YRKESHÖGSKOLAN NOVIA

Revival of an Industrial Module Test Rig

Update of test sequences to handle newer modules

Noel Knipström

Degree Thesis for Bachelor of Engineering

Degree Programme in Electrical Automation Engineering

Vaasa 2025

EXAMENSARBETE

Författare: Noel Knipström
Utbildning och ort: El- och automationsteknik, Vasa
Inriktning: Automationsteknik
Handledare: Tommy Emaus, Roger Mäntylä

Titel: Återupplivning av industriell modultestrigg

Datum: 29 Apr 2025 Sidantal: 21 Bilagor: 3

Abstrakt

Detta examensarbete undersökte återupplivningen av en äldre industriell testrigg inom Wärtsiläs produktutvecklings- och servicemiljö. Testriggen är ursprungligen avsedd för automatiserad testning av COM-10- och CCM-30-moduler tillverkade av Leverantör#1. Denna testrigg anpassades för att stödja nyare revideringar av samma moduler, tillverkade av Leverantör#2, samtidigt som de befintliga kraven för testerna uppfylldes.

Detta åstadkoms genom att analysera befintliga NI TestStand-testsekvenser för att identifiera problem med datamatrix-streckkodstolkning, USB-funktionalitet, igenkänning av PCB-serienummer och RS-485-kommunikation. Därefter uppdaterades testinställningar och parametrar för att hantera nya streckkodsformat, borttagen USB-funktionalitet, nya serienummerformat och ändrade överföringshastigheter. Ett par hårdvaruförbättringar gjordes för att förbättra testriggens användarvänlighet.

Resultatet av examensarbetet är att testriggen nu utför automatiserade tester av både äldre och nyare revideringar av COM-10- och CCM-30-modulerna. Felsökningstiden för modulerna har minskat från flera timmar till fem minuter för en COM-10 och tio minuter för en CCM30. En steg-för-steg-användarmanual har tagits fram. Jämförelser med manuella tester bekräftade testriggens testresultat. Examensarbetet har avsevärt ökat effektiviteten för Wärtsiläs modultestning.

Språk: engelska
Nyckelord: testrigg, automatiserad testning, COM-10, CCM-30, NI TestStand, UNIC

BACHELOR'S THESIS

Author: Noel Knipström

Degree Programme: Electrical Engineering

Specialisation: Automation

Supervisor(s): Tommy Emaus, Roger Mäntylä

Title: Revival of an Industrial Module Test Rig

Date: 29 Apr 2025 Number of pages: 21 Appendices: 3

Abstract

This bachelor's thesis examines the revival of an older industrial test rig within Wärtsilä's product development and service environment. The rig was originally intended for automated testing of COM-10 and CCM-30 modules manufactured by Supplier #1. It was adapted to support newer revisions of these modules, manufactured by Supplier #2, while ensuring compliance with existing testing requirements.

To achieve this, legacy NI TestStand test sequences were analysed to identify issues in data matrix barcode parsing, USB functionality, PCB serial number recognition and RS-485 communication. Subsequently, test settings and parameters were updated to accommodate the new barcode format, disabled USB functionality, updated serial numbering schemes and adjusted baud rates. Minor hardware improvements were implemented to enhance mobility and user accessibility.

As a result, the revived test rig now executes automated tests for both legacy and modern COM-10 and CCM-30 modules. It has reduced module verification time from several hours of manual work to approximately five minutes per COM-10 and ten minutes per CCM-30. A comprehensive step-by-step user manual was developed. Validation against manual testing confirmed full agreement with manual test results. The thesis has significantly boosted efficiency in module diagnostics and quality control processes.

Language: English

Key words: test rig, automated testing, COM-10, CCM-30, NI TestStand, UNIC

Table of Contents

Abbreviations

COM-10 – Communication module

CCM-30 – Cylinder control module

DUT – Device under test

UUT – Unit under test

ECU – Electronic control unit

PCB – Printed circuit board

DO – Digital output

DI – Digital input

ADO – Analog digital output

ADI – Analog digital input

FDO – Fast digital output

FDI – Fast digital input

ETH – Ethernet

CAN – Control area network

RS-485 – Recommended standard

PTCL – Procket tool/test command language

STH – Sustainable technology Hub

UNIC – Wärtsilä Unified Controls

UPS – Uninterrupted power supply

WMAP – Wärtsilä Modular Application Platform

HALT – Highly Accelerated Life Testing

1 Introduction

The objective of this thesis was to bring an older communications module tester, that had fallen out of use due to a change in suppliers, back into use. This thesis work includes software changes made to an existing test rig to be able to test post 2016 COM-10 and CCM-30 modules. The thesis was commissioned by Wärtsilä.

Wärtsilä is a global leader in innovative technologies and lifecycle solutions for the marine and energy markets. They consist of approximately 18,300 professionals in more than 230 locations in 77 countries. [1]

1.1 Background

The test rig, which this thesis is based on, has previously served at Supplier #1, which was contracted by Wärtsilä to produce the COM-10 and CCM-30 modules. At Supplier #1 the test rig was used to test the new modules leaving the factory as well as modules returned for diagnostics. [2]

When Wärtsilä's subcontractor for the modules changed from Supplier #1 to Supplier #2, this test rig was delivered from Supplier #1 to STH. The tester has sat dormant since 2016, apart from when it was used in a Hackathon project in 2019.

Before the thesis began, the test rig was started by Wärtsilä engineers. It was noted that it was mainly functional except for firmware and serial number scanning. It was also unknown whether the test coverage was complete or not. [2]

1.2 Purpose and objectives

Staff handling customer claims are burdened by returned COM-10 and CCM-30 modules, which require testing and diagnosing. This is a time-intensive procedure, especially if the module did not arrive with a clearly documented issue, e.g., AO CH2 faulty.

The main purpose of this thesis is to reduce the workload brought on by reportedly defective modules returning from customer installations as well as those from production and laboratory engines. This is done by reducing several hours of manual testing to about ten minutes of automated testing for each module, freeing up time and resources, and thereby contributing to customer value. A second use case will be testing laboratory modules, making sure they are fit for purpose, before connecting them to other test rigs, used to simulate engine conditions.

1.3 Scope

The scope of this thesis is to make the existing test rig, designed for Supplier #1 made modules, compatible with the newer revision COM-10s and CCM-30s produced by Supplier #2. The test rig should remain compatible with the testing requirements of the modules. Calibration needs are to be studied to confirm proper test values, and a user manual is to be made to increase ease of use. The test rig shall produce automated test reports which will have to be exported to external computers for handling. As an acceptance criterion, a batch of reportedly defective CCM-30s and COM-10s will be run through the test rig.

2 Brief history of Wärtsilä

This chapter presents a brief history of Wärtsilä, the company that commissioned this thesis. Wärtsilä was founded in 1834, when a sawmill was built in Tohmajärvi. The company was then acquired by N. L. Arppe, who expanded the business to include an ironworks facility by 1851. This period marked the beginning of the company's engagement with heavy industrial activities. In 1898, the company was renamed Wärtsilä Ab, which in 1907 changed to Ab Wärtsilä Oy [3]

In 1935, the company's headquarters were relocated to Helsinki. The move to Helsinki made closer integration with Finland's industrial network possible. In 1938, Wärtsilä entered the diesel engine sector through a licence agreement with Friedrich Krupp Germania Werft AG. The production of the first diesel engine in Turku in November 1942 marked the start of the company's involvement in marine and power generation systems. [3]

After World War II, Wärtsilä started the in-house design of diesel engines. In the late 1950s, the first Wärtsilä designed diesel engine, the Wärtsilä Vasa 14 was started for the first time. Around the same time frame, the first engines were ordered. Four Vasa 614 engines were made and delivered for a passenger cruise ship, sailing between Finland and Sweden [4]

The 1980s and 1990s were characterized by international expansion and corporate restructuring. During the early 1980s, Wärtsilä's shares were listed on two international stock exchanges, the Stockholm Stock Exchange and the London Stock Exchange. In response to a downturn in the global marine industry during the mid-1980s, the company restructured by forming Wärtsilä Marine Oy in cooperation with Valmet. In 1997, the acquisition of New Sulzer Diesel (NSD) expanded Wärtsilä's manufacturing base and product range in diesel engine technology. [3]

Since 2000, Wärtsilä has shifted its direction in response to global trends regarding sustainability. The company reverted to the Wärtsilä name following a period under the name Metra and subsequently invested in renewable energy and hybrid technology systems. The 2001 acquisition of Sermet Oy was Wärtsilä's entry into biopower. Recent engine models, such as the Wärtsilä 31, internationally recognized for its energy efficiency, along with work in advanced fuel types, e.g., methanol, hydrogen and ammonia, reflect advances in engine technology as well as a new era for the company. [3]

3 UNIC

This chapter of the thesis introduces Wärtsilä's Unified Control System (UNIC). UNIC is an engine control platform that serves as the foundation for all Wärtsilä 4-stroke engine applications. The modules which this thesis aims to automate the testing of, are a part of the second generation of UNIC. UNIC stems from decades of incremental improvements, from the early off-engine monitoring systems of the 1970s to the more recent embedded engine control systems. [5]

A defining characteristic of UNIC is its modular hardware design. The system uses connector-less, point-to-point cable connections and the "flying lead" approach, both of which offer superior reliability over traditional wiring-harnesses. A UNIC system is comprised of several different modules, including the Cylinder Control Module (CCM), Input/Output Modules (IOM), safety modules (ESM), communication modules (COM) and local display units (LDU). This design allows for scalable applications, from simple single-module controllers to complex multi-module configurations. It also streamlines validation by allowing step-by-step integration and pre-testing directly on the engine. [5]

UNIC's software is built on WMAP. This platform serves as the foundation on which product-specific functionality is built. The system's modular software is good for operational flexibility, enabling rapid real-time adjustments for varying running profiles or changes in fuel type. [5]

Redundancy is a redundant element in UNIC. Dual communication modules and redundant local display units are implemented to safeguard against single-point failures. Redundancy isn't the only thing making UNIC a reliable system. Advanced simulation and validation methods, including HALT, ensure that the system meets reliability standards and extends component lifespan despite the rapid evolution of electronics in high-volume markets. [5]

4 Modules

The modules relevant to this thesis are the COM-10 and CCM-30. These modules are vital to the function and performance of an engine, acting much like the ECU of a regular car. These modules have multiple revisions through their respective lifetimes. The motives behind these revisions are things like defect correction, new requirements, added/removed functionality and component obsolescence. [2]

4.1 CCM-30

“The cylinder control module is mainly responsible for combustion control. It monitors and controls all the injection and combustion functions, as well as the inlet valve timing for the cylinders. The number of modules varies according to the number of cylinders. The CCM is typically located on the engine side profiles, enclosed in Wärtsilä terminal boxes (WTB).” [6]

Figure 1 Wärtsilä CCM-30

4.2 COM-10

“The communication module is the main gateway to the UNIC system from vessel systems, supporting multiple interfaces such as Modbus, OPC, and hardwired I/O. COM is a key module for UNIC system communication and is responsible for various control functions, software updates, and configuration update management. Typically, two COM modules (located in the engine main cabinet) are used in the UNIC system for redundancy.” [6]

Figure 2 Wärtsilä COM-10

4.2.1 RS485

One of the COM-10's features is RS-485 communication. RS-485 is a communication standard built for industrial settings. It uses differential signalling, where a pair of wires carries two opposite signals. This design effectively cancels out interference and noise. RS-485 can manage data transmission over distances up to 1200 metres and is capable of speeds up to 10 Mbps at short distances. The standard can handle both half and full-duplex communication. Proper termination, at the master and the slave furthest from the master, is necessary to minimize reflections that can distort the data. [7]

5 Test Rigs

This chapter covers test rigs as a concept. Test rigs are nothing new to Wärtsilä nor the Industrial world at large. [8] Test rigs are specialized setups designed to replicate specific conditions and loads to test the performance, durability and safety of a device or material under controlled circumstances. Test rigs range widely in complexity and form, from simple jigs and fixtures to elaborate computer-controlled machinery. They are almost always custom-built for their respective purposes. [9]

Test rigs are widely used across industries as essential tools in both product development and research. They allow for verification of designs meeting requirements (for example, ensuring an engine meets emission standards) and helping pinpoint weaknesses before a product is released. [9]

5.1 When did test rigs become mainstream?

Test rigs have a long history, but they became mainstream alongside the rise of modern engineering and industrial quality control. Basic forms of test rigs have existed for centuries, for example, Leonardo da Vinci invented basic machines to test material strength. [10] The widespread adoption of test rigs in industry began in the late 1800s. A key milestone was the development of the first universal testing machine in 1880 by Tinius Olsen. Olsen's "Little Giant" machine was groundbreaking, performing tensile, compression, and bending tests all in one apparatus. [11]

Following World War II, as technologies advanced, there was a boom in specialized test rig development. Powerful jet engines, for example, required special test cells to be built to simulate flight conditions. [12] Electronics required automated test systems and space exploration demanded large thermal vacuum chambers [13] and shake tables to qualify spacecraft. By the late 20th century, virtually every engineering field had its own array of dedicated test rigs as part of the standard development cycle. This trend has only grown in the 21st century. Today, the use of test rigs is a mainstream practice across industries. [14]

6 Software

In this thesis, NI TestStand is used. The legacy test sequences, used for the older Supplier #1 made modules, are both built in TestStand. These are the sequences which are to be modified to achieve the goals of the thesis.

NI TestStand is a test management software developed by National Instruments (NI). It provides a flexible environment for integrating various test instruments and executing test scripts written in multiple programming languages such as LabVIEW, Python, C++, and .NET. It also manages test data for analysis and reporting. [15]

There are two test sequences, one for the COM-10s and another for the CCM-30s. The ready-made sequences are both built mainly on a multitude of LabVIEW scripts, but also TestStand logical operators and scripts.

7 The rig

This chapter introduces the test rig, on which the thesis was conducted. The test rig, as shown in Figure 1, is a Supplier #3 made module tester, ordered by Wärtsilä for use at Supplier #1. It consists of a Windows 7 computer to run the test software, a PSU for powering the modules, hardware to generate, send and receive the signals necessary for testing and a UPS which is not in use. Everything is fitted into a rolling cabinet chassis with a bench for the modules, a moveable arm-mounted monitor and a barcode scanner. The rig is powered by a three-phase 400V connector at the back, which is where a USB port and some unused pneumatics are also located.

The test rig fell out of use in 2016, when Wärtsilä changed its supplier of COM-10s and CCM-30s, from Supplier #1 to Supplier #2. As the rig had been ordered and paid for by Wärtsilä, it was sent to Wärtsilä as part of Wärtsilä's agreement with Supplier #1. There it has been sat for the last nine years, with only minor engagements by staff.

Figure 3 Test rig

8 Hardware improvements

This chapter covers the physical changes made to the test rig. As the test rig was already physically complete, only a couple of hardware tweaks were made to improve useability.

8.1 Manoeuvrability

The test rig stands on four wheels, of which one was broken, shown in Figure 2. This made moving the rather large and heavy rig difficult. The broken wheel was replaced to increase its manoeuvrability.

Figure 4 Test rig on a pallet jack

8.2 Connectivity

There was a limited amount of USB ports for peripherals and external memory, of which half were located at the far backside of the rig. This was remedied by the addition of a USB hub at the back of the monitor arm, allowing the user to easily connect a keyboard, mouse and a flash drive.

9 Experimentation

This chapter covers the early experimental stage of the thesis. Before proceeding with the newer Supplier #2 modules, there was a need to ensure the functionality of the rig with the older Supplier #1 modules. Whenever there was an attempt to start a test, it would fail immediately with an error referencing PTCL. After studying internal documentation of the COM-10 modules, the test sequence itself and supplier documentation, it was found that there was an IP address, 192.168.0.1, missing from UUT net in windows. This address was added, bringing contact between PTCL and the DUT. After this the rig could successfully run the older modules

9.1 Proof of concept with Supplier #2 modules

As the modules have, through UNIC-2, remained almost identical in function, to ensure backwards compatibility within the system, an experiment was started. One of the newer revision COM-10s, which had been returned from a customer installation, was clamped to the test bench and a sequence was started. Problems arose immediately when trying to scan its data matrix. As none of the information was in the expected format, the test failed. To continue the experiment, every test based on barcode and or PCB info was set to “force pass”. This netted a successful test of: Powering DUT, Input current consumption, USB test, Power supply input switching and input measurements, Calibration values logging, Software version logging, DO and DI loop-back test, ADO and ADI mA loop-back test, ADO and ADI digital loop-back test, AO and AI loop-back test, FDO and FDI loop-back test, Excitation voltage test, ETH communication loopback test, CAN communication loop-back test, LED test case.

10 Software changes

This chapter covers the software changes made to the test rig. Most of the work has been to study and implement software changes in the form of altering parameters to establish proper communication between the tester and the modules. The modules have remained mostly the same through UNIC2, connectivity and signal-wise, as to easily replace older modules without modification to the engines they manage or the instruments they communicate with. A hand full of changes were however made when switching to Supplier #2. This made the tester incompatible with the new modules.

10.1 Barcode

The barcodes on the older Supplier #1 modules were in the form of PDF417, shown in Figure 3. These contained clear information about the module as follows: COM-10;PAAF142575;10;11/17;.00002275. COM-10 refers to the module model, PAAF142575 to its Wärtsilä number, 10 to its revision, 11/17 to its production week & year and 00002275 to its specific serial number.

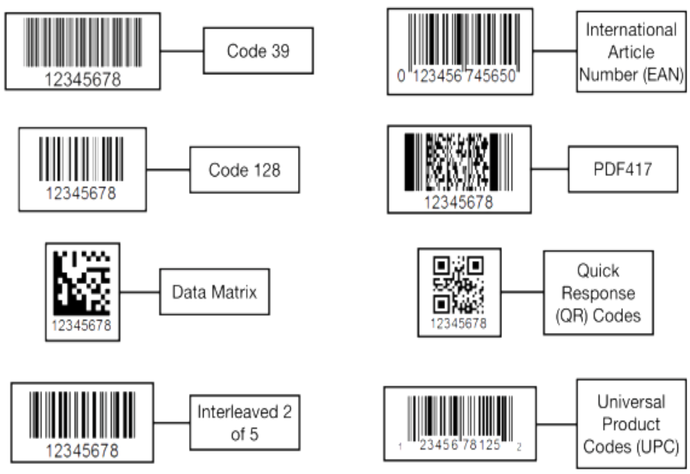


Figure 5 Barcode formats, taken from gototags.com

The newer barcodes of the Supplier #2 modules are in a data matrix format, which the rig's barcode scanner was able to read but not understand due to the info contained being as follows: 213346#23F#B#S#2323856022. 213346 referring to its SAP vendor number, 23F to month of manufacture, B to revision, S to it being serialized, 2323856022 to its serial number.

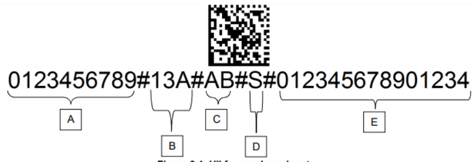


Figure 3.1: UII for purchased parts

Table 3.1 shows a list of different sections for UII in case of purchased parts.

