



KONGSBERG

Simrad CS90 Fish-finding sonar Harbour Acceptance Test

The purpose of this Harbour Acceptance Test is to verify that the CS90 system provided to the vessel is correctly installed, and fully functional. It is then ready for the Sea Acceptance Test. When all the tasks have been done, the report form must be signed by the relevant parties. The completed document then becomes the official report.

Vessel/Customer

Serial numbers (if applicable)	
Processor Unit	
Operating Panel	
Transceiver Unit	
Hull Unit Controller	
Hull Unit	
Transducer	

SIMRAD
By KONGSBERG

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Disclaimer

Kongsberg Maritime AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.

Support information

If you require maintenance or repair, contact your local dealer. You can also contact us using the following address: simrad.support@simrad.com. If you need information about our other products, visit <https://www.kongsberg.com/simrad>. On this website you will also find a list of our dealers and distributors.

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Introduction

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Purpose

This is the Harbour Acceptance Test for the Simrad CS90 Fish-finding sonar.

The purpose of this Harbour Acceptance Test is to verify that the CS90 system provided to the vessel is correctly installed, and fully functional. It is then ready for the Sea Acceptance Test. When all the tasks have been done, the report form must be signed by the relevant parties. The completed document then becomes the official report.

Personnel and location

Successful completion of the test requires qualified and experienced test engineers and/or technicians.

This Harbour Acceptance Test is done on board the vessel, alongside the quay. The test is done by personnel from Kongsberg Maritime. All personnel must have good knowledge of the product and/or module(s) at hand.

A representative from an authorized dealer or distributor can do the Harbour Acceptance Test on behalf of Kongsberg Maritime.

Representatives from the client and/or end user are normally present to witness the test and results.

As with all assembly and test procedures related to advanced technical and/or electronic equipment, the skill of the operator is vital to a successful completion of the tasks. The only way to secure high quality of our products is first rate workmanship and high professional standards throughout the production chain.

It is equally important that all members of the production and test crews show initiative, and are willing to suggest improvements to functionality, design, procedures and documents. If you find a mistake in a document, or find that information is missing, offer this information to the proper authorities without further delay. Likewise, your experience as a skilled worker is valuable. Please forward any suggestions to make improvements to the product, the design, the production method, or any other matters related to your expertise.

Referenced documents

The installation and use of the CS90 is described in several documents and end user manuals. Internal test documents are used throughout the production and test of the CS90.

This list is not complete. Additional documents and end user manuals are available for the CS90. These publications are not relevant for this Harbour Acceptance Test.

Note

Unless specified in the applicable procedure(s), the CS90 publications listed here are not required during this Harbour Acceptance Test.

All the document numbers refer to the English version of each publication.

End user manuals

- **Reference Manual and On-line Help:** 442700
- **Installation Manual:** 442699

Software documents

- **Software Release Note:** 442717

Customer acceptance test procedures

- **Factory Acceptance Test:** 442721
- **Harbour Acceptance Test:** 442722
- **Sea Acceptance Test:** 442723

Qualifying documents

- **EC Declaration of Conformity:** NYA

Tools and test equipment

Specific tools and test equipment are required for this Simrad CS90 Harbour Acceptance Test. The required tools and equipment must be made available before the test can start.

The required test equipment is listed. For each item, record the instrument's serial number and - if relevant - its calibration expiry date.

Multimeter (Make and model)	Serial number	Calibration expiry date

The following tool is required:

- Allen key

Acceptance test summary

The purpose of this Harbour Acceptance Test is to verify that the CS90 system provided to the vessel is correctly installed, and fully functional. This acceptance test summary is provided to offer an overview of the functions and items that need to be tested. References are made to the individual chapters in this Harbour Acceptance Test.

Procedure

- 1 Record the software and hardware items that are included in the test.
- 2 Do a visual inspection of each unit that is comprised by the CS90 delivery.
- 3 Test the main functionality of the CS90.
- 4 Test the interfaces between the CS90 and relevant external devices and/or sensors.
- 5 Make sure that all the relevant installation parameters have been defined correctly.
- 6 When all the tests have been successfully concluded, open the *Customer acceptance* form, and fill it in with the relevant signatures.

Hardware and software registration

Topics

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Verification of previously tested items

It is not necessary to fill in registration tables for software and hardware items that have already been recorded in a previous test.

Are the CS90 user interface software and hardware units the same as those tested during the *Factory Acceptance Test*? If this is the case, it is not necessary to fill out the registration tables again.

- If no changes have been made to neither the software nor the hardware, sign the table below to verify this.
- If the software has been updated, record the new software version.
- If hardware changes have been made (units are replaced), all serial numbers must be recorded again.

Verification of previously tested items
Neither user interface software nor hardware units have been changed on this CS90 system since the <i>Factory Acceptance Test</i> . For this reason, the registration tables have not been filled out.
Date and signature

Software items

Every software program that is provided as a part of the CS90 delivery must be registered. Part number and software version must be registered. When software media (USB flash drive, CD, DVD etc) is provided, the part number of the media and the CS90 software version provided on the media must be registered.

Software	Part number	Software version
Simrad CS90	442716	

Software media	Part number	Software version
Simrad CS90	442719	

The software version on the software media shall be the same as the version installed on the Processor Unit. End user documentation is included on the same software media.

Hardware items

Topics

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Display

Each display provided with the CS90 delivery must be uniquely identified. Make(s), model(s), part number(s) and serial number(s) must be registered. Any unit that is not provided by Kongsberg Maritime AS does not need to be registered.

Display (Make and model ¹)	Part number ²	Serial number	Revision
¹ Fill in the make, model and serial number for each unit that is provided with the CS90 delivery. If applicable, add the part number. The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Processor Unit

The Processor Unit provided with the CS90 delivery must be uniquely identified. Make, model, part number and serial number must be registered.

Processor Unit ¹	Part number ²	Serial number	Revision
CS90 Processor Unit (with CS90 software)	441536		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Transceiver Unit

The Transceiver Unit provided with the CS90 delivery must be uniquely identified. Make, model, part number and serial number must be registered. The Transceiver Unit contains circuit boards and modules that must be recorded separately.

CS90 Transceiver Unit

The transceiver controls the transmission and reception made by the transmitters and receiver channels. The Transceiver Unit also holds an Ethernet switch and a large capacitor bank.

Transceiver boards

Transceiver boards (From left towards right)	Serial number	Revision
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

Transceiver boards (From left towards right)	Serial number	Revision
Transceiver board (Type): LPT32 Transceiver Board		
Part number: 425841		

Ethernet switch

Ethernet switch (Make and model) ¹	Part number ²	Serial number	Revision
HP 3600-24	382039		
¹ The unit contains neither circuit boards nor modules that need to be identified separately. If the HP 3600-24 Ethernet switch is not used with this delivery, fill in information about the replacement type in the empty row.			
² This is the part number on the unit label.			

Operating Panel

The Operating Panel provided with the CS90 system must be uniquely identified. Make, model, part number and serial number must be registered.

