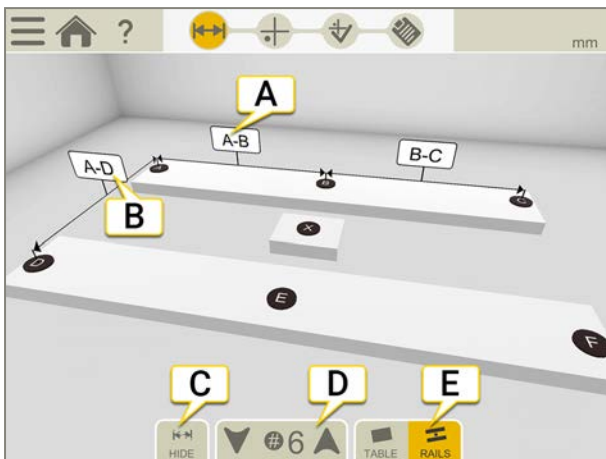
### Rough align

1. Place the S-unit close to position **A**. Make sure that the S and M-unit are on the same height. Especially important when you are using a tilt table.
2. Mark where the measurement positions are on your measurement object, to ensure that you place the detector on the same position each time. Make sure to place the centre point (X) exactly in the middle.
3. Place M-unit on the position diagonal to A. Make sure that the laser beam hits the detector target.
4. Place the M-unit on position **X**. Make sure that the laser beam hits the detector target.
5. Place the M-unit on measurement position **A**.
6. Tap **0** to zero set the value.
7. Move the M-unit back to the diagonal position. Adjust the laser beam to zero ( $\pm 0.1$  mm).





*Position A and position X.*

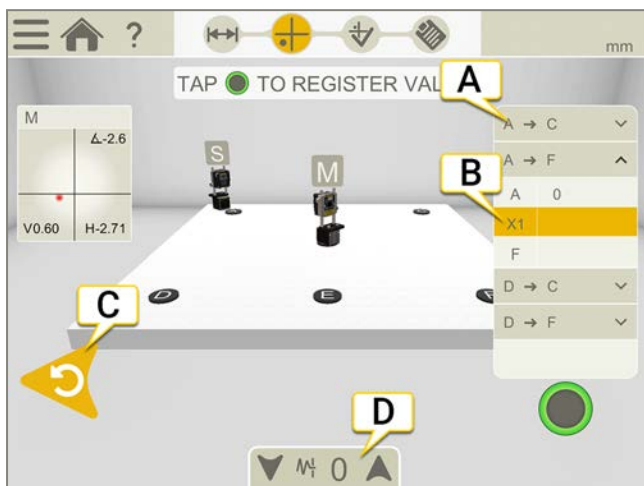
## Enter distances



- A. Tap any field to enter distances.
- B. This distance is only for documentation.
- C. Hide/show distances.
- D. Select 4, 6 or 8 measurement points.
- E. Select table or beams.

## MEASURE

1. Tap  to register values.
2. Tap  to display the result view.



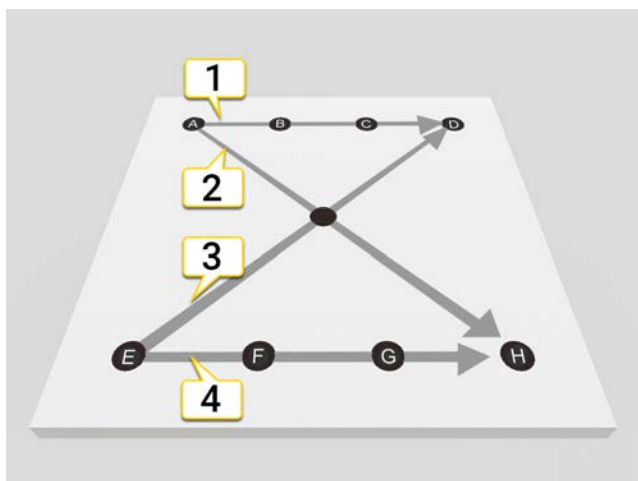
- A. Table with measurement sections.
- B. Active measurement point.
- C. Delete latest measurement point.
- D. Tap to select filter. See "Filter" on page 8

### Measurement sections

The number of sections depends on how many measurement points you have selected.

- Four measurement points: only the two diagonals are measured.
- Six or eight measurement points: four sections are measured.

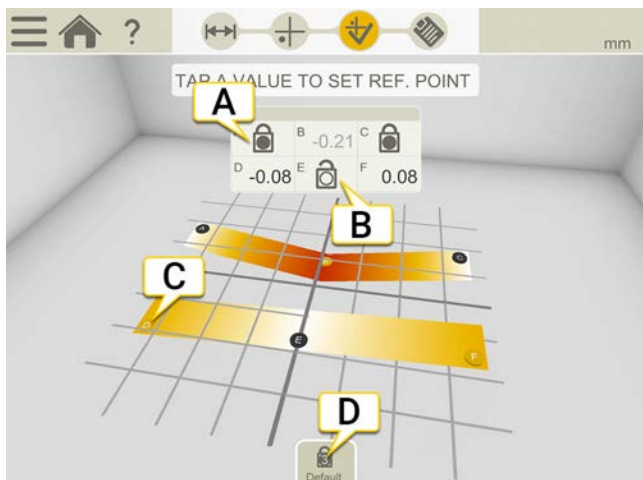
#### Example with eight measuring points



1. Section A to D
2. Section A to H
3. Section E to D
4. Section E to H

## RESULT

Tap  to display the Result view. A table and a graph show the result.





- A. Reference point.
- B. Opened reference point.
- C. Point below zero.
- D. Set default reference points.

## Reference points

### Default reference points

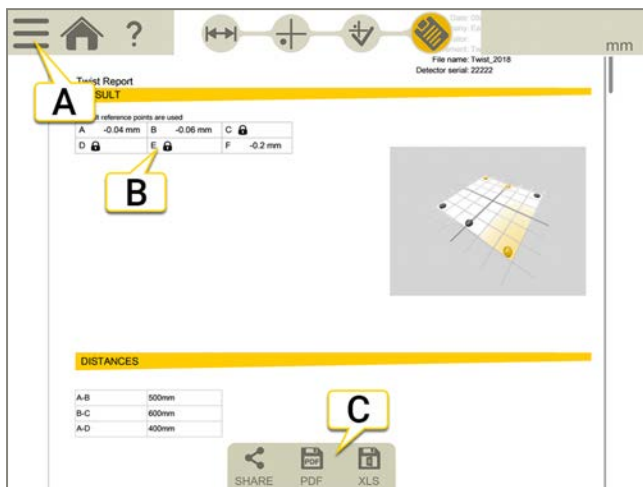
By default, a best fit is calculated with all measurement points below zero.



### Custom reference points

1. Tap  in the table to open a reference point.
2. Tap a value in the table to set it as reference. Maximum two of the reference points can be in line horizontally.
3. Tap  to return to the default reference points.

## TWIST REPORT

Tap  in the workflow to view the report.



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- Reference point.
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See "Report" on page 14.

# BASIC FLATNESS


---



## OVERVIEW BASIC FLATNESS

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Use this program to measure flatness on for example machine foundations.

Equipment that can that can be used: XT70 (M-unit) together with a laser transmitter.



The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

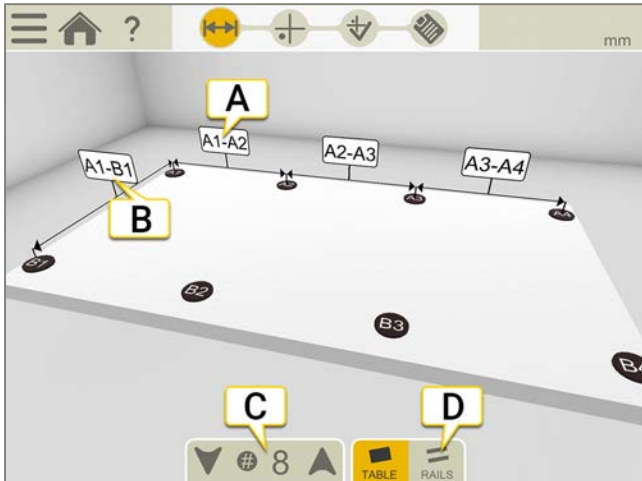
See "Templates for measurements" on page 12.

## PREPARE

### Enter distances

Two rows of measurement points is possible in Basic Flatness. A row can have 2-8 points.

If you do not enter any distances, it is assumed that the distances are symmetrical and you can still measure. If you enter one distance, please also enter the rest of the distances. Otherwise the bestfit operations will be disabled.



- A. Tap any field to enter distances.
- B. Distance between the two rows.
- C. Tap the arrows to select number of points. Default is 8 points. (min: 4, max: 16)
- D. Select table or beams.

### Settings

Settings only for the program Basic Flatness. The settings are saved and will be default the next time you open the program.

1. Tap and .
2. Select which buttons to show/hide in the program.

#### Possible buttons to show/hide

- Distance input, button to Show/Hide the distances.
- Number of points, buttons to select the number of points.
- Rails or table, button to show a table or rails.
- Buttons to select Best fit and Reference points calculations.
- Report template, button to select which template to use.

#### Use settings in a template


The settings are useful when you want to make templates that forces the user to use certain settings. For example, you want a template that uses six points and the best fit calculation All positive.

1. Select six points on the Prepare view.
2. Select (All positive) on the Result view.
3. Hide the options "Number of points" and "Reference calculations".
4. Tap and to save as a template.

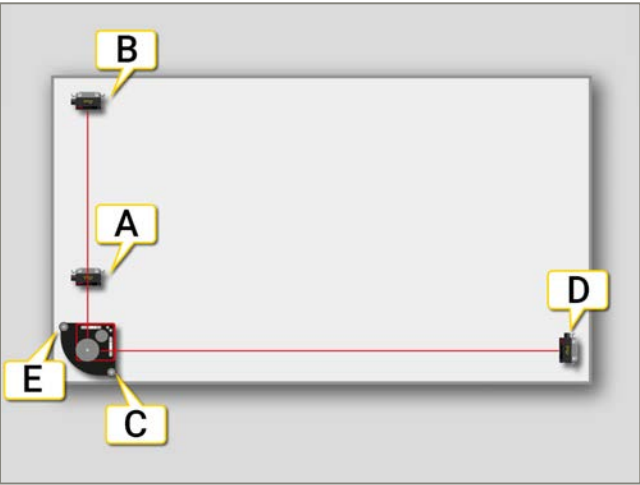
See "Templates for measurements" on page 12


# MEASURE

## Set up



- 1. Place the laser transmitter on the table or mount it on a tripod.
- 2. Tap the target to connect the measuring unit. If you need the target to be bigger, tap .
- 3. Place the M-unit close to the transmitter, on point **A**.
- 4. Adjust the M-unit on the rods until the laser hit the centre of the target.
- 5. Select **0** to zero set the value. This is now reference point number one.
- 6. Move the M-unit to point **B**.
- 7. Adjust the laser beam by using the screw **C** on the tilt table. Level to  $\pm 0.1$  mm.
- 8. Move the M-unit to point **D**.
- 9. Adjust the laser beam by using the screw **E** on the tilt table. Level to  $\pm 0.1$  mm.