Section	Information	Length type	Description
A	Vendor SAP number e.g.: 0123456789	▶ **Variable** length of max 10 digits	▶ Max 10 digits alphanumeric string ▶ Supplier codes indicate the tier one supplier ▶ If SAP code is shorter, do not use filler characters, zeros leading or any space: e.g. vendor code 1234 → 1234
B	Manufacturing period e.g.: 13A	▶ Fixed length of 3 digits	▶ 3 digits alphanumeric string ▶ First 2 digits for manufacturing year as numeric string: e.g. year 2013 → 13, year 2014 → 14, etc. ▶ The last digit for manufacturing month as alphabetic digit: "A"= January, "B"=February, …, "L"= December
C	Material revision letter e.g.: AB	▶ **Variable** length of max 2 digits	▶ 2 digits alphanumeric string ▶ Indicates the revision of material number mentioned in the Purchase Order ▶ If revision is shorter, do not use filler characters, zeros leading or any space: e.g. PAAE12345 rev.A → "A"
D	indication for serialized parts or batch numbering	▶ Fixed length of 1 digit	▶ 1 digit (alphabetic) ▶ "S"=serialized, "B"=batch ▶ Batch means produced in lots [1]
E	Supplier Serial Number or Batch Number	▶ **Variable** length of max 15 digits	▶ Max 15 digits alphanumeric string ▶ Is the actual vendor Serial or Batch Number used to identify the part [2] ▶ Every character can be used except the ASCII code35 (# "Number")

Document ID: DAAF307741 Revision: - 5 (18)

Table 3.1: UII sections for purchased parts

Figure 6 Supplier #2 data matrix explanation

To make this new format compatible with an existing test sequence, all but the serial number was removed from the initial validation of the DUT. This serial number is later in the sequence compared to the internal serial number of the DUT to ensure the label matches the PCBs. In this step, other relevant information, week of production and revision, is gathered as well.

10.2 USB

COM-10s of revision 10.08 and newer always failed their USB functionality tests. Looking at their revision tracking logs it became clear that all USB functionality of the modules, except power, had been removed due to security concerns. The natural step was to remove the USB test completely from the sequence, this however bricked the sequence, causing it to produce implausible signals, like -1e +120, at a lot of the channel tests. To get around this, the USB test was simply set to “force pass”.

10.3 PCB serial numbers

Each module consists of two PCBs. In addition to the serial number of the module, both of these PCBs have their own unique serial number. The old PCB serial numbers all started with “LAY”. This is no longer the case. Through testing it was found that the new Supplier #2 PCBs have SNs starting with numbers, four numbers for the CCM-30s and ten numbers for the COM-10s.

Adapting the sequences to accommodate for the newer modules in this regard meant changing the parameters of an existing LabView script to look for “[0-9][0-9][0-9][0-9]” instead of “LAY” in the CCM-30s and “[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]” in the COM-10s.

10.4 Testing RS-485 in post 2016 COM-10s

A recurring theme throughout the thesis work has been RS-485 tests failing in all but a few modules. Packets would be successfully sent but never received. When looking deeper into the issue, it was found that the baud rate set in the sequence differed significantly from the baud rate set for the COM-port which handles the RS-485, 115,2 kb/s versus 9,6kb/s. In addition to this it was found documented from 2016 that the COM-10s had been having issues with RS-485 above 100 kb/s. As these speeds are not needed the remedy would be to run at lower baud rates.

Bit rates were set to 9,6 kb/s in the test sequence as well as in Windows for the COM-port. This did not solve the package loss problem, but it did solve another issue. Used to be that packets received by the tester from the DUT would be -1e+120 instead of zero. With the matching baud rates, packages received changed to an even zero.

To gain knowledge of why none of the packets were getting through even with the matching baud rates, the data traffic during the test was monitored with NI I/O Trace. With I/O Trace it was confirmed that there was indeed no data reaching the buffers.

In an attempt to get any traffic at all, the RS-485 positive and negative leads were switched at the COM-10's RS-485 pins. This yielded distorted data, but data, nonetheless. The leads were switched back to their original positions, but now there was still data flowing. It looked less distorted but still not readable by the test sequence.

After some trial and error, the baud rate was set to 19,2k in TestStand, VISA and Windows. That got the UUT to tester RS-485 communication working, and 15/16 packages were received. Well within spec. The tester to UUT test still reported 0/10 packages received.

To debug Tester to UUT, there were some breakpoints placed in the sequence, right before sending the packets to the UUT. This resulted in a perfect 10/10 packet transfer. There was a thought to increase the delay before this step in the sequence, however, the breakpoints were removed, without increasing delay, and it stayed working.

11 Evaluation

In this chapter, an evaluation of the finished project takes place. To make sure that testing requirements were kept, both a COM-10 and a CCM-30 test report were compared to their respective test specifications. All deviations from the original test specs in the final test sequences were noted and documented. They were subsequently approved by a senior expert.

11.1 Manual

The test rig arrived at Wärtsilä with a user manual of sorts, but as neither the hardware nor the software pictured in the manual correlated to the actual tester, it was less than useful. A new, user-friendly, step-by-step manual was made, iterated, printed and tested on subjects both familiar and unfamiliar with module testing. The manual guided both subjects through a complete test of a module and the export of their desired test report. Included in the manual is a brief explanation of every test step, helping its users to accurately diagnose the eventual failures of the modules.

The manual was made by documenting each step from energizing the test rig to shutting it down. Pictures of multiple steps have been included in the manual and referenced in its instructions. These pictures leave very little to be interpreted, thus securing a successful test. The manual has been well received by its intended demographic. For the complete user manual, see Appendix 1.

11.2 Need for calibration

In its current form, the test rig is used as a functional test rig, meaning that there is no need for official documentation, which would require it to be calibrated. Hence it has been agreed with the experts and engineers involved, that there is no need for calibration.

11.3 Module SW not overwritten by test rig

By manually checking the software of a returned module in Unitool before and after testing it in the rig, it was confirmed that the module is indeed booting to test mode, running commands from a tftpd server, and no software is being overwritten by the automated test sequence. This is good for workflow, as a module, which has passed its test, will usually be used in the same way it was before the test. Not having to reload the modules SW removes a step from the process, saving time and effort. It is also helpful when it is not known whether a returned module is faulty due to SW or HW issues. If this were to be the case, reloading new SW might erase the culprit of the fault.

11.4 Identical results as manual tests

To check the accuracy of the test rig, it ran a batch of COM-10s, which had previously been manually tested and diagnosed. The results were 100% consistent with the failure modes gained from manual testing.

11.5 Patch work

Solutions like setting the steps of the USB test to force pass and switching leads to jump-start RS-485 communication are not desirable. Forcing the USB test to pass, while not an optimal solution, does not pose an issue to the goal of the thesis or the function of the test rig. The fact that COM-port buffers only started filling with data once the leads of the RS-485 card had been switched around and then put back to normal, however. This raises questions regarding the integrity of the test and the longevity of RS-485 card installed in the test rig.

The test rig is due to serve as a functional tester for troubleshooting failures, not as an official validation tool. Therefore, these solutions while not ideal, will not have a profound impact on the way the test rig is used.

12 Conclusion

In conclusion, the thesis has been successful in its aim to revive the old test rig and adapt it to the newer revision modules. It has also successfully eased the burden of testing and reporting of the modules returning under warranty. What used to be hours of manual work is now summed up to five minutes of automated testing for COM-10s and ten minutes for CCM-30s. The rig is due to serve Wärtsilä's laboratories for the coming ten years. For a full test report on a COM-10 and a CCM-30, see Appendices 2 and 3.

Outside the scope of the thesis, a demo day was held at the STH common labs, to familiarize Wärtsilä's technical staff with their new test rig. The demo was well received by its audience and served to inform them of the new testing possibilities.

12.1 Future improvements

A few suggestions for future improvement and reliability: The layout of the reports should be changed. For increased clarity, all module ID info, as in, SN, revision, and week of production, should be at the top of the report. There should be a backup made of the test rig's hard drive, ensuring it is not lost in the event of corrupted memory due to e.g., age. There should be a script made to analyse and create failure statistics based on the failed test reports. The RS-485 module and test should be further studied to ensure longevity.

There has been a question. Why are there no test rigs within Wärtsilä for the other modules used? The solution would likely be the development of specialized test rigs alongside the development of new modules. This way there would never be lag, as opposed to first developing the module and the test rig later. The development and production of a single test rig would likely be cost prohibitive, but as Wärtsilä's sub-suppliers are likely to develop test rigs for their own product lines, it is possible the cost could be cut by cooperating with these suppliers.

13 Bibliography

[1] “This is Wärtsilä,” Wärtsilä, 2024. [Online]. Available: https://www.wartsila.com/about. [Accessed 13 March 2025].

[2] T. Emaus, *Expert in UNIC TESTING,* Personal communication, 2024.

[3] “The History of Wärtsilä,” 2023. [Online]. Available: https://www.wartsila.com/about/history. [Accessed 09 04 2025].

[4] W. Wahlstedt, “HUR DET BÖRJADE,” 1990. [Online]. Available: https://www.wartsila.com/docs/default-source/about-us/wilmer-wahlstedt_wd-vi.pdf?sfvrsn=36a2d744_0. [Accessed 09 04 2025].

[5] “Next generation UNIC automation system enables Wärtsilä 31 performance,” Wärtsilä, 2017. [Online]. Available: https://www.wartsila.com/insights/article/next-generation-unic-automation-system-enables-wartsila-31-performance. [Accessed 09 04 2025].

[6] “Wärtsilä UNIC Engine Control System Overview,” Wärtsilä, 2017. [Online]. Available: https://www.wartsila.com/docs/default-source/product-files/engines/brochure-o-e-unic-ms.pdf?sfvrsn=7ab39545_4. [Accessed 09 04 2025].

[7] H. Marais, “RS-485/RS-422 Circuit Implementation Guide,” Analog devices, Norwood, 2008.

[8] Wärtsilä, “Wärtsilä technical journal,” *in detail,* no. 02, p. 15, 2017.

[9] D. Williamsson, “Modularization of Test Rigs,” KTH Royal Institute of Technology, Stockholm, 2015.

[10] J. R. L. a. J. P. BYRNE, “LEONARDO DA VINCI'S TENSILE,” University of California, Davis, 2000.

[11] “AZO Materials,” 03 08 2021. [Online]. Available: https://www.azom.com/article.aspx?ArticleID=20596. [Accessed 10 04 2025].

[12] NASA, “Lab Built in 1950s to Test Powerful Full-Scale Aircraft Engines. Today it still does,” 29 1 2020. [Online]. Available: https://www.nasa.gov/history/lab-built-in-1950s-to-test-powerful-full-scale-aircraft-engines-today-it-still-does/. [Accessed 10 04 2025].

[13] NASA, “Thermal Vacuum Chamber A,” 06 01 2025. [Online]. Available: https://www.nasa.gov/setmo/facilities/thermal-vacuum-chamber-a/. [Accessed 10 04 2025].

[14] NASA, "NASA Shake Testing Helps Make Safer Cars," 07 09 2017. [Online]. Available: https://www.nasa.gov/technology/tech-transfer-spinoffs/nasa-shake-testing-helps-make-safer-cars/. [Accessed 10 04 2025].

[15] National Instruments, "How Do I Develop Automated Production Test Systems With TestStand?," National Instruments, 2025. [Online]. Available: https://www.ni.com/en/shop/electronic-test-instrumentation/application-software-for-electronic-test-and-instrumentation-category/what-is-teststand/how-do-i-develop-test-validation-systems.html. [Accessed 15 04 2025].

Appendix 1: User manual

WÄRTSILÄ

COM10 & CCM30 Tester Manual

WÄRTSILÄ

Start up of test rigg

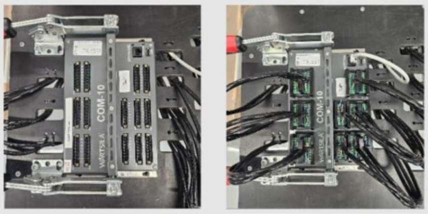
- Connect the three-phase power cable to an outlet.
- Turn the main switch to the on position and wait Windows to boot.[1]
- Turn the green switch to “Start” and let it bounce back a step to “1”.[2]

[1] Main switch

[2] Green switch after bouncing back from start

Connection of UUT

- Clamp down and connect the desired module to its corresponding connectors, COM10s are connected on the left side of the table [3] and CCM30s on the right.[4] **Note, only one module should be connected at any given time during testing.**



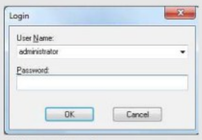
[3] COM10 placed on left side of the test bench

[4] CCM30 placed on the right side of the test bench

Start up of test stand

- Double click the “Module tester” icon on the desktop.[5]
- When the program has started you will be prompted to log in.
- Leave the password empty and press “OK“.[6]
- Wait for the program to complete startup.
- When startup is complete, a window “Tftpd32” **may** pop up.
- Minimize this window. **Do not close it.**
- Test stand will then alert you to a missing file, this is fine. Click “OK”.[7]

[5] Module tester icon



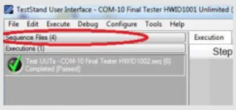
[6] Password prompt

[7] Product serial code prompt

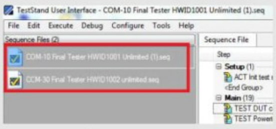
WÄRTSILÄ

Select sequence file

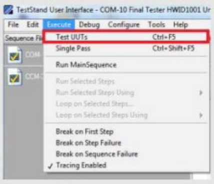
- Click on "Sequence files".[8]
- Select the correct sequence file.
- If a sequence file were to be missing, go to "File" -> open sequence file -> C:\Procket\Wartsila\Production testing\(COM10 or CCM30) Final Tester\TS. You may then open your desired file from here.
- **COM-10 Final tester HWID1001 Unlimited (1)** for COM10s.
- **CCM-30 Final tester HWID1002 unlimited** for CCM30s.[9]
- After selecting your desired sequence, click "Execute" then "Test UUTs".[10]



[8] Sequence files



[9] Sequence files to choose from

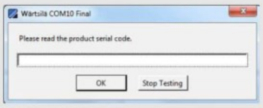


[10] Test UUTs

WÄRTSILÄ

Scan the module

- You will now once again be prompted to read the product serial number. Click on the prompt window.[11]
- With the built-in barcode scanner, read the data matrix (looks like a QR code) on the sticker of the module. [12]
- It is common for the data matrix to be obscured by a connector on the CCM30s, simply remove the connector to scan the matrix, remembering to put it back before beginning the test.
- If it is the first module of the session, a window, "Tftpd32" **may** appear. [13]
- Minimize the window. **Do not close it.**
- Click the "Please read product serial code" window and scan the data matrix again.



[11] Product serial code prompt

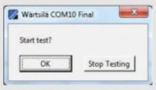
[12] Barcode scanner held over data matrix

[13] Tftpd32 window

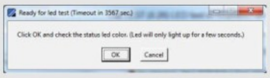
Begin testing

- You will be shown the info contained within the data matrix. Click "OK". [14]
- You will then be prompted to start testing. Click "OK". [15]
- Wait for the sequence to run.
- In case a vital test at the beginning fails, the sequence will promptly end. Please refer to page 8.
- At the end of the test, you will be prompted to check the status LED color. Click OK. [16]
- Check the color of the status LED on the module and select said color in the "LED TEST" window. Side note, white may look a bit purple. [17] [18]
- The sequence will now resume and shortly finish.

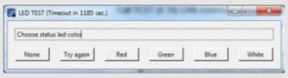
[14] Data contained within data matrix



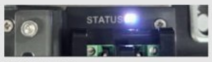
[15] Start testing prompt



[16] LED check prompt

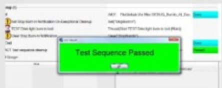


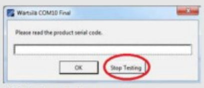
[17] LED color prompt


[18] Status LED

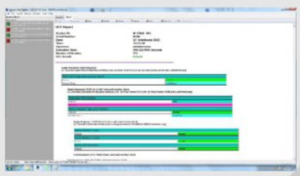
Finishing up

- The test sequence has now either passed or failed. Click "OK". [19]
- You will now be prompted to continue testing. Click "Stop Testing". [20]
- You will then be presented with the results of your test. [21]
- If you now wish to continue testing, replace the previously tested module with your next patient and refer to page 5.


[19] Test sequence passed



[20] Continue testing prompt


[21] Test results

WÄRTSILÄ

Reports

- The report from every test is automatically saved as an HTML file. These reports can be accessed from the “Html – Shortcut” on your desktop. [22]
- To transfer a report from the test rigg to your personal work computer, simply copy it to the USB stick at the back of the riggs monitor arm, eject the USB, insert it into your computer and retrieve the file.
- **The rigg is not and should not be connected to the internet.**

[22] Report folder

CONFIDENTIAL

WÄRTSILÄ

Shut down

- Close all open windows.
- Shut down the computer, it will try and fail to update, this is normal.
- Turn the green switch to its off-position.
- When the computer has finished powering off, you may turn the main switch to its off-position.
- If the rigg won’t be used for a long time, you may unplug it as well.

CONFIDENTIAL

WÄRTSILÄ

Explanation of the individual tests: COM10 Powering DUT

8.3 Powering DUT

Continue from the end state of the previous test.

Purpose	To safely powering up the DUT, preventing unit damages. Also verify PE isolation
Test procedure	1) Measure PE isolation AC-resistance 2) Measure PE isolation DC-resistance 3) Initialize tester power supply with low current limitation 4) Connect tester power supply to both PSS1 and PSS2 inputs 5) Turn ON tester power supply 6) Verify input current 7) Initialize tester power supply current limitation higher for next test cases
Notes:	If test case fails, result is saved and test execution is terminated AC resistance should be near to zero, because PE is connected to GND through capacitor on DUT.

Table 3 Purpose and procedure for Powering DUT

WÄRTSILÄ

COM10 Input current consumption

8.4 Input current consumption

Continue from the end state of the previous test.

Purpose	Measure input current consumption after MCU initialization.
Test procedure	1) Wait unit PTCL response from unit by trying to open PTCL 2) Measure input current
Notes:	If unit does not response to PTCL, result is saved and test execution is terminated

Table 5 Purpose and procedure for Input current consumption

WÄRTSILÄ

COM10 Read serial numbers of PCBs and save results

8.5 Read serial numbers of PCBs and save results

Continue from the end state of the previous test.

Purpose	**Read A and B board serial numbers for test result traceability purposes. PCB serial numbers will be also added to final testing serial number field, which is main search key field in databases.** **This test will also fail if either PCB board is not PASSED in PCB level tests**
Test procedure	1) Read A board serial number from unit via PTCL, validate serial number and save result 2) Read B board serial number from unit via PTCL, validate serial number and save result
Notes:	~~Example of A-board serial number: LAY20350D.0000070~~ ~~Example of B-board serial number: LAY27310D.0000070~~ ~~It is enough that board serial number start with "LAY" (are not "XXXXXXXX").~~ LabVIEW regexp for checking A-board serial number: ~~*^LAY.**~~ LabVIEW regexp for checking B-board serial number: ~~*^LAY.**~~ PCB serial numbers shall be added to serial number field in following module serial number, separated by '_' char. E.g. [Module serial number]_[PCB A serial number]_[PCB B serial number] PTCL command to read A board serial number: *SYSInformation:DATA:ASERial ?* PTCL command to read B board serial number: *SYSInformation:DATA:BSERial ?*

Table 7 Purpose and procedure for Read serial numbers of PCBs and save results

WÄRTSILÄ

COM10 Power supply input switching and input measurements

8.7 Power supply input switching and input measurements

Continue from the end state of the previous test.

Purpose	**Verify PSS1 and PSS2 input power supply inputs by input switching**
Test procedure	1) Connect tester power supply only to PSS1 2) Verify input current 3) Connect tester power supply only to PSS2 4) Verify input current 5) Verify internal current measurement 6) Verify internal voltage measurement
Notes:	If failed, turn other input back ON and wait boot-up delay PTCL command to read internal voltage on PSS1: POWEr:EXT:VOLT:VALue? PTCL command to read internal voltage on PSS2: POWEr:EXT:VOLT:VALue? PTCL command to read internal current on PSS1: POWEr:EXT:CURR:VALue?

Table 11 Purpose and procedure for Power supply input switching and input measurements

WÄRTSILÄ

COM10 Diagnostic information logging

8.8 Diagnostic information logging

Continue from the end state of the previous test.

