IT IS SIMPLE AND AMAZING

ENERGY SAVING SYSTEM

TEMPLATE FOR NEW PRODUCT

MADE BY Eco Service Limited

E S S 2023

CONTENT

E

SHIP ESS

The SWP&FWP&E/R FAN be the most basic load equipment of one vessel. How to save the electrical energy by these equipments shall be the key point of the ESS system.

E S S 2023

Original design for the W.P & E/R Fans as maximum demanded power

E/R Fans design as maximum temperture and rate power of ME

Actually, the maximum load condition almost never coms up

And the ME be limited as EECI, more energy efficient space be cleared out

On the premise of saliing safety, we inprove the energy efficiency

ESS For S.W.P

As proved by the vessels installed with ESS system, around 70% of electric energy saving for owner.

PLC is playing the important role of energy saving which continue monitoring the system and automatic control the frequency drive output to satisfy the vessels cooling demands.

Futher more, after EGCS installation on most of the vessels, two sets of Aux engine are running during vessels sailing with EGCS mode, ESS will enable vessel to use only one Aux engineer while vessel sailing with EGCS mode.

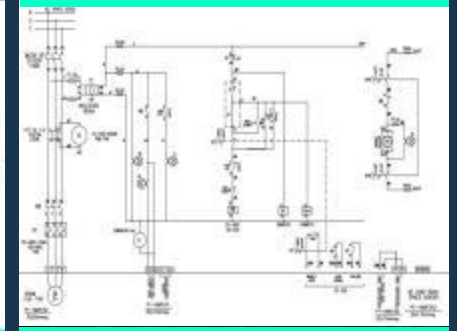
E S S 2023

ORIGINAL DESIGNER

WHAT We FACe

The cooling system of vessel just consider the temperture of sea warter as 32℃ with 100% load.

ACTUALLY CONDITION



WHAT ACTUALLY

Because not all ships are in the equatorial surface water body or the largest Speed sailing, so maximum cooling capacity is rarely used

SYSTEM UPGRAED

WHAT WE CAN DO

So the pump flow rate whenthe frequency controller controls the pump can always be adapted to the demand at any given time, resulting in significant energy savings

INVESTMENT RECOVERY

WHAT TIME

The investment return time of the optimal scheme of frequency conversion control system of sea water pump is usually 18 month

E S S 2023

PROCESS A

Local measurement to confirm the new ESS panels(Frequency panel and ESS control panel) installation

PROCESS B

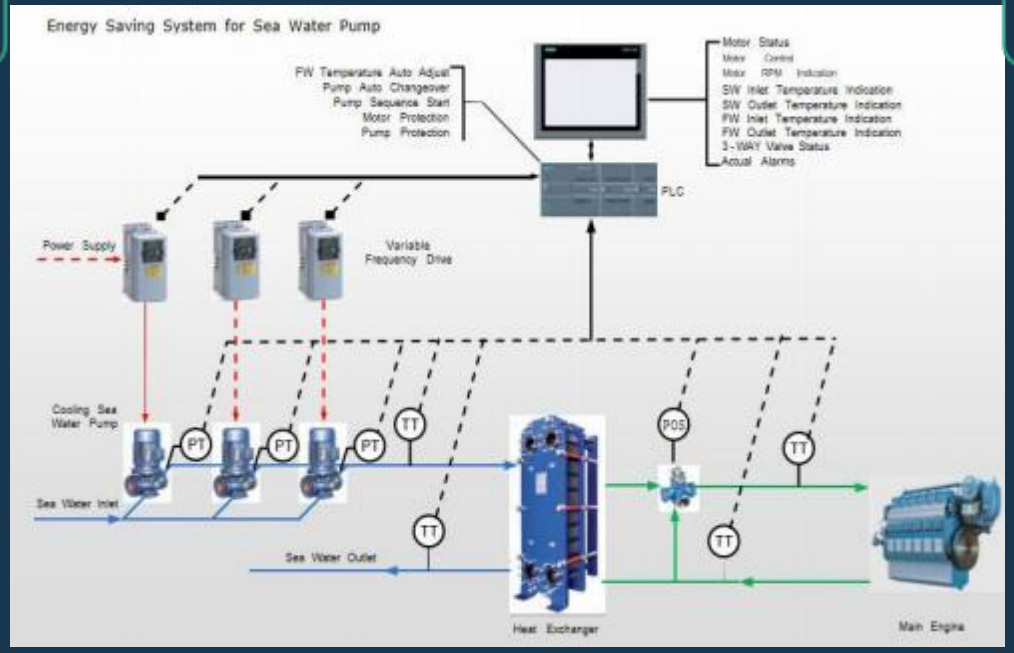
Solution prepare and internal control test

