

ECS COMPONENTS LIST

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ITEM	DESCRIPTION	CONNECTION SIZE
CPC	Control PC	NON PIPE CONNECTION
PDE	Power Distributor Equipment	NON PIPE CONNECTION
ECU	Electro Chamber Unit	1000B INLET/OUTLET JIS 10K-350A, DRAIN : 10K-25A
PRU	Power Rectifier Unit	INLET/OUTLET SUS TUBE Φ12
EPJ	ECU Power Junction Box	NON PIPE CONNECTION
ESJ	ECU Signal Junction Box	NON PIPE CONNECTION
ANU	Auto Neutralization Unit	INLET/OUTLET SUS TUBE Φ12 (DRAIN SUS316L TUBE Φ12)
TSU-S	TRO Sensor Unit & TSU-S Control Unit	INLET SUS TUBE Φ6 / OUTLET SUS TUBE Φ10
APU	Air Pump Unit	INLET/OUTLET FLANGE JIS 10K-15A (AIR LINE Φ12/Φ10)
FMU	Flow Meter Unit	INLET/OUTLET FLANGE JIS 5K-300A
FTS	F.W Temperature Sensor	INLET/OUTLET FLANGE PT 1/2"
CSU	Conductivity Sensor Unit	INLET/OUTLET FLANGE JIS 5K-50A
GDS	Gas Detection Sensor	NON PIPE CONNECTION
EWU	EM Washing Unit	INLET/OUTLET FLANGE JIS 10K-25A
PS&PI	Pressure Switch & Pressure Indicator	FLANGE JIS 10K-25A
TS&TI	Temperature Switch & Temperature Indicator	FLANGE JIS 10K-40A
T-STR	T-Strainer	INLET/OUTLET FLANGE JIS 5K-350A
PCU	Pump Control Unit	NON PIPE CONNECTION
FCV	Flow Control Valve	INLET/OUTLET FLANGE JIS 5K-80A / 5K-350A
MIXING S.W. PUMP		INLET/OUTLET FLANGE JIS 10K-50A



THE DRAWING IS BASED ON THE POS AND MAKER STANDARD,
IF ANY ADDITIONAL EQUIPMENT IS REQUIRED BY SHIPYARD OR SHIP'S OWNER REQUIREMENTS
THE EXTRA COST CAN BE OCCURRED.

SYMBOL

SYMBOL			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
*	MAKER (TECHCROSS) SUPPLY	N.C	TO BE CLOSED ALWAYS EXCEPT MAINTENANCE OF ECU
	BUTTERFLY VALVE		3-WAY COCK VALVE
	REMOTE BUTTERFLY VALVE		STRAINER
	THROTTLING VALVE		ORIFICE
	GLOBE VALVE		LOCKING DEVICE
	CHECK VALVE		INSULATION
	CHECK VALVE WITHOUT HANDLE		
	BALL VALVE		
	DIAPHRAGM VALVE		
	ANGLE VALVE		
	SOLENOID VALVE		
	CROSSING PIPES CONNECTED		
	CROSSING PIPES NOT CONNECTED		
	BRANCH PIPES		
	TEE PIECE (FLANGE END)		
	REDUCER		
	EDUCTOR		
	BLIND FLANGE		
	CLOSED PIPE CONNECTION		
	BOSS WITH BLANK FLANGE		
	PUMP		
	STRAINER		
	Y-STRAINER		
	FILTER		
	SIGNAL		
	SCUPPER		
	PRESS REGULATOR		
	LIMIT SWITCH		
	PUMP MOTOR		
	RECEPTACLE		
	PLUG		
	PRESSURE INDICATOR		
	PRESSURE SWICH		
	LEVEL SWITCH		
	THERMOMETER (TEMPERATURE INDICATOR)		
	TEMPERATURE SWITCH		
N.O	TO BE OPENED ALWAYS EXCEPT MAINTENANCE OF ECU		

HISTORY OF P&ID FOR BWTS

DATE	REV.	REVISION DESCRIPTION	DSGN	CHKD	APPD
25.12.15.	0	PREPARED FOR APPROVAL.	S.M.KIM	E.K.OH	S.J.LEE

NOTE OF P&ID FOR BWTS

1. SYSTEM

1) VALVE SIGNAL IS USED TO OPERATE ELECTRO CLEEN SYSTEM.

2. G-2 SAMPLING PORT

1) G-2 SAMPLING PORT SHALL BE COMPLIED WITH IMO REGULATION.
2) G2 SAMPLING PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.

3. ECU

1) ECU OUTLET PIPE SHOULD BE ARRANGED HIGHER THAN ECU IN ORDER TO KEEP FULL WATER INSIDE ECU.
2) PS&PI AND TS&TI FOR ECU SHALL BE PROVIDED BY MAKER, BUT THE INSTALLATION WORK SHALL BE CARRIED OUT BY YARD. (IF NECESSARY)
3) EXCESSIVE VACUUM MAY BE FOUND IN THE BALLAST PIPES WHEN SHIFTING THE BALLAST WATER DOWNSTREAM FROM AN Elevated PLACE, HENCE COUNTERMEASURES SUCH AS INSTALLATION OF VACUUM VALVES SHOULD BE CONSIDERED.

4. TSU

1) BETWEEN TSU SAMPLING PORT AND APU TO BE ARRANGED AS SHORT AS POSSIBLE(WITHIN 5M AND WITHIN 2M IN HEIGHT).
2) TSU SAMPLING PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.
2-1) THE ECUS OUTLET PIPING IS INSTALLED OF VERTICAL DOWNSTREAM WITH LONG DISTANCE, THERE IS A HIGH POSSIBILITY OF VACUUM. TRO SAMPLING PORT SHOULD BE INSTALLED AFTER VERTICAL DOWNSTREAM.
3) KEEP MIN' 5D INSTALLATION POSITION DISTANCE BETWEEN TSU PORT AND ANU PORT.
4) FLUSHING AND DRAIN NEED TO BE IMPLEMENTED BEFORE USING TRO SENSOR(FOR SPARE)
5) THE VALVE OF TSU SAMPLING LINE SHOULD BE ARRANGED NEAR TSU.
6) THE MATERIAL FOR PIPE AND VALVE OF TSU SAMPLING LINE SHOULD BE SUS316L.

5. ANU

1) BETWEEN ANU INJECTION PORT AND ANU TO BE ARRANGED AS SHORT AS POSSIBLE(WITHIN 10M).
1-1) IF ANU DOSING LINE IS FAR(ABT.10M) FROM THE ANU, THE "PREPARATION" BUTTON IN ANU ICON OF HMI SHALL BE CLICKED BY THE CREW TO FILL THE NEUTRALIZING AGENT IN THE DOSING LINE.
2) ANU INJECTION PORT(S) MUST BE PLACED AT HORIZONTAL OR UP-STREAM OF VERTICAL MAIN BALLAST WATER PIPE. IT SHALL NOT BE INSTALLED AT THE DOWN-STREAM OF VERTICAL MAIN BALLAST WATER PIPE.
3) KEEP MIN' 5D INSTALLATION POSITION DISTANCE BETWEEN TSU PORT AND ANU PORT.
4) THE VALVE OF ANU INJECTION PIPE SHOULD BE ARRANGED NEAR ANU.
5) IN CASE OF EACH OF THE ANU INJECTION PIPE IS CONNECTED TO ONE, THIS SHOULD BE INCLINED AS SHOWN IN THE DETAIL "D". (IF NECESSARY)
6) EXCESSIVE VACUUM MAY BE FOUND IN THE ANU PIPES WHEN SHIFTING THE NEUTRALIZATION REAGENT DOWNSTREAM FROM AN Elevated PLACE, HENCE COUNTERMEASURES SUCH AS INSTALLATION OF VACUUM VALVES SHOULD BE CONSIDERED.
7) THE MATERIAL FOR PIPE AND VALVE OF ANU DOSING LINE SHOULD BE SUS316L.
8) MINIMUM TEMPERATURE OF F.W. TO BE SECURED ABOVE 20°C. IF THE TEMPERATURE OF F.W. IS ALWAYS MORE THAN 20°C, THE HOT WATER LINE COULD BE DELETED.
IT SHOULD BE ABOVE 20°C, EVEN IN WINTER.

6. EWU

1) FRESH WATER SUPPLY LINE AND DRAIN CONNECTION LINE FOR EWU(EM WASHING UNIT) SHOULD BE ARRANGED WITHIN APPROXIMATELY 3 METER AROUND ECU.