Purpose	Read diagnostic information from returning units for fault finding purposes
Test procedure	1) Read and save diagnostic information via PTCL
Notes:	Function mainly intended for customer reclamation units to save diagnostic history from a field. Single string length is limited to 255 characters, if data can be longer, save only 10 last diagnostic report lines for individual test cases. In normal production this should be empty. Reclamation products may have strings, but they can't be stored into DB, only to xml. Prefer to put error code into DB.

Table 13 Purpose and procedure for Diagnostic information logging

WÄRTSILÄ

COM10 Calibration values logging

8.9 Calibration values logging

Continue from the end state of the previous test.

Purpose	Read all calibration values from returning units for fault finding purposes
Test procedure	1) Read and save calibration values (slope, intercept) via PTCL for all calibrated channels.
Notes:	Function mainly intended for customer reclamation units to save diagnostic history from a field. Refer to 003122 Calibration specification for channels and values. -

Table 15 Purpose and procedure for Calibration values logging

WÄRTSILÄ

COM10 Software version logging

8.10 Software version logging

Continue from the end state of the previous test.

Purpose	Read separate SW versions for fault finding purposes
Test procedure	1) Read bootloader1, HAL and bootloader2 SW versions via PTCL
Notes:	In production SW versions are always as one packed. This function is intended for customer reclamation units coming from fields for information only, where SW versions might be updated PTCL command to read bootloader1 version: *SYSI:DATA:UBOO?* PTCL command to read HAL version: *SYSInformation:DATA:HALRevision?* PTCL command to read bootloader2 version: PTCL command to read Diag sw version: *SYSInformation:DATA: DIREvision?*

Table 17 Purpose and procedure for Software version logging

WÄRTSILÄ

COM10 DO and DI loop-back test

8.11 DO and DI loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality for DO outputs and DI inputs
Test procedure	1) Set all DOs OFF state via PTCL 2) Verify OFF states from DIs via PTCL 3) Set DOs ON individually and verify state from DI 4) Set all DOs OFF state
Notes:	DO outputs are connected to DI channel by channel. There are 5 DO and DI channels. PTCL command to set DO OFF: *DOX:VALue 0* PTCL command to read DI: *DIX:VALue?* PTCL command to set DO ON: *DOX:VALue 1*

Table 19 Purpose and procedure for DO and DI loop-back test

WÄRTSILÄ

COM10 ADO and ADI mA loop-back test

8.12 ADO and ADI mA loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality on mA-mode for ADO outputs and ADI inputs
Test procedure	1) Reset ADO and ADI wires 2) Set ADO and ADI channels to mA mode 3) Set ADO channels currents to 0mA 4) Connect voltages to ADOx+ and ADIx+ 5) Reset ADO and ADI wires 6) Read ADIs current references when ADOs currents set to 0mA 7) Set 4mA current to all ADO channels individually 8) Read via PTCL and verify current changes from ADI ports 9) Set ADO channels currents to 0mA
Notes:	Connect ADOx to ADIx. Connect +24V through 1k resistor to parallel ADOx+ and ADIx+ and connect ADOx- and ADIx- to ground. When ADO and ADI are connected parallel ja ADO is set to 0mA all current goes through ADI. When ADO current is set to >0, some of the current goes through ADO and current through ADI decreases. PTCL command to set ADO to mA mode: *ADO:WIReX:MODe CL020* PTCL command to set ADI to mA mode: *ADI:WIREX:MODE CL020* PTCL command to set 0 mA current to ADO: *ADOX:AO:VALue 0* PTCL command to set 4 mA current to ADO: *ADOX:AO:VALue 4000* PTCL command to set 20 mA current to ADO: *ADOX:AO:VALue 20000* PTCL command to read current from ADI: *ADIX:AI:VALue?*

Table 21 Purpose and procedure for ADO and ADI mA loop-back test

WÄRTSILÄ

COM10 ADO and ADI digital loop-back test

8.13 ADO and ADI digital loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality on Digital mode for ADO outputs and ADI inputs
Test procedure	1) Reset ADO and ADI wires 2) Set ADO and ADI channels to digital mode 3) Set all ADO channels to OFF state 4) Read via PTCL and verify channel states from ADI 5) Set all ADO channels to ON state individually 6) Read via PTCL and verify channel states from ADI 7) Set all ADO channels to OFF 8) Read via PTCL and verify channel states from ADI
Notes:	4 ADO channels are looped to 4 ADI channels in tester. PTCL command to set ADO to DO mode: *ADO:WIReX:MODe DOUT* PTCL command to set ADI to DI mode: *ADI:WIREX:MODE DIN* PTCL command to set ADI channel OFF: *ADOX:DO:VALue 0* PTCL command to set ADI channel ON: *ADOX:DO:VALue 1* PTCL command to read channel state from ADI: *ADIX:DO:VALue?*

Table 23 Purpose and procedure for ADO and ADI digital loop-back test

COM10 AO and AI loop-back test

8.14 AO and AI loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality for AO outputs and AI inputs
Test procedure	1) Set AO channel to 20 mA mode and AI channel to mA mode 2) Enable AO 3) Set 4mA current to AO channel output 4) Read via PTCL and verify current from AIs 5) Set current 20mA to AO 6) Read and verify current from AIs 7) Set AO current to 0 mA
Notes:	1 AO channel is connected to 2 AI channels in series PTCL command to set AO to 20 mA mode: *AO:WIRe1:MODe CL020* PTCL command to set AI to mA mode: *AI:WIREX:MODE CL020* PTCL command to enable AO: *AO:WIRE1:ENABLED 1* PTCL command to set 0 mA current to *AO1:VALue 0* PTCL command to set 4 mA current to *AO1:VALue 4000* PTCL command to set 20 mA current to AO: *AO1:VALue 20000* PTCL command to read current from AI: *AIX:VALue?*

Table 25 Purpose and procedure for AO and AI loop-back test

COM10 FDO and FDI loop-back test

8.15 FDO and FDI loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality for FDO outputs and FDI inputs
Test procedure	If DUT supports only reading FDI state: 1) Reset FDO diagnostics 2) Reset FDI diagnostics 3) Set FDO to DOUT mode 4) Set FDI Threshold Level For Rising to 1.26V 5) Set FDI Threshold Level For Falling to 0.5V 6) Send one pulse from FDO 7) Read FDIs, should be off 8) Set FDO on 9) Read FDIs, should be on 10) Set FDO off 11) Set FDI Threshold Level For Rising to 1.35V 12) Set FDI Threshold Level For Falling to 0.5V 13) Send one pulse from FDO 14) Set FDO on 15) Read FDIs, should be off 16) Set FDO off
Notes:	1 FDO channel is connected to 4 FDI channels in parallel. FDO+ voltage is divided so that input to FDIx+ is 0 or ~1.3V. PTCL command to set FDO mode: *FDO:WIRE1:MODE DOUT* PTCL command to set FDI raising thresholds: *FDI:WIReX:ERTHreshold* PTCL command to set FDI falling thresholds: *FDI:WIReX:EFTHreshold* PTCL command to set FDO channel OFF: *FDO1:DO:VALue 0* PTCL command to set FDO channel ON: *FDO1:DO:VALue 1* PTCL command to read FDI channel : *FDIX:DI:Value?*

Table 27 Purpose and procedure for FDO and FDI loop-back test

WÄRTSILÄ

COM10 Excitation voltage test

8.16 Excitation voltage test

Continue from the end state of the previous test.

Purpose	To verify excitation functionality of FDI channels
Test procedure	1) Reset FDI diagnostics 2) Disconnect excitation voltage via PTCL for all FDI channels 3) Verify excitation voltages are not connected 4) Set excitations ON. 5) Verify excitation voltages 6) Disconnect excitation voltage via PTCL for all FDI channels
Notes:	Load resistors to 4 FDI excitation power lines 100% load. (24V/40mA) PTCL command to set FDI excitation OFF: *FDI:WIReX:EXCitation 0* PTCL command to set FDI excitation ON: *FDI:WIReX:EXCitation 1*

Table 29 Purpose and procedure for Excitation voltage test

CONFIDENTIAL

WÄRTSILÄ

COM10 ETH communication loopback test

8.17 ETH communication loopback test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality of HSR communication by test data packet generator and validator in PTCL, which sends data and validates received data and counts received valid data packets
Test procedure	1) Set packet generator frequency 2) Turn ON test data packet generator and validator for PHYx via PTCL 3) Wait 10 s. 4) Turn OFF test data packet generator and validator for PHYx via PTCL 5) Read sent data count 6) Read verified received data count from 7) Repeat to PHY1-4
Notes:	PHY1 and PHY2 are connected to validator 1. PHY3 and PHY4 are connected to validator 2. PHY1 and PHY4 can be tested simultaneously as can PHTY2 and PHY3. PTCL command to set generator frequency: *:NETworking:CEx:TPGenerator:FREQuency* PTCL command to set packet data validator ON: *:NETworking:SEx:TPValidator:ENABle 1* PTCL command to set packet data generator ON: *:NETworking:CEx:TPGenerator:ENABle 1* PTCL command to read validated received data count: *:NETworking:SEx:TPValidator:COUNt ?* PTCL command to read sent data count: *:NETworking:CEx:TPGenerator:COUNt ?*

Table 31 Purpose and procedure for ETH communication loopback test

CONFIDENTIAL

WÄRTSILÄ

COM10 CAN communication loop-back test

8.18 CAN communication loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality of CAN ports by test data packet generator and validator in PTCL, which sends data and validates received data and counts received valid data packets
Test procedure	1) Set CAN TPGenerator frequencies 2) Turn ON test data packet generator and validator for CAN1, CAN2, CAN3 and CAN4 via PTCL 3) Wait 10 s 4) Turn OFF test data packet generator and validator for CAN1, CAN2, CAN3 and CAN4 via PTCL 5) Read sent data count from CAN1, CAN2, CAN3 and CAN4 6) Read verified received data count from CAN1, CAN2, CAN3 and CAN4
Notes:	CAN 1 is connected to CAN2. CAN 3 is connected to CAN4. PTCL command to set packet generator frequency: *CAN**X**:TPGenerator:FREQuency* PTCL command to set packet data validator ON: *CAN**X**:TPValidator:ENABle 1* PTCL command to set packet data generator ON: *CAN**X**:TPGenerator:ENABle 1* PTCL command to read sent data count: *CAN**X**:TPGenerator:COUNt?* PTCL command to read validated received data count: *CAN**X**:TPValidator:COUNt?*

Table 33 Purpose and procedure for CAN communication loop-back test

WÄRTSILÄ

COM10 RS485 communication test

8.19 RS485 communication test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality RS485 by sending and receiving data to/from tester
Test procedure	1) Start receiving on tester end 2) Command DUT to start sending test data to tester via PTCL 3) Command DUT to stop sending test data to tester via PTCL 4) Query DUT for sent packet count via PTCL 5) Verify received data 6) Start receiving on DUT end 7) Send data packets from tester to DUT 8) Validate data received from DUT via PTCL
Notes:	~~Use maximum baud rate during the test (115 kbit/s)~~ PTCL command to set baud rate: *SERIal:TPGenerator:FREQuency **N*** PTCL command to enable packet generator: *SERIal:TPGenerator:ENABle 1* PTCL command to query sent packer count: *SERIal:TPValidator:COUNt?* PTCL command to enable packet validator: *SERIal:TPValidator:ENABle 1* PTCL command to ask validated packet count: *SERIal:TPValidator:COUNt ?*

Table 35 Purpose and procedure for RS485 communication test

WÄRTSILÄ

COM10 LED test case

8.20 LED test case

Continue from the end state of the previous test.

Purpose	To verify RGB LED functionality
Test procedure	1) Turn red, green and blue leds on 2) Confirm from operator that led is white 3) Set LEDs to normal mode
Notes:	

Table 37 Purpose and procedure for LED test case

Measurements

Input / Action	Signal / Net name	Test point	Setup / Note	Accepted results
Set All LEDs on				
Query operator				
Led Color				White

Table 38 Actions and limits for LED test case

WÄRTSILÄ

CCM30 Powering DUT

8.2 Powering DUT

Continue from the end state of the previous test.

Purpose	To safely powering up the DUT
Test procedure	1) Measure PE isolation AC-resistance 2) Measure PE isolation DC-resistance 3) Initialize tester power supply with low current limitation 4) Connect tester power supply to both PSS1 and PSS2 inputs 5) Turn ON tester power supply 6) Verify input current 7) Initialize tester power supply current limitation higher for next test cases
Notes:	If test case fails, result is saved and test execution is terminated AC resistance should be near to zero, because PE is connected to GND through capasitor on DUT.

Table 3 Purpose and procedure for Powering DUT

WÄRTSILÄ

CCM30 Input current consumption

8.3 Input current consumption

Continue from the end state of the previous test.

Purpose	**Measure input current consumption after MCU initialization**
Test procedure	1) Wait unit PTCL response from unit by trying to open ptcl to detect unit boot-up 2) Measure input current
Notes:	If unit do not response to PTCL, result is saved and test execution is terminated

Table 5 Purpose and procedure for Input current consumption

WÄRTSILÄ

CCM30 Read serial numbers of PCBs and save results

8.4 Read serial numbers of PCBs and save results

Continue from the end state of the previous test.

Purpose	**Read A and B board serial numbers for test result traceability purposes. PCB serial numbers will be also added to final testing serial number field, which is main search key field in databases.** **This test will also fail if either PCB board is not PASSED in PCB level tests**
Test procedure	1) Read A board serial number from unit via PTCL, validate serial number and save result 2) Read B board serial number from unit via PTCL, validate serial number and save result
Notes:	**Note! ! Due to test time optimization this test is done at the end of the sequence during light burn in.** ~~It is enough that board serial number start with "LAY" (are not "XXXXXXXX").~~ PCB serial numbers shall be added to serial number field in following module serial number, separated by '_' char. E.g. [Module serial number]_[PCB A serial number]_[PCB B serial number]

Table 7 Purpose and procedure for Read serial numbers of PCBs and save results

CCM30 Diagnostic information logging

8.5 Diagnostic information logging

Continue from the end state of the previous test.

Purpose	Read diagnostic information from returning units for fault finding purposes
Test procedure	1) Read and save diagnostic information
Notes:	Function mainly intended for customer reclamation units to save diagnostic history from a field. Single string length is limited to 255 characters, if data can be longer, save only 10 last diagnostic report lines for individual test cases.

Table 9 Purpose and procedure for Diagnostic information logging

CONFIDENTIAL

CCM30 Save product individual data

8.6 Save product individual data

Continue from the end state of the previous test.

Purpose	Save product individual data to unit to Info Block. Saved information are Wärtsilä material number, HW revision, production week, production year and serial number
Test procedure	1) Parse unit individual data from product label bar code string 2) Save individual data to unit via PTCL and verify data saving
Notes:	**Note! ! Due to test time optimization this test is done at the end of the sequence during light burn in.**

Table 11 Purpose and procedure for Save product individual data

CONFIDENTIAL

CCM30 Power supply input switching and input measurement

8.7 Power supply input switching and input measurement

Continue from the end state of the previous test.

Purpose	Verify PSS1 and PSS2 input power supply inputs by input switching
Test procedure	1) Connect tester power supply only to PSS1 2) Verify input current 3) Connect tester power supply only to PSS2 4) Verify input current 5) Verify internal current measurement 6) Verify internal voltage measurement
Notes:	If failed, turn both inputs back ON and wait boot-up delay

Table 13 Purpose and procedure for Power supply input switching and input measurement

CCM30 Calibration values logging

8.8 Calibration values logging

Continue from the end state of the previous test.

Purpose	Read all calibration values from returning units for fault finding purposes
Test procedure	1) Read and save calibration values (slope, intercept) via PTCL for all calibrated channels.
Notes:	**Note! Due to test time optimization this test is done at the end of the sequence during light burn in.** Function mainly intended for customer reclamation units to save diagnostic history from a field.

Table 15 Purpose and procedure for Calibration values logging

WÄRTSILÄ

CCM30 Software version logging

8.9 Software version logging

Continue from the end state of the previous test.

Purpose	Read separate SW versions for fault finding purposes
Test procedure	1) Read bootloader1, HAL and bootloader2 SW versions
Notes:	**Note! Due to test time optimization this test is done at the end of the sequence during light burn in.** In production SW versions are always as one packed. This function is intended for customer reclamation units coming from fields for information only, where SW versions might be updated

Table 17 Purpose and procedure for Software version logging

WÄRTSILÄ

CCM30 Powering Drive blocks

8.10 Powering Drive blocks

Continue from the end state of the previous test.

Purpose	Safely power up the DRV block, preventing DUT damages
Test procedure	1. Turn OFF DRV outputs and disconnect loads 2. Initialize tester power supply for DRV blocks, 24Vdc with low linear current limitation preventing DUT damages 3. Connect input power supply only to PSD0-inputs 4. Turn ON tester power supply and measure PSD0 current 5. Connect input power supply only to PSD1-inputs 6. Turn ON tester power supply and measure PSD1 current 7. Connect input power supply only to PSD2-inputs 8. Turn ON tester power supply and measure PSD2 current 9. Connect input power supply to all DRV inputs 10. Re-initialize input 24Vdc with high current limitation for rest of the test cases
Notes:	

Table 19 Purpose and procedure for Powering Drive blocks

WÄRTSILÄ

CCM30 Drive Input switching

8.11 Drive Input switching

Continue from the end state of the previous test.

Purpose	Verify both inputs. This test is mainly for returning units, were either input A/B side ORing diode or connector can be damaged.
Test procedure	1) Set bank0 channel 1 to continuous mode 2) Connect tester power supply to PSD0A 3) Turn ON bank0 channel 1 output (1A) 4) Measure input current of PSD0A 5) Measure voltage PSD0A 6) Switch input voltage from PSD0A to PSD0B 7) Measure input current of PSD0B 8) Measure voltage PSD0B 9) Repeat steps 1-7 to first drives of banks 1 and 2.
Notes:	

Table 21 Purpose and procedure for Drive Input switching

WÄRTSILÄ

CCM30 Drive Current mode test HSD

8.12 Drive Current mode test HSD

Continue from the end state of the previous test.

Purpose	Verify Drive Current regulation mode (HSD) functionality and short circuit protection. Also both A and B inputs will be verified
Test procedure	1) Connect external loads 2) Set DRV mode to HSD 3) Set DRV mode to Continuous mode 4) Set one DRV channel ON, current to 1.5 A 5) Measure DRV channel current via PTCL 6) Verify DRV channel current by tester 7) Verify input current for PSDxA and PSDxB separately 8) Set DRV channel OFF 9) Repeat steps 1-8 for all channels on DRV blocks 1-3
Notes	

Table 23 Purpose and procedure for Drive Current mode test HSD

WÄRTSILÄ

CCM30 Drive light Burn-in test Start-up

8.13 Drive light Burn-in test Start-up

Purpose	**DRV power block needs to be stressed with power.** **There are no traditional Burn-in requirements for product in production. This test case will stress all power blocks to verify soldering of high current component pin soldering and also thermal connection from components to bottom mechanical plate of DUT.** **Test will be executed in parallel with rest of the test cases. Testing time shall be 5 min**
Test procedure	1) Measure DRV temperature. If temperature is over 75 C, stop all tests. 2) Connect solenoid loads to all DRV channel outputs 3) Set DRV channels mode to HSD current profile mode 4) Set DRV current profiles to each channel so that each channel drives 8A current. 5) Measure each channel current and check that currents are in limits. 6) Keep currents in 8A for 5 minutes - Monitor Temperature of DRV channels (1S/s). - If temperature exceeds 75 C, stop all tests. - If temperature rises more than 35 C, stop burn-in test. 7) Measure each channel current and check that currents are in limits. 8) Set DRV channels OFF
Notes	Voltage stress has been verified on PCB level testing, for safety reasons only 24Vdc will be used on final testing to keep Final testing set-up simple. Bottom plate shall be cooled by FAN cooled profile and DUT will be pressed on top of it. Cooling profile heating can affect slightly to all parameter measurements in productions, when cooling profile will heat-up with first units of each batch testing. Each DRV input blocks shall have separate input current protection on tester side.

