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Airbus
A318/A319/A320/A321

ATA 38
Water and Waste

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EASA Part-66
B1/B2

Training Manual

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- The LTT production process ensures that the Training Manual contains a complete set of all necessary pages in the latest finalized revision.

ATA 38 WATER AND WASTE

38-00 GENERAL

INTRODUCTION

General

The water and waste system consists of:

- a potable water system
- a drain water system
- a waste water system
- and a vacuum toilet system

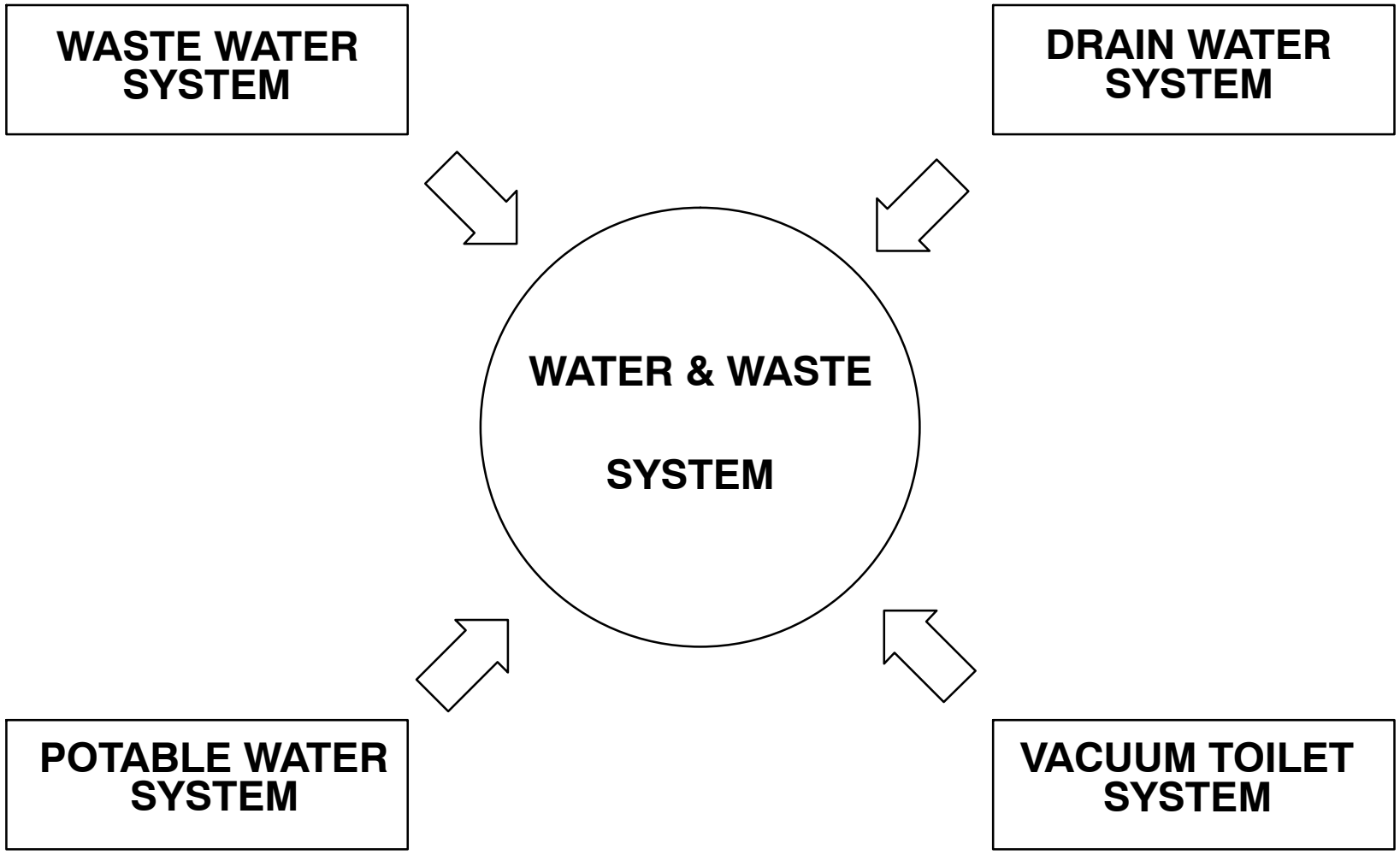


Figure 1 System Presentation

PANEL INTRODUCTION

Quantity Indication System

The LED (**L**ight **E**mitting **D**iode) indicator on the forward attendant panel shows the water and waste contents in percentage of volume.

To get a indication the **"IND ON"** push button must be pressed.

The indication for the potable water and waste system will be on as long as the water service panel is opened (Operated by a micro switch on the service panel).

Potable Water Preselection System (Optional)

For the potable water system a preselection system is installed.

This system allows to preselect the desired water quantity in 25% steps.

Fault Indications

For the toilet system different fault lights (Diode) are provided.

System INOP:

- The complete vacuum toilet system is inoperative.

  This will happen for example: if a fault occured, or the waste tank is full or the toilet service panel is opened to do the toilet servicing.

LAV INOP:

- Indicates an INOP lavatory due to a fault.

FORWARD ATTENDANT PANEL (FAP)

ENHANCED CABIN

FLIGHT ATTENDANT PANEL (FAP) WATER/WASTE PAGE

Figure 2 Fwd Attendant Panel (A318–21)

A Potable Water Service Panel

The water service panel is located in the left–hand lower fuselage, between FR65 and FR66. The panel has:

- the fill/drain control handle (1)
- a fill/drain port for the potable water (2)
- a connection for the ground–air pressure unit (3)
- the door micro switch (4)
- control lights for the motorized drain valves, the overflow valve and the tank full light. (5)

B Drain/Overflow Panel (A320 only)

The drain / overflow panel is located in the lower fuselage, between FR33 and FR34, it contains:

- the overflow port for the water tank (6)
- the drain port for the water tank (7)
- the manual control handles for the water tank drain valve and the water tank overflow valve (8)

C FWD Drain Panel

The forward drain panel is located in the lower fuselage, between FR28 and FR29, it contains:

- the FWD drain outlet
- the manual control handle for the FWD drain valve (8)

D Toilet Service Panel

The service panel is located in the right–hand lower fuselage, between FR65 and FR66. The panel is for the forward and aft toilets. The panel has:

- a waste holding tank rinse connection (9)
- a waste holding tank drain connection (10)
- the door micro switch (4)
- an actuation unit for the waste drain valve (11)

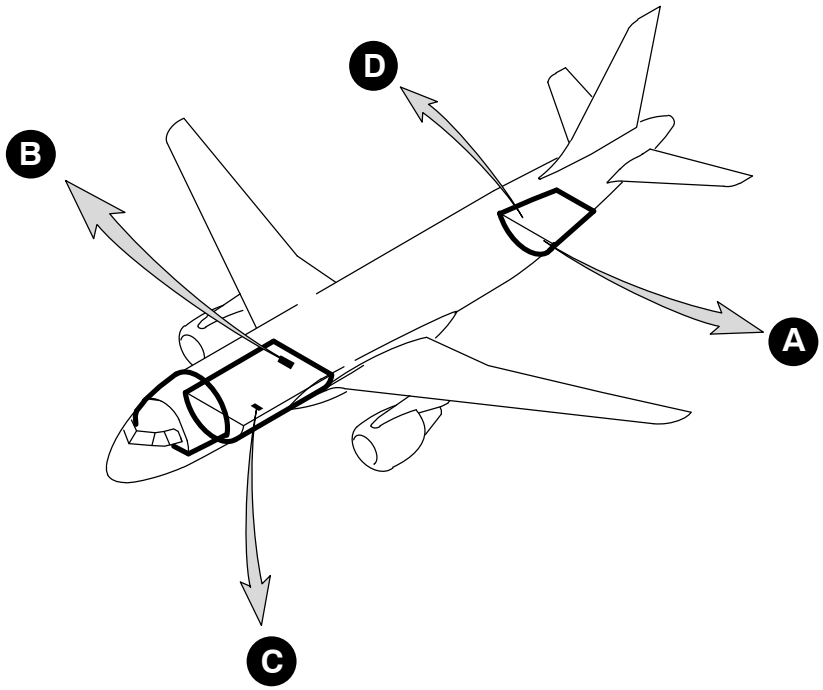
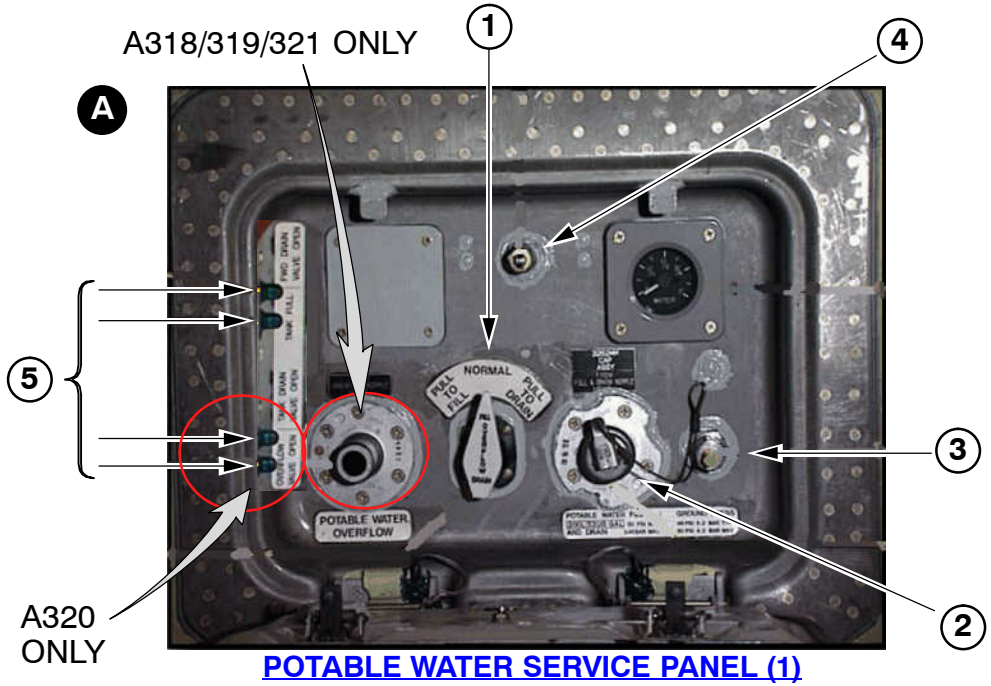
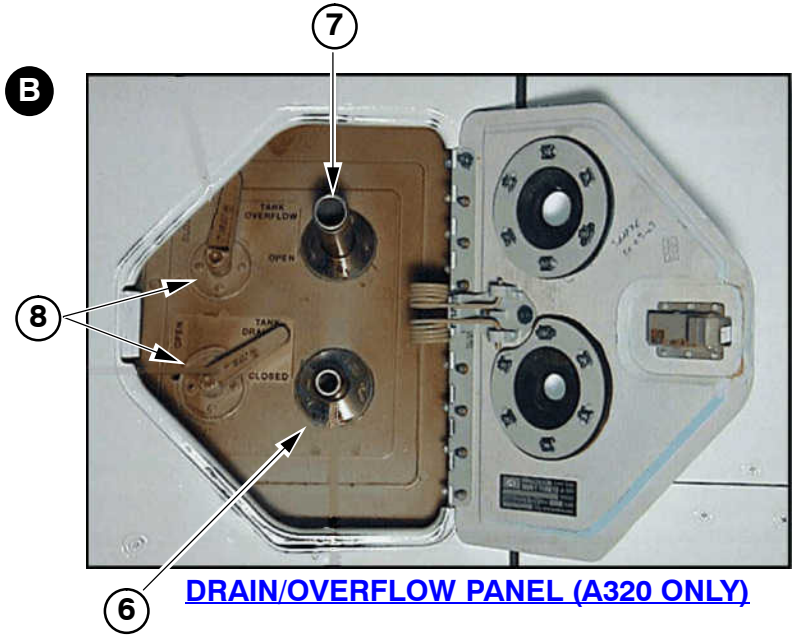


Figure 3 Service Drain Panels Location

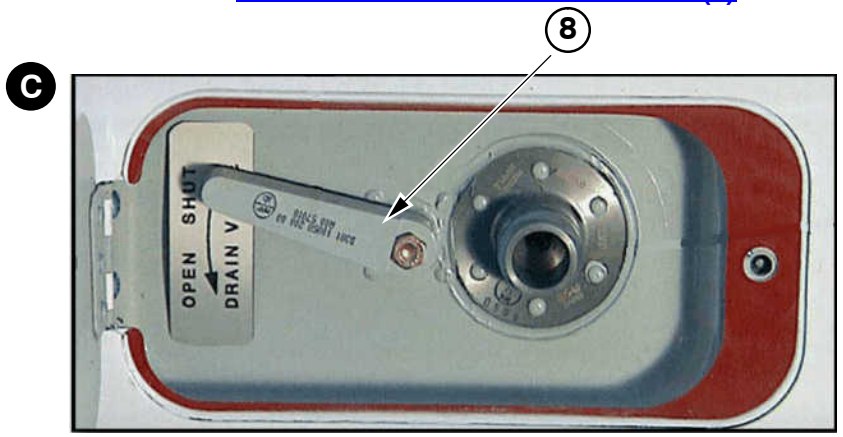


POTABLE WATER SERVICE PANEL (1)

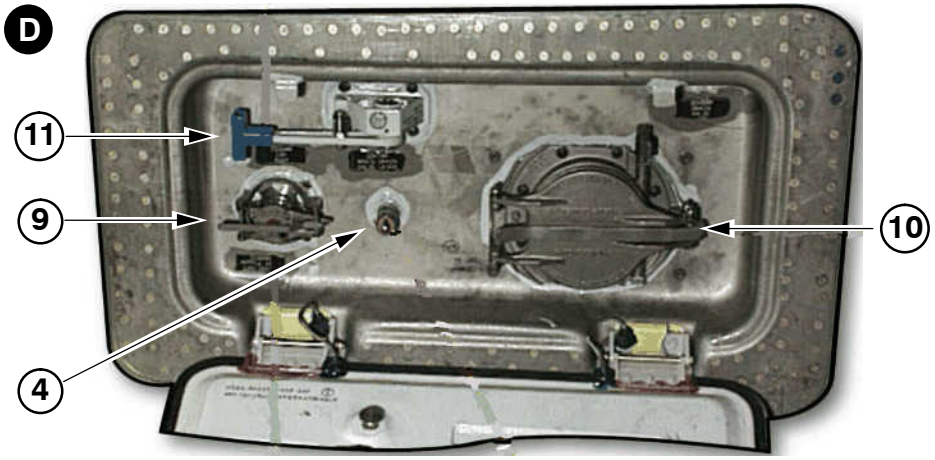
POTABLE WATER SERVICE PNL (2)



DRAIN/OVERFLOW PANEL (A320 ONLY)



FWD DRAIN PANEL



TOILET SERVICE PANEL

Figure 4 Service/Drain Panels

WATER/WASTE GENERAL LAYOUT

General

The water and waste system consists of a pneumatically pressurized potable water system, a drain water system, a waste disposal system and a vacuum toilet system.

Potable Water System

The potable water system supplies the galleys and lavatories with water from a tank via a distribution system.

It is pressurized by bleed air system (air from ENG1; ENG2, APU).

A ground connector for external supply is also available.

Drain Water System

The drain water system gives the possibility to drain the water from the potable water system, by means of drain valves and drain ports.

Waste Water System

The waste water system includes drainage of waste water from lavatory wash basin and galley sinks, to be discharged overboard via heated drain lines and heated drain masts.

Toilet System

The toilet system collects waste in a underfloor waste holding tank. The tank is emptied and cleaned during aircraft ground service.

The toilet system uses water from the potable water system for the toilet flush. Waste is removed from the toilet bowl by a vacuum draining system.

An electronic VSC (**V**acuum **S**ystem **C**ontroller) controls and monitors the vacuum system.

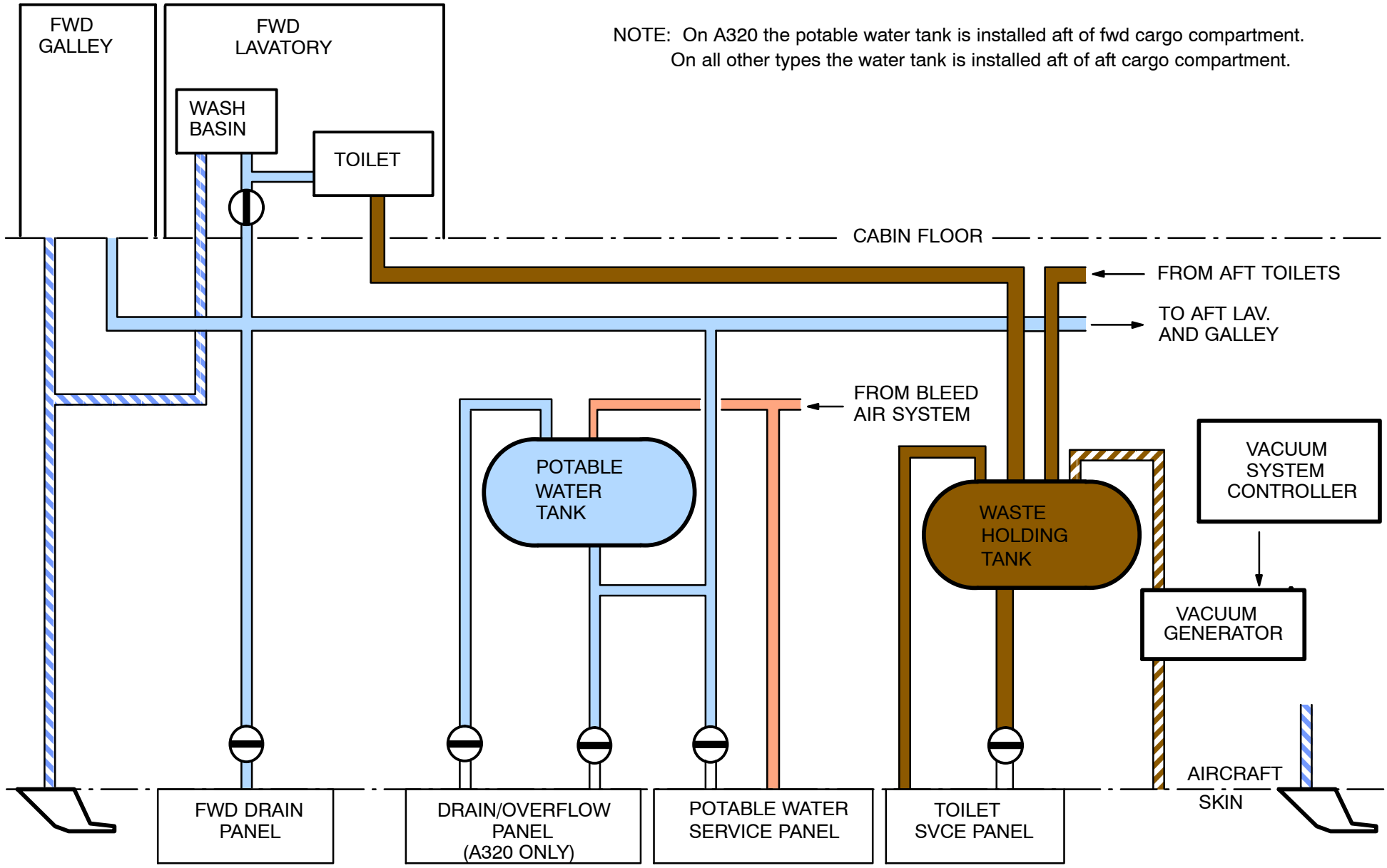


Figure 5 Water & Waste Basic Schematic (A320)

38-10 POTABLE

WATER SYSTEM GENERAL DESCRIPTION (A320)

Storage

The potable water is stored in one tank installed in the pressurized underfloor area of the right hand fuselage, aft of the forward cargo compartment.

Potable water tank capacity: 200 liters (53 US gal).

Pressurization

Pressurization of the system enables water supply from the tank to the necessary service location.

Compressed air is trapped from the cross feed line of the engine bleed air.

When the aircraft is on ground, a compressor or ground air cart can pressurize the potable water distribution system.

Distribution

Potable water from the water tank is supplied through a system of distribution lines. The lavatory and galley distribution lines run below the passenger compartment floor.

They are shrouded and insulated, and some of them are heated.

User Supply

Each lavatory can be isolated from the potable water distribution system through a manual shut-off valve.

Heating

A water heater is installed under the wash basin inside the sanitary unit cabinet. A thermostat allows the water temperature to be maintained between 45°C (113°F) and 48°C (118°F).

An overtemperature safety device protects the heating element.

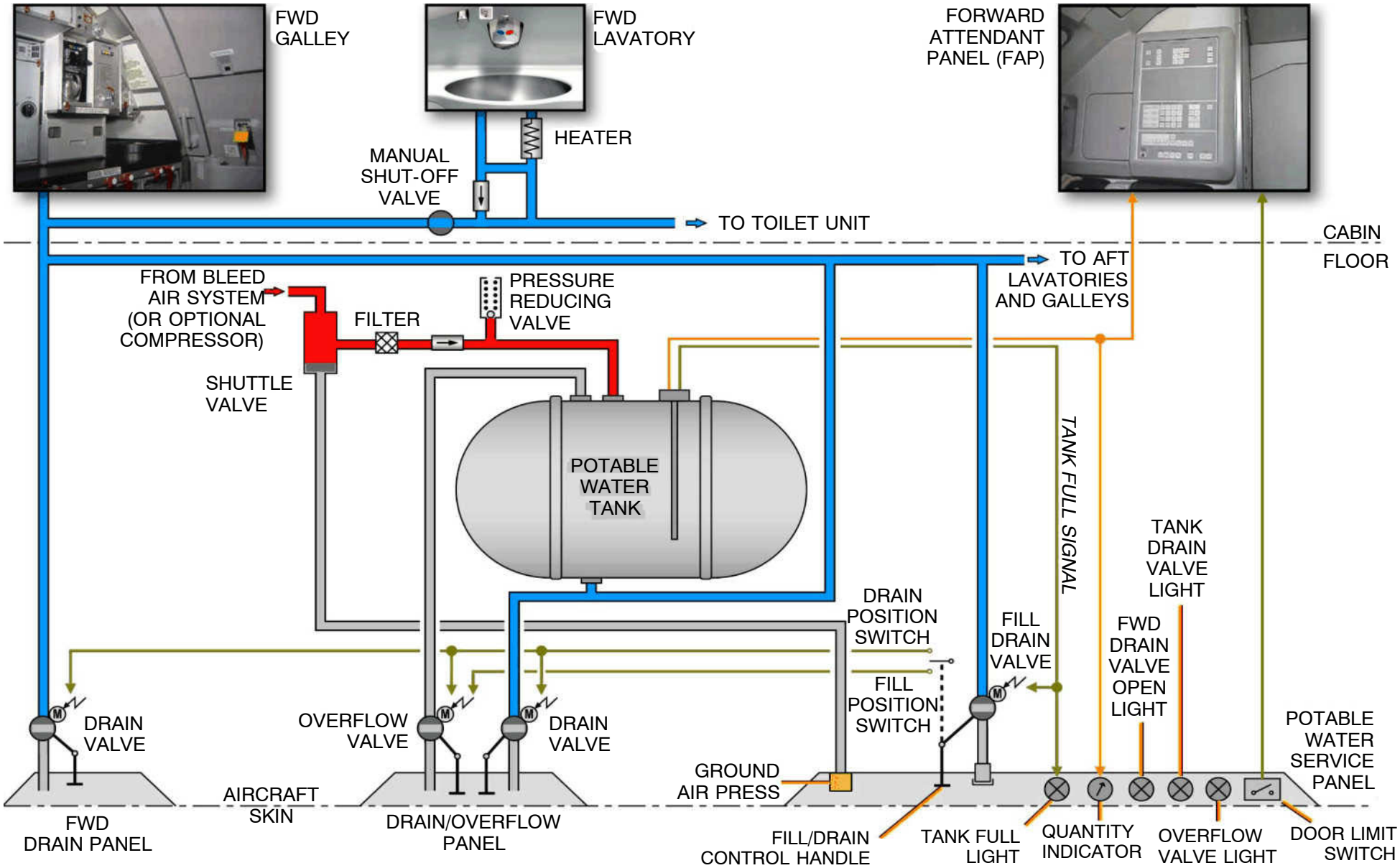


Figure 6 Water System Basic Schematic (A320)

WATER SYSTEM GENERAL (A318/319/321)

Storage

The potable water is stored in one tank installed in the pressurized underfloor area of the right hand fuselage, aft of the rear cargo compartment.

Potable water tank capacity: 200 liters (53 US gal).

Pressurization

Pressurization of the system enables water supply from the tank to the several service location.

The air is supplied from the engine bleed air or the Auxiliary Power Unit. A compressor or ground air cart can also pressurize the potable water distribution system.

Distribution

Potable water from the water tank is supplied through a system of distribution lines. The lavatory and galley distribution lines run below the passenger compartment floor. They are shrouded and insulated, and some of them are heated.

User Supply

Each lavatory can be isolated from the potable water distribution system through a manual shut-off valve.

Heating

A water heater is installed under the wash basin inside the sanitary unit cabinet. A thermostat allows the water temperature to be maintained between 45°C (113°F) and 48°C (118°F).

An overtemperature safety device protects the heating element.

Filling

Filling is achieved through a fill / overflow and drain valve operated by the fill/drain control handle on the potable water service panel.

The quantity transmitter sends a tank full-signal, via preselector control unit, to close the fill/overflow and drain valve automatically (the tank full signal will be provided when the preselected quantity is reached). A manual operation is also possible.

Maximum permissible pressure to fill the potable water tank is 50 psi (3.4 bars).

Draining

The draining operation is achieved through the fill / overflow and drain valve and a motorized drain valve, using the same control handle as the filling operation.

Manual operation is possible via control handle dedicated to each valve.

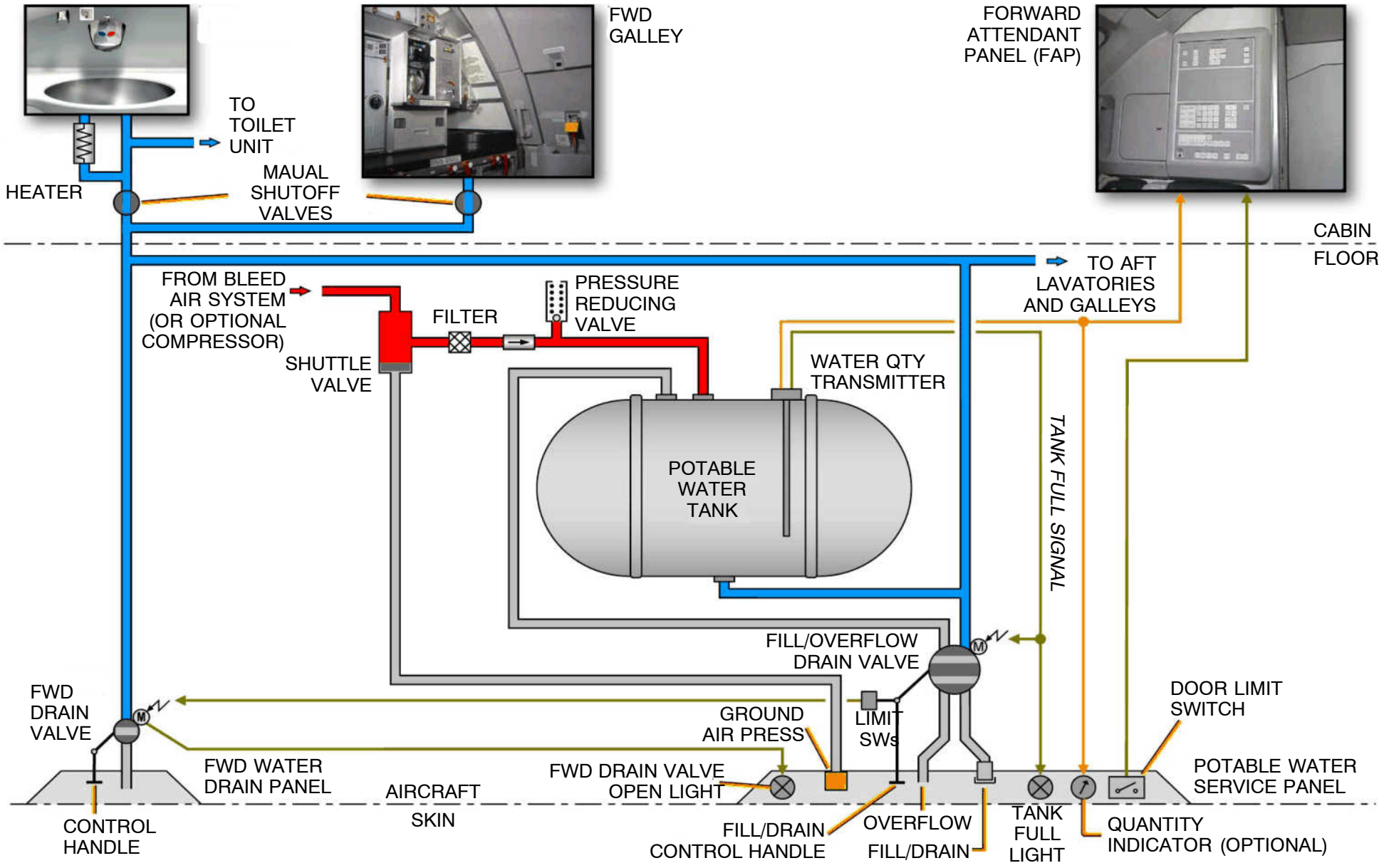


Figure 7 A319/321 Water System Basic Schematic (A318/319/321)

POTABLE WATER SYSTEM FILLING PRESENTATION (A320)

Filling

When the fill / drain control handle is turned from ”NORMAL” to ”FILL” position and pulled out to its stop, it mechanically opens the fill/drain valve.

The fill limit switch sends an open signal to the overflow valve.

The overflow valve control light (green) comes on when the valve is open.

The quantity transmitter sends the quantity signal to the preselector control unit.

The preselector control unit provides a tank full signal when the preselected quantity is reached.

This signal causes the fill/drain valve to close electrically.

The control handle is automatically pulled in and returns to the ”NORMAL” position. When the fill/drain valve is closed, the tank full control light (green) comes on.

The fill / drain control handle ”NORMAL” position causes the electrical closure of the overflow valve.

Fill System (without Electrical Power)

You can also fill the water tank when there is no electrical power.

To do so you must open the fill/drain valve and the overflow valve manually.

To open the fill /drain valve you turn the control handle on the potable water service panel from ’NORMAL’ to ’FILL’.

Then pull the control handle out to its stop.

To open the overflow/ventilation valve you turn the control handle at the overflow and drain panel from ’SHUT’ to ’OPEN’.

There are no indications that the valves are open.

When the tank is full, you must close the valves manually again.

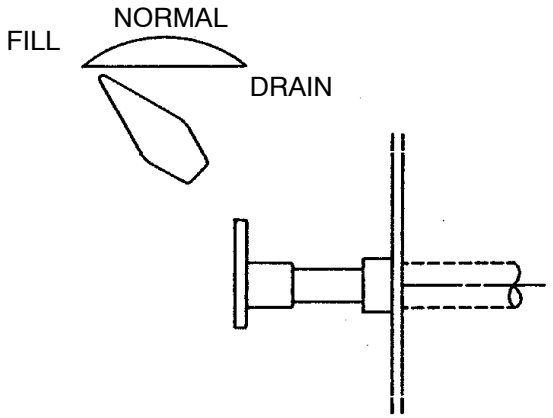


Figure 8 Fill Position (A320)

1. Handle from in flight pos (see 1) turned 45° to the left and pulled out.
   In this position the cable assy switches on the motorized overflow valve.
2. Fill/drain
   Valve open.
3. Motorized drain valves closed (zone 133 and 138)
4. After Filling the handle returns to normal position when pushed in or when the fill/drain valve is electrically operated.

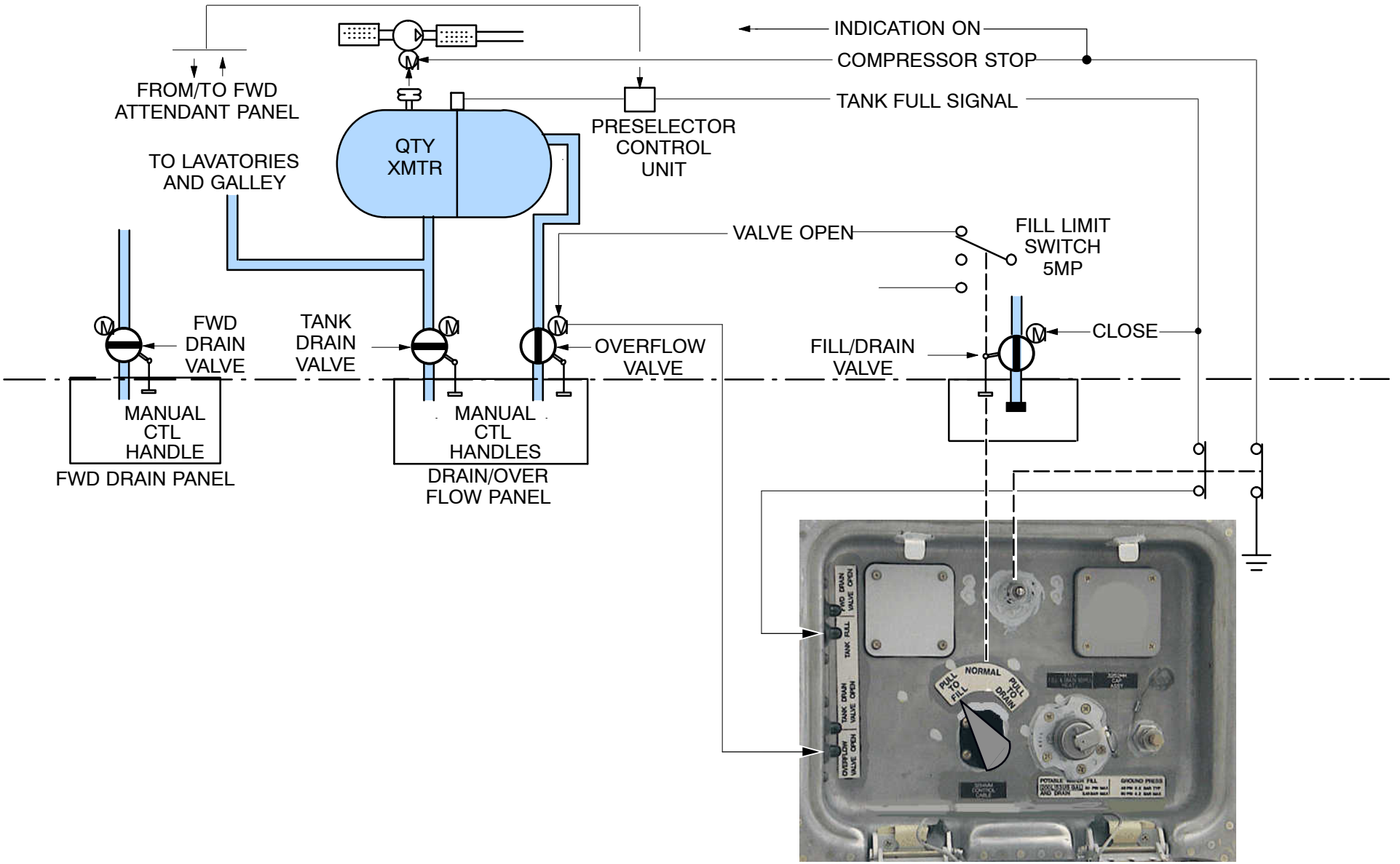


Figure 9 Water Fill Schematic (A320)

POT. WATER SYST. FILL PRESENTATION (A318/319/321)

Filling

When the fill/drain control handle is turned from ”NORMAL” to ”FILL” position and pulled out to its stop, it mechanically opens the fill / drain and overflow valve.