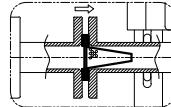
2) THE USED EM CLEANING WATER CONTAINING CHEMICAL AGENT SHOULD BE STORED IN EWU TANK AND DISCHARGED AT SEA MORE THAN 12 NAUTICAL MILES AND 25M IN DEPTH.

7. GDS

1) GDS SHOULD BE INSTALLED ABOVE THE ECU.

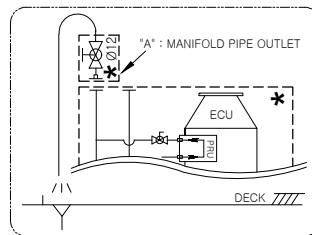
8. PRU COOLING MANIFOLD STRAINER

1) STRAINER HAVE BEEN INSTALLED TO PREVENT THE BLOCKAGE OF COOLING WATER LINE FROM PRU.
CREW SHOULD BE CHECK THE CONDITION ONCE EVERY QUARTER.



9. COOLING F.W CONDITION FOR PRU

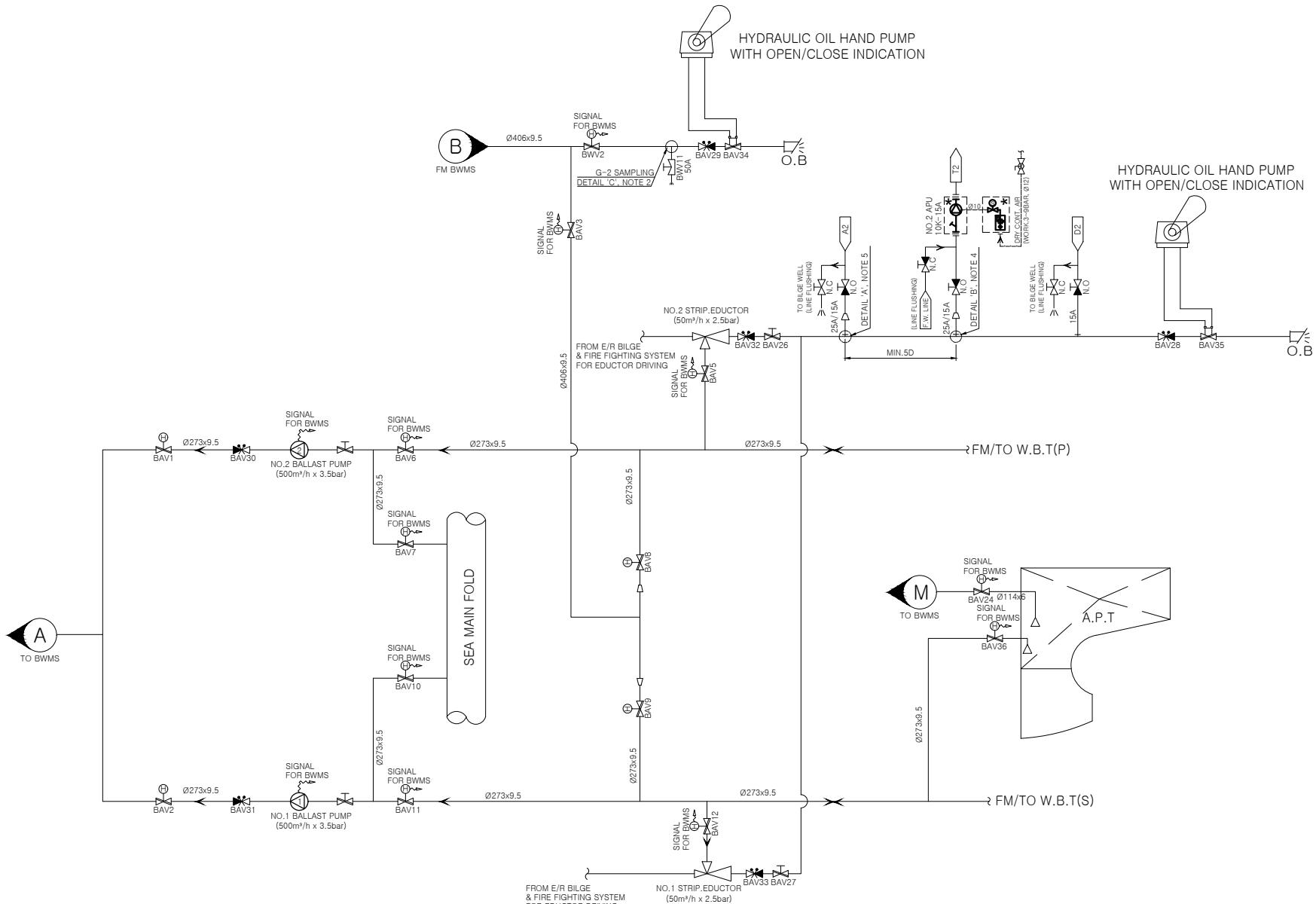
1) COOLING S.W TEMPERATURE (INLET) : +32°C
2) COOLING F.W TEMPERATURE (INLET) : +36°C
3) COOLING F.W PRESSURE DROP : 0.5BAR
4) FLOW RATE VOLUME : 0.45m³/h (PER PRU)
5) INLET VALVE SHOULD BE PLACED NEAR THE ECU.
6) AIR VENT AND VALVE MUST BE INSTALLED AT COOLING WATER PIPE COMMON OUTLET. ("A" POSITION)
AIR VENT AND VALVE ONLY REQUIRED FOR THE VERTICAL TYPE OF ECU (MAKER STANDARD), NOT FOR HORIZONTAL TYPE OF ECU.



[MIXING OPERATION]

- 1) THE VOLUME OF SEA WATER HOLDING TANK SHALL BE MINIMUM 4.3% OF TOTAL BALLASTING CAPACITY.
[S.W.(34.7 PSU) : 4.3% + F.W.(0 PSU) : 95.7% = MIXING (1.5 PSU)]
- 2) IF A.P.TK IS USED FOR MIXING SEA WATER HOLDING TANK,
· BALLAST WATER CAN BE TREATED ABT. XX,XXXm³.
· THIS AMOUNT IS APPROX. XXX% OF TOTAL BALLAST VOLUME.
· IN VIEW OF SUCTION CAPABILITY AT RATED FLOW RATE,
THE SUCTION CENTER OF MIXING PUMP SHOULD BE POSITIONED LOWER THAN THE LEVEL OF BOTTOM PLATE OF A.P.TK.
- 3) IF ONE OF W.B.TK IS USED FOR MIXING SEA WATER HOLDING TANK,
· AIR EJECTOR AT MIXING S.W.PUMP SHALL BE ADDITIONALLY APPLIED. (MAKER SCOPE)
· THE MIXING PUMP SHOULD BE OPERATED CONSIDERING THE VALUE OF NPSH.
· IF THE SEAWATER LEVEL OF D.B.W.TANK IS LOW, SEA WATER SUCTION WILL BE DIFFICULT AND THE MECHANICAL SEAL OF MIXING PUMP WILL BE DAMAGED.
- 4) WHEN THE MIXING OPERATION, THE SUCTION LINE OF MIXING PUMP SHOULD BE ARRANGED TO BE FULL FILL SEAWATER CONDITION.

