

A350
TECHNICAL TRAINING MANUAL
MAINTENANCE COURSE - T1+T2 - RR Trent XWB
Water/Waste

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WATER/WASTE

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POTABLE WATER SYSTEM DESCRIPTION (2/3)

General System Philosophy

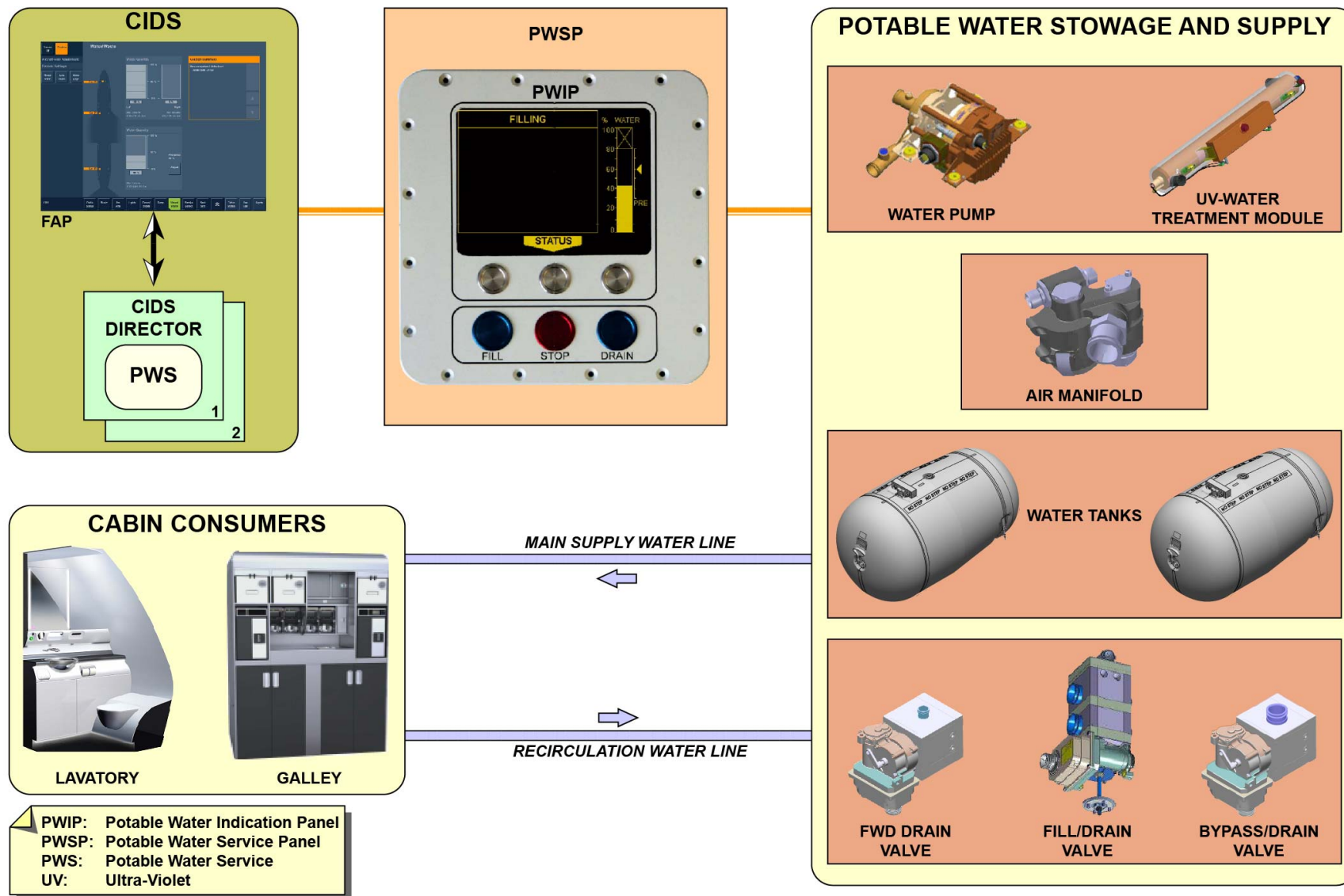
The Potable Water System (PWS) is based on a centralized system architecture with components for the water storage, pressurization and distribution. These components are used for the water cabin consumers:

- Galleys
- Lavatories.

The Human-Machine Interface (HMI) for the servicing/ground handling, maintenance operations and cabin crew interaction with the PWS is installed at the stations that follow:

- Potable Water Service Panel (PWSP) and its Potable Water Indication Panel (PWIP)
- CIDS/FAP (cabin crew interface), through the PWS function hosted in the CIDS.

The PWS control, monitoring and communication use a single system Controller Area Network (CAN) bus and the distributed logic (intelligence) of its smart components. The PWS supplies water under pressure and keeps a hygienically water quality, during the system filling and during the ground/flight distribution.



GENERAL SYSTEM PHILOSOPHY

POTABLE WATER SYSTEM DESCRIPTION (2/3)

Potable Water Storage/Supply Description

Potable water storage part

Potable-water tank assemblies

Two potable-water tank assemblies are installed side by side in a horizontal position aft of the bulk cargo compartment.

The potable-water storage capacity of the A/C extends from the baseline volume of (1060 liters) to an optionally extended volume of (1500 liters).

Each tank has:

- A recirculation port
- An overflow/vent port
- A water outlet port
- A capacitive dip stick, associated with a Potable-Water Quantity Transmitter (PWQT).

The dip stick measures the water level and sends a signal to its related potable-water quantity transmitter. The transmitter sends the signal to the PWIP for calculation. The level indication is available on the FAP and the PWIP.

Potable-water tank pressurization

The potable water tanks are pre-pressurized to (30 - 35 psig), by the bleed air or by ground supplied compressed air through an air manifold.

If the PWS is operated without tank pressurization available (e.g. on ground without a bleed air/ground pressure available), the pressure-controlled water pump is used as a single pressure source. If there is a failure of the water pump in flight, the bleed air is used as a single pressure source to supply the water.

Potable-water treatment module

The PWS has a water treatment module, to prevent the system contamination. The water treatment is done by water irradiation with the Ultra-Violet (UV) lights. The water goes through the water

treatment module before going to the main supply line and to the cabin consumers.

The water treatment function also prevents the microbiological contamination during tank refilling. The water tanks are filled via the fill/drain valve, the water treatment module and the bypass/drain valve.

Fill/drain valve

This valve enables the servicing functions (fill and drain) and performs the depressurization and overflow protection for the tanks. It is electrically controlled and monitored by the PWIP. By design, the PWS servicing on ground (filling and draining) operates with the electrical power only.

The valve is equipped by a manual override device, accessible directly at the PWSP. The maintenance personnel use it, as a back-up, if:

- There is a fill/drain valve failure
- The electrical power is not available during servicing.

Bypass/drain valve

This valve is installed between the water treatment module and the recirculation ports of the tanks, to bypass the potable water pump, when it is opened. The bypass/drain valve is used for two reasons:

- During filling operation, to avoid a loss of water-tanker refill pressure, flow rate and shorter-system servicing duration
- For full drainage operation of the system piping, by gravity.

It is electrically controlled and monitored by the PWIP.

The valve has a manual lever, to be opened or closed manually if:

- There is a valve failure
- No electrical power is available (manual override).

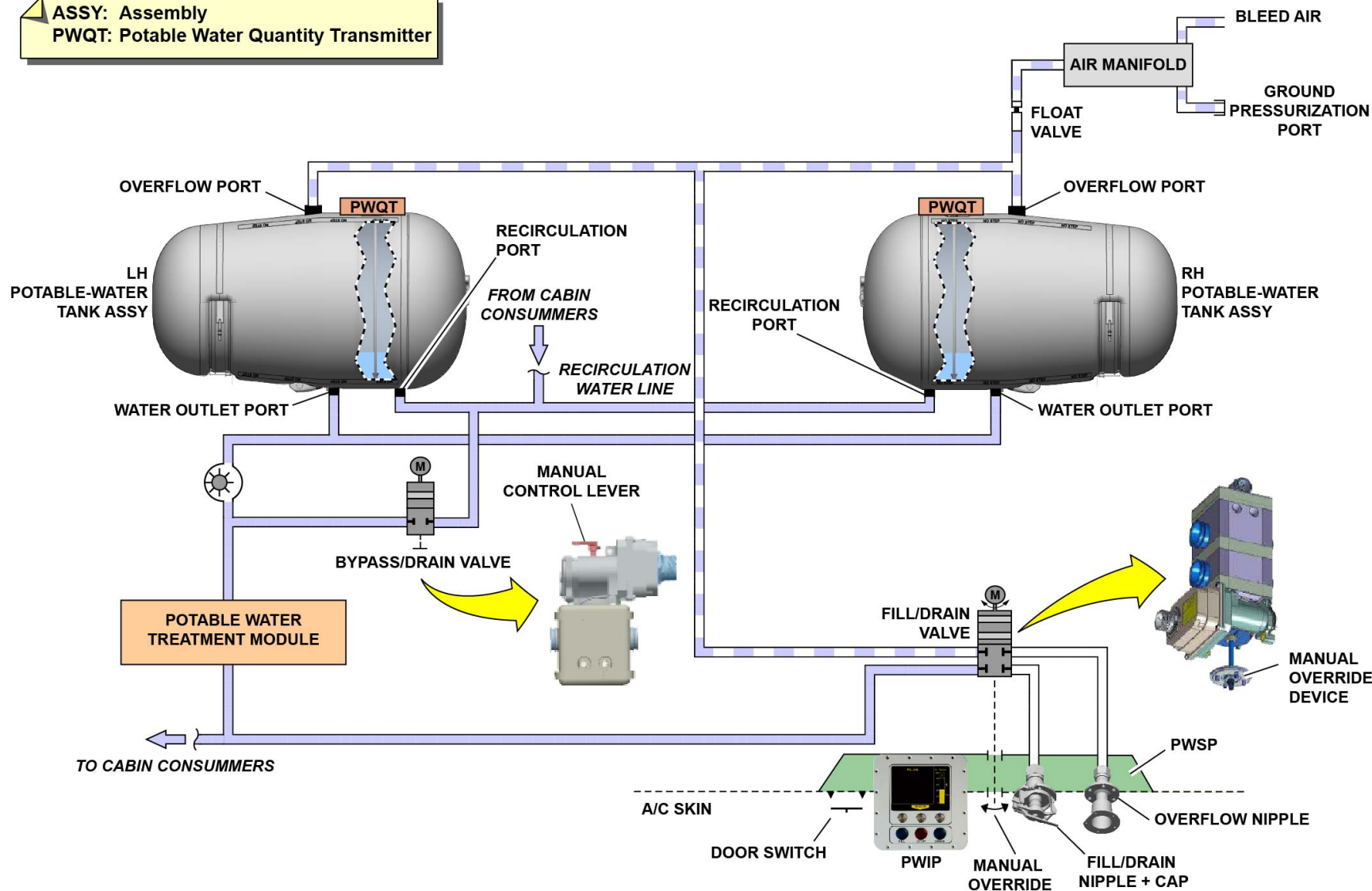
Maintenance operation is necessary to remove access panel, for this back-up action. A label shows if the valve is in the open or closed position.

