

Sea water cooling pump software description

SW VFD implementation

There are eight main sea water cooling pumps. Two in each pump room for cooling the FW cooling system via the central water coolers/heat exchangers. One pump in each quadrant will be fitted with a VFD will be implemented on the SW system to actively regulate the flow of the SW in order to regulate temperature of the FW cooling system.

Tag	Description	Freshwater TT tag.
721-PA-001A	MAIN SEA WATER COOLING PUMP PORT FWD	TBC
721-PA-001C	MAIN SEA WATER COOLING PUMP STBD FWD	TBC
721-PA-002A	MAIN SEA WATER COOLING PUMP PORT AFT	TBC
721-PA-002C	MAIN SEA WATER COOLING PUMP STBD AFT	TBC

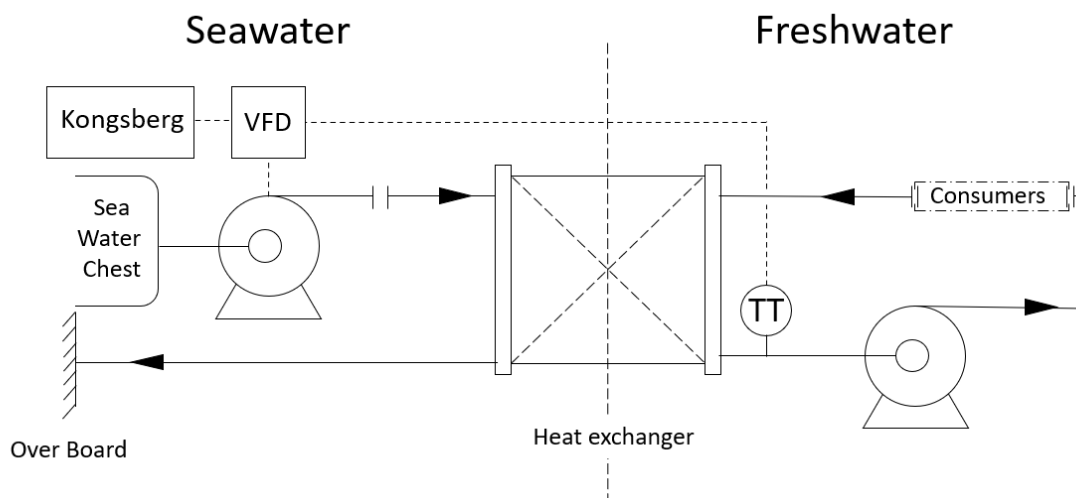
The VFDs for the SW pumps will be controlled by the IAS via Profibus-DP communication. The existing Main/standby pump logic will remain as is. The existing low pressure fault detection is to be eliminated and replaced with FW temperature low detection. In the following cases below, the main pump is to stop and the standby pump is to start:

- VFD Tripped
- VFD Warning
- VFD not able to obtain setpoint temperature

In the case of a fault, the control room operator has the option to reset the fault in IAS.

In the case of communication failure, the IAS is only to start backup pump when a pressure drop is detected, or if manually overridden. Even with a communication failure the VFD should continue to work normally, running on integrated controller unless it has had a power loss.

The VFDs for the SW pumps will be controlled by the IAS via Profibus-DP communication. The motor speed will be determined by a temperature controller integrated in the VFDs software. The Temperature setpoint will be given to the VFD by IAS. The VFD will be connected to a separate Temperature transmitter. The existing temperature transmitter will be used by the IAS to monitor the system. In the case of the VFD not being able to obtain the setpoint, the standby pump is to be started.