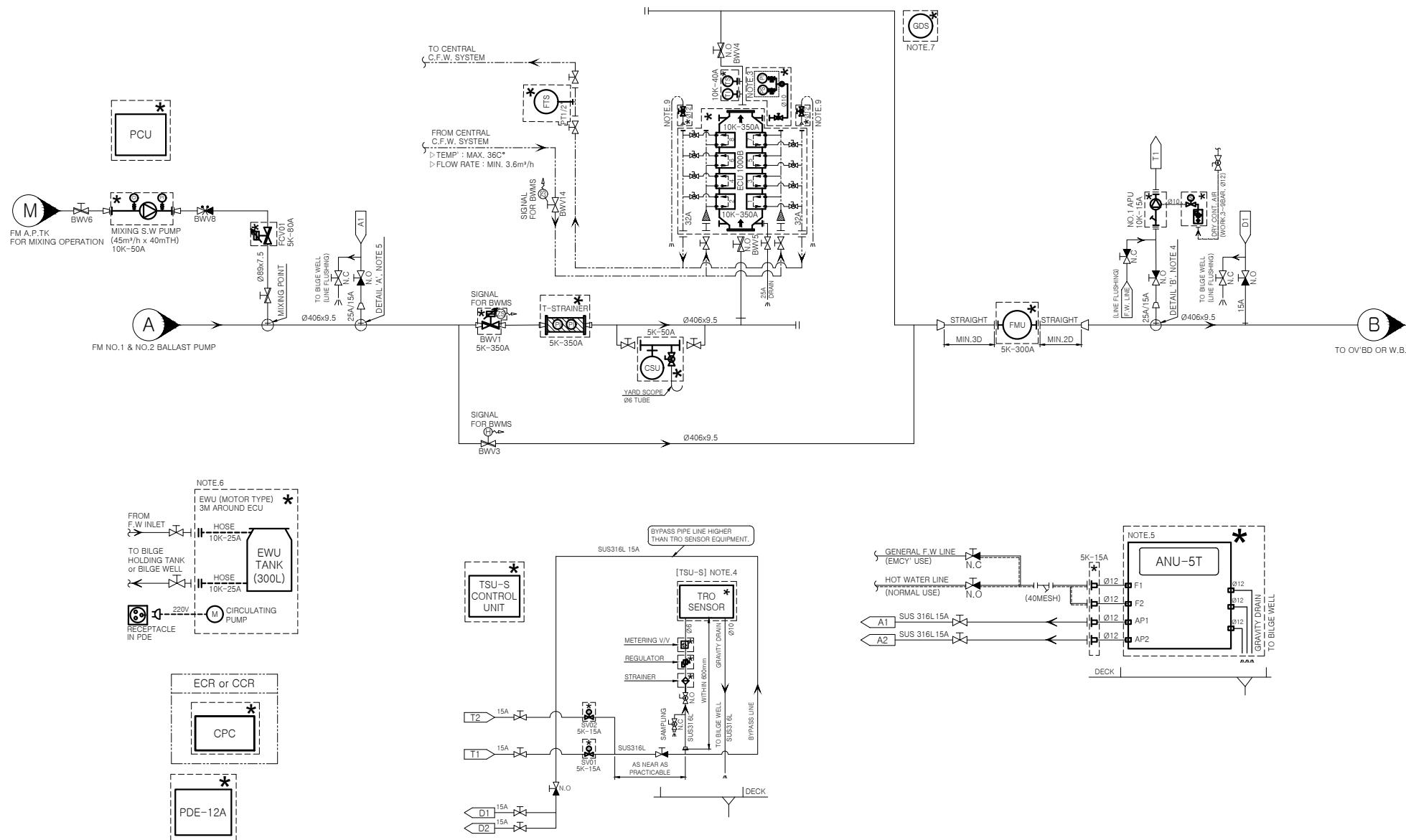
ENGINE ROOM (SAFETY AREA)



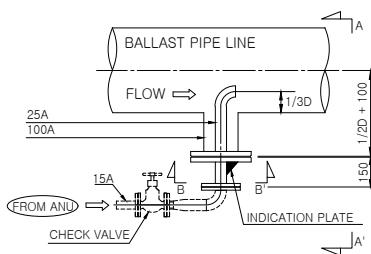
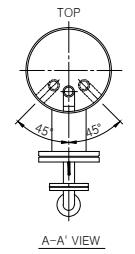
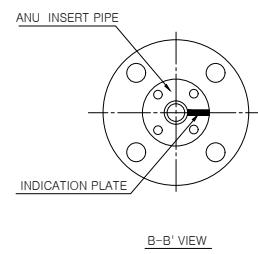
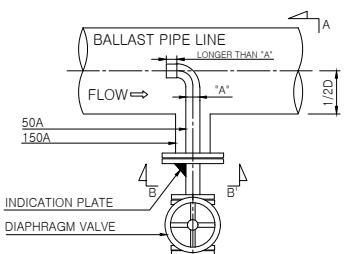
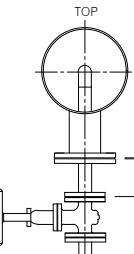
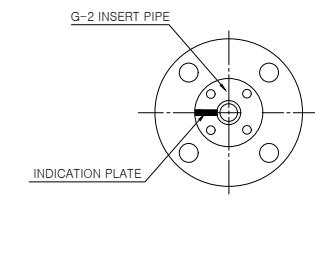
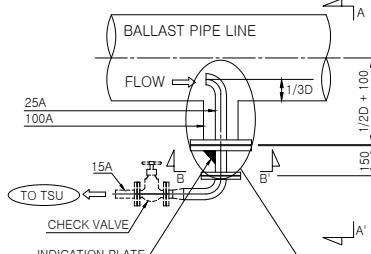
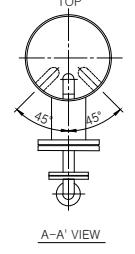
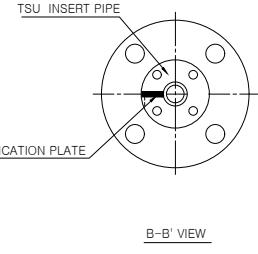
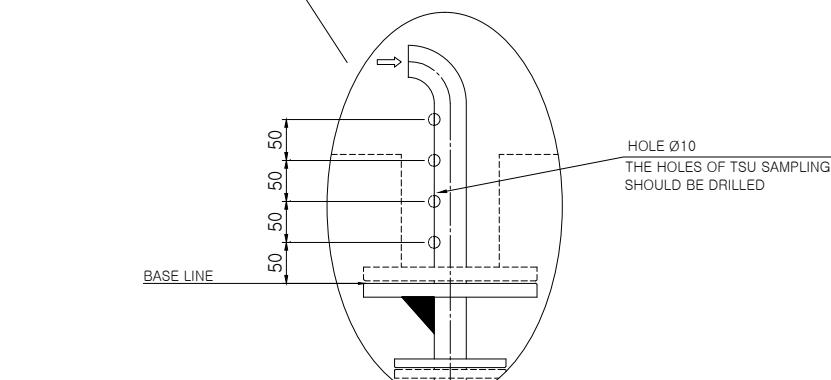
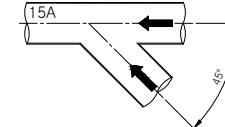
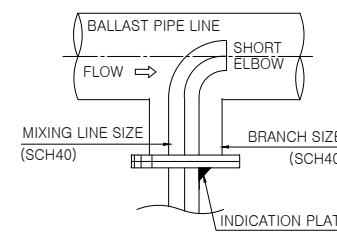
P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	1
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2



ENGINE ROOM (SAFETY AREA)



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	2
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

DETAIL 'A'	ANU DOSING PORT (YARD/OWNER SUPPLY)	DETAIL 'C'	G2 SAMPLING PORT (YARD/OWNER SUPPLY)																		
1) ANU DOSING PORT SHOULD BE INSTALLED AT THE BOTTOM OF BALLAST PIPE LINE. 2) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH DOSING PORT.			1) WHEN THE SIZE OF G-2 SAMPLING PORT PIPE IS 50A, THE SIZE OF BRANCH PIPE FROM BALLAST PIPE LINE SHOULD BE MORE THAN 150A. 2) G2 SAMPLING PORT SHOULD BE INSTALLED AT THE BOTTOM OR SIDE OF BALLAST PIPE LINE. 3) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH SAMPLING PORT.																		
  			  																		
DETAIL 'B'	TSU SAMPLING PORT (YARD/OWNER SUPPLY)	DETAIL 'D'	PIPE CONNECTION PARTS (IF APPLICABLE)																		
1) TSU SAMPLING PORT SHOULD BE INSTALLED AT THE BOTTOM OF BALLAST PIPE LINE. 2) THE INDICATION PLATE IS FOR INDICATION OF INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH SAMPLING PORT. [NOTE] THE ECUS OUTLET PIPING IS INSTALLED OF VERTICAL DOWNSTREAM WITH LONG DISTANCE, THERE IS A HIGH POSSIBILITY OF VACUUM. TRO SAMPLING PORT SHOULD BE INSTALLED AFTER VERTICAL DOWNSTREAM.			  																		
																					
DETAIL 'E'			MIXING POINT (IF APPLICABLE)																		
			<table border="1"> <thead> <tr> <th>MIXING LINE</th> <th>BRANCH SIZE</th> </tr> </thead> <tbody> <tr> <td>50A</td> <td>100A</td> </tr> <tr> <td>65A</td> <td>125A</td> </tr> <tr> <td>80A</td> <td>150A</td> </tr> <tr> <td>100A</td> <td>200A</td> </tr> <tr> <td>125A</td> <td>250A</td> </tr> <tr> <td>150A</td> <td>300A</td> </tr> <tr> <td>200A</td> <td>350A</td> </tr> <tr> <td>250A</td> <td>400A</td> </tr> </tbody> </table>	MIXING LINE	BRANCH SIZE	50A	100A	65A	125A	80A	150A	100A	200A	125A	250A	150A	300A	200A	350A	250A	400A
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1) THE INDICATION PLATE IS FOR INDICATION OF MIXING INSERT PIPE DIRECTION. THIS SHOULD BE INSTALLED IN THE SAME DIRECTION WITH MIXING PORT.			 <p>SAMPLING DETAIL DRAWING HULL NO. YZJ2023-1584/1585 SHEET 1 MODEL ECS1000B 1.1 x 1 1 DWG NO. TPD0241019-GA-A001A-SAMPLING</p>																		

