Certificate No:
TAA00003BE

TYPE APPROVAL CERTIFICATE

This is to certify:

That the EPL / ShaPoLi arrangement

with type designation(s)
FP Cabinet, HMI

Issued to
Frugal Technologies ApS
Aalborg, **Denmark**

is found to comply with
DNV rules for classification – Ships

Application :

Product approved by this certificate is accepted for installation on all vessels classed by DNV.

Location classes:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
FP Cabinet	A	B	A	A	B
HMI	A	B	A	B	B

Issued at **Høvik** on **2024-07-04**
This Certificate is valid until **2026-07-03**.
DNV local unit: **Denmark CMC**

Approval Engineer: **Ruben Magnus Kolås**

for **DNV**

Siri Tag
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

The Frugal Propulsion v3 (FP) is a ShaPoLi solution designed to comply with the ShaPoLi approach as outlined in MEPC 335.76 when interfaced to the vessels propulsion remote control system. The complete FP ShaPoLi solution comprises the following main parts;

1. FP cabinet version V6.2
2. Shaft torque meter (not covered by this TA certificate)
3. FP HMI and Moxa router installed on bridge

Functionality specified by MEPC.335(76) concerning EPL/ShaPoLi are listed in Table 1. Which of these functions that are covered by the subject Type Approval Certificate are identified in column no. 3. When the system shall be used onboard DNV classed vessels, the vessel-specific configuration shall be reflected in Annex 1.

Table 1: Functions defined in MEPC.335(76)

No	Function	Covered by the subject TAC	SW No	DNV HW TAC
1	**Power limitation**			
1a	EPL - Power limitation	N/A		
1b	ShaPoLi - Power limitation	Yes Note 1		
2	**Override**			
2a	Override power limitation	Yes Note 1		
3	**Alarming**			
3a	Alarming relevant failures on bridge	Yes		
4	**Indication (on the bridge)**			
4a	Activation of un-limiting mode	Yes		
4b	Power limit exceeded (visual and audible)	Yes		
4c	Indication of shaft speed, -torque and -power	Yes		
5	**Recording**			
5a	Shaft speed, -torque and -power recorded in un-limiting mode Note 1	Yes		
5b	Power limit exceeded	Yes		
5c	Activation of override	N/A		
6	**Tamper-proofing**			
6a	The following measures are established to tamper proof the FP system: The power limit is configured at the commissioning of the system and cannot be changed on-board. All relevant data is saved on the PLC and is encrypted. Upon power limit exceeded, the user must specify why the power limit is exceeded and enter a PIN code. Opening of the Frugal Cabinet will be recorded by the system by a door sensor. The system configuration is stored on Frugals PLC in an encrypted parameter file. In addition to general system configuration, the following EEXI related data is stored in the encrypted parameter files: • Start or end of ShaPoLi event and timestamp of ShaPoLi event, including reason code at the start and end of ShaPoLi event. Choices are: Adverse Weather, Icy Waters, Search and Rescue, Manouvering, Ship Safety and Other. • Shaft Power and RPM at the start and end of ShaPoLi event, including Max Limited and Max Unlimited shaft power. • Ship position and sea state at the at the start and end of ShaPoLi event. • Vessel Name, IMO, Ship Type, size in DWT • FP system and shaft torque meter status "Online" and "Offline" alongside timestamp, latitude and longitude. FP "In Control" and "Not In Control" alongside timestamp, latitude and longitude.			
Note 1	Torque meter for use in ShaPoLi-configuration is not covered by the subject TAC. Dedicated signals prepared to interface signals from torque meter. SW arranged to limit the power accordingly.			

Table 2: FP application SW version number structure

x	:	Major modifications	0-99
y	:	Major – Minor modifications	0-9
z	:	Minor modifications	0-99
ShaPoLi application SW version no. covered by this TA certificate, version no. (Vx.y.z): V3.5.02			

Table 3: FP ShaPoLi system, HW

Name	Description	DNV certificate	Physical location
FP Cabinet V6.2	Frugal control cabinet	This TAC	ER/ECR
HMI	Dedicated ShaPoLi HMI	TAA000026G	Bridge, optional HMI in ER/ECR
Serial device server	Moxa EDR8010	TAA00003B9	Bridge
Torque meter	Not covered by this TA certificate.		

Place of manufacture

Elektro Gruppen A/S, Brønderslev, Denmark

Approval Conditions

The following documents, holding vessel specific information shall be available onboard and be presented to the DNV surveyor upon request:

- Annex 1 in this TA certificate (filled in with vessel specific information)
- Document “Service Report appendix - SAT checklist”, document no. D62.
- Torquemeters calibration certificate, (not older than 6 months)
- Torquemeters environmental data specification* or Type Approval Certificate

*The torque meter providing input to the Frugal ShaPoLi system shall comply with the environmental requirements in Pt.4 Ch.9 Sec.5 / IACS UR E10.

A dedicated shaft torque meter shall be interfaced to the FP system.

FP system to give alarm upon complete failure of the system. This will normally be done via interfacing to the ship main alarm system. For installations without a main alarm system, the remote propulsion control system that FP is interfaced to shall give alarm upon complete failure of Frugal system.

Compass safe distance to be according to TAA000026G for HMI (50 cm) and TAA00003B9 for Moxa EDR8010 (40 cm).

Any interface between FP and existing sensors onboard the ship is to be done according to makers instruction and interfaced so that failure in FP shall not be able to spread to external systems.

Frugal shall ensure that the DNV Type Approval certificates for the components listed in Table 3 are valid, and that any application/limitations in these are complied with prior to installation onboard.

When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required, and the certificate may have to be renewed to identify the new software version.

Table 4 shows the minimum required standard interfacing signals between the Frugal Propulsion system and the vessels Remote Control System. Additional signals may be part of a specific delivery, used for example for data collection or other functionality.
To be made in accordance with Frugals technical specifications.

Table 4: Required signal interface between FP and RCS

Source	Signal	Format
PCS	Ready for FP (PCS ready)	High = ready
FP	Request control	High = request
PCS	FP has control	High = true
FP	CPP Pitch demand	4-20mA
FP	RPM demand	4-20mA
PCS	Current prop pitch	4-20mA
PCS	Current engine RPM	4-20mA
PCS	Current engine load	4-20mA
FP	FP ready	High = normal, low = FP error
FP	FP general alarm to integrated alarm system	High = normal, low = FP error
Digital signals to be arranged in accordance with Frugals technical specifications.		

Table 5: Take-over logic conditions

Condition	Logic requirement
PCS system in RCS mode	**AND**
PCS in bridge mode	**AND**
Current RCS command must be dead-slow ahead or higher	**AND**
Engine shutdown OR load reduction OR major fault	**AND NOT**
Ready for FP	**AND**
FP request control	**AND**

Application/Limitation

This Type Approval certificate covers hardware and software as listed in Table 2 and Table 3.

The Type Approved FP cover ShaPoLi functionality only. Any other or additional use is subject to case-by-case approval prior to installation onboard.

If FP HMI is not installed in close vicinity to the Remote Propulsion Control System, so that one cannot operate both systems with reasonable ease, an additional “acknowledgement step” is required when transferring command from RCS to FP.

The shaft torque meter is not covered by the subject TA.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
Function tests according to document Frugal Propulsion SAT v1.1

Marking of product
Frugal cabinet marked on inside and outside.
Marking on the backside of the HMI screen.
Marking in software screen itself, under “system setup”.

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer’s product type marking and the type approval certificate

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE

Annex 1: Ship specific configuration