The quantity transmitter sends the quantity signal to the preselector control unit.

The preselector control unit provides a tank full signal when the preselected quantity is reached.

This signal causes the fill/overflow and drain valve to close electrically.

The control handle is automatically pulled in and returns to the ”NORMAL” position. The tank full control light (green) comes on.

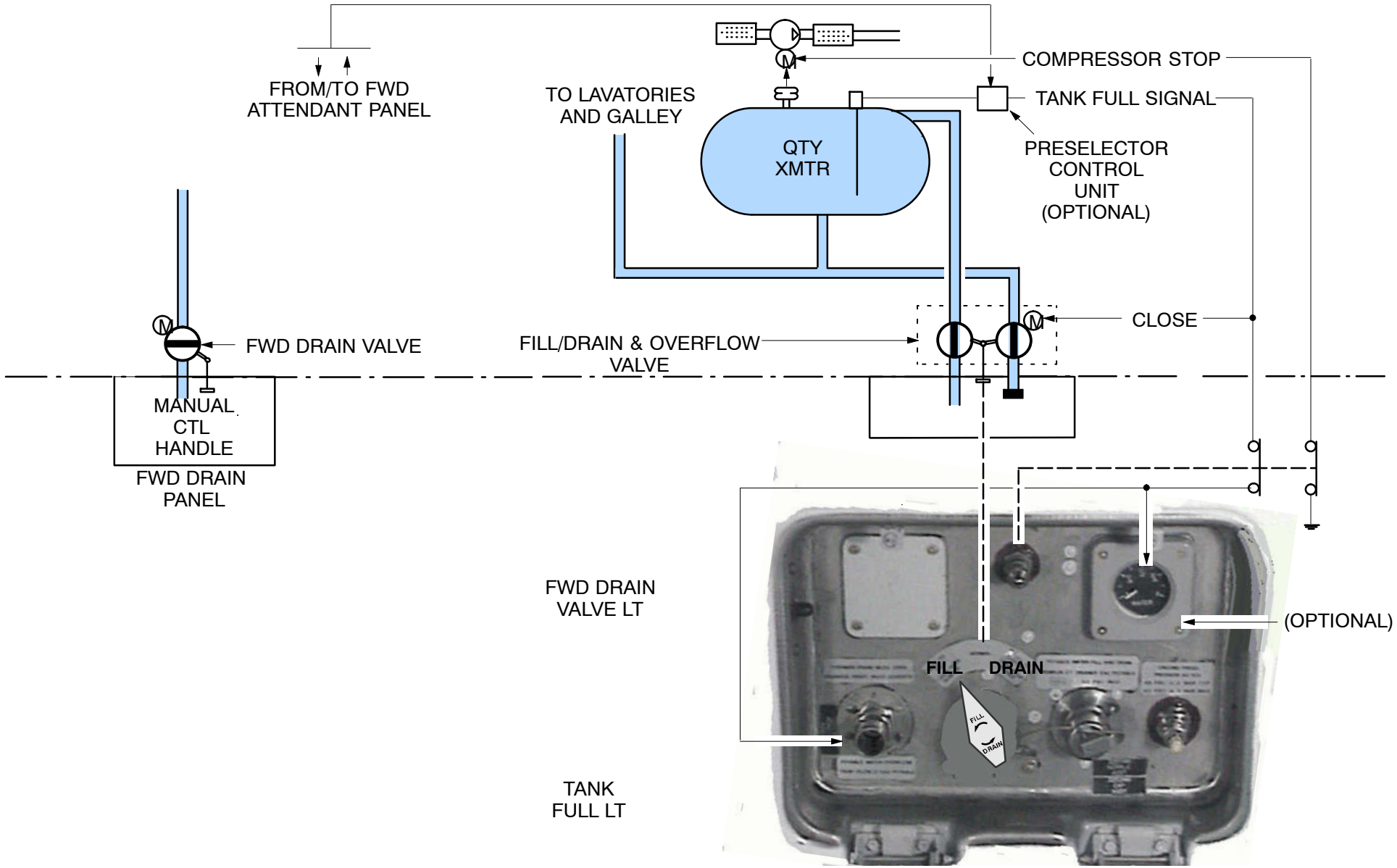


Figure 10 Schematic Water Fill (A318/319/321)

POTABLE WATER SYSTEM DRAIN PRESENTATION (A320)

Draining

When the fill/drain control handle is turned to ”DRAIN” and pulled out, it mechanically opens the fill / drain valve. The drain limit switch sends open signals to the overflow valve and the drain valves.

The control lights (green) on the service panel come on when the associated valves are opened (fwd drain valve, tank drain valve and overflow valve).

When the system has been drained, the fill / drain control handle must be manually set back to ” NORMAL” this closes the fill / drain valve.

The fill/drain control handle ”NORMAL” position causes the electrical closure of the overflow, tank and forward drain valve.

If electrical power is not available, you can open the valves manually with handles installed on the potable water service and the drain panels. The handles are marked ”SHUT / OPEN”.

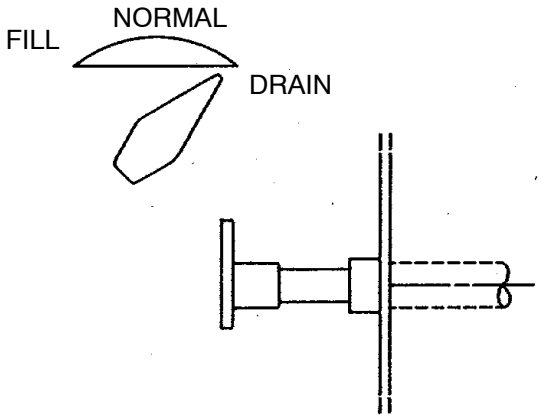


Figure 11 Drain Position

1. Handle from in flight pos (see 1) turned 45° to the right and pulled out.
   In this position the cable assy switches on the motorized drain valves in zones 133 and 138 and the overflow valve in zone 138
2. Fill/drain
   Valve open
3. Motorized drain valves open (zone 133 and 138)
4. Motorized overflow valve open (zone 138)
5. After draining the handle returns to normal position when pushed in

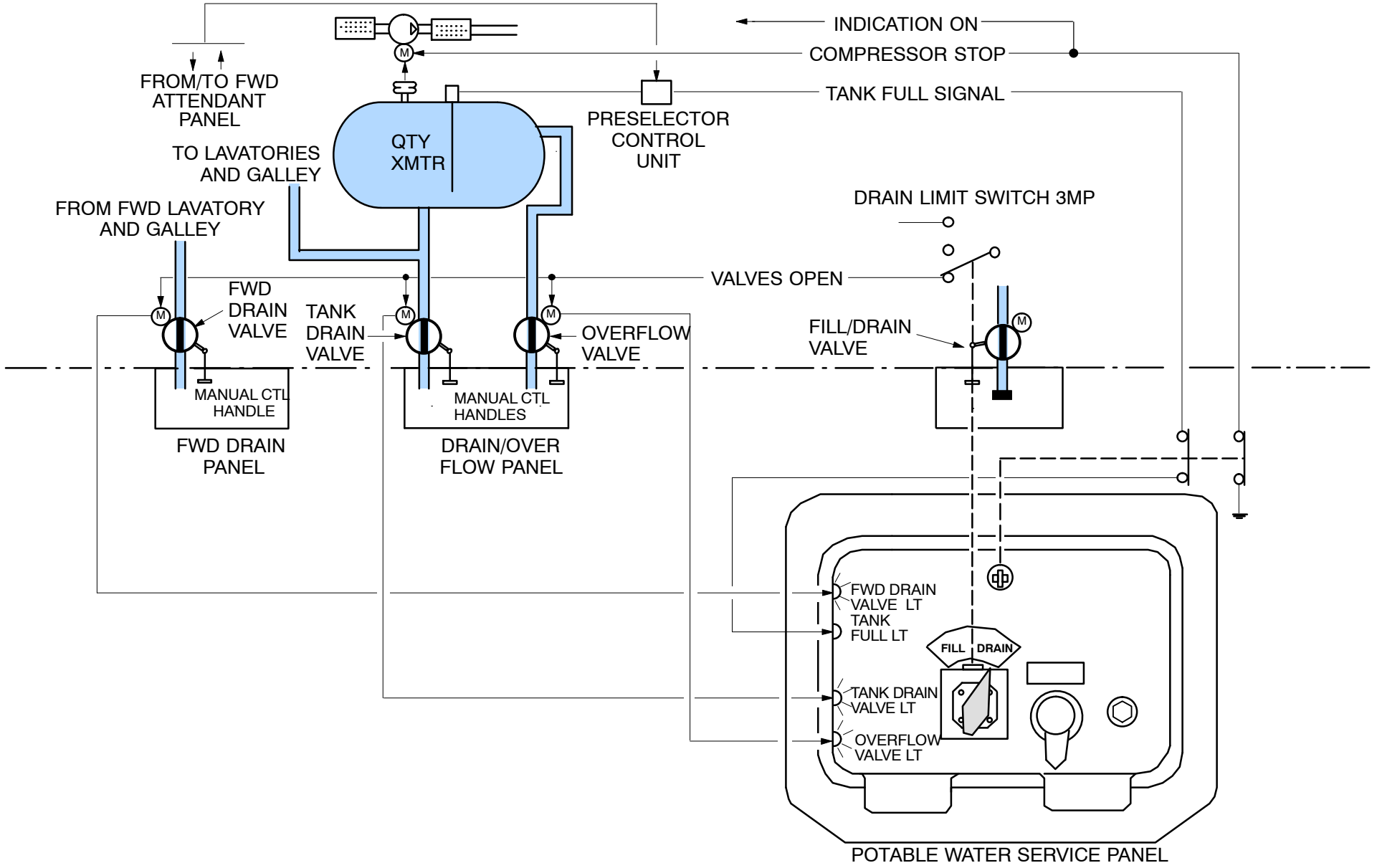


Figure 12 Water Drain Schematic (A320)

POT. WATER SYST. DRAIN PRESENTATION (A319/A321)

Draining

When the fill/drain control handle is turned and pulled to ”DRAIN”, it mechanically opens the fill/drain and overflow valve. The drain limit switch sends an open signal to the forward drain valve.

The control light (green) on the service panel comes on when the forward drain valves is in open position.

When the system has been drained, the fill / drain control handle must be manually set back to ”NORMAL” position.

The fill/drain control handle ”NORMAL” position causes the electrical closure of the forward drain valve.

If electrical power is not available, you can open the forward drain valve manually with a handle installed on the forward drain panel. The handle is marked ”SHUT/OPEN”.

CONFIGURATION				EXPOSURE TIME IN (HOURS:MIN	DEPRESSURIZATION REQUIRED	WATERTANK DRAIN REQUIRED	PURGE OF SYSTEM REQUIRED
AIR CONDITIONING	HEATING WATER/ WASTE SYS	CABIN TEMPERATURE	OUTSIDE AIR TEMPERATURE				
ON	ON/OFF	ABOVE 10° C (50°C)	BETWEEN 0 AND -15° C (32 AND 5° F)	ANY	NO	NO	NO
	ON	ABOVE 10° C (50°C)	BELOW -15°C (5°F)	1:15	YES		
OFF	ON		BETWEEN 0 AND -7° C (32 AND 19.4° F)	1:30			
			BETWEEN -7 AND -15° C (19.4 AND 5° F)	0:30			
			BELOW -15°C (5°F)	ANY			
OFF	OFF		BETWEEN 0 AND -7° C (32 AND 19.4° F)	1:30		YES	YES
			BETWEEN -7 AND -15° C (19.4 AND 5° F)	0:30			
			BELOW -15°C (5°F)	ANY			

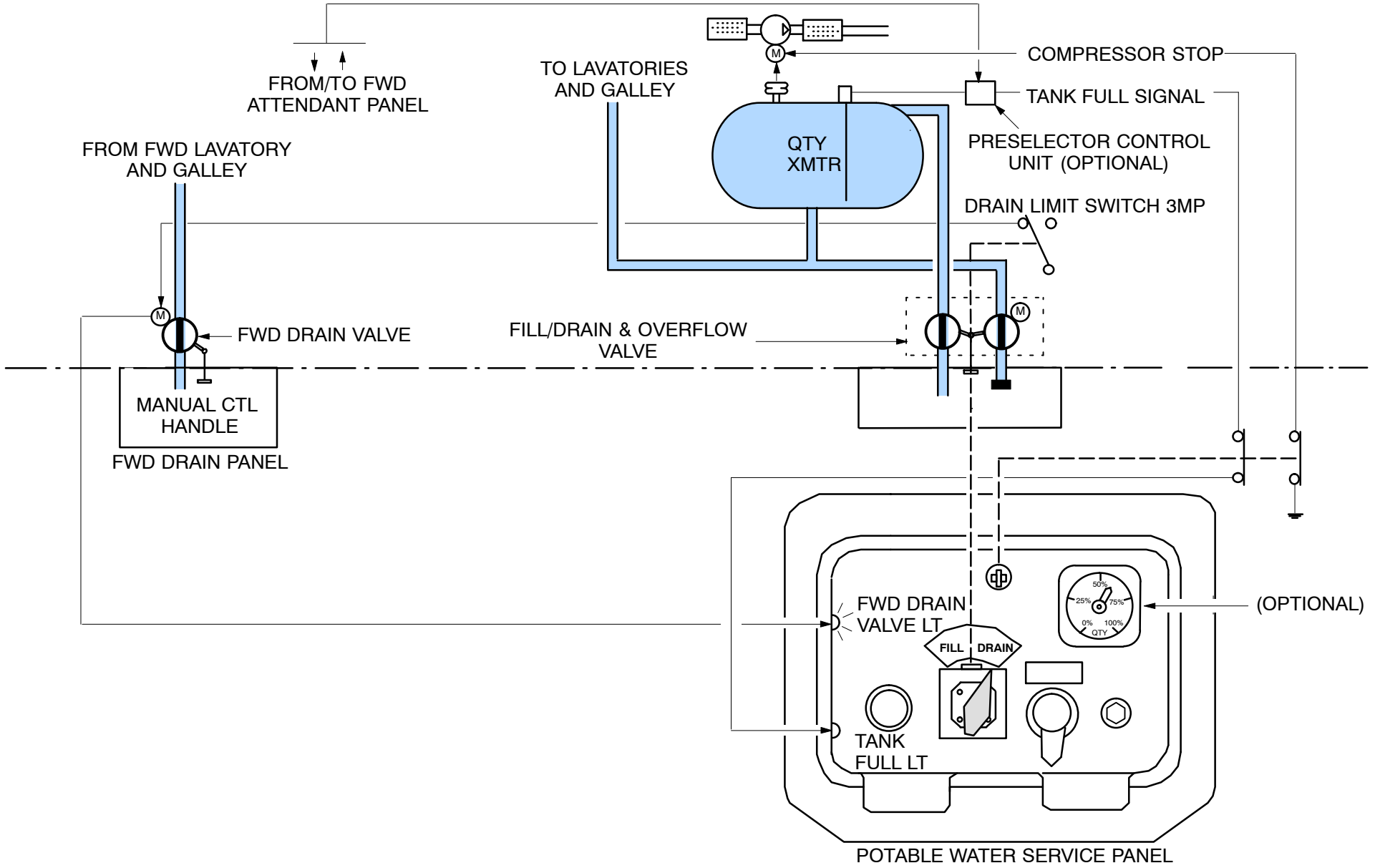


Figure 13 Water Drain Schematic (A318/319/321)

38–14 WATER DRAINING SYSTEM

POTABLE WATER DRAIN SYSTEM DESCRIPTION (A320)

General

The drain system gives the possibility to drain the water from the potable water system.

Operation

Turn the control handle to DRAIN and pull it out to the stop. This opens the fill/drain valve 16MA and closes the limit switch 3MP.

The motorized overflow valve 8MP and the motorized drain valves 4MP and 14MP are energized and move to the open position.

On the potable water service panel 2023VU, the drain valve control lights 2MP and 12MP and the overflow valve control light 6MP come on.

When the system has drained, you push and turn the control handle to the NORMAL position.

The limit switch 3MP opens, the three valves close and the control lights go off.

If electric power is not available, you can open the valves manually with the handles installed on the potable water service and the drain panels.

The handles are marked SHUT/OPEN.

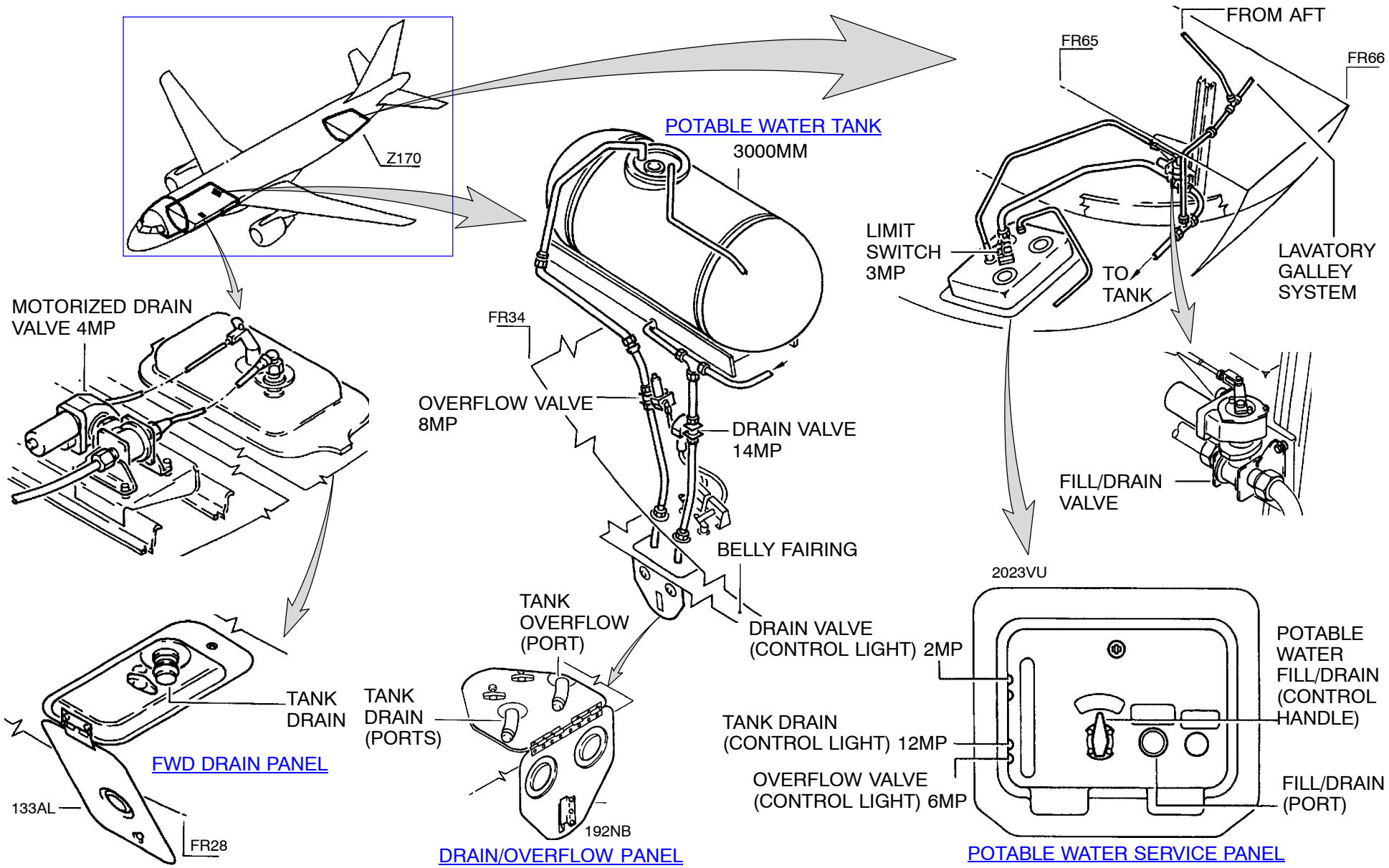


Figure 14 Water Draining Component Location (A320)

WATER DRAINING –ELECTRICAL OPERATION (A320)

Description

Three drain valves and drain ports are installed in the potable water system.

The drain valve 14MP drains the potable water tank and the center section of the potable–water distribution system.

The motorized drain valve 4MP drains the system's front section.

The motorized fill/drain valve 16MA drains the system's rear section.

The fill/drain control handle 3254MM which is located on the potable water service panel 2023VU opens the fill/drain valve 16MA. The limit switch 3MP is energized to operate the related overflow and drain valves.

The overflow valve 8MP opens to let air into the potable water tank.

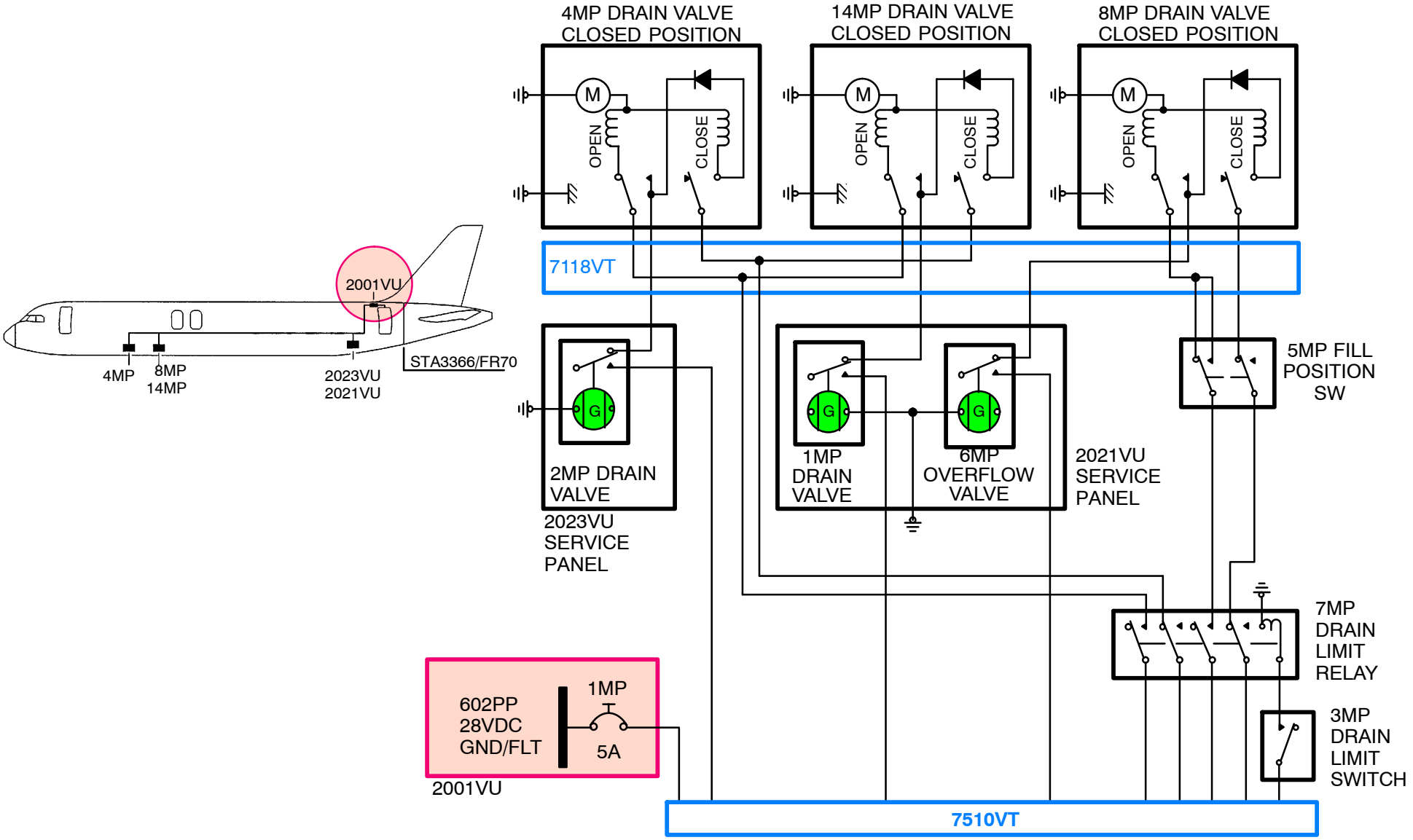


Figure 15 Water Draining–Electrical Schematic (A320)

POT. WATER DRAIN SYST. DESCRIPTION (A318/319/321)

General

The drain system gives the possibility to drain the water from the potable water system.

Operation

When you set the control handle to 'DRAIN' and pull it out to its stop, the fill/overflow drain valve opens. This procedure also closes the limit switch 3MP which energizes and moves the motorized drain valve 4MP to the open position.

The drain valve control–light 2MP, which is located on the potable water service panel 2023VU, comes on when the motorized drain valve 4MP opens.

The two valves close when the system has drained and the control handle is pushed in and set to 'NORMAL'. The drain valve control–light will also go off. You can open the motorized drain valve manually, if electrical supply is not available.

A handle, which is located on the drain panel, opens the valve when you move it from SHUT to DRAIN.

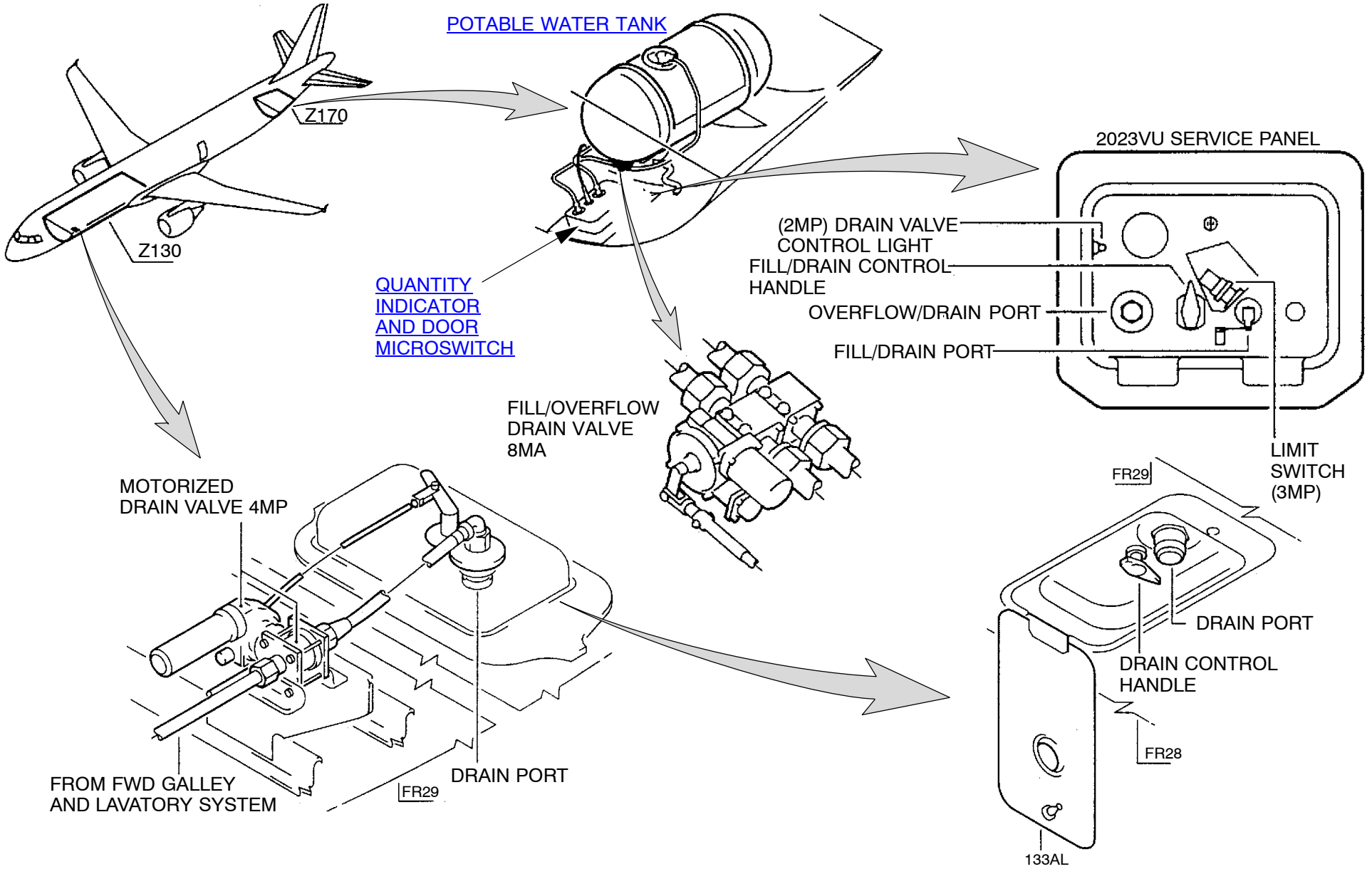


Figure 16 Water Draining Component Location (A318/319/321)

WATER DRAIN–ELECTRICAL OPERATION (A318/319/321)

Description

Two drain valves and two drain ports are installed in the potable water system.

The fill/overflow drain valve 8MA drains the rear section of the potable–water distribution system.

The motorized drain valve 4MP drains the system's front section.

The fill/drain control handle which is located on the potable water service panel 2023VU opens the two drain valves at the same time.

You can drain the potable water system fully through the two drain ports.

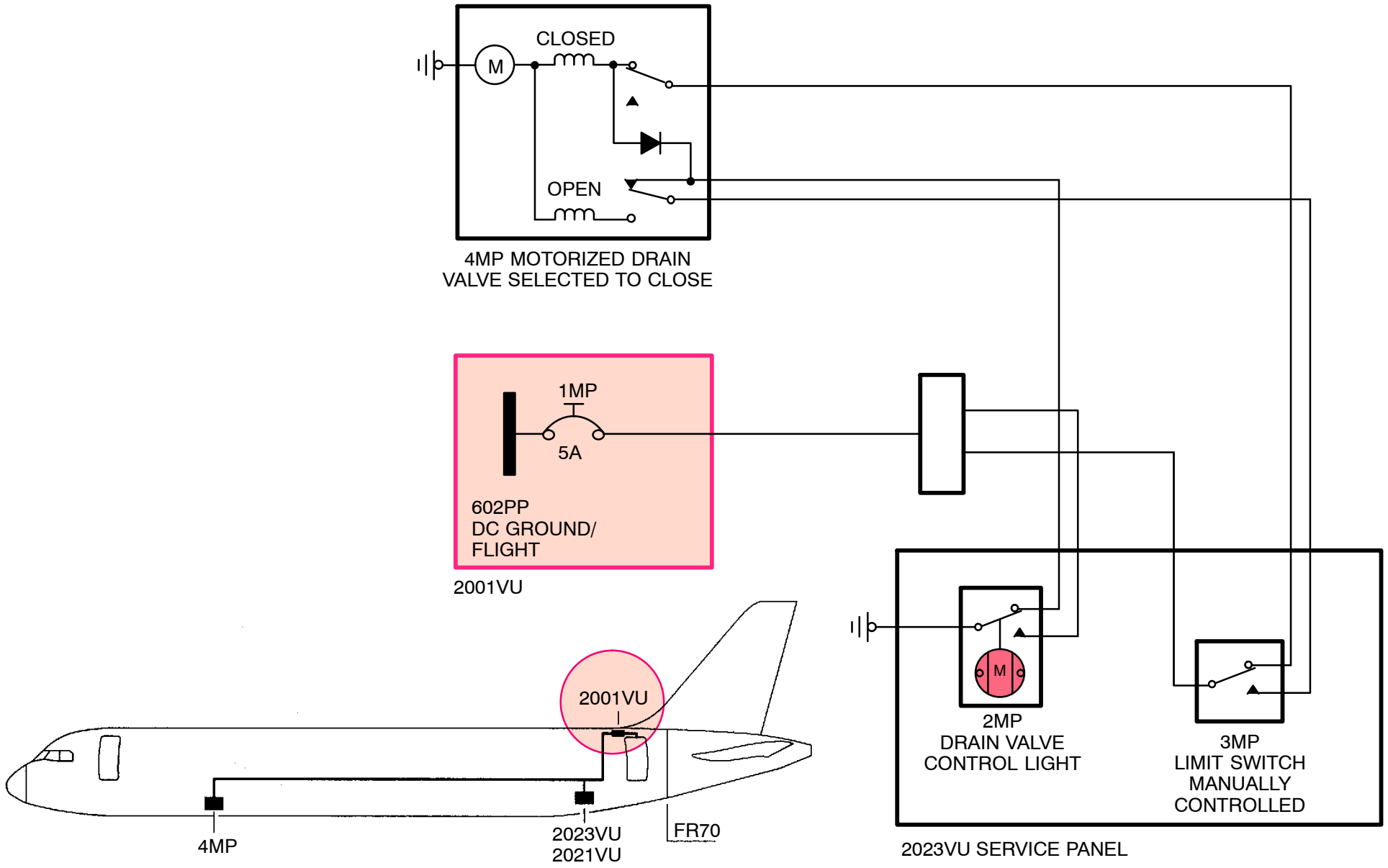


Figure 17 Water Draining–Electrical Schematic (A318/319/321)

38–10 POTABLE

POTABLE WATER SYSTEM OPERATION (A320)

Storage

The potable water is stored in one tank installed in the pressurized underfloor area of the right hand fuselage, aft of the forward cargo compartment.

Potable water tank capacity: 200 liters (53 US gal).

Pressurization

Pressurization of the system enables water supply from the tank to the necessary service location.

Compressed air is trapped from the cross feed line of the engine bleed air. When the aircraft is on ground, a compressor or ground air cart can pressurize the potable water distribution system.