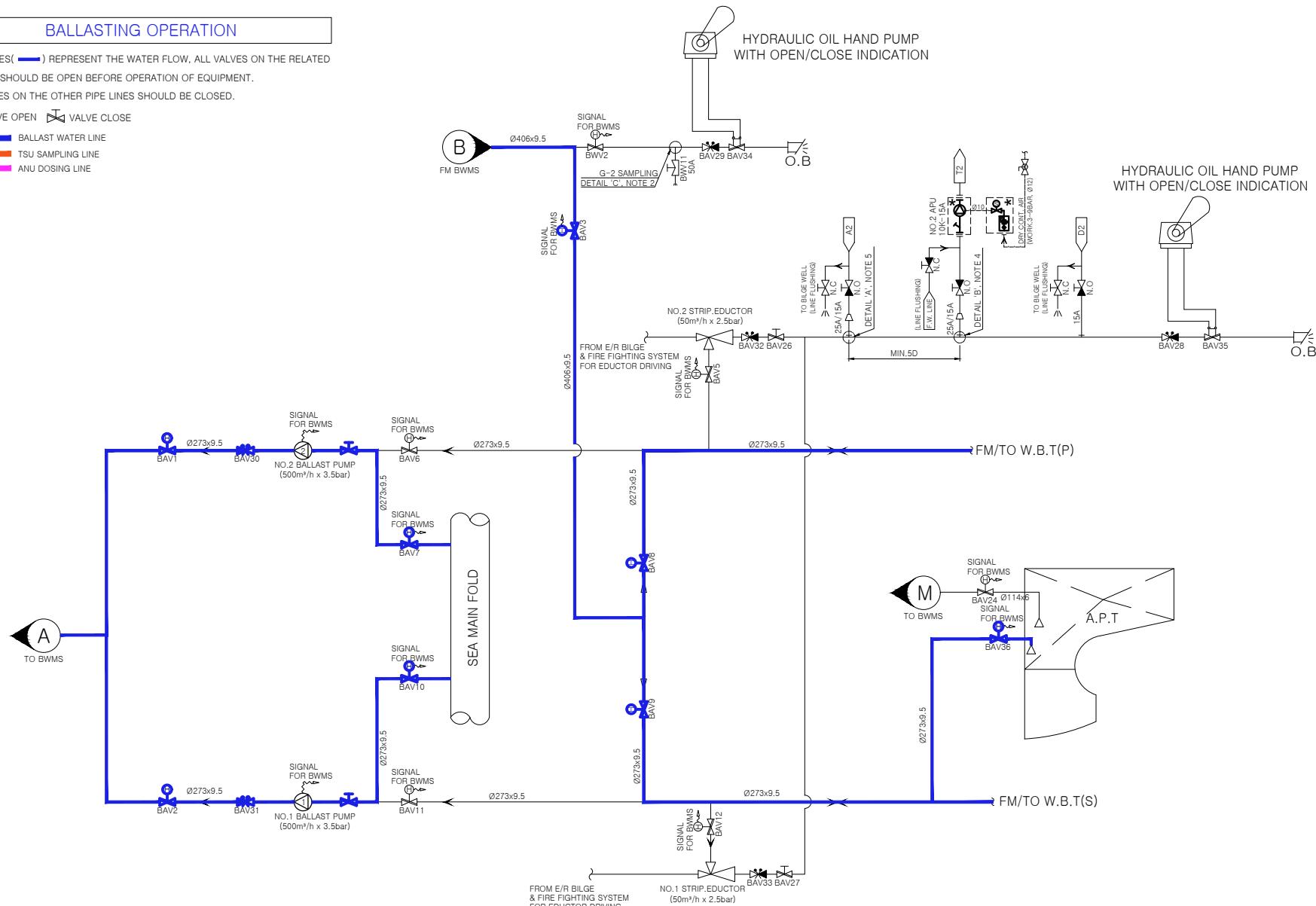
ENGINE ROOM (SAFETY AREA)

BALLASTING OPERATION

THICK LINES() REPRESENT THE WATER FLOW, ALL VALVES ON THE RELATED PIPE LINE SHOULD BE OPEN BEFORE OPERATION OF EQUIPMENT.
THE VALVES ON THE OTHER PIPE LINES SHOULD BE CLOSED.

 VALVE OPEN VALVE CLOSE

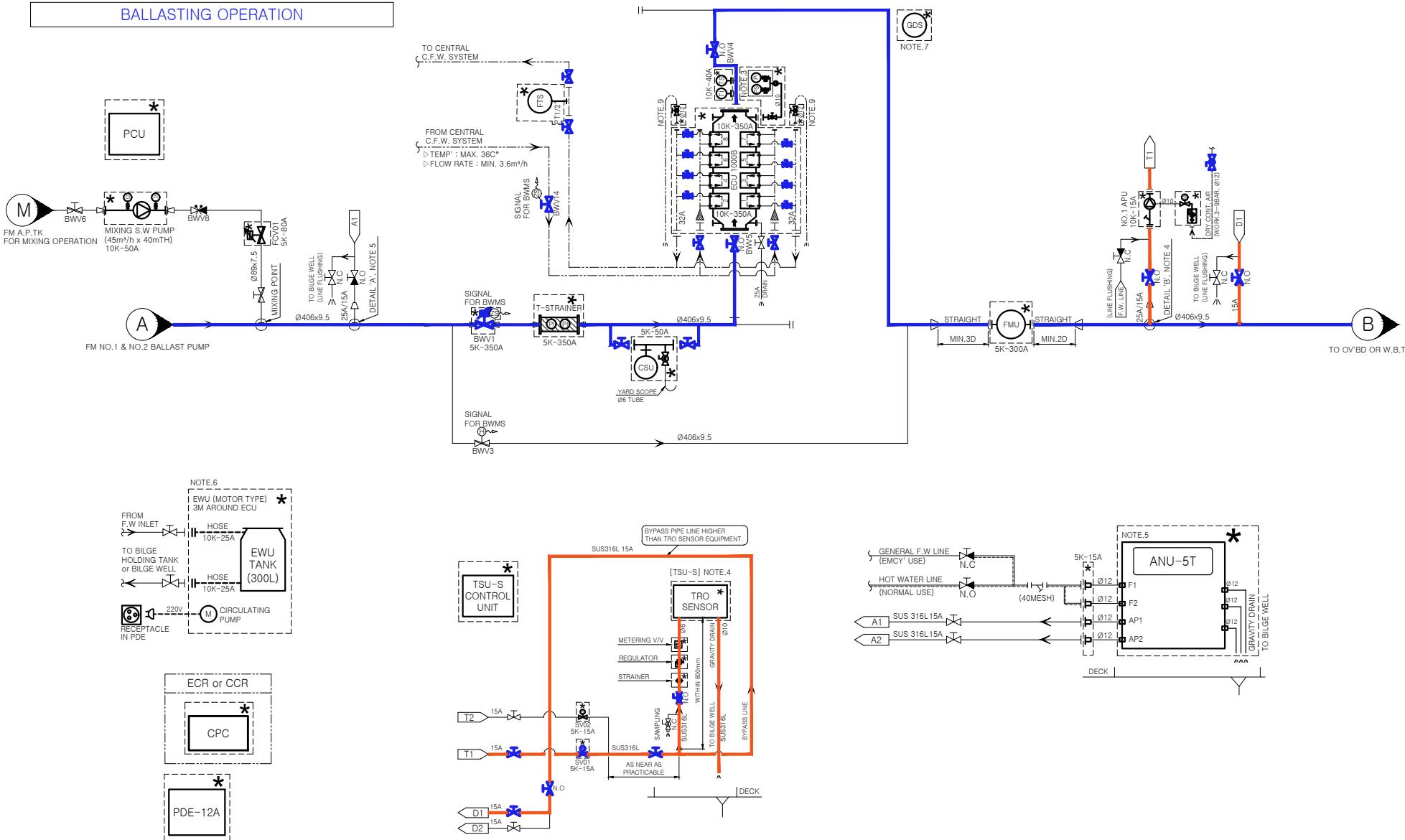
 BALLAST WATER LINE
 TSU SAMPLING LINE
 ANU DOSING LINE



 TECHCROSS	P&ID FOR BWTS		
	HULL NO.	YZJ2023-1584/1585	SHEET
	MODEL	ECS1000B 1.i x 1	1
	DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