Door switch

The door micro switch detects the service panel door position (open/not open). The POTABLE WATER SERVICE DOOR OPEN

message status is indicated on the FAP. This status is known by the PWIP to perform control logic for the valves.

ASSY: Assembly
PWQT: Potable Water Quantity Transmitter



POTABLE WATER STORAGE/SUPPLY DESCRIPTION - POTABLE WATER STORAGE PART

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POTABLE WATER SYSTEM DESCRIPTION (2/3)

Potable Water Storage/Supply Description (continued)

Potable water supply part

Potable water pump

The potable water pump operates as a pressure boost pump to increase the water pressure to (40 psig) (system working pressure) and to make the water circulation. It is an electrically-driven and pressure-controlled centrifugal pump.

The potable water pump continuously supplies a water circulation through the PWS main supply-lines and the recirculation lines.

FWD drain valve

The FWD drain valve is used to drain the forward PWS part by gravity. It is electrically controlled and monitored by the PWIP.

The FWD drain valve has a lever to manually open or close the valve if:

- There is a valve failure
- No electrical power is available.

A maintenance access removal is necessary for this back-up action.

A label shows if the valve is in the open or closed position.

Cabin consumers: lavatory and galley

All the cabin consumers are connected to the main water supply line, which comes from the water tanks.

A water recirculation line is installed from the FWD cabin part back to the potable water tanks. It creates a closed circuit with a continuous flow of treated water.

Cold weather package (optional)

The main depress valve is installed on the overflow line between the tanks and the overflow nipple. This valve is used for the optional depress mode, selected via the FAP and the WATER DEPRESS key. This valve bypasses the fill/drain valve, to release air pressure from the tanks on ground only. The depress mode is an optional PWS function for the A/C cold weather operation. It allows the transfer of the water from the wet monuments (lavatories and galleys) into heated

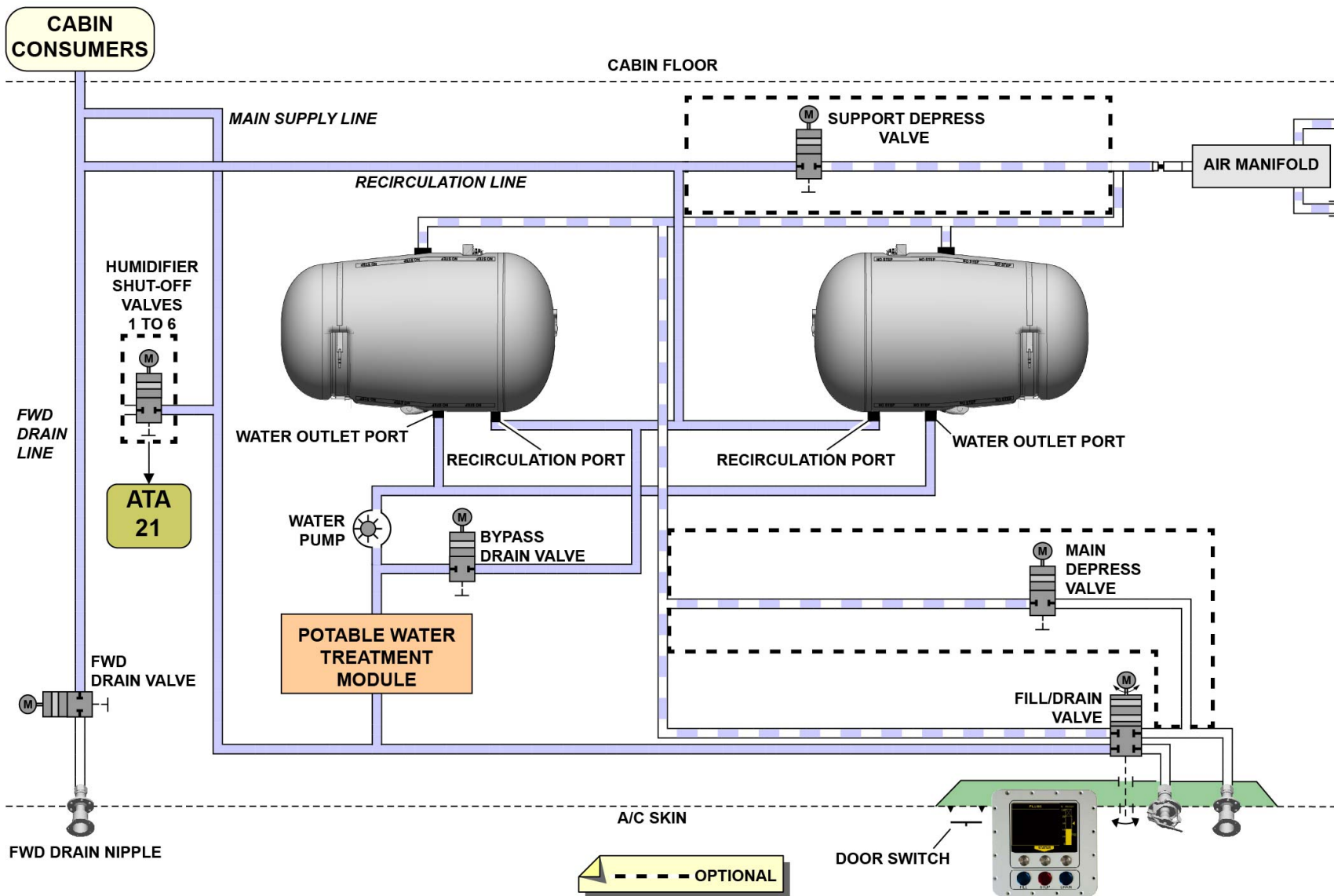
zones of the PWS, to prevent freezing. The system depressurization is necessary to transfer easily.

The support depress valve is installed between the overflow line and the recirculation line and used to vent the recirculation line. It creates easily the full drainage of FWD PWS part.

The last step will be the opening of the FWD drain valve after a fixed time delay in order to relief outboard the remaining water.

Cabin/cockpit zone humidification (optional)

A maximum of six humidifier shut-off valves supply water to the cabin/cockpit zone humidification system (ATA 21 optional).



POTABLE WATER STORAGE/SUPPLY DESCRIPTION - POTABLE WATER SUPPLY PART

POTABLE WATER SYSTEM DESCRIPTION (2/3)

Lavatory Water Supply Assembly/Galley Supply Assembly Description

The manual shut-off valve of the GWDU isolates the GWDU from the PWS if there is a leakage.

Lavatory water supply assembly

The Lavatory Water Supply Assy (LWSA) has:

- A thermostat unit
- A manual shut-off valve
- A water heater
- A washbasin with a faucet.

The manual shut-off valve isolates the lavatory from the PWS if there is a leakage. The water heater is a self-regulating heating device, which supplies hot water (50°C). In normal operation, the passenger operates the faucet to get water and changes the temperature through the pushbuttons. The thermostat control unit changes the temperature, via the pushbuttons of the faucet. The thermostat control unit also processes the infrared signal from the faucet to limit the water flow (while the hands are exposed to the infrared sensor signal or for a maximum of 45 seconds).

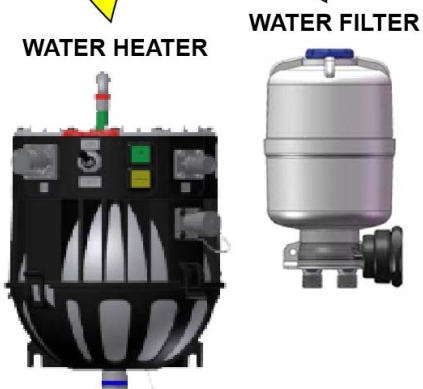
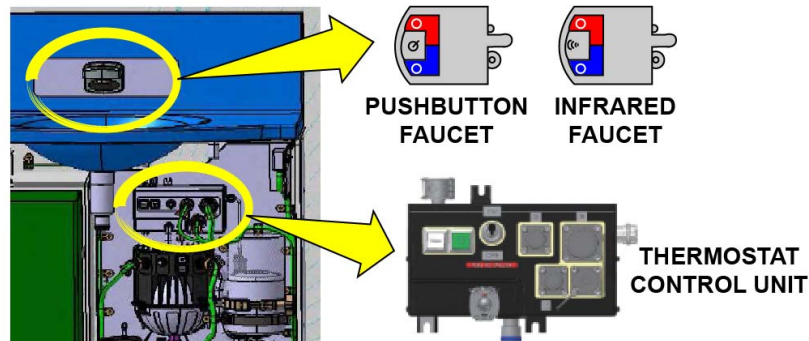
The thermostat control unit monitors all the electronic components of the lavatory. An ON/OFF P/BSW sets the component to the ON/OFF position or does a reset. The cleaning mode button stops the water flow to let the cleaning personnel do the servicing of the washbasin area.

Galley assembly

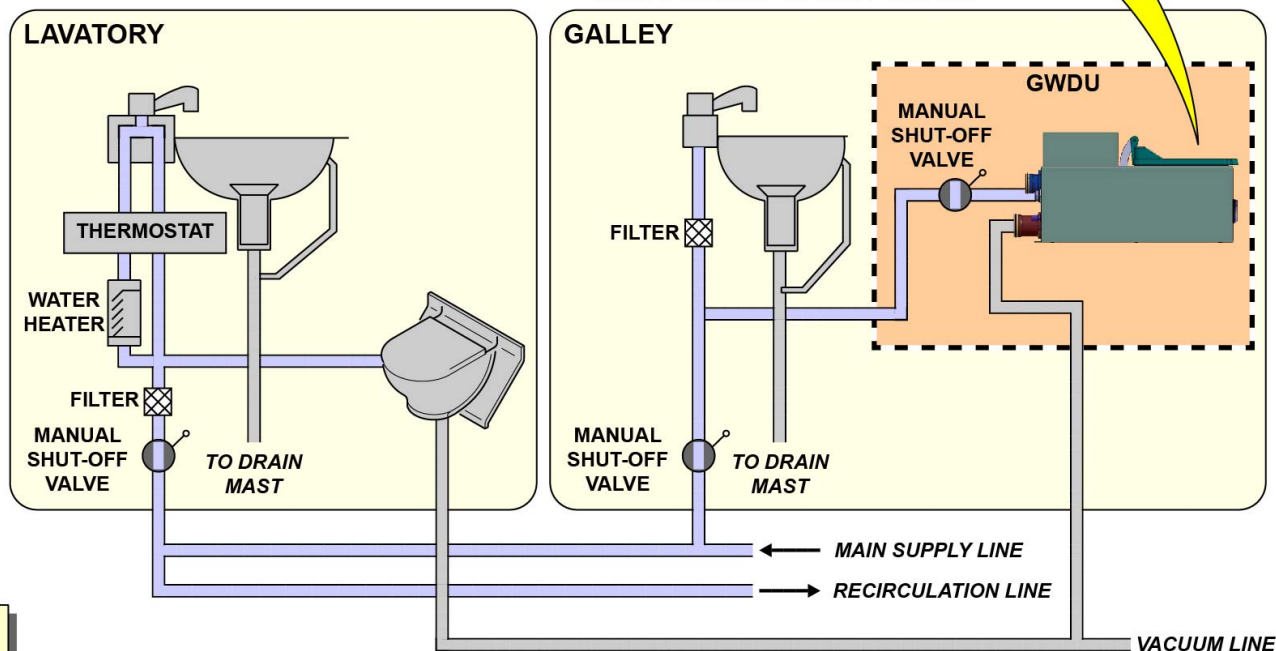
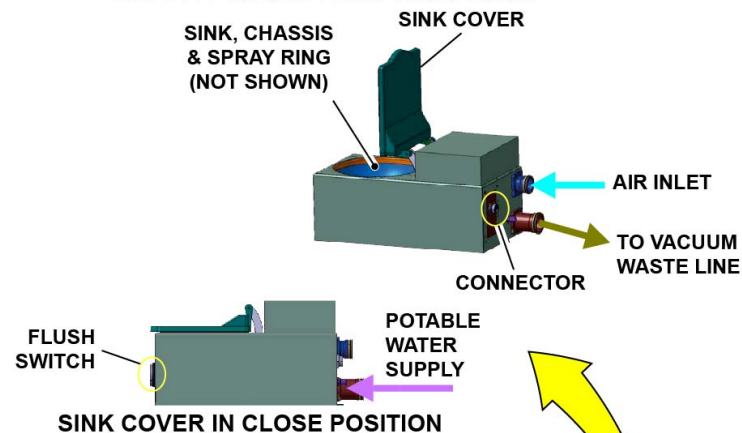
The galley assembly has:

- A manual shut-off valve for the galley
- A manual shut-off valve for the optional Galley Waste Disposal Unit (GWDU)
- A washbasin with a faucet.

The manual shut-off valve isolates the galley from the PWS if there is a leakage. As an option, specific galleys can have a GWDU.

WASH BASSIN ASSEMBLY


GWDU: Galley Waste Disposal Unit

GALLEY WASTE DISPOSAL UNIT


LAVATORY WATER SUPPLY ASSEMBLY/GALLEY SUPPLY ASSEMBLY DESCRIPTION - LAVATORY WATER SUPPLY ASSEMBLY & GALLEY ASSEMBLY

POTABLE WATER SYSTEM DESCRIPTION (2/3)

Potable Water System Description and Operation

The PWS components are smart LRUs connected to the CAN bus.

The PWS control and monitoring is based on distributed intelligence components. All the data related to the correct operation (or failures) of the PWS are available on a dedicated CAN bus.

The CAN bus is directly connected to the CIDS directors which connect the PWS with:

- The FAP
- The LGERS for the L/G status
- The CMS for failure report and tests.
- Other A/C systems, etc.

This connection is done through the PWS function hosted in the CIDS.

Control, monitoring and indicating

The PWIP is:

- The core brain of the PWS, for control, monitoring and indicating
- The HMI for ground servicing and maintenance operations.

The PWIP display unit shows the system status and the basic maintenance messages:

- Water quantity indication with tank full configuration
- Pre-selection (option)
- Status information (e.g.: filling, end of filling, draining and disinfection)
- System failures, maintenance messages.

The water/waste FAP page has the functions that follow:

- Water quantity indication with tank full configuration
- Water quantity pre-selection (with the adjust key)
- System depressurization (if the cold weather option is available, with the water depress key)
- System failures, maintenance messages.

Tank full configuration

The tank full configuration, associated with the pre-selection function, virtually limits the tank size to adapt to the different operator needs in relation to:

- The different cabin configurations
- The A/C versions
- The operator flight mission profiles.

This preconfigured water level (maximum available tank volume in percent) is programmed in the CIDS Cabin Assignment Module (CAM).

Pre-selection function

It is possible to adjust the target water quantity for water refilling from the FAP (baseline) or from the PWIP (alternative location as an option). It is done by steps of 10% of the total water quantity from 30% to the maximum available tank capacity, set through the tank full configuration.

This function is called pre-selection function. It is used to limit the water upload and automatically stop the refilling operation.

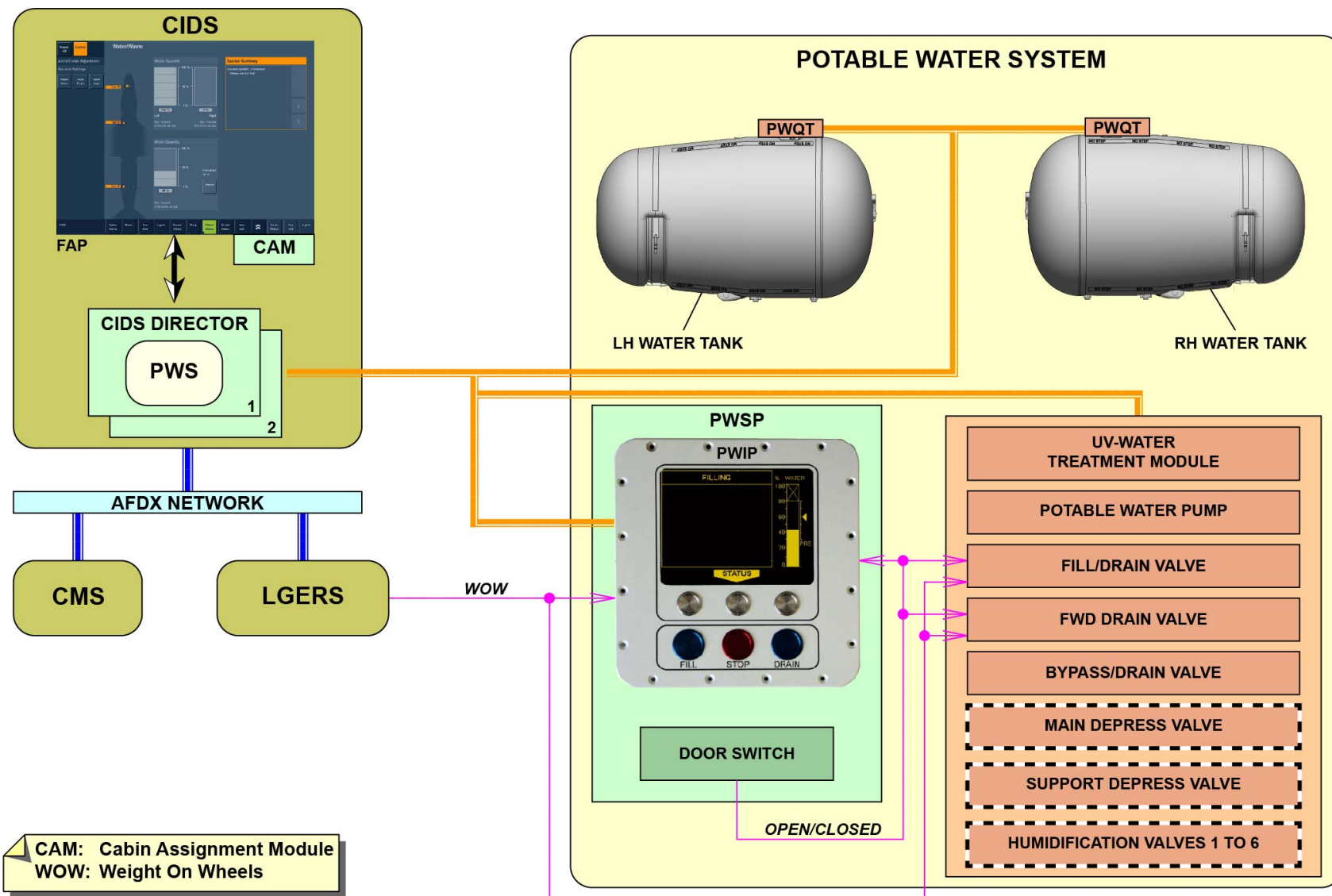
Safety protection

In addition to the CAN bus, the fill/drain valve and the FWD drain valve have three discrete signals:

- The landing gear system 1 (Weight on Wheels (WOW))
- The landing gear system 2 (WOW)
- The PWSP door switch signal.

These three signals are computed to keep the valves closed during the flight and to prevent a risk of loss of water overboard.

The door switch is connected to the PWIP. It senses the open/closed position of the service panel door. The POTABLE WATER SERVICE DOOR OPEN message status is shown on the FAP.



POTABLE WATER SYSTEM DESCRIPTION AND OPERATION - CONTROL, MONITORING AND INDICATING ... SAFETY PROTECTION

POTABLE WATER SYSTEM DESCRIPTION (2/3)

Location and Maintenance Devices

The two potable-water tank assemblies are installed side by side in a horizontal position in section 18 (behind bulk compartment).

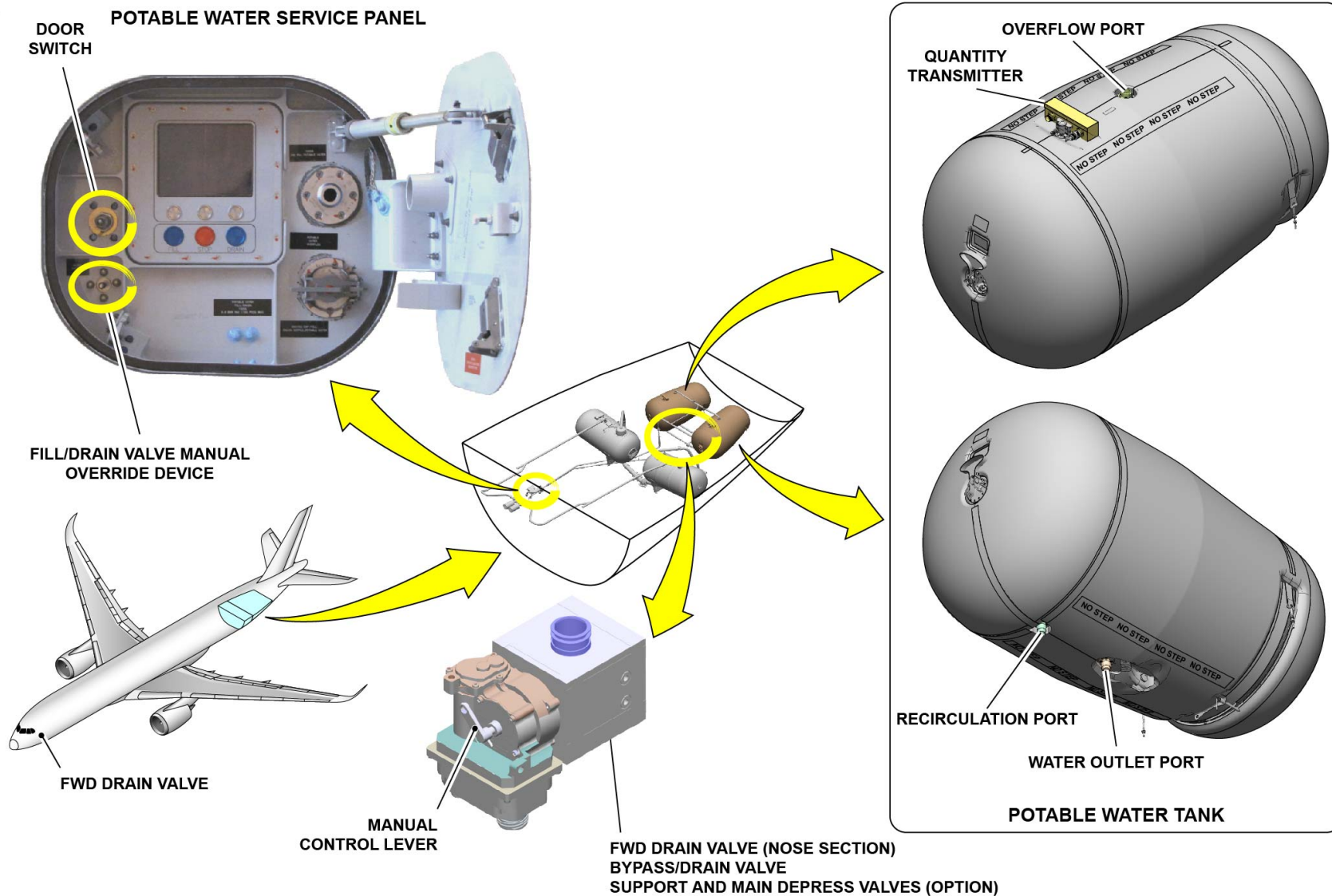
The primary interface for the system servicing is the PWSP and its PWIP, installed at section 18, in the lower right side fuselage.