Distribution

Potable water from the water tank is supplied through a system of distribution lines. The lavatory and galley distribution lines run below the passenger compartment floor. They are shrouded and insulated, and some of them are heated.

User Supply

Each lavatory can be isolated from the potable water distribution system through a manual shut-off valve.

Heating

A water heater is installed under the wash basin inside the sanitary unit cabinet. A thermostat allows the water temperature to be maintained between 45°C (113°F) and 48°C (118°F).

An overtemperature safety device protects the heating element.

Filling

Filling is achieved through a fill / drain valve operated by the fill/drain control handle on the potable water service panel.

The fill / drain control handle simultaneously opens the electrically motorized overflow valve for venting.

The quantity transmitter sends a tank full-signal, via preselector control unit, to close the fill/drain valve automatically (the tank full signal will be provided when the preselected quantity is reached).

Manual operation is possible via control handles dedicated to each valve. Maximum permissible pressure to fill the potable water tank is 50 psi (3.4 c bars).

Draining

The draining operation is achieved through the fill/drain valve and two motorized drain valves using the same control handle as the filling operation. In this case, the overflow valve is also controlled to open.

Manual operation is possible via control handles dedicated to each valve.

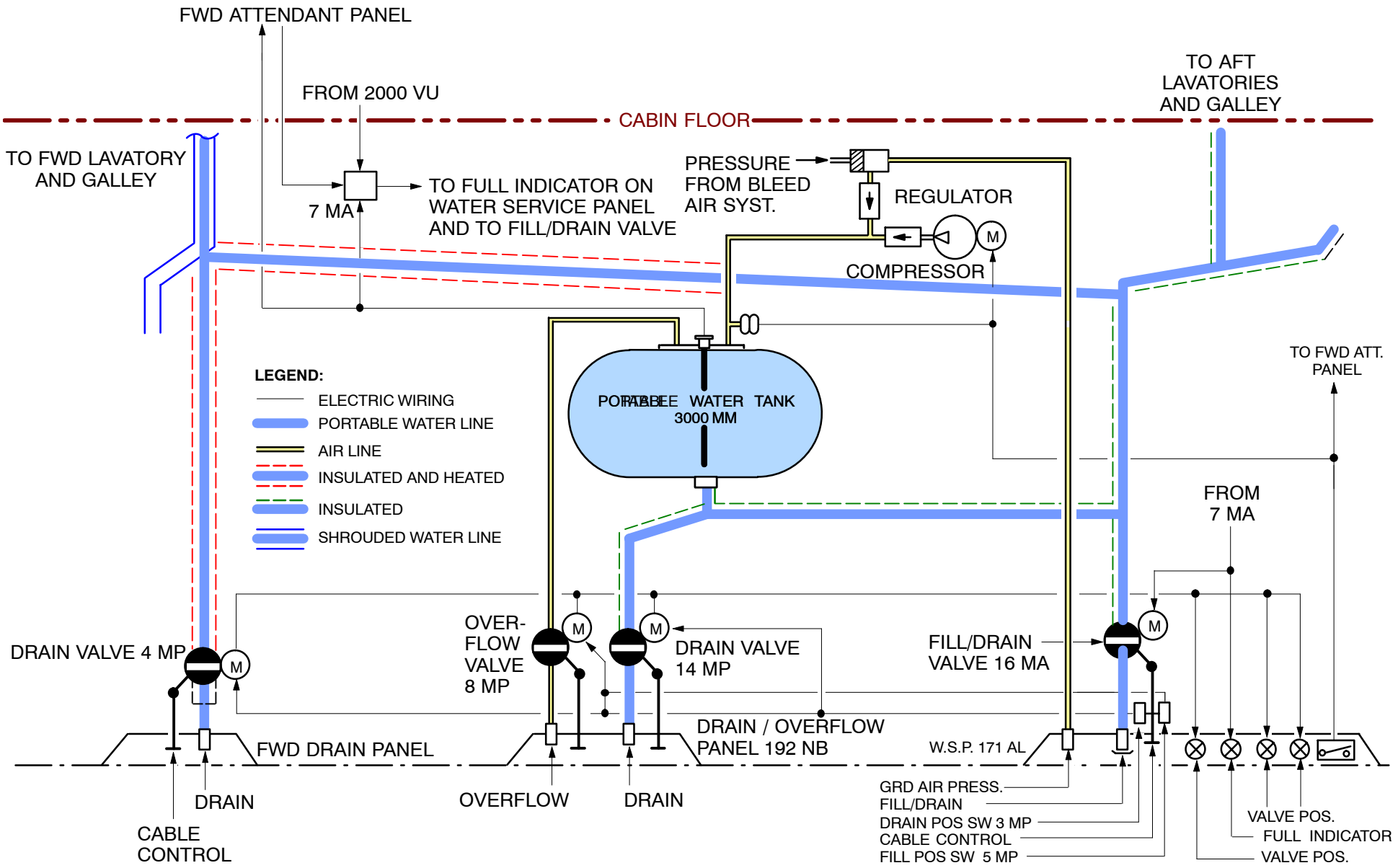


Figure 18 Potable Water System Basic Schematic (A320)

POTABLE WATER SYSTEM OPERATION (A318/319/321)

Storage

The potable water is stored in one tank installed in the pressurized underfloor area of the right hand fuselage, aft of the rear cargo compartment.

Potable water tank capacity: 200 liters (53 US gal).

Pressurization

Pressurization of the system enables water supply from the tank to the several service location.

The air is supplied from the engine bleed air or the Auxiliary Power Unit.

A compressor or ground air cart can also pressurize the potable water distribution system.

Distribution

Potable water from the water tank is supplied through a system of distribution lines. The lavatory and galley distribution lines run below the passenger compartment floor. They are shrouded and insulated, and some of them are heated.

User Supply

Each lavatory can be isolated from the potable water distribution system through a manual shut-off valve.

Heating

A water heater is installed under the wash basin inside the sanitary unit cabinet. A thermostat allows the water temperature to be maintained between 45°C (113°F) and 48°C (118°F).

An overtemperature safety device protects the heating element.

Filling

Filling is achieved through a fill/overflow and drain valve operated by the fill/drain control handle on the potable water service panel.

The quantity transmitter sends a tank full-signal, via preselector control unit, to close the fill/overflow and drain valve automatically (the tank full signal will be provided when the preselected quantity is reached). A manual operation is also possible.

Maximum permissible pressure to fill the potable water tank is 50 psi (3.4 bars).

Draining

The draining operation is achieved through the fill / overflow and drain valve and a motorized drain valve, using the same control handle as the filling operation.

Manual operation is possible via control handle dedicated to each valve.

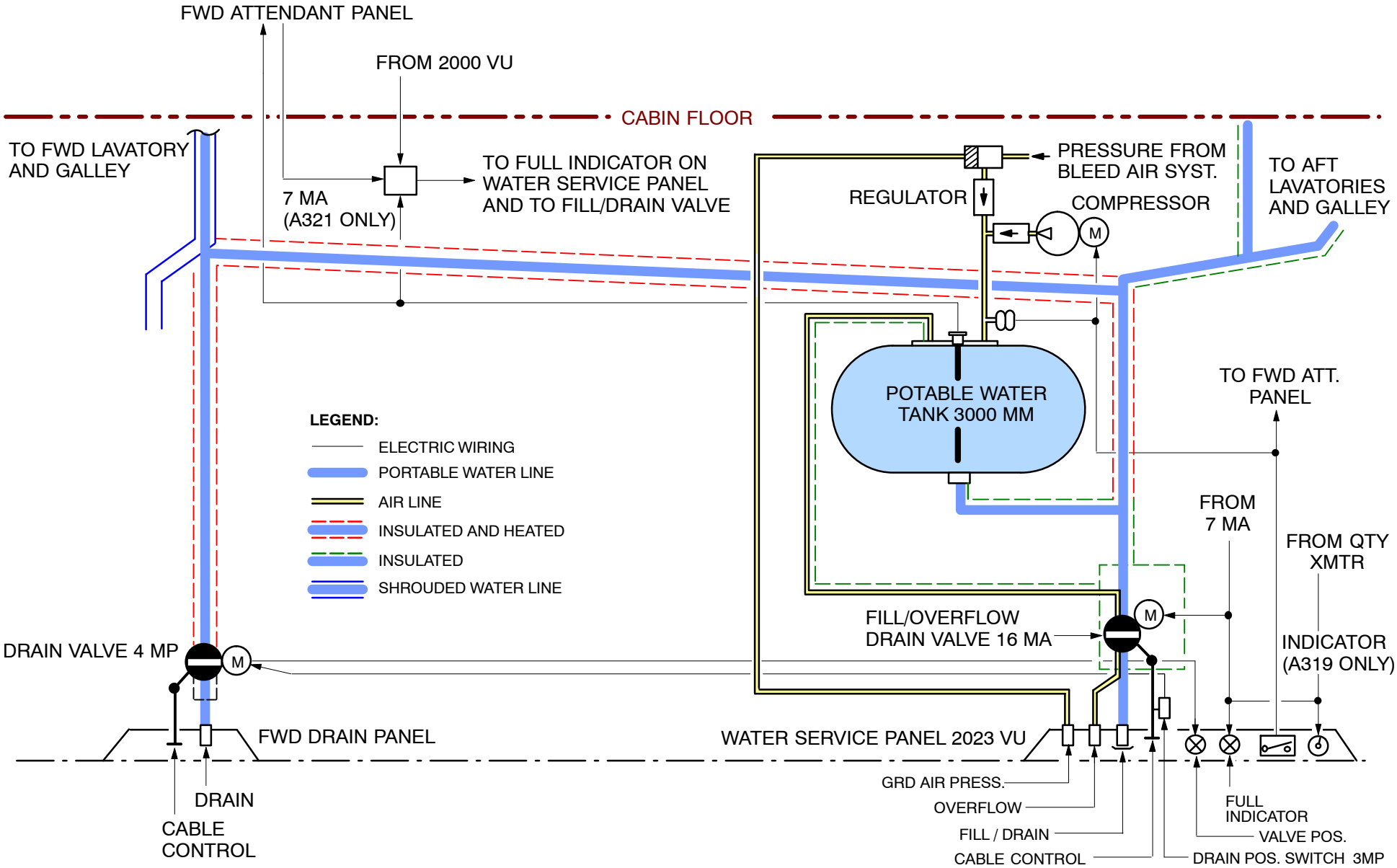


Figure 19 Potable Water System Basic Schematic (A318/319/321)

38-11 WATER STORAGE

WATER STORAGE FUNCTIONAL OPERATION (A320)

Water Tank 3000MM

The potable water tank is installed in the pressurized underfloor area RH behind the forward cargo compartment. It is made of GFRP (**G**lass**f**iber **R**einforced **P**lastic). It is strengthened to accept the rated pressure for the potable water system of between 22 and 25 psi (1.5 and 1.72 bar). The tank has a capacity of 200l (53 USgal).

The tank is assembled with:

- an overflow port,
- an installation port for the water–contents quantity transmitter 3MA,
- a connection for fill/drain/distribution plumbing,
- a connection for air pressurization plumbing.

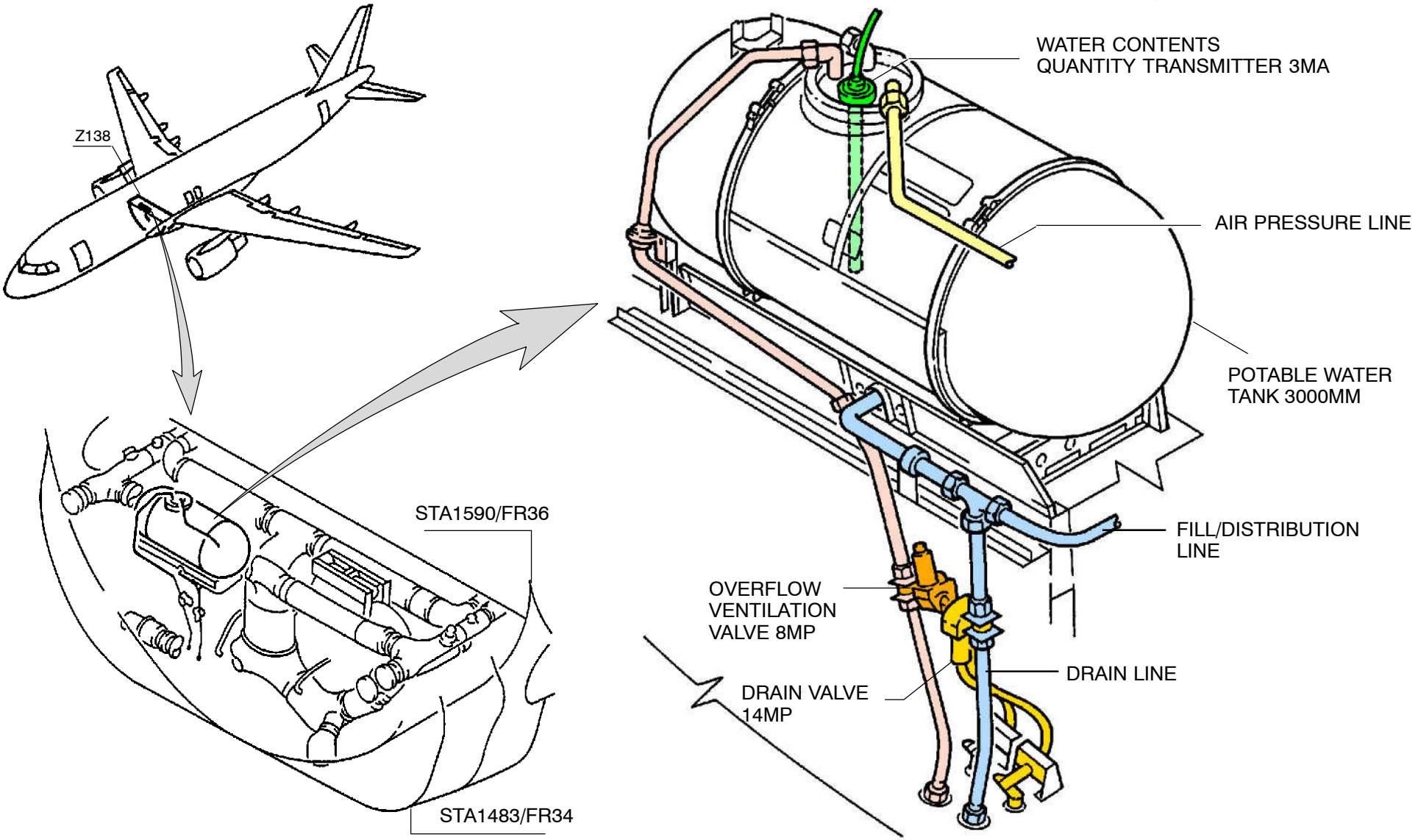


Figure 20 Potable Water Tank (A320)

WATER STORAGE FUNCTIONAL OPERATION (A318/319/321)

Water Tank 3000MM

The potable water tank is made of CFRP (**C**arbon**f**iber **R**einforced **P**lastic).

It is strengthened to accept the rated pressure for the potable water system. The capacity of the tank is 200l (53 USgal). The tank is attached to the aircraft structure with clamps.

The tank has:

- an overflow port,
- an installation port for the fill/overflow drain valve and for draining,
- an installation port for the water–contents quantity transmitter 3MH,
- a connection for air pressurization system with an air–no–water valve.

Fill/Overflow Drain Valve 8MA

The fill/overflow drain valve is installed between the water service panel and the potable water tank. Tube assemblies connect the valve to the tank and to the ports on the potable water service panel. The “fill“ function of the valve also operates as a system “drain“ facility. You can manually select the fill and drain facilities on the service panel.

The overflow function operates as an overflow outlet and a vent for the tank. The operation of the fill/overflow drain handle opens the overflow port when it is selected to the “FILL“ or “DRAIN“ position and the handle pulled out.

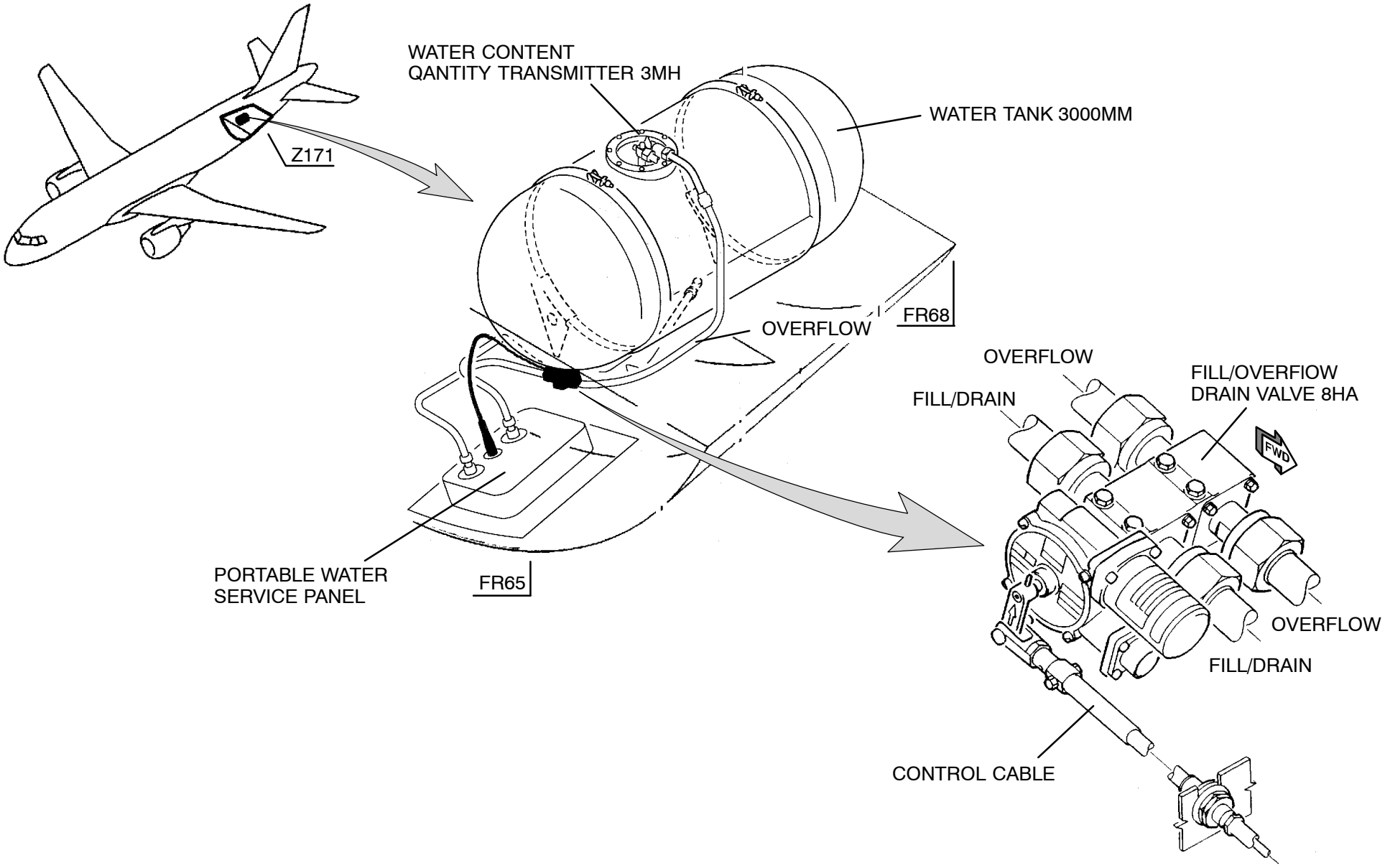


Figure 21 Potable Water Tank A318/319/321

38–41 AIR SUPPLY SYSTEM

WATER TANK PRESSURIZATION INTRODUCTION (ALL)

General

Air pressure is used to pressurize the potable water system.

The air is supplied from:

- the engine bleed air or
- the APU (**A**uxiliary **P**ower **U**nit) or
- the ground pressure connection.

An additional air supply source to pressurize the potable water system is the air supply boost–system (Ref. AMM 38–42–00).

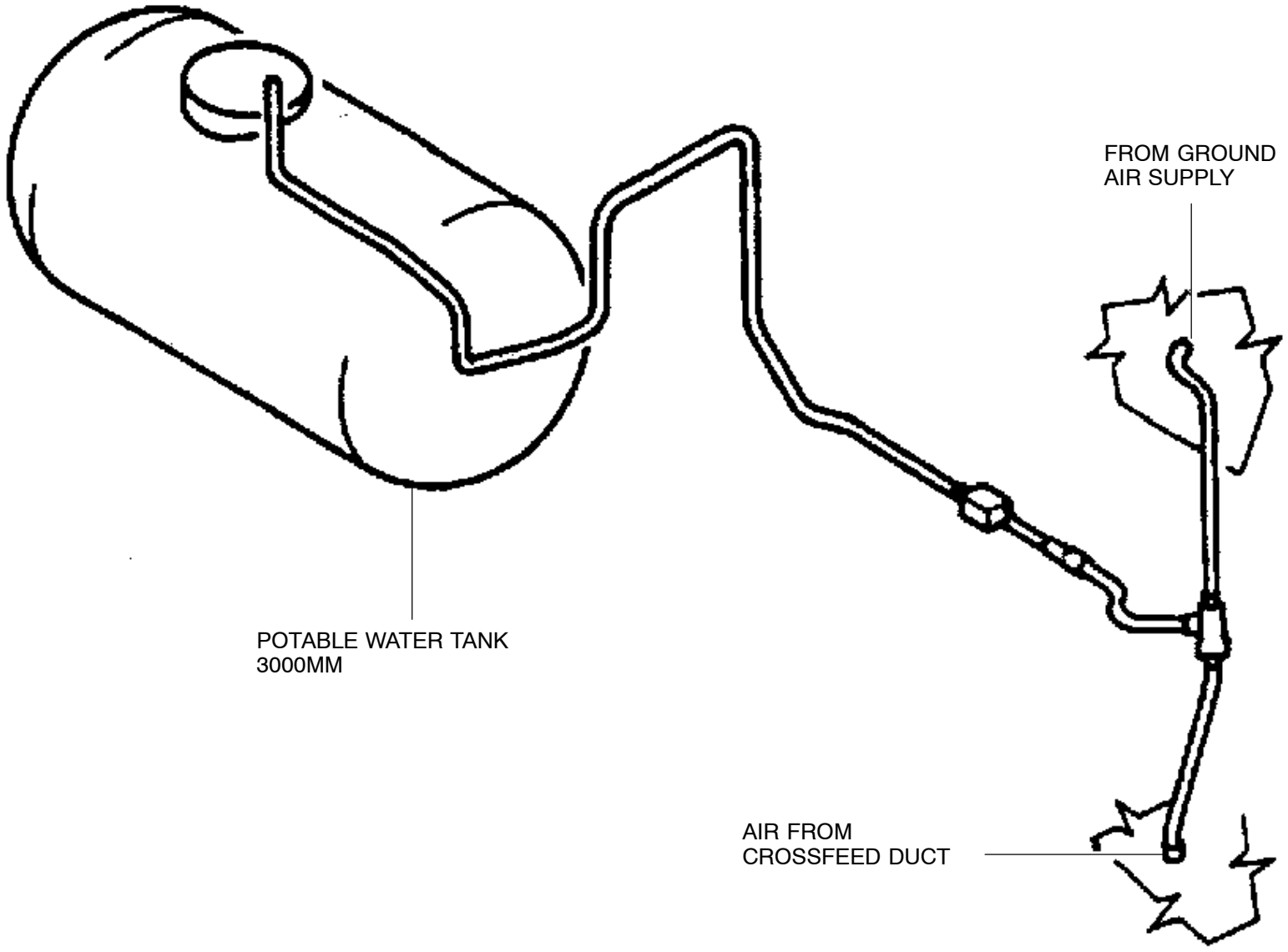


Figure 22 Air Supply System (All)

COMPRESSED AIR LINE DESCRIPTION (A320)

General

The compressed air line is composed of:

- A shuttle valve that directs the pressurized air. The system is supplied from the bleed air crossfeed–line or from the ground pressure connection.
- A check valve that lets compressed air flow only in the direction of the water tank (If a decrease in pressure of the supply source occurs).
- A pressure reducing and relief valve that reduces the compressed air pressure to the system working pressure (If the pressure is too high, the valve releases it).
- A ground pressure connection to pressurize the water system when the engines or the APU do not operate.

Operation and Description

The compressed air (Irrespective of the source which supplies it) flows from the shuttle valve to the potable water tank. It flows through the air filter, the check valve and the pressure reducing/relief valve to the potable water tank.

The air filter removes all unwanted materials from the compressed air.

The check valve is installed between the pressure reducing/relief valve and the air filter. It lets the compressed air flow in the direction of the water tank only.

The pressure reducing/relief valve reduces the air pressure from between 2.83bar (41.0456psi) and 3.24bar (46.9922psi) to the system working pressure 1.52bar (22.0457psi) to 1.73bar (25.0915psi).

The pressure relief section of the valve will operate and release the air out of the system if the pressure increases to a pressure of 2.21bar (32.0533psi) to 2.48bar (35.9693psi).

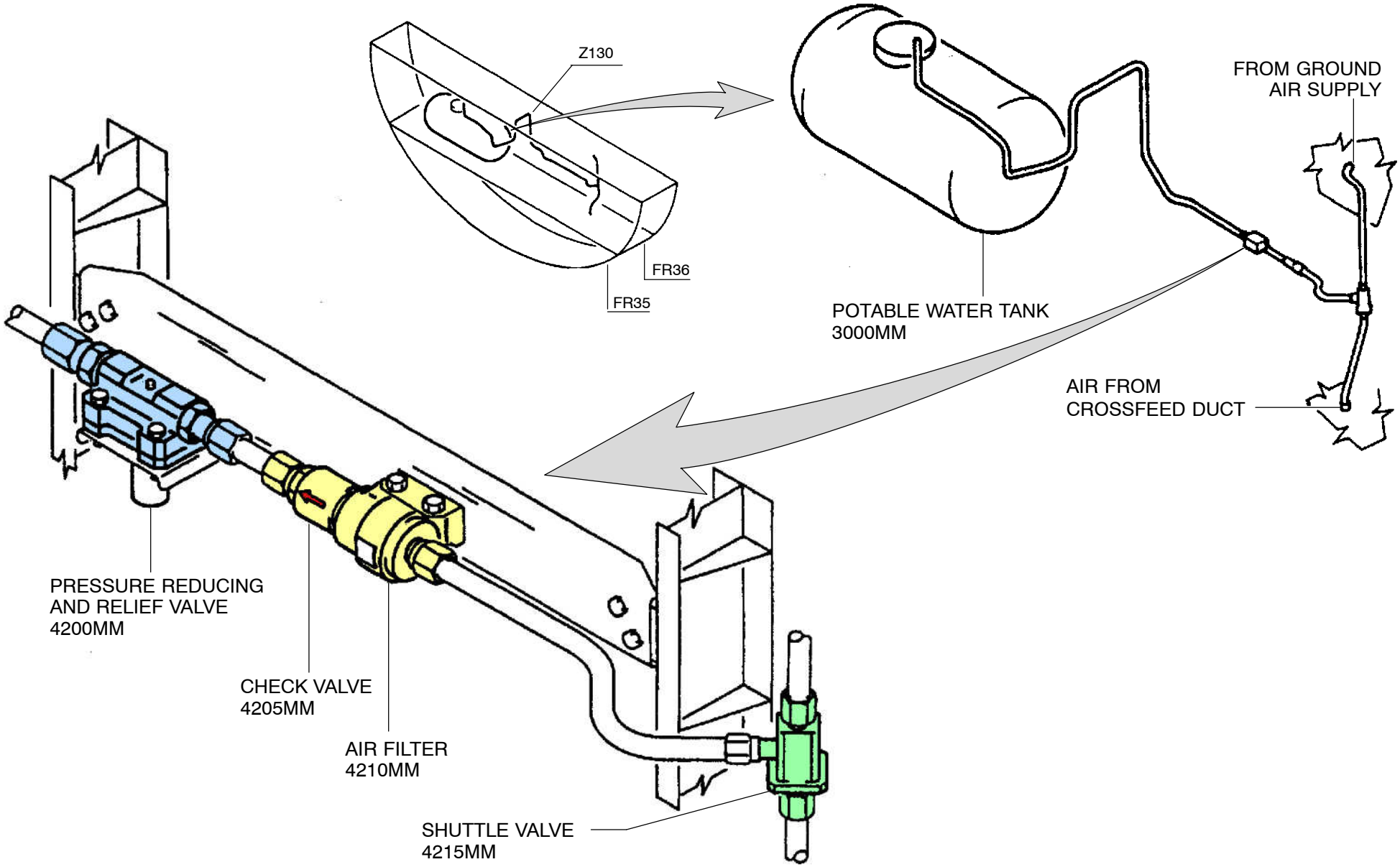


Figure 23 Air Supply System (A320)

COMPRESSED AIR LINE DESCRIPTION (A318/319A321)

General

In the compressed air line there is:

- A shuttle valve that directs the pressurized air. The system is supplied from the bleed air crossfeed–line or from the ground pressure connection.
- A check valve that lets compressed air flow only in the direction of the water tank (If a decrease in pressure of the supply source occurs).
- A pressure reducing and relief valve that reduces the compressed air pressure to the system working pressure (If the pressure is too high, the valve releases it).

On the potable water–service panel there is:

- A ground pressure connection to pressurize the water system when the engines or the APU do not operate.

Operation and Description

The compressed air (irrespective of the source which supplies it) flows from the shuttle valve to the potable water tank. It flows through the air filter, the check valve and the pressure reducing/relief valve to the potable water tank. The air filter removes all unwanted materials which are in the compressed air.

The check valve is installed between the pressure reducing/relief valve and the air filter. It lets the compressed air flow in the direction of the water tank only.

An air no water valve is install in the potable water tank. it is located at the end of the compressed air line to garantee that no water comes in the compressed air system.

The pressure reducing/relief valve reduces the air pressure from between 2.83bar (41.0456psi) and 3.24bar (46.9922psi) to the system working pressure 1.52bar (22.0457psi) to 1.73bar (25.0915psi).

The pressure relief section of the valve will operate and release the air out of the system if the pressure increases to a pressure of 2.21bar (32.0533psi) to 2.48bar (35.9693psi).

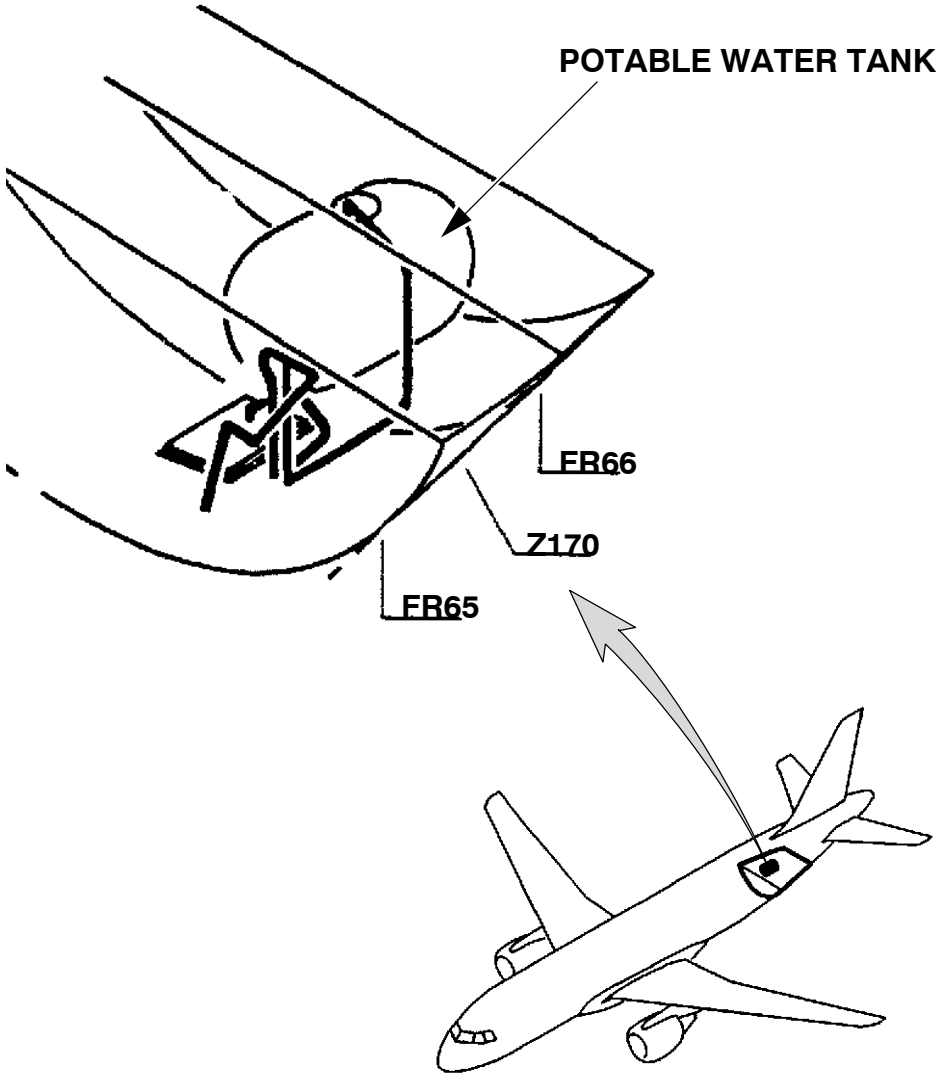


Figure 24 Potable Water Tank Location (A318/319/321)

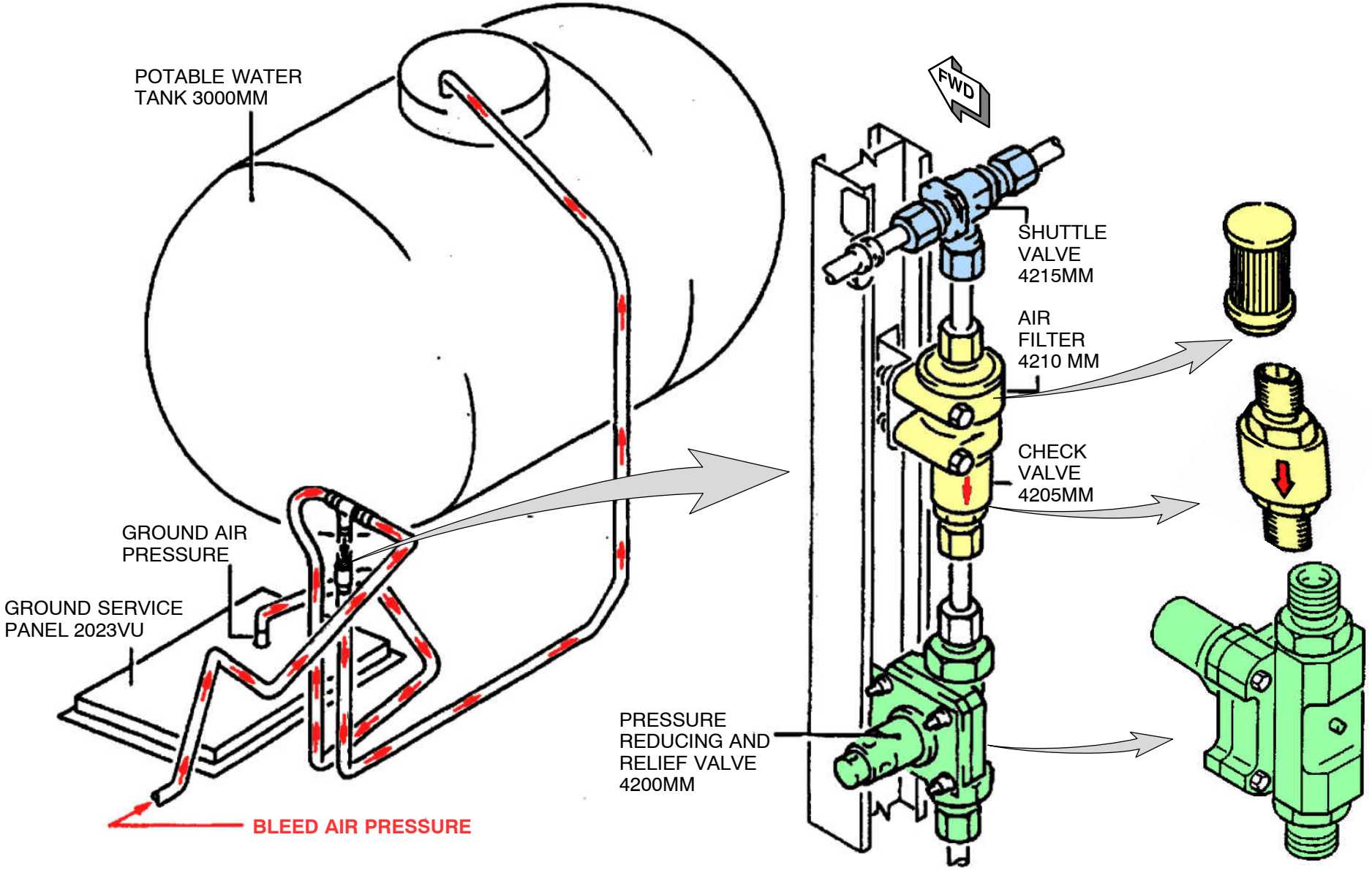


Figure 25 Air Supply System (A318/319/321)

38–42 AIR SUPPLY BOOST SYSTEM

INTRODUCTION (ALL)

General

The air supply boost–system gives pressure to the potable water system if no bleed air pressure is available. It makes sure that the potable water system works at the correct pressure.

