

**CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY
MARINE ENGINEER OFFICER**

STCW 78 as amended MANAGEMENT ENGINEER REG. III/2 (UNLIMITED)

040-36 - ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

WEDNESDAY, 02 APRIL 2025

1315 - 1615 hrs

Materials to be supplied by examination centres

Candidate's examination workbook
Graph paper

Examination Paper Inserts

DRG 175
DRG 176
DRG 177
DRG 178
DRG 179

Notes for the guidance of candidates:

1. Examinations administered by SQA on behalf of the Maritime & Coastguard Agency
2. Candidates are required to obtain 50% of the total marks allocated to this paper to gain a pass **AND** also obtain a minimum 40% in Sections A and B of the paper.
3. Non-programmable calculators may be used.
4. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.



Maritime &
Coastguard
Agency



ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

Attempt ALL questions.

Marks for each part question are shown in brackets.

Section A

1. DRG.175

State what the following items are and describe their specific function in the illustrated system.

(a)

The diagram shows a pneumatic actuator symbol, which is a circle with a diagonal line and a triangle. Above the symbol is a label 'Set 77°C'. The symbol is connected to a horizontal line representing a pipe.

(2)

(b)

The diagram shows a pneumatic actuator symbol, which is a circle with a diagonal line and a triangle. Above the symbol is a label 'Set 111V'. The symbol is connected to a horizontal line representing a pipe. Below the symbol is a label 'WF 111V'. To the right of the symbol is a label 'P/I'. Below the symbol is a label 'TVPID 1352'. Below the symbol is a label 'RB 03'.

(2)

(c)

The diagram shows a pneumatic actuator symbol, which is a circle with a diagonal line and a triangle. Above the symbol is a label 'Set 115V'. The symbol is connected to a horizontal line representing a pipe. Below the symbol is a label 'WF 115V'.

(2)

(d)

The diagram shows a pneumatic actuator symbol, which is a circle with a diagonal line and a triangle. Above the symbol is a label 'Set 115V'. The symbol is connected to a horizontal line representing a pipe. Below the symbol is a label 'WF 115V'.

(2)

(e)

The diagram shows a pneumatic actuator symbol, which is a circle with a diagonal line and a triangle. Above the symbol is a label 'Set 1513'. The symbol is connected to a horizontal line representing a pipe. Below the symbol is a label 'RB 02'.

(2)

2. DRG.176

- (a) Describe how the pump shaft axial location is fixed within the pump casing. (3)
- (b) Describe the type of fit that coupling 217 has with the shaft 206. (2)
- (c) Describe the operation of the assembly from stationary to running condition. (5)

3. DRG.177

Describe the information visible in the below images.

- (a) (2)



- (b) (2)



- (c) (2)



- (d) (2)



- (e) (2)



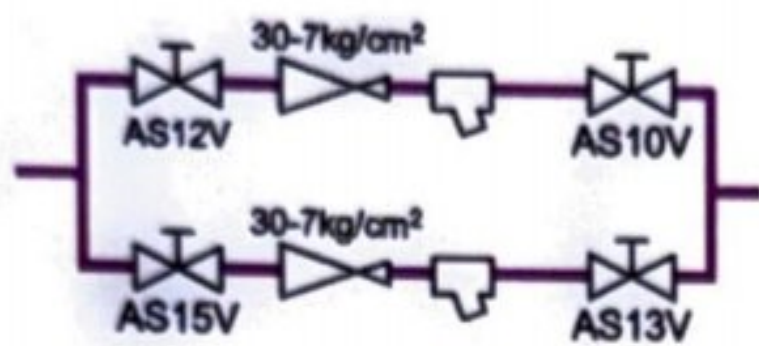
4. DRG.178

State what the following items are and describe their specific function in the illustrated system.