PROCESS C

Soluation approve / Equipment order & production

PROCESS D

Equipment install on board and final test



MAIN Feature

Feature A

PID closed loop precise control to meet temperature and pressure requirements

Feature B

Bypass contactors are designed to ensure high availability of sea pumps

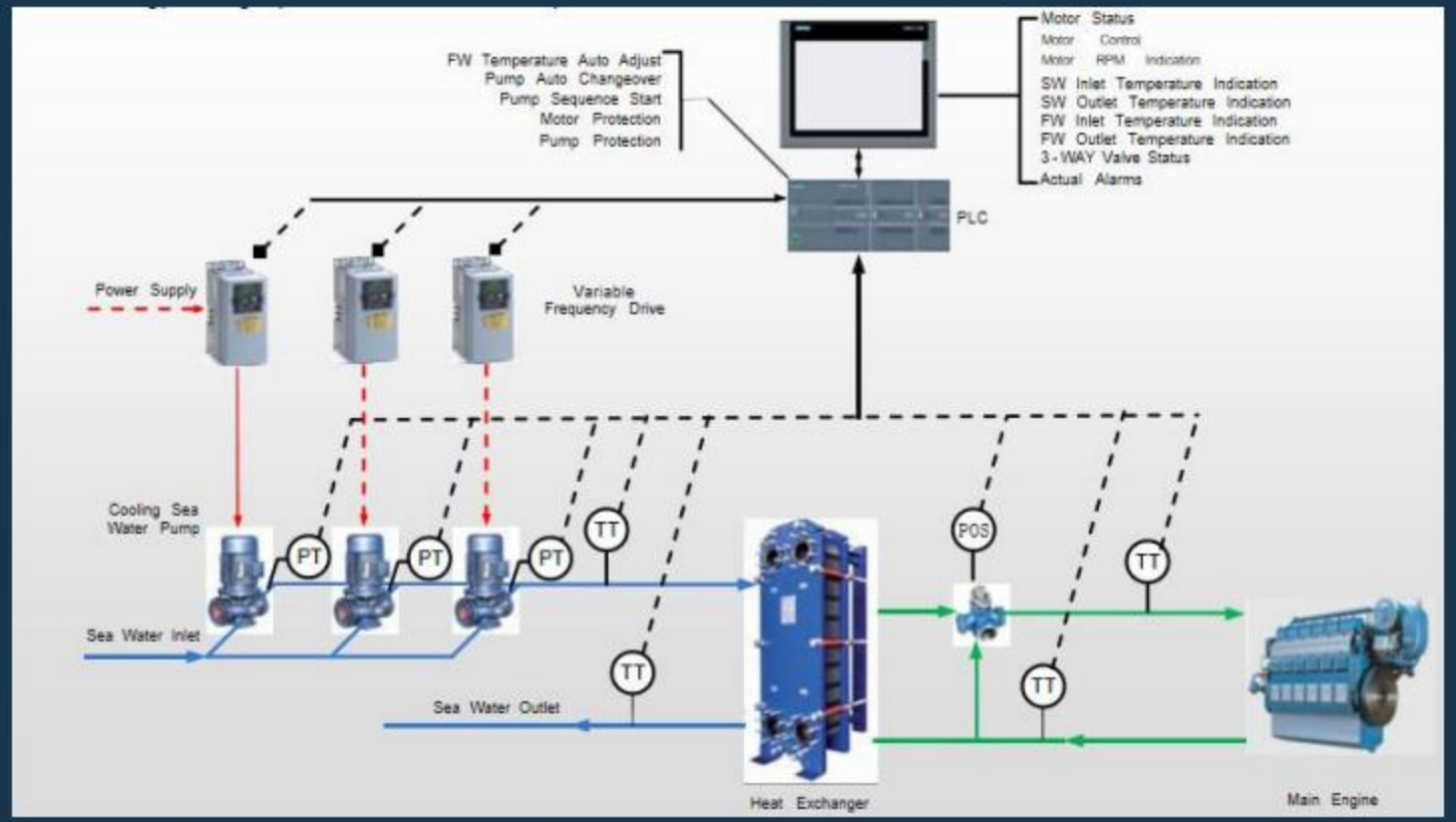
Feature C

The frequency converter integrates communication function to realize data transmission.