The compressor of this system is installed near the water tank. The system operates independently from the bleed air system of the aircraft and the ground–air pressure supply.

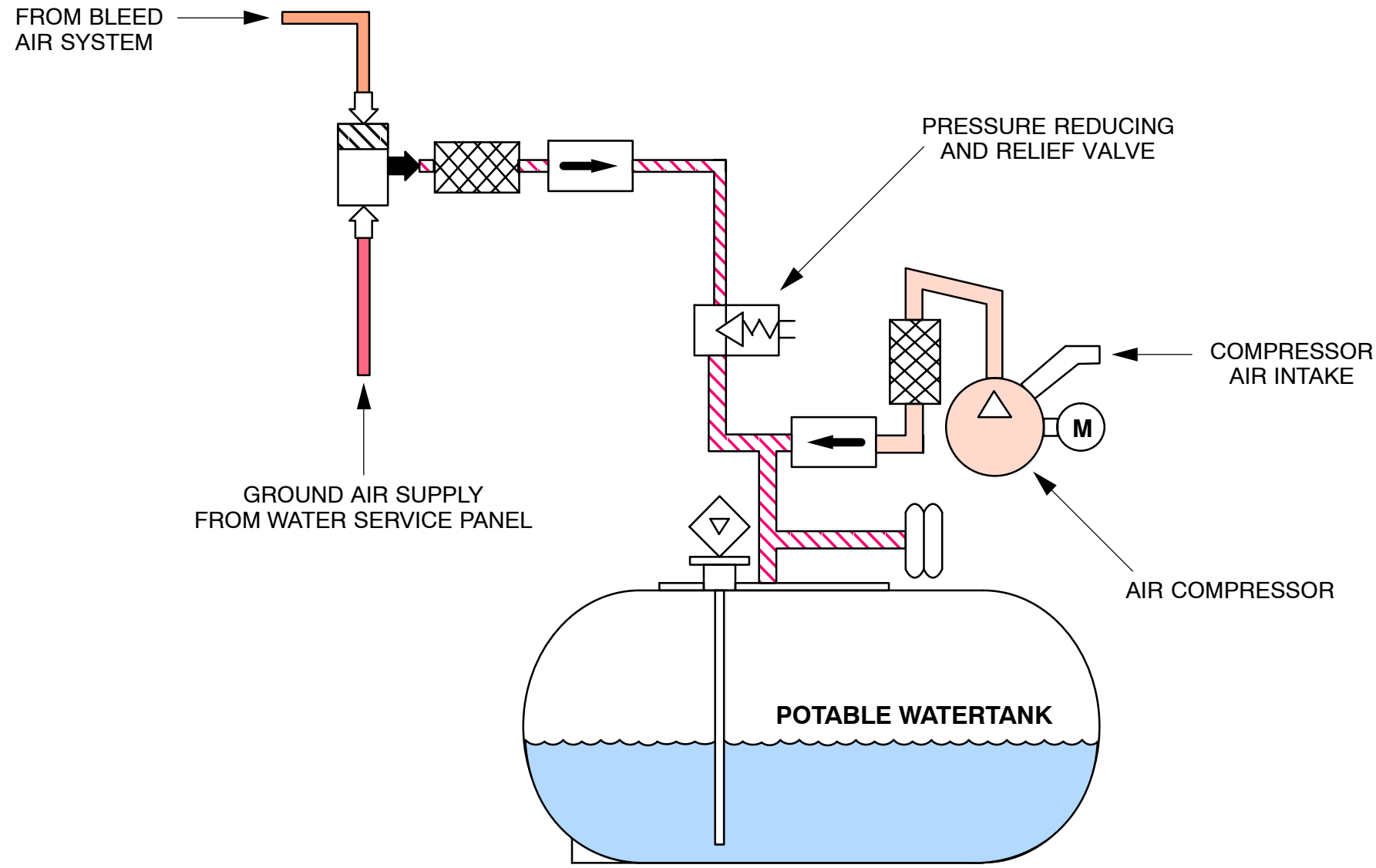


Figure 26 Air Supply Boost System (All)

AIR SUPPLY BOOST SYSTEM DESCRIPTION (A320)

GENERAL

The air supply boost–system gives pressure to the potable water system if no bleed air pressure is available. It makes sure that the potable water system works at the correct pressure. The compressor of this system is installed between FR35 and FR36, aft of the FWD cargo compartment.

The air supply boost–system supplies compressed air to the potable water tank 3000MM. This system has a compressor 8MD, a pressure switch 10MD, a check valve 4206MM and two air filters. One air filter 4211MM is directly connected to the inlet of the compressor and the other 4212MM on the outlet. The check valve 4206MM is installed downstream of the air filter 4212MM. This makes sure that the pressure flows only in the direction of the potable water tank. The pressure switch 10MD, installed between the check valve and the potable water tank, switches the compressor on and off.

1 Compressor 8MD

The air compressor 8MD is a double–bellows reciprocating pump that is electrically driven.

2 Pressure Switch 10MD

The pressure switch 10MD senses the pressure in the potable water tank and switches the electric motor (of the compressor) on and off.

3 Relay 9MD

The relay 9MD is installed below the aircraft floor at FR 65. It is a 28 V DC operated switch that connects and disconnects the 115 V AC BUS 2 to the electric motor. The 28 V DC electrical power that operates the relay is supplied from the GND/FLIGHT BUS. This is supplied through the limit switch 5MA of the maintenance door and the pressure switch 10MD.

4 Air Filters 4211MM/4212MM

The air filters stop the ingress of impurities into the system from the air around the compressor.

5 Check Valve 4206MM

The check valve makes sure that the compressed air flows only in the direction of the potable water tank.

6 Limit switch 5MA

The limit switch 5MA at the service panel 171AL is connected between the 28V DC GND/FLIGHT BUS and the pressure switch 10MD. When the service panel 171AL is open, the relay 9MD is de–energized and stops the electric motor of the compressor 8MD.

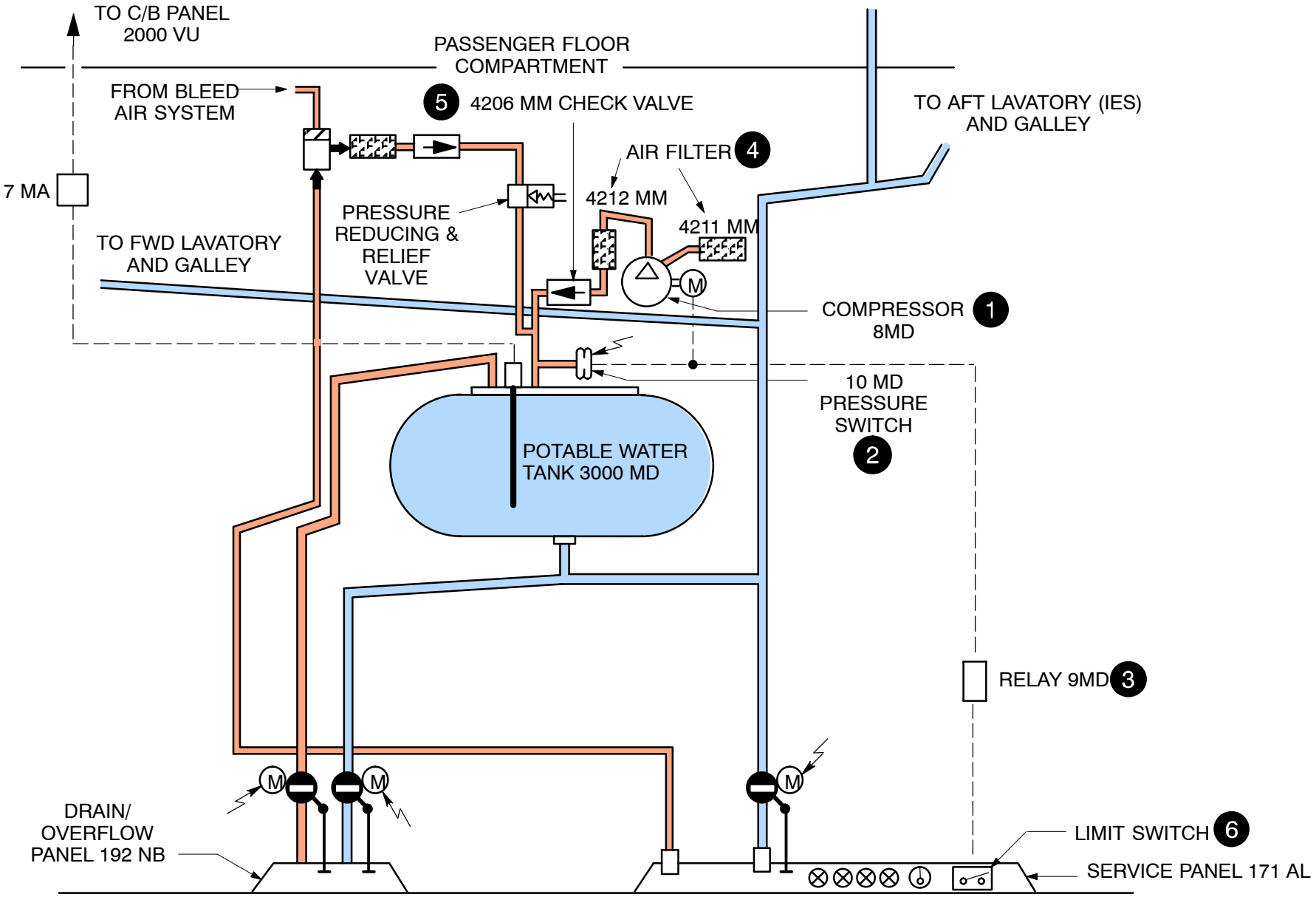


Figure 27 Air Supply Boost System (A320)

COMPONENT PRESENTATION (A320)

Air Compressor 8MD

The air compressor 8MD is a double–bellows reciprocating pump that is electrically driven.

It has:

- an electric motor,
- a housing,
- a crankshaft,
- bearings,
- inlet and outlet valves,
- two drive rods,
- two bellows (which function as a double–piston air compressor unit).

The electric motor is fan cooled and has its own housing. This is bolted to, and hermetically sealed from, the housing of the compressor. The motor operates at 3600 rpm when it is supplied with 115V AC 400Hz from the 3–phases of the AC BUS 2. A thermal–overload protection circuit stops the motor if it overheats. This same protection circuit starts the motor again when it has cooled down.

The bellows are made of stainless steel. They are contoured diaphragms, welded on alternate inside and outside diameters, in a series of convolutions. This design gives maximum stroke with minimum stress. At maximum stroke the bellows fully–nest (In the compressed position) to give high compression ratios. The bellows are hermetically sealed to isolate the air–stream from the drive section of the motor and all outside contaminants. The drive rods connect the bellows to the crankshaft.

Pressure Switch 10MD

The pressure switch 10MD senses the pressure in the potable water tank and switches the electric motor (Of the compressor) on and off.

At 25psi (1.7236 bar) the pressure switch disconnects the 28V DC line from the relay. This stops the electric motor. When the pressure in the potable water tank is 22psi (1.5168 bar) the pressure switch connects the 28V DC line.

This causes the relay to start the electric motor of the compressor to pressurize the system.

Air Filters 4211MM/4212MM

The air filters stop the ingress of impurities into the system from the air around the compressor.

The Check Valve 4206MM.

The check valve makes sure that the compressed air flows only in the direction of the potable water tank.

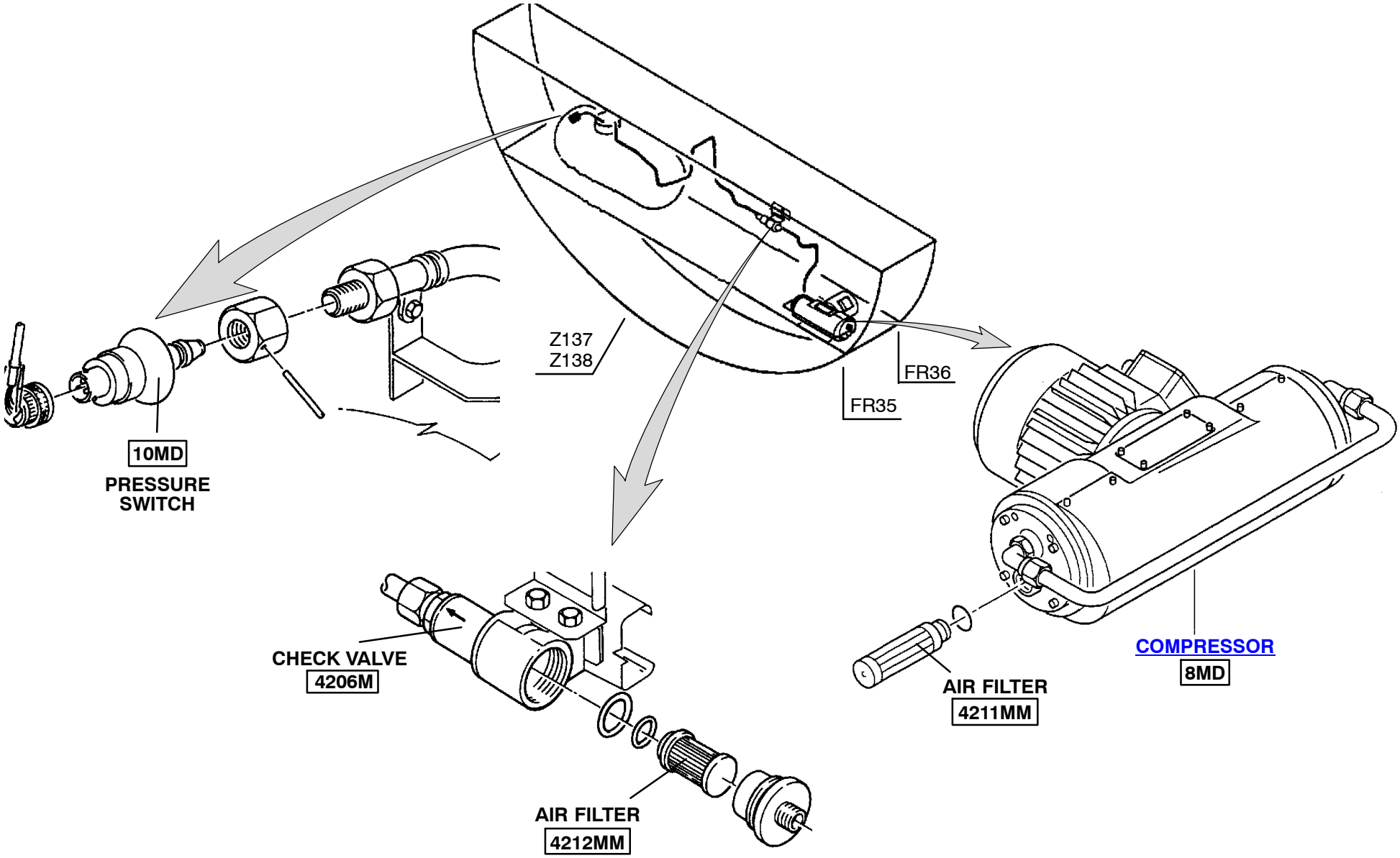


Figure 28 Air Supply Boost System Components (A320)

38–42 AIR SUPPLY BOOST SYSTEM

AIR SUPPLY BOOST SYSTEM DESCRIPTION (A318/319/321)

GENERAL

The air supply boost–system gives pressure to the potable water system if no bleed air pressure is available. It makes sure that the potable water system works at the correct pressure. The compressor of this system is installed between FR65 and FR66 in the rear of the AFT cargo compartment.

The air supply boost–system supplies compressed air to the potable water tank 3000MM. This system has a compressor 8MD, a pressure switch 10MD, a check valve 4206MM and two air filters. One air filter 4211MM is directly connected to the inlet of the compressor and the other 4212MM on the outlet. The check valve 4206MM is installed downstream of the air filter 4212MM.

This makes sure that the pressure flows only in the direction of the potable water tank. The pressure switch 10MD, installed between the check valve and the potable water tank, switches the compressor on and off.

1 Compressor 8MD

The compressor is a reciprocating piston type which is electrically driven.

2 Pressure Switch 10MD

The pressure switch 10MD senses the pressure in the potable water tank and switches the electric motor (Of the compressor) on and off.

3 Relay 9MD

The relay 9MD is installed below the aircraft floor at FR 65. It is a 28V DC operated switch that connects and disconnects the 115V AC BUS 2 to the electric motor. The 28V DC electrical power that operates the relay is supplied from the GND/FLIGHT BUS. This is supplied through the limit switch 5MA of the maintenance door and the pressure switch 10MD.

4 Air Filters 4211MM/4212MM

The air filters stop the ingress of impurities into the system from the air around the compressor.

5 Check Valve 4206MM

The check valve makes sure that the compressed air flows only in the direction of the potable water tank.

6 Limit switch 5MA

The limit switch 5MA at the service panel 171AL is connected between the 28V DC GND/FLIGHT BUS and the pressure switch 10MD. When the service panel 171AL is open, the relay 9MD is de–energized and stops the electric motor of the compressor 8MD.

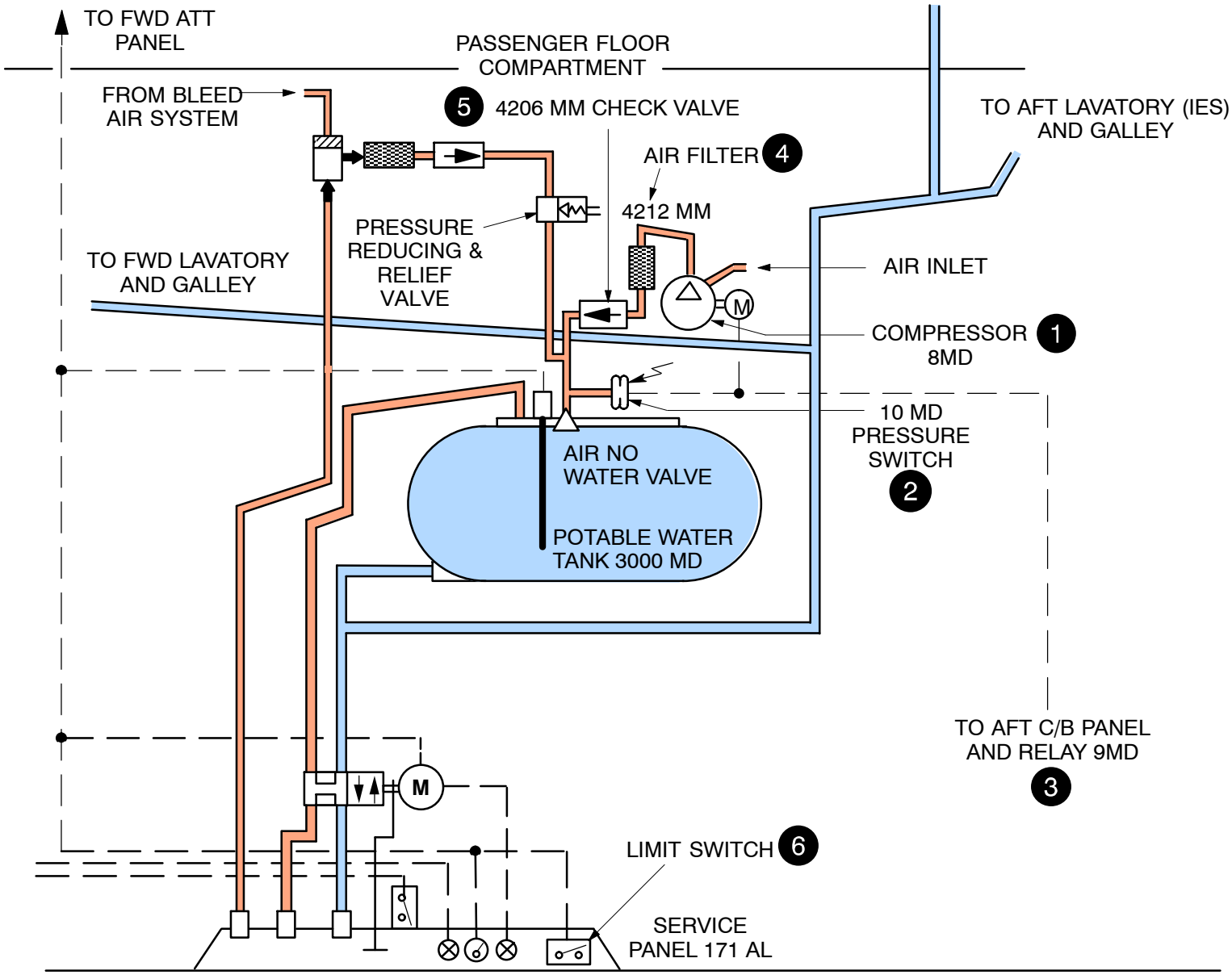


Figure 29 Air Supply Boost System (A318/319/321)

SYSTEM COMPONENTS PRESENTATION (A318/319/321)

The Air Compressor 8MD.

The compressor is a reciprocating piston type which is electrically driven. The compressor supplies 3801.6 in.3 (62297.19cm^3 per minute of clean compressed air at 30psi (2.0684bar) to the water tank. The compressor can work continuously to give this pressure and volume of air.

The compressor has:

- an electric motor,
- a housing,
- a crankshaft,
- bearings,
- inlet and outlet valves,
- an inlet filter,
- a piston rod,
- a piston cup,
- a relief valve.

The electric motor is fan cooled and has its own housing. The motor operates at 12000 rpm. A thermal–overload protection circuit stops the motor if it becomes too hot. The thermal–overload protection circuit starts the motor again when the temperature of the motor decreases to the normal temperature.

A driven pulley is connected to a crank shaft which connects to and moves a piston and piston cup in the cylinder. The piston cup is filled with teflon material and is self–lubricating. This is necessary to keep the compressed air output clean.

The Pressure Switch 10MD.

The pressure switch 10MD senses the pressure in the potable water tank and switches the electric motor (of the compressor) on and off. At 28psi (1.9305bar) the pressure switch disconnects the 28V DC line from the relay. This stops the electric motor. When the pressure in the potable water tank is 25psi (1.7236bar) the pressure switch connects the 28V DC line. This causes the relay to start the electric motor of the compressor to pressurize the system.

The Air Filters 4211MM/4212MM.

The air filters stop the ingress of impurities into the system from the air around the compressor.

The Check Valve 4206MM.

The check valve makes sure that the compressed air flows only in the direction of the potable water tank.

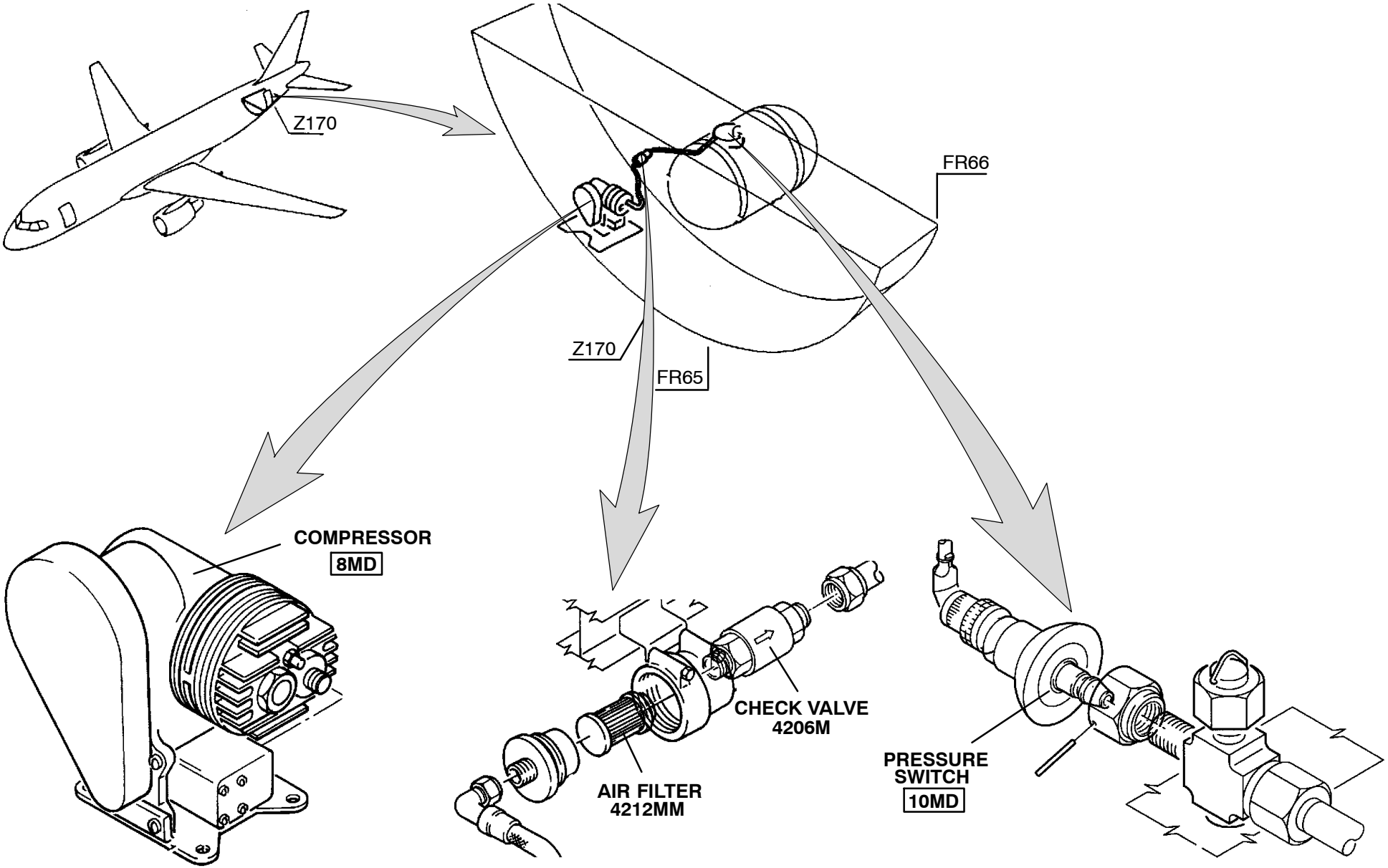


Figure 30 Air Supply Boost System Components (A318/319/321)

POWER SUPPLY OPERATION (ALL)

The electric motor that drives the compressor is supplied with 115V AC at 400 HZ from the 3–phase AC BUS 2. This is switched to the motor through the relay 9MD that is powered from the 28V DC GND/FLIGHT BUS.

Operation

A normal cycle of the compressor increases the pressure in the water tank to 28psi (1.9305 bar). At this pressure the pressure micro switch 10MD stops the power supply to the relay 9MD.

If the air pressure in the potable water system decreases to below 25psi (1.7236 bar):

- the pressure micro switch 10MD energizes the relay 9MD,
- the compressor starts and the pressure in the potable water system increases for another cycle.

If the air pressure in the system increases to above 28 psi (1.9305 bar):

- the pressure micro switch 10MD de–energizes the relay 9MD,
- the compressor stops.

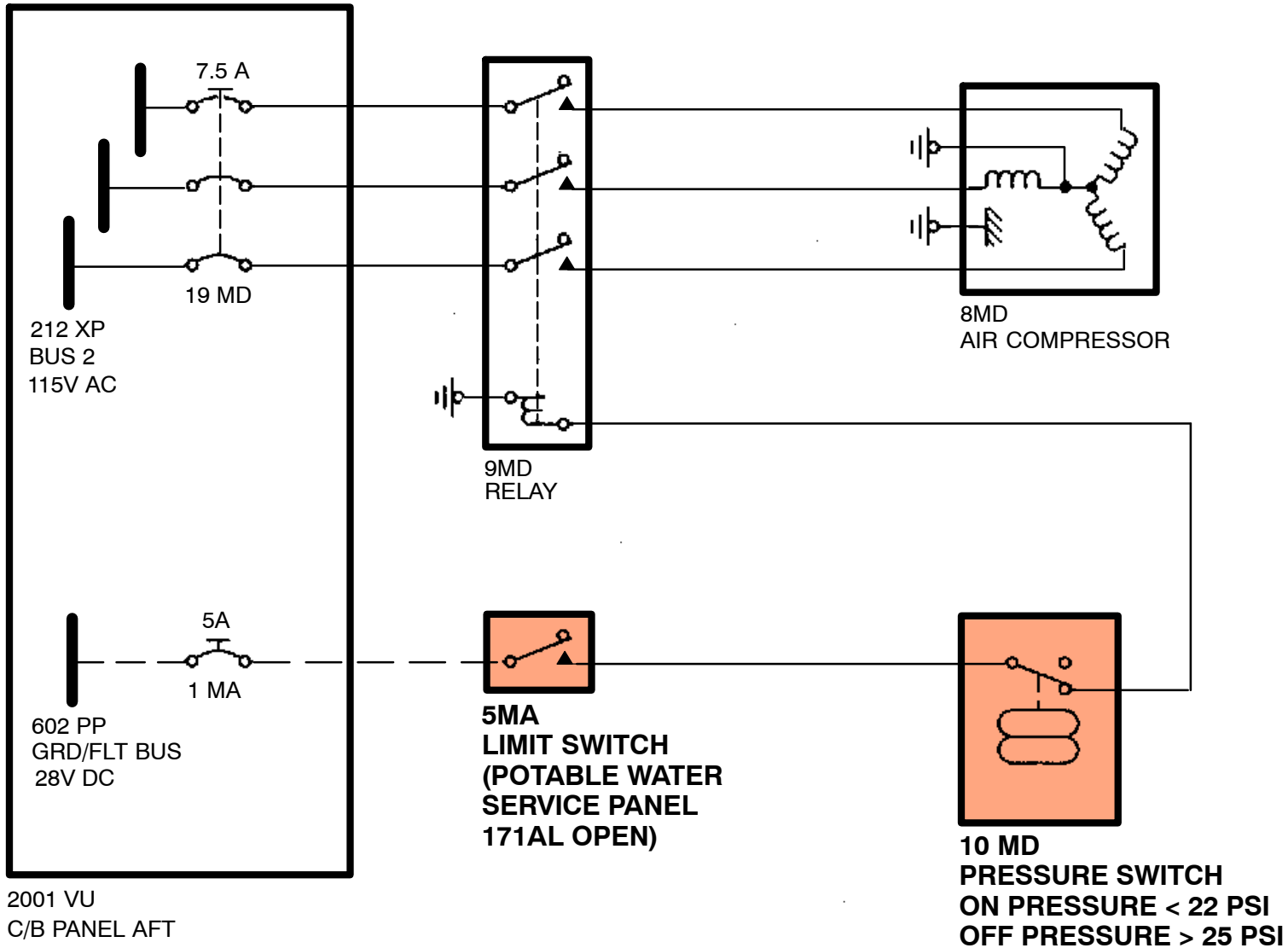


Figure 31 Air Compressor Power Supply (All)

38–13 QUANTITY INDICATION

SYSTEM DESCRIPTION (ALL)

The quantity indicating system gives a visual indication of how much water is available in the potable water tank. The indicating system is installed to assist the ground and cabin service personnel. A preselection system is installed on the FAP (**F**orward **A**ttendant **P**anel).

Water Quantity Transmitter 3MA

The water quantity transmitter 3MA is installed in the water tank and monitors the volume of water remaining in the tank

The quantity transmitter 3MA, operates as a variable capacitor and uses the water in the tank as the variable component. Any increase of water in the tank increases the output signal, any decrease in water decreases the output signal.

The quantity indicator on the FAP (**F**orward **A**ttendant **P**anel) gets its information from the transmitter. The signal to the FAP LED indicator shows the percentage of volume if the panel Pushbutton is pressed. The FULL indication light on the service panel comes on when the tank is full or when the pre–selected value is reach.

The transmitter also has a low–level switch which opens when the water tank contents drop to a set level. When the low–level switch opens it disconnects the electrical supply to the water heaters in the lavatories.

The transmitter also has a high–level switch, which controls the operation of a relay to close the fill/drain valve 16MA. The high level switch will de–energize the relay to stop the filling procedure when the tank is full.

Service Door 171AL

The service door 171AL operates the microswitch 5MA. The microswitch controls the power supply to the quantity indicating system.

