



Manual

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Vibration measurements of rotating devices on ships - measuring device



Content

1. Measurements Schedule	3
2. Measuring instrument	4
2.2 Connectors.....	4
2.3 Data transfer	6
3. Collecting the measurements in the route memory	8
3.1 Route structure	8
3.2 Automatic measurement	8
3.3 Transferring the measurements data to the PC	9
3.4 Erasing the route memory	10
4. Manner of measurement.....	11
4.1 Horizontal devices.....	12
Electric motor measurements	12
Pump measurements	14
4.2 Vertical device.....	15
4.3 Machinery list for Type 1 - STX	16
1.1. Tachometer activation	20
1.2. Tachometer: external view.....	21
1.3. View on the LCD display.....	22
1.4. Description of the tachometer functions	23

1. Measurements Schedule

- Measurements of all machinery should be performed in approx. 3 months period.
- As it was discussed with BW Group Technical Department measurements should be performed:
 - ✓ at the change of C/E onboard (new C/E should perform measurements of all machinery at the beginning of the contract)
 - ✓ when the remarks in report suggest that machine should be measured more often
 - ✓ before and after overhaul
 - ✓ whenever crew decide that machine works at abnormal conditions



Vibration Measurements have to be done using channel B!

2. Measuring instrument

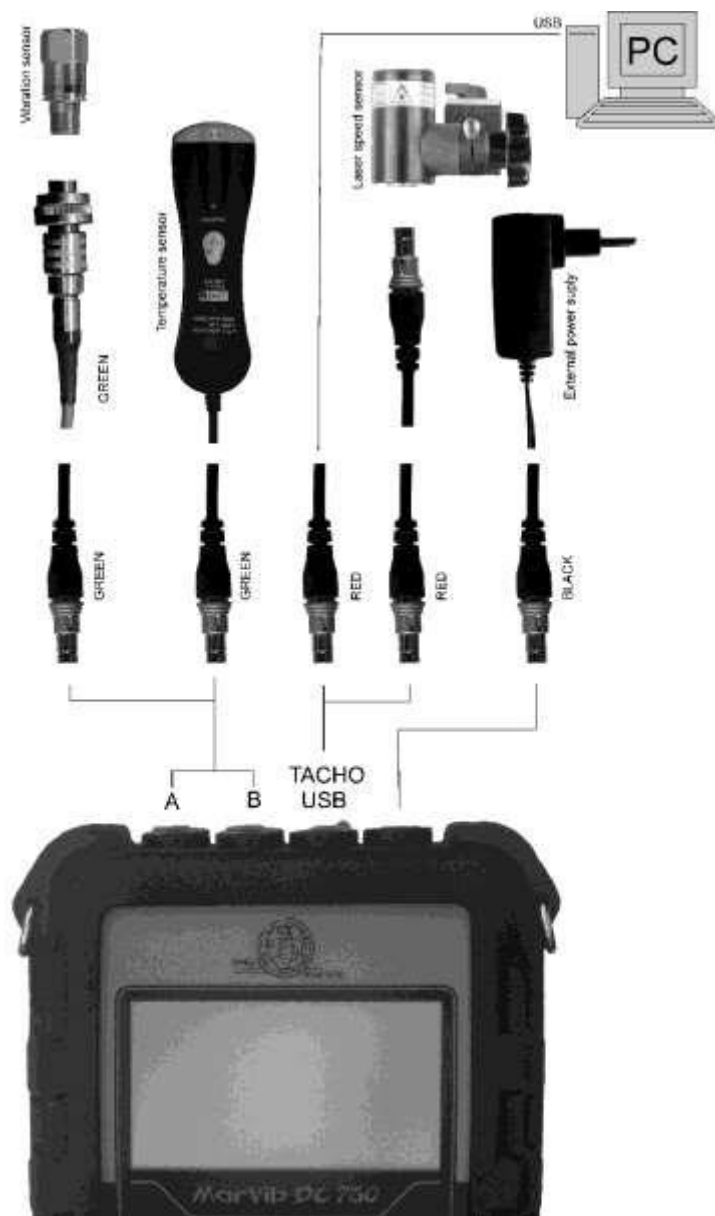
2.1 Front panel



2.2 Connectors




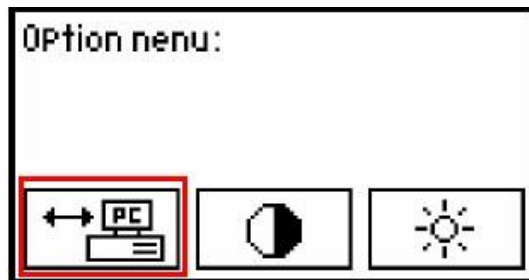
The following drawing shows how different sensors are connected to the instrument. The connectors and corresponding plugs are of PUSH-PULL type and there are protections that make it impossible to insert a plug into a connector that does not fit.



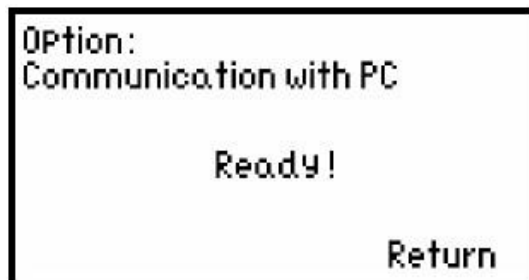
2.3 Data transfer

In order to communicate with the computer the user should do the following:

1. Connect the *MarVib* to the USB port in PC.
2. On the device press the button  and then press the button under the communication with PC option.