Operating Panel ¹	Part number ²	Serial number	Revision
Operating Panel Mk1	SH8-203593		
Operating Panel Power Supply	361102	N/A	N/A
¹ These units do not contain any circuit boards or modules that must be identified separately.			
² This is the part number on the unit label.			

Operating Panel ¹	Part number ²	Serial number	Revision
Operating Panel Mk2	442454		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Hull Unit Controller

The Hull Unit Controller provided with the CS90 system must be uniquely identified.

The Hull Unit Controller provides power and direction to the hoisting motor, and thus controls the lowering and hoisting of the transducer. The unit also controls the gate valve. The gate valve must open before the transducer is lowered, and close after the transducer has been hoisted.

The Hull Unit Controller is an optional part of the CS90 system. When supplied, it replaces the Motor Control Unit normally mounted on the hull unit gantry.

Hull Unit Controller ¹	Part number ²	Serial number
Hull Unit Controller		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.		
² This is the part number on the unit label.		

Hull Unit

The hull unit provided with the CS90 delivery must be uniquely identified. If possible, type, part number and serial number must be registered. Several different hull units are available for the CS90, each with different characteristics. Only one hull unit is supplied with the delivery.

The CS90 system can be provided with one of the following hull units:

Hull Unit	Part number	Lowering depth	Transducer cables	Maximum speed
CS90	439051	1.0 m	4.6 m	20 knots
	439054		10 m	
CS94	439057	2.1 m	4.6 m	19 knots
	439047		7 m	
The same transducer is used on all hull unit types.				
If a Hull Unit Controller is supplied with the system, the Motor Control Unit cabinet is used as a junction box.				

Hull Unit (Type)	Part number	Serial number
The unit contains neither circuit boards nor modules that need to be identified separately.		

Transducer

The transducer provided with the CS90 delivery must be uniquely identified.

Note

The transducer is not accessible during the Harbour Acceptance Test. The hardware registration is then omitted.

Transducer¹	Part number²	Serial number	Revision
Transducer	407951		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Test procedures

Topics

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[Testing the operating functionality of the CS90 system, page 29](#)

[Testing the interfaces with peripheral devices, page 41](#)

[Verifying the installation parameters, page 50](#)

Inspecting the installation of the CS90 system

Topics

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[Making sure that all CS90 system cables are properly connected, page 27](#)

Visual inspection of the display

A visual inspection of the display is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*. The CS90 system is turned off. You need the following equipment:

- Multimeter

Context

This test procedure is only applicable when the display is provided by Kongsberg Maritime as a part of the CS90 delivery.

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the physical installation of the unit has been completed.
 - a Make sure that the structure to which the display is fastened is substantial enough to hold the unit securely under all operating conditions.
 - b If applicable, make sure that the display (or the display mounting bracket) is bolted or welded securely to the deck and/or bulkhead.
 - c If applicable: Make sure that ample ventilation is provided to avoid overheating.

- d Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - e Make sure that the bolts, screws or studs that have been used are all of the correct size.
 - f Make sure that the correct flat and shake-proof washers have been used.
 - g Make sure that all the nuts have been tightened properly.
 - h Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 3 Make sure that the display is installed in the correct location, and that it is suitably orientated with respect to ambient light conditions and reflections.
 - 4 Make sure that the unit is not physically damaged, and that the surfaces and paint-work are clean without dents or scratches.

The physical handling during the installation may have caused some minor scratches to the surfaces or paint-work. This can be accepted. However, if rough handling has caused serious damage, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a The unit must be connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The display is correctly installed with easy access for maintenance and replacement of parts.	
The display is free from scratches, dents or other physical damage.	
Free access to all the connectors on the display is provided. All cables are properly mounted with enough slack.	
The display is properly grounded.	
Date and signature:	

Visual inspection of the Processor Unit

A visual inspection of the Processor Unit is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*. The CS90 system is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the computer is installed in the correct location, and that it is suitably oriented for replacement and cabling.
- 3 Make sure that the physical installation of the unit has been completed.
 - a Make sure that you have free access to rear and front side connectors on the computer for maintenance purposes.
 - b Make sure that ample space is provided to open/close DVD and/or CD lids (if relevant), and to insert and remove USB flash drives.
 - c If applicable: Make sure that ample ventilation is provided to avoid overheating.
 - d Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - e Make sure that the bolts, screws or studs that have been used are all of the correct size.
 - f Make sure that the correct flat and shake-proof washers have been used.
 - g Make sure that all the nuts have been tightened properly.
 - h If applicable: Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 4 Make sure that the unit is not physically damaged, and that the surfaces and paint-work are clean without dents or scratches.

The physical handling during the installation may have caused some minor scratches to the surfaces or paint-work. This can be accepted. However, if rough handling has caused serious damage, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.

- b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Processor Unit is correctly installed with easy access for maintenance and replacement of parts.	
The Processor Unit is new, clean and free from scratches, dents or other physical damage.	
Free access to all the connectors on the Processor Unit is provided. All cables are properly mounted with enough slack.	
The Processor Unit can be fully opened for access to the internal parts.	
The Processor Unit is properly connected to vessel ground.	
Date and signature:	

Visual inspection of the Operating Panel

A visual inspection of the Operating Panel is required to verify that the unit has not been physically damaged during the installation..

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*. The CS90 system is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the physical installation of the unit has been completed.
 - a Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - b Make sure that the bolts, screws or studs that have been used are all of the correct size.

- c Make sure that the correct flat and shake-proof washers have been used.
 - d Make sure that all the nuts have been tightened properly.
- 3 Make sure that the Operating Panel is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
 - 4 Make sure that the unit is not physically damaged, and that the surfaces and paint-work are clean without dents or scratches.

The physical handling during the installation may have caused some minor scratches to the surfaces or paint-work. This can be accepted. However, if rough handling has caused serious damage, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Operating Panel is correctly installed with easy access for maintenance and replacement of parts.	
The Operating Panel is free from scratches, dents or other physical damage.	
Free access to all the connectors on the Operating Panel are provided.	
All cables are properly mounted with enough slack.	
Date and signature:	

Visual inspection of the Transceiver Unit

A visual inspection of the Transceiver Unit is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*. The CS90 system is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the Transceiver Unit is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
- 3 Make sure that the Transceiver Unit is fully populated with all the circuit boards and modules mounted.
- 4 Make sure that the physical installation of the unit has been completed.
 - a Make sure that the cabinet door can be fully opened for unrestricted access.
 - b Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - c Make sure that the bolts, screws or studs that have been used are all of the correct size.
 - d Make sure that the correct flat and shake-proof washers have been used.
 - e Make sure that all the nuts have been tightened properly.
 - f Make sure that the welds and support brackets to which the unit is fastened are substantial enough to hold the it securely under all operating conditions.
 - g Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 5 Make sure that the unit is not physically damaged, and that the surfaces and paint-work are clean without dents or scratches.

The physical handling during the installation may have caused some minor scratches to the surfaces or paint-work. This can be accepted. However, if rough handling has caused serious damage, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 6 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .

- 7 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 8 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The transceiver is correctly installed with easy access for maintenance and replacement of parts.	
The transceiver is free from scratches, dents or other physical damage.	
Free access to all the connectors on the transceiver are provided. All cables connected to the transceiver are properly mounted with enough slack.	
The transceiver can be fully opened, and you have full access to the circuit boards and modules inside the unit.	
The welds and brackets that support the transceiver are strong enough to hold the unit securely in place under all operating conditions. The welds and brackets have been painted with the correct preservation medium to prevent corrosion.	
The transceiver is properly grounded.	
Date and signature:	

Visual inspection of the Hull Unit Controller

A visual inspection of the Hull Unit Controller is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*. The CS90 system is turned off. You need the following equipment:

- Multimeter

Context

The Hull Unit Controller is an optional part of the CS90 system. The Hull Unit Controller provides power and direction to the hoisting motor, and thus controls the lowering and hoisting of the transducer. The unit also controls the gate valve. When supplied, it replaces the Motor Control Unit normally mounted on the hull unit gantry. The Motor Control Unit cabinet is used as a junction box.

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the Hull Unit Controller is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
- 3 Make sure that the physical installation of the unit has been completed.
 - a Make sure that the cabinet door can be fully opened for unrestricted access.
 - b Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - c Make sure that the bolts, screws or studs that have been used are all of the correct size.
 - d Make sure that the correct flat and shake-proof washers have been used.
 - e Make sure that all the nuts have been tightened properly.
 - f Make sure that the welds and support brackets to which the unit is fastened are substantial enough to hold it securely under all operating conditions.
 - g Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 4 Make sure that the unit is not physically damaged, and that the surfaces and paint-work are clean without dents or scratches.

The physical handling during the installation may have caused some minor scratches to the surfaces or paint-work. This can be accepted. However, if rough handling has caused serious damage, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.
- 5 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Hull Unit Controller is correctly installed with easy access for maintenance and replacement of parts.	
The Hull Unit Controller is free from scratches, dents or other physical damage.	
Free access to all the connectors on the Hull Unit Controller are provided. All cables connected to the Hull Unit Controller are properly mounted with enough slack.	
The Hull Unit Controller can be fully opened, and you have full access to the circuit boards and modules inside the unit.	
The welds and brackets that support the Hull Unit Controller are strong enough to hold the unit securely in place under all operating conditions.	
The Hull Unit Controller is properly grounded.	
Date and signature:	

Checking the environmental conditions in the sonar room

It is important that the sonar room is kept dry. The CS90 units must not be exposed to excessive temperatures, moisture or humidity. Such conditions can cause corrosive attacks and subsequent failures to the electronic circuitry.

Prerequisites

Neither tools nor instruments are required.

Procedure

- 1 Make sure that the compartment ("sonar room") is clean and dry.
- 2 Make sure that the room is provided with ample ventilation to prevent system units from overheating.
- 3 Write down the type of ventilation system that is installed.
- 4 Make sure that the ambient temperature of the room is monitored.
- 5 Make sure that neither the room itself nor any of the system units have been subjected to corrosive attacks.

Result

Requirements	Results
The sonar room is clean and dry.	
A ventilation system is installed.	

Requirements	Results
Write down the type of ventilation system that is installed.	
There are no corrosive attacks.	
Date and signature:	

Making sure that all CS90 system cables are properly connected

The CS90 system relies on communication between each unit, and between the CS90 system and external devices. It is very important that all cables are correctly installed, that the proper cable types have been used, and that all cables are connected correctly.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*.

- The CS90 system is turned off.
- All system cables are installed.
- All cable connections are made.

Neither tools nor instruments are required.

Context

All cabling is described in the *Cable layout and interconnections* chapter in the *CS90 Installation Manual*. Refer to the cable plan, the cable list and the basic cable requirements.

Procedure

- 1 For each cable in use on the CS90 system:
 - a Make sure that the cable is installed as specified in the *Installation Manual*.

Note _____

Pay special attention to signal cables. These must not be installed too close to power cables.

- b Make sure that each Ethernet cable meets the relevant quality requirements.
 - c Make sure that the terminations at each end of the cable are correct.
 - d Make sure that the cable is properly identified.
- 2 Make sure that the transducer cables can move freely when the transducer is lowered and hoisted.

Result

Requirements	Results
Each cable is installed correctly.	
All cable connections are made.	
Each cable is properly identified.	
Each Ethernet cable in use meets quality requirement CAT5E STP (Shielded Twisted Pair) or better.	
The transducer cables can move freely when the transducer is lowered and hoisted.	
Date and signature:	

Testing the operating functionality of the CS90 system

Topics

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[Testing the user interface to verify basic functionality, page 35](#)

[Verifying system operation by means of the Element BITE functionality, page 36](#)

Checking the hull unit lowering and hoisting functionality

The hull unit is used to lower the transducer down below the ship's hull when the CS90 system shall be used. This is a key functionality of the CS90 system. It is very important that the hoist/lower function is tested before the CS90 system is put to operational use.

To test the lower and hoist functionality two tasks must be done at the same time.

Two persons are needed.

- One person must stay on the bridge in order to operate the CS90 system.
- One person must stay in the sonar room to make sure that the CS90 system starts, and that the hull unit works properly.

Proper oral communication must exist between the bridge and the sonar room.

Note

This test can only be done if the water depth allows the transducer to be lowered completely. If this is not the case, the vessel must be moved to another location, or the test must be cancelled. Kongsberg Maritime cannot take responsibility for tests that are cancelled for this reason.

Certain steps in the procedures are location specific. The steps marked [*Sonar room*] are done in the sonar room. The steps marked [*Bridge*] are done on the bridge.

The Hull Unit Controller is an optional part of the CS90 system. The Hull Unit Controller provides power and direction to the hoisting motor, and thus controls the lowering and hoisting of the transducer. The unit also controls the gate valve. The gate valve must open before the transducer is lowered, and close after the transducer has been hoisted. When supplied, it replaces the Motor Control Unit normally mounted on the hull unit gantry. The Motor Control Unit cabinet is used as a junction box.

Note

In the event of problems or malfunctions:

1 *On the Motor Control Unit:*

- *Locate the **Motor Protecting Switch** (S301).*
- *Set the switch to position **OFF**.*

2 *On the Hull Unit Controller: Set the mode switch to position **OFF**.*

WARNING

The transducer may be damaged if it transmits in open air.

Topics

[Bridge steps, page 31](#)

[Sonar room steps, page 33](#)

Bridge steps

These tasks are done on the bridge.

Prerequisites

The CS90 system is turned on and operates normally. Neither tools nor instruments are required.

Context

Certain steps in the procedures are location specific. The steps marked [*Sonar room*] are done in the sonar room.

Procedure

- 1 Make sure that you have sufficient water depth below the keel before you lower the transducer.
- 2 [*Sonar room*]:
 - a Use a spanner to open the door on the Motor Control Unit.
 - b Locate the **Motor Protecting Switch** (S301). Set the switch to position *ON*.
 - c Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.
 - d Close the door on the Motor Control Unit.

or:

 - a On the Hull Unit Controller: Set the mode switch to position *REMOTE*.
- 3 Lower the transducer to its middle position.
 - a On the Operating Panel, press **Middle**.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.
 - b [*Sonar room*]: When the transducer shaft stops, make sure this happens at the correct middle position.
- 4 Lower the transducer to its bottom position.
 - a On the Operating Panel, press **Down**.



