Certificate No: TO.DEB.20-1963

TÜRK LOYDU

TYPE APPROVAL CERTIFICATE

This Certificate consists of 3 pages.

This is to certify that the

Engine Control Systems - Engine Room Components

With type designations

PCS-5 / ECS-5 / ECS-5 Blue Vision /ADEC-Uni

Manufactured by

MTU Friedrichshafen GmbH

Is found to comply with

TL Rules, Part E, Chapter 104 - Naval Ship Technology, Propulsion Plants January 2015, TL Rules, Part E, Chapter 105 - Naval Ship Technology, Electrical Installations January 2016, TL Rules, Part E, Chapter 106 - Naval Ship Technology, Automation January 2015, TL Rules, Part B, Chapter 5, Electric July 2019, TL Rules, Part B, Chapter 4-1, Automation July 2019, TL Rules, Part B, Chapter 4, Machinery January 2020.

Application	: Engine Control and Monitoring Systems, PCS Applications.
Design	: MTU Friedrichshafen GmbH
Sizes	: According to Approved Sizes.
Address of Manufacturer	: 88045 Friedrichshafen, Germany
Place and date	: İSTANBUL / 30.12.2021

Subject to the conditions referred to in the following pages, this certificate is valid until 10.12.2026

EMRAH SÖĞÜTÇÜ
New Building Division Manager



Product description : Control Systems, its Sensors and Switches.

Type Designation : PCS-5 / ECS-5 / ECS-5 Blue Vision /ADEC-Uni,

Materials used : Below sub components to be used ;

ECS-5, ECS-5 Blue Vision for MTU Engines Series 2000, 4000, 8000, 1164-04, 1600 Hardware Elements

Local Operating Panel : LOPl, LOP4, LOP8, LOP10, LOP11, LOP14, LOP15
Engine Monitoring Unit : EMU1, EMU2, EMU7, EMU8
Engine Control Unit : ECU4, ECU7, ECU9
Engine Interface Module : EIM2, EIM3, EIM5, EIM6
Standard Automation Module : SAM1
Gear Control and Monitoring Unit : GCU/GMUl, GCU 2,GCU 3,GCU 6
Monitoring Extension Unit : MEU1
Priming Pump Control : PPC, SUE-VSP
Terminal Box : X010, CCU2
Propeller Control and Monitoring Unit : PCMU
Filter Module : FIB
Extension Unit : EXU
Panel :EIL1
Remote Control System : DCM1

-ECS-Uni, ADEC-Uni for Engine 1163-03,396,595 1600 configured with following hardware elements;
Main and Back Up Engine Control Unit : ADEC UNI, ECS UNI
Engine Terminal Box : ETB2F, ETB4F
Customer Connecting Box : CCS-396, CCS-595, CCS-1163
Local Operating Panel : LOP ECS

-Sensor Descriptions :
Speed Sensors: 000 535 73 33, 000 535 74 33, 000 535 75 33, 000 535 76 33, X00E5 0208364
Hall Speed Sensor : 000 535 77 33
Exhaust Turbocharger Speed Sensors : 520 530 40 69 and 000 535 84 33
Pressure Sensors :
0-40 bar : 003 535 3231
±7 0 mbar : 003535 2231
0-200 mbar : 003 535 3131
0-4 bar : 003 535 2331
0-6 bar : 003 535 24 31, 004 535 88 31 and 004 535 89 31
0-10 bar : 003 535 25 31
0-15 bar : 003 535 30 31 and 003 535 17 31
0.5 - 4.5 bar (absolute) : 002 535 90 31 and 003 535 27 31
0-1600 bar : 003 535 39 31
0- 2000 bar : 003 535 29 31
Differential Pressure Switches :
l.8 bar : 001 535 91 02
2.2 bar : 001 535 96 02
Temperature Sensors :
NTC : 000 535 56 30
Bearing Temperature : 000 535 66 30
PT 1000 Exhaust Temperature : 000 535 57 30 and 000 535 59 30
PT 100 Exhaust Temperature NiCrNi : 000 535 99 60 and 000 535 72 30
Level Sensors : 000 535 51 03, 000 535 52 03, 000 535 53 03, 000 535 54 03
Oil Level Sensor : 000 535 49 03
PLD- Injector : Injector for engine series 2000
CR- Injector : Injector for engine series 4000 and 8000
Turbocharger Speed Sensor : 5205303269
Temperature Controllers: X00010488, X00E50203 785, X00E50208498

Application/ Limitation (Approval conditions) :

- Internal Combustion Engines itself, are out of the scope of this Approval.
- Individual Product Certification is required. In projects obliged to TL Rules, Engine Monitoring and Control Systems with the enlisted scope of materials, are also obliged to Product Certification.
- For each application, project documentations and software descriptions have to be submitted to TL for approval.
- Systems will be delivered with the relevant documentation for their maintenance and their operation.
- Any changes to the approved design parameters or construction including software version are to be intimated and approved by TL.
- If requirement of enclosure IP levels higher than the approved material, required IP level is to be complied with.

Documentation : Plan Approval Letters issued by TL :
PAE-EPAS/011015/20-1963/GTÇ 19.11.2021
PAE-EPAS/011033/20-1963/GTÇ 22.11.2021
PAE-EPAS/011173/20-1963/GTÇ 03.12.2021
PAE-EPAS/008399/20-1964/GTÇ 17.01.2021
PAE-EPAS/010787/20-1964/GTÇ 26.10.2021

Test carried out (and results) : Type Approval Tests Reports submitted by Designer :
3.8.7-2 3.8.7 - 2 ECS UNI CCS
3.8.7-3 EIM 05 EIM 06
3.8.7-5 EMU8
3.8.7-12 ECU9
3.8.7-16 INS P1A INS N1A
3.8.7-17 GCU GMU1
3.8.7-18 PCMU WJ
3.8.7-19 Terminal Box CB1
3.8.7-20 LOP1
20201117_ADEC-UNI 3.8.7-1
20201125_Pressure Sensors 3.8.7 - 24
20201125_sensors temperature 3.8.7 - 33
20201125_SpeedSensor 3.8.7 - 25
20201123_209-2014-ERGP-GR EIM IP Schutz_EIM2 3.8.7 - 39 (1)
20201124_5005353799_4_e_proximityswitch 3.8.7 - 8

-Additional Tests and Note :
Radiated radio frequency immunity test: frequency range from 80 MHz to 2 GHz for EMU 2, LOP 4, Bearing temperature sensors, hall speed sensors, oil level sensors and pressure sensors.
All sensors have been tested at -40°C (Low Temperature test for 16 hrs) and at 125°C (Dry heat test for 16 hrs).

Place of test carried out : MTU Friedrichshafen GmbH, 88045 Friedrichshafen, Germany.

Marking of product : The product to be marked same as below mentioned.
- Maker's name or trade mark.
- Equipment type or model identification.
- Serial number of the units.
- TL Product Certification Marking(s) for each individual shipset.

SERHAN OFLAS
Surveyor

This certificate is subject to terms and conditions described below:

- Any significant change in design or construction may render this Certificate invalid. Type Approval Certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. This certificate is not valid for products without marking above mentioned. The manufacturer should notify TÜRK LOYDU of any modifications or changes to the equipment in order to obtain valid certificate. This certificate shows that tested specimens as representative of the product complies of the TÜRK LOYDU rules, and relevant international instruments that apply to it.