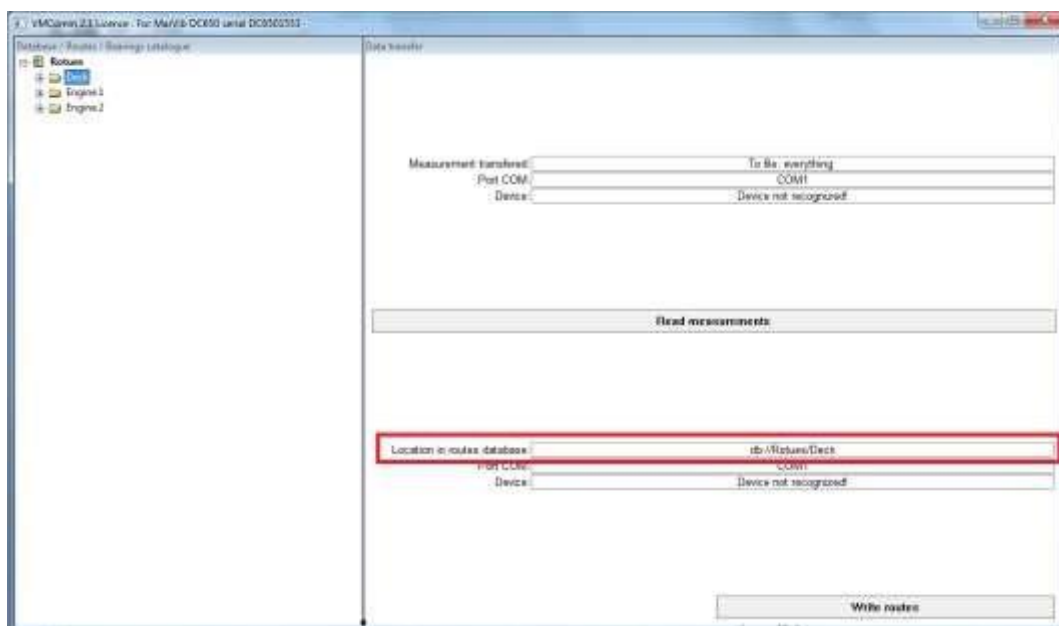


After connecting the device will show the announcement:



3. Launch on the PC program *VMComm*, select the route you want to download to the device (by clicking once left button of the mouse on the following name: Deck, Engine1, Engine2).

The route should appear in "Location in routes database", see below:



If the route doesn't display, minimize the window and click on it again to enlarge.

4. When right routes display press *Write routes*.

During the transfer following announcement in device will be shown:



While data is transferred, the progress of transfer is displayed on the computer screen.
Please do not do anything until the end.

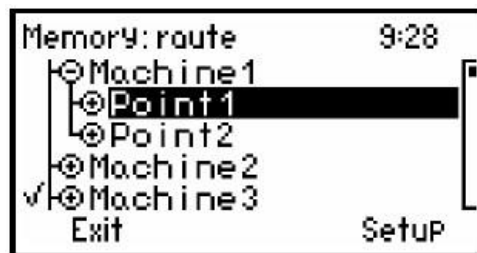
3. Collecting the measurements in the route memory



3.1 Route structure

The route memory has a tree structure: the first level is reserved for machines, the second for the measurement points on respective machines, and the third one concerns the measurements that should be executed at these points. The following display reflects the structure of the route memory:



3.2 Automatic measurement




If in the memory menu is shown the list of measurement points and one of these points is selected, then by pressing the key  we launch automatic measurement in this point. The "automatic measurement" means that consecutive measurements for this point will be executed without the necessity of pressing the key . If we have completed all measurements for all points of a given branch then the sign (✓) will appear next to the name of the machine to which belong all these points. In this case we can select another machine, unfold the branch of the selected point and continue collecting measurements. Once we have

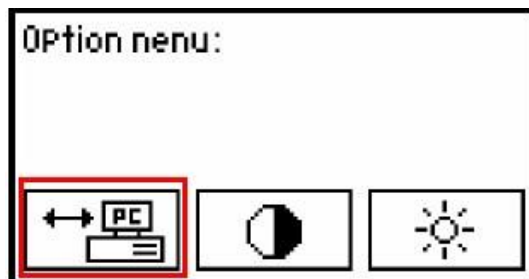


completed all measurements of the route, the sign (✓) will be displayed on the first line, next to the word **Route**.

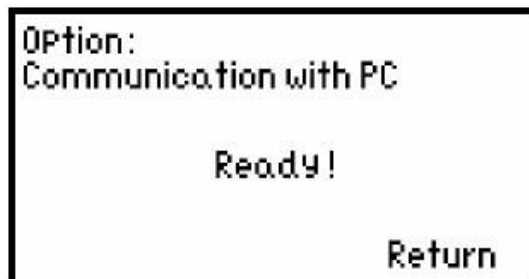
3.3 Transferring the measurements data to the PC

In order to communicate with the computer the user should do the following:

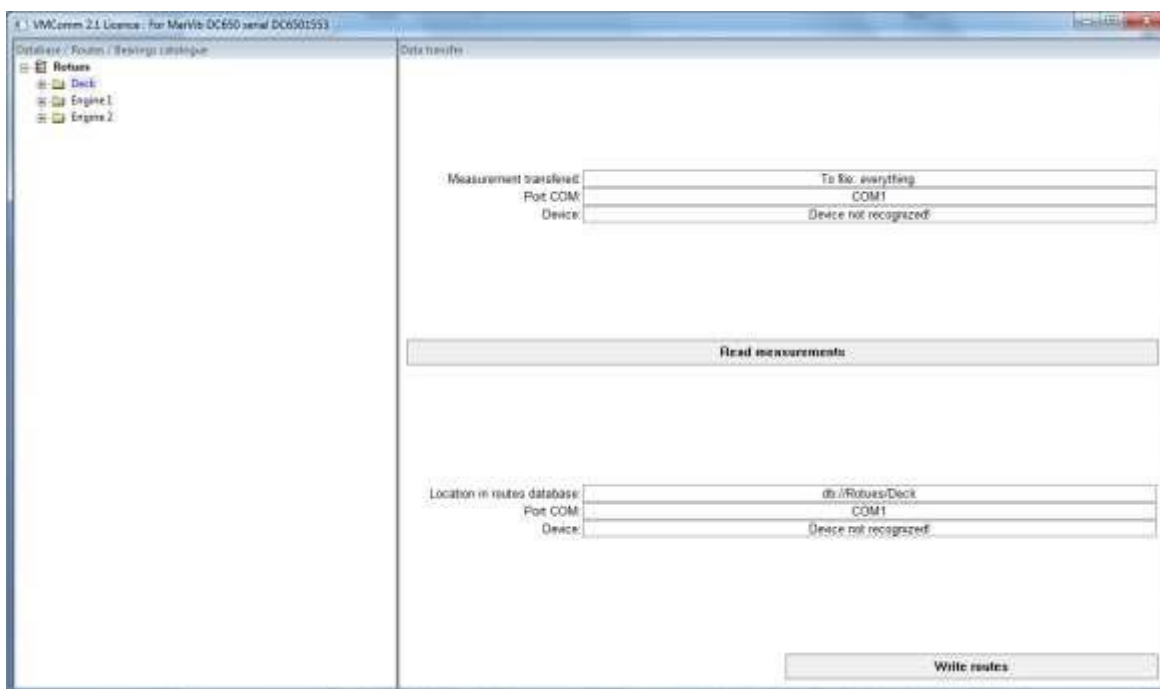
1. Connect the *MarVib* to the USB port in PC.
2. On the device press the button  and then press the button under the communication with PC option.



After connection the device will show the announcement:



3. Launch on the PC program *VMComm*, select the route you want to download to the device and press *Read measurements*. Then you need to put the name of the file (ex. Deck_date) and select the file location.



During the transfer following announcement will be shown:

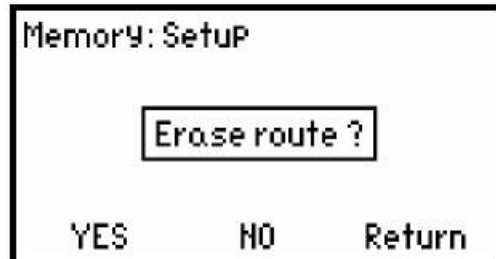


3.4 Erasing the route memory

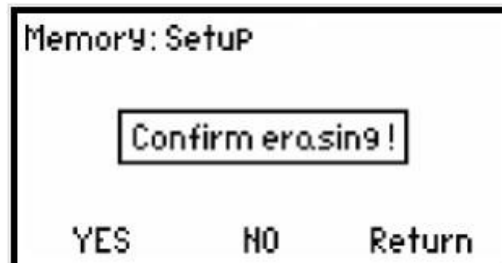
Before downloading the new route into the device the route memory must be erased. To do that we need to enter the memory settings (press **MEMORY**, then **MENU** and select **Setup**).

Next, using the arrow

By choosing **YES** we get ready to erase the measurements or the measurements together with the route (in order to avoid this we should choose **No** or **Return**) :



Now we choose **Yes**, then we still have to answer the following question:



By selecting **Yes** we erase the memory.

4. Manner of measurement

Vibration diagnosis is based on the measuring trend. The next measurement should be conducted in the same places and in the similar operating conditions. Mark with the waterproof marker the place of measurement with the description of measurement. In case of measured devices with tactile skewer drill the place of measurement slightly, what prevent the sensor from slipping. Remember, use magnetic measurement, which is easier, where it is possible. At the same time RPM should be measured using attached Optical Tachometer ST723. It should also be written down in the measuring card. A few rules, which should be taken into account to obtain the right result with the correct description of the places of measure on the device.

There are three measuring points on the ship:

H – Horizontal

V – Vertical

A – Axial

There are two types machines:

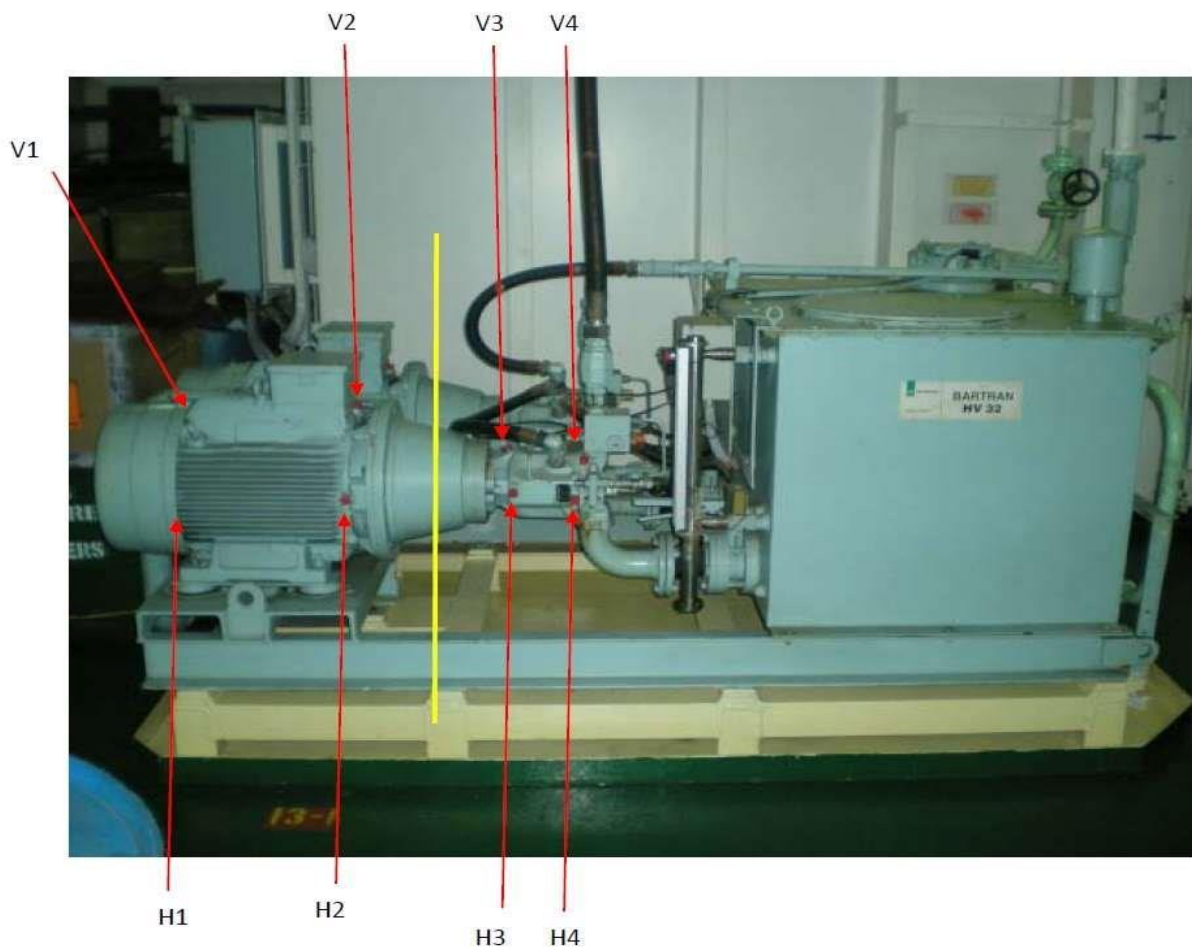
- a) horizontal
- b) vertical

4.1 Horizontal devices

Start the measurement in the horizontal device from the free end of the device. In most cases the devices which drives the machine is engine, but there are few exceptions like power generators, when the device is driven by mechanical engine. Measurement is obtained from bearing node, always from right to left, looking from the free end. Measuring points are on the horizontal level (H) and vertical level (V) and they are 90° away from each other.

Examples are shown below:

Electric motor measurements

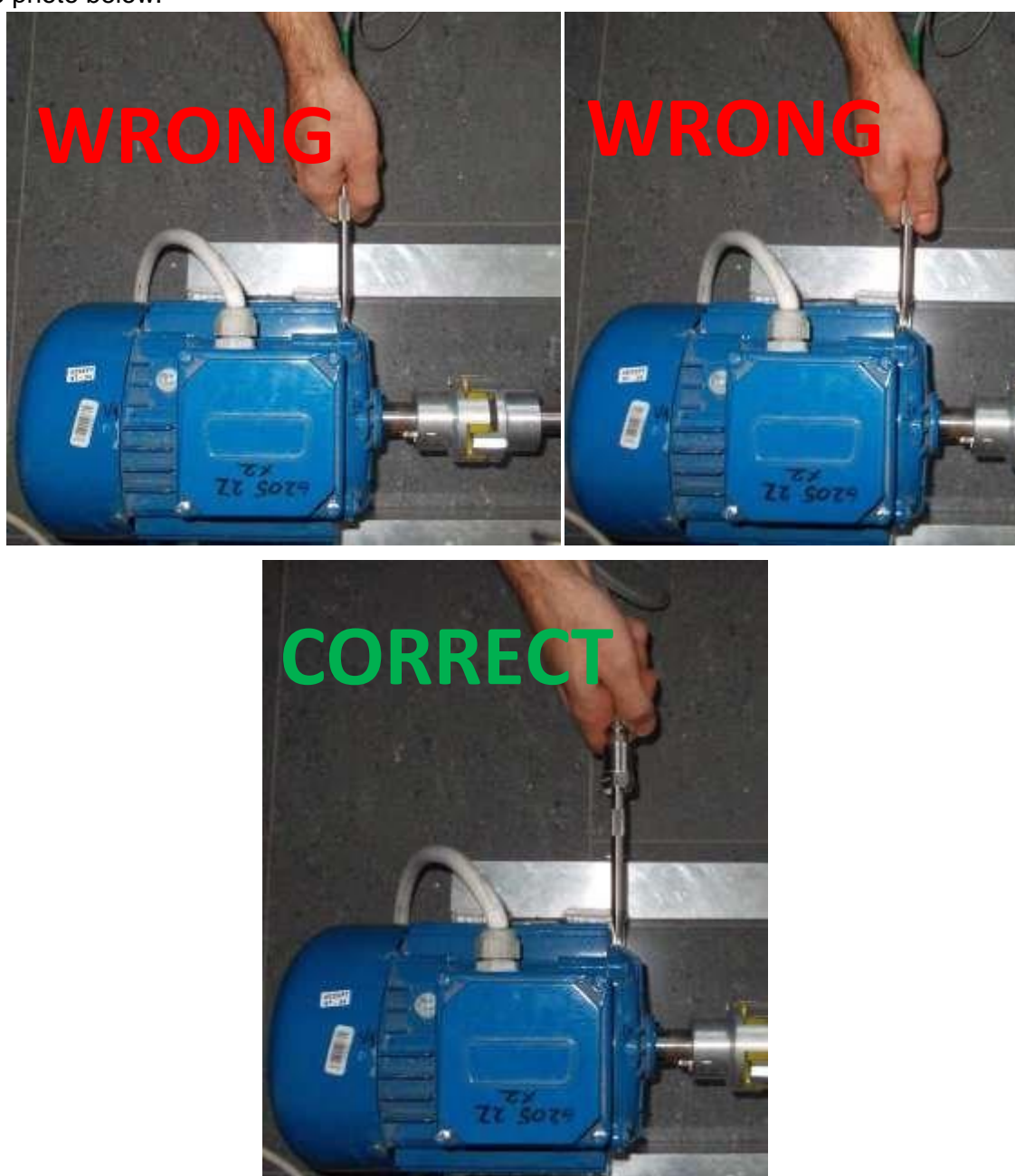


There are H1 and V1 points, which are between the ribbing and close to the fan guard. They are measured with tactile sensor as a skewer. Skewer should be held perpendicularly to the surface, which it is adhered to by gently pressing.

Attention:

Remember to hold the handle and not the sensor, while measuring with tactile sensor.

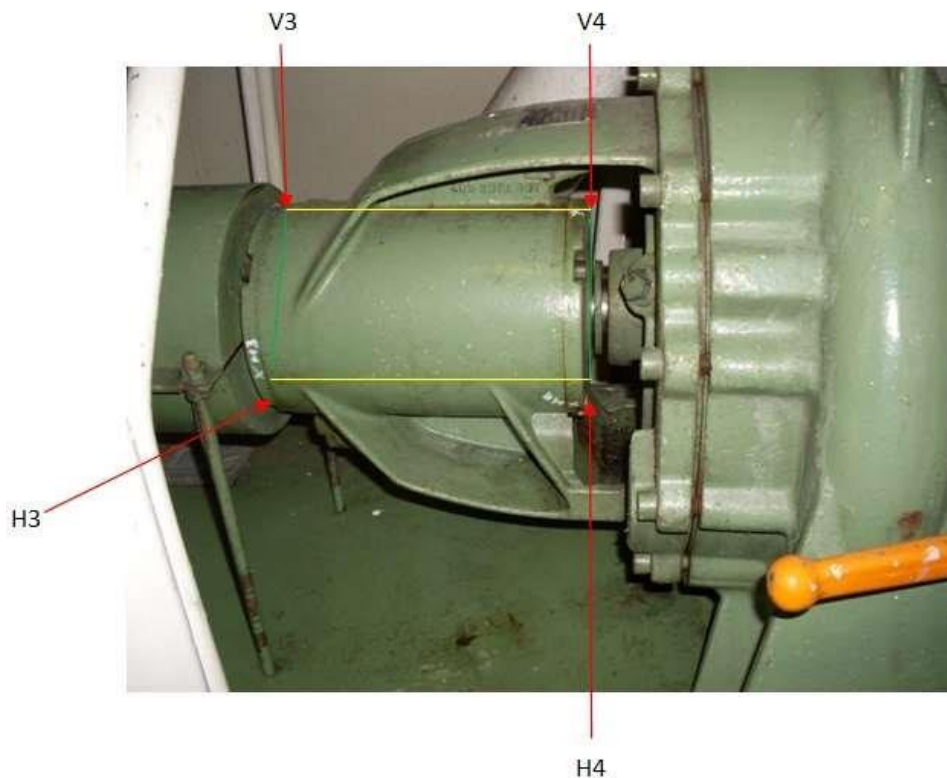
See photo below:



The other H2 and V2 measuring points on the motor are measured with magnetic sensor, which helps the measurement. Remember that magnetic sensor have to adhere tightly to the round surfaces.

Pump measurements

The first point is located from the side of the coupling on the pump in the horizontal surface in no. H3 and vertical V4 is moved 90°, similarly in no. H4 and V4.



Attention:

Measuring points H1 and V1 ; H2 and V2; H3 and V3; H4 and V4 should always form one vertical line (green line). Similarly points H1 and H2; H2 and H3; H3 and H4 as well as V1 and V2; V2 and V3; V3 and V4 should always form a horizontal line (yellow line). The example is shown in the photo above.

4.2 Vertical device

Start the measurement in the horizontal device from the free end of the device, which drives the machine. In most case the devices, which drives the machine is engine, but there are few exceptions like hydraulic motor, when the device is driven by mechanical engine (read more in 3.3.). Measurement is obtained from bearing node, always from right to left, if you look from the free edge. Measuring points are on the horizontal level (H) first from right and horizontal level (HH) and they are 90° to the left side. All measurement should be conducted on the working machine.