(a) (2)



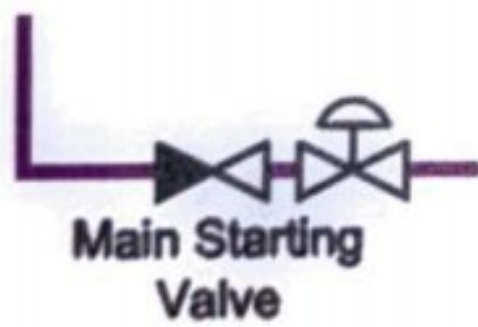
(b) (2)



(c) (2)



(d) (2)



(e) (2)

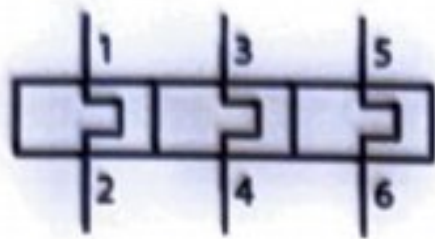


[OVER

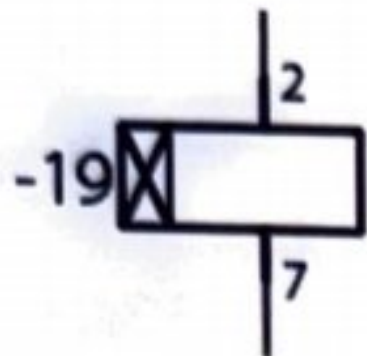
5. DRG.179

State what the following items are and describe their specific function in the illustrated system.

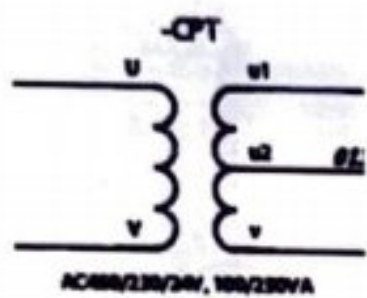
(a) (2)



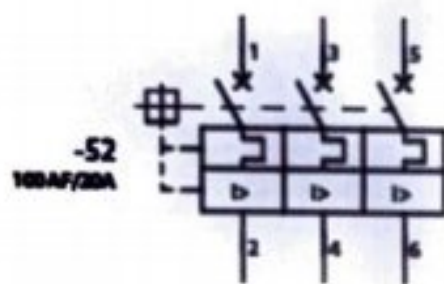
(b) (2)



(c) (3)



(d) (3)