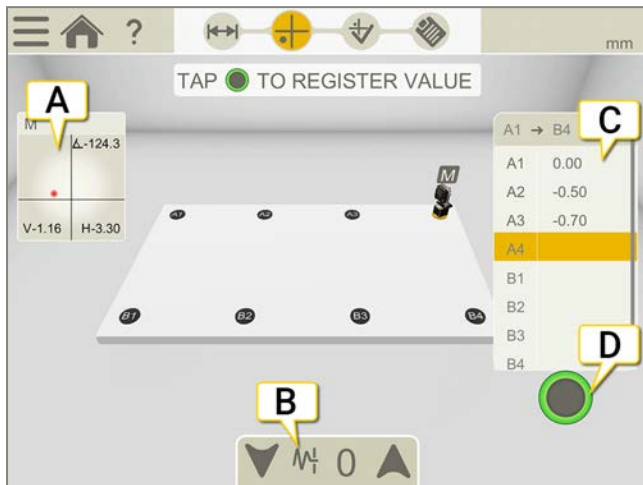
Repeat procedure until you have all three reference points within  $\pm 0.1$  mm.



	Tap to enlarge the target.
<b>0</b>	Zero set the displayed value. Zero point of the target moves to the laser point.
$\frac{1}{2}$	Halve the displayed value. Zero point of the target moves halfway towards the laser point.
<b>1</b>	Return to the absolute value. Zero point of the target returns to the center.

## Measure

1. Tap  to register values. First measured point is set to zero.
2. Tap  to display the result view.




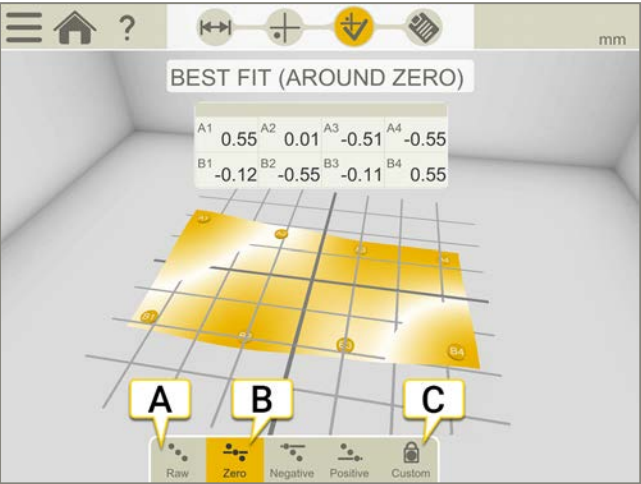
- A. Tap to select detector.
- B. Tap to select filter. See "Filter" on page 8
- C. Registered values. Tap a value to remeasure.
- D. Tap to register points.

## Edge warning

When the laser beam is close to the edge, the edge is "lit up" as a warning. It is still possible to register values when the edge warning is active.

# RESULT





Tap  to display the Result view. A table and a graph show the result. You can try different settings and analyze the measurement result directly in the Display unit.



- A. Raw values.
- B. "Best fit around zero" is the selected in this example.
- C. Set custom reference points.

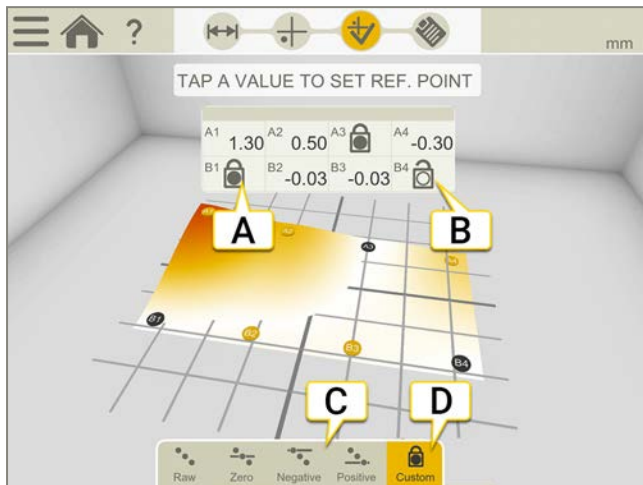
## Best fit

When you perform a best fit calculation, the object is tilted to the lowest peak to peak value. It is fitted as flat as possible between two planes.

	Raw values
	Zero. When you perform a best fit calculation, the measurement object is tilted to the lowest peak to peak value. It is fitted as flat as possible between two planes where the average value is zero.
	Negative. Best fit with all measurement points below 0. The reference line is moved to the highest measurement point.
	Positive. Best fit with all measurement points above 0. The reference line is moved to the lowest measurement point.


## Reference points

The measurement values can be recalculated so that any three of them become zero references, with the limitation that a maximum of two of them are in line horizontally or vertically in the coordinate system. (If there are three in line, it is just a line and not a plane!). Reference points are needed when you are going to machine the surface.



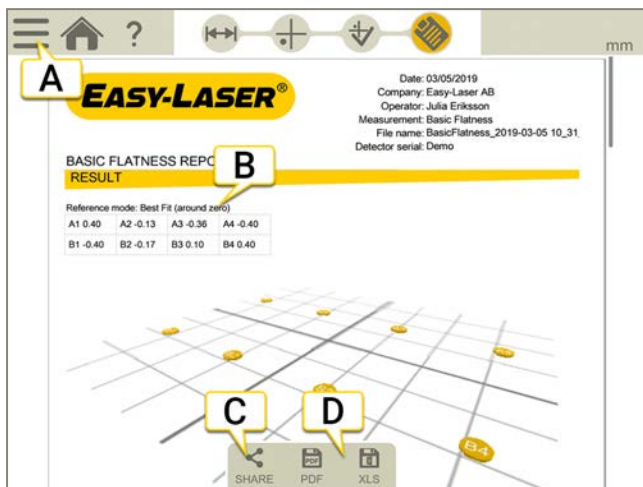
- A. Reference point.
- B. Opened reference point.
- C. Different best fit calculations.
- D. Set custom reference points is active. By default, a best fit is calculated using global peak to peak.



### Set custom reference points

1. Tap  in the table to open a reference point.
2. Tap a value in the table to set it as reference. Maximum two of the reference points can be in line horizontally or vertically.

# BASIC FLATNESS REPORT

Tap  in the workflow to view the report.



- Tap  and  to finalize the measurement. See "Finalize" on page 8
- A best fit calculation has been used.
- Share the report.
- Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

## For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See "Report" on page 14.

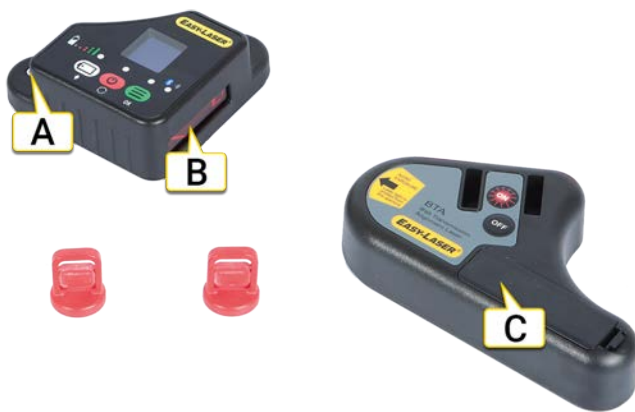


# BELT

## OVERVIEW BELT

Easy-Laser® BTA system consists of a laser transmitter and a detector. Magnetic mountings on laser and detector make it easy to mount the equipment. Non-magnetic sheave/pulleys can be aligned as the units are very light and can be mounted using double-sided tape. All types of sheave/pulleys can be aligned, regardless of belt type. You can compensate for sheaves of varying widths.


For technical information, See "XT190 BTA" on page 207.





- A. Connector
- B. Detector aperture
- C. Battery Alkaline 1xR6 (AA) 1.5 V

**NOTE!** If not using the system for a long period of time, remove the battery from the laser transmitter.

### Workflow Belt

The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.



When you have finished the measurement, tap  and  to finalize it.



*Prepare view is active in the workflow*

## BELT

### Create a template

1. Tap  and .
2. Enter a new name or keep the default name. The template is saved in the File manager.

See "Templates for measurements" on page 12.

### Belt types



- A. V-belt
- B. Flat belt
- C. Timing belt
- D. Chain drives

### Offset and angular misalignment

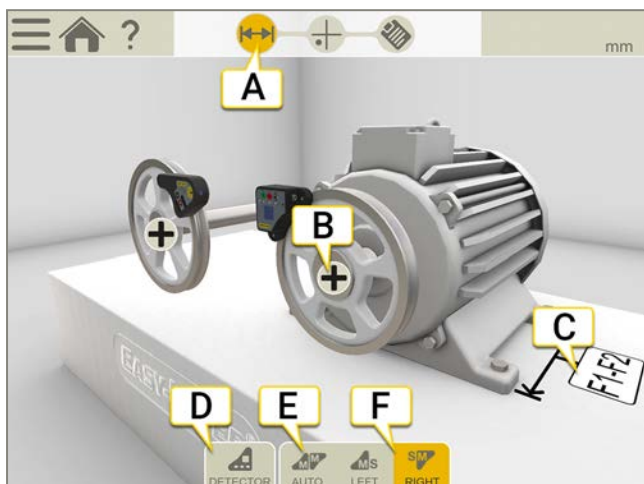
The misalignment can be offset or angular. It can also be a combination of both.



- A. Offset
- B. Angular
- C. Both offset and angular misalignment.

## PREPARE

- Check the sheaves for radial runout. Bent shafts will make it impossible to perform an accurate alignment.
- Check the sheaves for axial runout. If possible, adjust with the mounting screws of the bushings.
- Make sure that the sheaves are clean from grease and oil.
- The distance from the belt to the axial face of the sheave can be different on the two sheaves. See "Sheave width and diameter" on the next page.