4.3 Machinery list for Type 1 - STX

Name from route	Full name
Aux blower 1 m	ME aux blower no1 el. motor
Aux blower 2 m	ME aux blower no2 el. motor
AE no1 engine	Auxiliary Engine no1 engine
AE no1 alternat	Auxiliary Engine no1 alternator
AE no2 engine	Auxiliary Engine no2 engine
AE no2 alternat	Auxiliary Engine no2 alternator
AE no3 engine	Auxiliary Engine no3 engine
AE no3 alternat	Auxiliary Engine no3 alternator
ME LO pump 1 m	Main LO pump no1 el. motor
ME LO pump	Main LO pump no1
ME LO pump 2 m	Main LO pump no2 el. motor
ME LO pump	Main LO pump no2
SternTube LO 1 m	Stern tube LO pump no1 el. motor
SternTube LO 1	Stern tube LO pump no1
SternTube LO 2 m	Stern tube LO pump no2 el. motor
SternTube LO 2	Stern tube LO pump no2
HPU pp no1 m	HPU pump no1 el. motor
HPU pp no2 m	HPU pump no2 el. motor
AE1 LO prim m	DG pre-lub pump no1 el. motor
AE1 LO prim	DG pre-lub pump no1
AE2 LO prim m	DG pre-lub pump no2 el. motor
AE2 LO prim	DG pre-lub pump no2
AE3 LO prim m	DG pre-lub pump no3 el. motor
AE3 LO prim	DG pre-lub pump no3
Main CSWpp no1 m	Main cooling SW pump no1 el. motor
Main CSWpp no1	Main cooling SW pump no1
Main CSWpp no2 m	Main cooling SW pump no2 el. motor
Main CSWpp no2	Main cooling SW pump no2
Fire & GS pump m	Fire & GS pump el. motor
Fire & GS pump	Fire & GS pump
Fire&Bilge pp m	Fire & bilge pump no2 el. motor
Fire&Bilge pp	Fire & bilge pump no2
Scrub CWS IGG m	Scrubber CWS pump for top up IGG el. motor
Scrub CWS IGG	Scrubber CWS pump for top up IGG
Scrub IGS pump m	Scrubber IGS pump el. motor
Scrub IGS pump	Scrubber IGS pump
Deck wat seal1 m	IG deck seal water pump no1 el. motor
Deck wat seal1	IG deck seal water pump no1
Deck wat seal2 m	IG deck seal water pump no2 el. motor

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Deck wat seal2	IG deck seal water pump no2
LT CFW pump1 m	LT cooling FW pump no1 el. motor
LT CFW pump1	LT cooling FW pump no1
LT CFW pump2 m	LT cooling FW pump no2 el. motor
LT CFW pump2	LT cooling FW pump no2
ME Jack CFW p1 m	ME jacket cooling FW pump no1 el. motor
ME Jack CFW p1	ME jacket cooling FW pump no1
ME Jack CFW p2 m	ME jacket cooling FW pump no2 el. motor
ME Jack CFW p2	ME jacket cooling FW pump no2
FeedW AuxBoi 1 m	Aux boiler feed water pump no1 el. motor
FeedW AuxBoi 1 p	Aux boiler feed water pump no1
FeedW AuxBoi 2 m	Aux boiler feed water pump no2 el. motor
FeedW AuxBoi 2 p	Aux boiler feed water pump no2
FeedW ComBoi 1 m	Composite boiler feed water pump no1 el. motor
FeedW ComBoi 1 p	Composite boiler feed water pump no1
FeedW ComBoi 2 m	Composite boiler feed water pump no2 el. motor
FeedW ComBoi 2 p	Composite boiler feed water pump no2
FWG ejector m	FW Generator ejector pump el. motor
FWG ejector	FW Generator ejector pump
AuxBLR FO pp1 m	Aux boiler FO pump no1 el. motor
AuxBLR FO pp1	Aux boiler FO pump no1
AuxBLR FO pp2 m	Aux boiler FO pump no2 el. motor
AuxBLR FO pp2	Aux boiler FO pump no2
CompBLR FO pp1 m	Composite boiler FO pump no1 el. motor
CompBLR FO pp1	Composite boiler FO pump no1
CompBLR FO pp2 m	Composite boiler FO pump no2 el. motor
CompBLR FO pp2	Composite boiler FO pump no2
CompBLR MDO pp1 m	Composite boiler MDO pump no1 el. motor
CompBLR MDO pp1	Composite boiler MDO pump no1
CompBLR MDO pp2 m	Composite boiler MDO pump no2 el. motor
CompBLR MDO pp2	Composite boiler MDO pump no2
FO supply pp 1 m	FO supply pump no1 el. motor
FO supply pp 1	FO supply pump no1
FO supply pp 2 m	FO supply pump no2 el. motor
FO supply pp 2	FO supply pump no2
FO circ pp no1 m	FO circulation pump no1 el. motor
FO circ pp no1	FO circulation pump no1
FO circ pp no2 m	FO circulation pump no2 el. motor
FO circ pp no2	FO circulation pump no2
LO purifier 1 m	LO purifier no1 el. motor
LO purifier 1	LO purifier no1



LO purifier 2 m	LO purifier no2 el. motor
LO purifier 2	LO purifier no2
GE LO purifier m	GE LO purifier el. motor
GE LO purifier	GE LO purifier
HFO purifier 1 m	HFO purifier no1 el. motor
HFO purifier 1	HFO purifier no1
HFO purifier 2 m	HFO purifier no2 el. motor
HFO purifier 2	HFO purifier no2
MELOpuriFeed 1 m	ME LO purifier feed pump no1 el. motor
MELOpuriFeed 1 p	ME LO purifier feed pump no1
MELOpuriFeed 2 m	ME LO purifier feed pump no2 el. motor
MELOpuriFeed 2 p	ME LO purifier feed pump no2
GELOpuriFeed m	GE LO purifier feed pump el. motor
GELOpuriFeed p	GE LO purifier feed pump
HFO puriFeed1 m	HFO purifier feed pump no1 el. motor
HFO puriFeed1 p	HFO purifier feed pump no1
HFO puriFeed2 m	HFO purifier feed pump no2 el. motor
HFO puriFeed2 p	HFO purifier feed pump no2
LDCL Sys Circ m	LDCL system circulation pump el. motor
LDCL Sys Circ	LDCL system circulation pump
COPT cond pp1 m	COPT condensate pump no1 el. motor
COPT cond pp1	COPT condensate pump no1
COPT cond pp2 m	COPT condensate pump no2 el. motor
COPT cond pp2	COPT condensate pump no2
Cargo1 turbine	Cargo pump no1 turbine
Cargo1 pump	Cargo pump no1
Cargo2 turbine	Cargo pump no2 turbine
Cargo2 pump	Cargo pump no2
Cargo3 turbine	Cargo pump no3 turbine
Cargo3 pump	Cargo pump no3
Ball 1 pp el mot	Ballast pump no1 el. motor
Ballast pp1	Ballast pump no1
Ball 2 pp el mot	Ballast pump no2 el. motor
Ballast pp2	Ballast pump no2
Main air comp1 m	Main air compressor no1 el. motor
Main air comp2 m	Main air compressor no2 el. motor
AC comp no1 m	AC compressor no1 el. motor
AC comp no1	AC compressor no1
AC comp no2 m	AC compressor no2 el. motor
AC comp no2	AC compressor no2
Contr Air Compr	Control air compressor