Table 25 Purpose and procedure for Drive light Burn-in test Start-up

CONFIDENTIAL

WÄRTSILÄ

CCM30 TEMP channel PT1000 mode test

8.14 TEMP channel PT1000 mode test

Purpose	**Verify that the temperature channels works in PT1000 mode with fixed resistor**
Test procedure	1) Set temperature mode to PT1000 2) Verify temperature sensor value ohm from channel X 3) Repeat steps 1 – 2 to all channels.
Notes	

Table 27 Purpose and procedure for TEMP channel PT1000 mode test

CONFIDENTIAL

WÄRTSILÄ

CCM30 TEMP channel TC mode test

8.15 TEMP channel TC mode test

Continue from the end state of the previous test. There are 12 temperature channels.

Purpose	Verify TEMP channel functionality with fixed input resistor (0V point)
Test procedure	1) Set TEMP channels mode to TC 2) Verify temperature sensor value from channel X 3) Repeat steps 1 – 2 to all channels.
Notes	**Note! To improve test stability this test is done before light burn in.**

Table 29 Purpose and procedure for TEMP channel TC mode test

CONFIDENTIAL

WÄRTSILÄ

CCM30 AI channel TC mode test

8.16 AI channel TC mode test

Continue from the end state of the previous test.

Purpose	Verify AI channel TC mode functionality with fixed resistor (0V)
Test procedure	1) Set AI channels mode to TC 2) Verify temperature sensor value from channel X 3) Repeat steps 1-2 for all channels
Notes	**Note! To improve test stability this test is done before light burn in.**

Table 31 Purpose and procedure for AI channel TC mode test

CONFIDENTIAL

WÄRTSILÄ

CCM30 AI channel mA mode test

8.17 AI channel mA mode test

Continue from the end state of the previous test.

Purpose	Verify AI mA mode functionality with one current point
Test procedure	1) Set AI channel to mA mode 2) Connect low current to input 3) Read value from AI channel 4) Connect high current to input 5) Read value from AI channel 6) Repeat steps 1-5 to all channels
Notes	PTCL command for mA mode: *AI:WIReX:Mode CL020* PTCL command for value reading: *AIX:VALue?*

Table 33 Purpose and procedure for AI channel mA mode test

WÄRTSILÄ

CCM30 AI channel Excitation output test

8.18 AI channel Excitation output test

Continue from the end state of the previous test.

Purpose	Verify excitation functionality of AI channels
Test procedure	1) Connect small resistive loads to excitation voltages 2) Disable excitation voltages via PTCL for all AI channels 3) Verify excitation voltages are not connected by DAQ 4) Enable excitation voltages 5) Verify excitation voltages by DAQ 6) Disable excitation voltages via PTCL for all AI channels
Notes:	PTCL command to set AI excitation OFF: AI:WIReX:EXCitation 0 PTCL command to set AI excitation ON: AI:WIReX:EXCitation 1

Table 35 Purpose and procedure for AI channel Excitation output test

CCM30 FAI channel Excitation output test

8.19 FAI channel Excitation output test

Continue from the end state of the previous test.

Purpose	To verify excitation functionality of FAI channels
Test procedure	1) Connect small resistive loads to excitation voltages 2) Disable excitation voltages via PTCL for all FAI channels 3) Verify excitation voltages are not connected by DAQ 4) Enable excitation voltages 5) Verify excitation voltages by DAQ 6) Disable excitation voltages via PTCL for all FAI channels
Notes:	PTCL command to set FAI excitation OFF: FAI:WIReX:EXCitation 0 PTCL command to set FAI excitation ON: FAI:WIReX:EXCitation 1

Table 37 Purpose and procedure for FAI channel Excitation output test

CCM30 FAI channel functionality test

8.20 FAI channel functionality test

Continue from the end state of the previous test.

Purpose	Verify current measurement functionality from FAI channels
Test procedure	1) Connect low current to input 2) Read value from FAI channel 3) Connect high current to input 4) Read value from FAI channel 5) Repeat steps 1-4 to all channels
Notes	All channels are tested parallel PTCL command for value reading: *FAIX:VALue?*

Table 39 Purpose and procedure for FAI channel functionality test

WÄRTSILÄ

CCM30 FDI channel Excitation output test

8.21 FDI channel Excitation output test

Continue from the end state of the previous test.

Purpose	To verify excitation functionality of FDI channels
Test procedure	1) Connect small resistive loads to excitation voltages 2) Set FDI trigger levels so that Excitation ON state should trigger FDI 3) Disable excitation voltages via PTCL for all FDI channels 4) Verify excitation voltages are not connected by DAQ 5) Verify FDI state by ptcl 6) Enable excitation voltages 7) Verify excitation voltages by DAQ 8) Verify FDI state by ptcl 9) Disable excitation voltages via PTCL for all FDI channels
Notes:	PTCL command to set FDI excitation OFF: FDI:WIReX:EXCitation 0 PTCL command to set FDI excitation ON: FDI:WIReX:EXCitation 1

Table 41 Purpose and procedure for FDI channel Excitation output test

CONFIDENTIAL

WÄRTSILÄ

CCM30 FDI channel raise and falling slope triggering level test

8.22 FDI channel raise and falling slope triggering level test

Continue from the end state of the previous test.

Purpose	Verify that slope triggering levels are within specified limits
Test procedure	1) Set rising trigger value to 1.9V 2) Set falling trigger value to 1.5V 3) Generate square pulse by DAQ 4) Verify raising and falling slope detection from DUT. 5) Set rising trigger value to 2.1V 6) Set falling trigger value to 1.5V 7) Generate square pulse by DAQ 8) Verify raising and falling slope are not detected by DUT.
NOTES	Note. FDI needs an extra pulse before actual test.

Table 43 Purpose and procedure for FDI channel raise and falling slope triggering level test

CONFIDENTIAL

WÄRTSILÄ

CCM30 Piezo channel test

8.23 Piezo channel test

Continue from the end state of the previous test.

Purpose	Verify PIEZO Vpp measurement functionality
Test procedure	1) Generate 1kHz 0.5Vpp sine wave signal to PIEZO inputs 2) Set Piezo sampling rate to 10 000 3) Enable Piezo amplitude measurements 4) Read Piezo amplitude 5) Disable Piezo amplitude measurements 6) Repeat steps 1 – 5 for all channels.
Notes	PTCL command for set sampling rate: PIEZo*X*:AMEAsurement:FREQ 10000 PTCL command for enabling measurements: PIEZo*X*:AMEAsurement:ENABle 1 PTCL command for reading amplitude value: *PIEZoX:AMEAsurement:AMPlitude?* PTCL command for disabling measurements: PIEZo*X*:AMEAsurement:ENABle 0

Table 45 Purpose and procedure for Piezo channel test

CONFIDENTIAL

WÄRTSILÄ

CCM30 HSR communication loop-back test

8.24 HSR communication loop-back test

Continue from the end state of the previous test.

Purpose	To verify basic IO functionality of HSR communication by test data packet generator and validator in PTCL, which sends data and validates received data and counts received valid data packets
Test procedure	1) Turn PHY2 link up 2) Ping 192.168.0.20 (MOXA)
Notes:	DUT FPGA is configured to act as Ethernet switch between HSR1 and HSR2. HSR1 is connected to tester PC and HSR2 is connected to MOXA converter which can answer to icmp ping. MOXA address is 192.168.0.20 When tester PC sends ping to192.168.0.20, DUT routes request through both HRS-connections to MOXA, which replies request. This way both HSR-connections get tested.

Table 47 Purpose and procedure for HSR communication loop-back test

CONFIDENTIAL

CCM30 CAN communication loop-back test

8.25 CAN communication loop-back test

Continue from the end state of the previous test.

Purpose	**To verify basic IO functionality of CAN ports by test data packet generator and validator in PTCL, which sends data and validates received data and counts received valid data packets**
Test procedure	1) Turn ON test data packet generator and validator for CAN1 and CAN2 via PTCL 2) Wait 3 seconds 3) Read sent data count from CAN1 and CAN2 4) Read verified received data count from CAN1 and CAN2
Notes:	CAN 1 is connected to CAN2.

Table 49 Purpose and procedure for CAN communication loop-back test

CCM30 LED test case

8.26 LED test case

Continue from the end state of the previous test.

Purpose	**To verify LED functionalities**
Test procedure	1) Set White LED ON 2) Confirm LED operation from test operator
Notes:	PTCL command to set LED ON: :LED:SYSState:TESt 1

Table 51 Purpose and procedure for LED test case

Appendix 2: COM-10 test report

UUT Report

Station ID:	**W-FINAL-001**
Serial Number:	**1942860332**
Date:	**18. helmikuuta 2025**
Time:	**19:18:11**
Operator:	**administrator**
Execution Time:	**278.9461799 seconds**
Number of Results:	**250**
UUT Result:	**Passed**

Begin Sequence: MainSequence
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

TEST DUT code and version check	
Status:	Passed
TEST Powering DUT	
Status:	Passed
Module Time:	5.06165

Begin Sequence: TEST (8.3) Powering DUT
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Check for PE AC capasitor	
Status:	Passed
Measurement:	0.8642904825884
Units:	volt rms
Limits:	
Low:	0.5
High:	1
Comparison Type:	GELE (>= <=)
Module Time:	0.0448802
Check for PE DC short circuit	
Status:	Passed
Measurement:	2.710306980999
Units:	volt
Limits:	
Low:	1.5
High:	2.75
Comparison Type:	GELE (>= <=)
Module Time:	0.0166414
Measure startup input current	
Status:	Passed
Measurement:	0.1423
Units:	ampere
Limits:	
Low:	0.1
High:	0.4
Comparison Type:	GELE (>= <=)

End Sequence: TEST (8.3) Powering DUT

TEST Input current consumption and USB	
Status:	Passed
Module Time:	24.4060403

Begin Sequence: TEST (8.4) Input current consumption and USB
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Open PTCL	
Status:	Passed

Measure input current	
Status:	Passed
Measurement:	0.457
Limits:	
Low:	0.3
High:	0.75
Comparison Type:	GELE (>= <=)
TEST USB	
Status:	Passed

End Sequence: TEST (8.4) Input current consumption and USB

TEST Read serial numbers of PCBs and save results	
Status:	Passed
Module Time:	0.1328185

Begin Sequence: TEST (8.5) Read serial numbers of PCBs and save results
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Validate board A serial number	
Status:	Passed
Module Time:	0.0005632
1930845041	
Validate board B serial number	
Status:	Passed
Module Time:	0.0003374
1935875542	

End Sequence: TEST (8.5) Read serial numbers of PCBs and save results

TEST Save product individual data	
Status:	Passed
Module Time:	3.9270805

Begin Sequence: TEST (8.6) Save product individual data
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

HW revision found	
Status:	Done

Save Product Individual Data Wait until values stored	
Status:	Passed
Save Product Individual Data Wait until values loaded	
Status:	Passed
Save Product Individual Data CStatus1	
Status:	Passed
String:	OK
Limits:	
String:	OK
Comparison Type:	Ignore Case
Verify HW revision	
Status:	Passed
100600	
Verify production week	
Status:	Passed
42	
Verify production year	
Status:	Passed
19	
Verify serial number	
Status:	Passed
1942860332	

End Sequence: TEST (8.6) Save product individual data

TEST Power supply input switching and input measurements	
Status:	Passed
Module Time:	8.6211298

Begin Sequence: TEST (8.7) Power supply input switching and input measurements
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Measure PSS1 current	
Status:	Passed
Measurement:	0.468
Units:	ampere
Limits:	
Low:	0.3
High:	0.75
Comparison Type:	GELE (>= <=)
Module Time:	0.0454588
Verify PSS1 current measurement	
Status:	Passed
Measurement:	-0.01
Units:	ampere
Limits:	
Low:	-0.05
High:	0.05
Comparison Type:	GELE (>= <=)
Measure PSS1 input voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	21.6
High:	26.4
Comparison Type:	GELE (>= <=)
Module Time:	0.0463646
Verify PSS1 voltage measurement	
Status:	Passed
Measurement:	0.078
Units:	volt
Limits:	
Low:	-0.15
High:	0.15
Comparison Type:	GELE (>= <=)
Measure PSS2 current	
Status:	Passed
Measurement:	0.469
Limits:	
Low:	0.3
High:	0.75
Comparison Type:	GELE (>= <=)
Module Time:	0.0381457
Verify PSS2 current measurement	
Status:	Passed
Measurement:	-0.0054
Units:	ampere
Limits:	
Low:	-0.05
High:	0.05
Comparison Type:	GELE (>= <=)
Measure PSS2 input voltage	
Status:	Passed
Measurement:	24.001
Units:	volt

Limits:	
Low:	21.6
High:	26.4
Comparison Type:	GELE (>= <=)
Module Time:	0.0353572
Verify PSS2 voltage measurement	
Status:	Passed
Measurement:	0.0278
Units:	volt
Limits:	
Low:	-0.15
High:	0.15
Comparison Type:	GELE (>= <=)

End Sequence: TEST (8.7) Power supply input switching and input measurements

TEST Calibration values logging	
Status:	Passed
Module Time:	2.9227115

Begin Sequence: TEST (8.9) Calibration values logging
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

ADI1 current gain	
Status:	Done
0.012553	
ADI1 current offset	
Status:	Done
-32.715000	
ADI2 current gain	
Status:	Done
0.012511	
ADI2 current offset	
Status:	Done
26.934900	
ADI3 current gain	
Status:	Done
0.012739	
ADI3 current offset	
Status:	Done
-13.319000	
ADI4 current gain	
Status:	Done
0.012689	
ADI4 current offset	
Status:	Done
-43.735100	
ADO1 current gain	
Status:	Done
0.009167	
ADO1 current offset	
Status:	Done
-44.804000	
ADO2 current gain	
Status:	Done
0.009044	
ADO2 current offset	
Status:	Done
-48.692100	
ADO3 current gain	
Status:	Done
0.009136	

ADO3 current offset	
Status:	Done
-16.397900	
ADO4 current gain	
Status:	Done
0.009019	
ADO4 current offset	
Status:	Done
-41.624300	
AI1 current gain	
Status:	Done
0.012643	
AI1 current offset	
Status:	Done
-6.748630	
AI2 current gain	
Status:	Done
0.012632	
AI2 current offset	
Status:	Done
-8.770480	
AI1 voltage gain	
Status:	Done
10.843100	
AI1 voltage offset	
Status:	Done
-10480.000000	
AI2 voltage gain	
Status:	Done
10.833400	
AI2 voltage offset	
Status:	Done
-5359.280000	
FDI1 FT gain	
Status:	Done
13.658203	
FDI1 FT offset	
Status:	Done
-7125.209961	
FDI2 FT gain	
Status:	Done
13.602539	
FDI2 FT offset	
Status:	Done
-6990.339844	
FDI3 FT gain	
Status:	Done
13.610352	
FDI3 FT offset	
Status:	Done
-6845.579102	
FDI4 FT gain	
Status:	Done
13.529297	
FDI4 FT offset	
Status:	Done
-6860.549805	
FDI1 RT gain	
Status:	Done
13.615234	

FDI1 RT offset	
Status:	Done
-7016.009766	
FDI2 RT gain	
Status:	Done
13.527344	
FDI2 RT offset	
Status:	Done
-6588.019531	
FDI3 RT gain	
Status:	Done
13.535156	
FDI3 RT offset	
Status:	Done
-6890.539063	
FDI4 RT gain	
Status:	Done
13.481445	
FDI4 RT offset	
Status:	Done
-6825.679688	

AO current calibration 20mA GAIN	
Status:	Done
0.067762	
AO current calibration 20mA OFFSET	
Status:	Done
-898.499000	
AO current calibration 200mA GAIN	
Status:	Done
0.067328	
AO current calibration 200mA OFFSET	
Status:	Done
-803.004000	
PSS1 measurement GAIN	
Status:	Done
0.011917	
PSS1 measurement OFFSET	
Status:	Done
411.673000	
PSS2 measurement GAIN	
Status:	Done
0.011945	
PSS2 measurement OFFSET	
Status:	Done
352.353000	
Internal current measurement GAIN	
Status:	Done
0.002805	
Internal current measurement OFFSET	
Status:	Done
62.881500	

End Sequence: TEST (8.9) Calibration values logging

TEST Software version logging	
Status:	Passed
Module Time:	0.1757862

Begin Sequence: TEST (8.10) Software version logging
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Bootloader1 SW version	
Status:	Done
U-Boot2010.06-R08(Jan192018-09:43:44)MPC83XX	
HAL version	
Status:	Done
8.3.4	
Bootloader2 SW version	
Status:	Skipped
Diagnostics SW version	
Status:	Done
2.10.000	

End Sequence: TEST (8.10) Software version logging

TEST DO and DI Loopback test	
Status:	Passed
Module Time:	3.9719289

Begin Sequence: TEST (8.11) DO and DI loopback test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read DI Vector 0 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0521639
Read DI Vector 0 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0536442
Read DI Vector 0 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0500749
Read DI Vector 0 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512062
Read DI Vector 0 CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513304
Read DI Vector 1 CH 1	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0517899

Read DI Vector 1 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0508742
Read DI Vector 1 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512517
Read DI Vector 1 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513923
Read DI Vector 1 CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0527484
Read DI Vector 2 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0507288
Read DI Vector 2 CH 2	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0527039
Read DI Vector 2 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510056
Read DI Vector 2 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513013
Read DI Vector 2 CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0514101
Read DI Vector 3 CH 1	

Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0505304
Read DI Vector 3 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510799
Read DI Vector 3 CH 3	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0512944
Read DI Vector 3 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0527316
Read DI Vector 3 CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0511576
Read DI Vector 4 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0531857
Read DI Vector 4 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510238
Read DI Vector 4 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.051405
Read DI Vector 4 CH 4	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0513533
Read DI Vector 4 CH 5	
Status:	Passed

Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513499
Read DI Vector 5 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0519066
Read DI Vector 5 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0514727
Read DI Vector 5 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0507579
Read DI Vector 5 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512749
Read DI Vector 5 CH 5	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0513478

Read DI Safe State CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0530957
Read DI Safe State CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0508712
Read DI Safe State CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513831
Read DI Safe State CH 4	
Status:	Passed

Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510464
Read DI Safe State CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513482

End Sequence: TEST (8.11) DO and DI loopback test

TEST ADO and ADI mA loopback test	
Status:	Passed
Module Time:	6.5034615

Begin Sequence: TEST (8.12) ADO and ADI mA loop-back test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read ADI Reference Value on ADO 0mA CH 1	
Status:	Passed
Measurement:	21862
Units:	microampere
Limits:	
Low:	21000
High:	23000
Comparison Type:	GELE (>= <=)
Module Time:	0.0523634
Read ADI Reference Value on ADO 0mA CH 2	
Status:	Passed
Measurement:	21878
Units:	microampere
Limits:	
Low:	21000
High:	23000
Comparison Type:	GELE (>= <=)
Module Time:	0.053146
Read ADI Reference Value on ADO 0mA CH 3	
Status:	Passed
Measurement:	21919
Units:	microampere
Limits:	
Low:	21000
High:	23000
Comparison Type:	GELE (>= <=)
Module Time:	0.050711
Read ADI Reference Value on ADO 0mA CH 4	
Status:	Passed
Measurement:	21873
Units:	microampere
Limits:	
Low:	21000
High:	23000
Comparison Type:	GELE (>= <=)
Module Time:	0.0508784

Read ADI Value Change 4mA Vector 0 CH 1	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200