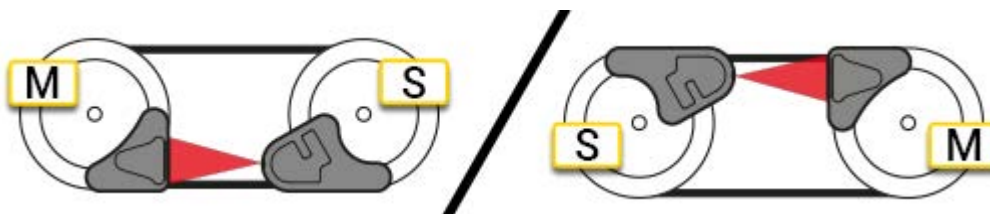


- The Prepare icon is active in the workflow.
- Tap to open machine properties. (Sheave width and tolerance.)
- Tap input field to enter distance.
- Tap to select detector.
- The Display unit automatically recognize where the units are placed.
- Set M-unit to the left or right.

## Mount the units

The units are mounted on a flat machined surface with magnets. The magnets are very strong, try to soften the touch by putting just one magnet to sheave first, then turning the other ones in. Non-magnetic sheave/pulleys can be aligned as the units are very light and can be mounted using double-sided tape.

1. Mount the laser transmitter on the stationary machine.
2. Mount the detector on the movable machine.
3. Make sure all magnetic surfaces are in contact with the sheave.



**NOTE!** All of the magnetic surfaces must be in contact with the object.

## Sheave width and diameter

### Enter sheave width in program

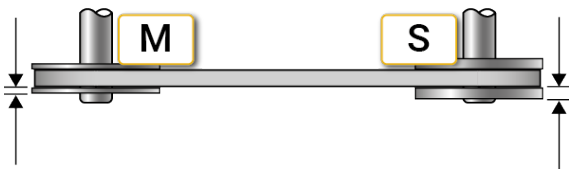
The distance from the belt to the axial face of the sheave can be different on the two sheaves. To calculate a possible offset the system requires **both** sheave face widths.

1. Tap **+** to open machine properties.
2. Measure the distance from the belt to the axial face of the sheave.
3. Enter the value.



### Different sheave width without program

If the sheaves have different face widths, just add or subtract the difference from the zero value to get the value for perfect alignment.




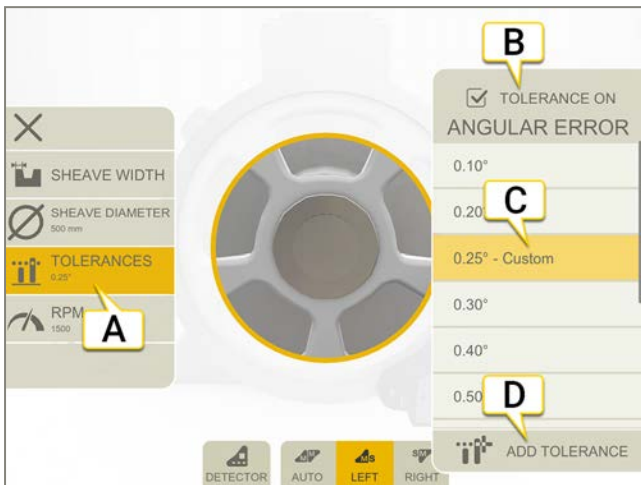
*Sheaves with different face widths.*

### Sheave diameter

Tap **Ø** and enter sheave diameter. The diameter is visible in the report.

## Belt Tolerance and RPM

1. Tap  to open machine properties.
2. Enter the value.




- A. Selected tolerance.
- B. Tap to select if you want to use a tolerance or not.
- C. Tap to select a tolerance.
- D. Add a custom tolerance.

### Tolerance table

Recommended maximum tolerances from manufacturers of belt transmissions is 0.25–0.50°. Recommendations are always dependent on belt type. Please consult the design manual of the specific belt type.

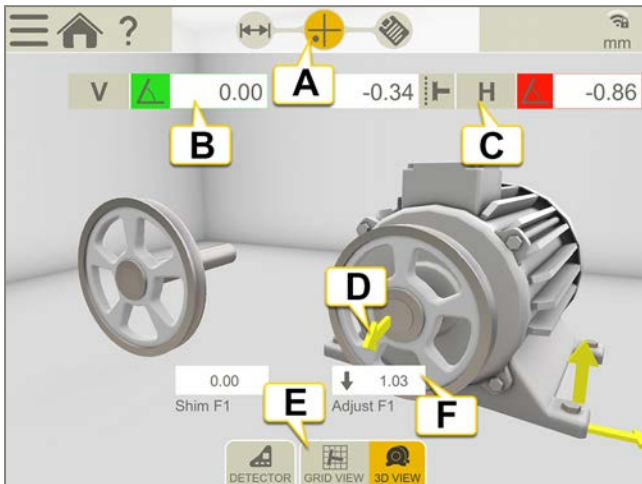
<°	mm/m mils/inch
0.1°	1.75
0.2°	3.49
0.3°	5.24
0.4°	6.98
0.5°	8.73
0.6°	10.47
0.7°	12.22
0.8°	13.96
0.9°	15.71
1.0°	17.45

### RPM

Tap  and enter RPM. It is visible in the report.


## MEASURE WITH DISPLAY UNIT

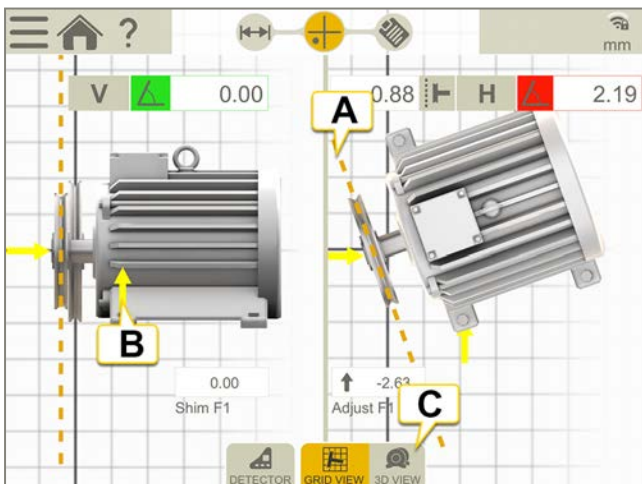
Make sure that the laser line hits the detector aperture. The Display unit shows the offset and angular misalignment. The laser transmitter flashes when the battery is low. Change the batteries before you continue to measure. The E190 BTA can also be used as a separate tool. See "Measure without Display unit" on page 166.



- A. The Measure icon is active in the workflow.
- B. Vertical angular error. To set tolerance, See "Belt Tolerance and RPM" on the previous page.
- C. Horizontal angular and offset error.
- D. Adjustment arrows show how to move the machine.
- E. Toggle between showing grid and machine view.
- F. Feet values.


### Grid view




Tap  to show the grid view.



- A. The yellow line amplifies the offset and angle for an easier adjustment.
- B. Adjustment direction.
- C. Switch to 3D view.

Menu icons

Tap  to open the menu.

	Add a note to the report. See " Report" on page 14.
	See "Camera" on page 24.
	Finalize the measurement. See "Finalize" on page 8.

Adjust

Start by adjusting the sheave, and then the machine.

- Correct offset by moving the movable machine with axial jackscrews, or by repositioning one of the sheaves on its shaft.
- Correct vertical angular error by shimming the movable machine.
- Correct horizontal angular error by adjusting the movable machine with lateral jackscrews.

When you adjust the machine one way, it often affects the machine’s other alignment conditions. Which means this process may have to be repeated several times.


**NOTE!** If not using the system for a long period of time, remove the battery from the laser transmitter.

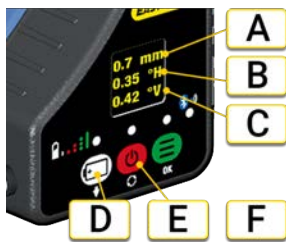
## MEASURE WITHOUT DISPLAY UNIT

The XT190 BTA can be used as a separate tool.

### Measure

To change between XT or E-system, see Settings below.




1. Press  to start the detector and ON to start the laser transmitter.
2. Read the values. Offset, horizontal angle and vertical angle are displayed.
3. Adjust machine, See "Measure with Display unit" on page 164.



- A. Offset (mm or inch)
- B. Horizontal angle
- C. Vertical angle
- D. Settings
- E. On/Off
- F. Battery

### Settings

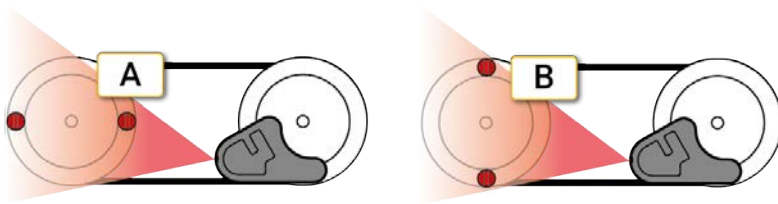
Press  to open the settings view. Use  to move up and down in the menu.

- Press  to switch position on the M and S-unit.
- Toggle between mm and inch with .
- Press  to select XT or E-system.

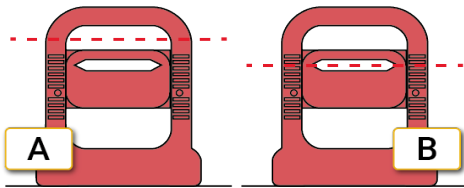
#### Different sheave width

See "Sheave width and diameter" on page 162.

## Align with targets

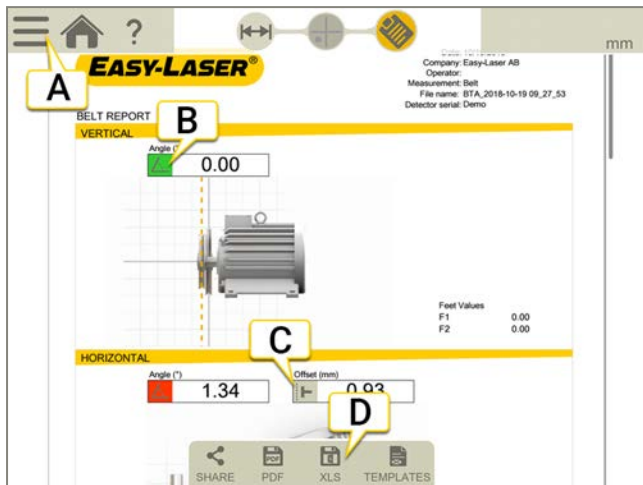




- A. Horizontal alignment
- B. Vertical alignment



- A. Misaligned sheave
- B. Aligned sheave, the laser beam disappears in the slot of the target.

## BELT REPORT



- A. Tap  and  to finalize the measurement. See "Finalize" on page 8
- B. Angle value. Green = within tolerance.
- C. Offset value.
- D. Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

### For information on how to:

- Change the template
- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB

See " Report" on page 14.