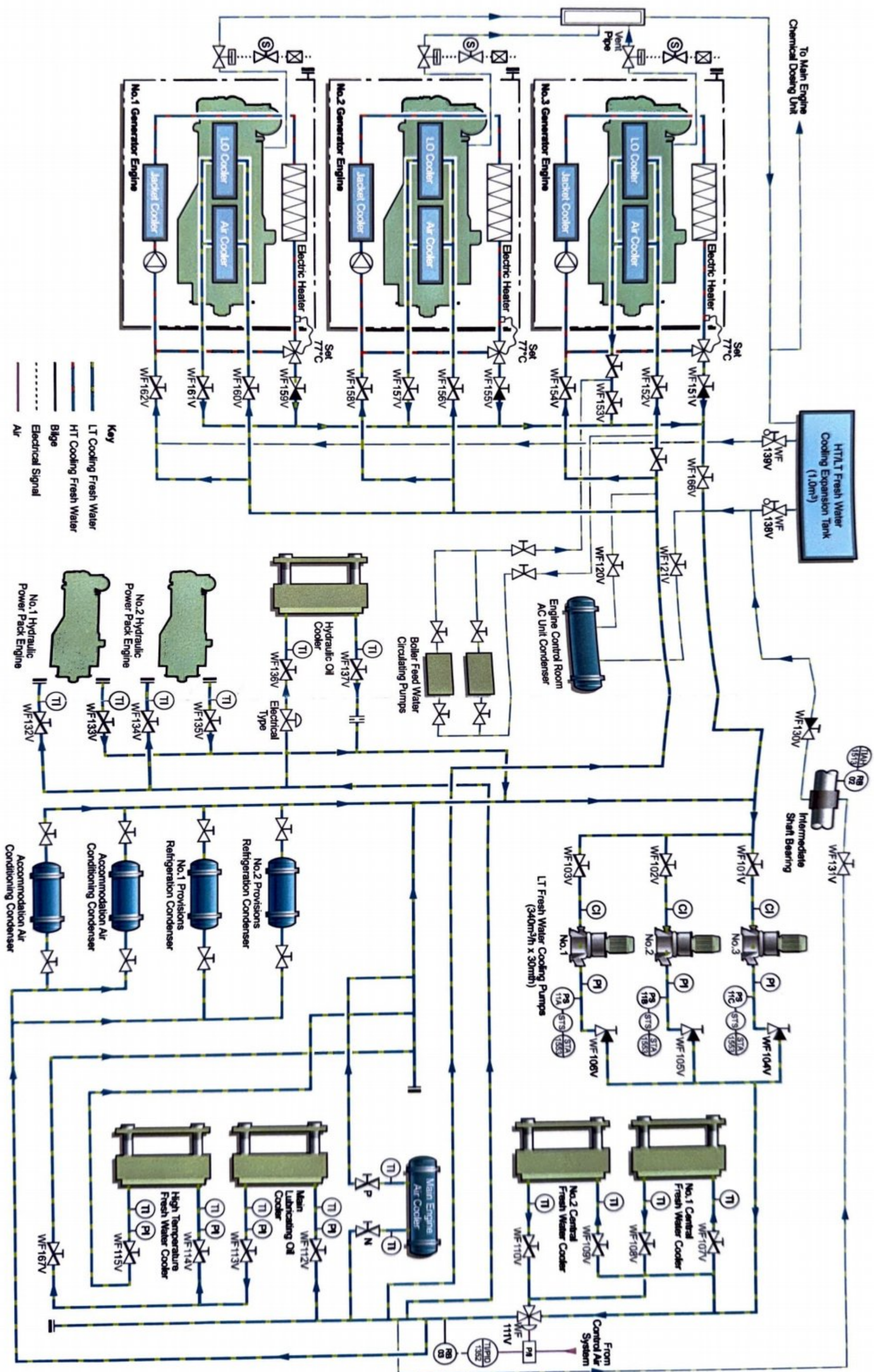
Section B

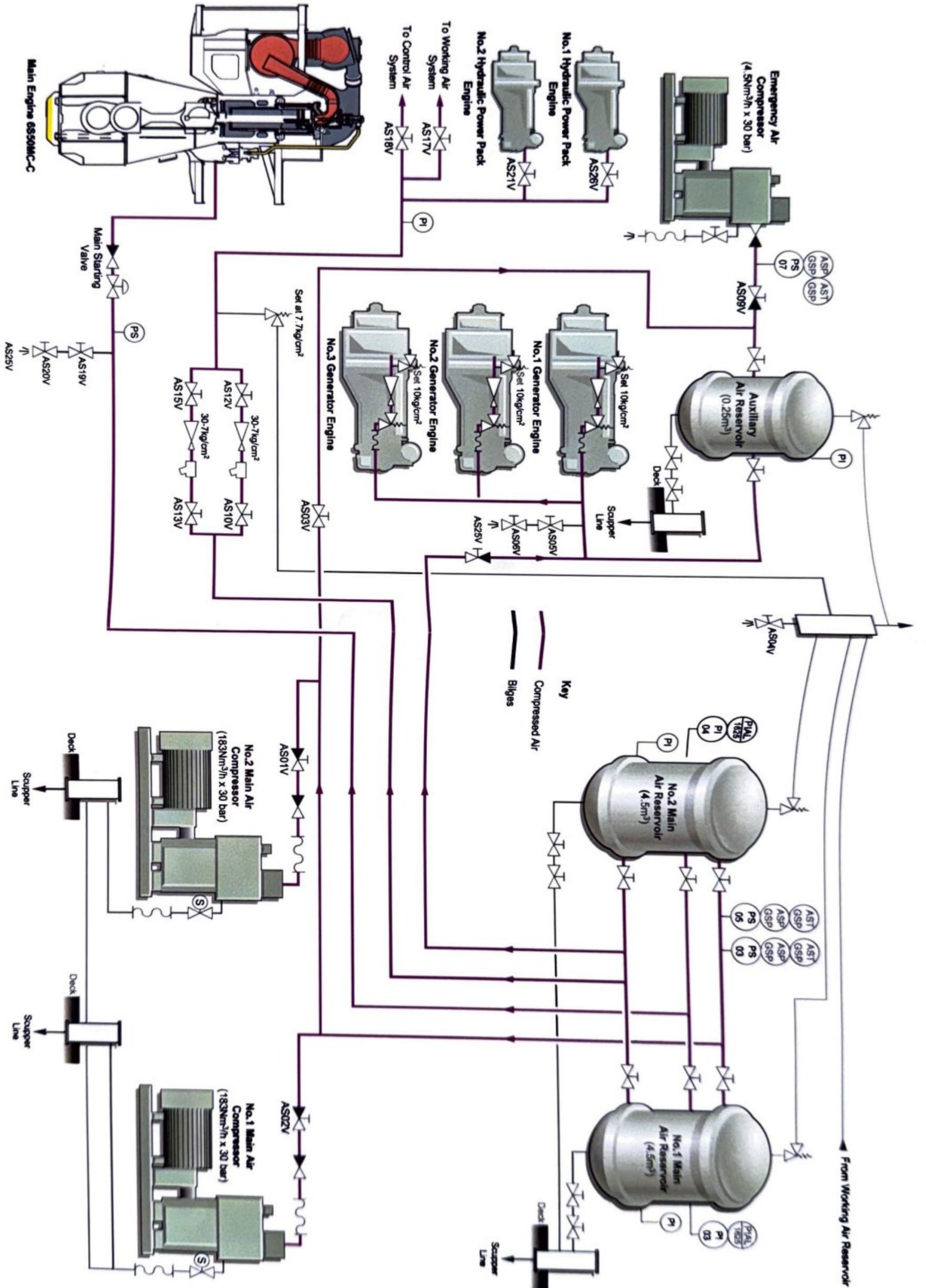
6. DRG.176

- (a) Describe using drawing references the procedure for removal of the clutch coupling and replacement of the clutch pad 362. (10)