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Prov comp no1 m	Provision compressor no1 el. motor
Prov comp no1	Provision compressor no1
Prov comp no2 m	Provision compressor no2 el. motor
Prov comp no2	Provision compressor no2
Se Air Comp	Service air compressor
Steering pump1 m	Steering gear pump no1 el. motor
Steering pump1	Steering gear pump no1
Steering pump2 m	Steering gear pump no2 el. motor
Steering pump2	Steering gear pump no2
Emergency fire m	Emergency fire pump el. motor
Emergency fire p	Emergency fire pump
BoilerBurn mot	Boiler burner blower el. motor
AuxBlr FD fan1 m	Aux. boiler FD fan no1 el. motor
AuxBlr FD fan2 m	Aux. boiler FD fan no2 el. motor
IGG fan no1 mot	IG blower no1 el. motor
IGG fan no2 mot	IG blower no2 el. motor
AHU fan m	AHU fan el. motor
AHU fan	AHU fan
Purf Space exh m	Purifier space exh fan el. motor
Mach work exh m	Machinery workshop welding area exh fan el. motor
San Exh fan mot	Sanitary exhaust fan el. motor
Pump RM fan 1 m	Pump room fan no1 el. motor
Pump RM fan 2 m	Pump room fan no2 el. motor
StGeer RM fan	Steer gear room exhaust fan el. motor
Galley fan	Galley exhaust fan el. motor
ER vent fan no1	ER ventilation fan no1 el. motor
ER vent fan no2	ER ventilation fan no2 el. motor
ER vent fan no3	ER ventilation fan no3 el. motor
ER vent fan no4	ER ventilation fan no4 el. motor
Incinerato fan m	Incinerator fan el. motor
IncinPrim blow m	Incinerator primary blower el. motor
Distilate pump m	Distilate pump el. motor
Distilate pump	Distilate pump
Sludge pump m	Sludge pump el. motor
Sludge pump	Sludge pump
SewageVac pp1 m	Vacuum pump for STP no1 el. motor
SewageVac pp1	Vacuum pump for STP no1
SewageVac pp2 m	Vacuum pump for STP no2 el. motor
SewageVac pp2	Vacuum pump for STP no2



Manual

Optical tachometer ST723

Table of contents

1. TACHOMETER SERVICE

- 1.1. Tachometer activation
- 1.2. Tachometer external view
- 1.3. LCD display
- 1.4. Description of the tachometer functions
 - 1.4.1. *Measurement of rotational velocity (RPM)*

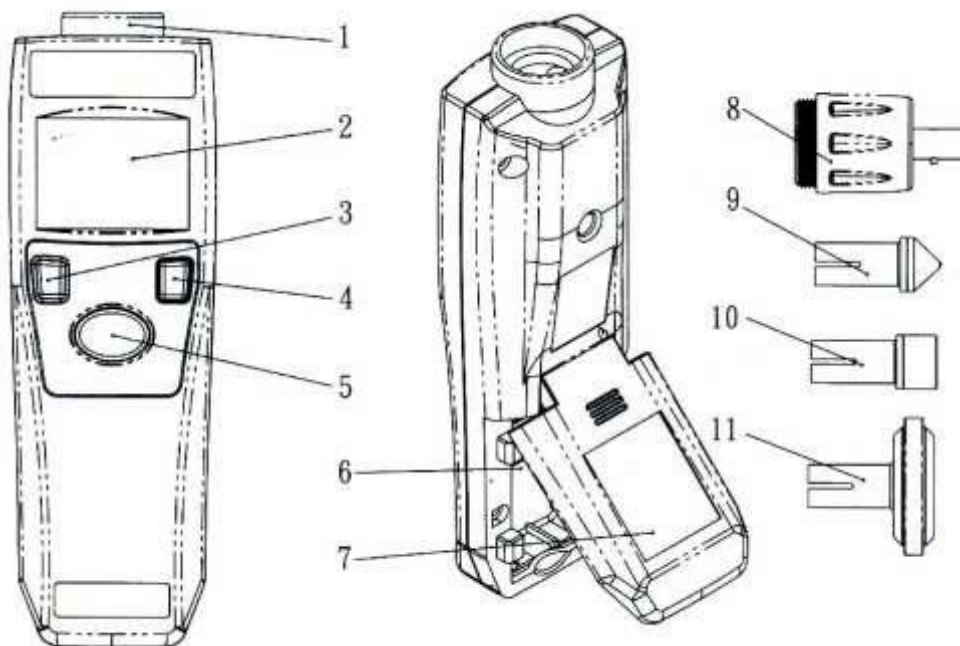
2. CLEANING

1.1. Tachometer activation

Optical method:

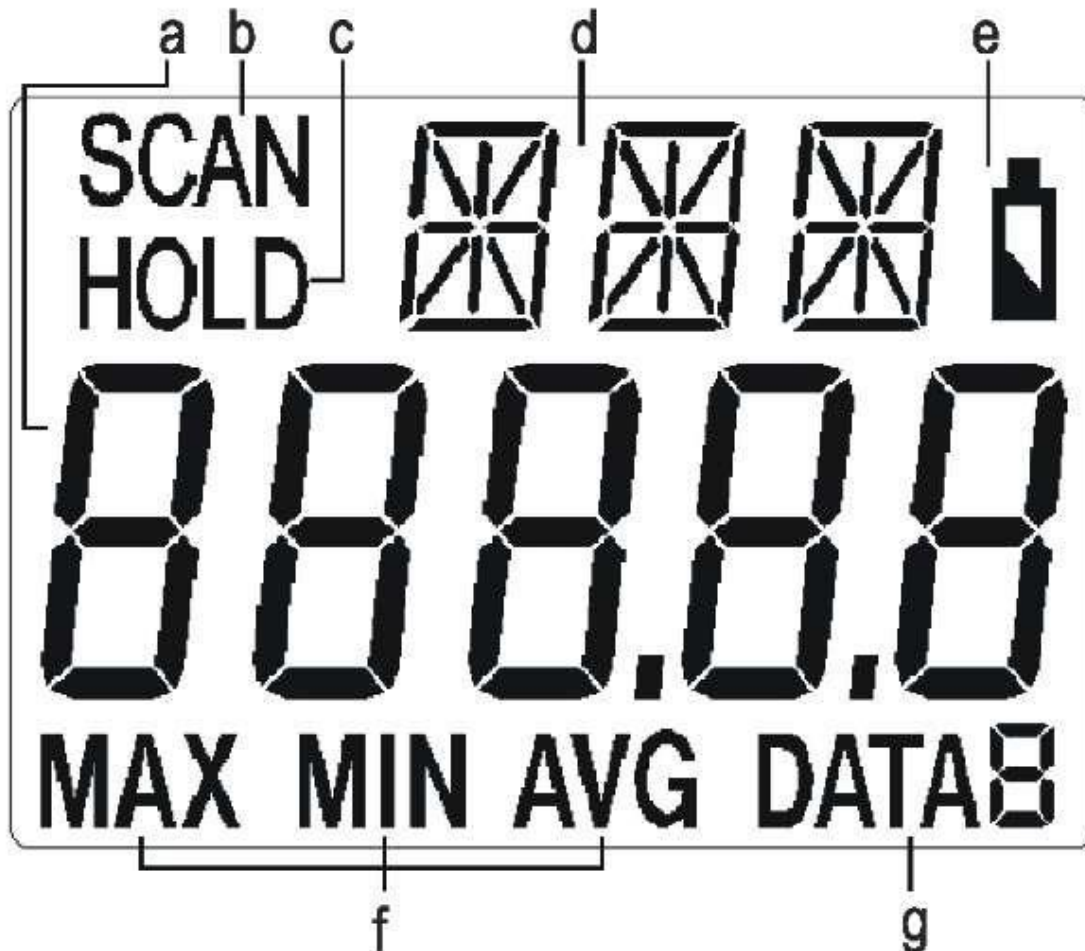
- Stick fragment of reflective tape on the object, which rotational speed will be measured. Tape should be stucked as close as possible to the outer edge (surface) of the object.
- Take the tachometer.
- Push the button and settle the laser sight on the measured object on place where the reflective tape was stucked. The RPM will be shown on the display.

1.2. Tachometer: external view



1. Outlet of laser emission.
2. LCD display.
3. Memory button.
4. Choose of the measurement function and indication unit.
5. Measurement button.
6. Cover of batteries.
7. Warning concerning the use of device and laser sight.
8. Adapter and shaft to settle the measuring catch.
9. Conic measuring catch.
10. Funnel measuring catch.
11. Round measuring catch with the circumference 10cm. (only for ST723).

1.3. View on the LCD display



- a. Main display (5 figures): display of the result of measurement.
- b. Symbol SCAN: It appears after pushing the measuring button MEAS or after activating electronic blockade of the measuring button, when the result is being refreshed.
- c. Symbol HOLD: It appears after disengaging the measuring button MEAS or after disconnecting the electronic blockade of the measuring button, when the current result of the measurement is kept on the display.
- d. Indication of the current indication unit.
- e. Indication of exhaust battery – indicator flashes.
- f. Symbol MAX/MIN/AVG: It appears when the current main display indication is adequately the maximum value, minimal value and medium value.
- g. Memory: Number of the current memory cell.



1.4. Description of the tachometer functions

1.4.1. Measurement of rotational speed (RPM)

While measuring (symbol SCAN) the current result of the RPM is on the main display. After releasing the measuring button (symbol HOLD) the result is stopped on the display until the automatic disconnection of the measuring instrument after 30 sec of being inactive.

2. Cleaning of the lens (laser converter):

- Remove the dust with compressed air.
- Dusty surface of the converter can be gently cleaned with brush made of natural hair (e.g. photographic).
- After removing the fixed contaminant of the converter can be wiped with damp cotton cloth.

ATTENTION

- Do not use any grinding materials or solvents to clean the measuring lens.
- While cleaning do not allow any fluid or moisture get into the measuring instrument.