# VIBRATION



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## OVERVIEW VIBRATION

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Easy-Laser® XT280 is a simple to use vibration monitoring and analysis tool that allows easy display of vibration signals. The XT280 automatically performs vibration analysis functions based on machine running speed to help diagnose faults such as unbalance, misalignment and looseness. The system is designed to enable you to take vibration measurements from assets (e.g. pumps, motors, fans and bearings). The unit displays vibration frequency plots and allows vibration severity and bearing condition to be monitored.



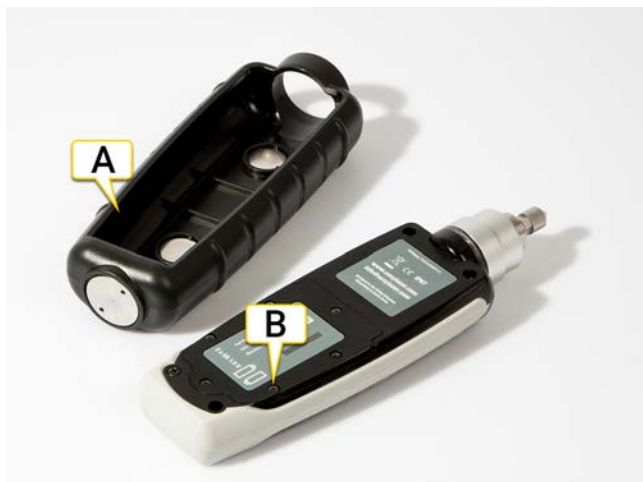
- A. On/Off. It will automatically turn off if not used for 1 minute. Change the default setting in the Device settings. If the XT280 is connected to the Vibration program, the auto-off is disabled.
- B. Press  to show Configuration menu.
- C. Press  show Asset manager.

For information regarding technical data: See "XT280 VIB" on page 209.

## Replace the batteries



The XT280 uses two AA batteries.

1. Remove the protective cover (**A**).
2. Unscrew the battery cover (**B**) and replace the batteries.



**NOTE!** If not using the system for a long period of time, remove the batteries.

## CONFIGURATION

1. Press  to open the Configuration menu.
2. Move up and down in the menu using the arrow buttons.
3. Press  to select the highlighted item.

Left and right arrow buttons can be used to move backward and forward through the menus.



### Live update

It is possible to have the XT280 continuously display readings that are taken at intervals of approx. 1 second. It is possible to use live update with the basic readings screen, the VA bands screen or 100 line frequency spectrum.

Press  to register a value at any time during live update. A full (800 line) resolution reading is registered.


**NOTE!** Live values are not displayed in the Vibration program.

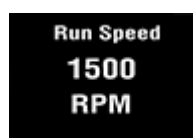
### Setup Wizard

Selecting the Setup Wizard opens a dialogue that allows the machine running speed to be entered and the ISO alarm levels to be set automatically according to the size and type of machine to be monitored.

#### Run speed

The first Setup Wizard screen shows the currently selected running speed in the pre-selected units (Hz or RPM).

1. Press the up arrow button (to increase run speed) or down arrow button (to decrease run speed).
2. Press  to confirm. Machine type settings is displayed.



#### Machine type

The second Setup Wizard screen allows you to select machine type (motor or pump)

- If a **motor** is selected the size must be selected (under or over 300kW).
- If a **pump** is selected, it must be specified whether it has an integrated or external drive unit.

Motor Size	Pump Type
Under 300kW	Integrated Drive
Over 300kW	External Drive

Selecting the machine type and size allows the ISO alarm levels to be set accordingly, as does specifying the type of mounting (rigid or flexible). As a basic “rule of thumb”, unless a machine is bolted down to a concrete floor, its mounting should be considered as being flexible. Most motors and pumps are mounted on some kind of frame or structure and as such should definitely be considered as flexibly mounted.

## Manual setup

### Velocity settings

1. Select Velocity alarms.
2. Set the alarm levels at which the velocity readings change color. Normal levels are displayed on a green background.
3. Press arrow left to go back to Manual setup.
  - **Warning.** Yellow readings, default is set to 4.5 mm/s. Use up and down arrows to change the setting.
  - **Critical.** Red readings, default is set to 7.10 mm/s. Use up and down arrows to change the setting.

### BDU alarm settings

1. Select BDU alarms.
2. Set the alarm levels at which the BDU readings change color. Normal levels are displayed on a green background.
3. Press arrow left to go back to Manual setup.
  - **Warning.** Yellow readings, default is set to 50. Use up and down arrows to change the setting.
  - **Critical.** Red readings, default is set to 100. Use up and down arrows to change the setting.


These levels are typical for medium sized machine bearings operating at run speeds in the region of 1000 to 3000 RPM. Larger bearings or higher run speeds may need increased BDU threshold values to identify worn or bad bearings.



### Run Speed

1. Select Run speed.
2. Select a run speed using the up and down arrow buttons.
3. Press arrow left to go back to Manual setup.

## Device settings

Use the down arrow button to see all device settings. Pressing  to select a setting. Press arrow left to return to the previous menu.

### Auto Off Time

From 1 minute up to 60 minutes. If the XT280 is connected to the Vibration program, it will not turn off.

### Brightness

- Mode. Select Standard or High
- Level. Set anywhere between 1 (least brightness) up to 10 (full brightness).
- Auto Dim Time. Set the time using the up and down arrows.

### Language

Only English is available.

### Factory reset

Select to return to the default settings. Select to return to metric or imperial default settings.

### Graph Mode

Set to display the frequency spectrum as either a Line graph or a Bar graph.

**Color Scheme**

Configured as standard (full colour) or monochrome, e.g. for convenient viewing in direct sunlight.  
You need to restart the XT280 to see the change of color scheme.

**Time & Date**

Setting can be achieved using the up, down, left and right arrow buttons




**Units**

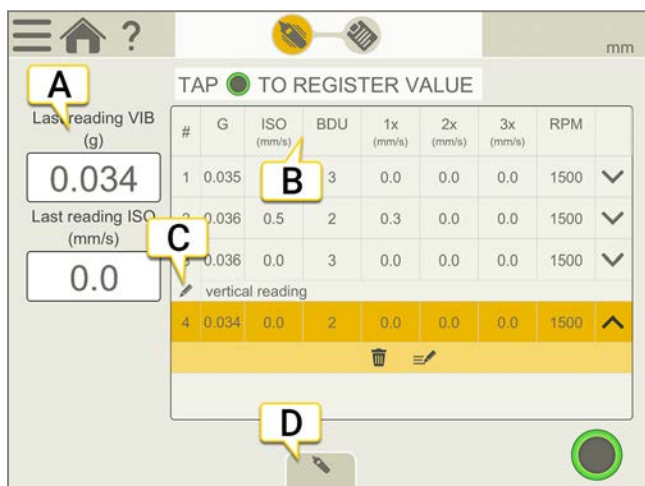
- Velocity. Select mm/s or inch/s.
- Run speed. Select Hertz (Hz), revolutions per minute (RPM) or cycles per minute (CPM).
- Velocity type. Select RMS or Peak.
- Displacement. Select Peak (Pk) or Peak to peak (Pk-Pk).

**Information**

Version number, serial number and Mac ID.


## MEASURE WITH DISPLAY UNIT


1. Press  to start the XT280.
2. Set the appropriate configurations in the XT280 menus. See "Configuration" on page 171.
3. Place the XT280 on a rigid part of the machine as close as possible to the desired measurement point (e.g. bearing block) using the magnet mount.
4. Tap  to connect to an XT280 device.
5. Tap  to register values. Either on the XT280, or on the Display unit. It will take 3-5 seconds to register a value.



- A. The latest readings are displayed here.
- B. For information regarding these values See "Result" on page 177.
- C. It is possible to add a note to a measurement point.
- D. Tap to select a XT280 device.





### Workflow Vibration

The workflow on the top of the screen will guide you through your work. The current view is marked yellow. The report is constantly being filled out while the session is carried out. To see the report at its current state tap  in the workflow. The measurement is saved automatically through the entire workflow.

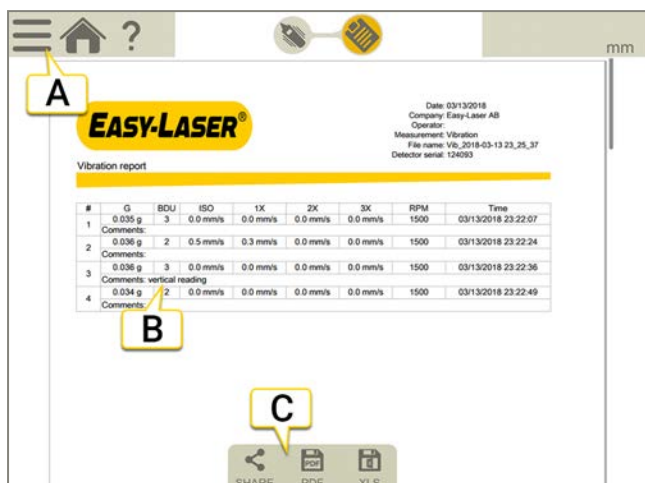
When you have finished the measurement, tap  and  to finalize it.



### Add a note

Notes are also visible in the report.

- Select  and  if you want to add a note for the **whole** measurement.
- Tap  on a value and then  to add a note for the selected value.

# VIBRATION REPORT



- A. Tap  and  to finalize the measurement. See "Finalize" on page 8
- B. The comments are visible in the report.
- C. Save as a Pdf or Excel file. The files are saved in the File manager. The functions Share and Save as Pdf or Excel file are available after the measurement has been finalized.

## For information on how to:

- Add a note
- Add a photo
- Change user information
- Save a report
- Share a report to USB



See "Report" on page 14.

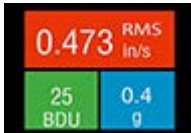
## MEASURE WITHOUT DISPLAY UNIT

---

The XT280 can be used as a separate tool.

### Measure

1. Press  to start the XT280.
2. Set the appropriate configurations in the XT280 menus. See "Configuration" on page 171.
3. Place the XT280 on a rigid part of the machine as close as possible to the desired measurement point (e.g. bearing block) using the magnet mount.
4. Press  to register a value. It will take 3-5 seconds to register a value.

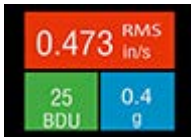


Three values are displayed. The Velocity and BDU values are color coded to show their alarm status.

- Velocity. RMS or Peak (shown in mm/second or inch/s)
- Bearing Noise in BDU (Bearing Damage Units)
- Total g (acceleration)

For more information See "Result" on the facing page.