While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.



- b [Sonar room]: When the transducer shaft stops, verify that the correct bottom position has been reached.
- 5 Hoist the transducer to its middle position.
- a On the Operating Panel, press **Middle**.
 - b [Sonar room]: When the transducer shaft stops, make sure this happens at the correct middle position.
- 6 Hoist the transducer to its upper position.
- a On the Operating Panel, press **Up**.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.



- b [Sonar room]: When the transducer shaft stops, verify that the correct upper position has been reached.
- 7 Lower the transducer to its bottom position.
- a On the Operating Panel, press **Down**.
 - b [Sonar room]: When the transducer shaft stops, verify that the correct bottom position has been reached.
- 8 Hoist the transducer to its upper position.
- a On the Operating Panel, press **Up**.
 - b [Sonar room]: When the transducer shaft stops, verify that the correct upper position has been reached.
- 9 Repeat the test using the **Hull Unit Control** dialog box on the top bar.
- 10 Notify the sonar room that the test is finished.

Result

Requirements	Results
The lowering and hoisting function - as seen from the bridge - is operational.	
Date and signature:	

Related topics

[Testing the operating functionality of the CS90 system, page 29](#)

[Checking the hull unit lowering and hoisting functionality, page 30](#)

Sonar room steps

These tasks are done in the sonar room.

Prerequisites

The CS90 system is turned on and operates normally. Neither tools nor instruments are required.

Context

Certain steps in this procedure are location specific. The steps marked [*Bridge*] are done on the bridge.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury.

The Hull Unit Controller is an optional part of the CS90 system. The Hull Unit Controller provides power and direction to the hoisting motor, and thus controls the lowering and hoisting of the transducer. The unit also controls the gate valve. The gate valve must open before the transducer is lowered, and close after the transducer has been hoisted. When supplied, it replaces the Motor Control Unit normally mounted on the hull unit gantry. The Motor Control Unit cabinet is used as a junction box.

In the event of problems or malfunctions:

- 1 On the Motor Control Unit:
 - Locate the **Motor Protecting Switch** (S301).
 - Set the switch to position *OFF*.
- 2 On the Hull Unit Controller: Set the mode switch to position *OFF*.

Procedure

- 1 [*Bridge*]: Make sure that you have sufficient water depth below the keel before you lower the transducer.
- 2 Do the following preparations.
 - a Use a spanner to open the door on the Motor Control Unit.
 - b Locate the **Motor Protecting Switch** (S301). Set the switch to position *ON*.
 - c Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.
 - d Close the door on the Motor Control Unit.or:
 - a On the Hull Unit Controller: Set the mode switch to position *REMOTE*.
- 3 [*Bridge*]: Lower the transducer to its middle position.

- a Make sure that the gate valve opens before the transducer is lowered.
 - b Make sure that the transducer can be lowered without complications or obstacles.
 - c When the transducer shaft stops, make sure this happens at the correct middle position.
- 4 [Bridge]: Lower the transducer to its bottom position.
- a Make sure that the transducer can be lowered without complications or obstacles.
 - b When the transducer shaft stops, verify that the correct bottom position has been reached.
- 5 [Bridge]: Hoist the transducer to its middle position.
- a Make sure that the transducer can be hoisted without complications or obstacles.
 - b When the transducer shaft stops, make sure this happens at the correct middle position.
- 6 [Bridge]: Hoist the transducer to its upper position.
- a Make sure that the transducer can be hoisted without complications or obstacles.
 - b When the transducer shaft stops, verify that the correct upper position has been reached.
 - c Make sure that the gate valve closes when the transducer is hoisted to its upper position.
- 7 [Bridge]: Lower the transducer to its bottom position.
- a Make sure that the gate valve opens before the transducer is lowered.
 - b Make sure that the transducer can be lowered without complications or obstacles.
 - c When the transducer shaft stops, verify that the correct bottom position has been reached.
- 8 [Bridge]: Hoist the transducer to its upper position.
- a Make sure that the transducer can be hoisted without complications or obstacles.
 - b When the transducer shaft stops, verify that the correct upper position has been reached.
 - c Make sure that the gate valve closes when the transducer is hoisted to its upper position.
- 9 [Bridge]: Repeat the test using the **Hull Unit Control** dialog box on the top bar.
- 10 [Bridge]: Notify the sonar room that the test is finished.
- 11 Close the door on the Motor Control Unit. Use a spanner to secure it.

Result

Requirements	Results
The lowering and hoisting function - as seen from the sonar room - is operational.	
The transducer is lowered and hoisted without complications or obstacles.	
Date and signature:	

Related topics

[Testing the operating functionality of the CS90 system, page 29](#)

[Checking the hull unit lowering and hoisting functionality, page 30](#)

Testing the user interface to verify basic functionality

A functional test is done with the CS90 system assembled as a complete product.

Prerequisites

The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- The vessel is berthed.

Caution

You must never set the CS90 system to "ping" unless the transducer is submerged in water. The transducer may be damaged if it transmits in open air.

Neither tools nor instruments are required.

Procedure

- 1 Make sure that the CS90 user interface is fully operational.
 - a Make sure that the CS90 visual presentation is shown with adequate quality.
If necessary, adjust the display and/or the relevant properties in the Processor Unit operating system.
 - b Make sure that the Operating Panel is functional.
Press and/or turn each button, and make sure that the corresponding function is activated in the user interface.

- c Make sure that the menu system offered by the CS90 is operational.
Make random selections, and make sure that the relevant sub-menus, functions or dialog boxes are activated.
 - d Make sure that the relevant views are operational.
Move the cursor to the views in the main part of display presentation. Click inside one of the views. Make sure that the view is activated, and that relevant changes are made in any dynamic menus.
 - e If relevant, connect a computer mouse to the Processor Unit.
Make sure that the computer mouse works in the CS90 user interface. Make random selections, and make sure that the relevant sub-menus, functions or dialog boxes are activated.
 - f If relevant, connect a keyboard to the Processor Unit.
Make sure that the keyboard works in the CS90 user interface. Open relevant functions or dialog boxes, and make sure that you can type in them.
- 2 Select the icon on the top bar to open the **Messages** dialog box.
- a Verify that no error messages are presented during normal operation.
 - b Close the dialog box by selecting **Close** or **[X]** in its top right corner.



Result

Requirements	Results
The basic functionality of the CS90 is present.	
No error messages are presented.	
Date and signature:	

Related topics

[Testing the operating functionality of the CS90 system, page 29](#)

Verifying system operation by means of the Element BITE functionality

The purpose of the **Element BITE** (Element Built-In Test Equipment) dialog box is to allow on-line test and verification of the individual elements in the transducer. It allows you to see if the transducer elements are operational during transmission and reception. The **B-Scan** page allows you to monitor the data received from each of the elements in the transducer. The start sample and the number of samples to be displayed are selectable.