High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0534834
Read ADI Value Change 4mA Vector 0 CH 2	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.053302
Read ADI Value Change 4mA Vector 0 CH 3	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511798
Read ADI Value Change 4mA Vector 0 CH 4	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0526006
Read ADI Value Change 4mA Vector 1 CH 1	
Status:	Passed
Measurement:	3600
Units:	microampere
Limits:	
Low:	3436
High:	3836
Comparison Type:	GELE (>= <=)
Module Time:	0.0527015
Read ADI Value Change 4mA Vector 1 CH 2	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0514741
Read ADI Value Change 4mA Vector 1 CH 3	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511035
Read ADI Value Change 4mA Vector 1 CH 4	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200

Comparison Type:	GELE (>= <=)
Module Time:	0.0511134
Read ADI Value Change 4mA Vector 2 CH 1	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0508571
Read ADI Value Change 4mA Vector 2 CH 2	
Status:	Passed
Measurement:	3598
Units:	microampere
Limits:	
Low:	3436
High:	3836
Comparison Type:	GELE (>= <=)
Module Time:	0.0528647
Read ADI Value Change 4mA Vector 2 CH 3	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0520147
Read ADI Value Change 4mA Vector 2 CH 4	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511993
Read ADI Value Change 4mA Vector 3 CH 1	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0509187
Read ADI Value Change 4mA Vector 3 CH 2	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511473
Read ADI Value Change 4mA Vector 3 CH 3	
Status:	Passed
Measurement:	3633
Units:	microampere
Limits:	
Low:	3436
High:	3836
Comparison Type:	GELE (>= <=)

Module Time:	0.0503894
Read ADI Value Change 4mA Vector 3 CH 4	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0505321
Read ADI Value Change 4mA Vector 4 CH 1	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511754
Read ADI Value Change 4mA Vector 4 CH 2	
Status:	Passed
Measurement:	0
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0520301
Read ADI Value Change 4mA Vector 4 CH 3	
Status:	Passed
Measurement:	10
Units:	microampere
Limits:	
Low:	-200
High:	200
Comparison Type:	GELE (>= <=)
Module Time:	0.0511531
Read ADI Value Change 4mA Vector 4 CH 4	
Status:	Passed
Measurement:	3629
Units:	microampere
Limits:	
Low:	3436
High:	3836
Comparison Type:	GELE (>= <=)
Module Time:	0.0513218

End Sequence: TEST (8.12) ADO and ADI mA loop-back test

TEST ADO and ADI digital loopback test	
Status:	Passed
Module Time:	4.5055975

Begin Sequence: TEST (8.13) ADO and ADI digital loop-back test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read ADI DI Mode Vector 0 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0535782
Read ADI DI Mode Vector 0 CH 2	

Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.050773
Read ADI DI Mode Vector 0 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0500592
Read ADI DI Mode Vector 0 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0539844
Read ADI DI Mode Vector 1 CH 1	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0517591
Read ADI DI Mode Vector 1 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512753
Read ADI DI Mode Vector 1 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0527682
Read ADI DI Mode Vector 1 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0514323
Read ADI DI Mode Vector 2 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0533421
Read ADI DI Mode Vector 2 CH 2	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0500684
Read ADI DI Mode Vector 2 CH 3	
Status:	Passed

Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0514399
Read ADI DI Mode Vector 2 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512524
Read ADI DI Mode Vector 3 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.050801
Read ADI DI Mode Vector 3 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512445
Read ADI DI Mode Vector 3 CH 3	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0514098
Read ADI DI Mode Vector 3 CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0514666
Read ADI DI Mode Vector 4 CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0507302
Read ADI DI Mode Vector 4 CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513116
Read ADI DI Mode Vector 4 CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513181
Read ADI DI Mode Vector 4 CH 4	
Status:	Passed
Measurement:	1

Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0511446

Read ADI DI Mode Cleanup CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0536603
Read ADI DI Mode Cleanup CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510091
Read ADI DI Mode Cleanup CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0513721
Read ADI DI Mode Cleanup CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0524733

End Sequence: TEST (8.13) ADO and ADI digital loop-back test

TEST AO and AI loopback test	
Status:	Passed
Module Time:	3.2805322

Begin Sequence: TEST (8.14) AO and AI loop-back test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read 4mA AI CH 1	
Status:	Passed
Measurement:	3971
Units:	microampere
Limits:	
Low:	3800
High:	4200
Comparison Type:	GELE (>= <=)
Module Time:	0.0532264
Read 4mA AI CH 2	
Status:	Passed
Measurement:	3970
Units:	microampere
Limits:	
Low:	3800
High:	4200
Comparison Type:	GELE (>= <=)
Module Time:	0.0509796

Read AO FeedBack ADC 4mA	
Status:	Passed

Measurement:	2954
Units:	microampere
Limits:	
Low:	2450
High:	5000
Comparison Type:	GELE (>= <=)
Module Time:	0.0535973

Read 20mA AI CH 1	
Status:	Passed
Measurement:	19977
Units:	microampere
Limits:	
Low:	19800
High:	20200
Comparison Type:	GELE (>= <=)
Module Time:	0.0531867
Read 20mA AI CH 2	
Status:	Passed
Measurement:	19978
Units:	microampere
Limits:	
Low:	19800
High:	20200
Comparison Type:	GELE (>= <=)
Module Time:	0.0522847

Read AO FeedBack ADC 20mA	
Status:	Passed
Measurement:	16137
Units:	microampere
Limits:	
Low:	15000
High:	25000
Comparison Type:	GELE (>= <=)
Module Time:	0.0523131

End Sequence: TEST (8.14) AO and AI loop-back test

TEST FDO and FDI loop-back test	
Status:	Passed
Module Time:	3.9330154

Begin Sequence: TEST (8.15) FDO and FDI loop-back test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read FDI Off CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0529414
Read FDI Off CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.050799
Read FDI Off CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0

Comparison Type:	EQ (==)
Module Time:	0.0529294
Read FDI Off CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.051665
Read FDI On CH 1	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.068701
Read FDI On CH 2	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0519836
Read FDI On CH 3	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0515015
Read FDI On CH 4	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0510645
Read FDI No Trigg CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0533602
Read FDI No Trigg CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0533961
Read FDI No Trigg CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0506087
Read FDI No Trigg CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)

Module Time:	0.0515004

End Sequence: TEST (8.15) FDO and FDI loop-back test

TEST Excitation voltage test	
Status:	Passed
Module Time:	2.4524891

Begin Sequence: TEST (8.16) Excitation voltage test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Read FDI Excitation Off V CH 1	
Status:	Passed
Measurement:	0.008257299906817
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1062958
Read FDI Excitation Off V CH 2	
Status:	Passed
Measurement:	0.008244812552754
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1053096
Read FDI Excitation Off V CH 3	
Status:	Passed
Measurement:	0.008274226406753
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1053113
Read FDI Excitation Off V CH 4	
Status:	Passed
Measurement:	0.008280542265013
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1052494
Read FDI Excitation On V CH 1	
Status:	Passed
Measurement:	22.90494442104
Units:	volt
Limits:	
Low:	20
High:	26
Comparison Type:	GELE (>= <=)
Module Time:	0.1057325
Read FDI Excitation On V CH 2	
Status:	Passed
Measurement:	22.91877810013
Units:	volt
Limits:	
Low:	20
High:	26
Comparison Type:	GELE (>= <=)

Module Time:	0.104862
Read FDI Excitation On V CH 3	
Status:	Passed
Measurement:	22.65093271068
Units:	volt
Limits:	
Low:	20
High:	26
Comparison Type:	GELE (>= <=)
Module Time:	0.1048887
Read FDI Excitation On V CH 4	
Status:	Passed
Measurement:	22.65636425439
Units:	volt
Limits:	
Low:	20
High:	26
Comparison Type:	GELE (>= <=)
Module Time:	0.1048877

End Sequence: TEST (8.16) Excitation voltage test

TEST ETH communication loopback test	
Status:	Passed
Module Time:	70.7361095

Begin Sequence: TEST (8.17) HSR communication loopback test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Wait	
Status:	Done
Wait	
Status:	Done
Open Extra HSR PTCL connection	
Status:	Passed
Module Time:	0.0243741
Test PHY4	
Status:	Passed
Module Time:	16.3644714

Begin Sequence: MEAS (8.17) HSR Communication Loopback Test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

PHY4 Loopback Setup 1	
Status:	Passed
PHY4 Loopback PHY4 Up	
Status:	Passed
up	
PHY4 Loopback PHY2 Up	
Status:	Passed
up	
PHY4 Loopback Setup 2	
Status:	Passed
PHY4 Loopback Test	
Status:	Passed
Tx = 97, Rx = 96	

End Sequence: MEAS (8.17) HSR Communication Loopback Test

Test PHY1	
Status:	Passed
Module Time:	15.7990807

Begin Sequence: MEAS (8.17) HSR Communication Loopback Test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

PHY1 Loopback Setup 1	
Status:	Passed
PHY1 Loopback PHY1 Up	
Status:	Passed
up	
PHY1 Loopback PHY3 Up	
Status:	Passed
up	
PHY1 Loopback Setup 2	
Status:	Passed
PHY1 Loopback Test	
Status:	Passed
Tx = 92, Rx = 91	

End Sequence: MEAS (8.17) HSR Communication Loopback Test

Test PHY3	
Status:	Passed
Module Time:	17.2954761

Begin Sequence: MEAS (8.17) HSR Communication Loopback Test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

PHY3 Loopback Setup 1	
Status:	Passed
PHY3 Loopback PHY3 Up	
Status:	Passed
up	
PHY3 Loopback PHY1 Up	
Status:	Passed
up	
PHY3 Loopback Setup 2	
Status:	Passed
PHY3 Loopback Test	
Status:	Passed
Tx = 107, Rx = 106	

End Sequence: MEAS (8.17) HSR Communication Loopback Test

Test PHY2	
Status:	Passed
Module Time:	16.8018483

Begin Sequence: MEAS (8.17) HSR Communication Loopback Test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

PHY2 Loopback Setup 1	
Status:	Passed
PHY2 Loopback PHY2 Up	
Status:	Passed
up	
PHY2 Loopback PHY4 Up	
Status:	Passed
up	
PHY2 Loopback Setup 2	

Status:	Passed
PHY2 Loopback Test	
Status:	Passed
Tx = 102, Rx = 100	

End Sequence: MEAS (8.17) HSR Communication Loopback Test

Set PHY1 Link Up	
Status:	Done
Module Time:	0.1038837
1	
Set PHY2 Link Up	
Status:	Done
Module Time:	0.1030443
1	
Set PHY3 Link Up	
Status:	Done
Module Time:	0.1029109
1	
Set PHY4 Link Up	
Status:	Done
Module Time:	0.1041017
1	

End Sequence: TEST (8.17) HSR communication loopback test

TEST CAN communication loopback test	
Status:	Passed
Module Time:	13.5859878

Begin Sequence: TEST (8.18) CAN communication loopback test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Data Count (CAN1 -> CAN2)	
Status:	Passed
CAN1 Tx = 1085, CAN2 Rx = 1085	
Data Count (CAN2 -> CAN1)	
Status:	Passed
CAN2 Tx = 1086, CAN1 Rx = 1086	
Data Count (CAN3 -> CAN4)	
Status:	Passed
CAN3 Tx = 1086, CAN4 Rx = 1086	
Data Count (CAN4 -> CAN3)	
Status:	Passed
CAN4 Tx = 1086, CAN3 Rx = 1086	

End Sequence: TEST (8.18) CAN communication loopback test

TEST RS-485 communication test_2	
Status:	Passed
Module Time:	13.2690605

Begin Sequence: TEST (8.19) RS-485 communication test_2
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Initialize Connection	
Status:	Passed
Module Time:	0.6236199
login send succesfully	
Send-Received data	
Status:	Passed
DataReceived:	#

Module Time:	1.4054145
Sends the command successfully	
Send-Received data	
Status:	Passed
DataReceived:	#
Module Time:	1.2161646
Sends the command successfully	
Close Connection	
Status:	Passed
Module Time:	0.0002987
close session	
RS485 from UUT to Tester	
Status:	Passed
UUT Sent #: 16. Tester received #: 15	
RS485 from UUT to Tester	
Status:	Passed
Tester Sent #: 10. UUT received #: 10	

End Sequence: TEST (8.19) RS-485 communication test_2

TEST LED test	
Status:	Passed
Module Time:	103.8667387

Begin Sequence: TEST (8.20) LED test
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Led Color	
Status:	Passed
String:	White
Limits:	
String:	White
Comparison Type:	Ignore Case

End Sequence: TEST (8.20) LED test

TEST Diagnostic information logging	
Status:	Passed
Module Time:	6.6465171

Begin Sequence: TEST (8.8) Diagnostic information logging
(C:\Procket\Wartsila\Production testing\COM-10 Final Tester\TS\COM-10 Final Tester HWID1001 Unlimited (1).seq)

Record diagnostic information	
Status:	Done
(0x00806680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 0, signal: exc overcurrent, (0x00826680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 1, signal: exc overcurrent, (0x00846680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 2, signal: exc overcurrent, (0x00866680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 3, signal: exc overcurrent, (0x01c06680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 0, signal: no sync, (0x01c26680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 1, signal: no sync, (0x01c46680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 2, signal: no sync, (0x01c66680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 3, signal: no sync, (0x01c86680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 4, signal: no sync, (0x00000680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: DO, wire: 0, signal: wire fault, (0x00020680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: DO, wire: 1, signal: wire fault, (0x00040680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: DO, wire: 2, signal: wire fault, (0x00060680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault	

event, faultev: fault detected, group: DO, wire: 3, signal: wire fault, (0x00080680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: DO, wire: 4, signal: wire fault, (0x00001680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: ADO, wire: 0, signal: wire fault, (0x00021680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: ADO, wire: 1, signal: wire fault, (0x00041680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: ADO, wire: 2, signal: wire fault, (0x00061680) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: ADO, wire: 3, signal: wire fault, (0x00001c00) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: DMCU, class: sysstate change, sysstate: error, (0x00000400) pos: 0, time: -1077193336, modtype: COM10, modid: 0, source: DMCU, class: sysstate change, sysstate: power failure, Total msg count: 109

End Sequence: TEST (8.8) Diagnostic information logging

ACT Test sequence cleanup	
Status:	Passed
Module Time:	0.2066047

End Sequence: MainSequence

End UUT Report

Appendix 3: CCM-30 test report

UUT Report

Station ID:	**W-FINAL-001**
Serial Number:	**NONE**
Date:	**27. helmikuuta 2025**
Time:	**13:17:20**
Operator:	**administrator**
Execution Time:	**590.3217804 seconds**
Number of Results:	**751**
UUT Result:	**Passed**

Begin Sequence: MainSequence
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

TEST UUT code and version check	
Status:	Passed
Module Time:	0.0088513

Begin Sequence: TEST (8.1) UUT code and version check
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Sequence File Version	
Status:	Done
1.0.1.11	
Check Product Type and Version	
Status:	Passed
Module Time:	0.0081282

Begin Sequence: TEST Final Tester code and version check
(C:\Procket\Wartsila\Production testing\Common\TS\UNICv2 PROD Common.seq)

Verify Product Code	
Status:	Passed
Verify Material Code	
Status:	Passed
Verify HW Revision	
Status:	Passed

End Sequence: TEST Final Tester code and version check

End Sequence: TEST (8.1) UUT code and version check

TEST Powering DUT	
Status:	Passed
Module Time:	4.981981

Begin Sequence: TEST (8.2) Powering DUT
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Check for PE AC capasitor	
Status:	Passed
Measurement:	0.6672775275126
Units:	volt rms
Limits:	
Low:	0.2
High:	1
Comparison Type:	GELE (>= <=)
Module Time:	0.0228216
Check for PE DC short circuit	

Status:	Passed
Measurement:	2.676312126733
Units:	volt
Limits:	
Low:	2
High:	2.75
Comparison Type:	GELE (>= <=)
Module Time:	0.0159331
Measure DUT Vin Startup_1	
Status:	Passed
Module Time:	0.0308502
Measure DUT Vin Startup_2	
Status:	Passed
Module Time:	0.0444051
Measure startup input current	
Status:	Passed
Measurement:	0.1484
Units:	ampere
Limits:	
Low:	0.07
High:	0.35
Comparison Type:	GELE (>= <=)

End Sequence: TEST (8.2) Powering DUT

TEST Input current consumption	
Status:	Passed
Module Time:	41.2012618

Begin Sequence: TEST (8.3) Input current consumption
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Open PTCL	
Status:	Passed
Module Time:	1.131065
Measure DUT current consumption	
Status:	Passed
Measurement:	0.371
Units:	ampere
Limits:	
Low:	0.3
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.0392549

End Sequence: TEST (8.3) Input current consumption

TEST Read serial numbers of PCBs and save results	
Status:	Passed
TEST Power supply input switching and input measurements	
Status:	Passed
Module Time:	6.8720998

Begin Sequence: TEST (8.7) Power supply input switching and input measurements
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure PSS1 current consumption	
Status:	Passed
Measurement:	0.374
Units:	ampere
Limits:	

Low:	0.1
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.0328017
Verify PSS1 current measurement	
Status:	Passed
Measurement:	-0.006
Units:	ampere
Limits:	
Low:	-0.05
High:	0.05
Comparison Type:	GELE (>= <=)
Measure PSS1 input voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	21.6
High:	26.4
Comparison Type:	GELE (>= <=)
Module Time:	0.0466543
Verify PSS1 voltage measurement	
Status:	Passed
Measurement:	0.064
Units:	volt
Limits:	
Low:	-0.1
High:	0.3
Comparison Type:	GELE (>= <=)
Measure PSS2 current consumption	
Status:	Passed
Measurement:	0.375
Units:	ampere
Limits:	
Low:	0.1
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.0350827
Verify PSS2 current measurement	
Status:	Passed
Measurement:	-0.005
Units:	ampere
Limits:	
Low:	-0.05
High:	0.05
Comparison Type:	GELE (>= <=)
Measure PSS2 input voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	21.6
High:	26.4
Comparison Type:	GELE (>= <=)
Module Time:	0.0386397
Verify PSS2 voltage measurement	
Status:	Passed
Measurement:	0.056
Units:	volt
Limits:	
Low:	-0.1
High:	0.3

Comparison Type:	GELE (>= <=)

End Sequence: TEST (8.7) Power supply input switching and input measurements

TEST Powering drive blocks	
Status:	Passed
Module Time:	11.2295268

Begin Sequence: TEST (8.10) Powering drive blocks
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Input current on P3 and P4	
Status:	Passed
Measurement:	0.375
Units:	ampere
Limits:	
Low:	0.01
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.0409097
Input current on P5 and P6	
Status:	Passed
Measurement:	0.378
Units:	ampere
Limits:	
Low:	0.01
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.034813
Input current on P7 and P8	
Status:	Passed
Measurement:	0.374
Units:	ampere
Limits:	
Low:	0.01
High:	0.5
Comparison Type:	GELE (>= <=)
Module Time:	0.0379187

End Sequence: TEST (8.10) Powering drive blocks

TEST Drive input switching	
Status:	Passed
Module Time:	27.0932285

Begin Sequence: TEST (8.11) Drive input switching
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV Drive Input Switching Test Setup	
Status:	Passed
PSD0 Input Switching Drv Init	
Status:	Passed
PSD0A Input Switching Current Delta	
Status:	Passed
Initial Current: 0.373 Delta: 0.034	
PSD0A Input Switching LSD Current	
Status:	Passed
Measurement:	1.004389
Units:	ampere
Limits:	
Low:	0.8