## RESULT



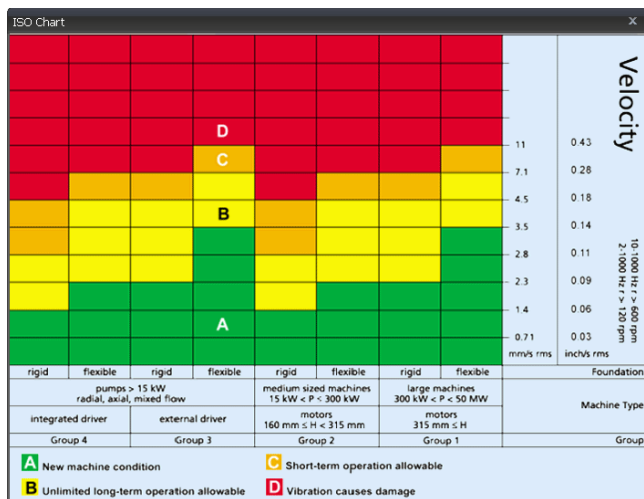
Three values are displayed. The Velocity and BDU values are color coded to show their alarm status.

- Velocity. RMS or Peak (shown in mm/second or inch/s)
- Bearing Noise in BDU (Bearing Damage Units)
- Total g (acceleration)

See "Vibration analysis" on page 179.

### RMS value

The ISO value (in mm/s or inch/s) is the RMS (average) of the vibration velocity in the frequency band 10Hz (600 RPM) to 1kHz (60,000 RPM) or 2Hz (120 RPM) to 1kHz (60,000 RPM), as specified by the ISO standard. The correct frequency band is automatically selected by the XT280 based on running speed. The background is colour coded according to the ISO 10816-1 vibration velocity level chart (see below). The colour coded background indicates the condition of the machine according to the size and type of machine selected. See "Configuration" on page 171.



ISO 10816-1:1995. Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts.

### Bearing Noise (BDU)

Bearing noise (high frequency vibration) in Bearing Damage Units (BDU), where 100 BDU corresponds to 1g RMS (average) vibration measured above 1kHz. This is a measure of the wear state of the bearings in the equipment being monitored. The higher the number, the more worn the bearing.

It is commonly held that 1g of high frequency vibration (100 BDU) corresponds to a relatively high level of bearing noise and so can be considered indicative of a damaged bearing. In other words, it may be helpful to think of the Bearing Noise figure as being very roughly equivalent to "percentage" of bearing wear.

By default, the bearing noise is displayed on a

- Red background if it is above 100 BDU
- Amber background between 50 and 100 BDU
- Green background below 50 BDU.

The BDU alarm levels can be changed. See "Configuration" on page 171.

### Total acceleration (g)

This is the RMS (average) value of the total vibration acceleration measured by the meter over its entire frequency range (2Hz to 10kHz). This reading is shown in units of g (Earth's gravitational constant, where  $1g = 9.81 \text{ m/s}^2$ ).

### RMS displacement

Press the left (<) or right (>) arrow button when the reading screen is displayed will display RMS displacement (in  $\mu\text{m}$  or mils) on a blue background. Press either arrow button again will revert to display of the ISO value (mm/s or inch/s).

## VIBRATION ANALYSIS

Press the down arrow to display the readings of vibration velocity (mm/s or inch/s), or displacement ( $\mu\text{m}$  or mils) if selected, broken down into each of 3 bands.

The display shows the vibration level in frequency ranges that are all based on multiples (1X, 2X and 3X) of the specified Run Speed of the machine as displayed beneath the 3 bar graphs.

In order to perform a vibration analysis it is important that the running speed of the machine is entered correctly. This can be done with the Setup Wizard. See "Configuration" on page 171.



The frequency ranges of the VA bands are based on the following multiples of running speed:

### 1X = Unbalance

The level of vibration in the frequency band based on the running speed is usually indicative of how well balanced the machine is. A large vibration at the running speed usually indicates that the machine is out of balance. However even a very well balanced machine will typically show some vibration at the running speed but this figure should ideally be quite low (e.g. typically less than about 2 mm/sec for a medium sized machine).

### 2X = Misalignment

A high level of vibration in the frequency band centered at twice the running speed is a possible indication of misalignment. This is based on the fact that shaft misalignment can result in a double peak in the waveform due to there being two different centers of gravity (one from each shaft). In other words the accelerometer picks up a peak as each centre of gravity passes by and hence there will be two positive and two negative peaks each revolution of the shaft. This will typically give rise to a vibration signal at double the running speed of the machine.

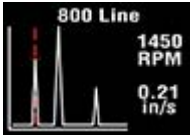
### 3X = Looseness:

High vibration in the frequency band centered at 3 times running speed is a possible indication that something may be loose (e.g. loose mounting bolts, weak foundations etc.) as it is not usual to see third order vibration in a machine unless there is some structural looseness that is being "excited" by the vibration of the machine.

## FREQUENCY SPECTRUM

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Press the down arrow button once more to display vibration levels shown as a frequency spectrum in the range from 0 to 1kHz. The heights of the peaks indicate the RMS vibration level (in mm/s or inch/s) at each frequency point in the spectrum. The readings to the right of the screen show the frequency (in Hz or CPM) and the RMS vibration level (in mm/s or inch/s) at the position of the cursor (red dotted line). The cursor position can be moved by use of the left (<) and right (>) arrow buttons.



Pressing the down arrow button increases the resolution of the frequency axis from 100 Lines (i.e. 10Hz or 600 RPM resolution) to 800 Lines (i.e. 1.25Hz or 75 RPM resolution). Increasing the resolution effectively zooms into the frequency spectrum. In order to display the full spectrum at the higher resolution the display must be scrolled using the left and right arrow buttons.


## ASSET MANAGEMENT

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1. Press  to open the Asset Manager, the Machines menu is displayed (four machines).
2. Scroll the list with the up and down arrow buttons.
3. Press  to select a machine. This brings up a list of measurement points for that machine.

### Measurement point

Each machine can have up to 10 VibPoints.

1. Scroll the list of measurement points by using the up and down arrow buttons.
2. Press  to select a VibPoint. The various options for each VibPoint are displayed.
  - Take Reading – takes a new reading and saves it to this VibPoint.
  - Run Speed – set the run speed.
  - Save Reading – saves the previously taken reading to this VibPoint.
  - Load Reading – loads a saved reading (e.g. for re-display)

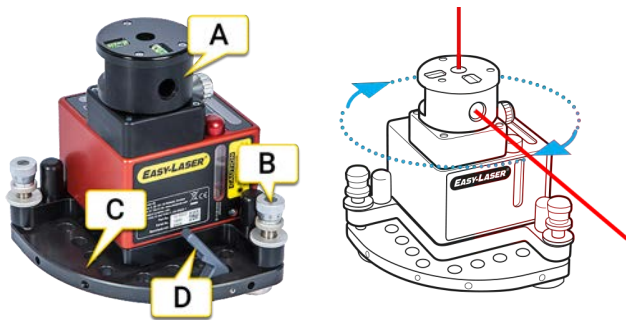


# LASER TRANSMITTERS

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## LASER TRANSMITTER D22

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- A. Rotatable head with angular prism.
- B. Tilting screw.
- C. Tilting table.
- D. The release lever has to be removed before the D22 can be mounted on a tripod.

### Tilting screws

The tilting screws on the levelling table of the laser transmitter have to be operated carefully and according to instructions.

#### Visual rough alignment to (detector) target

Check the position of the fine adjustment screw. It should be in its nominal position approx. 2.5 mm.

1. Loosen the locking screw.
2. Adjust with the course screw to wanted position.
3. Tighten the locking screw.

#### Digital fine adjustment to detector and read values

1. Check so that the locking screw is tightened.
2. Adjust with the fine adjustment screw to wanted value.



## LASER TRANSMITTERS

1. Fine adjustment screw
2. Course screw
3. Locking screw
4. Maximum position

### Safety strap

Use the safety strap (part. no 12-0915) to prevent equipment from falling and causing injuries. Check the strap for damages and wear regularly. If it has been involved in a sharp drop, please replace it. Do not fasten anything heavier than the D22 to the safety strap. Fasten the line **above** the laser.



### Calibrate D22

- See "Level D22 horizontally" on the facing page
- See "Level D22 vertically" on page 187

### Technical data D22

- See "D22 Technical data " on page 198

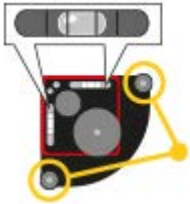
## LEVEL D22 HORIZONTALLY

### Calibrate the horizontal spirit levels

You can calibrate the spirit levels on the D22 laser transmitter. This is done at factory, but should be redone prior to a job. The spirit levels are scaled to 0.02 mm/m [4 arc sec.]. By calibrating the spirit levels and then use them to level the laser transmitter, you can achieve an absolute levelling of the laser plane of approximately 0.01 mm/m [2 arc sec.].

### Level

1. Place the D22 laser transmitter on a flat and stable surface.
2. Level the laser transmitter according to the spirit levels. Use the tilting screws.



*Level the laser transmitter*

### Zero set

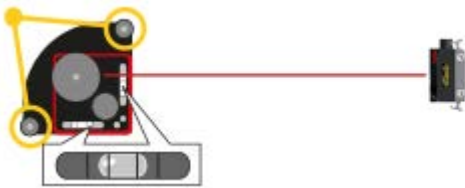
3. Place the detector at a distance of 5-10 metres. Make sure that the laser beam hit the detector target.
4. Tap  $\begin{smallmatrix} V & 0.00 \\ H & 0.00 \end{smallmatrix}$  to open the program Values.
5. Tap  $0$  to zero set.



*5-10 m between laser and detector*

### Index and level

6. Rotate the D22 180° and turn the laser beam to the detector.
7. Level the laser transmitter according to the spirit levels. Use the tilting screws.



*Rotate laser transmitter 180° and level the laser transmitter.*

### Adjust value

8. Tap  $\frac{1}{2}$  to halve the value.
9. Adjust the V-value to 0.00 using the tilting screw.

## LASER TRANSMITTERS



*Halve value and adjust to 0.00 using this tilting screw.*

### **Calibrate spirit level**

10. Calibrate the spirit level using a hex key.
11. Repeat step 6–9 to control.



*Calibrate the spirit level using this screw.*

### **Calibrate second spirit level**

12. Rotate the D22 90° and turn the laser beam to the detector.
13. Repeat step 4–12.



*Adjust second spirit level.*

See "Level D22 vertically" on the facing page

See "D22 Technical data " on page 198

## LEVEL D22 VERTICALLY

Before you calibrate the vertical spirit level, you need to calibrate both horizontal spirit levels.