- (b) Describe using drawing references overhaul of the pump side of the arrangement. (15)

7. DRG.179

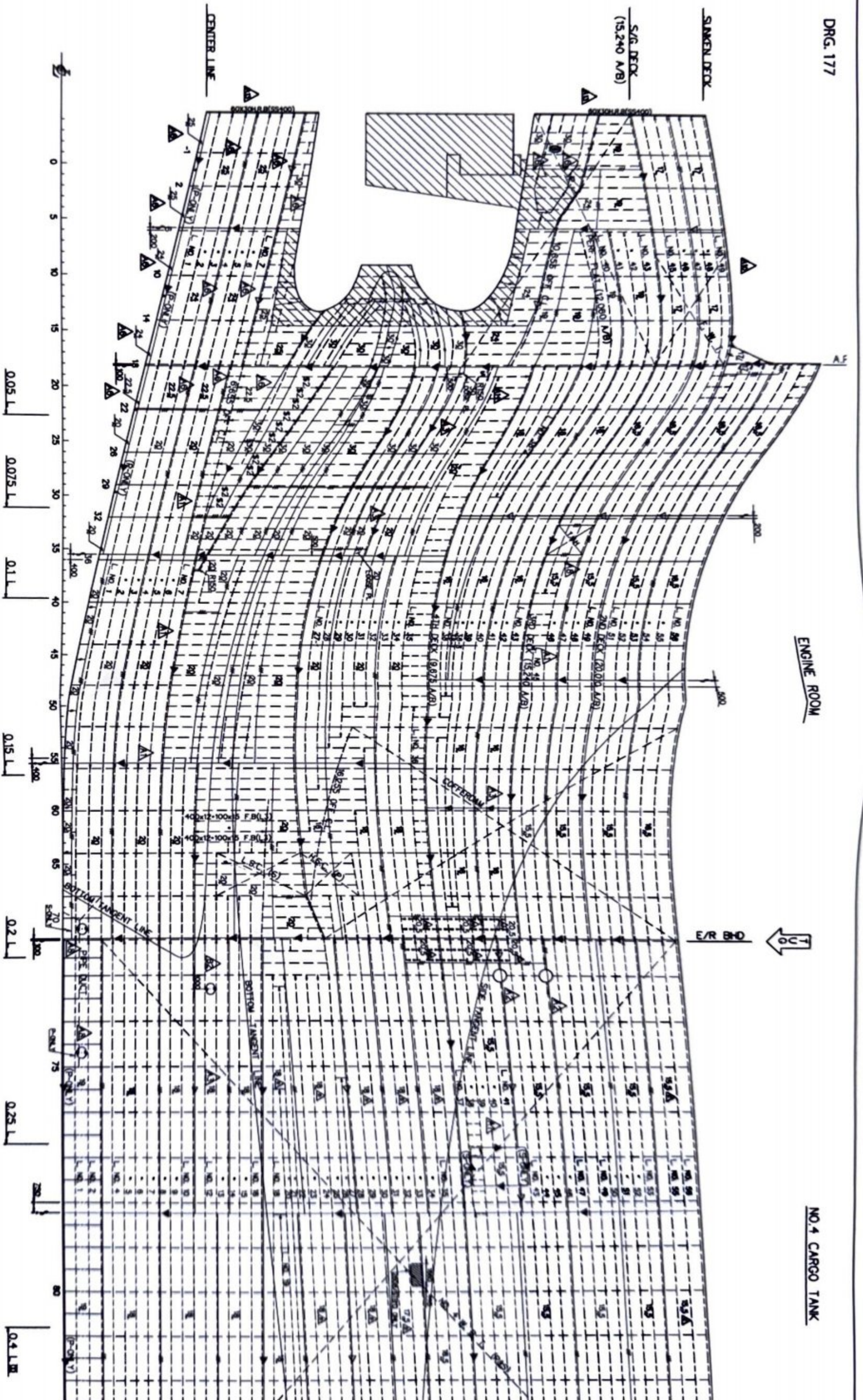
- (a) Describe what the illustrated circuit is designed to achieve. (10)
- (b) Describe the heating circuit and how it functions. (5)
- (c) Describe the starting operation of the above circuit from when the auto control panel energises relay 4x. (10)