Feature D

Provide pump group fault auto changeover& Blackout sequence start function.

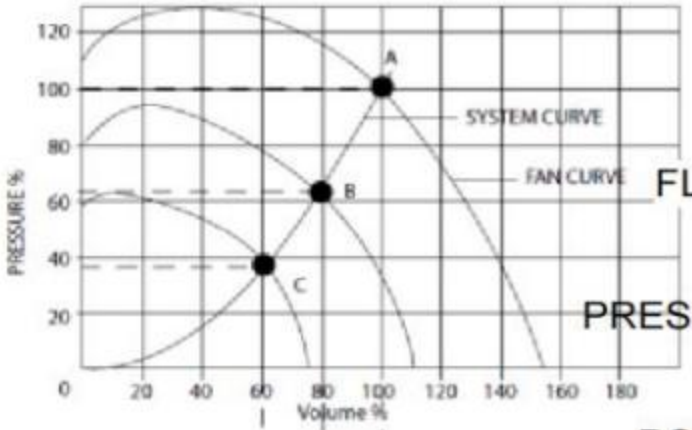
SYSTEM CONFIG

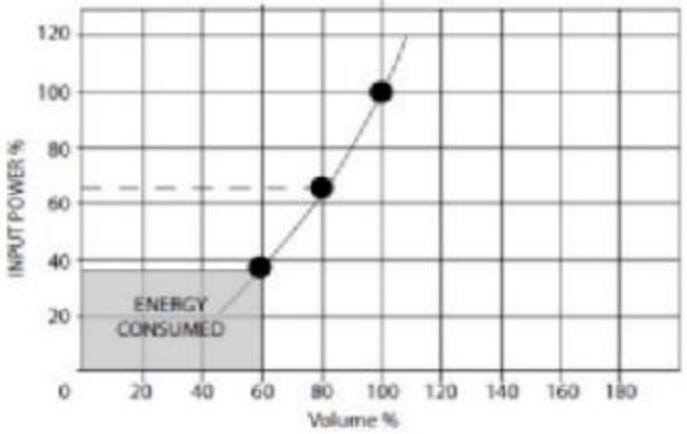


HMI: Human-machine interface design
SCM: Single Chip Micyoco control
Frequency changer: Pump control and energy saving
Sensor: Temperture & Pressure monitor
Three-way Valve: Flow control

Sensor signal request:
Sea water input temperture
Sea water output temperture
Fresh water input temperture
Fresh water output temperture
Sea water pump output pressure
Sea water pipeline pressure
Three-way valve signal

SYSTEM CALCULATE





FLOW : $\frac{Q_1}{Q_2} = \frac{n_1}{n_2}$

PRESSURE : $\frac{H_1}{H_2} = \left(\frac{n_1}{n_2}\right)^2$

POWER : $\frac{P_1}{P_2} = \left(\frac{n_1}{n_2}\right)^3$

When using frequency converters to control the speed of fans and pumps, the most prominent advantage is to save electricity. The centrifugal blast equipment and pump equipment are subject to the following proportionality law

Q	流量 FLOW	P	功率 POWER
Q_1	额定流量 RATE FLOW	P_1	额定功率 RATE POWER
Q_2	降低后的流量NEW FLOW	P_2	降低后的功率 NEW POWER
H	压力 PRESSURE	n	速度控制 SPEED CONTROL
H_1	额定压力 RATE PRESS.	n_1	额定转速 RATE SPEED
H_2	降低后的压力NEW PRESS	n_2	降低后的速度 NEW SPEED