BALLASTING OPERATION



 TECHCROSS	P&ID FOR BWTS		
	HULL NO.	YZJ2023-1584/1585	SHEET
	MODEL	ECS1000B 1.1 x 1	2 / 2
	DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	

ENGINE ROOM (SAFETY AREA)

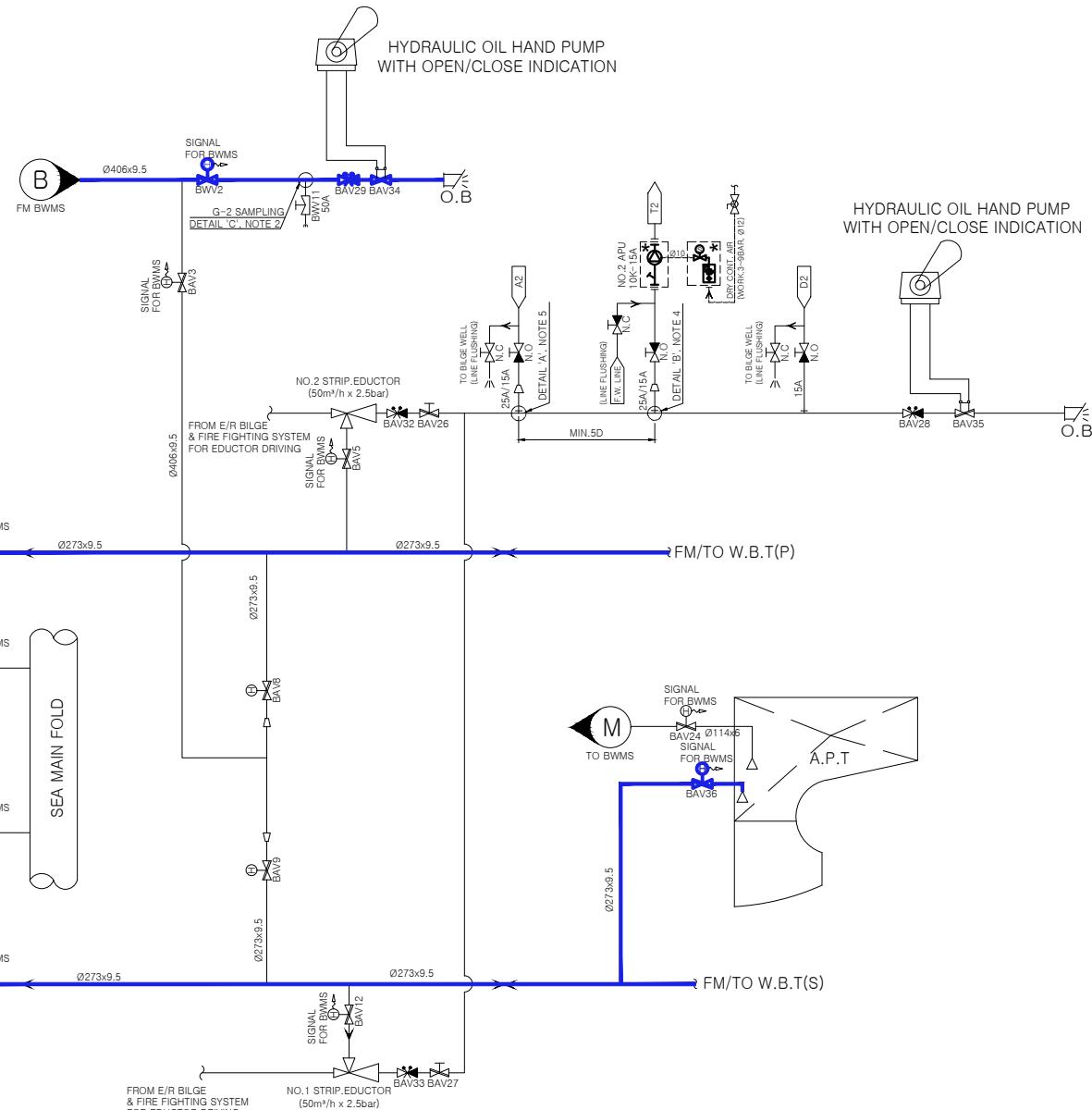
DE-BALLASTING OPERATION

THICK LINES (—) REPRESENT THE WATER FLOW, ALL VALVES ON THE RELATED PIPE LINE SHOULD BE OPEN BEFORE OPERATION OF EQUIPMENT.

THE VALVES ON THE OTHER PIPE LINES SHOULD BE CLOSED.

VALVE OPEN VALVE CLOSE

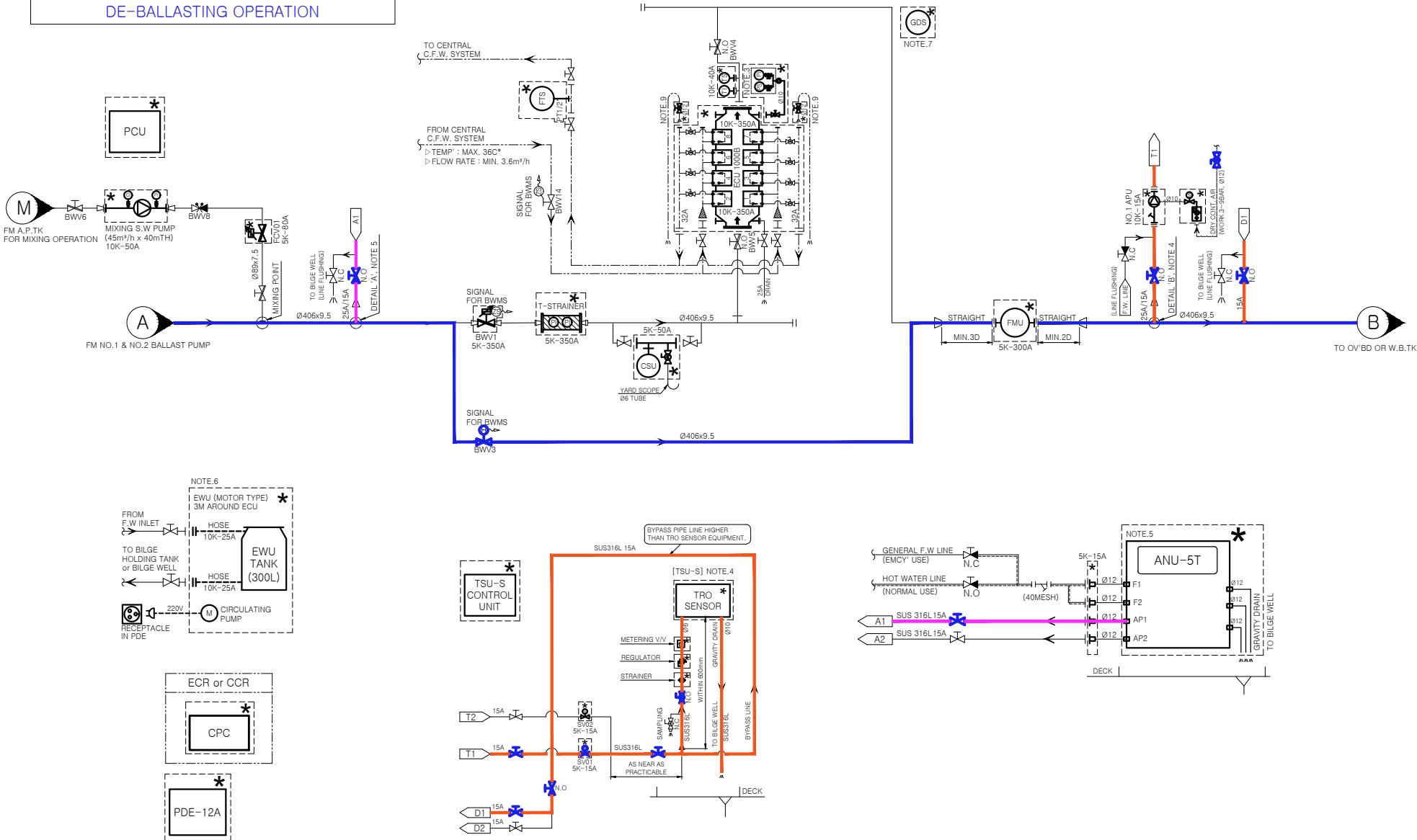
- BALLAST WATER LINE
- TSU SAMPLING LINE
- ANU DOSING LINE



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585 <th>SHEET</th>	SHEET
MODEL	ECS1000B 1.1 x 1	1
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