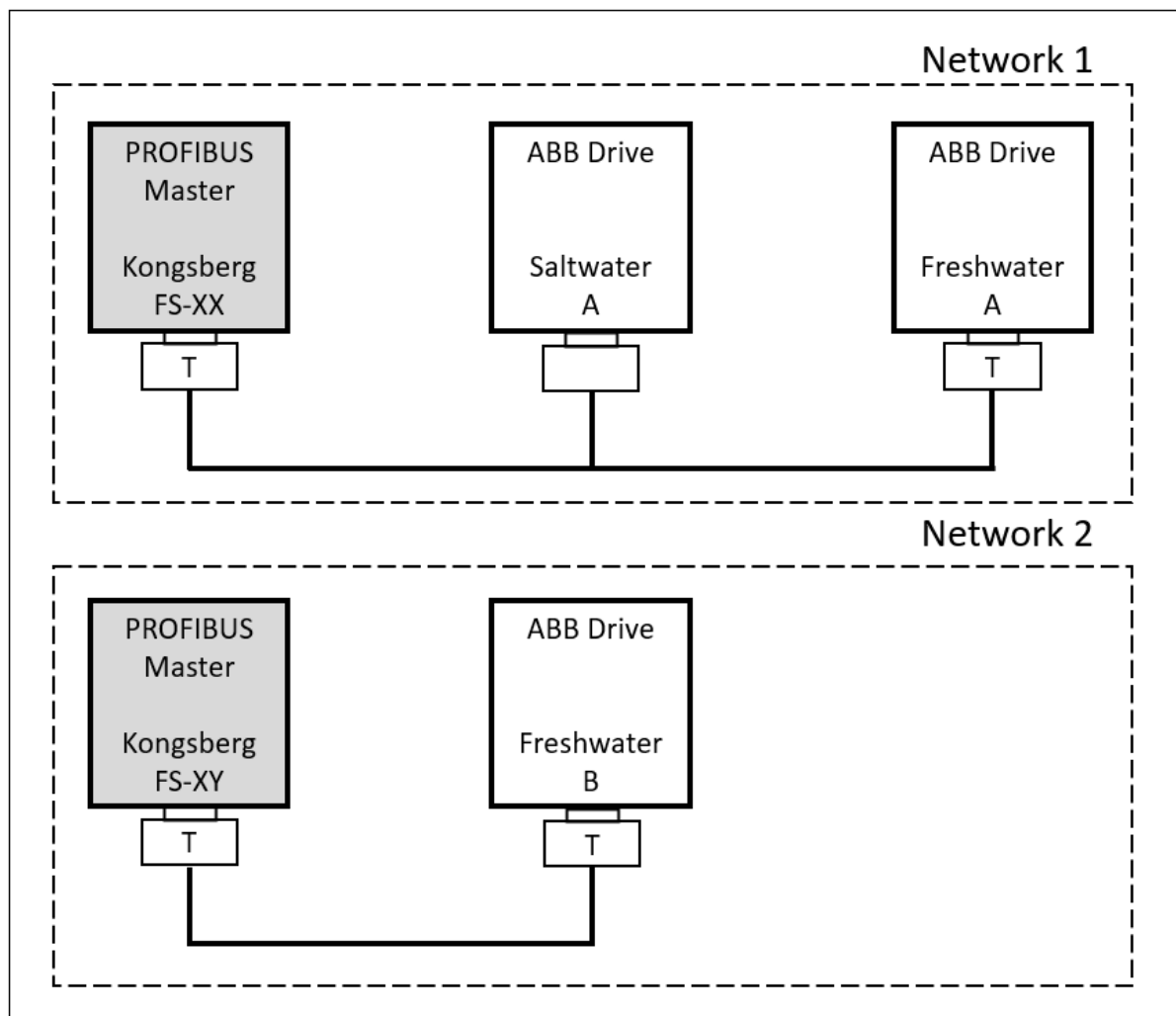
Speed in % and kW output is to be displayed on IAS control panel.

Profibus-DPv1 Communication

Communication:

DSG File	Telegram Name	Cyclic telegram Length
https://new.abb.com/drives/connectivity/fieldbus-connectivity/profibus/profibus-dp-fpba	PPO 6	0 PKW + 10PZD In/Out

Each quadrant will consist of two Profibus-networks to ensure redundancy. Each network consists of a Kongsberg RCU (remote controller unit), one SW pump VFD, and one FW pump VFD. The Kongsberg RCU will act as the Master, and the VFD's will act as slaves.



Input

Address	Name	Length	Description
FBA Data out 1	Control Word	16bit	See control Word description below. (Start, Stop, Reset)
FBA Data out 2	Pressure reference	16bit	Pressure reference = pressure setpoint in IAS*100. Example: 7.2Bar = 720.

Output

Address	Name	Length	Description
FBA Data in 1	Status Word	16bit	See status Word description below.
FBA Data in 2	Speed %	16bit	Range 0-100%
FBA Data in 3	KW output	16bit	Power output = (Value from drive)/10000. Example: 16000/10000 = 1.6kW

Control Word

Bit	Name	Description
0 (LSB)	Off1 Control (Start Stop)	True = start, False = stop
1	Off2 Control	ALWAYS TRUE
2	Off3 Control	ALWAYS TRUE
3	Run	ALWAYS TRUE
4	Ramp out zero	ALWAYS TRUE
5	Ramp Hold	ALWAYS TRUE
6	Ramp In zero	ALWAYS TRUE
7	Reset	True = reset alarm and faults
8	Inching 1	ALWAYS FALSE
9	Inching 2	ALWAYS FALSE
10	Remote cmd	ALWAYS TRUE
11	Extr ctrl loc	ALWAYS FALSE
12	User bit0	ALWAYS FALSE
13	User bit1	ALWAYS FALSE
14	User bit2	ALWAYS FALSE
15 (MSB)	User bit3	ALWAYS FALSE

The highlighted bits are the relevant bits for control of the drive

Example:

Command	Binary	Hex
Start Drive	0000 0100 0111 1111	047F
Stop Drive	0000 0100 0111 1111	047E
Reset Alarm	0000 0100 1111 1111	04FE

Status Word

Bit	Name	Description
0 (LSB)	Ready to switch on	True = ready
1	Ready run	True = running
2	Ready ref	NA
3	Tripped	True = tripped
4	Off2 Inactive	NA
5	Off3 Inactive	NA
6	Switch-on inhibited	NA
7	Warning	True = warning
8	At setpoint	NA
9	Remote	True = System in remote mode
10	Above limit	NA
11	User bit0	NA
12	User bit1 (TT sensor failure)	False = Temperature sensor failure. pump stops and stby pump has to start
13	User bit2	NA
14	User bit3	NA
15 (MSB)		NA

The highlighted bits are the relevant for monitoring the Drive