As an option, the water tanks capacity can be extended to (1500 liters). A manual operation of the valves can be done through the maintenance control levers and the manual override device.

For the fill/drain valve, the manual override device is operated directly from the PWSP.

For the bypass/drain, support and main depress valves, it will be necessary to get access to the section 18.

For the FWD drain valve, if necessary, an avionics compartment floor panel can be removed.



LOCATION AND MAINTENANCE DEVICES

WASTE DISPOSAL SYSTEM DESCRIPTION (2/3)

General Philosophy

The waste system contains the Vacuum Toilet System (VTS) and the waste water system.

The VTS has two autonomous subsystems, which are divided into LH and RH subsystems. Each subsystem is equipped with one waste tank and works independently.

The waste water system has two autonomous subsystems, which are divided into FWD and AFT subsystems.

The basic functions of VTS are:

- Human and galley (option) waste transportation, by vacuum
- Waste storage
- Waste servicing.

Each subsystem has:

- Toilet assemblies
- Galley Waste Disposal Units (GWDUs) (as an option)
- A waste tank
- An overboard check valve
- A vacuum generator.
- A vacuum control valve assembly (VCVA).

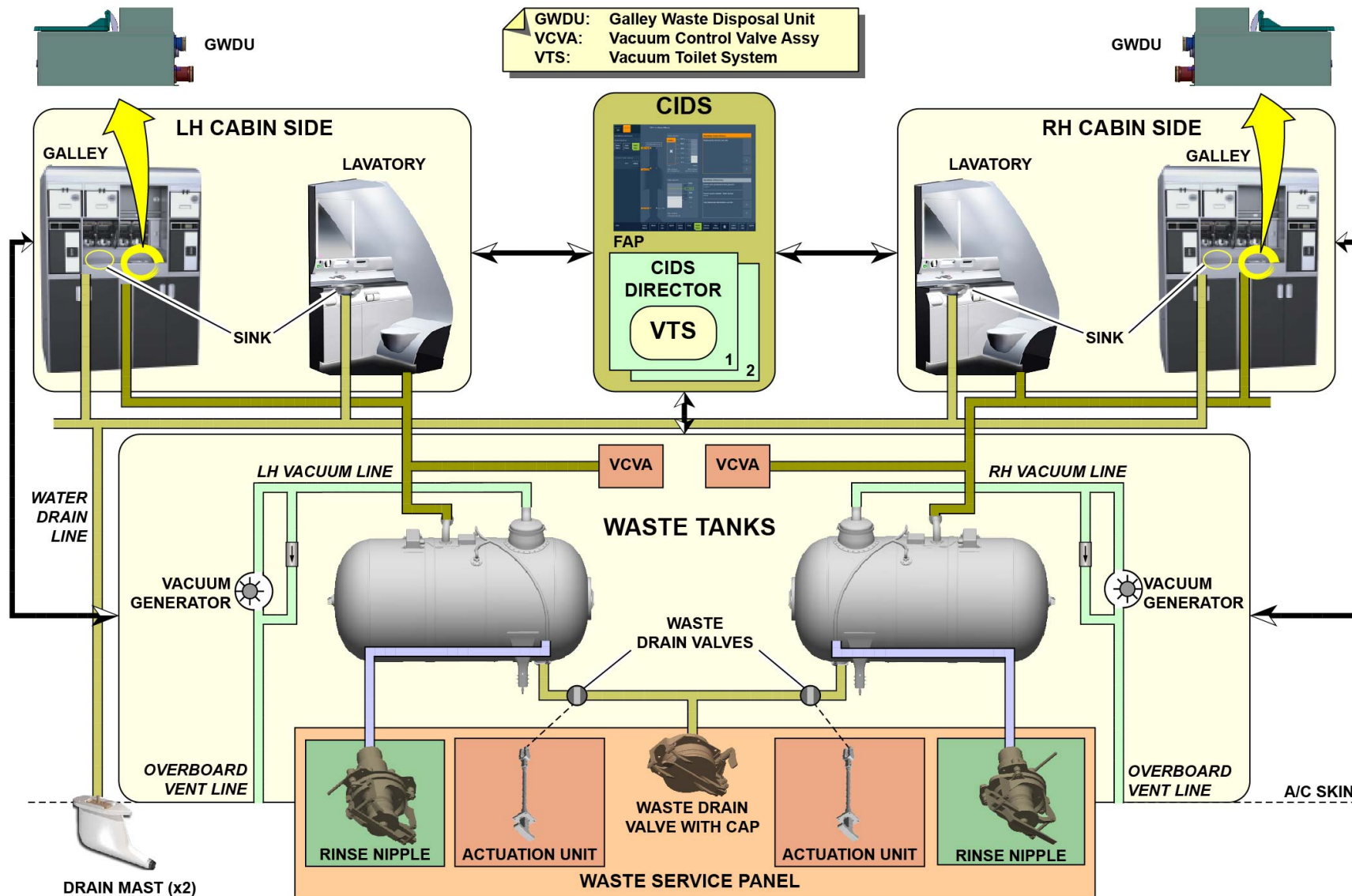
The waste tanks are in the pressurized fuselage area, behind the bulk compartment. Each tank has a usable capacity of (595 liters).

The vacuum generator supplies the vacuum necessary for the waste transportation only if there is not sufficient differential pressure between the cabin and the atmosphere. At high differential pressure, the vacuum generator does not operate and the airflow bypasses the vacuum generator through the overboard check valve, and after goes to the overboard vent port.

The VTS communication with the FAP and the CIDS (and others systems) is done through a VTS function hosted in the CIDS. The information about the system condition is displayed on the FAP.

The waste service panel enables servicing of the waste tanks.

The waste water system disposes and discards the waste water from the lavatory and the galley sinks overboard, through the FWD and AFT heated drain masts. The system includes two independent subsystems, one for the drainage of the FWD part and the other for the AFT part.



GENERAL PHILOSOPHY

WASTE DISPOSAL SYSTEM DESCRIPTION (2/3)

Toilet Assembly and GWDU

The cabin installation has a toilet assembly in each lavatory. Some specific galleys have a GWDU. The waste material is sent from the waste receptacles (toilet bowl or GWDU sink) to the waste storage tanks by differential pressure, through the VTS.

Toilet assembly

The toilet assembly has:

- A flush switch, which starts a flush sequence.
- A flush control module, which controls and monitors the flush sequence.
- A solenoid operated rinse-valve (controlled by the flush control module), which opens to spray potable water, to rinse the bowl.
- A motorized flush valve (controlled by the flush control module), which opens to send the waste materials to the waste tank, by differential pressure.

GWDU

The GWDU unit has:

- A flush switch, which starts a flush sequence.
- A controller module, which controls and monitors the flush sequence.
- A rinse valve, which opens to spray potable water to rinse the sink.
- A flush valve, which opens to send the waste materials to the waste tanks, by differential pressure.
- A sink cover, monitored in position
- A sink full sensor.

There are two modes to flush the GWDU:

- Mode 1: wet flush (usual) for waste material
- Mode 2: dry flush for liquid discard only.

The sink cover must be closed, before to start a flush sequence. This prevents the noise emission in the cabin. On request, the GWDU does a flush sequence controlled and monitored by the GWDU controller.

If you push the flush switch two times in one second, a dry flush mode starts. If you push it only one time in one second, a wet flush mode starts.

The solenoid operated rinse-valve (controlled and monitored by the controller) is used to control the water supply to the sink spray ring. The flush valve opens to send the waste materials to the waste tanks.

Overflow protection

Toilet bowl overflow protection

The overflow protection starts if the flush control module monitors that the rinse valve is failed open. The flush control module flushes automatically and regularly (in a given period of time), until the rinse valve is back to the closed position. After three flush sequences, if the rinse valve is still open, the flush control module sends a caution message to the FAP. In the worst condition, a manual operation of the potable water shut-off valve, in the lavatory, stops the water flow.