Prerequisites

The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- The vessel is berthed.

Caution

You must never set the CS90 system to "ping" unless the transducer is submerged in water. The transducer may be damaged if it transmits in open air.

Neither tools nor instruments are required.

Context

By means of the **Element BITE** (Element Built-In Test Equipment) functionality, you can easily determine if the CS90 hardware is operational. The following pages are provided:

Matrix

The **Matrix** page allows you to monitor the average signal values or signal phases from each of the channels and transducer elements in the CS90 system. The presentation is provided on a matrix corresponding to the element locations in the transducer.

B-Scan

The **B-Scan** page allows you to monitor the data received from each of the elements in the transducer. The start sample and the number of samples to be displayed are selectable.

In the B-Scan presentation, each element in the transducer is shown as a long coloured vertical rectangle. If you place the cursor on top of one of these rectangles, a small yellow tool-tip will identify key information about the channel.

- The identification of the transducer element
- The identification of the transceiver board
- The current sample you are looking at
- The measured echo value (in dB)

Note

This test can only be done if the water depth allows the transducer to be lowered completely. If this is not the case, the vessel must be moved to another location, or the test must be cancelled. Kongsberg Maritime cannot take responsibility for tests that are cancelled for this reason.

If you are unable to do this test during the Harbour Acceptance Test, it must be repeated during the Sea Acceptance Test.

Procedure

- 1 Make sure that you have sufficient water depth below the keel before you lower the transducer.
- 2 Lower the transducer to its bottom position.
- 3 Select the default settings.
 - a On the **Main** menu, select **User Settings**.
 - b Observe the **Factory Settings** list.
 - c Select the setting you want to use.
 - d Select **Activate Selected Setting**.
 - e Select **OK** to apply your changes and close the **User Settings** dialog box.
- 4 Make the following preparations.
 - a On the **Main** menu: Set **Range** to *1500 m*.
 - b On the **Operation** menu: Set **Tx Power** to *Off*.
 - c On the **Active** menu:
 - 1 Set **Pulse Type** to *CW Medium*.
 - 2 Set **Frequency** to the start frequency: *70 kHz*
 - 3 Set **Vertical TX Sector** to *Narrow*.
 - 4 Set **Noise Filter** to *Off*.
 - 5 Set the **Bottom Filter Threshold** to *Off*.
 - d On the **Setup** menu: Select **Diagnostics** to open the dialog box.
- 5 Select **Processor** to open the page.
- 6 Open the **Element BITE** (Element Built-In Test Equipment) dialog box.
 - a Select **Element BITE** to open the dialog box.
 - b Select the **B-Scan** tab to open the page.
 - c Select **Element amplitude**.
- 7 Test the receiver performance.
 - a Set **Start sample** to *5000*.
 - b Set **Sample range** to *10000*.
 - c Check if you have any black lines in the sample range.

To detect unserviceable transducer elements and/or transceiver boards, you must compare the rectangles. When operating the CS90 system in port, the colours will be less homogeneous due to the environmental noise and the shallow depth.

- If a single element is "dead" (no transmit, no receive), the rectangle is easily spotted because its colour is black.

- If a single element is receiving, but not transmitting, the rectangle is normally presented in lighter shades of blue.
 - If a transceiver board is "dead" (no transmit, no receive), all the transducer elements connected to the board are easily spotted because they are all black.
- 8 Test the transmitter performance.
 - a Set **Tx Power** to *Maximum*.
 - b Set **Start sample** to *50*
 - c Set **Sample range** to *2000*
 - d Check if you have any black lines in the sample range.
 - 9 Make sure that the maximum number of unserviceable ("dead") elements does not exceed 5.

A small number of unserviceable transducer elements are accepted, even for operational use. This is regarded as "graceful degradation".

The CS90 system offers a large number of transceiver channels. 16 identical transceiver boards are used. If a single channel fails during normal operation, you are not likely to detect it. Even if several channels fail, you may not see it.

The detection of a faulty channel depends on the physical location of the relevant transducer element. If faulty channels are grouped together on the transducer face, this may cause a visible defect in the display presentation. If they are scattered, the visible defect may be a lot harder to see. In all cases, the echoes from the neighbouring channels cause an interpolation that will restore a lot of the degraded presentation.

- 10 If any weak elements are detected, record these in the result table.
- 11 If any unserviceable transducer element (black lines) are detected, record these in the result table.
- 12 Make a screen capture of the **B-Scan** page.

Save the screen capture using a unique file name that identifies context, date, time and vessel. Attach the image file to the electronic copy of the test report. Print the image in colour if the report is submitted on paper.

- 13 Finish the test.
 - a Close the **Element BITE** (Element Built-In Test Equipment) dialog box.
 - b Close the **Diagnostics** dialog box.
 - c Set **Tx Power** to *Off*.
 - d Set **Operation** to *Inactive*.
 - e Hoist the transducer back up to its upper position.

Result

Requirements	Results
The information presented by the B-Scan page verifies that the CS90 system is fully operational.	
All elements are operational in both transmit and receive. The maximum number of bad elements is: 5	
Weak elements:	
Unserviceable elements (black lines):	
A screen capture of the B-Scan page is archived.	
Date and signature:	

Related topics

[Testing the operating functionality of the CS90 system, page 29](#)

Testing the interfaces with peripheral devices

Topics

[Verifying the communication with a navigation system \(GPS\), page 41](#)

[Verifying the communication with speed log, page 43](#)

[Verifying the communication with the course gyro, page 45](#)

[Verifying the communication with the motion reference unit \(MRU\), page 47](#)

Verifying the communication with a navigation system (GPS)

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. The communication with the sensor is tested.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*.

- The sensor is connected to a communication port on the CS90 system. The sensor is turned on and in normal operation.
- The interface port is set up with the correct communication parameters.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The CS90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Most global positioning system (GPS) receivers provide NMEA 0183 datagrams containing geographical latitude and longitude information, as well as current speed and sailed distance. Some GPS systems will also provide the current heading, but this information is normally taken from the gyro.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. To make sure that the information from the "most

reliable" sensors are used by the CS90 system, use the **Sensor Configuration** page to define a datagram priorities.

The communication parameters defined for NMEA 0183 are:

- **Baud rate:** 4800 bit/s
- **Data bits:** 8
- **Parity:** Even
- **Stop bits:** 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select **Sensor Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.
- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.

If necessary, enable the read-out in the **Display Options** dialog box.
- 8 If possible, use another instrument to verify that the information provided by the CS90 is correct.
- 9 Fill in the result tables.

Result

Sensor	Source sensor	Datagram	Port	Baud rate
Position				
Speed				
Distance				
Heading				

X Offset	Y Offset	Z Offset

Requirements	Results
Position data is provided.	
Speed data is provided.	
Distance data is provided.	
Heading data is provided.	
The relevant communication parameters are recorded.	
Date and signature:	

Related topics

[Testing the interfaces with peripheral devices, page 41](#)

Verifying the communication with speed log

In order to operate correctly, the CS90 system requires input from a speed log. The vessel speed is shown on the top bar if you have enabled this in the **Display Options** dialog box. The communication with the sensor is tested.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*.