DE-BALLASTING OPERATION



ENGINE ROOM (SAFETY AREA)

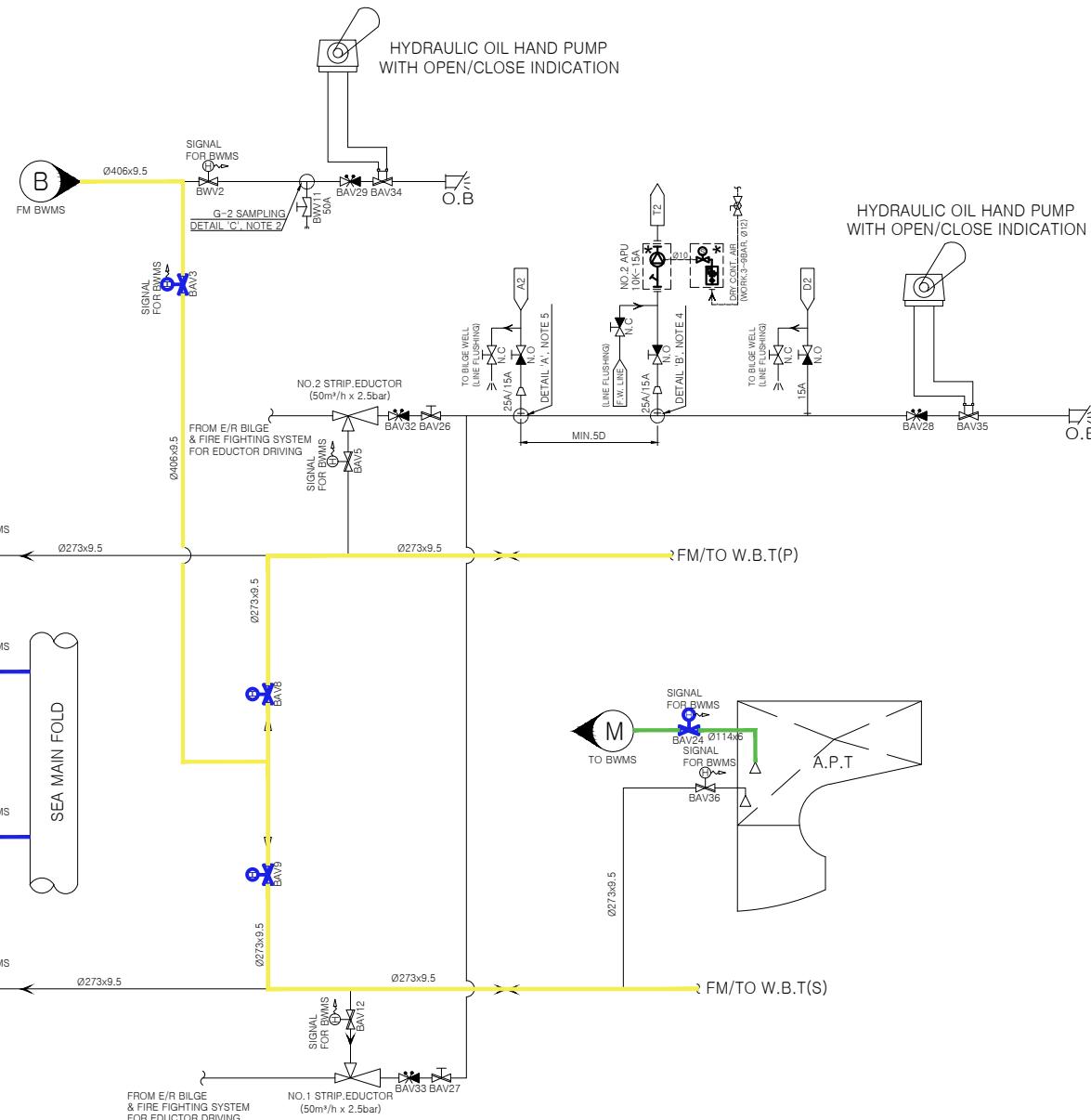
MIXING OPERATION

THICK LINES (—) REPRESENT THE WATER FLOW, ALL VALVES ON THE RELATED PIPE LINE SHOULD BE OPEN BEFORE OPERATION OF EQUIPMENT.

THE VALVES ON THE OTHER PIPE LINES SHOULD BE CLOSED.

VALVE OPEN VALVE CLOSE

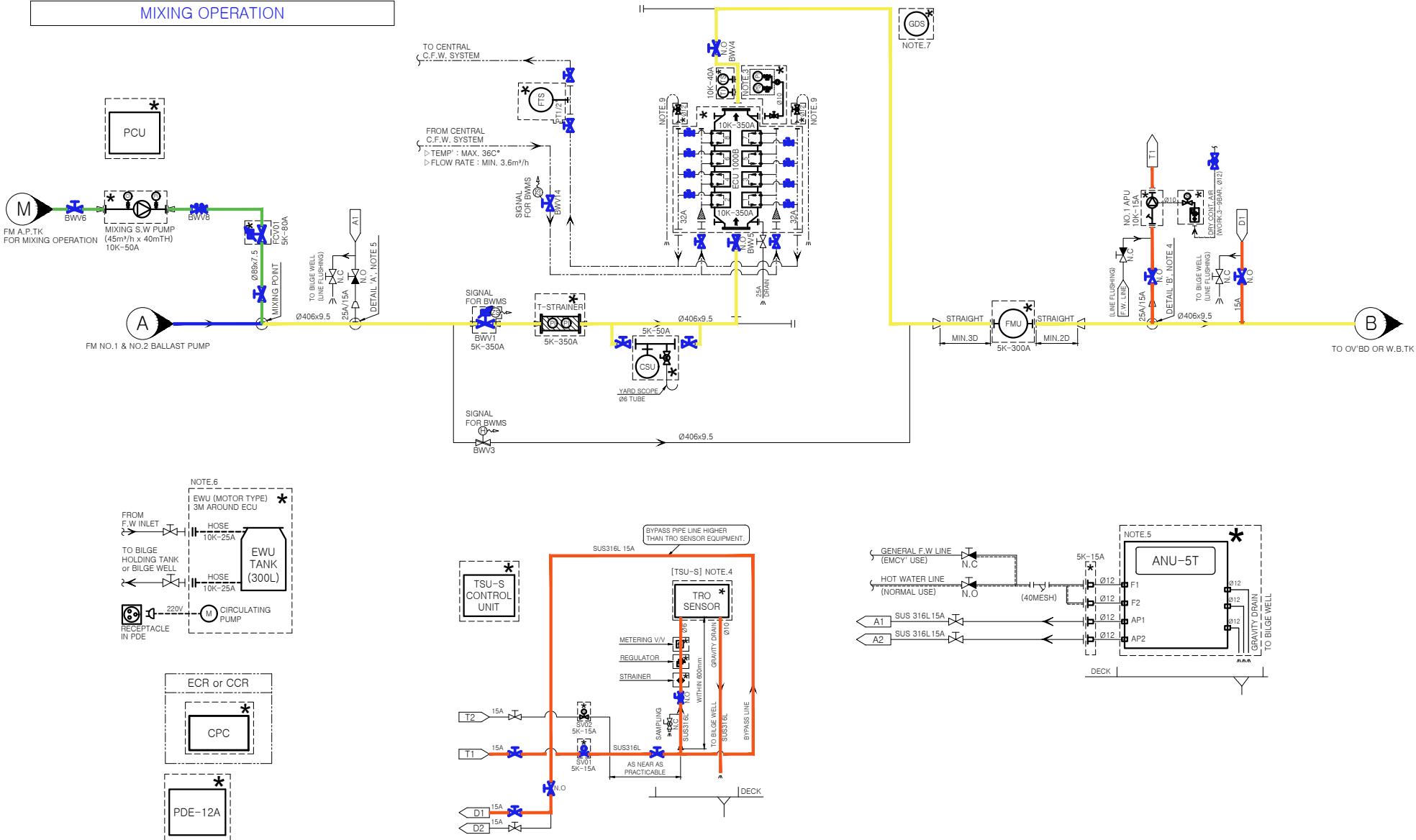
- FRESH WATER LINE (0 PSU)
- TSU SAMPLING LINE
- ANU DOSING LINE
- SEA WATER LINE (34.7 PSU)
- MIXED WATER LINE (1.5 PSU)



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	1
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

MIXING OPERATION



ENGINE ROOM (SAFETY AREA)

STRIPPING OPERATION

THICK LINES() REPRESENT THE WATER FLOW. ALL VALVES ON THE RELATED PIPE LINE SHOULD BE OPEN BEFORE OPERATION OF EQUIPMENT.
THE VALVES ON THE OTHER PIPE LINES SHOULD BE CLOSED.