The microswitch 5MA closes to energize the indicating system when the service door 171AL is opened for ground servicing. The microswitch 5MA isolates the indicating system when the service door 171AL is closed again. A membrane switch, identified by 'IND ON', is installed on the forward attendant panel. The membrane switch overrides the microswitch 5MA, if you push it in.

LED (Light Emitting Diode)

The LED (**L**ight **E**mitting **D**iode) indicator on the forward attendant panel shows the water tank contents in percentage of volume.

Indicator Light 10MA

The indicator light 10MA on the potable water service panel will come on when the selected water quantity is reached and the fill/drain valve is closed.

Preselection Membrane Switches

The preselection membrane switches are installed on the FAP. There are four switches for the preselection system, one for each percentage selection. The switches are used to let the potable water tank fill only to that quantity which is selected.

When you push one of the preselection membrane switches, the preselection system is energized.

When the water quantity reaches the preselected value, the quantity transmitter 3MA sends a signal to the preselection control unit 7MA.

The preselection control unit then sends a signal to close the fill/drain valve 16MA.

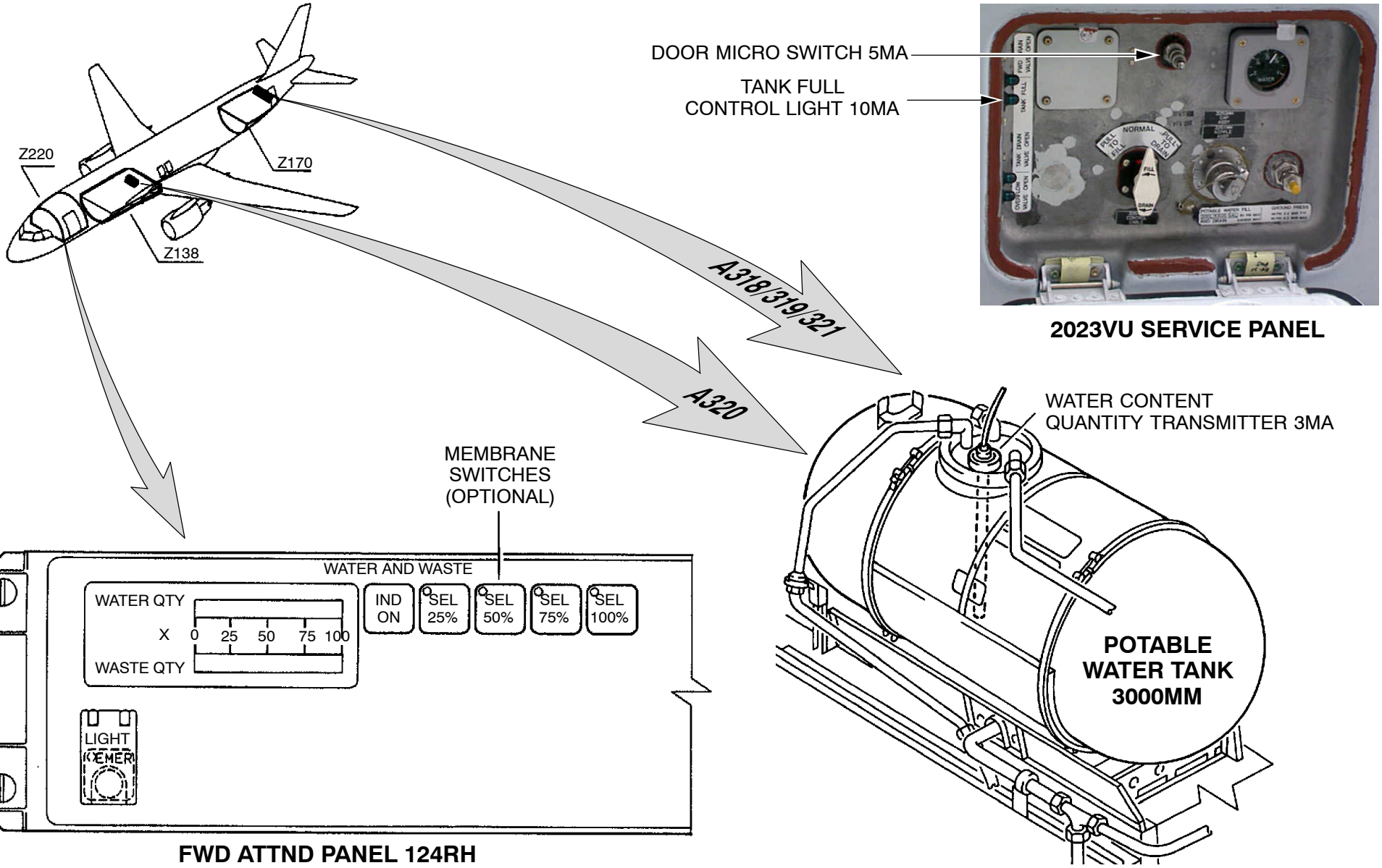


Figure 32 Quantity Indication Components (All)

PRESELECTION CNTRL. UNIT PRESENTATION (OPTIONAL)

Preselection Control Unit 7MA

When the water quantity reaches the preselected value, the quantity transmitter 3MA sends a signal to the preselection control unit 7MA.

The preselection control unit then sends a signal to close the fill/drain valve16MA on the A320, or the fill/overflow and drain valve 8MA on the A321.

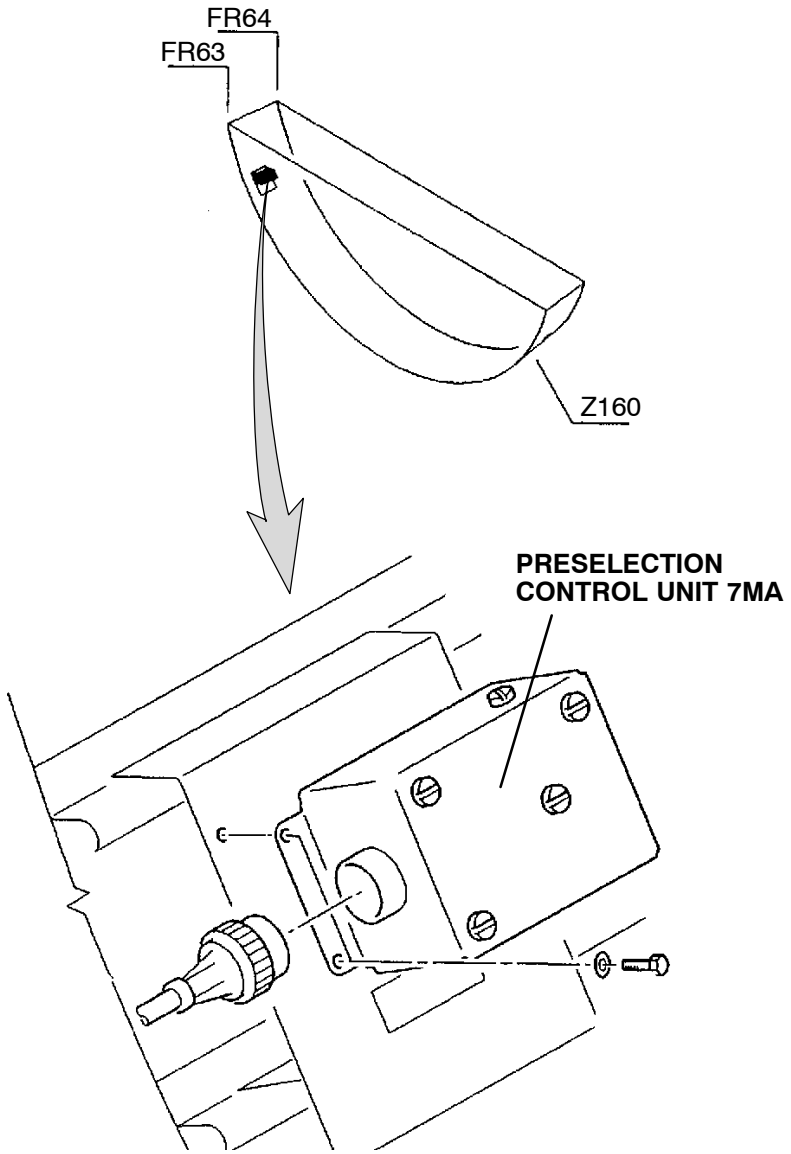


Figure 33 Preselection Control Unit (A320/A321)

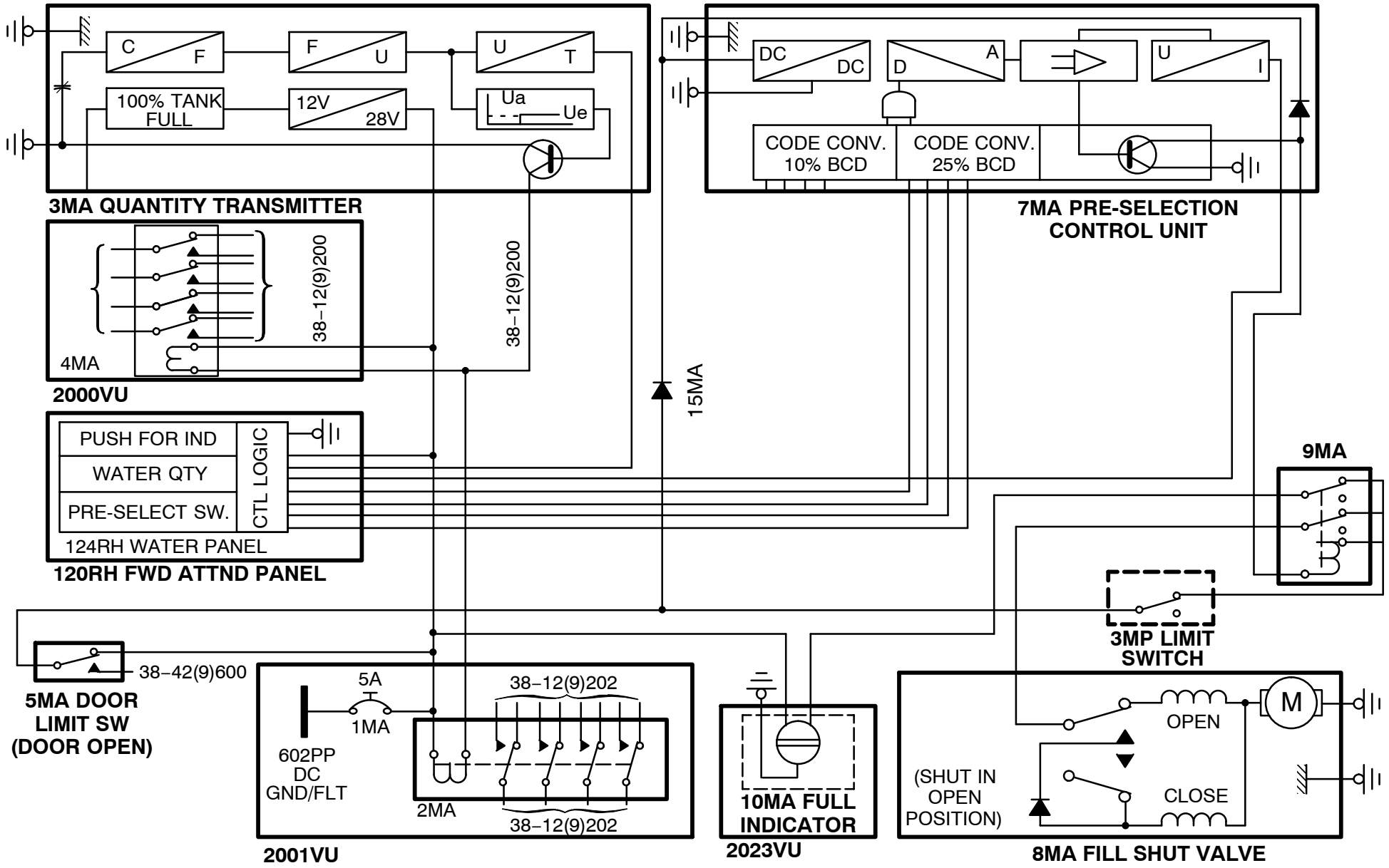


Figure 34 Quantity Indication Electrical Schematic (A318/320/321)

38–12 DISTRIBUTION

PRESENTATION (ALL)

Potable water from the water tank is supplied through a system of distribution lines. Routing for the distribution lines to the front and rear galleys and lavatories is below the passenger compartment floor. A part of the forward distribution line to the front services passes through a hose, for added protection.

The potable water–distribution lines are insulated and electrically heated in section 13 to prevent ice formation in and around the lines.

Mechanically or electrically operated valves control the supply of the potable water system. Compressed air is used to pressurize the system to supply water from the tank to the necessary service locations. Compressed air is tapped from the cross feed line of the engine bleed air and is connected to the water tank air–inlet.

TWO DIFFERENT WATER FAUCETS

Config: 1

The water faucets have a self–venting valve, push knob and spout. Water is available when light pressure is applied to the push knob. Water flow will stop automatically after release of the push knob and completion of the valve time–delay sequence. Each water faucet is connected to a mixing unit.

The mixing unit is installed under the wash basin and connected to the hot (red) and the cold (blue) potable water supply lines. A thermostat is installed on the mixer unit. You can set the thermostat to that water temperature you want on the water outlet.

Config: 2

The water faucets have a self–venting mixing valve, push–lever and spout.

The mixing valve includes a time delay device and is connected to the hot (water heater) and the cold–water supply lines. The push–lever is installed on the mixing valve and includes hot (red) and cold (blue) water identification and selection arrows. Hot water, mixed flow, or cold water is available when light pressure is applied to the push–lever. Water flow will stop automatically after release of the push–lever and completion of the mixing–valve time–delay sequence.

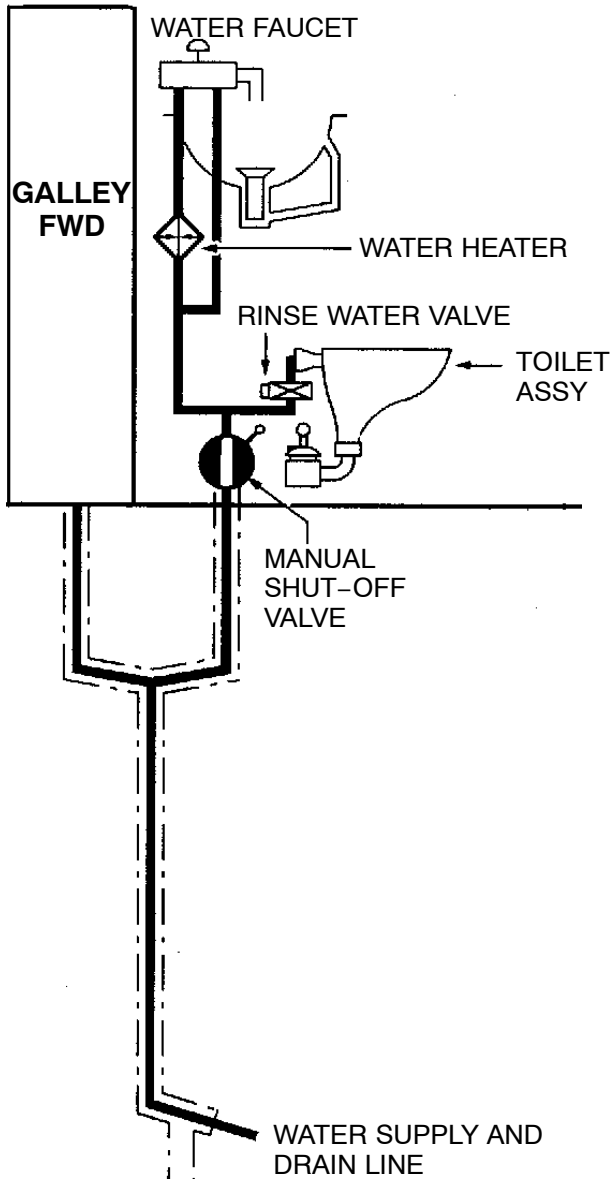


Figure 35 FWD Lavatory and Galley System (A319–21)

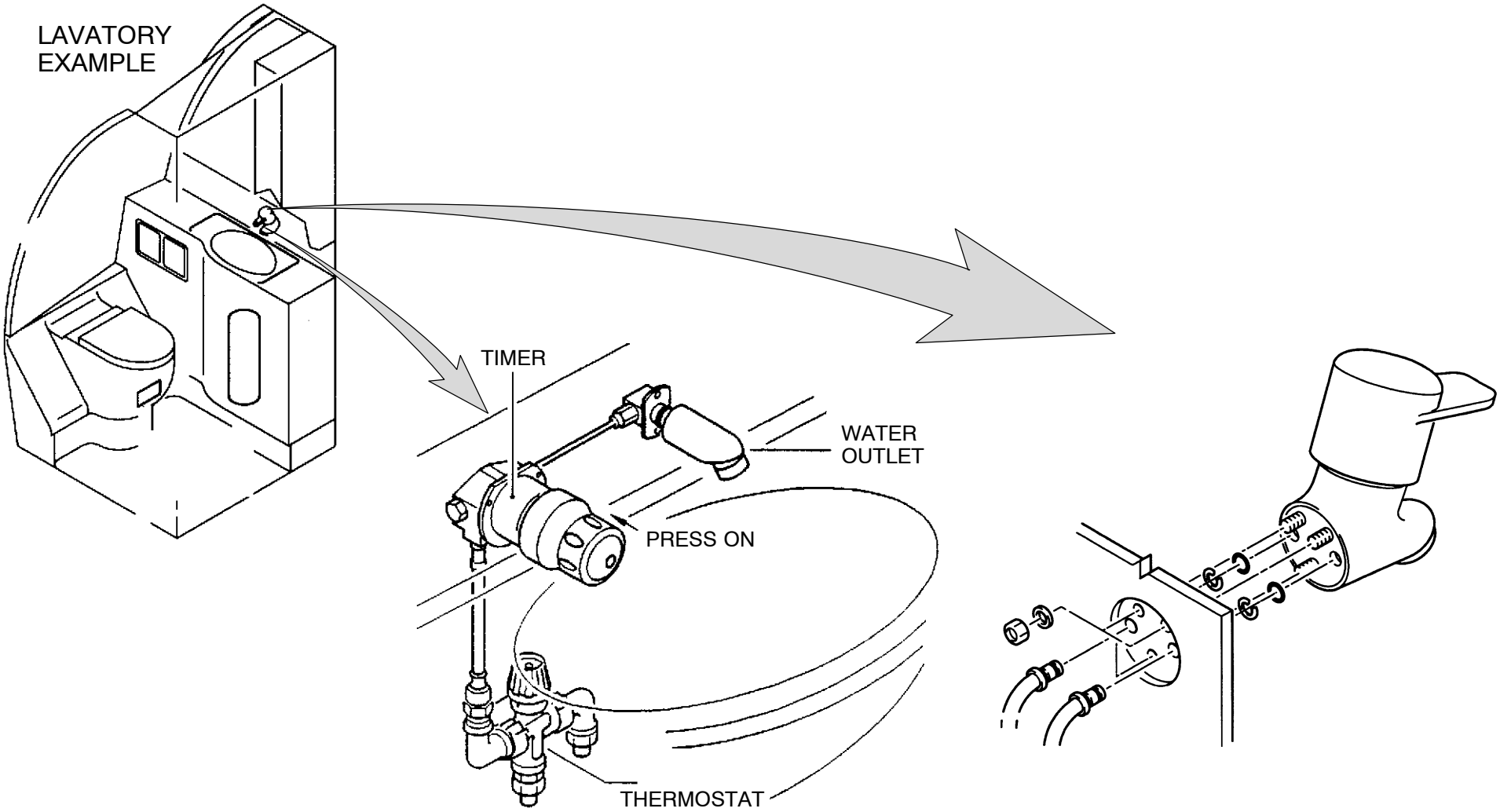


Figure 36 Water Faucets (All)

WATER HEATER DESCRIPTION (ALL)

MANUAL WATER SHUT – OFF VALVE

The manual shut–off valve isolates the water faucet and the toilet from the potable–water distribution system when closed. It is usual for the valve to remain in the 'OPEN' position. The shut–off valve is installed under the toilet shroud. You gain access to the valve through the access panel at the front of the shroud.

RINSE WATER VALVE

The toilet rinse valve is solenoid controlled and is electrically operated.

TWO DIFFERENT HEATERS

Config 1

The water heater is installed under the washbasin inside the sanitary unit cabinet. The potable–water supply line is connected to the heater inlet and the outlet is connected to the water faucet. The water heater has a capacity of 1.5 l (0.4 US gal), the maximum quantity of water that can be heated at one time. The water heater ON/OFF switch is found on the top part of the unit.

When you set the ON/OFF switch to ON the water heating element energizes (control light is on). When the water heats to a set temperature, a thermostat opens to remove the electrical power from the heating element. When the water temperature drops (usual heat decrease or as cold water replaces used hot water) the thermostat closes to energize the heating element again.

This sequence continues for as long as the water temperature changes and the ON/OFF switch is set to ON. The thermostat is set to open (GO OFF) when the water temperature increases to 48 DEG. C (118.40 DEG. F). It is set to close (COME ON) when the water temperature decreases to 45 DEG. C (113.00 DEG. F). An over–temperature safety device which has a temperature range of 55 DEG. C (131.00 DEG. F) to 65 DEG. C (149.00 DEG. F) protects the heating element.

You can reset the safety device with the pushbutton which is on the top part of the water heater (under a cover).

Config 2

This heater regulates the water temperature between 45° C and 51° C.

An Overtemperature protection will be done by an internal overtemperature switch, this opens the heating circuit above 72° C. A reset can be done through the ON/OFF switch when the temperature is below 35° C and after a time delay of 9 minutes.

An internal pressure sensor cuts off the power to the heating element when the pressure is below 7,25 psi. The pressure sensor is reset automatically when the pressure increases above 11 psi.

A pressure relief valve reduces the pressure when it is above 55 psi.

An internal low level switch cuts off the electrical power to the heating element when the water level in the heater is below one liter. The resets automatically above this level.

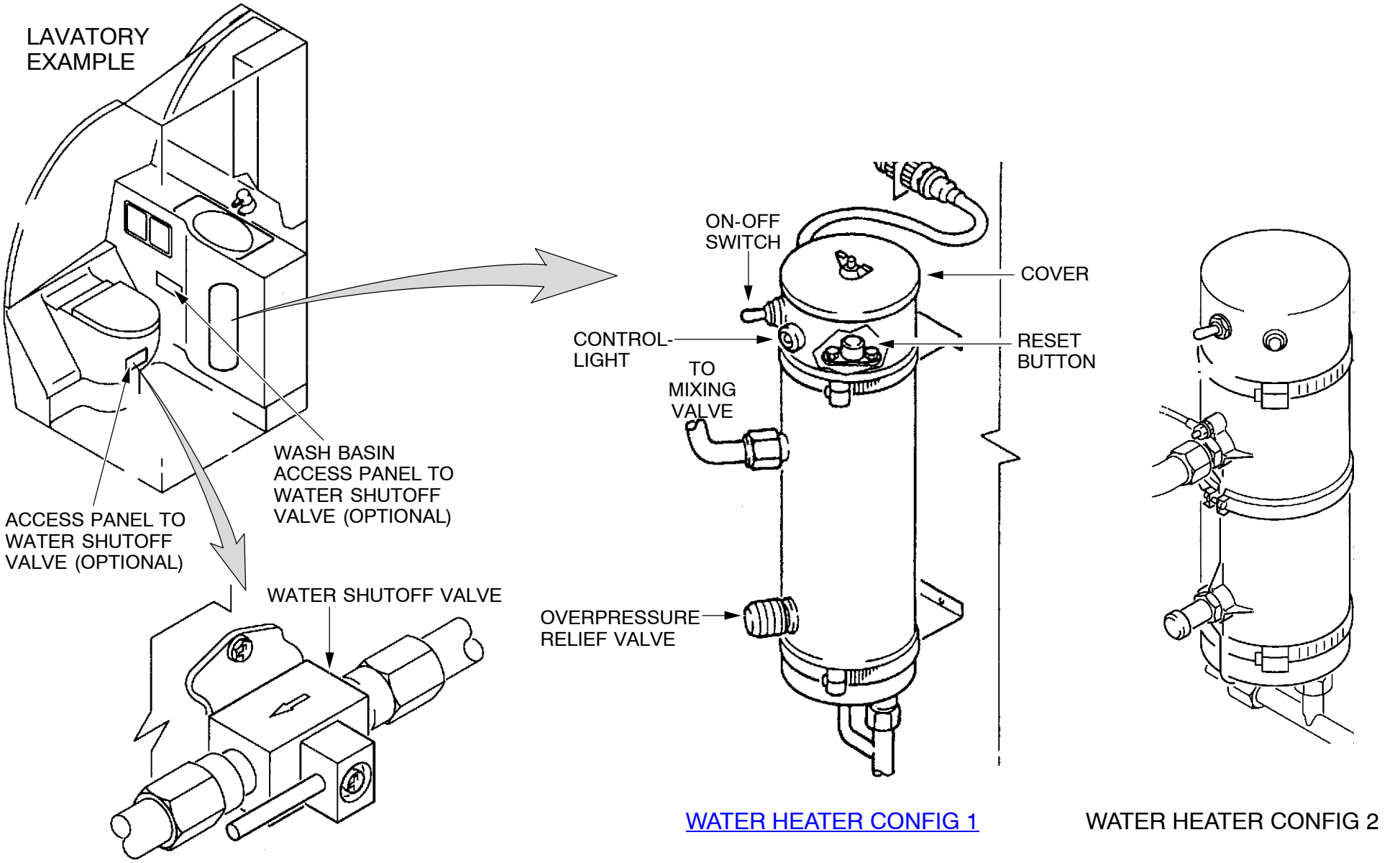


Figure 37 Water Shutoff Valve and Water Heater (All)

ELECTRICAL OPERATION (ALL)

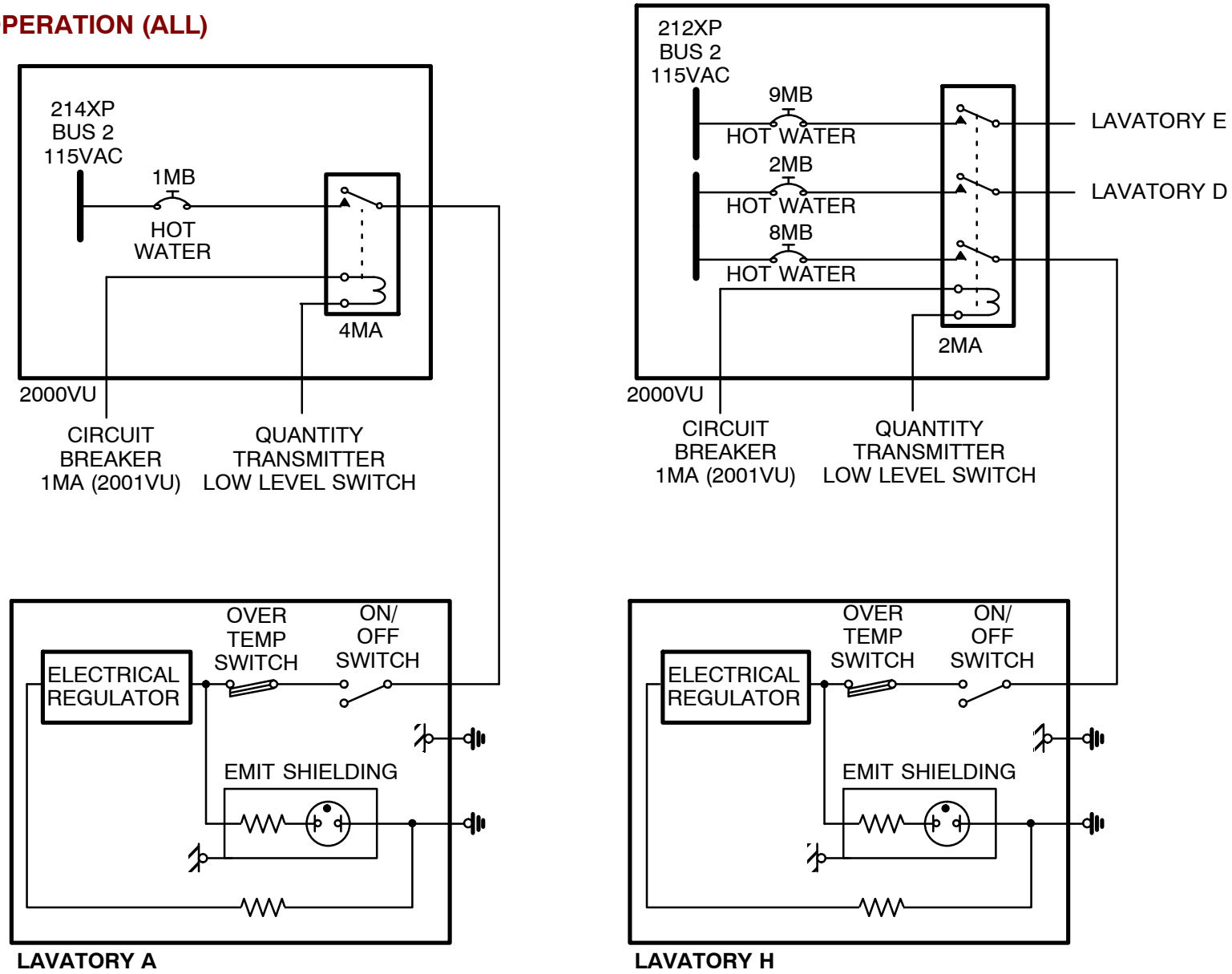


Figure 38 Water Heater (CONFIG 1) Elec. Schematic (All)

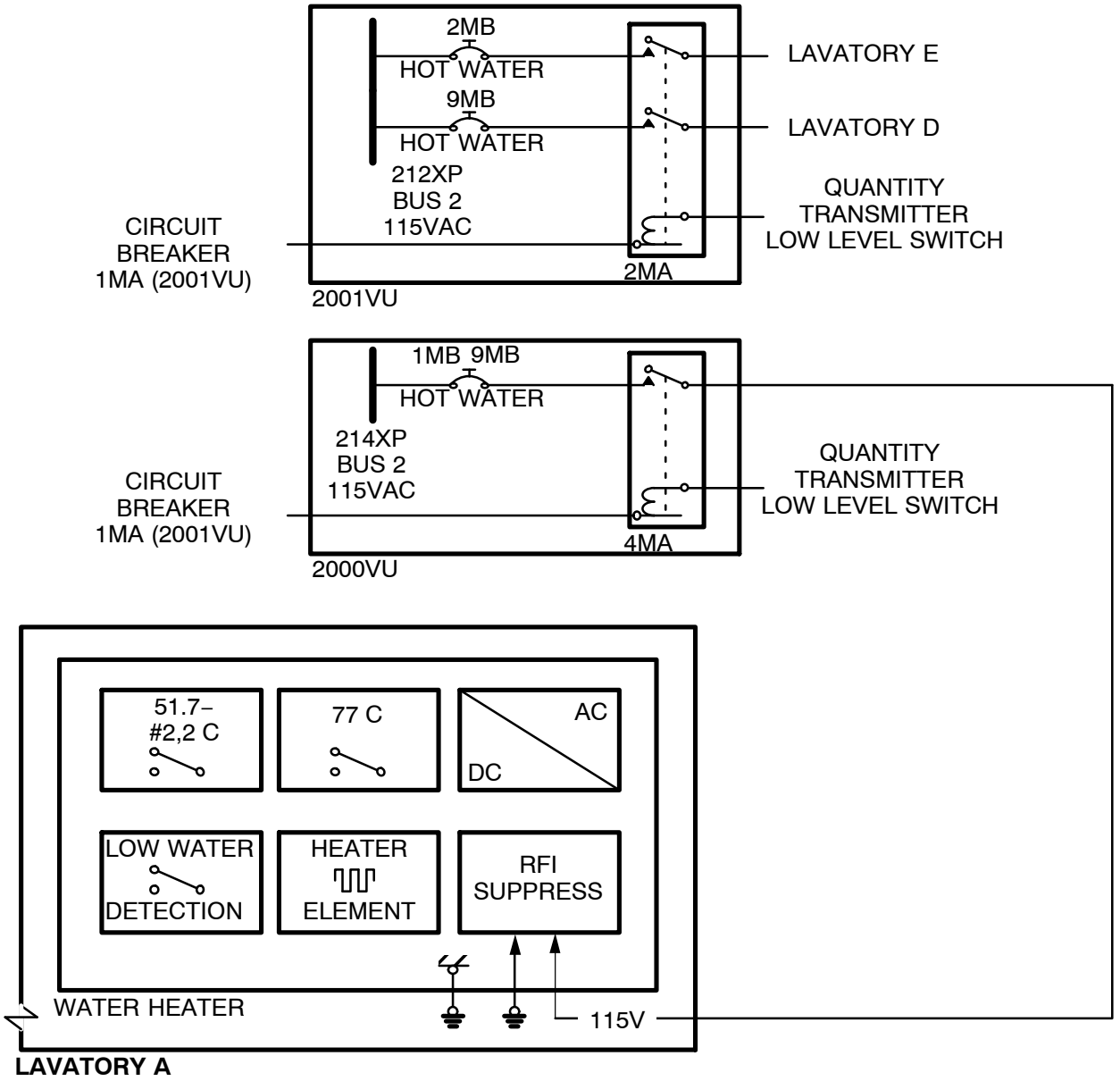


Figure 39 Water Heater (CONFIG 2) Elec. Schematic (All)

38-32 WASTE WATER DRAIN

GENERAL (ALL)

The waste–water drain system disposes the waste water from the lavatory washbasins and the galley sinks.

The system has:

- washbasin drain assemblies in the lavatories and galleys,
- drain valves in the sanitary unit cabinets,
- drain lines and the heated drainmasts.

Drain Assembly

The lavatory washbasins have a drain valve assembly. This drain valve assembly has a valve body with drain and overflow connections. Optional is a control cable and control knob. The control cable connects the valve to the control knob.

Drain Valve

The drain valves, which are installed in the drain lines, have a valve body with inlet/outlet connections, and a diaphragm. The valves prevent leakage of cabin air through the drain lines. The valves also have a backflow prevention device.

The backflow prevention device which is integrated in the drain valves prevents backflow of water through the outlet side of the valves.

Drainmast

Waste water is discarded to the outside through two drainmasts, which are installed on the lower fuselage shell. The pressure difference between the cabin and the drainmasts outlet discards the waste water through the drainmasts in flight.

Gravity discards the waste water through the drainmasts on the ground.

The two masts have integrated electrical heating–elements to prevent the water from freezing during high–altitude flights or during cold weather.

The heating elements are connected to the aircraft electrical network (Ref: 30–71–00).