- The sensor is connected to a communication port on the CS90 system. The sensor is turned on and in normal operation.
- The interface port is set up with the correct communication parameters.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The CS90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Note

The speed input is essential for CS90 operation. Without speed information, the CS90 system will neither be able to present correct navigational information, nor compensate for vessel movements. This lack of compensation will prevent the system from providing correct echo information. If you do not use a dedicated speed log, but rather a GPS system, you can skip this test.

In most cases a suitable sensor is already installed on the vessel. A global positioning system (GPS) with a compatible output format can also be used.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. To make sure that the information from the "most reliable" sensors are used by the CS90 system, use the **Sensor Configuration** page to define a datagram priorities.

The communication parameters defined for NMEA 0183 are:

- **Baud rate:** 4800 bit/s
- **Data bits:** 8
- **Parity:** Even
- **Stop bits:** 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select **Sensor Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.
- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.

- 7 Make sure that the information from the sensor is displayed.
If necessary, enable the read-out in the **Display Options** dialog box.
- 8 If possible, use another instrument to verify that the information provided by the CS90 is correct.
- 9 Fill in the result tables.

Result

Datagram	Port	Baud rate	Talker ID

Requirements	Results
Speed data is provided and displayed.	
The relevant communication parameters are recorded.	
Date and signature:	

Related topics

[Testing the interfaces with peripheral devices, page 41](#)

Verifying the communication with the course gyro

In order to operate correctly, the CS90 system requires input from a course gyro. The current heading is shown on the top bar if you have enabled this in the **Display Options** dialog box. The communication with the sensor is tested.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*.

- The sensor is connected to a communication port on the CS90 system. The sensor is turned on and in normal operation.
- The interface port is set up with the correct communication parameters.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The CS90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Note

The input from a course gyro is essential for operation. Without the input from a course gyro, the CS90 system will not be able to present correct navigational information. This lack of compensation will prevent the system from providing correct echo information.

In most cases a suitable course gyro is already installed on the vessel. A global positioning system (GPS) with a compatible output format can also be used.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. To make sure that the information from the "most reliable" sensors are used by the CS90 system, use the **Sensor Configuration** page to define a datagram priorities.

The communication parameters defined for NMEA 0183 are:

- **Baud rate:** 4800 bit/s
- **Data bits:** 8
- **Parity:** Even
- **Stop bits:** 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select **Sensor Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.
- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.

If necessary, enable the read-out in the **Display Options** dialog box.

- 8 If possible, use another instrument to verify that the information provided by the CS90 is correct.
- 9 Fill in the result tables.

Result

Datagram	Port	Baud rate	Talker ID

X Offset	Y Offset	Z Offset

Requirements	Results
Heading data is provided and displayed.	
The relevant communication parameters are recorded.	
Date and signature:	

Related topics

[Testing the interfaces with peripheral devices, page 41](#)

Verifying the communication with the motion reference unit (MRU)

The information from a motion reference unit (MRU) (normally heave, roll and pitch information) is imported into the CS90 system to increase the accuracy of the echo data. The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) can be used. This task is only applicable if you are using an external motion reference unit on your CS90 system.

Prerequisites

The CS90 system is installed as specified in the *Installation Manual*.

- The sensor is connected to a communication port on the CS90 system. The sensor is turned on and in normal operation.
- The interface port is set up with the correct communication parameters.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.

- All relevant vessel drawings, installation reports and/or measurement results are available.
- The CS90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

The motion reference unit (MRU) measures the roll and pitch movements of the vessel. The information provided by the motion sensor is used by the CS90 system to stabilize the beams.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



- Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.
- 3 On the left side of the **Installation** dialog box, select **Motion Reference Unit**.
 - a If you use the motion sensor in the Motor Control Unit on the hull unit, make sure that **LAN** is selected.

The sensor uses a local area network (LAN) port on your computer. A message on the page verifies that it is connected to the CS90 system's beamformer application.
 - b If you use an external motion reference unit (MRU), make sure that a **COM** port is selected, and that the correct parameters are provided.
 - 4 On the left side of the **Installation** dialog box, select **Installation Parameters** to open the page.
 - a Open the **MRU** (Motion Reference Unit) page.
 - b Make sure that the installation parameters for the motion sensor (offset and rotation) are correct.

The physical location of the sensor (X, Y and Z offsets) must be extracted from the detailed vessel drawings, or from the reports provided by the personnel that did the actual installation. The information about the installation angles must be extracted from the reports provided by the personnel that did or measured up the actual installation.
 - 5 Close the **Installation** dialog box without making any changes.
 - 6 Observe the top bar.
 - 7 Make sure that the information from the sensor is displayed.

If necessary, enable the read-out in the **Display Options** dialog box.

Note

In order to read the motion compensation values, the CS90 must be "pinging". As long as the vessel is in port, you can not expect major changes in the values.

- 8 If possible, use another instrument to verify that the information provided by the CS90 is correct.
- 9 Fill in the result tables.

Result

Sensor	Source system	Baud rate	Port	Protocol
Motion Reference Unit				

X Offset	Y Offset	Z Offset
Rotation Around X	Rotation Around Y	Rotation Around Z

Requirements	Results
Motion compensation is operational.	
The compensated values are shown.	
Date and signature:	

Related topics

[Testing the interfaces with peripheral devices, page 41](#)

Verifying the installation parameters

Topics

[Verifying vessel origin and ship dimensions, page 50](#)

[Verifying the installation parameters for the transducer, page 52](#)

[Verifying the installation parameters for the global positioning system \(GPS\) antenna, page 54](#)

[Verifying the installation parameters for the motion reference unit \(MRU\), page 55](#)

Verifying vessel origin and ship dimensions

The physical length and width of the ship are important parameters that need to be recorded in the CS90 software.

Prerequisites

For accurate location of the ship dimensions, you need the detailed vessel drawings. Neither tools nor instruments are required. The CS90 system is turned on and operates normally.

Context

It is common practice to place the *Ship Origin* at the same position as the motion reference unit (MRU). This will minimize the vectors when your vessel is moving. Use the vessel drawings to establish the offset values between the basic position of the *Ship Origin* and the MRU location.