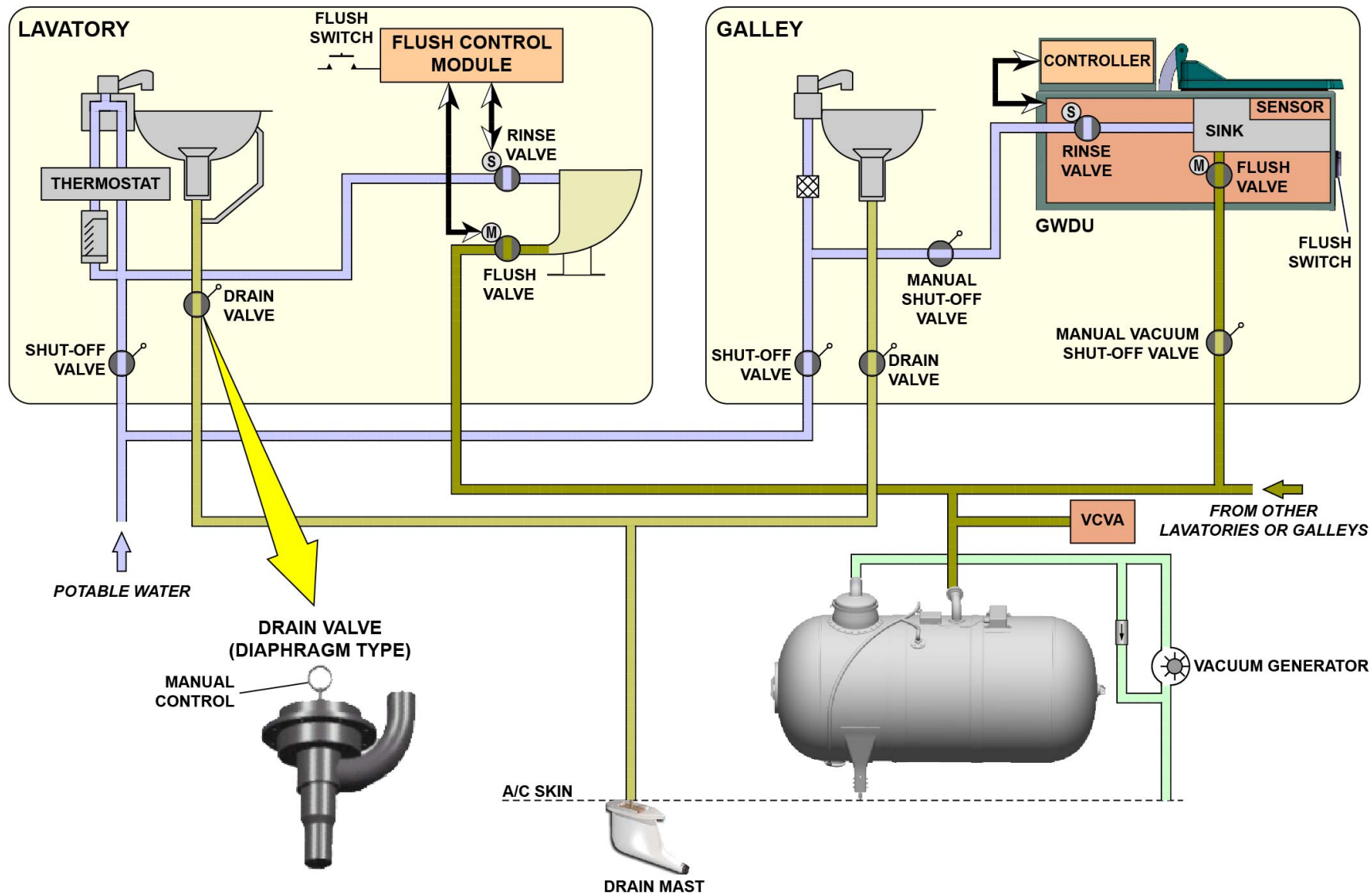
GWDU sink overflow protection

If the sink full sensor detects a full condition and the rinse valve is open (then the position of the GWDU cover is ignored), the GWDU controller starts an automatic flush cycle to prevent an overflow. The flush starts every 15 seconds. In the worst condition, a manual operation of the GWDU water shut-off valve stops the water flow. If there is a GWDU flush-valve failure (failed open), it is possible to stop a cabin pressure leak with the GWDU manual vacuum shut-off valve. These valves are also manually operated during maintenance operations.

Drain valves

The water diaphragm drain-valves are installed below the lavatory and galley sinks. They are used to send the waste water into the waste water system. On ground, if there is no differential pressure between the cabin and the atmosphere, the diaphragm is permanently open. The waste water can be drained overboard by gravity, through the heated drain mast.

In flight, the drain valve is closed by differential pressure, to prevent a continuous leakage of the cabin air through the waste water-system drain lines. The valve opens only if a sufficient quantity of water is collected, to lift the diaphragm and to overcome the membrane closing force. The gravity is associated with the differential pressure, to drain the waste water.



TOILET ASSEMBLY AND GWDU - TOILET ASSEMBLY ... DRAIN VALVES

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WASTE DISPOSAL SYSTEM DESCRIPTION (2/3)

Waste Tank Assembly and Associated Equipment

The waste tank assembly has:

- A waste inlet.
- A waste separator, with a filter to separate the waste materials from the air. It prevents damage to the vacuum generator and the environment, against the waste and particles. The waste moist air goes to an A/C fuselage-overboard vent port, via the overboard check valve or the vacuum generator.
- Two rinse nozzles at the top of the tank:
 - To clean the inner walls with the rotating head
 - To supply the pre-charged disinfectant fluid to the waste tank.
- A waste control unit, to measure the waste level in the waste tank through a non-intrusive waste-level measurement (capacitive meshes included in the waste tank walls). Separated meshes are used to get the Continuous Level Measurement (CLM) and the Full Level Detection (FLD).

The associated equipments are:

- A variable speed vacuum generator
Its speed changes following the location of the lavatory or galley, the flight level and cabin-to-ambient pressure and the number of overlapping flush cycles. The vacuum generator is used until the cabin-to-ambient differential pressure is higher than (250 hPa (+/- 20)), Cabin Pressure Control System (CPCS) data (= 3.62 psi).

- An overboard check valve

It is installed in the overboard vent line in parallel with the vacuum generator. At high cabin-to-ambient differential pressure, the airflow bypasses the generator through the check valve and blows out at the overboard vent port.

- A VCVA

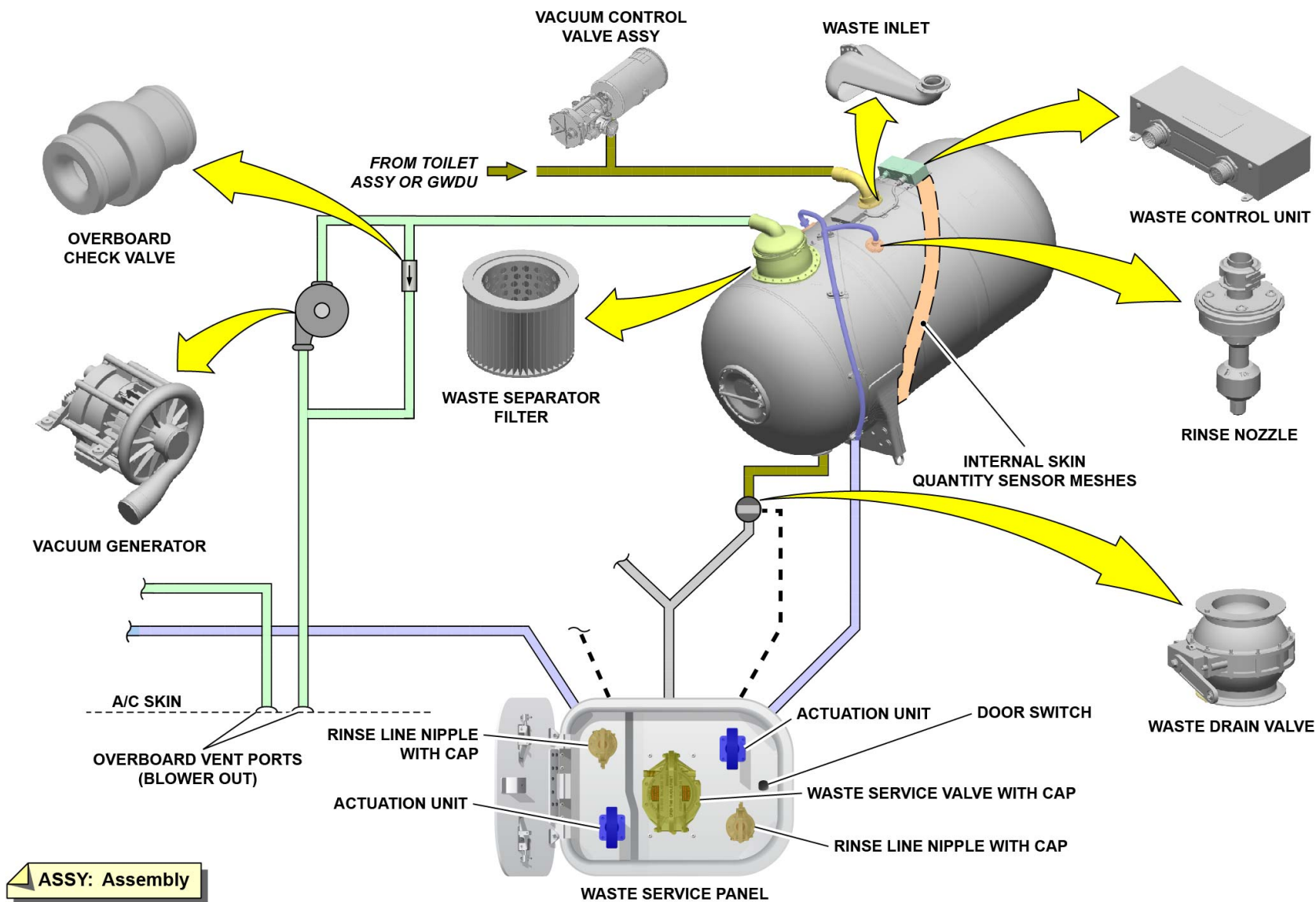
It is an electrical/spring-loaded valve associated to a muffler, installed before the waste tank. It opens when the toilet or GWDU flush valve operate. It decreases and adjusts/controls the differential pressure in the

waste tank and the vacuum waste lines, to keep the noise in the lavatory or galley to a minimum.

- A waste drain valve

It is installed in the waste drain line. There is one valve for each tank.

The waste drain valve keeps the waste material in the tank. The related actuation unit is used to mechanically open the waste drain valve for the waste servicing.



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WASTE DISPOSAL SYSTEM DESCRIPTION (2/3)

Control System Architecture

The VTS components, connected through the CAN bus, are:

- The toilet assemblies (flush control module, rinse valve and flush valve)
- The GWDUs (controller, rinse valve, flush valve and sensors)
- The vacuum generators
- The waste control units.
- The VCVAs.

All the components are smart LRUs.

The VTS data are sent through the CAN bus to the CIDS directors and their internal VTS functions:

- To manage the data exchange between the VTS and other A/C systems (e.g.: CPCS, LGERS, CMS, FWS)
- To recover the VTS monitoring data and fault reporting for the Human-Machine Interfaces (HMIs): FAP and OMT (for maintenance).

The vacuum generators analyze the flight phase data and cabin-to-ambient differential pressure, transmitted by the CIDS VTS function. These data are coming from the FWS and CPCS, through the AFDX network.

For redundancy (CIDS is not available), they receive discrete signals from the LGERS (Weight On Wheels (WOW)) and waste service-panel door switch (during ground servicing).

The FAP shows the waste level in each waste tank, the VTS and its components failure messages. If one or both waste tanks are full, the FAP shows a message received from the waste control unit.

The tank full detection has only an effect on the related subsystem (left or right subsystem). The other subsystem stays fully functional.

All equipments of the LH or RH VTS subsystems can communicate and operate independently from the CIDS, if the communication is stopped.

The door switch input is a discrete signal sent to the vacuum generators.