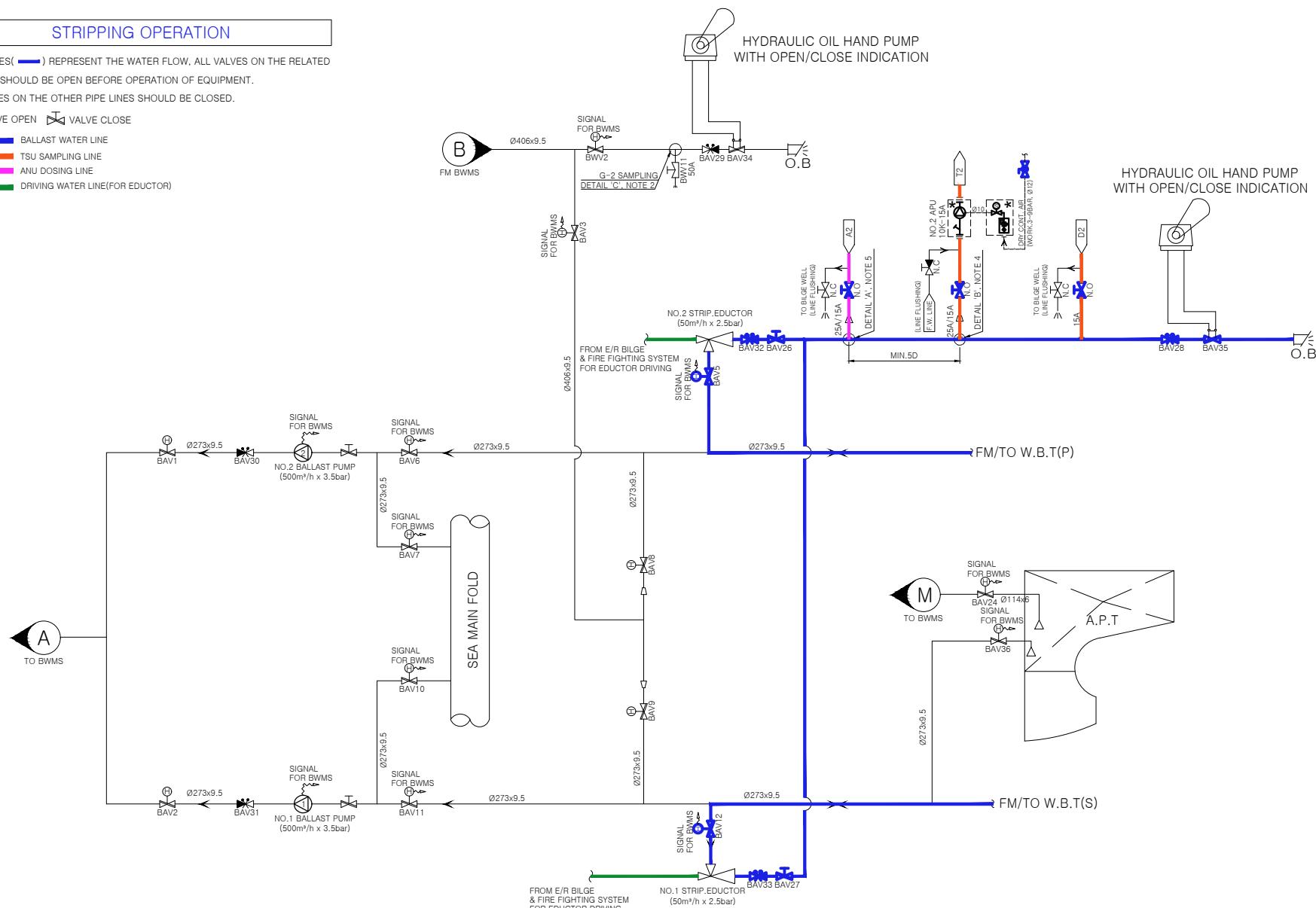
ANSWER

 VALVE OPEN VALVE CLOSE

BALLAST WATER LINE

TSU SAMPLING LINE

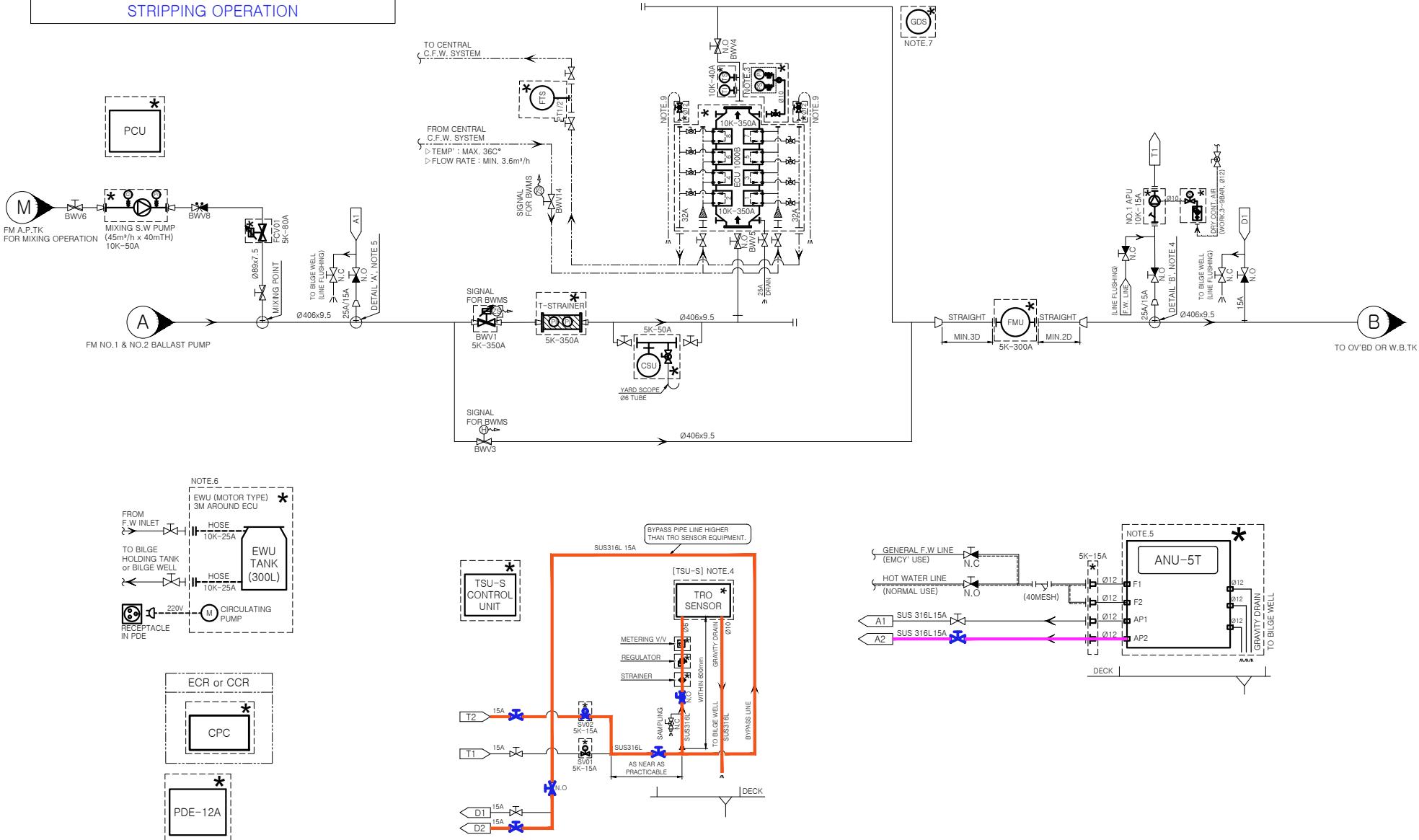
ANU DOSING LINE



	P&ID FOR BWTS	
HULL NO.	YZJ2023-1584/1585	SHEET 1
MODEL	ECS1000B 1.1 x 1	
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

STRIPPING OPERATION



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	2
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