If you do not have a motion sensor you can place the *Ship Origin* at any location on the vessel. We suggest that you place the origin under the captain's seat on the bridge. All sensors will then be referenced to this position. Whenever a sonar is used with short ranges, this will provide a more precise presentation.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.
Observe that a menu opens with access to all the individual pages.
- 4 Open the **Ship** page.
- 5 For each parameter, makes sure that the current setting is correct.
- 6 Record the information in the result table.
- 7 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Result

Ship Dimensions	
Length	
Width	

Vessel origin		
X Offset	Y Offset	Z Offset

Requirements	Results
The ship dimensions are entered in the CS90.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Related topics

[Verifying the installation parameters, page 50](#)

Verifying the installation parameters for the transducer

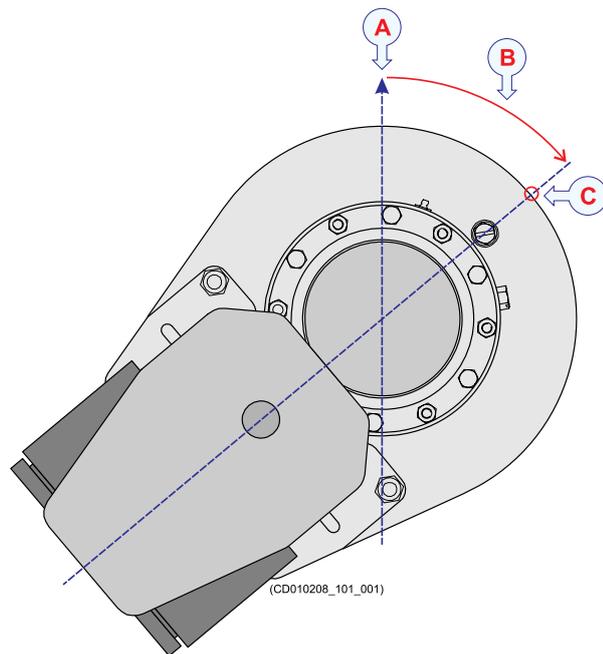
When the installation trunk is mounted, it may not be positioned with the mounting holes perfectly aligned to the centre line of the vessel. When the hull unit is placed on the trunk, the "forward" mark on the transducer shaft sleeve - and thus also "forward" on the transducer - may not point forward at all, but several degrees off the centre line. To obtain accurate echo presentations, this misalignment must be adjusted by changing the installation parameters.

Prerequisites

Illustration CS90:

- A** Bow
- B** This is the alignment angle ($\pm 180^\circ$)
- C** 0° transducer mark

For accurate location of the transducer, you need the detailed vessel drawings. Neither tools nor instruments are required. The CS90 system is turned on and operates normally.



Context

Independent of the hull unit orientation, the alignment is always defined as:

The angle measured from the bow to the 0° transducer mark.

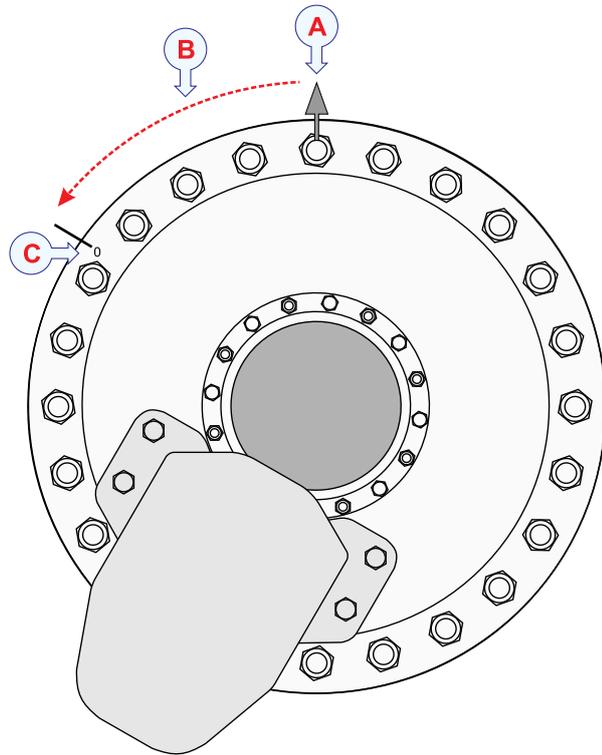
The 0° transducer mark is located outermost on the mounting flange, and it is marked as a red "0". Depending on the transducer mounting, it can be located at any angle on the mounting flange, not necessarily as shown in the illustration.

On the **Transducer** page, define this angle as rotation around **Z**.

- If the 0° transducer mark points to the starboard (right) side of the vessel's centre line, insert the alignment as a number between 0 and +180 degrees.
- If the 0° transducer mark points to the port (left) side of the vessel's centre line (as shown in the illustration), insert the alignment as a number between 0 and -180 degrees.

Illustrations CS94:

- A** Bow
- B** This is the alignment angle ($\pm 180^\circ$)
- C** 0° transducer mark



Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

- 4 Select **Transducer** to open the page.
 - a Obtain the offset and rotation (angle) information from the personnel that installed the transducer.
 - b Make sure that the correct offset values have been inserted.
 - c Make sure that the correct installation angles have been inserted.
 - d Record the information in the result table.
- 5 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Result

Transducer offsets		
X Offset	Y Offset	Z Offset
Installation angle X	Installation angle Y	Installation angle Z

Requirements	Results
All offset values and rotation angles are entered in the CS90 system.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Related topics

[Verifying the installation parameters, page 50](#)

Verifying the installation parameters for the global positioning system (GPS) antenna

Information from a few key sensors are vital for the CS90 accuracy. In order to achieve maximum accuracy, the physical locations of these sensors - normally referred to the *Ship Origin* - must be recorded in the CS90 setup. For future reference, the offset values for each sensor is recorded.

Prerequisites

For accurate location of the global positioning system (GPS) antenna, you need the detailed vessel drawings. Neither tools nor instruments are required. The CS90 system is turned on and operates normally.

Context

The physical location of the global positioning system (GPS) antenna relative to the transducer is required to allow the CS90 to show the correct navigational information in the CS90 presentation. The locations of the transducer and the Global Positioning System (GPS) antenna must be referenced to a common *Ship Origin*.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



- Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.
- 3 On the left side of the **Installation** dialog box, select **Sensor Installation**.
 - 4 Select the relevant sensor in the **Installed Sensors** list.
 - 5 Make sure that the correct offset values have been inserted.
 - 6 Fill in the result table.

Result

Global positioning system (GPS) offsets	
X Offset	
Y Offset	
Z Offset	

Requirements	Results
All offset values are entered in the CS90 system.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Related topics

[Verifying the installation parameters, page 50](#)

Verifying the installation parameters for the motion reference unit (MRU)

The physical location of the motion reference unit (MRU) relative to the transducer is required to allow the CS90 system to adjust for roll and pitch as accurately as possible. This task is only applicable if you are using an external motion reference unit on your CS90 system.

Prerequisites

The relevant offset values can normally be taken from the vessel drawings. The information about the installation angles must be retrieved from the reports provided by the personnel that installed the equipment. Neither tools nor instruments are required. The CS90 system is turned on and operates normally.

Context

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. The motion sensor measures the roll and pitch movements of the vessel.

Note

If you want to use the built-in motion sensor, you do not need to enter any offset values.

*If the hull unit has been installed with the Motor Control Unit pointing straight aft, you do not need to enter any rotation values. If the unit faces in any other direction you must compensate for this by typing the relevant value for **Rotation Around Z**.*

For improved operational accuracy, an external motion reference unit (MRU) can be used.

- **Offsets:** The offset values specify the physical location of the motion reference unit relative to the reference point (origin). The relevant offset values can normally be taken from the vessel drawings.
- **Rotation:** The values for rotation around the X, Y and Z axis are used to compensate for any misalignments made during the physical installation of the motion reference unit. Such misalignments occur if the sensor is not placed in parallel with the vessel's horizontal and/or vertical planes. We strongly recommend that you install your motion reference unit so that all rotation angles can be set to 0 (zero).