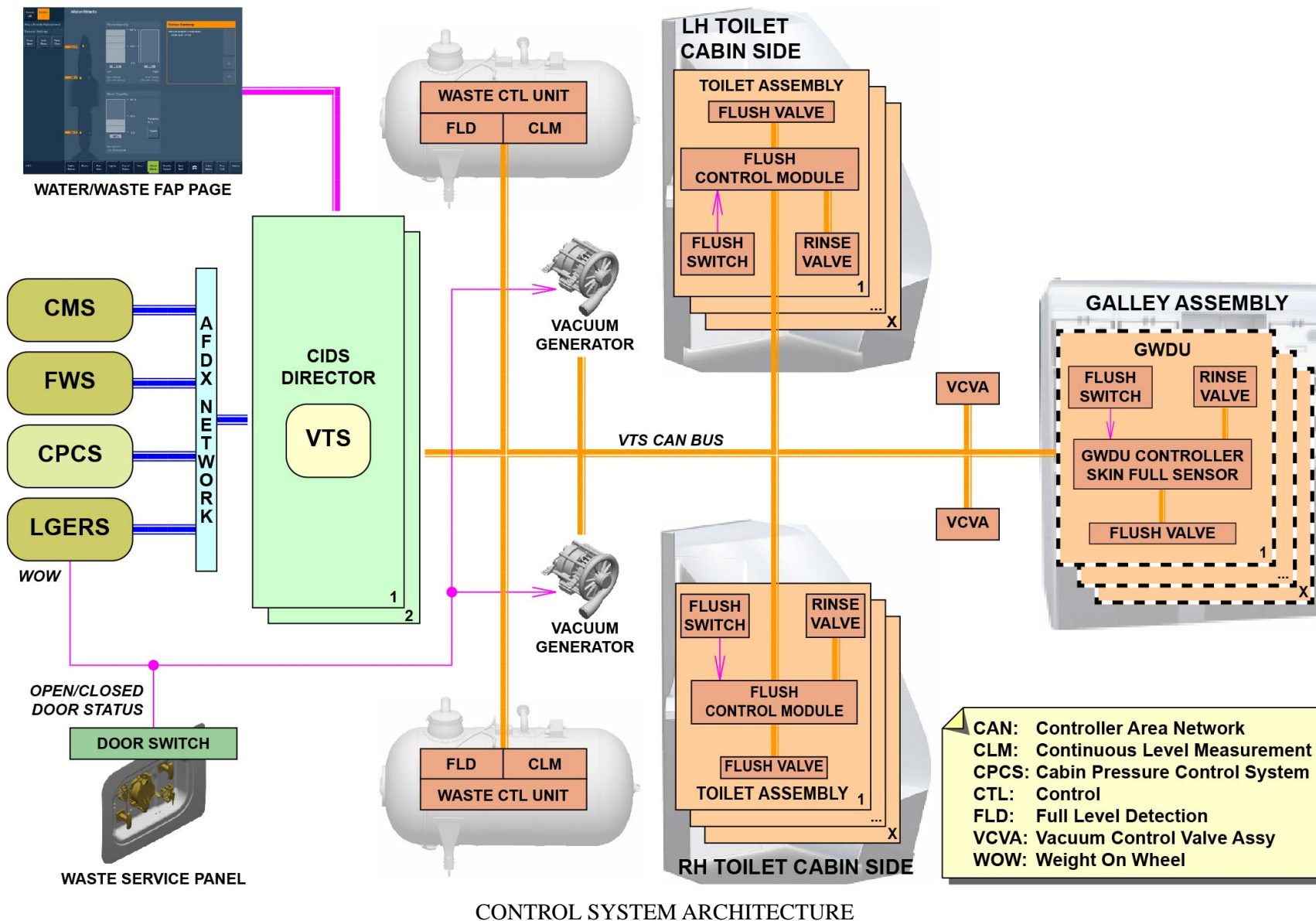
With an OPEN discrete signal, the VTS operates in GROUND

SERVICING MODE:

- The vacuum generators and the VTS operations (flushing demand) are inhibited

- The WASTE SERVICE DOOR OPEN message is displayed on the FAP.

With a CLOSED discrete signal, the VTS is fully available.



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WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

FAP Description (2)

The main Human Machine Interfaces (HMI) for servicing/ground handling and maintenance purposes and for cabin crew interaction with the PWS is provided at the following stations:

- Potable Water Service Panel (PWSP) (maintenance and servicing interface),
- Flight Attendant Panel (FAP) (cabin crew interface),
- On-board Maintenance Terminal (maintenance interface).

The potable water storage capacity of A350 A/C ranges from the baseline volume of (1060) liters to an optionally extended volume of (1500) liters. The total quantity of water in the potable water system can be read at the Flight Attendant Panel (FAP) or at the Potable Water Indication Panel (PWIP). This quantity is shown in percentage.

FLIGHT ATTENDANT PANEL (FAP):

Flight Attendant Panel (FAP) is the user interface on ground or during flight.

The FAP provides the means to select the following functions of the PWS:

- Set water pre-selection, eventually limited by tank full configuration,
- Select/de-select depress mode (for cold weather package option).

The FAP indicates:

- The total capacity of the potable water tanks, actual water tank quantity,
- Pre-selected level,
- PWS operational status,
- Active General settings function, through A/C Symbols column,
- Additional information for maintenance and cabin crew awareness, through information summary column,
- PWS and its components failure messages, through caution summary column.

PRE-SELECTION FUNCTION:

The target water quantity for water filling can be pre-selected from the FAP (baseline) or from the PWIP (alternative location, option) by steps

of 10% of the total water quantity starting at 30% up to the maximum usable tank capacity, set via Tank Full Configuration.

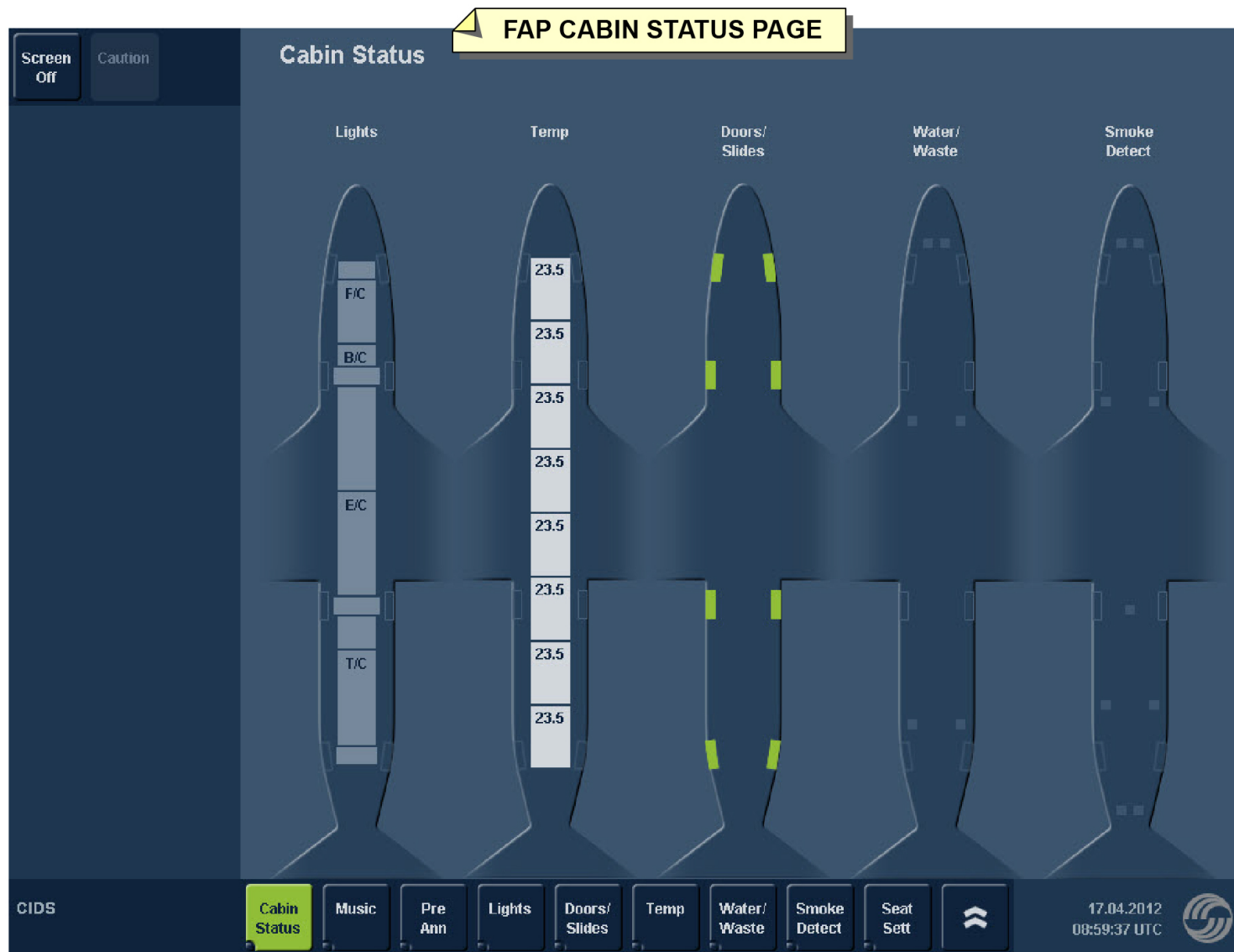
At the FAP, "POTABLE WATER SERVICE DOOR OPEN" message appears through information summary column, when Potable Service panel is open. FAP pre-selection is still available with the Potable Service panel open.

TANK FULL CONFIGURATION:

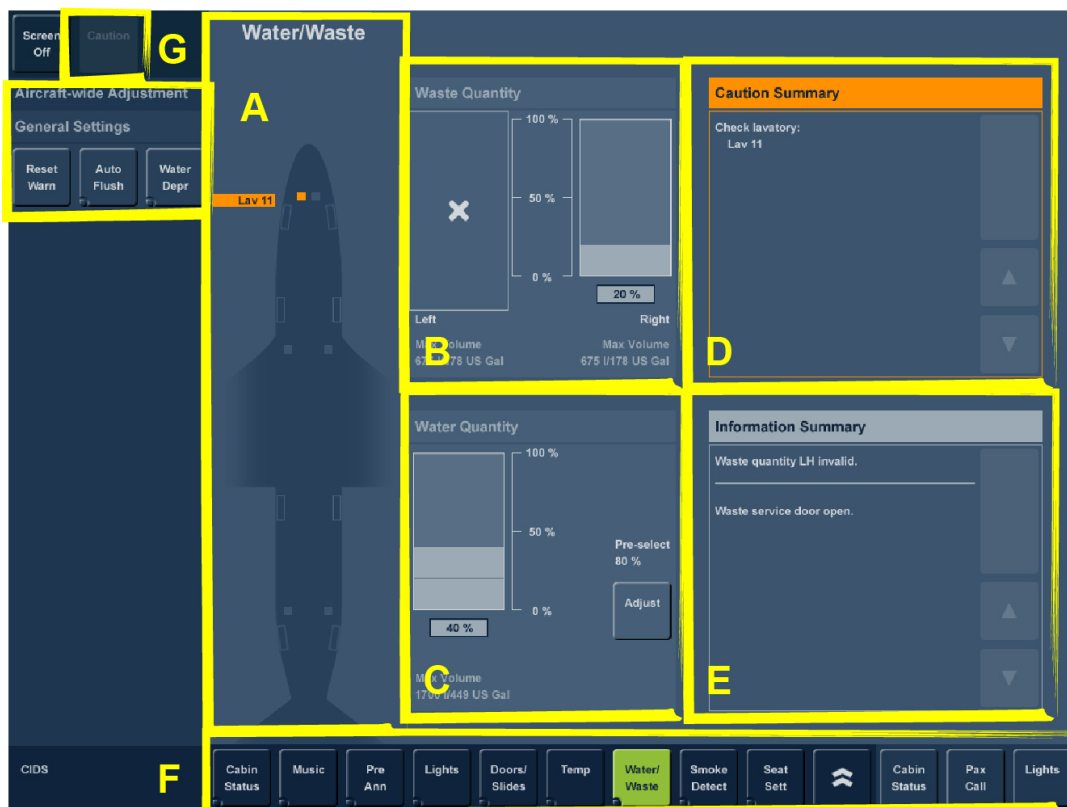
The Tank Full Configuration function allows the definition of an individual maximum usable tank volume per A/C. This feature virtually limits the tank size in order to meet different operator needs according to different cabin configurations, A/C versions and flight mission profiles. Any configuration modification must be done through CAM programming. The PWIP checks the configuration provided via CAM versus the total capacity.