High:	1.2
Comparison Type:	GELE (>= <=)
PSD0A Input Switching Voltage	
Status:	Passed
24.001	
PSD0A Input Switching ptcl Voltage Accuracy 1	
Status:	Passed
Measurement:	0.0802
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)
ptcl value: 23.9208	
PSD0B Input Switching ptcl Voltage 1	
Status:	Passed
0.759	
PSD0B Input Switching Current Delta	
Status:	Passed
Initial Current: 0.373 Delta: 0.034	
PSD0B Input Switching LSD Current	
Status:	Passed
Measurement:	1.008368
Units:	ampere
Limits:	
Low:	0.8
High:	1.2
Comparison Type:	GELE (>= <=)
PSD0B Input Switching Voltage	
Status:	Passed
24.001	
PSD0A Input Switching ptcl Voltage 2	
Status:	Passed
0.735	
PSD0B Input Switching ptcl Voltage Accuracy 2	
Status:	Passed
Measurement:	0.0806
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)
ptcl value: 23.9204	
PSD1 Input Switching Drv Init	
Status:	Passed
PSD1A Input Switching Current Delta	
Status:	Passed
Initial Current: 0.375 Delta: 0.031	
PSD1A Input Switching LSD Current	
Status:	Passed
Measurement:	1.00373
Units:	ampere
Limits:	
Low:	0.8
High:	1.2
Comparison Type:	GELE (>= <=)
PSD1A Input Switching Voltage	
Status:	Passed
24.001	
PSD1A Input Switching ptcl Voltage Accuracy 1	

Status:	Passed
Measurement:	0.0868
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)
ptcl value: 23.9142	

PSD1B Input Switching ptcl Voltage 1	
Status:	Passed
0.703	

PSD1B Input Switching Current Delta	
Status:	Passed
Initial Current: 0.375 Delta: 0.03	

PSD1B Input Switching LSD Current	
Status:	Passed
Measurement:	1.003295
Units:	ampere
Limits:	
Low:	0.8
High:	1.2
Comparison Type:	GELE (>= <=)

PSD1B Input Switching Voltage	
Status:	Passed
24.001	

PSD1A Input Switching ptcl Voltage 2	
Status:	Passed
0.697	

PSD1B Input Switching ptcl Voltage Accuracy 2	
Status:	Passed
Measurement:	0.0726
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)
ptcl value: 23.9284	

PSD2 Input Switching Drv Init	
Status:	Passed

PSD2A Input Switching Current Delta	
Status:	Passed
Initial Current: 0.403 Delta: 0.004	

PSD2A Input Switching LSD Current	
Status:	Passed
Measurement:	1.001439
Units:	ampere
Limits:	
Low:	0.8
High:	1.2
Comparison Type:	GELE (>= <=)

PSD2A Input Switching Voltage	
Status:	Passed
24.001	

PSD2A Input Switching ptcl Voltage Accuracy 1	
Status:	Passed
Measurement:	0.06939999999999
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)

ptcl value: 23.9316	
PSD2B Input Switching ptcl Voltage 1	
Status:	Passed
0.67	
PSD2B Input Switching Current Delta	
Status:	Passed
Initial Current: 0.403 Delta: 0.006	
PSD2B Input Switching LSD Current	
Status:	Passed
Measurement:	1.000566
Units:	ampere
Limits:	
Low:	0.8
High:	1.2
Comparison Type:	GELE (>= <=)
PSD2B Input Switching Voltage	
Status:	Passed
24.001	
PSD2A Input Switching ptcl Voltage 2	
Status:	Passed
0.71	
PSD2B Input Switching ptcl Voltage Accuracy 2	
Status:	Passed
Measurement:	0.08689999999999
Units:	volt
Limits:	
Low:	-1.5
High:	1
Comparison Type:	GELE (>= <=)
ptcl value: 23.9141	

End Sequence: TEST (8.11) Drive input switching

TEST Drive current mode test	
Status:	Passed
Module Time:	152.603896

Begin Sequence: TEST (8.12) Drive current mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV Drive Current Mode Test Setup	
Status:	Passed
DRV 1 Current Mode	
Status:	Passed
Module Time:	10.3185998

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV1 HSD Current Mode Test Setup	
Status:	Passed
DRV1 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.051	
DRV1 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.501288
Units:	ampere
Limits:	
Low:	1.2

High:	1.8
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.569724
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.945	
DRV1 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.759	
DRV1 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.051	
DRV1 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.502173
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.569306
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV1 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.735	
DRV1 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.874	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 2 Current Mode

Status:	Passed
Module Time:	10.3223132

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV2 HSD Current Mode Test Setup	
Status:	Passed

DRV2 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.05	

DRV2 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.499382
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV2 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.557609
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV2 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)

DRV2 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.945	

DRV2 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.759	

DRV2 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.051	

DRV2 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.500716
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV2 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.560271
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV2 HSD CURR PSDB Input Voltage

Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV2 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.735	
DRV2 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.932	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 3 Current Mode	
Status:	Passed
Module Time:	10.3154767

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV3 HSD Current Mode Test Setup	
Status:	Passed
DRV3 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.045	
DRV3 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.49224
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV3 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.544043
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV3 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV3 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.886	
DRV3 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.76	
DRV3 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.045	

DRV3 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.493128
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV3 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.542397
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV3 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)

DRV3 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.735	

DRV3 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.932	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 4 Current Mode	
Status:	Passed
Module Time:	10.3203313

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV4 HSD Current Mode Test Setup	
Status:	Passed

DRV4 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.051	

DRV4 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.500041
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV4 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.574218
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV4 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV4 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.828	
DRV4 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.76	
DRV4 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.049	
DRV4 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.500484
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV4 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.572574
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV4 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV4 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.736	
DRV4 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.874	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 5 Current Mode	
Status:	Passed
Module Time:	10.3232871

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV5 HSD Current Mode Test Setup	
Status:	Passed
DRV5 HSD CURR PSDA Input Current Delta	
Status:	Passed

Initial Current: 0.379 Delta: 0.051	
DRV5 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.502729
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.557598
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.886	
DRV5 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.76	
DRV5 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.051	
DRV5 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.503627
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.557181
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV5 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.736	

DRV5 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.874	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 6 Current Mode	
Status:	Passed
Module Time:	10.3174214

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV6 HSD Current Mode Test Setup	
Status:	Passed
DRV6 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.054	
DRV6 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.50154
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.544887
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.887	
DRV6 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.76	
DRV6 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.054	
DRV6 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.502423
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDB HSD Current	
Status:	Passed

Measurement:	1.548563
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV6 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.736	
DRV6 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.932	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 7 Current Mode	
Status:	Passed
Module Time:	10.3193906

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV7 HSD Current Mode Test Setup	
Status:	Passed
DRV7 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.054	
DRV7 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.502676
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.553199
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed

23.891	
DRV7 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.704	
DRV7 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.378 Delta: 0.054	
DRV7 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.500466
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.555066
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV7 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.698	
DRV7 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.882	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 8 Current Mode	
Status:	Passed
Module Time:	10.3164249

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV8 HSD Current Mode Test Setup	
Status:	Passed
DRV8 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.048	
DRV8 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.501595
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDA HSD Current	

Status:	Passed
Measurement:	1.562785
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.892	
DRV8 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.762	
DRV8 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.051	
DRV8 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.502923
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.563815
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV8 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.698	
DRV8 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.824	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 9 Current Mode	
Status:	Passed
Module Time:	10.3262055

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV9 HSD Current Mode Test Setup	
Status:	Passed

DRV9 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.049	

DRV9 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.504829
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV9 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.555975
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV9 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)

DRV9 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.892	

DRV9 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.704	

DRV9 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.049	

DRV9 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.505273
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)

DRV9 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.558039
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)

DRV9 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	

Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV9 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.698	
DRV9 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.94	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 10 Current Mode	
Status:	Passed
Module Time:	10.3174094

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV10 HSD Current Mode Test Setup	
Status:	Passed
DRV10 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.049	
DRV10 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.501007
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.570493
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.892	
DRV10 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.704	
DRV10 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.048	
DRV10 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.500133
Units:	ampere

Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.570093
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV10 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.698	
DRV10 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.882	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 11 Current Mode	
Status:	Passed
Module Time:	10.3203593

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV11 HSD Current Mode Test Setup	
Status:	Passed
DRV11 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.051	
DRV11 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.494891
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.553474
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt

Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.921	
DRV11 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.671	
DRV11 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.051	
DRV11 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.496649
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.549762
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV11 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.712	
DRV11 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.862	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 12 Current Mode	
Status:	Passed
Module Time:	10.3232744

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV12 HSD Current Mode Test Setup	
Status:	Passed
DRV12 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.055	
DRV12 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.498162

Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.550247
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.862	
DRV12 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.671	
DRV12 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.379 Delta: 0.054	
DRV12 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.498609
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.54839
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV12 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.712	
DRV12 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.92	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 13 Current Mode	
Status:	Passed
Module Time:	10.3193975

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV13 HSD Current Mode Test Setup	
Status:	Passed
DRV13 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.052	
DRV13 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.500699
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.535595
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.921	
DRV13 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.671	
DRV13 HSD CURR PSDB Input Current Delta	
Status:	Passed
Initial Current: 0.381 Delta: 0.052	
DRV13 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.501146
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.537668
Units:	ampere
Limits:	
Low:	1
High:	1.8

Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV13 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.712	
DRV13 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.862	

End Sequence: MEAS (8.12) Drive current mode test HSD

DRV 14 Current Mode	
Status:	Passed
Module Time:	10.3144772

Begin Sequence: MEAS (8.12) Drive current mode test HSD
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV14 HSD Current Mode Test Setup	
Status:	Passed
DRV14 HSD CURR PSDA Input Current Delta	
Status:	Passed
Initial Current: 0.382 Delta: 0.051	
DRV14 HSD CURR PSDA LSD Current	
Status:	Passed
Measurement:	1.49994
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDA HSD Current	
Status:	Passed
Measurement:	1.548658
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDA Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDA Input PSDA ptcl Voltage 1	
Status:	Passed
23.862	
DRV14 HSD CURR PSDA Input PSDB ptcl Voltage 1	
Status:	Passed
0.672	
DRV14 HSD CURR PSDB Input Current Delta	

Status:	Passed
Initial Current: 0.382 Delta: 0.051	
DRV14 HSD CURR PSDB LSD Current	
Status:	Passed
Measurement:	1.499491
Units:	ampere
Limits:	
Low:	1.2
High:	1.8
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDB HSD Current	
Status:	Passed
Measurement:	1.547426
Units:	ampere
Limits:	
Low:	1
High:	1.8
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDB Input Voltage	
Status:	Passed
Measurement:	24.001
Units:	volt
Limits:	
Low:	23
High:	25
Comparison Type:	GELE (>= <=)
DRV14 HSD CURR PSDB Input PSDA ptcl Voltage 2	
Status:	Passed
0.712	
DRV14 HSD CURR PSDB Input PSDB ptcl Voltage 2	
Status:	Passed
23.862	

End Sequence: MEAS (8.12) Drive current mode test HSD

End Sequence: TEST (8.12) Drive current mode test

TEST TEMP channel TC mode test	
Status:	Passed
Module Time:	5.0725681

Begin Sequence: TEST (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

TEMP TC Mode Test Setup	
Status:	Passed
Temp 1 THK Mode	
Status:	Passed
Module Time:	0.0546186

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp1 THK Mode Channel Value	
Status:	Passed
Measurement:	175
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 2 THK Mode	
Status:	Passed
Module Time:	0.0517364

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp2 THK Mode Channel Value	
Status:	Passed
Measurement:	178
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 3 THK Mode	
Status:	Passed
Module Time:	0.0518459

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp3 THK Mode Channel Value	
Status:	Passed
Measurement:	172
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 4 THK Mode	
Status:	Passed
Module Time:	0.0531202

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp4 THK Mode Channel Value	
Status:	Passed
Measurement:	177
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 5 THK Mode	
Status:	Passed
Module Time:	0.0546169

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp5 THK Mode Channel Value	
Status:	Passed
Measurement:	162
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 6 THK Mode	
Status:	Passed
Module Time:	0.0530832

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp6 THK Mode Channel Value	
Status:	Passed
Measurement:	165
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 7 THK Mode	
Status:	Passed
Module Time:	0.0518216

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp7 THK Mode Channel Value	
Status:	Passed
Measurement:	177
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 8 THK Mode	
Status:	Passed
Module Time:	0.053167

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp8 THK Mode Channel Value	
Status:	Passed
Measurement:	181

Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 9 THK Mode	
Status:	Passed
Module Time:	0.0519738

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp9 THK Mode Channel Value	
Status:	Passed
Measurement:	174
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 10 THK Mode	
Status:	Passed
Module Time:	0.0517449

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp10 THK Mode Channel Value	
Status:	Passed
Measurement:	179
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 11 THK Mode	
Status:	Passed
Module Time:	0.0518253

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp11 THK Mode Channel Value	
Status:	Passed
Measurement:	148
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Temp 12 THK Mode	
Status:	Passed
Module Time:	0.0545087

Begin Sequence: MEAS (8.15) TEMP channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp12 THK Mode Channel Value	
Status:	Passed
Measurement:	166
Units:	microvolt
Limits:	
Low:	60
High:	360
Comparison Type:	GELE (>= <=)

End Sequence: MEAS (8.15) TEMP channel TC mode test

Read TEMP CJ1 Sensor Element Type	
Status:	Passed
String:	couple-k
Limits:	
String:	couple-k
Comparison Type:	Ignore Case
Module Time:	0.0512426
couple-k	
Read TEMP CJ1 Sensor Element Temperature	
Status:	Passed
Measurement:	29.843
Limits:	
Low:	10
High:	50
Comparison Type:	GELE (>= <=)
Module Time:	0.0517576
29843	
Read TEMP CJ2 Sensor Element Type	
Status:	Passed
String:	couple-k
Limits:	
String:	couple-k
Comparison Type:	Ignore Case
Module Time:	0.0518941
couple-k	
Read TEMP CJ2 Sensor Element Temperature	
Status:	Passed
Measurement:	29.968
Limits:	
Low:	10
High:	50
Comparison Type:	GELE (>= <=)
Module Time:	0.0531222
29968	

End Sequence: TEST (8.15) TEMP channel TC mode test

TEST AI channel TC mode test	
Status:	Passed
Module Time:	1.9105013

Begin Sequence: TEST (8.16) AI channel TC mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Read AI1 TC Sensor Value	
Status:	Passed
Measurement:	20
Units:	microvolt
Limits:	
Low:	-170
High:	410
Comparison Type:	GELE (>= <=)

Read AI2 TC Sensor Value	
Status:	Passed
Measurement:	22
Units:	microvolt
Limits:	
Low:	-170
High:	410
Comparison Type:	GELE (>= <=)

Read AI3 TC Sensor Value	
Status:	Passed
Measurement:	32
Units:	microvolt
Limits:	
Low:	-170
High:	410
Comparison Type:	GELE (>= <=)

Read AI4 TC Sensor Value	
Status:	Passed
Measurement:	14
Units:	microvolt
Limits:	
Low:	-170
High:	410
Comparison Type:	GELE (>= <=)

Read AI5 TC Sensor Value	
Status:	Passed
Measurement:	23
Units:	microvolt
Limits:	
Low:	-170
High:	410
Comparison Type:	GELE (>= <=)

Read AI CJ Element	
Status:	Passed
String:	couple-k
Limits:	
String:	couple-k
Comparison Type:	Ignore Case
Module Time:	0.0517011
couple-k	

Read AI CJ Temperature	
Status:	Passed
Measurement:	29.843
Limits:	
Low:	10
High:	50
Comparison Type:	GELE (>= <=)
Module Time:	0.0518188
29843	

End Sequence: TEST (8.16) AI channel TC mode test

Start TEST Drive light burn-in test	
Status:	Done

Module Time:	0.0027977
TEST TEMP channel PT1000 mode test	
Status:	Passed
Module Time:	1.856512

Begin Sequence: TEST (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp 1 PT1000 Mode	
Status:	Passed
Module Time:	0.1530588

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp1 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198689
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0502667

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 2 PT1000 Mode	
Status:	Passed
Module Time:	0.1555855

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp2 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2199615
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0516902

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 3 PT1000 Mode	
Status:	Passed
Module Time:	0.1530722

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp3 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198308
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000

Comparison Type:	GELE (>= <=)
Module Time:	0.0517963

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 4 PT1000 Mode	
Status:	Passed
Module Time:	0.152884

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp4 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198931
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0516912

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 5 PT1000 Mode	
Status:	Passed
Module Time:	0.1556844

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp5 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2197821
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0517189

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 6 PT1000 Mode	
Status:	Passed
Module Time:	0.1556735

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp6 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198500
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0516957

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 7 PT1000 Mode	
Status:	Passed
Module Time:	0.1556615

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp7 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2197855
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0531017

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 8 PT1000 Mode	
Status:	Passed
Module Time:	0.1530766

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp8 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198852
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0518137

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 9 PT1000 Mode	
Status:	Passed
Module Time:	0.155603

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp9 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2198192
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0517234

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 10 PT1000 Mode	
Status:	Passed

Module Time:	0.1557272

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp10 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2199661
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0543948

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 11 PT1000 Mode	
Status:	Passed
Module Time:	0.1528997

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp11 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2199958
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0503533

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

Temp 12 PT1000 Mode	
Status:	Passed
Module Time:	0.1558199

Begin Sequence: MEAS (8.14) TEMP channel PT1000 mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Temp12 PT1000 Mode Channel Value	
Status:	Passed
Measurement:	2199599
Units:	milliohm
Limits:	
Low:	2150000
High:	2250000
Comparison Type:	GELE (>= <=)
Module Time:	0.0516419

End Sequence: MEAS (8.14) TEMP channel PT1000 mode test

End Sequence: TEST (8.14) TEMP channel PT1000 mode test

TEST AI channel mA mode test	
Status:	Passed
Module Time:	3.5210857

Begin Sequence: TEST (8.17) AI channel mA mode test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

AI Channel mA Mode Test Setup	
Status:	Passed

Measure AI1 mA Mode Low Voltage	
Status:	Passed
Measurement:	1.423435943363
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1053072

Measure AI2 mA Mode Low Voltage	
Status:	Passed
Measurement:	1.422450027557
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1047785

Measure AI3 mA Mode Low Voltage	
Status:	Passed
Measurement:	1.423385438726
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1049387

Measure AI4 mA Mode Low Voltage	
Status:	Passed
Measurement:	1.423433792572
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1048589

Measure AI5 mA Mode Low Voltage	
Status:	Passed
Measurement:	1.424084716748
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1047837

Read AI1 mA Mode Channel Value Low	
Status:	Passed
Measurement:	5.621
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0531927

Read AI2 mA Mode Channel Value Low	
Status:	Passed
Measurement:	5.62

Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0516861

Read AI3 mA Mode Channel Value Low	
Status:	Passed
Measurement:	5.624
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.051814

Read AI4 mA Mode Channel Value Low	
Status:	Passed
Measurement:	5.624
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0518144

Read AI5 mA Mode Channel Value Low	
Status:	Passed
Measurement:	5.629
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0531735

Measure AI1 mA Mode High Voltage	
Status:	Passed
Measurement:	3.492421499329
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1052494

Measure AI2 mA Mode High Voltage	
Status:	Passed
Measurement:	3.490434963514
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1047563

Measure AI3 mA Mode High Voltage	
Status:	Passed
Measurement:	3.492882327623
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1047765

Measure AI4 mA Mode High Voltage	
Status:	Passed

Measurement:	3.492191091637
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1047795

Measure AI5 mA Mode High Voltage	
Status:	Passed
Measurement:	3.494055912889
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1047508

Read AI1 mA Mode Channel Value High	
Status:	Passed
Measurement:	13.905
Units:	milliampere
Limits:	
Low:	13.4
High:	14.6
Comparison Type:	GELE (>= <=)
Module Time:	0.0524409

Read AI2 mA Mode Channel Value High	
Status:	Passed
Measurement:	13.903
Units:	milliampere
Limits:	
Low:	13.4
High:	14.6
Comparison Type:	GELE (>= <=)
Module Time:	0.053011

Read AI3 mA Mode Channel Value High	
Status:	Passed
Measurement:	13.913
Units:	milliampere
Limits:	
Low:	13.4
High:	14.6
Comparison Type:	GELE (>= <=)
Module Time:	0.0518425