ENGINE ROOM

NO. 4 CARGO TANK



FRAME SPACING : 800

1,600

FRAME SPACING : 1,600

L. NO. 45 - 48 : 2500/80/75 L.A

L. NO. 49 - 51 : 3500/100/12/7 L.A

L. NO. 1 - 7 : 4500/12/150/14 F.B.T

L. NO. 45 - 58 : 2500/80/75 L.A

L. NO. 59 - 61 : 3500/100/12/7 L.A

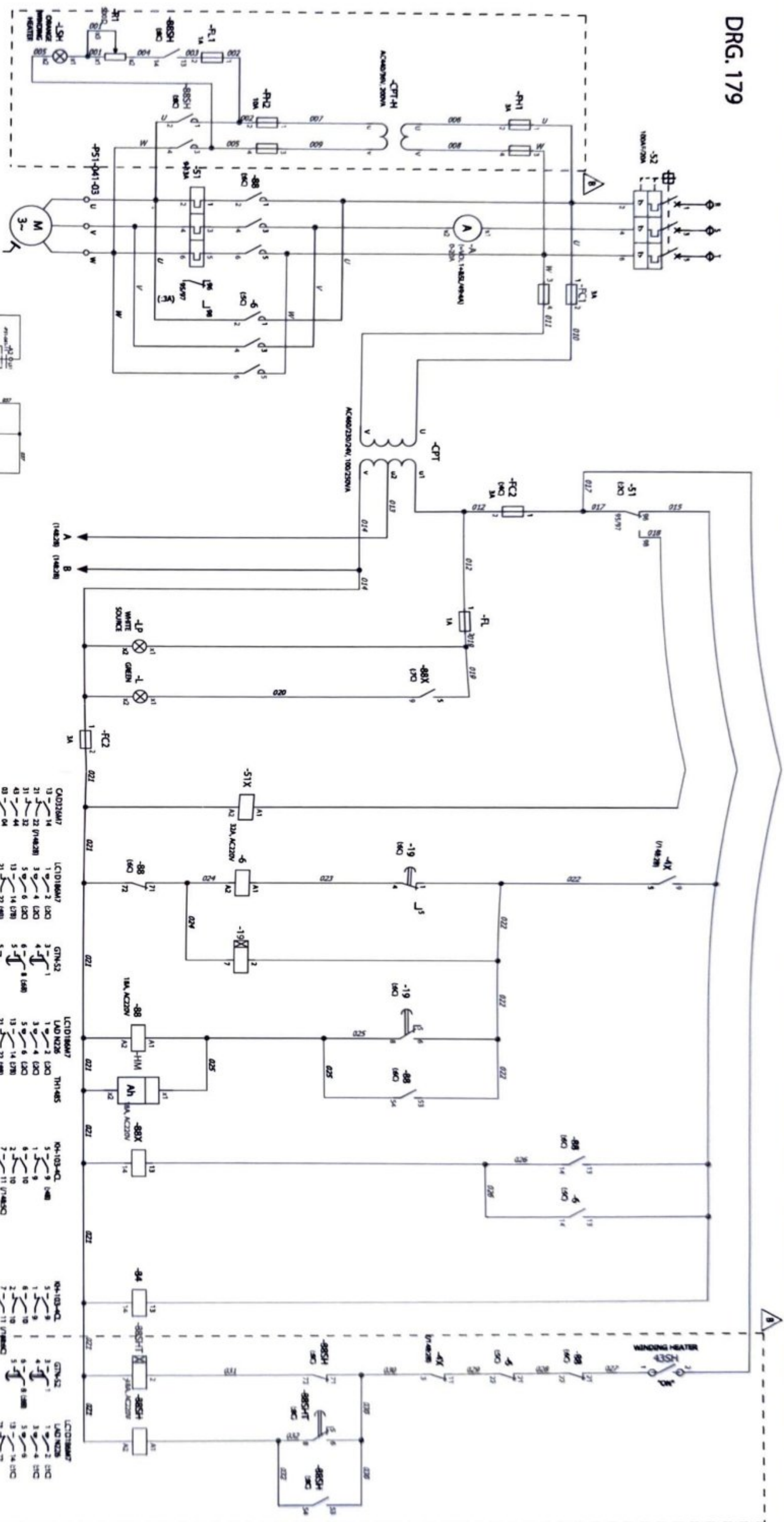
L. NO. 21 - 28 : 4500/100/12/7 L.A