WATER DEPRESS MODE (OPTION):

The Water Depress Mode is a PWS function for A/C cold weather operation. This function allows draining of the water from equipment and tubing located within the wet monuments (e.g. lavatories and galleys) into heated zones of the PWS and into the heated PWTAs (Potable Water Tank Assembly) to prevent freezing. The Depress Mode can be selected/de-selected via the FAP. If selected, the PWIP activates the Depress Mode if A/C on ground (or at A/C touch-down).



FAP DESCRIPTION (2)

FAP WATER/WASTE SYSTEM PRESENTATION LAYOUT

(A) A/C Symbols Column

- Indicate the active General Settings function
- A/C symbol for a position related cabin status information (e.g. lavatories, galley units...)

(B) Waste Quantity Indicator

- For LH and RH Water Tank

(C) Potable Water Indicator (ATA 38-10)

- Will not be analyzed in this module

(D) Caution Summary Column

- Caution message is indication of abnormal system status which has cabin effect
- Column appears in **AMBER** and additional visual indication appears in column (G)

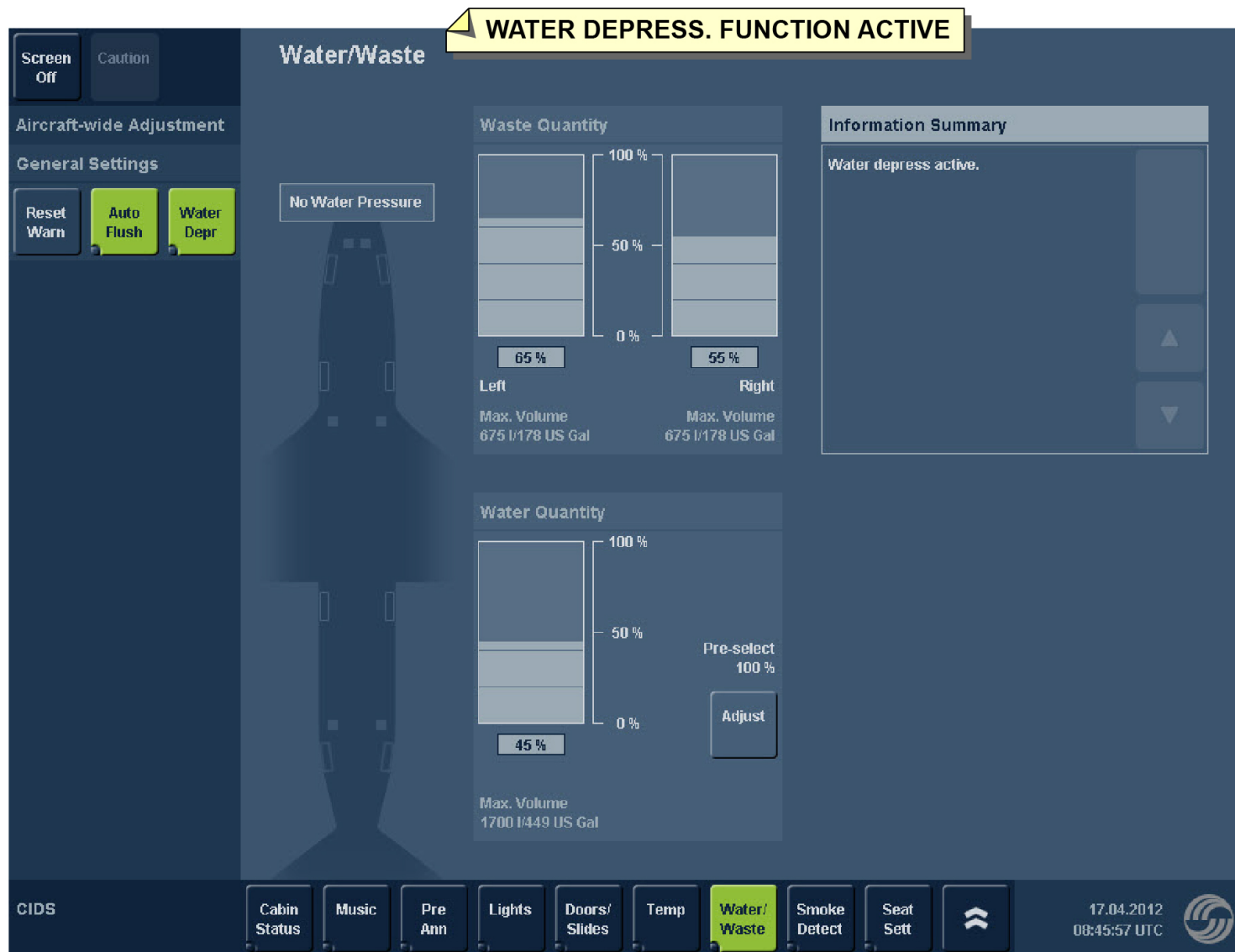
(E) Information Summary Column

- Information message window for indication of normal system status
- Indicate INFORMATION message

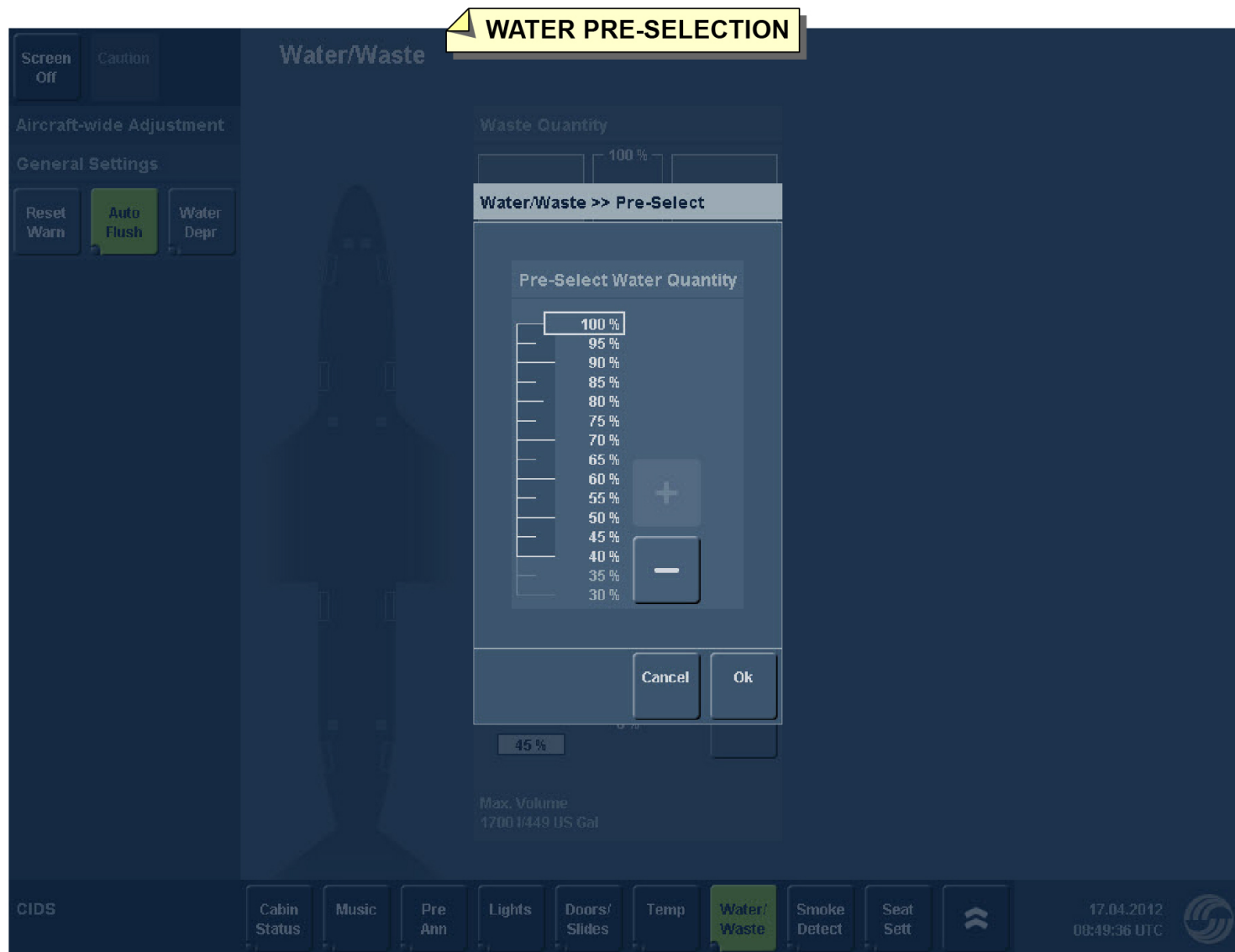
(F) Selection Button

- For other A/C system (With external example of selected Water/Waste button)

FAP DESCRIPTION (2)



FAP DESCRIPTION (2)



FAP DESCRIPTION (2)

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WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

PWSP Description(with optional pre-selection on PWIP)(2)

The Potable Water System supports the following operating modes:

- Water Supply Mode (normal mode),
- Filling Mode (servicing),
- Manual Filling Mode (servicing/maintenance),
- Draining Mode (servicing),
- Disinfection (maintenance),
- Interactive Mode Test (maintenance),
- Depress Mode (Cold Weather package option) to prevent pipe freezing if operated under cold environment.

The Potable Water Indication Panel (PWIP) acts as central unit of the PWS and provides all functions to control and monitor the system.

PWIP is used by ground personnel for system servicing and maintenance-operation.

PWIP is equipped by 6 piezo-electric buttons and a monochromatic graphical display:

- 3 colored ('hard-labeled') buttons used to start and stop the core servicing functions: Filling, Draining and Stop,
- 3 smaller ('soft-labeled') buttons used to control the display menus, Status page browsing and maintenance mode access (disinfection/test Modes). The soft buttons allow as well the target pre-selection setting (optional feature at PWIP). In case the standard location for pre-selection (at FAP) is configured, the labels for pre-selection setting are not displayed.

The PWIP receives the water quantity information from both Quantity Transmitters (LH and RH) and calculates and provides the total water quantity to the FAP and its own display. On PWIP, the quantity is shown via a bar graph on right part of the display, while the current valid pre-selection value and the allowed pre-selection range are shown by means of an arrow and a secondary scale. The non usable tank capacity (if set via Tank Full Configuration) is shown by an "X" overlapping the quantity indication bar-graph.

The PWIP concept includes pages, which can be scrolled by using the soft buttons to navigate among them:

- Main Page, as well as the target pre-selection setting,
- Disinfection page,
- Status page(s).