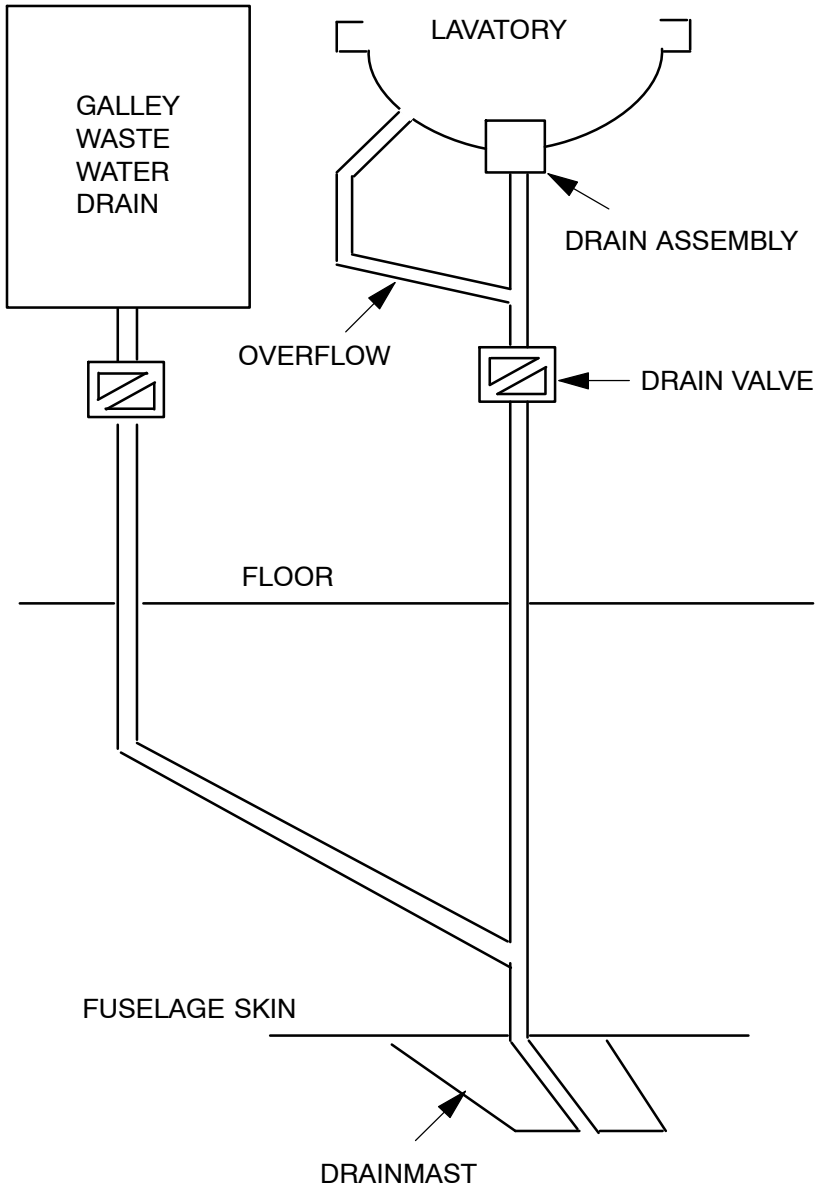


Figure 40 Lav. Washbasin Waste-Water Drain (All)

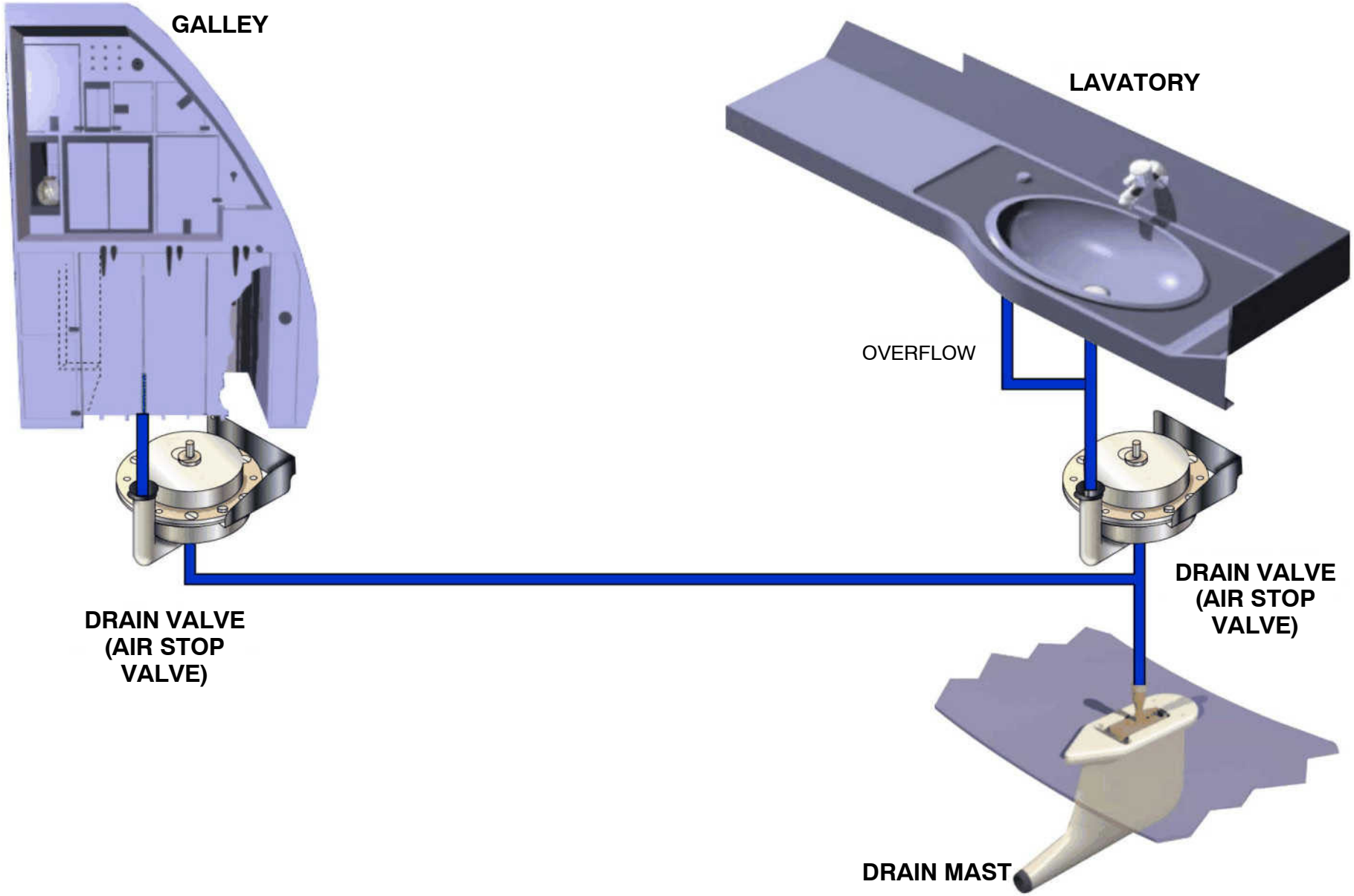


Figure 41 Water/Waste System Overview (All)

ATA 30 ICE AND RAIN PROTECTION

30-71 DRAIN MAST ICE PROTECTION

SYSTEM DESCRIPTION (ALL)

The waste water ice protection is installed to prevent ice formation in the drain lines and fwd and aft drain masts. The waste water which comes from the galley and lavatory washbasins is discarded through the drain lines and drain masts to atmosphere. Waste water lines installed in areas of possible icing conditions, are heated by electrical tape heating elements and insulated.

Heaters are installed in the fwd and aft drain masts to prevent ice formation.

Ice−Protection control units installed in the fwd and aft cargo compartments regulate through the sensors the heating elements of the drain lines and drain masts.

Drain Mast

Each drain mast assembly has:

- an aluminum alloy housing (aerodynamic shape),
- a drain tube with integrated electrical heating − elements,
- an PTC temperature sensor (measures the ambient temperature),
- an over temperature switch (prevents damage to heating element),
- A flange for installation of the drain mast is part of the top of the fairing.

Two ice protection control units 5DU and 15DU control the 115V AC 400Hz single phase to the related heater of the drain masts.

The drain mast heating element operates from −55° C (−65° F) to +75° C (+160° F).

The overtemperature switch installed in the drain mast will stop the power supply if the temperature increases above +120° C (+250° F).

Waste water lines.

The waste water ice protection system cannot be controlled manually.

The waste water ice protection system operates automatically when the related circuit breakers are closed.

The system is available with the aircraft electrical−circuits energized with 115 V AC and through closed circuit breakers 1DU and 11DU.

Control Unit 5DU and 15DU

All control units of the waste water ice protection system are provided with internal BITE test.

The BITE function monitors the correct function of:

- the control and monitor circuits,
- the connected heater elements (tapes),
- the connected temperature sensor,
- the internal solid states relays,
- the power supply of the system,
- the interface connector.

A test button located on top of the control unit, when pressed will start an internal BITE test to check the system. Two LEDs (**L**ight **E**mitting **D**iodes) in the control unit show the correct status of the system ”Heater OK” and ”Unit OK”.

You start the BITE when you push the TEST pushbutton, located on the top of the control unit.

Two LEDs (**L**ight **E**mitting **D**iodes) show the correct status of the system.

Additional the control units of the drainmast heating system are connected with three discrete lines to the CIDS (**C**abin **I**ntercommunication **D**ata **S**ystem), via a DEU−B. A test menu displayed on the CIDS PTP (**P**rogramming and **T**est **P**anel) gives you the facility to start a BITE test of the drainmast heating system without the need to remove the sidewall panels installed in the FWD and AFT cargo compartments.

When you initiate the test via the PTP, a 28VDC signal starts the internal BITE function of the related control units. Two LED GND signals, ’HEATER OK’ and ’UNIT OK’, shows the correct status of the drainmast heating system.

NOTE: For deactivation of the Waste Water Drain Mast Heating System refer to MEL Task 30-71-01

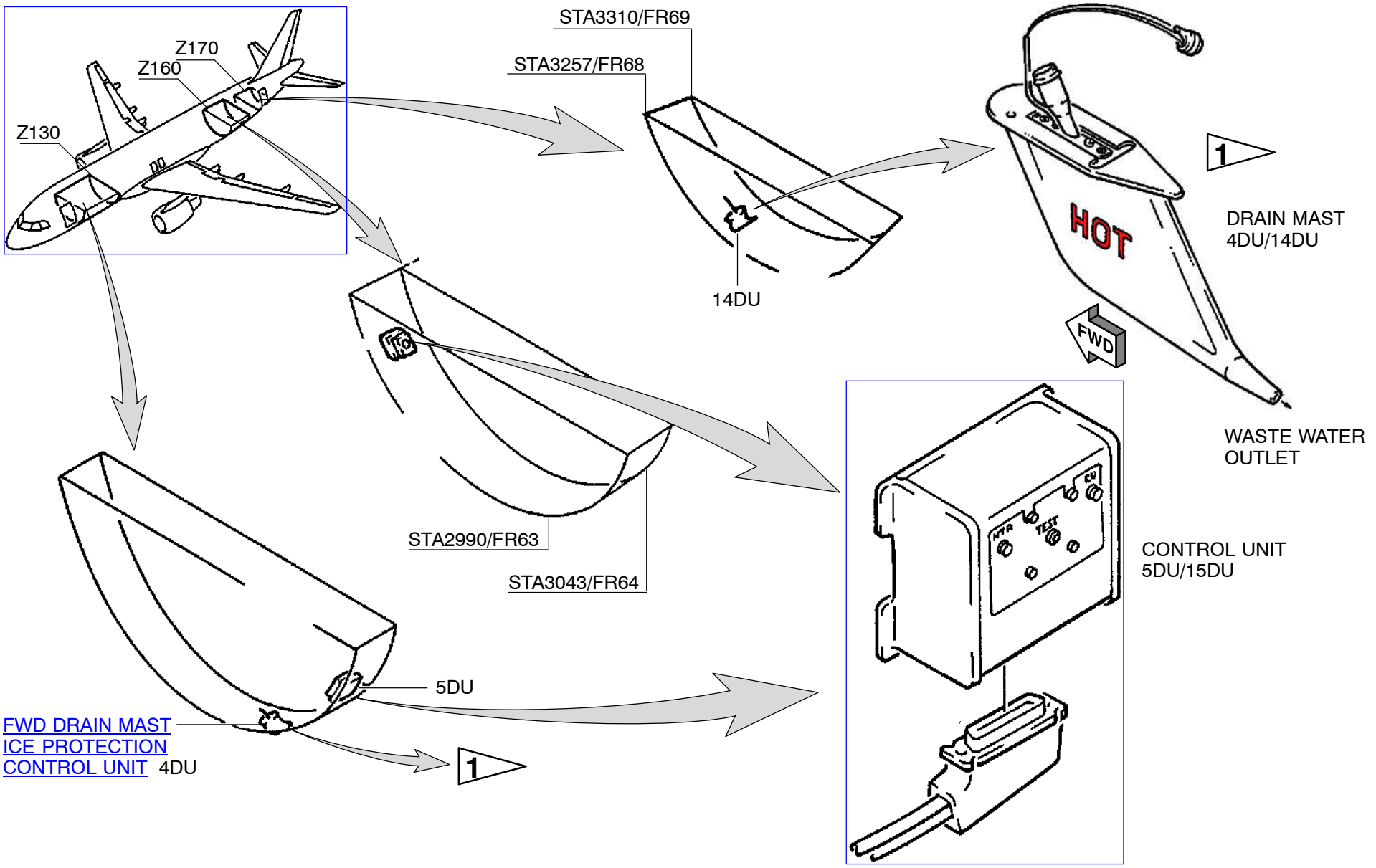


Figure 42 Drain Mast Heating (All)

30–73 POTABLE WATER ICE PROTECTION

PRESENTATION (ALL)

Potable Water Service Panel

The potable water service panel heating is installed to prevent ice formation in the potable water servicing panel in icing conditions.

The fill/drain nipple and overflow nipple are electrically heated to prevent ice formation of the remaining water in the fill/drain nipple and overflow nipple which could cause a blockage or damage to the nipples.

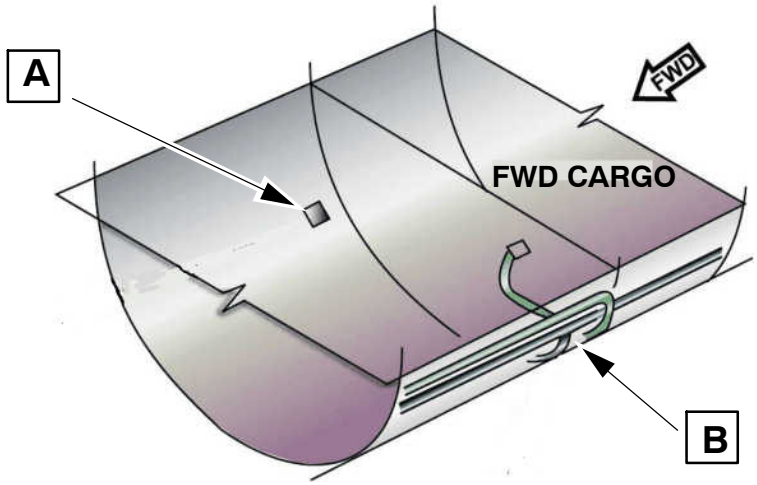
A control unit through a thermostat controls the potable water service panel heating.

Waste Service Panel

The waste service panel heating is installed to prevent ice formation in the waste servicing panel in icing conditions.

The flush nipples are electrically heated to prevent ice formation of the remaining water in the flush nipples which could cause a blockage or damage to the nipples.

A control unit through a thermostat controls the waste water service panel heating.



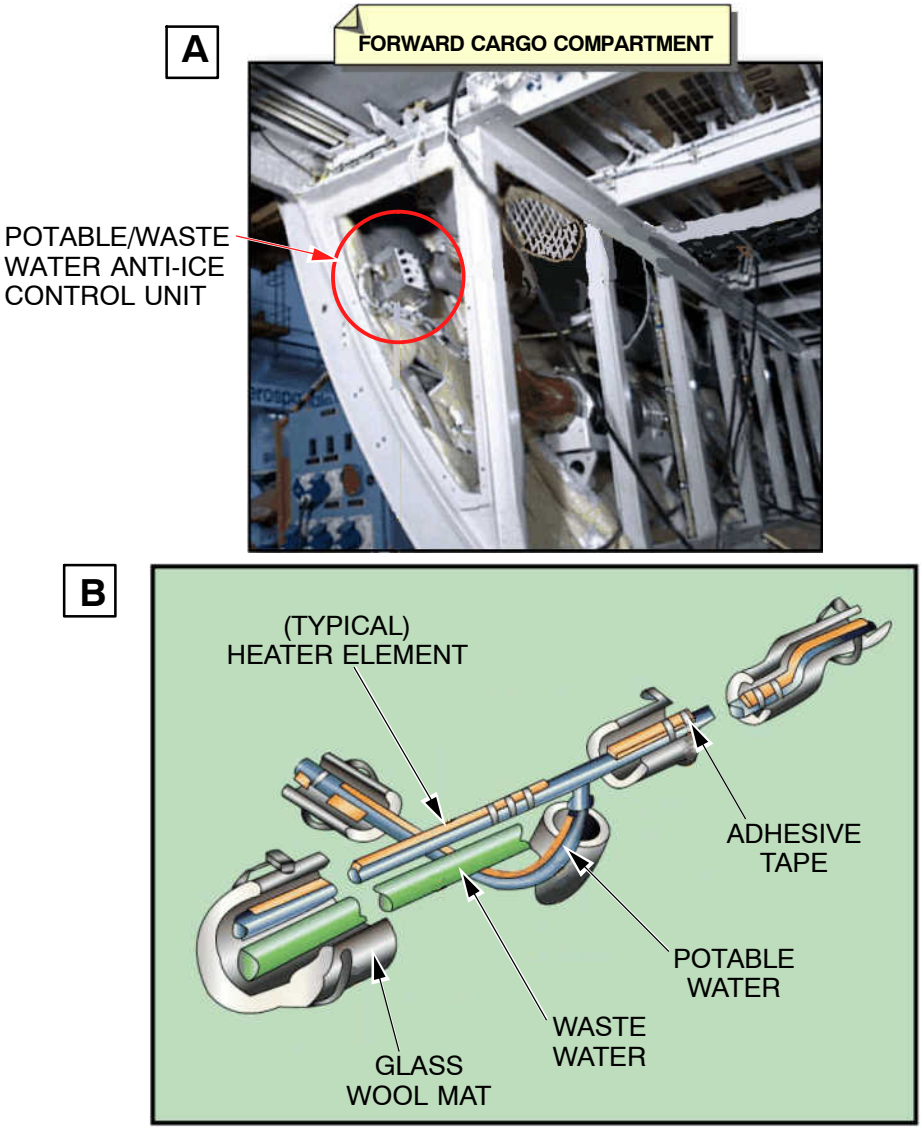


Figure 43 Potable Water Heating, Ice Protection (All)

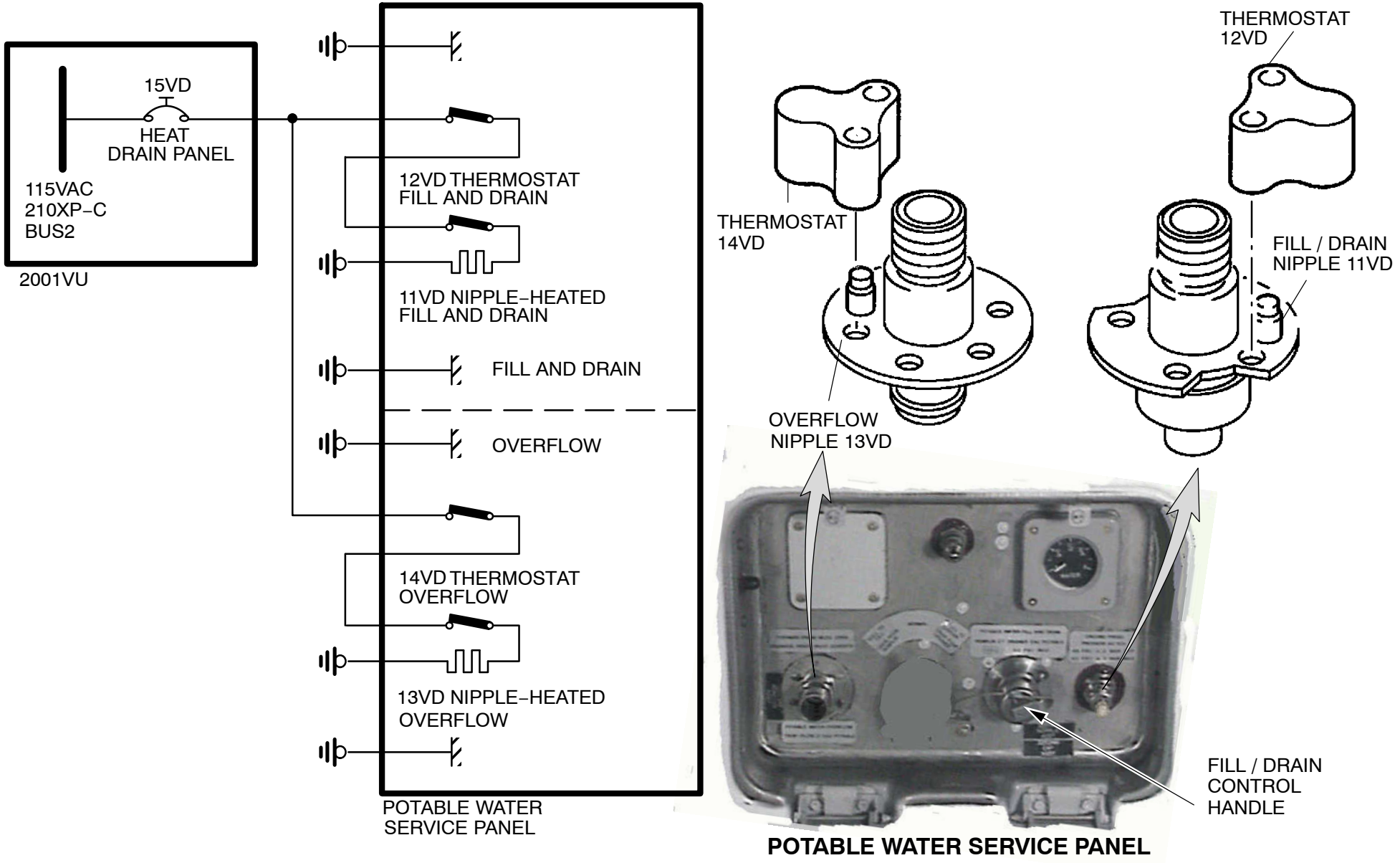


Figure 44 Potable Water Ice Protection (All)

30–71 DRAIN MAST ICE PROTECTION

WASTE WATER LINE HEATERS INTRODUCTION (A321)

The rear galley and rear lavatory waste water drain lines have heater assemblies which are installed on the drain lines with bonding tape.

115V AC is supplied to the control unit 140DU which controls the related sensor and heaters installed on the rear lavatory waste line.

115V AC is supplied from the GND/FLT busbar to the control unit 180DU which controls the related sensor and heaters installed on the rear galley waste line.

The sensor measures the waste water drain lines permanently, the control unit compares the measured values with the stored reference values. When icing conditions occured the control unit will turn on the power supply to the related tape heating circuits.

A test button located on top of the control unit, when pressed will start an internal BITE test to check the system.

Two LEDs (**L**ight **E**mitting **D**iodes) in the control unit show the correct status of the system ” Heater OK ” and ” Unit OK ”.

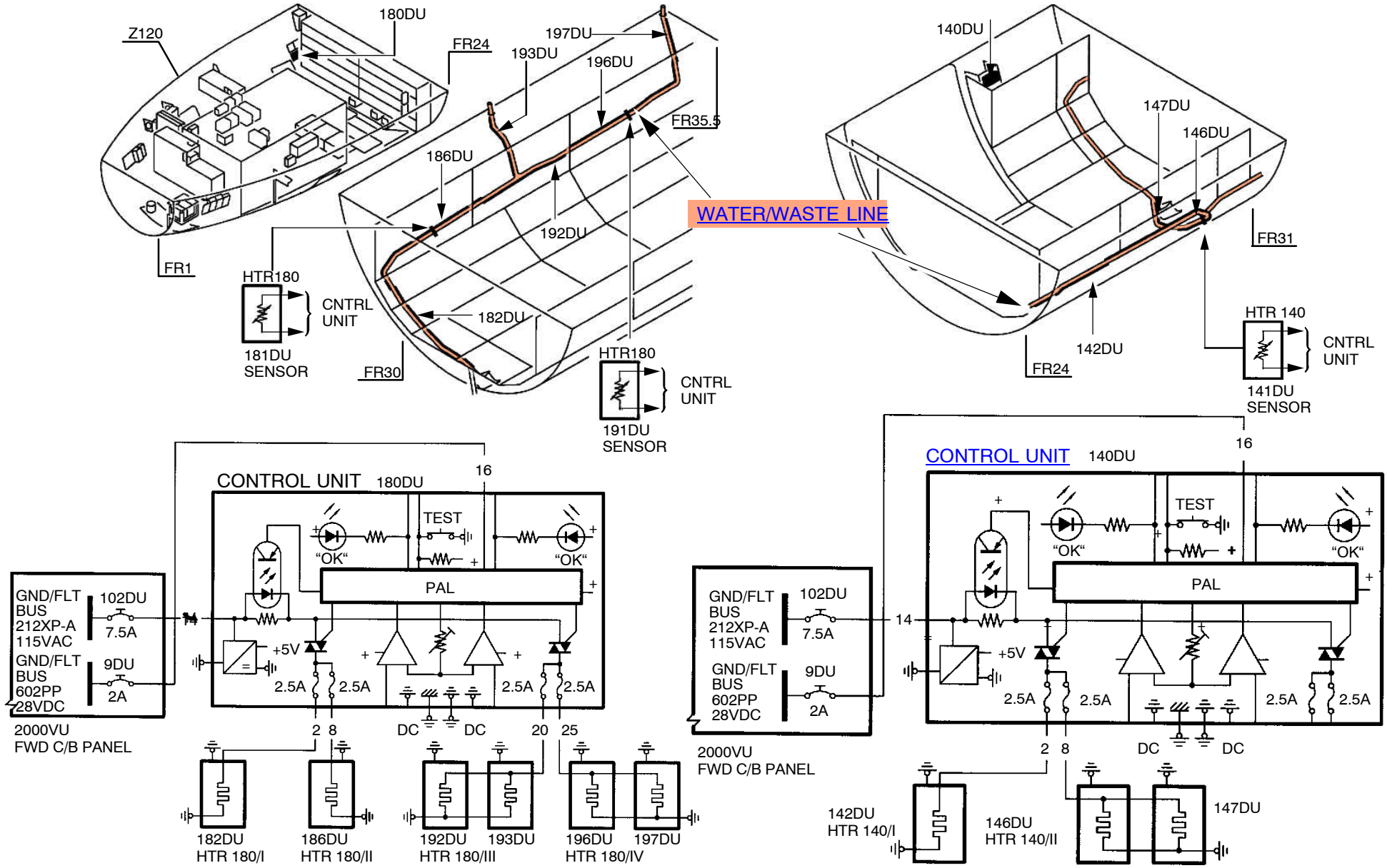


Figure 45 Water Drain Line Heating (A321)

ATA 23 COMMUNICATIONS

23-73 CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS)

The CIDS (**C**abin **I**ntercommunications **D**ata **S**ystem) is used to operate, control, monitor and test various cabin functions.

MISCELLANEOUS MODULE INTRODUCTION (NON ENHANCED)

1 CIDS Caution Light

This light is resettable in flight, but comes on again on the ground (Landing gear down and locked). The light cannot be reset on the ground. When a CIDS CAUTION occurs, the respective failure message is displayed on the programming and test panel.

2 SMOKE LAV Light

This light comes on when a signal from the smoke detector is received.

3 WASTE QTY LED

The WASTE QTY LED display shows the actual contents in the waste tank graduated in 20 steps, each step is equal to 5%.

4 IND ON Switch

It is to switch on the water and waste indicating system.

5 SEL 25%, SEL 50%, SEL 75% and SEL 100%

Pushing one switch, stores the related value to the preselection control unit. Pushing a second switch stores the new value and erases the previous value.

6 SYSTEM INOP, LAV INOP

The SYSTEM INOP indicator light comes on, if the vacuum waste system fails.

7 SLIDES ARMED

The SIDES ARMED indication light is off when all slides are disarmed. When at least one slide is armed the indication light flashes (green). When all slides are armed the indication light (green) is steady on.

8 DOORS CLOSED

The DOORS CLOSED indication light comes on, when all doors are closed. When at least one door is opened, the indication light goes off.

9 CABIN READY

When you push the CABIN READY membrane switch, the CABIN READY indication on the ECAM panel in the flight compartment comes on. This function indicates that the cabin is ready for take–off. You can do a manual reset when you push the CABIN READY membrane switch again. The CABIN READY function is automatically reset after take–off.

10 CIDS PNL LIGHT TEST

The CIDS PNL LIGHT TEST membrane switch switches on all the lights in the panel and the membrane switch integral light as long as the membrane switch is pressed.

11 RESET

The RESET membrane switch switches off the warning horn, if the evacuation system is activated (if installed) . It also switches off the lavatory smoke warning if the warning is activated. The membrane switch switches a discrete input to ground.

12 LIGHT EMER

The LIGHT EMER pushbutton switch switches on the emergency lighting system. The integral light in the pushbutton switch comes on. Pushing the pushbutton switch a second time switches off the emergency lighting system and the integral light. The function of the pushbutton switch is independent from the CIDS power supply.

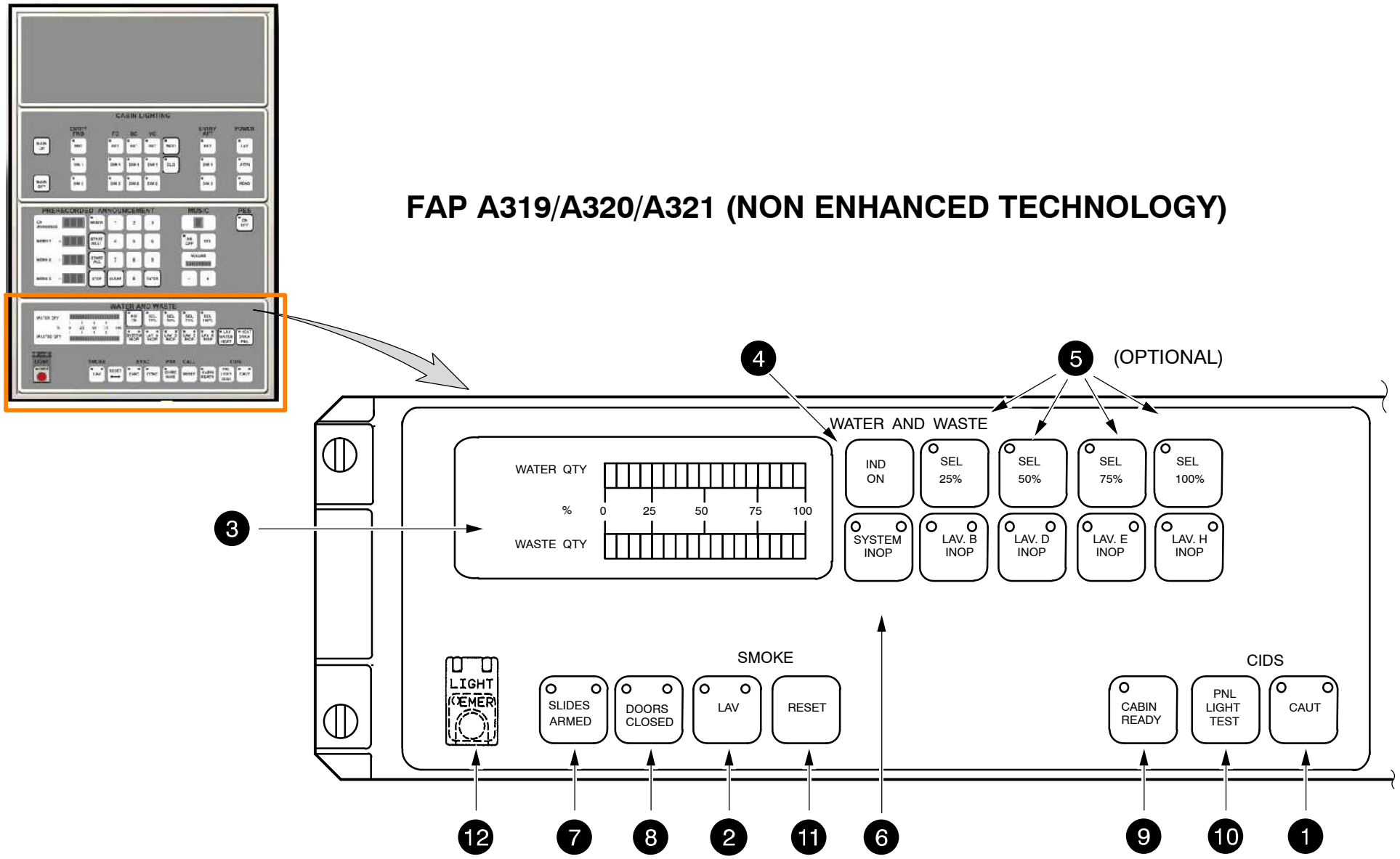


Figure 46 Miscellaneous Module

PROGRAMMING & TEST PANEL PRESENTATION (NON ENHANCED)

The PTP (**P**rogramming and **T**est **P**anel) 110RH is installed in the wall opposite of the FWD lavatory. It is located at the FWD attendant station, behind a hinged access door next to the FWD attendant panel. The PTP enables personnel to extensively test and re–program the CIDS.

To activate CIDS component tests and the readout of the results the PTP has an alphanumeric display with four rows of twenty characters. The display is used to present messages, test results and selection menus. A conventional keypad is provided for entry of numerical data.

ATTENTION: Pressing One membrane switch activates the display in on.

CIDS SYSTEM STATUS FUNCTION (NON ENHANCED)

The SYSTEM STATUS mode monitors the current status of the CIDS.

This includes the directors, the DEUs, the data buses, the CAM, the FWD ATTND PANEL, the PTP and the interfaces to other systems.

The DOOR STS menu is selected to display the status of the A/C doors (close or open).