### Level horizontally

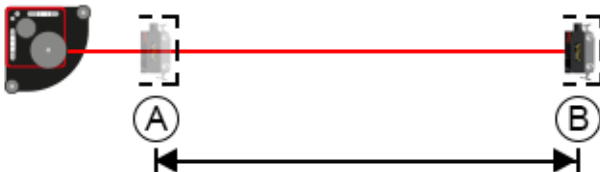
1. Place the D22 laser transmitter on a flat, clean and stable surface.
2. Level the laser transmitter according to the spirit level. Use the tilting screws.



*Level the laser transmitter.*

### Rough align

3. Select  $\begin{smallmatrix} V & 0.00 \\ H & 0.00 \end{smallmatrix}$  to open the program Values.
4. Place the detector on position **A** and move the detector until the laser beam hits the centre.
5. Mark the position of the detector.
6. Move the detector to position **B** and move the detector until the laser beam hits the centre.
7. Mark the position of the detector.



*Minimum 1m between position A and position B.*

### Zero set and read value

8. Move the detector back to position **A**.
9. Select 0 to zero set.
10. Move the detector to position **B**. Read and note the vertical value.



*Zero set at position A. Read value on position B.*

### Mount the D22 vertically

11. Mount the D22 vertically using the pin (01-0139) or a plate (01-0874).
12. Rough align the detector on position **B** ( $\pm 0.1\text{mm}$ ).

## LASER TRANSMITTERS



*Mount vertically and rough align on position B.*

### Zero set and adjust

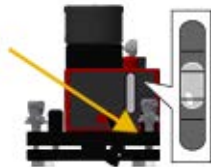
13. Move the detector back to position A.
14. Select 0 to zero set.
15. Move the detector to position B.
16. Adjust until you have the same value as in step 10. Use the tilting screw.
17. Repeat steps 13–16 until you have 0 on position A and the right value on position B.



*Zero set at position A. Read value on position B.*

### Calibrate spirit level

18. Calibrate the spirit level using a hex key.



# TECHNICAL DATA

## DISPLAY UNIT XT11

Part. no 12-0961



- A. IR Camera (optional)
- B. 13 Mp Camera
- C. LED Light
- D. Fastening points for shoulder strap (x4)
- E. Charger
- F. USB A
- G. HDMI connector
- H. USB B

### Display unit

Type of display/size	SVGA 8" colour screen, backlit LED, multitouch
Battery type	Heavy duty Li Ion chargeable
Operating time	Up to 16 h continuously
Connections	USB A, USB B, Charger, AV
Communication	Wireless technology
Camera, with diode lamp	13 Mp
IR camera (optional)	FLIR LEPTON® Long Wave Infrared
Help functions	Built-in manual
Environmental protection	IP class 66 and 67
Operating temperature	-10–50 °C
Storage temperature	-20–50 °C
Relative humidity	10–95%
OLED display	96x96 pixels
Housing material	PC/ABS + TPE
Dimensions	WxHxD: 274x190x44 mm [10.8x7.5x1.7"]
Weight	1450 g [51.1 oz]
FCC ID	FCC ID: 2AFDI-ITCNFA324
IC	9049A-ITCNFA324

## XT40 TECHNICAL DATA

Part. no 12-0943

Part. no 12-0944

The XT40 measuring units have large 30mm PSD, and OLED displays which shows the angle of the units.



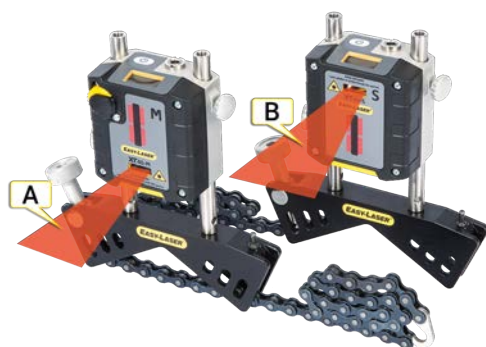
Type of detector	TruePSD 30 mm [1.2"]
Communication	Wireless technology
Battery type	Heavy duty Li Ion chargeable [3.7 V, 7.4 Wh, 2000 mAh]
Operating time	Up to 24 h continuously
Resolution	0.001 mm [0.05 mils]
Measuring errors	<1%
Measurement range	Up to 10 m [33 feet]
Type of laser	Diode laser
Laser wavelength	630–680 nm
Laser class	Safety class 2
Laser output	<0.9 mW
Electronic inclinometer	0.1° resolution
Environmental protection	IP class 66 and 67
Operating temperature	-10–50 °C
Storage temperature	-20–50 °C
Relative humidity	10–95%
OLED display	128x64 pixels
Housing material	Anodized aluminum + PC/ABS + TPE
Dimensions	WxHxD: 76x76.7x39.3 mm [3.0x3.0x1.5"]
Weight	245 g [8.6 oz]
FCC ID	FCC ID: QOQBGM111
IC	5123A-BGM111

### Laser classification

The XT40 is classified as laser class 2, for more information, See "Safety precautions" on page 212.

These products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with this User Manual.

Average power	Max. 0.6 mW
Pulse duration	4–6 µs
Pulse energy	Max. 8 nJ
Wavelength	630–680 nm
Beam divergence	1.5 mrad x 200 mrad
Pulse repetition frequency	75–120 kHz



A. Laser beam on M-unit

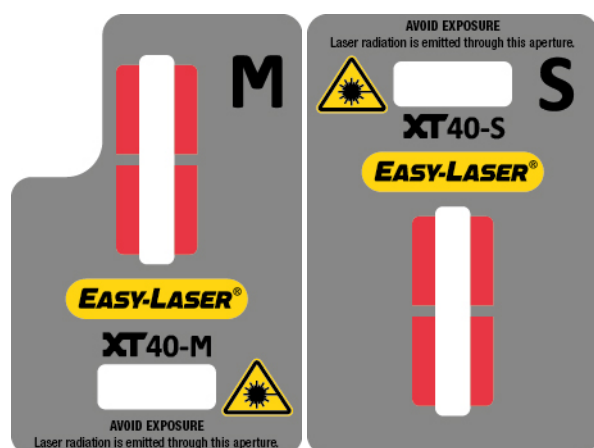
B. Laser beam on S-unit

### Labels with safety precautions

Label on the back of XT40:



Label on the front of XT40:



## XT50 TECHNICAL DATA

XT50 is an intrinsically safe laser product, please read the safety instructions. See "XT550 Shaft" on page 201.

Part. no 12-1027

Part. no 12-1028



### Charge XT50

Charge the measuring units by plugging in the power adapter intended for the measuring units. To fully charge the battery takes approx. 2 hours.

**NOTE!** Never charge the unit in intrinsic safety zone and only use the included Easy-Laser charger.

Type of detector	1 axis TruePSD 20x20 mm [0.79x0.79"]
Communication	Wireless technology
Battery type	Heavy duty Li Ion chargeable
Operating time	Up to 20 h continuously
Resolution	0.001 mm [0.05 mils]
Measuring errors	<1%
Measurement range	Up to 20 m [66 feet]
Type of laser	Diode laser
Laser wavelength	635–670 nm
Laser class	Safety class 2
Laser output	<1 mW
Electronic inclinometer	0.1° resolution
Environmental protection	IP class 66 and 67
Operating temperature	-10–50 °C
Storage temperature	-20–50 °C
Relative humidity	10–95%
OLED display	128x64 pixels
Housing material	Anodized aluminum + PC/ABS + TPE
Dimensions	WxHxD: 76x76.5x50.9 mm [3.0x3.0x2.0"]
Weight	316 g [11.1 oz]
Ex classification	Ⓔ II 2 GD Ex ib op is IIC T4 Gb, -10°C ≤ Ta ≤ +50°C
IC	Presafe 17 ATEX 10552X, IECEx PRE 17.0049X

# Laser classification

Average power	Max. 0.6 mW
Pulse duration	10–17 µs
Pulse energy	Max. 20 nJ
Wavelength	630–680 nm
Beam divergence	< 1.5 mrad
Pulse repetition frequency	32–47 kHz



- A. Laser beam on M-unit
- B. Laser beam on S-unit

## Labels with safety precautions



**WARNING! DO NOT CHARGE IN POTENTIALLY EXPLOSIVE ENVIRONMENT**

**Complies with:**  
 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.  
 IEC 60825-1:2014

Ex ib op is IIC T4 Gb -10°C ≤ Ta ≤ +50°C  
 Presafe 17 ATEX 10552X, IECEx PRE 17.0049X

**Contains:** FCC ID: Q008GM111, IC: 5123A-BGM111  
 Li-Ion battery 3.7 V 2 Ah 7.4 Wh

**CAUTION**  
 LASER RADIATION  
 DO NOT STARE INTO BEAM  
 CLASS 2 LASER PRODUCT  
 AVERAGE POWER < 0.6 mW, PULSE ENERGY < 20 nJ,  
 PULSE DURATION 10-17 µs, WAVELENGTH 630-680 nm.

**Easy-Laser AB**  
 Alfagatan 6, 431 49 Mölndal, Sweden. [www.easylaser.com](http://www.easylaser.com)

**Part No.** [Redacted]

**Serial No.** [Redacted]

**Manufactured** [Redacted]

**Calibration due:** [Redacted]

**IP66/67**  
**CE**  
 2480

## XT60 TECHNICAL DATA

Part. no 12-1028

Part. no 12-1029

The XT60 measuring units have large 20x20mm PSD, and OLED displays which shows the angle of the units.



Type of detector	1 axis TruePSD 20x20 mm [0.79x0.79"]
Communication	Wireless technology
Battery type	Heavy duty Li Ion chargeable [3.7 V, 7.4 Wh, 2000 mAh]
Operating time	Up to 24 h continuously
Resolution	0.001 mm [0.05 mils]
Measuring errors	<1%
Measurement range	Up to 20 m [66 feet]
Type of laser	Diode laser
Laser wavelength	630–680 nm
Laser class	Safety class 2
Laser output	<1 mW
Electronic inclinometer	0.1° resolution
Environmental protection	IP class 66 and 67
Operating temperature	-10–50 °C
Storage temperature	-20–50 °C
Relative humidity	10–95%
OLED display	128x64 pixels
Housing material	Anodized aluminum + PC/ABS + TPE
Dimensions	WxHxD: 76x76.4x45.9 mm [3.0x3.0x1.8"]
Weight	272 g [9.6 oz]
FCC ID	QOQBGM111
IC	5123A-BGM111

### Laser classification

The XT60 is classified as laser class 2, for more information See "Safety precautions" on page 212.

These products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with this User Manual.