Read AI4 mA Mode Channel Value High	
Status:	Passed
Measurement:	13.917
Units:	milliampere
Limits:	
Low:	13.4
High:	14.6
Comparison Type:	GELE (>= <=)
Module Time:	0.0517141

Read AI5 mA Mode Channel Value High	
Status:	Passed
Measurement:	13.925
Units:	milliampere
Limits:	
Low:	13.4
High:	14.6
Comparison Type:	GELE (>= <=)
Module Time:	0.0505411

End Sequence: TEST (8.17) AI channel mA mode test

TEST AI channel excitation output test	
Status:	Passed
Module Time:	6.6381564

Begin Sequence: TEST (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

AI Channel Excitation Test Setup	
Status:	Passed
AI 1 Excitation	
Status:	Passed
Module Time:	0.9186292

Begin Sequence: MEAS (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure AI1 excitation voltage off	
Status:	Passed
Measurement:	0.02353677830247
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1052203
Measure AI1 excitation voltage on	
Status:	Passed
Measurement:	3.495338087654
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1051368

End Sequence: MEAS (8.18) AI channel excitation output test

AI 2 Excitation	
Status:	Passed
Module Time:	0.9170825

Begin Sequence: MEAS (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure AI2 excitation voltage off	
Status:	Passed
Measurement:	0.02340778306761
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050133
Measure AI2 excitation voltage on	
Status:	Passed
Measurement:	3.494575046052
Units:	volt
Limits:	
Low:	3
High:	4.5

Comparison Type:	GELE (>= <=)
Module Time:	0.1051601

End Sequence: MEAS (8.18) AI channel excitation output test

AI 3 Excitation	
Status:	Passed
Module Time:	0.9183664

Begin Sequence: MEAS (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure AI3 excitation voltage off	
Status:	Passed
Measurement:	0.02310299360331
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050916
Measure AI3 excitation voltage on	
Status:	Passed
Measurement:	3.499440116656
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.105209

End Sequence: MEAS (8.18) AI channel excitation output test

AI 4 Excitation	
Status:	Passed
Module Time:	0.9169385

Begin Sequence: MEAS (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure AI4 excitation voltage off	
Status:	Passed
Measurement:	0.02268518431205
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050547
Measure AI4 excitation voltage on	
Status:	Passed
Measurement:	3.497765498637
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1050906

End Sequence: MEAS (8.18) AI channel excitation output test

AI 5 Excitation	
Status:	Passed
Module Time:	0.9170654

Begin Sequence: MEAS (8.18) AI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Measure AI5 excitation voltage off	
Status:	Passed
Measurement:	0.02270908911149
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050026
Measure AI5 excitation voltage on	
Status:	Passed
Measurement:	3.498240592191
Units:	volt
Limits:	
Low:	3
High:	4.5
Comparison Type:	GELE (>= <=)
Module Time:	0.1052025

End Sequence: MEAS (8.18) AI channel excitation output test

End Sequence: TEST (8.18) AI channel excitation output test

TEST FAI channel excitation output test	
Status:	Passed
Module Time:	4.9874621

Begin Sequence: TEST (8.19) FAI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI Channel Excitation Test Setup	
Status:	Passed
FAI 1 Excitation	
Status:	Passed
Module Time:	1.0182254

Begin Sequence: MEAS (8.19) FAI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI1 Excitation Off Voltage	
Status:	Passed
Measurement:	0.02352239654937
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.105082
FAI1 Excitation Off ptcl Current	
Status:	Passed
Measurement:	0.098
Units:	milliampere
Limits:	
Low:	0
High:	0.15

Comparison Type:	GELE (>= <=)
Module Time:	0.0523715
FAI1 Excitation On Voltage	
Status:	Passed
Measurement:	3.49273694134
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051231
FAI1 Excitation On ptcl Current	
Status:	Passed
Measurement:	13.955
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0519519

End Sequence: MEAS (8.19) FAI channel excitation output test

FAI 2 Excitation	
Status:	Passed
Module Time:	1.0208899

Begin Sequence: MEAS (8.19) FAI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI2 Excitation Off Voltage	
Status:	Passed
Measurement:	0.02357139815452
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1049948
FAI2 Excitation Off ptcl Current	
Status:	Passed
Measurement:	0.079
Units:	milliampere
Limits:	
Low:	0
High:	0.15
Comparison Type:	GELE (>= <=)
Module Time:	0.0512566
FAI2 Excitation On Voltage	
Status:	Passed
Measurement:	3.494551154037
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051683
FAI2 Excitation On ptcl Current	
Status:	Passed
Measurement:	13.962
Units:	milliampere
Limits:	

Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0533132

End Sequence: MEAS (8.19) FAI channel excitation output test

FAI 3 Excitation	
Status:	Passed
Module Time:	1.0168292

Begin Sequence: MEAS (8.19) FAI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI3 Excitation Off Voltage	
Status:	Passed
Measurement:	0.02418040699331
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050653
FAI3 Excitation Off ptcl Current	
Status:	Passed
Measurement:	0.09
Units:	milliampere
Limits:	
Low:	0
High:	0.15
Comparison Type:	GELE (>= <=)
Module Time:	0.0511037
FAI3 Excitation On Voltage	
Status:	Passed
Measurement:	3.49219815301
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051245
FAI3 Excitation On ptcl Current	
Status:	Passed
Measurement:	13.961
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0519013

End Sequence: MEAS (8.19) FAI channel excitation output test

FAI 4 Excitation	
Status:	Passed
Module Time:	1.0208691

Begin Sequence: MEAS (8.19) FAI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI4 Excitation Off Voltage

Status:	Passed
Measurement:	0.02286870062953
Units:	volt
Limits:	
Low:	-0.1
High:	0.1
Comparison Type:	GELE (>= <=)
Module Time:	0.1050201
FAI4 Excitation Off ptcl Current	
Status:	Passed
Measurement:	0.074
Units:	milliampere
Limits:	
Low:	0
High:	0.15
Comparison Type:	GELE (>= <=)
Module Time:	0.0511998
FAI4 Excitation On Voltage	
Status:	Passed
Measurement:	3.492079716462
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051115
FAI4 Excitation On ptcl Current	
Status:	Passed
Measurement:	13.955
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.052044

End Sequence: MEAS (8.19) FAI channel excitation output test

End Sequence: TEST (8.19) FAI channel excitation output test

TEST FAI channel functionality test	
Status:	Passed
Module Time:	3.0851266

Begin Sequence: TEST (8.20) FAI channel functionality test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FAI Channel Functionality Test Setup	
Status:	Passed
FAI1 Functionality Low Current Voltage	
Status:	Passed
Measurement:	1.421744348996
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1051464
FAI2 Functionality Low Current Voltage	
Status:	Passed
Measurement:	1.424048373624
Units:	volt
Limits:	

Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1047676
FAI3 Functionality Low Current Voltage	
Status:	Passed
Measurement:	1.42216328612
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1047837
FAI4 Functionality Low Current Voltage	
Status:	Passed
Measurement:	1.423415316525
Units:	volt
Limits:	
Low:	1
High:	2
Comparison Type:	GELE (>= <=)
Module Time:	0.1047518
FAI1 Functionality Low Current ptcl	
Status:	Passed
Measurement:	5.641
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0526534
FAI2 Functionality Low Current ptcl	
Status:	Passed
Measurement:	5.639
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0544037
FAI3 Functionality Low Current ptcl	
Status:	Passed
Measurement:	5.637
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0503858
FAI4 Functionality Low Current ptcl	
Status:	Passed
Measurement:	5.634
Units:	milliampere
Limits:	
Low:	5
High:	7
Comparison Type:	GELE (>= <=)
Module Time:	0.0517644
FAI1 Functionality High Current Voltage	
Status:	Passed
Measurement:	3.486156348829
Units:	volt

Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1050872
FAI2 Functionality High Current Voltage	
Status:	Passed
Measurement:	3.489112649172
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1047542
FAI3 Functionality High Current Voltage	
Status:	Passed
Measurement:	3.487868191164
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1048209
FAI4 Functionality High Current Voltage	
Status:	Passed
Measurement:	3.488546548242
Units:	volt
Limits:	
Low:	3
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1048021
FAI1 Functionality High Current ptcl	
Status:	Passed
Measurement:	13.928
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0513388
FAI2 Functionality High Current ptcl	
Status:	Passed
Measurement:	13.936
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0530856
FAI3 Functionality High Current ptcl	
Status:	Passed
Measurement:	13.935
Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0517802
FAI4 Functionality High Current ptcl	
Status:	Passed
Measurement:	13.946

Units:	milliampere
Limits:	
Low:	13
High:	15
Comparison Type:	GELE (>= <=)
Module Time:	0.0518195

End Sequence: TEST (8.20) FAI channel functionality test

TEST FDI channel excitation output test	
Status:	Passed
Module Time:	8.4044697

Begin Sequence: TEST (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI excitation Test Setup	
Status:	Passed
FDI 1	
Status:	Passed
Module Time:	1.0182329

Begin Sequence: MEAS (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI1 Excitation Off Voltage	
Status:	Passed
Measurement:	0.1518202098941
Units:	volt
Limits:	
Low:	-0.1
High:	0.2
Comparison Type:	GELE (>= <=)
Module Time:	0.1051577
FDI1 Excitation Off ptcl Input	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0509723
FDI1 Excitation On Voltage	
Status:	Passed
Measurement:	3.116249189597
Units:	volt
Limits:	
Low:	2
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1050707
FDI1 Excitation On ptcl Input	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0507167

End Sequence: MEAS (8.21) FDI channel excitation output test

FDI 2

Status:	Passed
Module Time:	1.0196321

Begin Sequence: MEAS (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI2 Excitation Off Voltage	
Status:	Passed
Measurement:	0.1522827969841
Units:	volt
Limits:	
Low:	-0.1
High:	0.2
Comparison Type:	GELE (>= <=)
Module Time:	0.1050954
FDI2 Excitation Off ptcl Input	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0539147
FDI2 Excitation On Voltage	
Status:	Passed
Measurement:	3.113657660645
Units:	volt
Limits:	
Low:	2
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051197
FDI2 Excitation On ptcl Input	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0519273

End Sequence: MEAS (8.21) FDI channel excitation output test

FDI 3	
Status:	Passed
Module Time:	1.0181556

Begin Sequence: MEAS (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI3 Excitation Off Voltage	
Status:	Passed
Measurement:	0.1517204834616
Units:	volt
Limits:	
Low:	-0.1
High:	0.2
Comparison Type:	GELE (>= <=)
Module Time:	0.1049849
FDI3 Excitation Off ptcl Input	
Status:	Passed
Measurement:	0
Limits:	

Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0511759
FDI3 Excitation On Voltage	
Status:	Passed
Measurement:	3.110196497168
Units:	volt
Limits:	
Low:	2
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1051361
FDI3 Excitation On ptcl Input	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0519212

End Sequence: MEAS (8.21) FDI channel excitation output test

FDI 4	
Status:	Passed
Module Time:	1.016847

Begin Sequence: MEAS (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI4 Excitation Off Voltage	
Status:	Passed
Measurement:	0.1519697671538
Units:	volt
Limits:	
Low:	-0.1
High:	0.2
Comparison Type:	GELE (>= <=)
Module Time:	0.1050047
FDI4 Excitation Off ptcl Input	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0512296
FDI4 Excitation On Voltage	
Status:	Passed
Measurement:	3.116470501426
Units:	volt
Limits:	
Low:	2
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.1052507
FDI4 Excitation On ptcl Input	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0517877

End Sequence: MEAS (8.21) FDI channel excitation output test

FDI 5	
Status:	Passed
Module Time:	1.0182089

Begin Sequence: MEAS (8.21) FDI channel excitation output test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI5 Excitation Off Voltage	
Status:	Passed
Measurement:	0.14697043713
Units:	volt
Limits:	
Low:	-0.1
High:	0.2
Comparison Type:	GELE (>= <=)
Module Time:	0.10508
FDI5 Excitation Off ptcl Input	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0511581
FDI5 Excitation On Voltage	
Status:	Passed
Measurement:	3.117237558542
Units:	volt
Limits:	
Low:	2
High:	4
Comparison Type:	GELE (>= <=)
Module Time:	0.105105
FDI5 Excitation On ptcl Input	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0506534

End Sequence: MEAS (8.21) FDI channel excitation output test

End Sequence: TEST (8.21) FDI channel excitation output test

TEST FDI channel raise and falling slope triggering level test	
Status:	Passed
Module Time:	5.3232056

Begin Sequence: TEST (8.22) FDI channel raise and falling slope triggering level test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup	
Status:	Passed
FDI 1	
Status:	Passed
Module Time:	0.6056545

Begin Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup on CH 1

Status:	Passed
FDI Slope Level Test Set RT To Trig on CH 1	
Status:	Passed
Module Time:	0.1031073
Rising Trigger level (PTCL) 1850	
FDI Slope Level Test Set FT on CH 1	
Status:	Passed
Module Time:	0.1009724
Falling Trigger level (PTCL) 1500	
FDI Slope Level Test Read FDI Off CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0507824
FDI Slope Level Test Read FDI On CH 1	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0518267
FDI Slope Level Test Set RT NO Trig on CH 1	
Status:	Passed
Module Time:	0.1023774
Rising Trigger level (PTCL) 1950	
FDI Slope Level Test Read FDI No Trigg CH 1	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.051386

End Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test

FDI 2	
Status:	Passed
Module Time:	0.6037523

Begin Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup on CH 2	
Status:	Passed
FDI Slope Level Test Set RT To Trig on CH 2	
Status:	Passed
Module Time:	0.1006514
Rising Trigger level (PTCL) 1850	
FDI Slope Level Test Set FT on CH 2	
Status:	Passed
Module Time:	0.1023213
Falling Trigger level (PTCL) 1500	
FDI Slope Level Test Read FDI Off CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.050831

FDI Slope Level Test Read FDI On CH 2	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0532529

FDI Slope Level Test Set RT NO Trig on CH 2	
Status:	Passed
Module Time:	0.1009327
Rising Trigger level (PTCL) 1950	

FDI Slope Level Test Read FDI No Trigg CH 2	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0511512

End Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test

FDI 3	
Status:	Passed
Module Time:	0.6058376

Begin Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test (C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup on CH 3	
Status:	Passed

FDI Slope Level Test Set RT To Trig on CH 3	
Status:	Passed
Module Time:	0.1028517
Rising Trigger level (PTCL) 1850	

FDI Slope Level Test Set FT on CH 3	
Status:	Passed
Module Time:	0.1009817
Falling Trigger level (PTCL) 1500	

FDI Slope Level Test Read FDI Off CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.05153

FDI Slope Level Test Read FDI On CH 3	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0516029

FDI Slope Level Test Set RT NO Trig on CH 3	
Status:	Passed
Module Time:	0.1023829
Rising Trigger level (PTCL) 1950	

FDI Slope Level Test Read FDI No Trigg CH 3	
Status:	Passed
Measurement:	0
Limits:	
Low:	0

Comparison Type:	EQ (==)
Module Time:	0.0514561

End Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test

FDI 4	
Status:	Passed
Module Time:	0.6066643

Begin Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test (C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup on CH 4	
Status:	Passed
FDI Slope Level Test Set RT To Trig on CH 4	
Status:	Passed
Module Time:	0.1007548
Rising Trigger level (PTCL) 1850	
FDI Slope Level Test Set FT on CH 4	
Status:	Passed
Module Time:	0.1036517
Falling Trigger level (PTCL) 1500	
FDI Slope Level Test Read FDI Off CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510366
FDI Slope Level Test Read FDI On CH 4	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.053241
FDI Slope Level Test Set RT NO Trig on CH 4	
Status:	Passed
Module Time:	0.1010097
Rising Trigger level (PTCL) 1950	
FDI Slope Level Test Read FDI No Trigg CH 4	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0520019

End Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test

FDI 5	
Status:	Passed
Module Time:	0.6081925

Begin Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test (C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

FDI Slope Level Test Setup on CH 5	
Status:	Passed
FDI Slope Level Test Set RT To Trig on CH 5	

Status:	Passed
Module Time:	0.1027032
Rising Trigger level (PTCL) 1850	
FDI Slope Level Test Set FT on CH 5	
Status:	Passed
Module Time:	0.1009413
Falling Trigger level (PTCL) 1500	
FDI Slope Level Test Read FDI Off CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0510277
FDI Slope Level Test Read FDI On CH 5	
Status:	Passed
Measurement:	1
Limits:	
Low:	1
Comparison Type:	EQ (==)
Module Time:	0.0517039
FDI Slope Level Test Set RT NO Trig on CH 5	
Status:	Passed
Module Time:	0.1023018
Rising Trigger level (PTCL) 1950	
FDI Slope Level Test Read FDI No Trigg CH 5	
Status:	Passed
Measurement:	0
Limits:	
Low:	0
Comparison Type:	EQ (==)
Module Time:	0.0539188

End Sequence: MEAS (8.22) FDI channel raise and falling slope triggering level test

End Sequence: TEST (8.22) FDI channel raise and falling slope triggering level test

TEST Piezo channel test	
Status:	Passed
Module Time:	3.4453393

Begin Sequence: TEST (8.23) Piezo channel test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Pietzo1 Amplitude	
Status:	Passed
Measurement:	493.469
Units:	millivolt
Limits:	
Low:	450
High:	550
Comparison Type:	GELE (>= <=)
Module Time:	0.0521374
Pietzo2 Amplitude	
Status:	Passed
Measurement:	496.534
Units:	millivolt
Limits:	
Low:	450
High:	550
Comparison Type:	GELE (>= <=)
Module Time:	0.0549645

Piezo3 Amplitude	
Status:	Passed
Measurement:	495.621
Units:	millivolt
Limits:	
Low:	450
High:	550
Comparison Type:	GELE (>= <=)
Module Time:	0.0523369
Piezo4 Amplitude	
Status:	Passed
Measurement:	496.592
Units:	millivolt
Limits:	
Low:	450
High:	550
Comparison Type:	GELE (>= <=)
Module Time:	0.0522958

End Sequence: TEST (8.23) Piezo channel test

TEST HSR communication loop-back test	
Status:	Passed
Module Time:	11.333311

Begin Sequence: TEST (8.24) HSR communication loop-back test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Set PHY Link Up	
Status:	Passed
Module Time:	0.1007288
Check PHY Link Up	
Status:	Passed
Module Time:	0.0518681
up	
HSR Communication loop-back test preparation	
Status:	Passed
Ping UUT	
Status:	Passed

End Sequence: TEST (8.24) HSR communication loop-back test

TEST CAN communication loop-back test	
Status:	Passed
Module Time:	4.5229793

Begin Sequence: TEST (8.25) CAN communication loop-back test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

CAN Communication loop-back test preparation	
Status:	Passed
Read Sent Data Count from CAN1	
Status:	Passed
Module Time:	0.0505452
321	
Read Sent Data Count from CAN2	
Status:	Passed
Module Time:	0.0530887
321	
Data Count CAN1	

Status:	Passed
CAN1 Tx = 321, CAN2 Rx = 321	
Data Count CAN2	
Status:	Passed
CAN2 Tx = 321, CAN1 Rx = 321	

End Sequence: TEST (8.25) CAN communication loop-back test

TEST Save product individual data	
Status:	Passed
Module Time:	13.5472216

Begin Sequence: TEST (8.6) Save product individual data
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

HW revision found	
Status:	Done

Save Product Individual Data 1 Wait until values stored	
Status:	Passed
Save Product Individual Data 1 Wait until values loaded	
Status:	Passed
Save Product Individual Data 1 CStatus1	
Status:	Passed
String:	OK
Limits:	
String:	OK
Comparison Type:	Ignore Case
Verify HW revision	
Status:	Passed
100703	
Verify production week	
Status:	Passed
26	
Verify production year	
Status:	Passed
22	
Verify serial number	
Status:	Passed
2226832305	