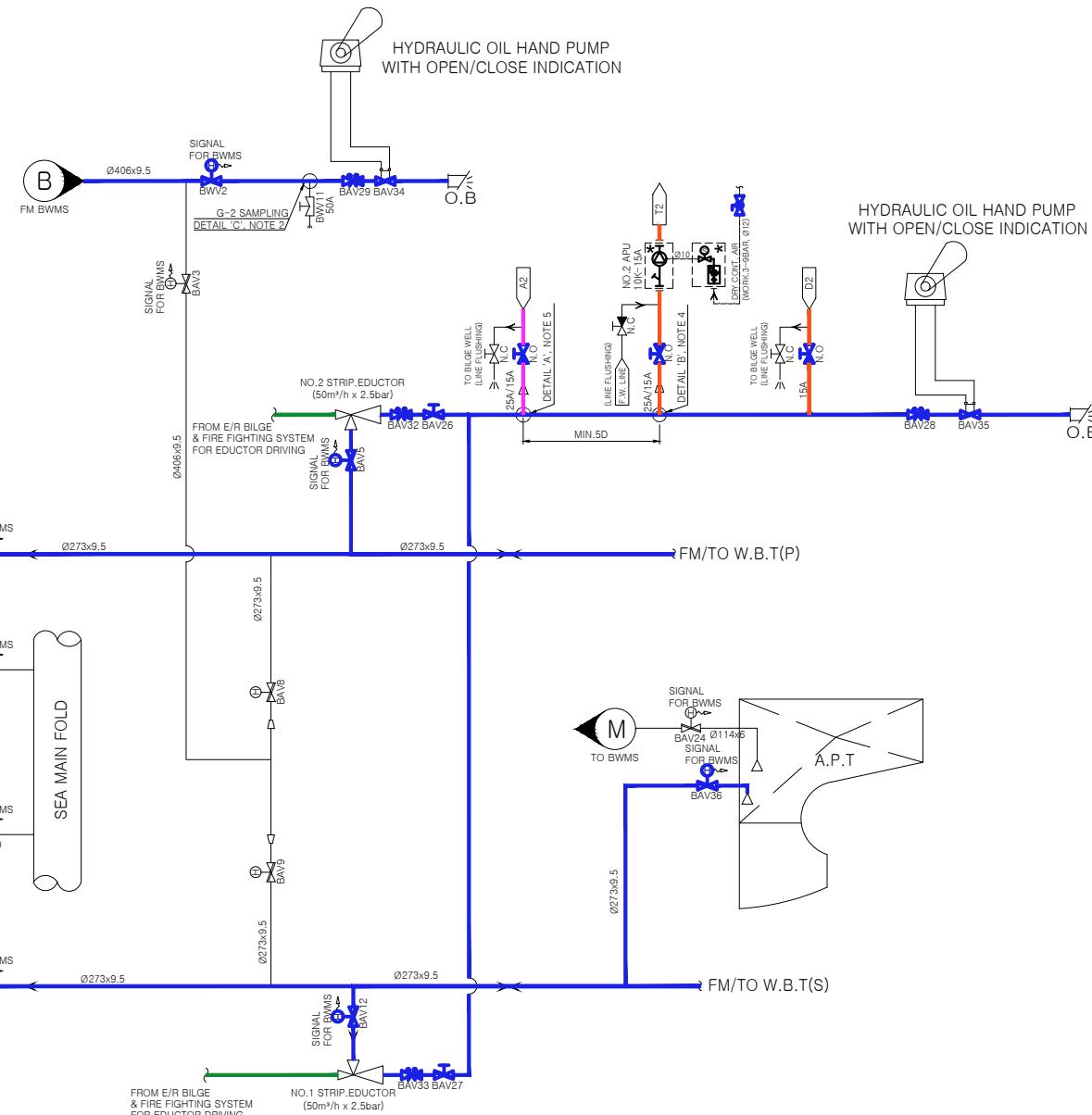
DE-BALLASTING + STRIPPING OPERATION

THICK LINES (—) REPRESENT THE WATER FLOW, ALL VALVES ON THE RELATED PIPE LINE SHOULD BE OPEN BEFORE OPERATION OF EQUIPMENT.

THE VALVES ON THE OTHER PIPE LINES SHOULD BE CLOSED.

VALVE OPEN VALVE CLOSE

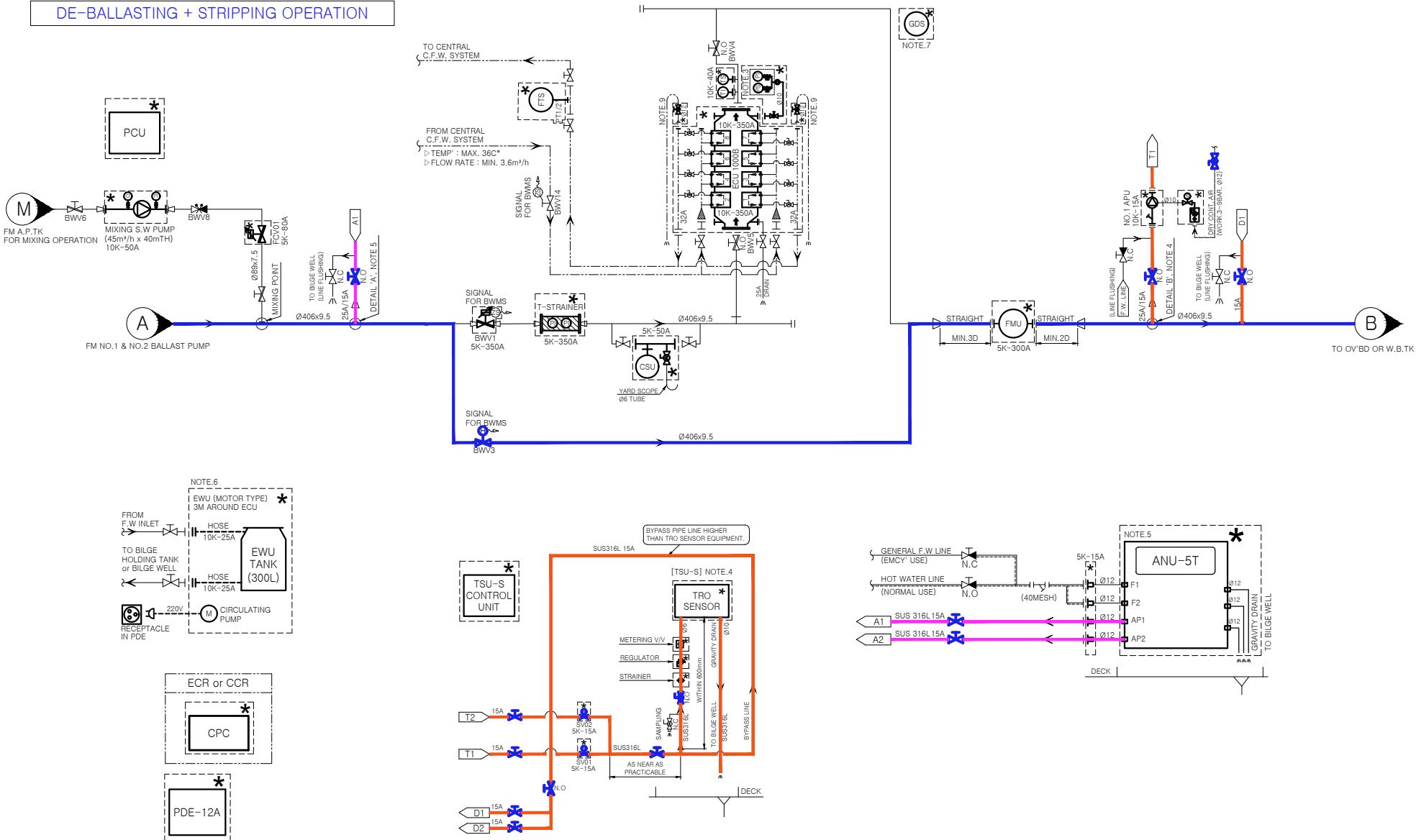
- BALLAST WATER LINE
- TSU SAMPLING LINE
- ANU DOSING LINE
- DRIVING WATER LINE (FOR EDUCTOR)



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	1
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2

ENGINE ROOM (SAFETY AREA)

DE-BALLASTING + STRIPPING OPERATION



P&ID FOR BWTS		
HULL NO.	YZJ2023-1584/1585	SHEET
MODEL	ECS1000B 1.1 x 1	2
DWG NO.	TPD025-GA-A001Z-YZJ2023-1584	2