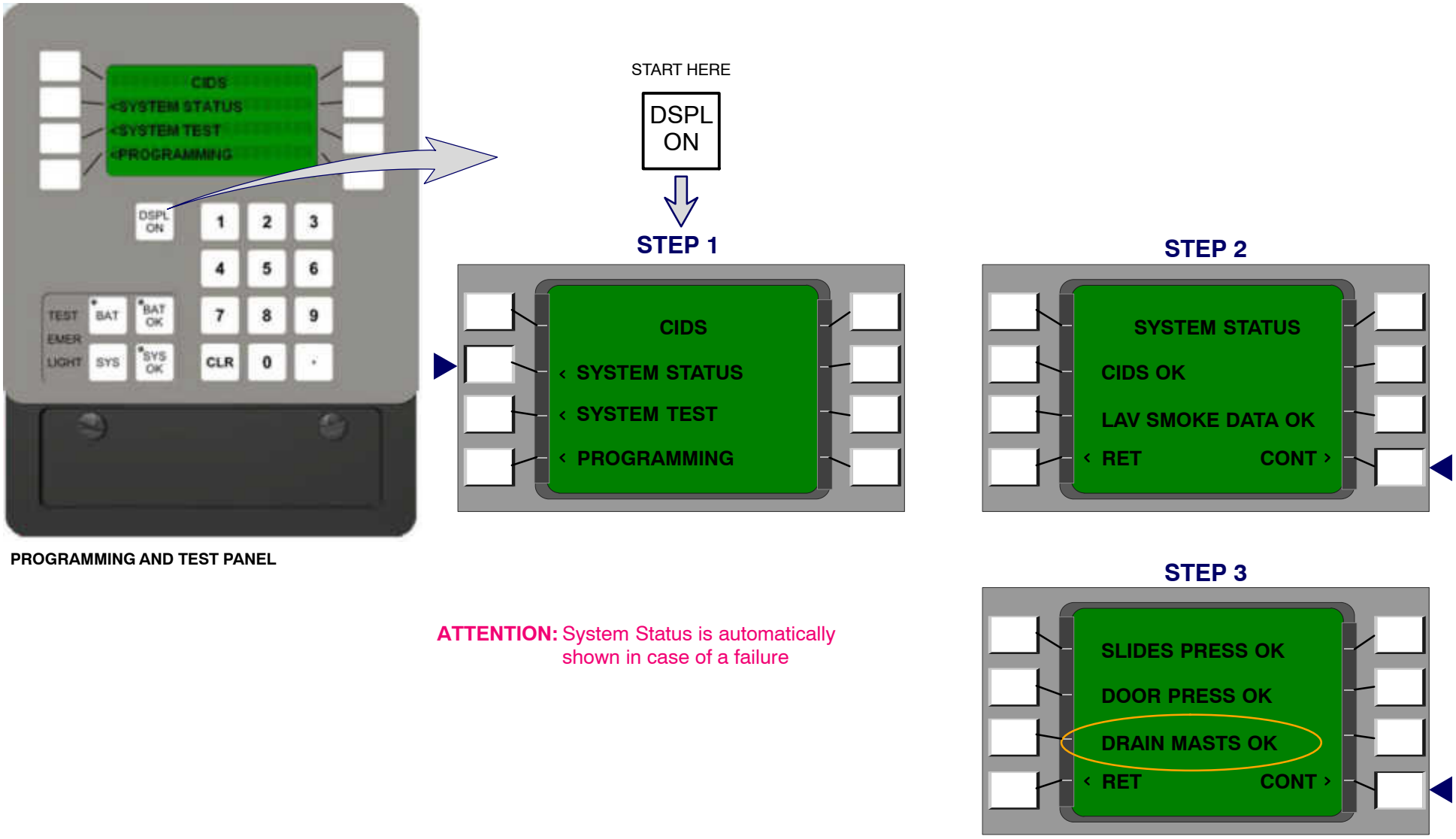
The SLIDES STS menu is to display the status of the A/C slides (armed or disarmed).

For use by the maintenance/cabin crew, the status of the following systems is also monitored:

- Lavatory Smoke Detection
- Slides Bottle Pressure
- Doors Bottle Pressure
- **Drainmasts (According the WATER/WASTE SYSTEM)**

After selection of SYSTEM STATUS mode, when there are no failures, the following messages are displayed on the PTP:

- CIDS OK
- LAV SMOKE DATA OK
- SLIDES PRESS OK
- DOORS PRESS OK
- **DRAINMASTS OK (According the WATER/WASTE SYSTEM)**



PROGRAMMING AND TEST PANEL

ATTENTION: System Status is automatically shown in case of a failure

Figure 47 CIDS Programming and Test Panel

System Status Readout (Drain Mast Fail)

Messages in case of:

<DRAINMASTS FAIL>:

CHECK WASTE WATER OVERFLOW FWD (example, the respective location is shown)

System Status Readout (Others)

ATTENTION: The System Status Readout according SLIDES (ATA 25), DOORS (ATA 52) and LAVATORY SMOKE SYSTEM (ATA 26) is described in the associated ATA Chapters.

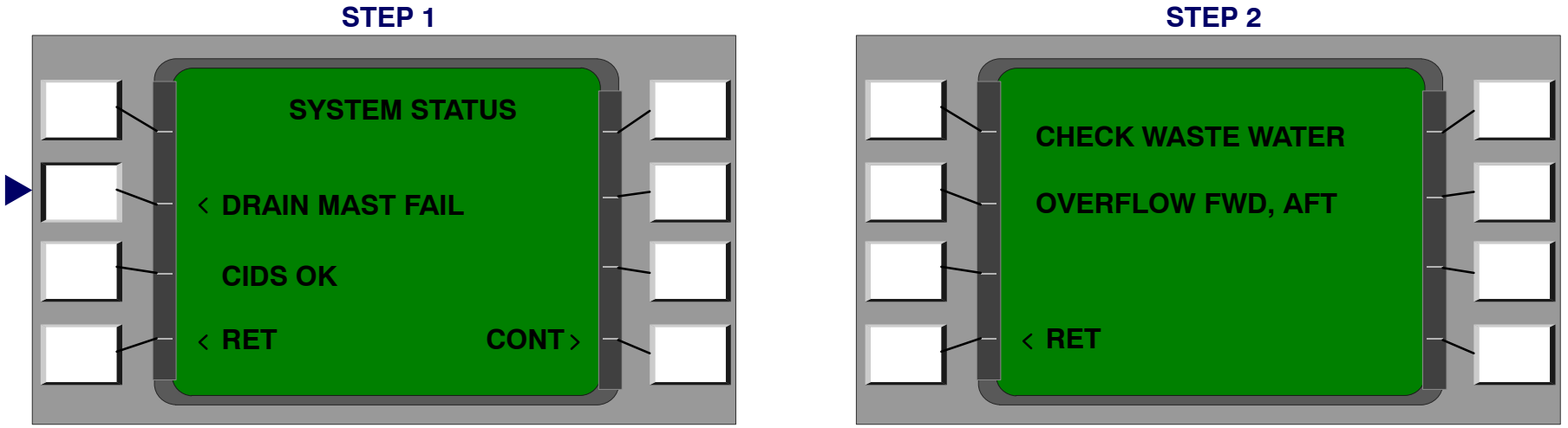


Figure 48 System Status

38-31 TOILET SYSTEM

GENERAL DESCRIPTION

The toilet system removes waste from the toilet bowl through a vacuum drain to an underfloor waste holding tank. The potable water system is used to flush the toilet bowl.

At high altitude, the differential pressure between the cabin and the atmosphere moves waste from the toilet bowl into the waste holding tank.

At low level altitude, a vacuum generator is used to obtain the necessary differential pressure.

During ground service, the waste holding tank is emptied, cleaned and filled with a prescribed quantity of sanitary fluid.

Flush Rinse Control

A Flush Control Unit per toilet controls the flush and rinse cycle as soon as the flush switch is pressed in.

Vacuum Control

Depending on the differential pressure, a VSC (**V**acuum **S**ystem **C**ontroller) automatically operates a vacuum generator.

The vacuum system controller monitors the operation of the flush control system and the waste holding tank level.

Flush Cycle Sequence

The time and sequence of the different components is controlled through the FCU (**F**lush **C**ontrol **U**nit), which controls the toilet flush cycle. The FCU BITE monitors the water valve, flush valve and internal control circuitry. If a fault is detected, it is transmitted to the VSC (**V**acuum **S**ystem **C**ontroller).

The flush cycle starts when you push the flush switch and the FCU starts the flush sequence as follows:

- the inhibit mode checks the system and inhibits the next flush cycle of the other toilets for approximate 15 seconds,
- the vacuum generator starts to operate after the operation of the flush switch, and stays on for approximate 15 seconds,
- the water valve opens 1 second after operation of the flush switch and stays open for one second. In this time the toilet bowl is rinsed.
- the flush valve opens 2 seconds after operation of the flush switch and it stays open for 4 seconds.

The differential pressure now moves the waste from the toilet bowl to the waste holding tank. Above 4877 +0 –0 m (16000.94 +0.00 –0.00 ft.) altitude, the flush cycle will stay the same. But the vacuum system controller will remove the electrical power from the vacuum generator and stop the generator operation.

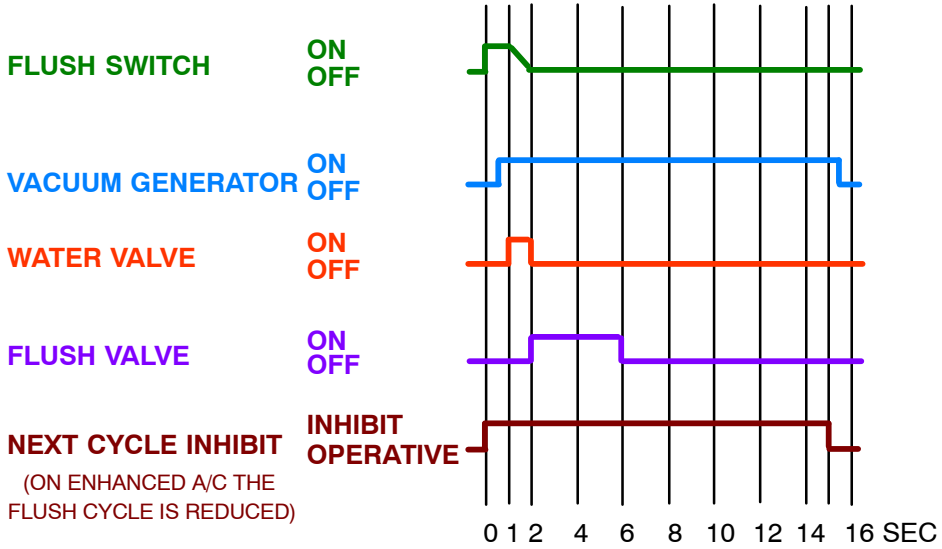


Figure 49 FCU Flush Cycle (All A/C))

The following parts are monitored by CFDS:

- Liquid Level Sensor and Liquid Level Transmitter
- Vacuum Generator
- Vacuum System Controller
- Altitude Pressure Switch
- Flush Switch
- FCU (**F**lush **C**ontrol **U**nit)

ATTENTION: On the A/C with enhanced Technology, the VSC function is integrated into the CIDS (**C**abin **I**ntercommunication **D**ata **S**ystem) director, the altitude data come from CPC (**C**abin **P**ressure **C**ontroller) via the SDAC (**S**ystem **D**ata **A**cquisition **C**oncentrator).

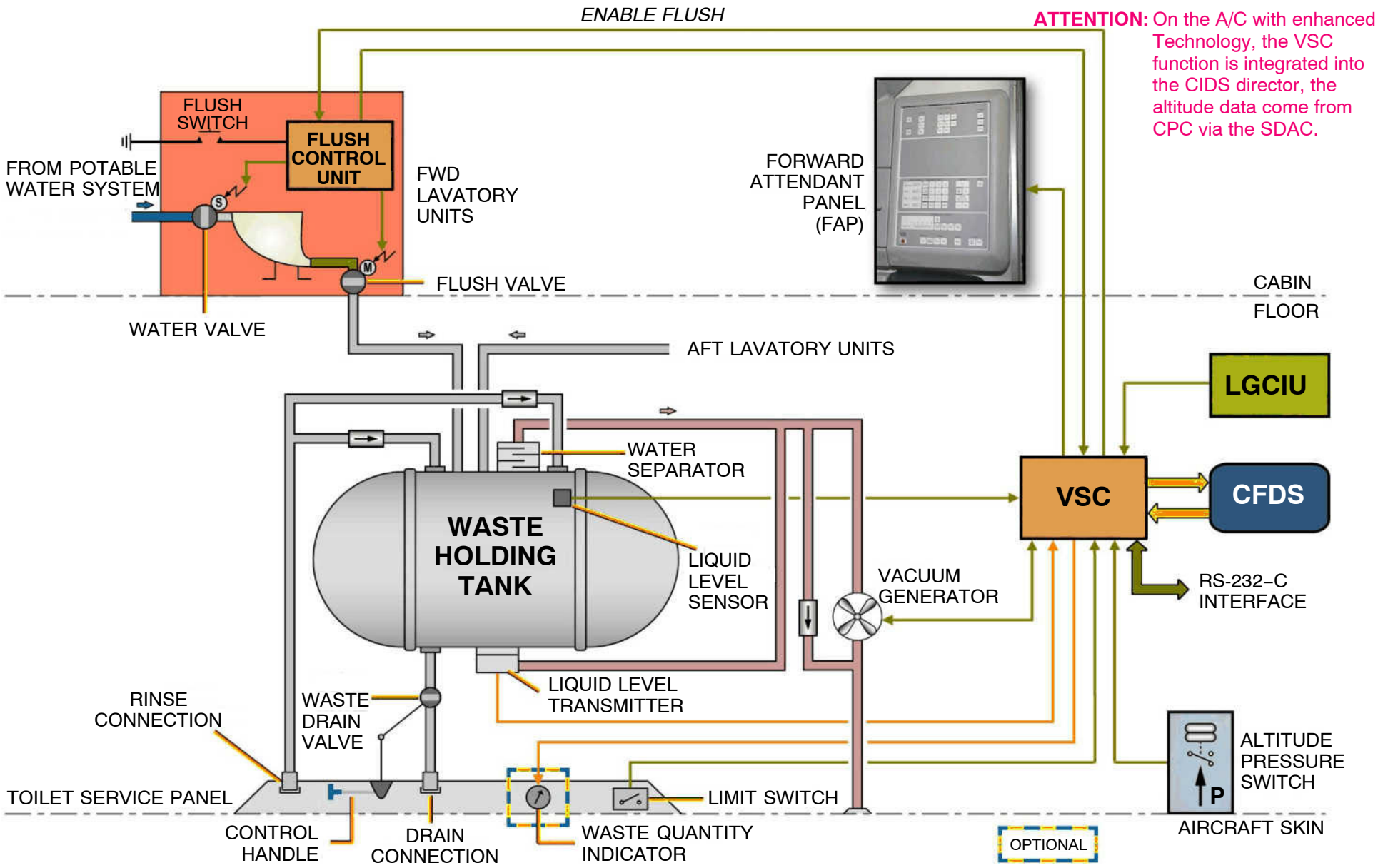


Figure 50 Toilet System Schematic (All A/C)

TOILET ASSY COMPONENT DESCRIPTION (ALL)

EACH TOILET ASSEMBLY HAS:

- a bowl and spray ring,
- a water (rinse) valve
- an anti–syphon valve,
- a flush valve,
- a manual waste shutoff valve,
- a flush control unit,
- a supporting frame.

Bowl and Spray Ring

The bowl is made of stainless–steel and has a nonstick coating applied to its inside surface. The spray ring is attached to the top of the bowl and connected to the anti–syphon valve.

Water (Rinse) Valve

The water (rinse) valve is solenoid controlled and is connected electrically to the flush control unit. It has a fitting for the aircraft system interface and a strainer. The outlet of the valve is connected to the anti–syphon valve.

Anti–Syphon Valve

The anti–syphon valve is installed above the toilet bowl and is connected to the water valve and the spray ring. It permits water to flow only in the direction of the spray ring and returns any back–water to the bowl.

Flush Valve

The flush valve is a motor–actuated self–contained unit. A duct connects the flush valve to the toilet bowl. The flush valve housing is a stainless–steel investment casting. Waste flows through a 2.0 in. (50.7999 mm) dia. moulded and reinforced elastomer tube. The tube is fully open during the flush cycle.

A motor–actuated pinch–knife closes and seals the tube between the flush cycles. The flush control unit controls the flush valve operation.

A manual waste shutoff valve is installed on the downstream side of the flush valve.

Manual Waste Shutoff Valve

The MWV (**M**anual **W**aste shutoff **V**alve) is installed on the downstream side of the flush valve. It is a back–up system to shutoff the flush line in case of a flush valve failure in the open position.

A handle accessible from the front of the toilet assembly activates the sliding mechanism inside the shutoff valve.

Flush Control Unit

The flush control unit is an electronic assembly installed on the supporting frame of the toilet assembly.

It is connected electrically to the:

- flush switch,
- water (rinse) valve,
- flush valve,
- vacuum system controller.

The unit controls the time and sequence of the toilet operation during the flush cycle. BITE (**B**uilt **I**n **T**est **E**quipment), monitors the operation of the water valve, flush valve and its internal control board circuitry. Faults are transmitted to the vacuum system controller.

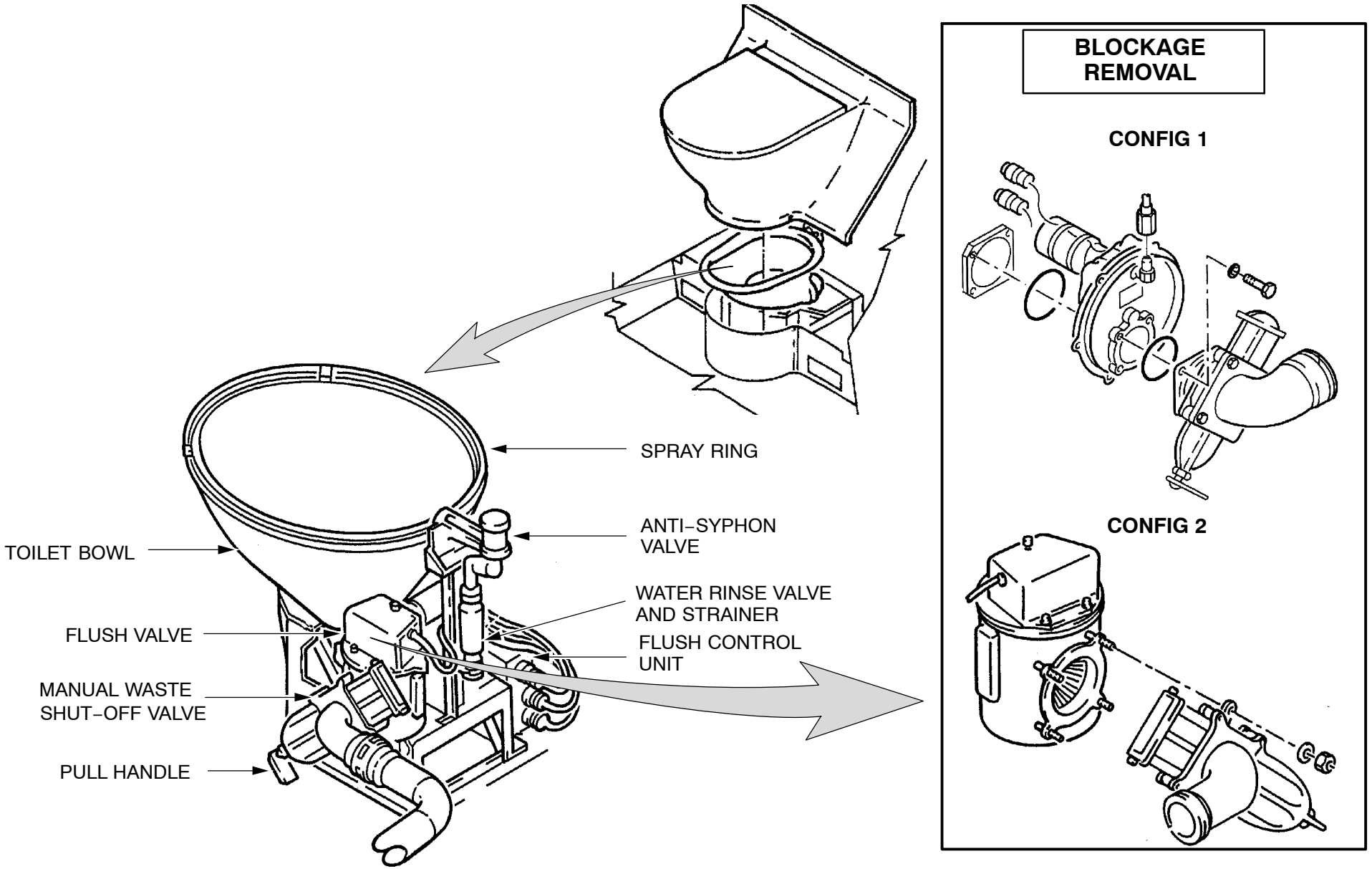


Figure 51 Toilet Assy (All)

WASTE LEVEL INDICATION (NON ENHANCED)

Liquid Level Transmitter 40MG

The LLT (**L**iquid **L**evel **T**ransmitter) gives the waste content level of the waste holding tank from empty to full. It measures the hydrostatic pressure of the tank contents.

The LLT is connected electrically to the VSC. It gives the VSC an analog signal for the waste content of the tank. The VSC calculates and transmits the signal to the FAP (**F**orward **A**ttendants **P**anel) for waste quantity indication.

Liquid Level Sensor 41MG

The LLS (**L**iquid **L**evel **S**ensor) is an ultrasonic type sensor it is connected electrically to the VSC. When the waste holding tank content level is at full, the LLS sends a signal to the VSC.

When the VSC receives a tank full signal, (from the LLS) it shuts down the toilet systems and the SYS INOP legend on FAP comes on. Under normal operation the LLS has the priority to transmit tank full to the VSC.

NOTE: The liquid level sensor operates independently of the liquid level transmitter.

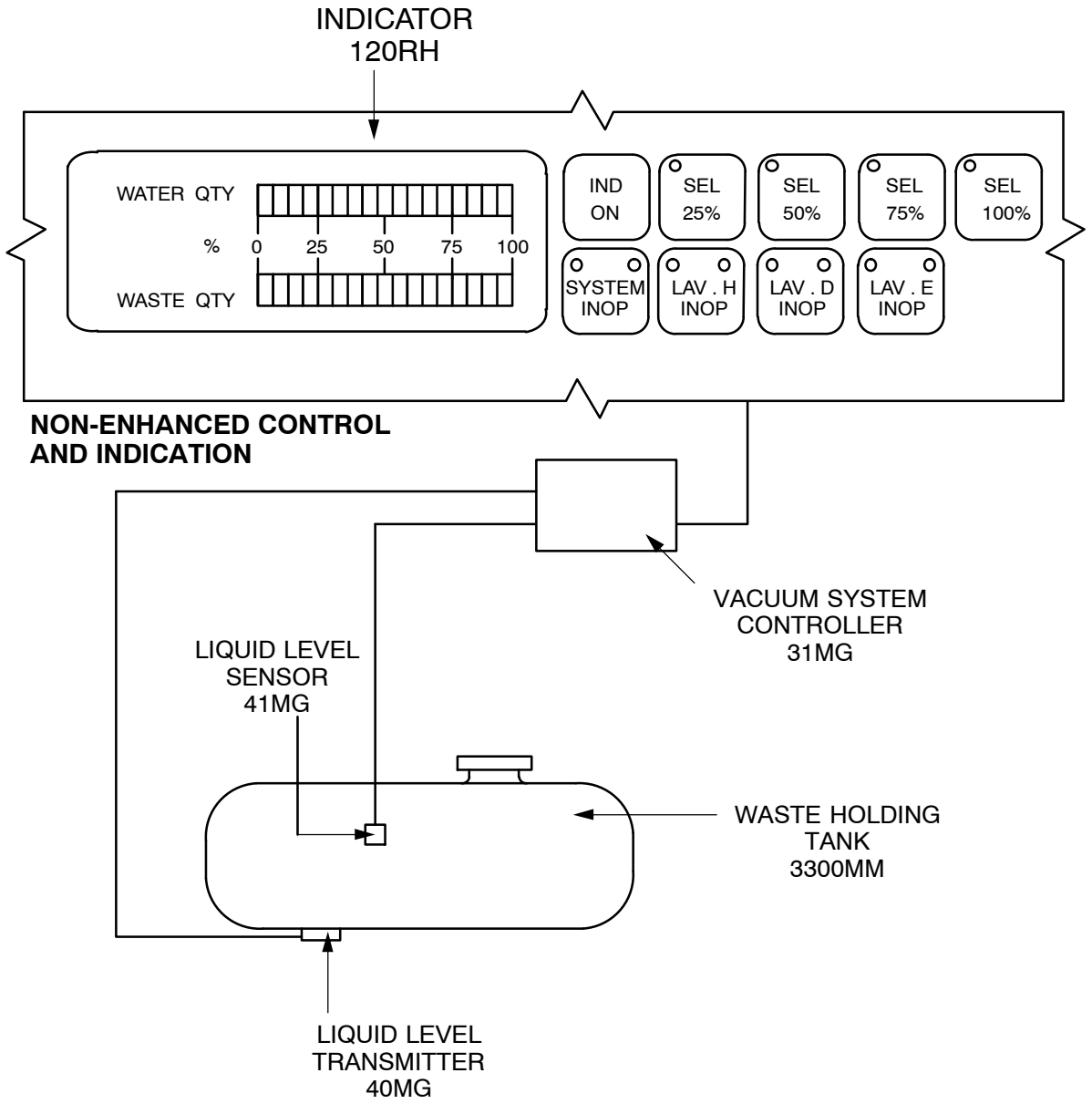


Figure 52 Waste Level Indication

VSC CFDS SYSTEM REPORT/TEST (ALL)

Monitoring

The VSC has a BITE (**B**uilt–**I**n **T**est **E**quipment) which operates in two modes:

- the power–up test,
- the continuous monitoring test

It monitors if the following external system circuits function correctly:

- the flush control units,
- the liquid level transmitter 40MG,
- the altitude pressure switch 43MG,
- the differential pressure transducer 42MG,
- the vacuum generator 37MG,
- the liquid level sensor 41MG,
- the aircraft power supply 115 V AC (400 Hz).

Menu Mode:

When requested (during line maintenance) the VSC will first transmit the menu as follows:

- TOILET SYS
- < LAST LEG REPORT >
- < PREVIOUS LEGS REPORT >
- < LRU IDENTIFICATION >
- < RETURN PRINT >

If the operator selects an item of the menu, the VSC will transmit the data to the CFDS.

- Last Leg Report
  - the DATE and GMT (**G**reenwich **M**ean **T**ime) at which each fault occured,
  - the identity of each faulty LRU, their related SRU, and the ATA chapter reference.
- Previous Legs Report

  The PREVIOUS LEGS REPORT contains:
  - the aircraft identification,
  - the DATE, GMT and flight leg count at which each fault occured,
  - the identity of each faulty LRU, their related SRU and the ATA chapter reference.

LRU Identification

The LRU identification contains the part number of the VSC.

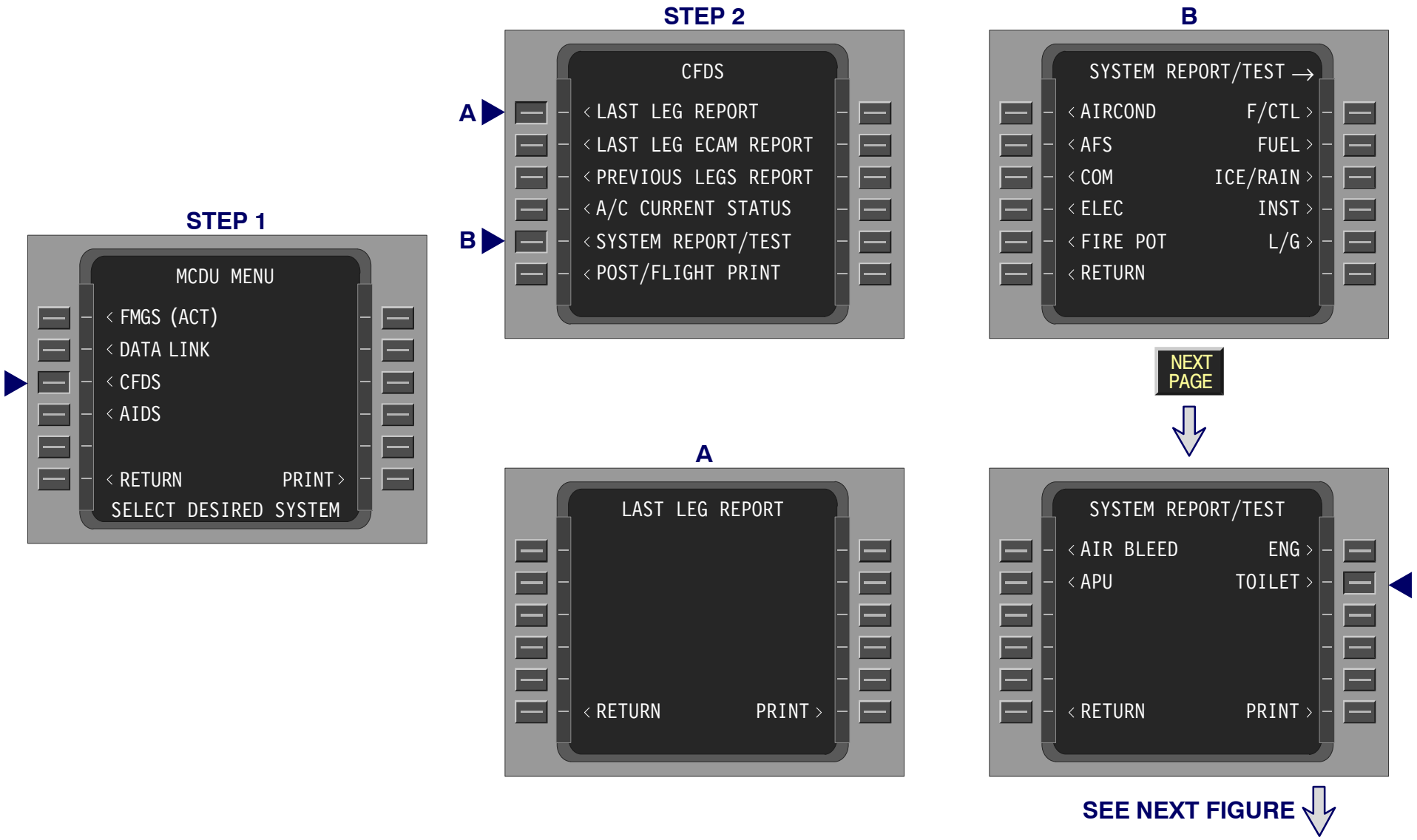


Figure 53 CFDS System Report/Test VSC (1) (All)

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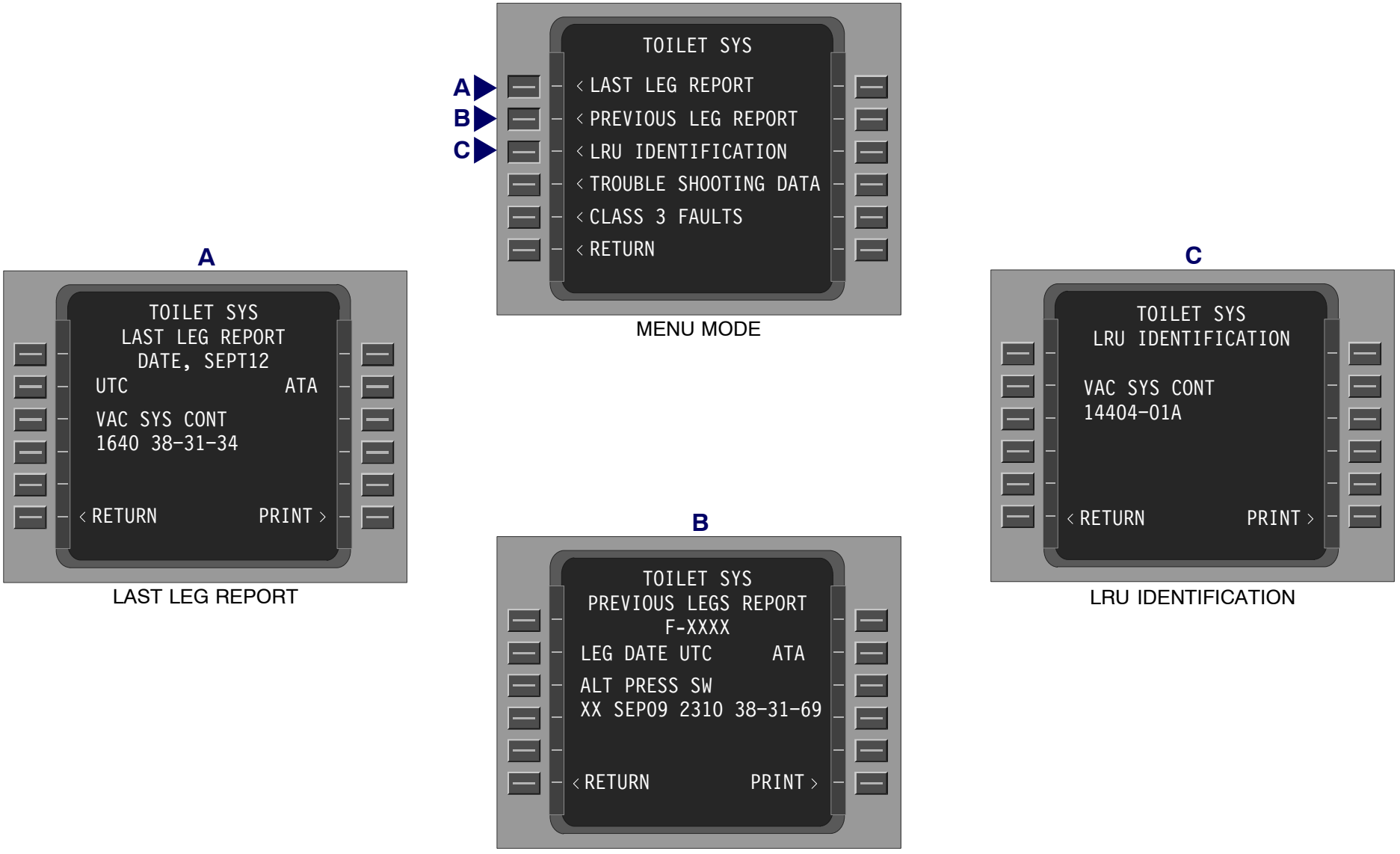


Figure 54 CFDS System Report/Test VSC (2) (All)

Vacuum System Controller Functional Operation

The VSC (**V**acuum **S**ystem **C**ontroller) is installed on the right of the lower section of the fuselage between FR62 and FR63. The VSC is connected electrically to the aircraft power circuit and electrical interfaces of the:

- flush control unit(s),
- liquid level transmitter,
- liquid level sensor,
- altitude pressure switch,
- differential pressure transducer,
- CFDS (**C**entralized **F**ault **D**isplay **S**ystem) via ARINC 429 data bus.