The required accuracy of the offset and rotation angles depends on the accuracy requirements for the echo data.

Tip

The motion sensor offset values are not important for sonar operation. Correct values for motion sensor rotation are important for roll and pitch compensation.

Procedure

- 1 Open the **Setup** menu.
- 2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

- 3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

- 4 Select **MRU** to open the page.
 - a From the vessel drawings, extract the relevant offset information, and insert those values.
 - b From the information provided by the personnel installing the motion sensor, obtain the relevant rotation information.
 - c Make sure that the correct offset values have been inserted.
 - d Make sure that the correct installation angles have been inserted.

- e Record the information in the result table.

Note

The Kongsberg Seapath® - and other GPS systems - allow you to define the MRU location in the positioning system. If this is done, the MRU offset values in the CS90 system must be set to 0 (zero) to avoid "dual compensation". The rotation angles are normally not recorded by the positioning system. These can either be inserted into the MRU control application, or into the CS90 system. Make sure that you do not insert them both places.

- 5 Select **Cancel** to close the dialog box without making any changes.

Result

Motion reference unit (MRU) offsets		
X Offset	Y Offset	Z Offset
Rotation Around X	Rotation Around Y	Rotation Around Z

Requirements	Results
All offset values and rotation angles are entered in the CS90 system.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Related topics

[Verifying the installation parameters, page 50](#)

Customer acceptance form

Fill in and sign this form for formal acceptance of the Simrad CS90 system.

The Simrad CS90 system is (<i>tick relevant column</i>):		
Accepted	Accepted with comments	Not accepted
Vessel/Customer		
Place and date		
Comments		
Test done by (name)	Company/Position	Date and signature
Test accepted by (name)	Company/Position	Date and signature
<p>When this test procedure has been completed with all relevant signatures and applicable forms filled in, the document must be sent to the Simrad Support Department at Strandpromenaden 50, P.O.Box 111, 3191 Horten, Norway. Alternatively, scan all the pages to PDF using minimum 200 DPI resolution, and send the file to simrad.support@simrad.com.</p>		

Secondary procedures

The end user and technical documentation for the CS90 contains several procedures that are also applicable for this Harbour Acceptance Test. These procedures are not part of the Harbour Acceptance Test. They are provided for reference purposes only. If you scan a completed Harbour Acceptance Test for archiving or reporting purposes, it is not necessary to include these procedures.

Topics

[Setting up the Operating Panel \(Mk2\), page 59](#)

Setting up the Operating Panel (Mk2)

The Operating Panel offers all necessary control functions for normal operation. Before it can be put to use, the Mk2 Operating Panel must be configured to permit Ethernet communication between the panel and the Processor Unit.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- Computer mouse
- Computer keyboard

Neither tools nor instruments are required.

Context

When supplied, the Operating Panel is set up with the following communication parameters:

- IP Address: 157.237.60.20
- Subnet mask: 255.255.255.0
- Gateway: 157.237.60.1

To set up the Ethernet communication, you must define the IP address for the panel, and identify the Processor Unit in the panel software. These settings allow you to use more than one Operating Panel on the Processor Unit. You can also control more than one Processor Unit from a single Operating Panel.

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. The file contains the product name, IP address and MAC address in the following format (example):

```
CS90
157.237.60.14
AC:1F:6B:1D:42:E6
```

If the text file is missing you must find the information manually. We suggest that you do this, and create the necessary folder and txt file before you start the setup process. See step 1 in the procedure.

Note

If the Operating Panel fails to establish contact with the Processor Unit it will time out and switch itself off after two minutes. When this happens the blue indicator light stops flashing.

Procedure

If required, locate the IP and MAC addresses on the ETH1 Ethernet adapter in the Processor Unit.

1 Obtain the IP address.

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. If the text file is missing you must find the information manually.

- a In the bottom-left corner of your desktop, select the Windows® **Start** button.
- b On the menu, select **Settings**.
- c Observe that the **Windows Settings** dialog box opens.
- d Select **Network & Internet**.
- e Select **Change adapter options**.
- f Select the relevant network adapter, then right-click and select **Properties** on the short-cut menu.
- g On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.
- h Observe the IP address for the Ethernet adapter.
- i Write down the information.
- j Close all the dialog boxes.

Obtain the MAC address.

- a In the bottom left corner of your desktop, select the looking glass to start a search.
- b Type "Command", do the search, and open the **Command Prompt** window.
- c Type **ipconfig /all** and press the **Enter** key.
- d Observe the "Physical Address" (MAC address) for the relevant Ethernet adapter.
- e Write down the information.
- f Close the **Command Prompt** window.

Select the adapter that the Operating Panel is connected to. On the CS90 system, the Ethernet adapter is named Simrad Connect.

Prepare the Operating Panel for use.

- 2 Make the following preparations.
 - a Connect the power cable from the Operating Panel to the power outlet on the uninterruptible power supply (UPS).
 - b Connect the Ethernet cable from the Processor Unit to the Operating Panel.
Make sure that you use the correct Ethernet socket on the rear side of the Processor Unit: ETH1
 - c Connect the keyboard and the mouse to USB sockets on the front panel of the Processor Unit.
 - d On the Processor Unit, close any programs that are running, and return to the desktop.
 - e On the Operating Panel, press **Power**, and keep it depressed for a few seconds.
The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When you start the panel for the first time the interface must be configured to establish this connection. When the connection has been made, the blue indicator light is lit permanently.
 - f On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.
 - g Double-click file `IPandMACaddress.txt` to open it in a text editor.
 - h Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.
 - i Observe that the Operating Panel configuration page opens on page `157.237.60.20:5000`.
- 3 Define the configuration parameters.
 - a Select **SOP Configuration** on the top menu to open the page.
 - b Observe the default values.
If you wish to keep these default values, do nothing. The default values are well suited if you have one single panel communicating with one single Processor Unit. For other configurations, see the relevant procedures.

- 4 Add a single Processor Unit to the Operating Panel configuration.
 - a Select **Sonar PCs Configuration** on the top menu to open the page.
 - b Type or copy the IP address into the relevant box.
 - c Type or copy the MAC address into the relevant box.
 - d Select **ADD Sonar PC**.
 - e Observe that your Processor Unit is added to the list.
 - f Close the web browser.
- 5 Make sure that the Operating Panel is functional.
 - a Make sure that the blue indicator is lit, and check that you can move the cursor on the screen.
 - b On the Processor Unit desktop, double-click the CS90 icon to start the program.
Wait until the CS90 system operates normally.
 - c Press and hold **Power** depressed for a minimum of four seconds to turn off the Operating Panel.
Observe that the **Transceiver On/Off** dialog box opens automatically.
Make sure that the CS90 system is turned off.
 - d Turn on the CS90 system with the **Power** button on the Operating Panel.
 - e Make sure that you can control the cursor, and that you can make selections in the menu system.
 - f Press and/or turn selected buttons, and make sure that the corresponding function is activated in the user interface.

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