Average power	Max. 0.6 mW
Pulse duration	10–17 µs

Pulse energy	Max. 20 nJ
Wavelength	630–680 nm
Beam divergence	< 1.5 mrad
Pulse repetition frequency	32–47 kHz



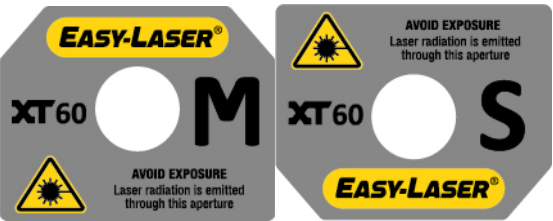
- A. Laser beam on M-unit
- B. Laser beam on S-unit

Labels with safety precautions

Label on the back of XT60:



Label on the front of XT60:



## XT70 TECHNICAL DATA

Part. no 12-1045

Part. no 12-1046

The XT70 measuring units have a dot-type laser and 2-axis square PSD surfaces. It has 20x20mm PSD, and OLED displays which shows the angle of the units.



Type of detector	2 axis TruePSD 20x20 mm [0.79x0.79"]
Communication	Wireless technology
Battery type	Heavy duty Li Ion chargeable [3.7 V, 7.4 Wh, 2000 mAh]
Operating time	Up to 24 h continuously
Resolution	0.001 mm [0.05 mils]
Measuring errors	<1%
Measurement range	Up to 20 m [66 feet]
Type of laser	Diode laser
Laser wavelength	630–680 nm
Laser class	Safety class 2
Laser output	<1 mW
Electronic inclinometer	0.1° resolution
Environmental protection	IP class 66 and 67
Operating temperature	-10–50 °C
Storage temperature	-20–50 °C
Relative humidity	10–95%
OLED display	128x64 pixels
Housing material	Anodized aluminum + PC/ABS + TPE
Dimensions	WxHxD: 76x76.4x45.9 mm [3.0x3.0x1.8"]
Weight	272 g [9.6 oz]
FCC ID	QOQBGM111
IC	5123A-BGM111

### Laser classification

The XT70 is classified as laser class 2, for more information See "Safety precautions" on page 212.

These products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with this User Manual.

Average power	Max. 0.6 mW
Pulse duration	10–17 µs

Pulse energy	Max. 20 nJ
Wavelength	630–680 nm
Beam divergence	< 1.5 mrad
Pulse repetition frequency	32–47 kHz



- A. Laser beam on M-unit
- B. Laser beam on S-unit

#### Labels with safety precautions

Label on the back of XT70:



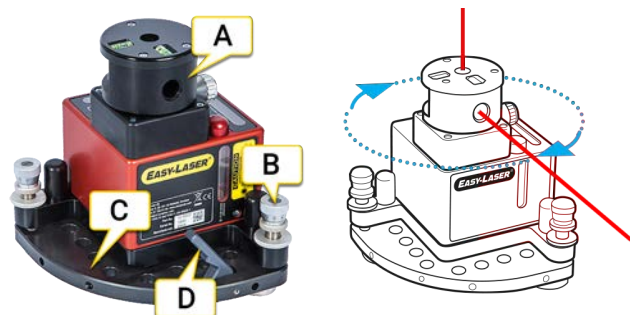
Label on the front of XT70:



## D22 TECHNICAL DATA

Part. no 12-0022

Laser transmitter D22 can be used to measure flatness, straightness, squareness and parallelism. The laser beam can sweep 360° with a measurement distance of up to 40 metres [130'] in radius. The laser beam can be angled 90° to the sweep, within 0.01 mm/m [2 arc sec.].



- A. Rotatable head with angular prism.
- B. Tilting screw.
- C. Tilting table.
- D. The release lever has to be removed before the D22 can be mounted on a tripod.

**NOTE!** The tilting screws on the levelling table have to be operated carefully and according to instructions. See "Laser transmitter D22" on page 183

Type of laser	Diode laser
Laser wavelength	630–680 nm, visible red light
Laser safety class	Class 2
Output	< 1 mW
Beam diameter	6 mm [1/4"] at aperture
Working area, range	40-metre radius [130']
Type of battery	1 x R14 (C) 1.5V, replaceable by user. Professional alkaline batteries recommended.
Operating temperature	0–50° C
Operating time/battery	appro. 24 hours
Levelling range	± 30 mm/m [± 1.7°]
3 x spirit vials' scaling	0.02 mm/m
Squareness between laser beams	0.01 mm/m [2 arc sec.]
Flatness of sweep	0.02 mm/m
Fine turning	0.1 mm/m [20 arc sec.]
2 x spirit vials for rotation	5 mm/m
Housing material	Aluminium
Dimensions	WxHxD: 139x169x139 mm [5.47"x6.64"x5.47"]
Weight	2650 g [5.8 lbs]
Operating temperature	0–50° C
Altitude	0-2000m
Designed for outdoor use (pollution degree 4)	

## XT440 SHAFT

With XT440 you can carry out the following:

- Align the machine
- Check soft foot
- Document and share the results



System Easy-Laser® XT440 Shaft with Display unit XT11, Part No. 12-0967

### A complete system includes

1	Display unit XT11
1	Measuring unit XT40-M
1	Measuring unit XT40-S
2	Shaft brackets with chains and rods
4	Rods 60 mm [2.36"]
1	Measuring tape 3 m [9.8']
1	Hexagon wrench set
1	Charger (100–240 V AC)
1	DC split cable for charging
1	DC to USB adapter, for charging
1	Shoulder strap for display unit
1	Quick reference manual
1	Cleaning cloth for optics
1	USB memory with manuals
1	Documentation folder
1	Carrying case Medium
	Weight: 7.2 kg [15.9 lbs], Dimension WxHxD: 460x350x175 mm [18.1"x13.8"x6.9"]

Customize your XT11

(Note that these options cannot be retrofitted)

Part No. 12-0968	IR Camera added to XT11
Part No. 12-0985	Camera removed from XT11

## XT550 SHAFT

XT550 is an intrinsically safe laser shaft alignment system, please read the safety instructions below.

With XT550 you can carry out the following:

- Align the machine
- Check base twist
- Check bearing play
- Check soft foot
- Document and share the results



### Easy-Laser® XT550 Shaft system (12-1031) includes:


1	Measuring unit XT50-M
1	Measuring unit XT50-S
2	Shaft brackets with chains and rods
4	Rods 60 mm [2.36"]
2	Rods 120 mm [4.72"]
2	Extension chains 900 mm [35.4"]
1	Measuring tape 3 m [9.8']
1	Rod tool
1	Charger (100–240 V AC)
1	DC split cable for charging. Length 1 m [39.4"]
1	Quick reference manual
1	Cleaning cloth for optics
1	USB memory with manuals
1	Carrying case Ex/ATEX (with conductive plastic and foam)

### System 12-1097 also includes:

Display unit ecom Tab-Ex®. (For full technical specification, see [www.ecom-ex.com](http://www.ecom-ex.com))

Type of display/size	TFT 8" colour screen
Operating system	Android™ 5.1.1

## TECHNICAL DATA

Operating time	Up to 11 h continuously
Communication	Bluetooth® LE4.0 Wireless technology, Wi-Fi
Camera	3 Mp with flash (rear), 1.3 Mp (front)
Operating temperature	-20–50 °C
Dimensions	WxHxD: 162x256x33 mm [6.4x10.1x1.3"]
Weight	1250 g [2.75 lbs]
Ex classification	 II 2 GD Ex db ia op is IIC T5 Gb, -20°C ≤ Ta ≤ +50°C
Ex certificate number	Sira 15 ATEX 1205X, IECEx SIR 15.0075X

For technical data regarding measuring units XT50. See "XT50 Technical data " on page 192.

## Declaration of conformity

Product: Easy-Laser® XT550


Easy-Laser AB declares that Easy-Laser® XT550 is manufactured in conformity with national and international regulations.

The system has been tested and complies with following standards and requirements:

- EMC directive: 2014/30/EU
- Low voltage directive: 2014/35/EU
- Atex directive: 2014/34/EU
- Rohs directive: 2011/65/EU
- Weee directive: 2012/19/EU

Easy-Laser® XT550 complies with the harmonized standards:

- ISO9001:2015
- EN 60079-0:2012
- EN 60079-11:2012
- EN 60079-28:2015
- EN 60825-1:2014
- USA: CFR 1040.10/11

**Ex classification:**  II 2G Ex ib op is IIC T4 Gb

**Ambient temperature:**  $-10^{\circ} \leq t_a \leq 50^{\circ}\text{C}$

**Ex certificate:** Presafe 17 ATEX 10552X, IECEx PRE 17.0049X

## Safety precautions / Warning!

- Always read and follow operation instructions
- Never charge the unit in intrinsic safety zone
- Opening the housing of the units will invalidate the Ex-rating, voids warranty and may result in hazardous light exposure.
- All repairs must be done by Easy-Laser main service center
- Only use the included Easy-Laser charger



**WARNING! DO NOT CHARGE IN POTENTIALLY EXPLOSIVE ENVIRONMENT**

**Complies with:**  
21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.  
IEC 60825-1:2014

Ex Ib op is IIC T4 Gb -10°C ≤ Ta ≤ +50°C  
Presafe 17 ATEX 10552X, IECEx PRE 17.0049X

**Contains:** FCC ID: Q008GM111, IC: 5123A-BGM111  
Li-ion battery 3.7 V 2 Ah 7.4 Wh

II 2G

**CAUTION**  
 **LASER RADIATION**  
**DO NOT STARE INTO BEAM**  
**CLASS 2 LASER PRODUCT**  
AVERAGE POWER < 0.6 mW, PULSE ENERGY < 20 nJ,  
PULSE DURATION 10-17 µs, WAVELENGTH 630-680 nm.

**Easy-Laser AB**  
Alfagatan 6, 431 49 Mölndal, Sweden. [www.easylaser.com](http://www.easylaser.com)

**Part No.**

**Serial No.**

**Manufactured**

**Calibration due:**

**IP66/67**  
**CE**  
2480

# XT660 SHAFT

With XT660 you can carry out the following:

- Align the machine
- Check base twist
- Check bearing play
- Check soft foot
- Document and share the results



System Easy-Laser® XT660 Shaft with Display unit XT11, Part No. 12-1058 (Medium case)

## A complete system includes

1	Display unit XT11
1	Measuring unit XT60-M
1	Measuring unit XT60-S
2	Shaft brackets with chains and rods
4	Rods 60 mm [2.36"]
2	Extension chain 900 mm [35.4"]
1	Measuring tape 3 m [9.8']
1	Hexagon wrench set
1	Charger (100–240 V AC)
1	DC split cable for charging
1	DC to USB adapter, for charging
1	Shoulder strap for display unit
1	Quick reference manual
1	Cleaning cloth for optics
1	USB memory with manuals
1	Documentation folder

1	Carrying case Medium Weight: 7.2 kg [15.9 lbs], Dimension WxHxD: 460x350x175 mm [18.1"x13.8"x6.9"]
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Customize your XT11

(Note that these options cannot be retrofitted)

Part No. 12-0968	IR Camera added to XT11
Part No. 12-0985	Camera removed from XT11

## XT770 SHAFT

System Easy-Laser® XT770 Shaft with Display unit XT11, Part No. 12-1095 (Medium case).