The VSC functions are:

- system control and monitoring,
- fault reporting.

The VSC calculates and transmits signals to the FAP to indicate the waste tank levels and reports system defects. The VSC memorizes and also signals the system defects to the ARINC 429 data bus which is connected to the CFDS. Defect signals are also sent to a RS 232–C interface for ground maintenance and inspection.

Normal Operation

When the VSC receives a signal from a FCU:

- it stops the operation of all other FCUs,
- it makes an analysis of the altitude pressure switch indication,
- it starts the vacuum generator if the altitude pressure switch gives a signal low (below 4877 m (16000.94 ft.)),
- it cuts the power to the vacuum generator if the altitude pressure switch gives a signal high (above 4877 m (16000 ft.)),
- it examines for defects in the aircraft power supply 115 V/400 Hz,
- it examines continuously the vacuum generator for overheat signals during the flush cycle if there is no 115 V/400 Hz defect.

The VSC calculates and transmits the signal to the FAP to show the level of the waste in the waste holding tank.

When the limit switch on the waste service panel indicates OPEN panel and LG (**L**anding **G**ear) signal indicates GROUND position (LG strut compressed):

- the VSC stops all toilet operations and the flush signals are ignored,
- the SYS INOP light on the FAP is switched on.

If the LG signal indicates Flight and the waste service panel is open the system will not be disable and it will be able to flush the toilets while the servicing is done.

The VSC will not react on a single LG fault, because the VSC BITE does not control the LG signal.

Failure Mode

The VSC transmits the system defects to the ARINC 429 data bus. The VSC memorizes the following defect signals for ground maintenance and inspection.

- Flush control unit defect:
  - all corresponding toilet operations are stopped and the defective LAV INOP legend on the FAP comes on.
- 115 V AC power supply shutdown (no signal input for at least one second):
  - the toilet which is in the flush cycle will stop and the VSC will indicate system INOP on the FAP,
  - the VSC will start normal operation again when the power supply has returned for at least 1 second.

The VSC will transmit and keep the defect data but the system will operate normally if the LLS indicates a full tank and the LLT does not (current signal 17.6 mA)

The VSC will stop the system operation and the SYS INOP legend on the FAP comes on if the LLT indicates a full tank and the LLS does not.

The VSC will stop the system operation and the SYS INOP legend on the FAP comes on if:

- the LG falsely indicate GROUND (LG down and strut compressed),
- the service panel door falsely indicates door OPEN when the aircraft is in flight.

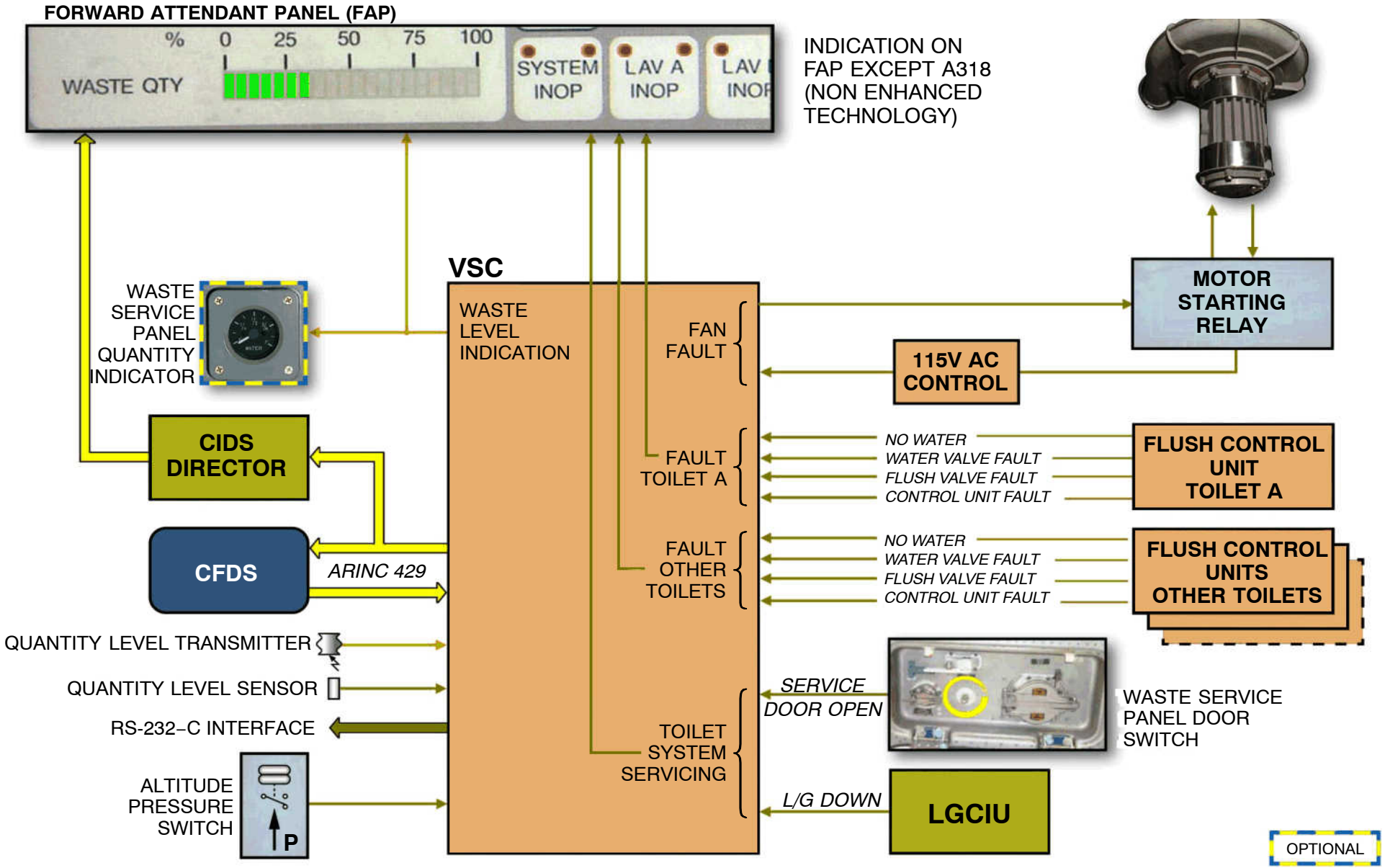


Figure 55 Vacuum System Controller (All)

WASTE HOLDING TANK SYSTEM DESCRIPTION (ALL)

The waste holding tank is installed on the right of the aircraft under the floor between FR65 and FR68.

The tank has:

- a water separator,
- a liquid level transmitter,
- a liquid level sensor,
- the waste inlets,
- a waste outlet,
- two rinse connections.

The tank is a filament wound cylindrical vessel with a toilet waste capacity of 170 l (45.0 USgal).

1 Water Separator 3302MM

2 Liquid Level Transmitter 40MG

The LLT (**L**iquid **L**evel **T**ransmitter) is installed in the bottom of the waste holding tank. It monitors the contents level in the waste holding tank and sends a analogous signal to the VSC (**V**acuum **S**ystem **C**ontroller).

3 Liquid Level Sensor 41MG

The LLS (**L**iquid **L**evel **S**ensor) is installed in the upper section of the waste holding tank. It sends a signal to the VSC (**V**acuum **S**ystem **C**ontroller) when the tank is full. The VSC prevents further toilet flush operation.

4 Vacuum Generator 37MG

The vacuum generator is installed on the right of the aircraft under the floor between FR68 and FR69. It is a self–contained centrifugal unit with thermal overload protection. The generator air inlet is connected to the water–separator air–outlet. The generator air outlet is connected to the aircraft overboard ventilation. The generator gives the necessary differential pressure in the waste tank to move the waste from the bowl to the tank. The vacuum generator is electrically connected to the aircraft power–circuit.

5 Waste Drain Valve 3340MM

The waste drain valve is installed in the waste holding tank drain line. It is a ball type manually operated shutoff valve.

6 Check Valve 3320MM (Vacuum pressure)

The check valve is installed in the waste holding tank air outlet–line and parallel to the vacuum generator line. It lets air flow from the tank to the overboard vent line and stops opposite airflow.

7 Differential Pressure Transducer 42MG

The differential pressure transducer is installed in the waste line downstream of the flush valves, between the toilet and waste tank. The transducer is connected electrically to the vacuum system controller. It measures the differential pressure between the waste line and the cabin.

8 Altitude Pressure Switch 43MG

The altitude pressure switch is installed between FR71 and FR72. The switch is connected electrically to the VSC (**V**acuum **S**ystem **C**ontroller).

It gives an electrical signal to the VSC which starts or stops the operation of the vacuum generator.

9 Check Valve 3322MM (tank rinse line)

The check valve is installed in the rinse line of the waste holding tank. It lets water flow in one direction only.

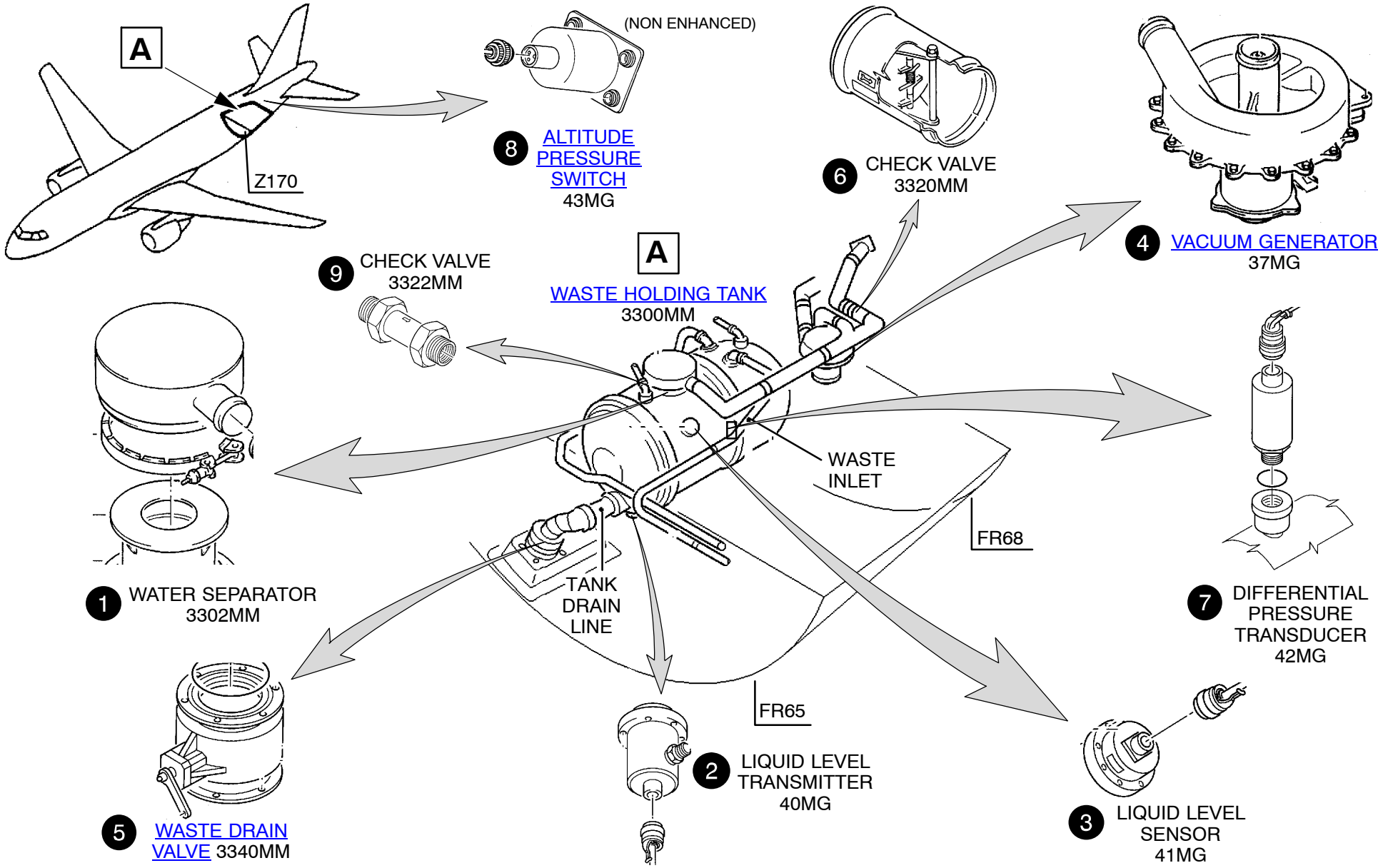


Figure 56 Waste Holding Tank and Components (All)

TOILET SYSTEM SERVICING (ALL)

ATTENTION: The following example is for information only and without obligation!

DRAIN, FLUSH AND FILLING PROCEDURE

System Drain

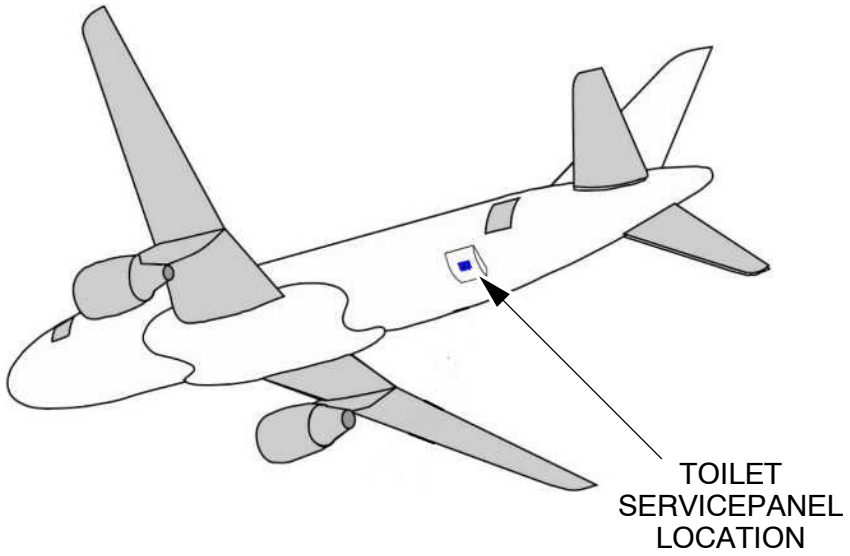
- Open the service panel access door.
  - The service panel micro switch stops all toilet operations and the flush signals are ignored. All toilets are disabled and the SYSTEM INOP light on the forward attendant panel is switched on.
- Open the caps of the toilet drain connection and the fill and rinse connection.
- Connect the drain hose to the toilet drain connector.
- Turn the lever **(1)** of the TACO valve flap to the OPEN position.
- Pull the drain valve control handle from the NORMAL to the DRAIN position.
- Connect the fill and rinse hose to the fill and rinse connection.

System Flush

- Flush the toilet system until it is clean.
  - Water pressure 35 psi
  - Water flow rate 38 l/min.
- Push the drain valve control handle to the NORMAL position.
- Turn the lever **(2)** to the closed position.
- To latch the TACO valve flap, hold the lever **(2)** in the CLOSED position and momentarily push the lever **(1)** in the OPEN direction and then to the direction opposite the OPEN arrow.
- Disconnect the drain hose.

System Fill

- Fill the waste holding tank with 13.5 l. of disinfectant fluid.
- Disconnect the fill and rinse hose.
- Close the caps of the drain and the fill and rinse connections and close the access door.



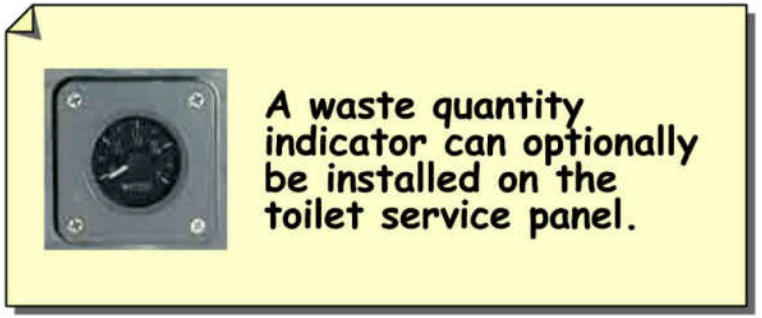


Figure 57 Toilet Service Panel Location (All)

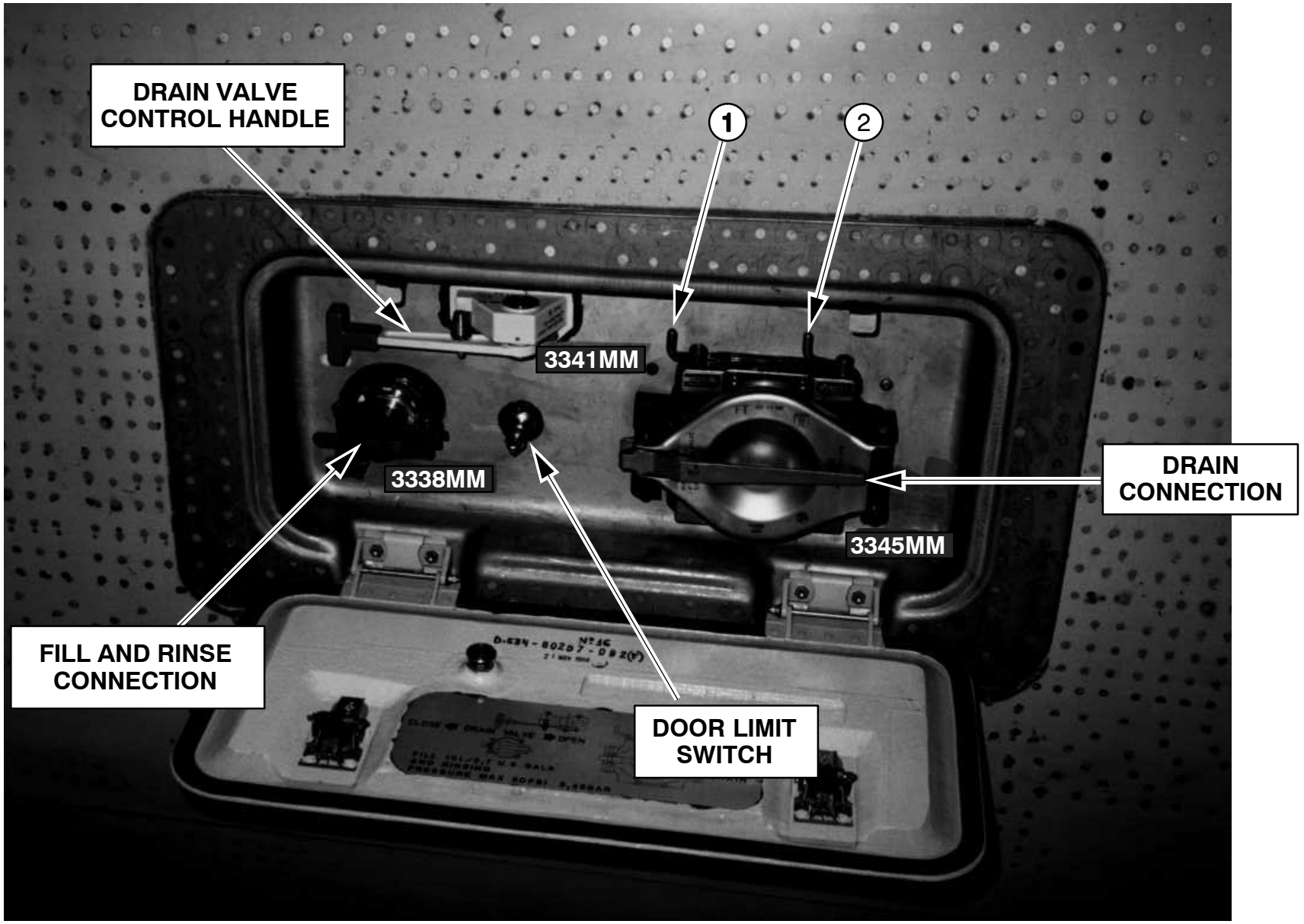


Figure 58 Toilet Service Panel (All)

38–10 POTABLE

WATER SYSTEM PRESENTATION (ENHANCED)

Differences to Non-enhanced

The main difference is in the quantity indication.

On the enhanced A/C, the water quantity transmitter sends the information to a DEU (**D**ecoder/**E**ncoder **U**nit) B which in turn interfaces with the active CIDS (**C**abin **I**ntercommunication **D**ata **S**ystem) director. Potable water quantity is displayed on the new FAP (**F**light **A**ttendant **P**anel).

The service door OPEN information is still sent to the FAP, but through a DEU B and the active CIDS director.

ATTENTION: The A320 Water Tank is still located behind the FWD Cargo Compartment.

The Tank Drain and Overflow valve is a separate panel on the A320.

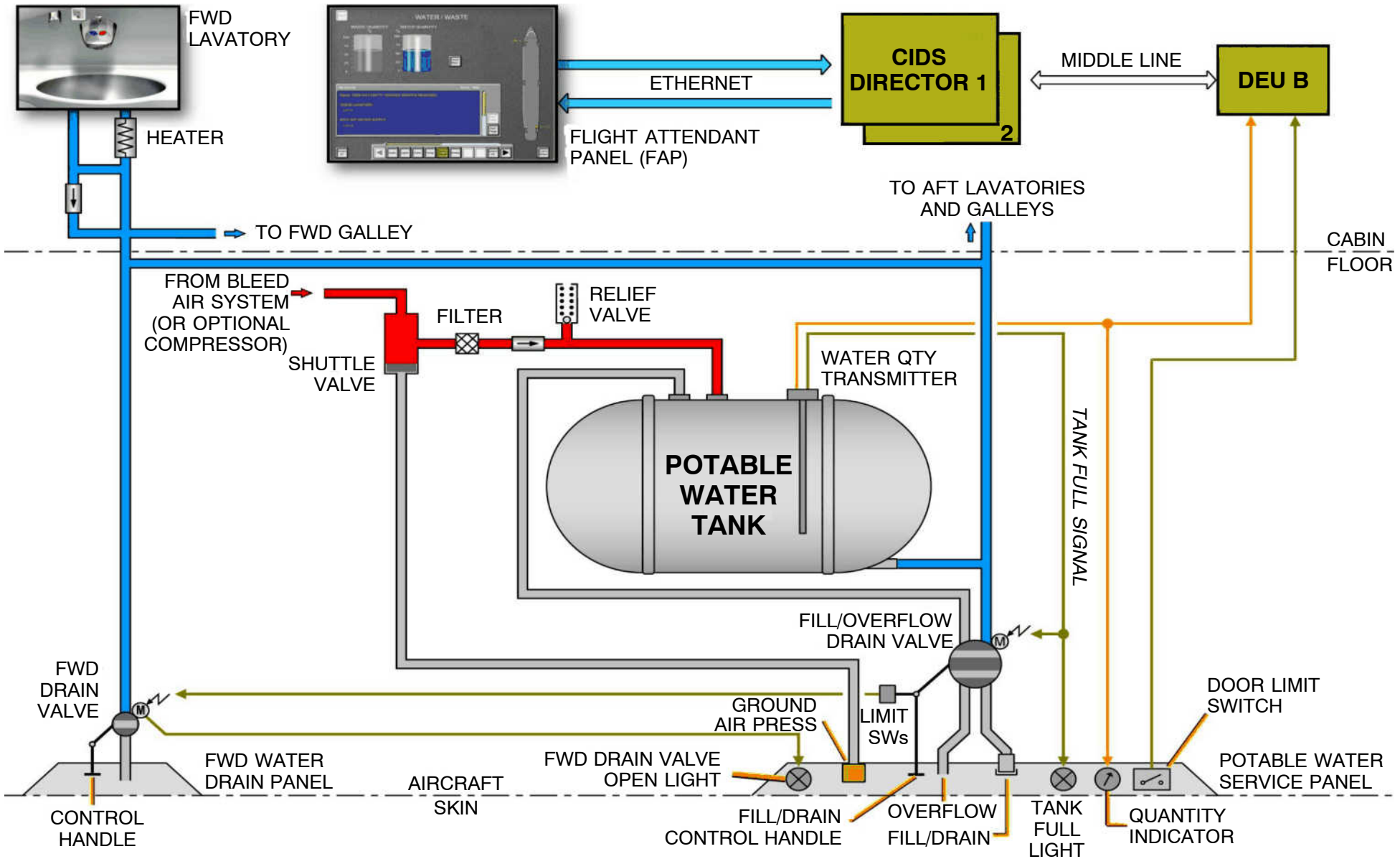


Figure 59 Potable Water System Basic Schematic (enhanced)

38–31 TOILET SYSTEM

PRESENTATION (ENHANCED)

TOILET SYSTEM DIFFERENCES TO NON-ENHANCED

Vacuum System Controller

On the A320, the VSC (**V**acuum **S**ystem **C**ontroller) controls and monitors the vacuum system and sends information directly to the Forward Attendant Panel. The VSC interfaces with other aircraft systems.

Cabin Intercommunication Data System

On the A318 or A/C with enhanced Technology, the VSC function is integrated into the CIDS (**C**abin **I**ntercommunication **D**ata **S**ystem) director, the altitude data come from CPC (**C**abin **P**ressure **C**ontroller) via the SDAC (**S**ystem **D**ata **A**cquisition **C**oncentrator).

Door switch information is send to the CIDS director via DEU (**D**ecoder/**E**ncoder **U**nit) B.

A new FAP (**F**light **A**ttendant **P**anel) displays information.

SYSTEM DESCRIPTION AND OPERATION

Waste system data is received by DEU–Bs and sent to the CIDS directors. This system is controlled by the VSCF (**V**acuum **S**ystem **C**ontroller **F**unction) which is integrated inside the CIDS director.

The user interface and system display is on the FAP.

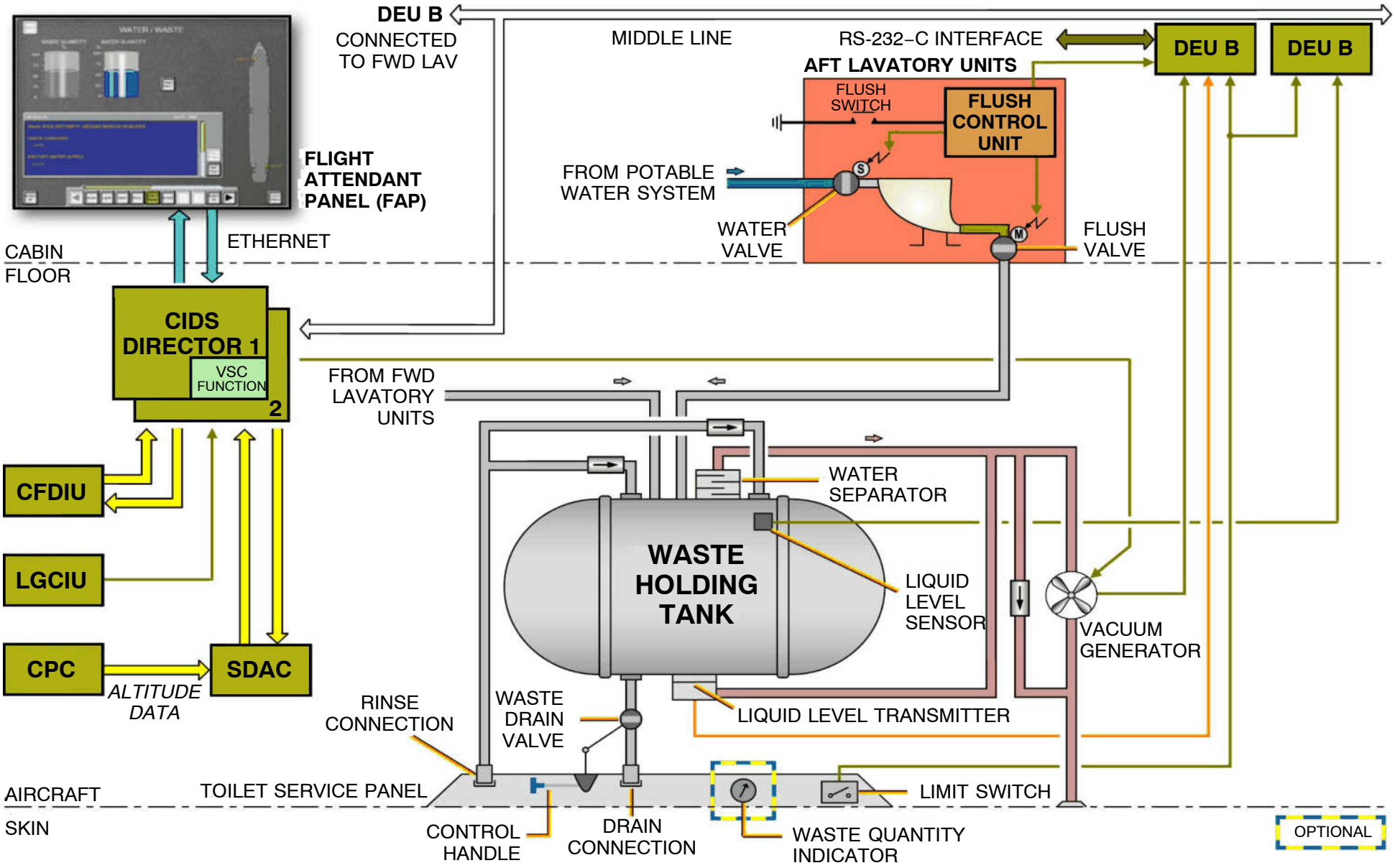


Figure 60 Toilet System Schematic (enhanced)

ATA 23 COMMUNICATIONS

23-73 CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS)

FAP INTRODUCTION (ENHANCED TECHNOLOGY)

FAP Water/Waste Page

The FAP WATER/WASTE page appears by selecting the dedicated key on the tool bar.

It can also appear automatically when the water service door is open or when there is a fault in the system. This page gives information about the water and waste system.

The WATER/WASTE page has:

- On the aircraft symbol, the location of the lavatory is shown either activated with a gray square or de–activated with an amber square and its associated name. A lavatory is de–activated when the Flush Control Unit is inoperative.

  An amber cross is displayed on the square in case of no communication with the Flush Control Unit.
- A messages list box will be shown, if there are any messages for the water/waste system.
- A potable water tank and a waste water tank symbol, which also display liquid level as a percentage.
- A RESET WARN pushbutton to be used in the case of a rinse valve failure. All visual warnings are reset by this button (ACP, AIP, and LAV CALL LIGHT).

Figure 61 Water/Waste Page (All)

38–31 TOILET SYSTEM

TOILET SYSTEM BITE/TEST (ENHANCED TECHNOLOGY)

MCDU Toilet Pages

Selecting the TOILET line key on the SYSTEM REPORT/TEST page does not give access to the TOILET SYSTEM page anymore.

This gives access to the CIDS 1 (or 2) TOILET SYStem page.

Available information is almost the same.

The LRU IDENTIFICATION page shows the CIDS director identification.

The new STATUS page displays the status of the toilet system.

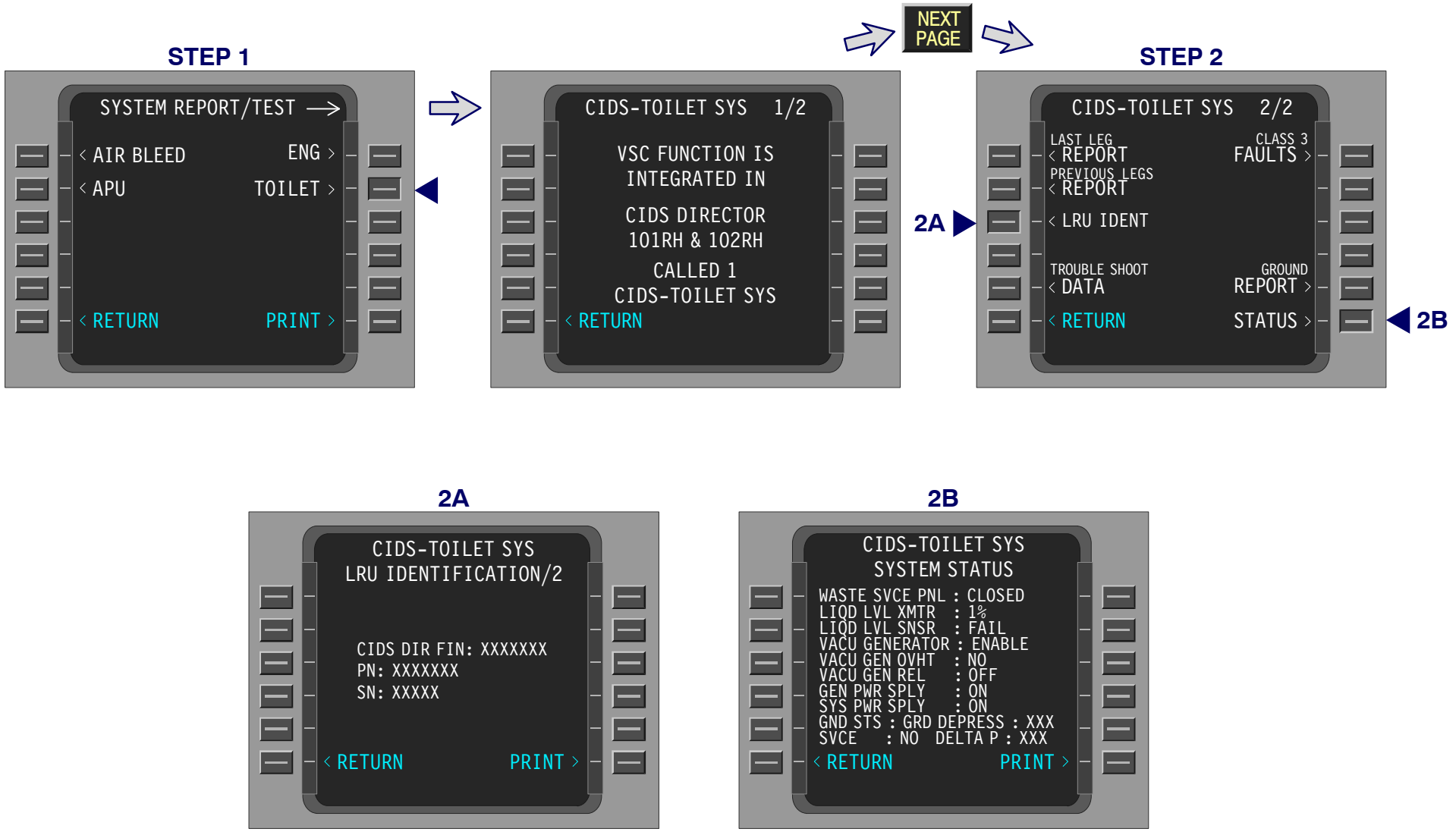


Figure 62 MCDU TOILET Page (Enhanced Technology)

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