End Sequence: TEST (8.6) Save product individual data

TEST Calibration values logging	
Status:	Passed
Module Time:	10.6091571

Begin Sequence: TEST (8.8) Calibration values logging
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

AI1 VM Gain	
Status:	Done
3.61433	
AI1 MA Gain	
Status:	Done
0.014497	
AI1 THK Gain	
Status:	Done
0.035241	

AI2 VM Gain	
Status:	Done
3.62228	
AI2 MA Gain	
Status:	Done
0.014534	
AI2 THK Gain	
Status:	Done
0.035241	
AI3 VM Gain	
Status:	Done
3.62228	
AI3 MA Gain	
Status:	Done
0.014534	
AI3 THK Gain	
Status:	Done
0.035241	
AI4 VM Gain	
Status:	Done
3.62228	
AI4 MA Gain	
Status:	Done
0.014534	
AI4 THK Gain	
Status:	Done
0.035241	
AI5 VM Gain	
Status:	Done
3.62228	
AI5 MA Gain	
Status:	Done
0.014534	
AI5 THK Gain	
Status:	Done
0.035241	
FAI1 Gain	
Status:	Done
0.014553	
FAI2 Gain	
Status:	Done
0.014507	
FAI3 Gain	
Status:	Done
0.014588	
FAI4 Gain	
Status:	Done
0.014504	
FDI1 FT Gain	
Status:	Done
13.716797	
FDI1 RT Gain	
Status:	Done
13.554688	
FDI2 FT Gain	
Status:	Done
13.65625	
FDI2 RT Gain	

Status:	Done
13.710938	
FDI3 FT Gain	
Status:	Done
13.65918	
FDI3 RT Gain	
Status:	Done
13.714844	
FDI4 FT Gain	
Status:	Done
13.662109	
FDI4 RT Gain	
Status:	Done
13.607422	
FDI5 FT Gain	
Status:	Done
13.558594	
FDI5 RT Gain	
Status:	Done
13.613281	
Piezo1 Gain	
Status:	Done
0.530415	
Piezo2 Gain	
Status:	Done
0.532314	
Piezo3 Gain	
Status:	Done
0.531332	
Piezo4 Gain	
Status:	Done
0.530291	

TEMP1 THK Gain	
Status:	Done
0.035202	
TEMP2 THK Gain	
Status:	Done
0.035207	
TEMP3 THK Gain	
Status:	Done
0.035227	
TEMP4 THK Gain	
Status:	Done
0.035199	
TEMP5 THK Gain	
Status:	Done
0.035205	
TEMP6 THK Gain	
Status:	Done
0.035231	
TEMP7 THK Gain	
Status:	Done
0.035223	
TEMP8 THK Gain	
Status:	Done
0.035214	
TEMP9 THK Gain	
Status:	Done

0.035204

TEMP10 THK Gain	
Status:	Done
0.035224	

TEMP11 THK Gain	
Status:	Done
0.035254	

TEMP12 THK Gain	
Status:	Done
0.035203	

TEMP1 PT Gain	
Status:	Done
0.035202	

TEMP2 PT Gain	
Status:	Done
0.035207	

TEMP3 PT Gain	
Status:	Done
0.035227	

TEMP4 PT Gain	
Status:	Done
0.035199	

TEMP5 PT Gain	
Status:	Done
0.035205	

TEMP6 PT Gain	
Status:	Done
0.035231	

TEMP7 PT Gain	
Status:	Done
0.035223	

TEMP8 PT Gain	
Status:	Done
0.035214	

TEMP9 PT Gain	
Status:	Done
0.035204	

TEMP10 PT Gain	
Status:	Done
0.035224	

TEMP11 PT Gain	
Status:	Done
0.035254	

TEMP12 PT Gain	
Status:	Done
0.035203	

DRV1 AO Gain	
Status:	Done
9.11097	

DRV2 AO Gain	
Status:	Done
9.11329	

DRV3 AO Gain	
Status:	Done
9.04633	

DRV4 AO Gain	
Status:	Done
9.07857	

DRV5 AO Gain	
Status:	Done
9.05324	
DRV6 AO Gain	
Status:	Done
9.11642	
DRV7 AO Gain	
Status:	Done
9.1162	
DRV8 AO Gain	
Status:	Done
9.12576	
DRV9 AO Gain	
Status:	Done
9.04186	
DRV10 AO Gain	
Status:	Done
9.10471	
DRV11 AO Gain	
Status:	Done
9.07325	
DRV12 AO Gain	
Status:	Done
9.07307	
DRV13 AO Gain	
Status:	Done
9.0783	
DRV14 AO Gain	
Status:	Done
9.10132	
DRV1 HSD Gain	
Status:	Done
16.3282	
DRV2 HSD Gain	
Status:	Done
16.1021	
DRV3 HSD Gain	
Status:	Done
16.142	
DRV4 HSD Gain	
Status:	Done
16.1801	
DRV5 HSD Gain	
Status:	Done
16.2253	
DRV6 HSD Gain	
Status:	Done
16.0516	
DRV7 HSD Gain	
Status:	Done
16.3265	
DRV8 HSD Gain	
Status:	Done
16.1609	
DRV9 HSD Gain	
Status:	Done
16.2519	
DRV10 HSD Gain	

Status:	Done
16.0081	
DRV11 HSD Gain	
Status:	Done
16.2182	
DRV12 HSD Gain	
Status:	Done
16.2549	
DRV13 HSD Gain	
Status:	Done
16.3259	
DRV14 HSD Gain	
Status:	Done
16.1524	
DRV1 LSD Gain	
Status:	Done
11.6005	
DRV2 LSD Gain	
Status:	Done
11.565	
DRV3 LSD Gain	
Status:	Done
11.5151	
DRV4 LSD Gain	
Status:	Done
11.5605	
DRV5 LSD Gain	
Status:	Done
11.5875	
DRV6 LSD Gain	
Status:	Done
11.5521	
DRV7 LSD Gain	
Status:	Done
11.5943	
DRV8 LSD Gain	
Status:	Done
11.6296	
DRV9 LSD Gain	
Status:	Done
11.5595	
DRV10 LSD Gain	
Status:	Done
11.5331	
DRV11 LSD Gain	
Status:	Done
11.5572	
DRV12 LSD Gain	
Status:	Done
11.6364	
DRV13 LSD Gain	
Status:	Done
11.6224	
DRV14 LSD Gain	
Status:	Done
11.5937	

PSS1 Volt Gain	
Status:	Done

0.011848	
PSS2 Volt Gain	
Status:	Done
0.011828	
PSS Curr Gain	
Status:	Done
0.002609	
AI1 VM Offset	
Status:	Done
709.69	
AI1 MA Offset	
Status:	Done
4.43077	
AI1 THK Offset	
Status:	Done
-19016.5	
AI2 VM Offset	
Status:	Done
78.7695	
AI2 MA Offset	
Status:	Done
1.77987	
AI2 THK Offset	
Status:	Done
-19001	
AI3 VM Offset	
Status:	Done
-1407.49	
AI3 MA Offset	
Status:	Done
-4.62241	
AI3 THK Offset	
Status:	Done
-18985.7	
AI4 VM Offset	
Status:	Done
-209.321	
AI4 MA Offset	
Status:	Done
0.291043	
AI4 THK Offset	
Status:	Done
-19043.3	
AI5 VM Offset	
Status:	Done
1726.45	
AI5 MA Offset	
Status:	Done
8.30548	
AI5 THK Offset	
Status:	Done
-18987.2	
FAI1 Offset	
Status:	Done
27.331	
FAI2 Offset	
Status:	Done
8.56475	

FAI3 Offset	
Status:	Done
9.9597	

FAI4 Offset	
Status:	Done
4.15558	

FDI1 FT Offset	
Status:	Done
-7207.25	

FDI1 RT Offset	
Status:	Done
-6950.15918	

FDI2 FT Offset	
Status:	Done
-6860.469727	

FDI2 RT Offset	
Status:	Done
-6917.229492	

FDI3 FT Offset	
Status:	Done
-7067.829102	

FDI3 RT Offset	
Status:	Done
-7029.419922	

FDI4 FT Offset	
Status:	Done
-6876.979492	

FDI4 RT Offset	
Status:	Done
-6874.949219	

FDI5 FT Offset	
Status:	Done
-6740.699219	

FDI5 RT Offset	
Status:	Done
-6674.199219	

Piezo1 Offset	
Status:	Done
-663991	

Piezo2 Offset	
Status:	Done
-667342	

Piezo3 Offset	
Status:	Done
-665625	

Piezo4 Offset	
Status:	Done
-662379	

TEMP1 THK Offset	
Status:	Done
-19030.5	

TEMP2 THK Offset	
Status:	Done
-19001.8	

TEMP3 THK Offset	
Status:	Done
-19064.9	

TEMP4 THK Offset	
Status:	Done
-19053.6	
TEMP5 THK Offset	
Status:	Done
-19006.4	
TEMP6 THK Offset	
Status:	Done
-19039.8	
TEMP7 THK Offset	
Status:	Done
-19036	
TEMP8 THK Offset	
Status:	Done
-19007	
TEMP9 THK Offset	
Status:	Done
-18978.4	
TEMP10 THK Offset	
Status:	Done
-19019.3	
TEMP11 THK Offset	
Status:	Done
-19064.3	
TEMP12 THK Offset	
Status:	Done
-19001.1	
TEMP1 PT1000 Offset	
Status:	Done
-3583.8	
TEMP2 PT1000 Offset	
Status:	Done
-2315.67	
TEMP3 PT1000 Offset	
Status:	Done
-1968.82	
TEMP4 PT1000 Offset	
Status:	Done
-3453.08	
TEMP5 PT1000 Offset	
Status:	Done
-2920.84	
TEMP6 PT1000 Offset	
Status:	Done
-2555.71	
TEMP7 PT1000 Offset	
Status:	Done
-2122.8	
TEMP8 PT1000 Offset	
Status:	Done
22.2292	
TEMP9 PT1000 Offset	
Status:	Done
-1299.03	
TEMP10 PT1000 Offset	
Status:	Done
-2045.27	
TEMP11 PT1000 Offset	

Status:	Done
-2777.99	
TEMP12 PT1000 Offset	
Status:	Done
-1116.61	
DRV1 AO Offset	
Status:	Done
-1183080	
DRV2 AO Offset	
Status:	Done
-1178170	
DRV3 AO Offset	
Status:	Done
-1189300	
DRV4 AO Offset	
Status:	Done
-1182010	
DRV5 AO Offset	
Status:	Done
-1179070	
DRV6 AO Offset	
Status:	Done
-1203590	
DRV7 AO Offset	
Status:	Done
-1204990	
DRV8 AO Offset	
Status:	Done
-1223590	
DRV9 AO Offset	
Status:	Done
-1179670	
DRV10 AO Offset	
Status:	Done
-1145920	
DRV11 AO Offset	
Status:	Done
-1164780	
DRV12 AO Offset	
Status:	Done
-1224780	
DRV13 AO Offset	
Status:	Done
-1165440	
DRV14 AO Offset	
Status:	Done
-1184620	
DRV1 HSD Offset	
Status:	Done
-9989.83	
DRV2 HSD Offset	
Status:	Done
11024.2	
DRV3 HSD Offset	
Status:	Done
-8633.52	
DRV4 HSD Offset	
Status:	Done

3681.5	
DRV5 HSD Offset	
Status:	Done
-7019.55	
DRV6 HSD Offset	
Status:	Done
8452.55	
DRV7 HSD Offset	
Status:	Done
-14539	
DRV8 HSD Offset	
Status:	Done
-3640.1	
DRV9 HSD Offset	
Status:	Done
-6673.97	
DRV10 HSD Offset	
Status:	Done
-1880.51	
DRV11 HSD Offset	
Status:	Done
-1406.28	
DRV12 HSD Offset	
Status:	Done
6310.84	
DRV13 HSD Offset	
Status:	Done
-5547.94	
DRV14 HSD Offset	
Status:	Done
4178.35	
DRV1 LSD Offset	
Status:	Done
-806549	
DRV2 LSD Offset	
Status:	Done
-809328	
DRV3 LSD Offset	
Status:	Done
-806081	
DRV4 LSD Offset	
Status:	Done
-794598	
DRV5 LSD Offset	
Status:	Done
-783149	
DRV6 LSD Offset	
Status:	Done
-796745	
DRV7 LSD Offset	
Status:	Done
-810222	
DRV8 LSD Offset	
Status:	Done
-812612	
DRV9 LSD Offset	
Status:	Done
-804242	

DRV10 LSD Offset	
Status:	Done
-815985	
DRV11 LSD Offset	
Status:	Done
-806713	
DRV12 LSD Offset	
Status:	Done
-823238	
DRV13 LSD Offset	
Status:	Done
-811723	
DRV14 LSD Offset	
Status:	Done
-787792	

PSS1 Volt Offset	
Status:	Done
327.587	
PSS2 Volt Offset	
Status:	Done
414.179	
PSS Curr Offset	
Status:	Done
69.057	

End Sequence: TEST (8.8) Calibration values logging

TEST Software version logging	
Status:	Passed
Module Time:	0.1561587

Begin Sequence: TEST (8.9) Software version logging
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Bootloader1 SW version	
Status:	Done
U-Boot2010.06-R08(Jan192018-09:43:51)MPC83XX	
HAL version	
Status:	Done
8.3.4	
Bootloader2 SW version	
Status:	Skipped
Diagnostics SW version	
Status:	Done
2.10.000	

End Sequence: TEST (8.9) Software version logging

TEST LED test case	
Status:	Passed
Module Time:	136.1565371

Begin Sequence: TEST (8.26) LED test
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Led Color	
Status:	Passed
String:	White

Limits:	
String:	White
Comparison Type:	Ignore Case

End Sequence: TEST (8.26) LED test

TEST Drive light burn-in test	
Status:	Passed

Begin Sequence: TEST (8.13) Drive light burn-in test startup
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

DRV Light burn-in Start Temperature	
Status:	Passed
Measurement:	26.247
Units:	degrees Celsius
Limits:	
Low:	-10
High:	75
Comparison Type:	GELE (>= <=)
Module Time:	0.0602708
DRV Drive light burn-in test setup	
Status:	Passed
DRV Light burn-in Start Temperature _2	
Status:	Passed
Measurement:	26.462
Units:	degrees Celsius
Limits:	
Low:	-10
High:	75
Comparison Type:	GELE (>= <=)
Module Time:	0.059492

DRV1 Light burn-in Start Current	
Status:	Passed
Measurement:	7.955817
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0566556
DRV2 Light burn-in Start Current	
Status:	Passed
Measurement:	7.980404
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0526811
DRV3 Light burn-in Start Current	
Status:	Passed
Measurement:	7.983867
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514719
DRV4 Light burn-in Start Current	
Status:	Passed

Measurement:	7.990821
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0528567

DRV5 Light burn-in Start Current	
Status:	Passed
Measurement:	8.000295
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514455

DRV6 Light burn-in Start Current	
Status:	Passed
Measurement:	7.989774
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0516515

DRV7 Light burn-in Start Current	
Status:	Passed
Measurement:	7.97573
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514219

DRV8 Light burn-in Start Current	
Status:	Passed
Measurement:	7.986826
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.055781

DRV9 Light burn-in Start Current	
Status:	Passed
Measurement:	7.981306
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0552752

DRV10 Light burn-in Start Current	
Status:	Passed
Measurement:	7.988593
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514619

DRV11 Light burn-in Start Current

Status:	Passed
Measurement:	7.976646
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0529042

DRV12 Light burn-in Start Current	
Status:	Passed
Measurement:	7.981792
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515406

DRV13 Light burn-in Start Current	
Status:	Passed
Measurement:	7.968526
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515441

DRV14 Light burn-in Start Current	
Status:	Passed
Measurement:	7.961476
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514975

DRV1 Light burn-in End Current	
Status:	Passed
Measurement:	7.933082
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0573954

DRV2 Light burn-in End Current	
Status:	Passed
Measurement:	7.958316
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0526521

DRV3 Light burn-in End Current	
Status:	Passed
Measurement:	7.982144
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515673

DRV4 Light burn-in End Current	
Status:	Passed
Measurement:	7.984543
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515923

DRV5 Light burn-in End Current	
Status:	Passed
Measurement:	7.980954
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515865

DRV6 Light burn-in End Current	
Status:	Passed
Measurement:	7.97993
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0529641

DRV7 Light burn-in End Current	
Status:	Passed
Measurement:	7.952008
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0514938

DRV8 Light burn-in End Current	
Status:	Passed
Measurement:	7.970239
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515899

DRV9 Light burn-in End Current	
Status:	Passed
Measurement:	7.960536
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515927

DRV10 Light burn-in End Current	
Status:	Passed
Measurement:	7.966769
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)

Module Time:	0.0529224
DRV11 Light burn-in End Current	
Status:	Passed
Measurement:	7.950607
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515937
DRV12 Light burn-in End Current	
Status:	Passed
Measurement:	7.957696
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0515708
DRV13 Light burn-in End Current	
Status:	Passed
Measurement:	7.946682
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.051582
DRV14 Light burn-in End Current	
Status:	Passed
Measurement:	7.944487
Units:	ampere
Limits:	
Low:	7
High:	9
Comparison Type:	GELE (>= <=)
Module Time:	0.0529008

DRV Light burn-in End Temperature	
Status:	Passed
Measurement:	54.645
Units:	degrees Celsius
Limits:	
Low:	9
High:	75
Comparison Type:	GELE (>= <=)
Module Time:	0.0556811
DRV Light burn-in End Temperature Change	
Status:	Passed
Measurement:	28.183
Units:	degrees Celsius
Limits:	
Low:	5
High:	35
Comparison Type:	GELE (>= <=)
DRV Light burn-in Duration	
Status:	Passed
Measurement:	301.4215791613
Units:	second
Limits:	
Low:	280
High:	500

Comparison Type:	GELE (>= <=)
Start light burn-in cleanup	
Status:	Done
End light burn-in cleanup	
Status:	Done

End Sequence: TEST (8.13) Drive light burn-in test startup

TEST Diagnostic information logging	
Status:	Passed
Module Time:	16.9308869

Begin Sequence: TEST (8.5) Diagnostic information logging
(C:\Procket\Wartsila\Production testing\CCM-30 Final Tester\TS\CCM-30 Final Tester HWID1002 unlimited.seq)

Record diagnostic information	
Status:	Done
(0x01c06681) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 0, signal: no sync, (0x01c26681) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 1, signal: no sync, (0x01c46681) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 2, signal: no sync, (0x01c66681) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 3, signal: no sync, (0x01c86681) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO fault event, faultev: fault detected, group: FDI, wire: 4, signal: no sync, (0x00001c01) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: DMCU, class: sysstate change, sysstate: error, (0x00000401) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: DMCU, class: sysstate change, sysstate: power failure, (0x00000001) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: DMCU, class: sysstate change, sysstate: system power enabled, (0x02808181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 0, iomode: IDLE, (0x02828181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 1, iomode: IDLE, (0x02848181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 2, iomode: IDLE, (0x02868181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 3, iomode: IDLE, (0x02888181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 4, iomode: IDLE, (0x028a8181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 5, iomode: IDLE, (0x028c8181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 6, iomode: IDLE, (0x028e8181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 7, iomode: IDLE, (0x02908181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 8, iomode: IDLE, (0x02928181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 9, iomode: IDLE, (0x02948181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 10, iomode: IDLE, (0x02968181) pos: 0, time: -1080910264, modtype: CCM30, modid: 0, source: HALIO, class: IO control, ioctrl: channel mode set, group: DRV, wire: 11, iomode: IDLE, Total msg count: 324	

End Sequence: TEST (8.5) Diagnostic information logging

ACT Test sequence cleanup	
Status:	Passed
Module Time:	0.1542589

End Sequence: MainSequence

End UUT Report