With XT770 you can carry out the following:

- Align the machine
- Check base twist
- Check bearing play
- Check soft foot
- Measure machine movement over time
- Document and share the results

### All XT770 systems includes:

1	Measuring unit XT70-M
1	Measuring unit XT70-S
2	Shaft brackets with chains and rods
4	Rods 60 mm [2.36"]
2	Magnet base
2	Offset bracket
2	Extension chain 900 mm [35.4"]
1	Measuring tape 3 m [9.8']
1	Hexagon wrench set
1	Charger (100–240 V AC)
1	DC split cable for charging
1	DC to USB adapter, for charging
1	Shoulder strap for display unit
1	Quick reference manual
1	Cleaning cloth for optics
1	USB memory with manuals
1	Documentation folder
1	Carrying case Large (or Large Geo)

### System 12-1095 and 12-1127 also includes:

1	Display unit XT11
1	Shoulder strap for display unit

### System 12-1127 and 12-1128 also includes:

1	Laser transmitter D22
1	Magnet base with turnable head (replaces one of the regular magnet bases)
4	Rods 120 mm [4.72"]

Weight for 12-1095: 11.9 kg [26.2 lbs]

Weight for 12-1127: 14.7 kg [32.4 lbs]

Weight for 12-1128: 13.2 kg [29.1 lbs]

### Customize your XT11

(Note that these options cannot be retrofitted)

Part No. 12-0968	IR Camera added to XT11
Part No. 12-0985	Camera removed from XT11

## XT190 BTA

When aligning with the Easy-Laser® BTA you reduce the wear on sheaves/pulleys, belts, bearings and seals as well as reducing vibration.

Clean the units and the windows at the apertures with a dry cotton cloth.

Part. no 12-1053

### Laser transmitter

Sheave diameter	> 60 mm [2.5"]
Laser class	2
Output power	<0.6 mW
Laser wavelength	630–680 nm
Beam angle	60°
Accuracy	Parallelity: < 0.05°, Offset < 0.2 mm [0.008"]
Battery type	1xR6 (AA) 1.5 V
Battery operation	8 hours cont.
Operating temperature	-10°C to +50°C
Material	ABS plastics / Hard anodized aluminium
Dimensions WxHxD	145x86x30 mm [5.7x3.4x1.2"]
Weight	270 g [9.52 oz]

**NOTE!** If not using the system for a long period of time, remove the battery from the laser transmitter.

### Laser classification

The XT60 is classified as laser class 2, for more information See "Safety precautions" on page 212.

These products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with this User Manual.



A. Laser aperture

### Label with safety precautions



Detector

Sheave diameter	> 60 mm [2.5"]
Displayed resolution	(Changeable between mm/inch) Axial offset: 0.1 mm [0.005"] Angular value: 0.1°
Measurement distance	Up to 3 m [9.8'] between transmitter and detector
Measurement range	Axial offset: ±3 mm [0.12"] Angular value: ±8°
Display resolution	Offset: 0.1° Angle:0.01°
Display type	Yellow OLED 96x96 pixels
Connection	Wireless technology
Battery type	Li-Ion
Battery operation	5 hours continuously
Housing material	ABS plastics / Anodized aluminium
Dimensions BxHxD	95x95x36 mm [3.7x3.7x1.4"]
Weight	190 g [6.7 oz]

Detector battery

Press to see the battery status of the detector. While the battery is charging, there is a green flashing light. The laser transmitter flashes when the battery is low. Change the batteries before you continue to measure.



- Red, flashing once: Battery empty.
- Red, flashing twice: Battery needs charging.
- Green, flashing three times: Good.
- Green, fixed light: Battery full.

## XT280 VIB

Part No. 12-1050

Vibration analyser that quickly diagnoses vibration level, unbalance, misalignment and looseness.

Size	200 mm x 60mm x 26mm
Weight	280g
<b>Environmental</b>	
Water, sand and dust	IP67 Waterproof
Operating temperature	0°C to 50°C
Storage temperature	-20°C to 70°C
Power supply	2xR6 (AA) 1.5 V
Battery life	Auto power OFF - typically 20 hours continuous operating time depending on brightness setting.
Frequency range	2 Hz to 1 kHz (ISO) 1 kHz to 10 kHz (BDU)
Max frequency resolution	1.25 Hz @ 800 lines FFT setting Acceleration in g Velocity in mm/s (or inch/s) Bearing noise in BDU (bearing damage units) Displacement (mm, microns, inch)
Displayed Frequency Units	Hertz (Hz), RPM or CPM
Input range	User selectable with accelerometer sensitivity
Dynamic range	96 dB (0.01g resolution)
VA diagnostic bands (RPM = run speed)	Unbalance 1x RPM Alignment 2x RPM Looseness 3x RPM

### Optional equipment

Stinger 03-1326 accessory probe (length 100 mm) and Magnet 03-1327.





# LEGAL NOTICE

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## QUALITY CERTIFICATE

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Easy-Laser AB is ISO 9001:2015 certified. Certificate number: 900958. Easy-Laser AB confirms that our products are produced according to applicable national and international regulations and standards. The calibration of the equipment fully complies with ISO 9001:2015 §7.1.5.

Each Easy-Laser® system undergoes a Factory Acceptance Test and is visually inspected prior to delivery.

### Warranty commitment

Easy-Laser AB develops and manufactures the Easy-Laser® product range. The products are manufactured under our stringent quality controls. If the product is malfunctioning or stops working within three (3) years of purchase, the warranty applies with free repair or replacement of defective parts or products.

Warranty does not apply:

- If the product is handled carelessly or incorrectly.
- If the product is subjected to unusually high temperatures, moisture, shock or high voltages.
- If the product is modified, repaired or dismantled by non approved personnel.

Compensation for any secondary damage caused by an Easy-Laser® product fault does not apply. Easy-Laser AB is not responsible for any transport costs for equipment sent back to Easy-Laser AB for repair.

### Lithium Ion battery limited warranty

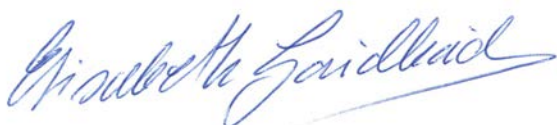
A Lithium ion battery inevitably loses power during its lifetime, depending on usage temperature and the number of charging cycles. Therefore, internal rechargeable batteries in the Easy-Laser® product range are not included in our general 3-year warranty. A 1-year warranty applies for the battery capacity to stay above 70 % (after 300 charging cycles, the battery should have more than 70 % of its nominal capacity left). A 3-year warranty applies if the battery becomes unusable because of a manufacturing fault or factors that Easy-Laser AB could be expected to have control of, or if the battery displays abnormal degradation of capacity in relation to use.

### ECOM Tablet Computer limited warranty

The warranty of ECOM Tablet Computer (part no. 12-1086) is one (1) year.

### Measurement data

It is the responsibility of the customer to make a backup of all saved data before the product is sent for repair. Resetting of saved measurement data is not covered by the warranty. Easy-Laser AB takes no responsibility for saved data that is damaged or lost during transportation or repair.



Elisabeth Gårdbäck  
Quality Manager, Easy-Laser AB

## SAFETY PRECAUTIONS

**NOTE!** Opening the laser units can result in hazardous radiation, and will invalidate the manufacturer warranty.

If starting the machine to be measured would result in injuries, the possibility to unintentionally start it must be disabled before mounting the equipment, for example by locking the switch in the off position or removing the fuses. These safety precautions should remain in place until the measurement equipment has been removed from the machine.

**NOTE!** The system must not be used in explosive risk areas.

### Laser safety

Easy-Laser® is a laser instrument in laser class 2 which requires the following safety precautions:

- Never stare directly into the laser beam
- Never aim the laser beam at anyone's eyes

This User Manual contains information about laser safety according to international standard IEC 60825-1: 2007 and 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24 2007. IEC 60825-1:2014.

The information enables the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.

According to IEC 60825-1: 2007, products classified as laser class 2 do **not** require:

- laser safety officer involvement
- protective clothes and eyewear
- special warning signs in the laser working area

if used and operated as defined in this User Manual due to the low eye hazard level.

National laws and local regulations could impose more stringent instructions for the safe use of lasers than IEC 60825-1: 2007.

It may be hazardous to look directly into the beam, in particular for deliberate exposure. The beam may cause strong temporary blindness, especially under low ambient light conditions. However, the risk of injury for Class 2 laser products is very low because:

- Unintentional eye exposure would rarely happen under worst case conditions, e.g., when the beam travels exactly through the center of the pupil, and that the eye lens focuses the light precisely on the retina.
- The exposure limits for the laser class include a safety margin, which means that the limits are substantially below those levels of radiation that are known to cause damage.
- The natural reflex of the eye to avoid strong light limits unintentional exposure to a very short time (0.25 s).

### Traveling with your measurement system

The system includes lithium-batteries. For more information see the product specifications in Technical data. When travelling by airplane with your measurement system we strongly recommend that you check which rules that apply for each airline company.

### Specifications for built-in rechargeable batteries

Easy-Laser Part No.	Type	Voltage	Output	Capacity	Included in Part No.
12-0953	Li-Ion	3.7 V	7.4 Wh	2000 mAh	12-0944, 12-0943, 12-1028, 12-1029, 12-1045, 12-1046
12-0952	Li-Ion	7.3 V	41.61 Wh	5300 mAh	12-0961 (2 pcs)

## SERVICE AND CALIBRATION

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Our Service centers will quickly assist you if your measurement system need to be repaired or when it is time for calibration.

Our main Service center is located in Sweden. There are several local Service centers that are certified to carry out limited service and repair. Contact your local Service center first before sending your equipment for service or repair. All Service centers are listed on our web site under Service and Calibration.

Before sending your measuring system to our main Service center, please fill in the online Service and Repair report.

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We might change and correct the manual in later issues without further information.

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### Address

Easy-Laser AB, PO Box 149, SE-431 22 Mölndal, Sweden

Phone: +46 31 708 63 00, E-mail: [info@easylaser.com](mailto:info@easylaser.com)

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