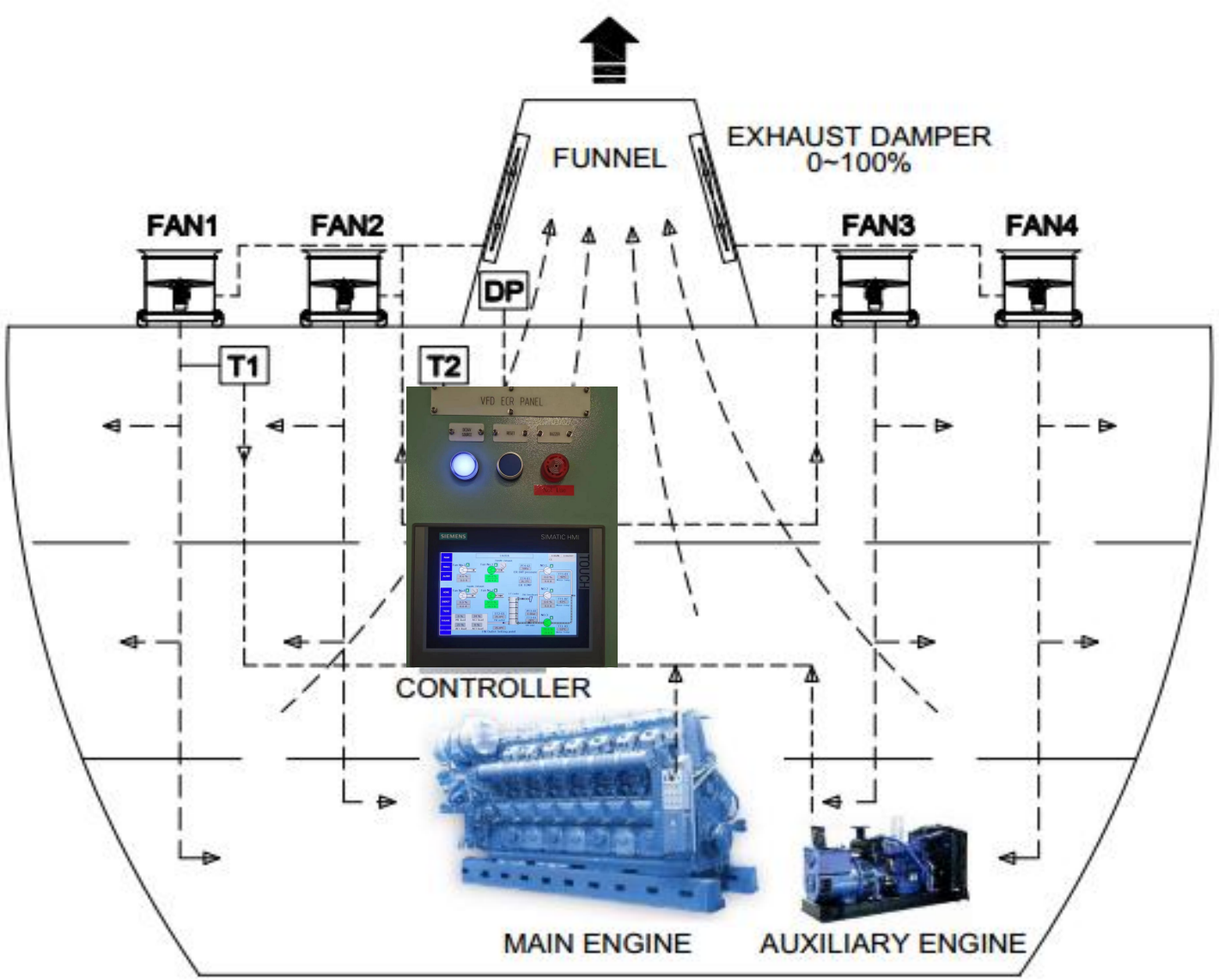
ESS For ER FAN

Same as S.W.P system, ER Fan also proved by the vessels installed with ESS system, around 70% of electric energy saving for owner.

PLC is playing the important role of energy saving which continue monitoring the system and automatic control the frequency drive output to satisfy the vessels air supply and cooling demands.

Although ER Fan motor power is less than S.W.P, but there are 4 sets of ER Fan running during sailing, by practice, ER Fan saving much more energy than S.W.P

ER FAN SYSTEM CONFIG



Temperature sensors: T1 & T2.
Upon the size of ER temperature sensors will be installed to monitor temperature changes in ER.

Differential Pressure transducer: DP
Differential pressure transducer will be installed to monitor the pressure difference between ER and atmosphere, which will correct indicate the ER air consumption.

PLC controller with HMI: Controller.
PLC will be installed to continue monitor all the sensor value and setting point, PID control will be apply to air supply quantity for the engine room.

Our Advantages

As the leading fiture of ESS apply in retrofit vessels, our advantage as following:

1. Flexibility and mobility during installation.
2. Functional completeness with class item.
3. Reliablity of the system.
4. Easy operation for crew.
5. Minimum the retrofit work as our special design.
6. By-pass switch in case of emergency operation.
7. Less investment and high rate of return on investment.
8. Maintenance free.
9. Remote access and data logging system free.