L. NO. 3 - 10 : 4500/12/150/14 F.B.T

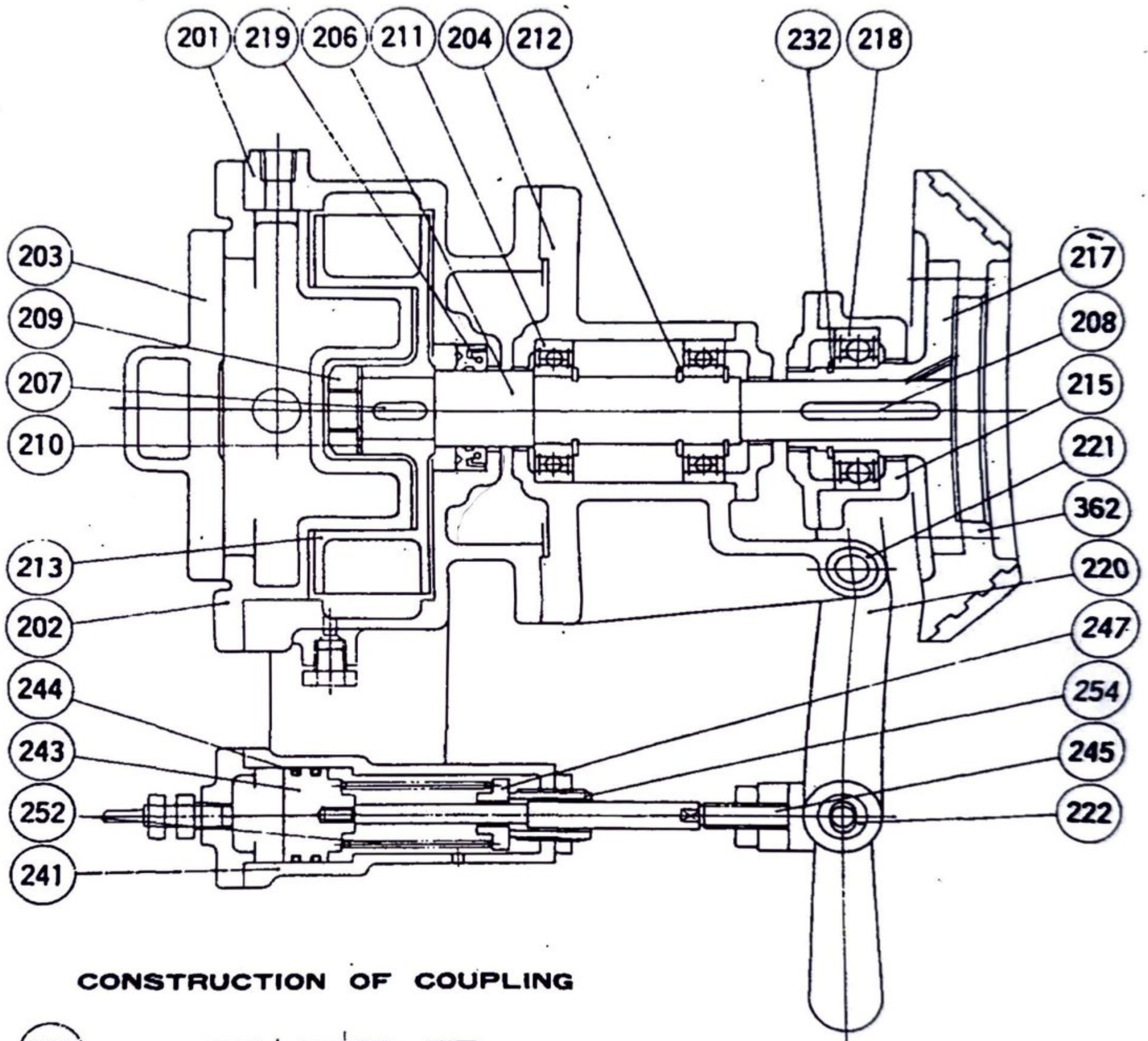
L. NO. 1 - 2 : 4500/12/150/14 F.B.T

81 : 5500/12/150/20 F.B.T

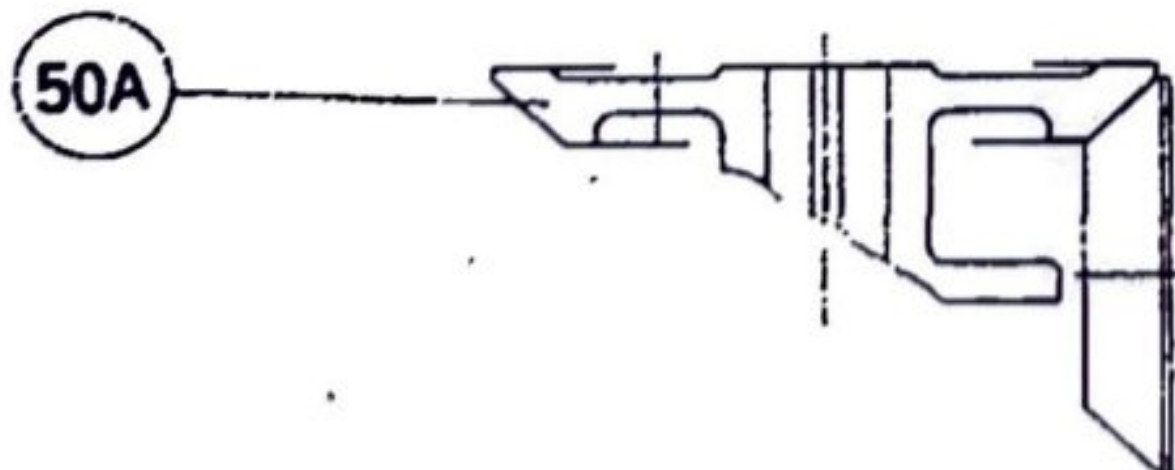
82 : 3500/12/125/15 F.B.T



VACUUM PUMP



CONSTRUCTION OF COUPLING



The coupling (50) shown in the sectional drawing becomes like one (50A) as shown in this drawing.