Flexibility and mobility

As the leading fiture of ESS apply in retrofit vessels, our system was designed as panel by panel, which will be possible to find suitable space to install on oboard a operation vessel.

Functional completeness with class item

As Sea water pump and ER fan related to class inpection items, after our retrofit, and the class item will be complete tested and hand over to owner with correct system..

Reliablity of the system

Reliablity of the system was approved by owners special team for all the safety test.

Easy operation for crew

After our ESS system retrofit, no trainning and our system operation needed, all the start and stop and change over by original start / stop control.

Maintenance free

Maintenance free concept is the target for the system design which will allow system running free of trouble for as longer as possible.

By-pass function

By-pass switch in case of emergency operation was installed in each VFD cabinet to keep system running in case of VFD issue.

Less investment and high ROI

We provide turn key solution for owner regarding to each ESS retrofit project, which will be very clear for owner about the minumum investment and got the high return of investment.

Minimum retrofit work

According to our special design and the project done, our retofit work is the minumum in the market, which suitable for all kind of vessels.

Remote access and data logging system

Remote access and data logging system was provided free for owner to get the energy saving data on line from each vessel, and also provide the remote trouble shooring access in case of VFD issue or other alarm.
The data logging system was our own software with all data store in owner's office without third party.

On line data logging

sample of energy saving

	Running Time	Total Consumpt	Total Saving	Proportion	Continue stopped
NO.1 SW	25 h	455 KWH	670 KWH	40.0 %	381.9 h
NO.2 SW	676 h	8412 KWH	22008 KWH	27.0 %	0.3 h
NO.3 SW	551 h	5998 KWH	18797 KWH	24.0 %	381.7 h
NO.1 FAN	1156 h	13577 KWH	29195 KWH	31.0 %	0.1 h
NO.2 FAN	1215 h	13328 KWH	31627 KWH	29.0 %	0.1 h
NO.3 FAN	1193 h	12943 KWH	31198 KWH	29.0 %	0.0 h
NO.4 FAN	1246 h	12450 KWH	33652 KWH	27.0 %	0.1 h
Total Energy saving		SW: 41475 KWH		FAN: 125672 KWH	

Our Retrofit reference

For S.W.P and ER Fan retrofit, our retrofit reference as following:

Item	Vessel	M.C.S.W	Qty	ER Fan	Qty
1	Star Eleni	45KW	3 sets	37KW	4 sets
2	Laura	37KW	3 sets	18,5KW	4 sets
3	Star Ophelia	90KW	2 sets	17,3KW	4 sets
4	Maharaj	45KW	3 sets	22KW	3 sets
5	Star Ayesha	45KW	3 sets	37KW	4 sets
6	Star Karlie	45KW	3 sets	37KW	4 sets
7	Star Lyra	45KW	3 sets	22KW	4 sets
8	Star Nicole	37KW	3 sets	11KW	3 sets
9	JY Ocean	30KW	3 sets	18,5KW	4 sets
10	Kaley	37KW	3 sets	18,5KW	4 sets
11	Star Claudine	90KW	2 sets	17,3KW	4 sets

Key Feature of Eco Service ESS

1. Easy installation on existing vessel(retrofit 5 days).
2. Safety protection added on motor.
3. Energy saving up to 90%(during vessel in winter).
4. Average saving up to 60%-70%.
5. Easy for crew operation and trouble shooting.
6. Maintenance free.
7. Recovery of investment period around 1 year.
8. Less generator engine maintenance as power consumption low.
9. Less LT cooler and sea chest cleaning as flow reduce.
10. High reliability of system components.

VFD With Bypass Options

A. New building standard VFD system consist of:

1. ESS control panel with PLC
2. Sensors
3. Standard VFD panel with Cooling Fan/ Protections/ Indications/ MCCB/ Contactors/ Relay (Electrical type of bypass)

B. Simplified VFD system consist of:

1. ESS control panel with PLC
2. Sensors
3. Simplified VFD panel with Manual switch over MCCB

VFD Without Bypass Options

C. New building standard VFD system consist of:

1. ESS control panel with PLC
2. Sensors
3. Standard VFD panel with Cooling Fan/ Protections/ Indications/ MCCB/ Relay

D. Simplified VFD system consist of:

1. ESS control panel with PLC
2. Sensors
3. Only VFD without panel

Valves to be used only for LT FW system and vessel without central cooling system

Total price compare Option A > Option C > Option B > Option D