On the PWIP main page, the current system status and basic failure messages affecting PWS are shown:

- System status (Filling/Draining/Valve Closed, etc...),
- Potable Water Tank level,
- Pre-selection quantity (option),
- Service relevant PWS equipment failure messages.

The Disinfection page is used to carry-out the maintenance disinfection and some short textual instructions to activate the system Disinfection Mode. The complete PWS including all components in contact with water can be disinfected by a chemical maintenance procedure. The activation of a Disinfection Mode is possible on the PWIP when the aircraft is on ground in order to ease this maintenance procedure.

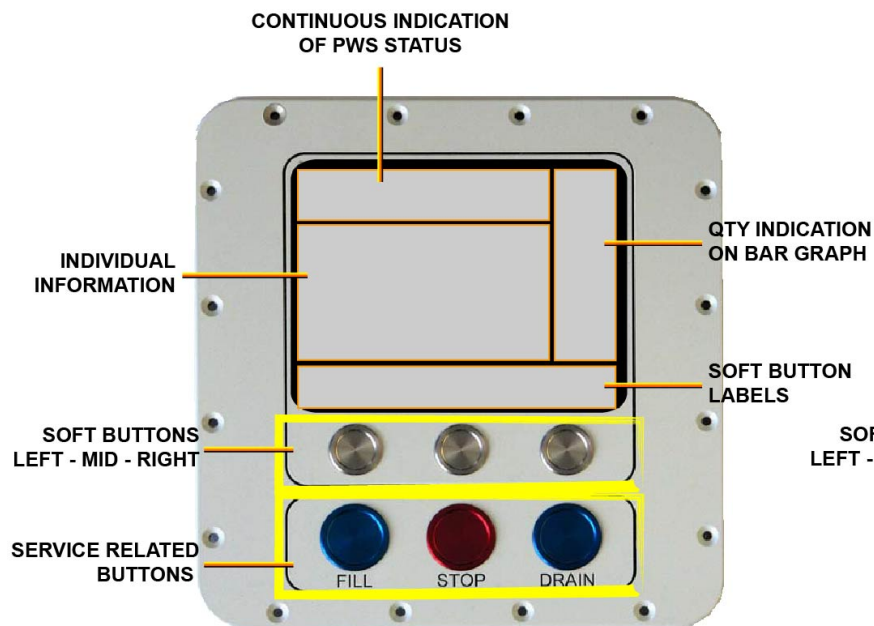
Using the Status page, maintenance action shall be carried out in order to identify the faulty equipment. System and equipment information/parameters can be read in real time to support the system troubleshooting.

A "MAINTENANCE REQUIRED" caution is shown in case a failure is detected. The possible root cause of the problem can be found thanks to the PWIP Status Page, e.g. when:

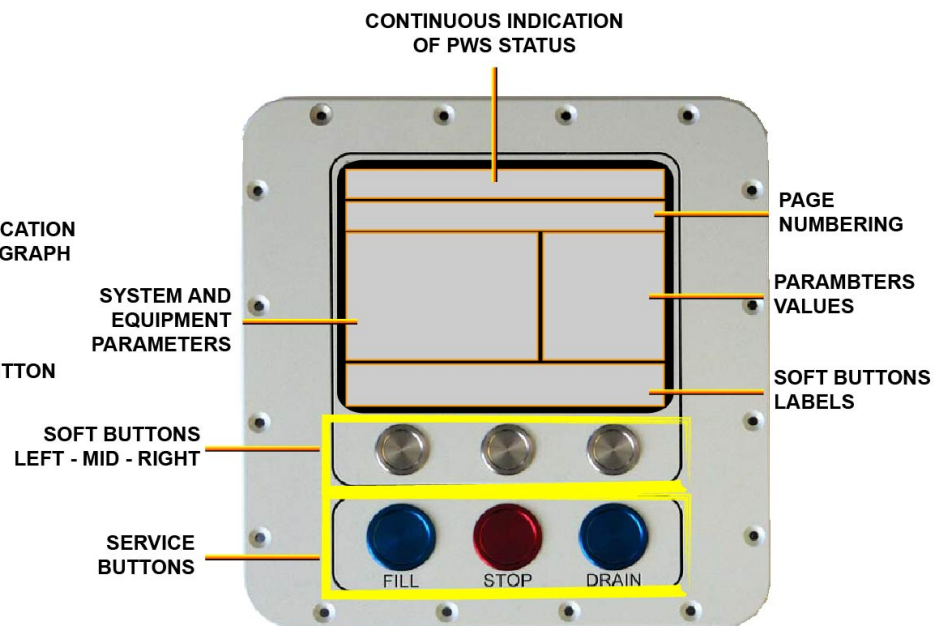
- Water level information is not available,
- One or more valves have a failure,
- One of the FILL/DRAIN/STOP button has a failure,
- No CAN-Bus communication can be established.

As soon as the failure condition disappears, the "MAINTENANCE REQUIRED" box disappears.

SERVICING AND MAINTENANCE DESINFECTION PAGE LAYOUT



STATUS PAGE LAYOUT



PWSP DESCRIPTION(WITH OPTIONAL PRE-SELECTION ON PWIP)(2)

WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

Potable Water System Filling (2)

All servicing tasks must be done following maintenance documentation. This template is for information only.

PWS is designed to be serviced with electrical power only. Without electrical power or in case of specific failures, it's still possible to manually operate valves, but some maintenance tasks need to be performed (example: valve access).

Once the pre selection it's done, to refill the potable water tanks is necessary to connect the potable water service-vehicle to the filling port connection.

The Filling Mode is activated by pressing the FILL button at the PWIP:

- Fill/Drain Valve opens,
- Bypass valve opens,
- Indication "FILLING" is shown on PWIP.

Both water tanks will be filled in parallel. Tanks are vented via the overflow-nipple. PWIP compares the pre-selected water quantity value with the calculated value from the quantity sensors. When the pre-selection is reached, "END OF FILLING" is shown.

The "END OF FILLING" information is displayed until PWS returns to its normal Water Supply Mode, with automatic closure of valves.

"VALVE CLOSED" is displayed when:

- The PWSP door is closed,
- STOP or DRAIN button is pressed,
- Pre-selection is increased,
- No valid level information is available,
- Any failure is detected.

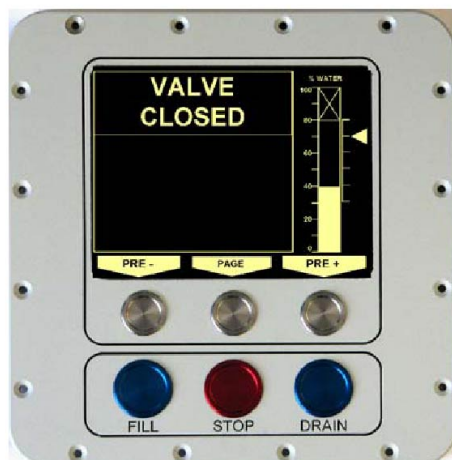
The PWIP allows the override of automatic filling pre-selection, using the "MANUAL FILLING" function.

The sub-state "MANUAL FILLING" allows the filling of the system until overflow without any restrictions:

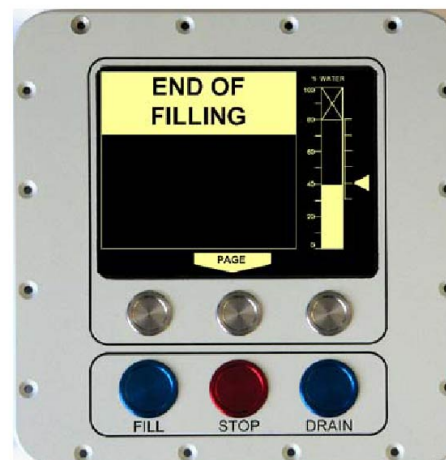
- Tank full detection will be deactivated,
- Tank Full Configuration is inhibited.

This mode can be selected if the pre-selected level has been already reached and the user presses the FILL button again. The user will then be prompted to confirm "MANUAL FILLING?"

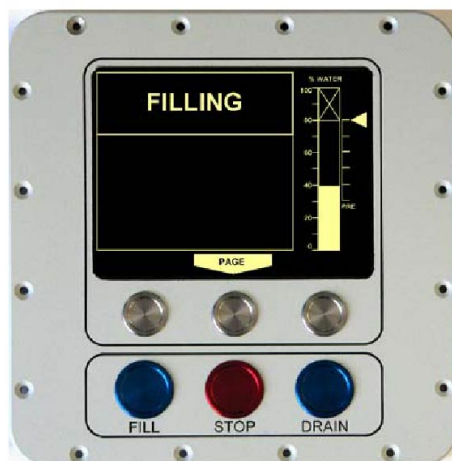
The automatic and manual FILLING processes can be stopped at anytime by pressing the STOP button. In this case, "STOP" is displayed in the PWS Status area.

PWIP DISPLAY PAGE EXAMPLES


**PWIP SERVICING, VALVE CLOSED
PRE-SELECTION ENABLE AT PWIP**



PWIP SERVICING, END OF FILLING



PWIP SERVICING, FILLING



PWIP DESINFECTION START PAGE

POTABLE WATER SYSTEM FILLING (2)

WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

Potable Water System Draining (2)

All servicing tasks must be done following maintenance documentation.

This template is for information only.

You can drain the water tanks and the distribution system through the:

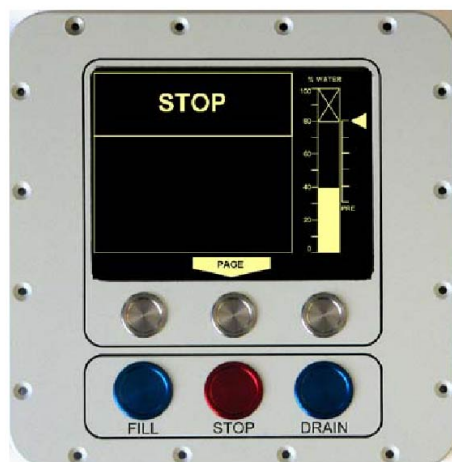
- Fill and Drain valve and the Fill and Drain nipple of the PWSP,
- FWD drain valve and FWD drain nipple of FWD drain panel (PWDP).

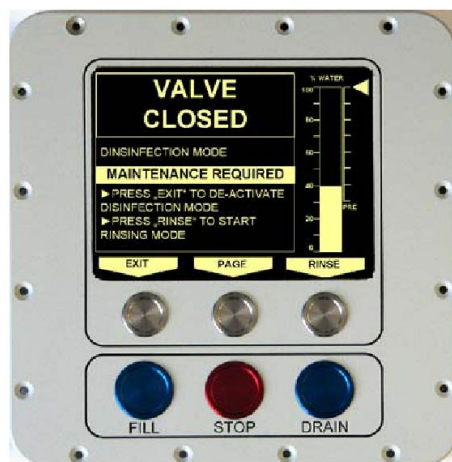
The draining of the potable water system is operated by the PWIP, with the use of the DRAIN button:

- Fill/Drain Valve opens,
- Bypass valve opens,
- With a time delay the FWD Drain Valve opens,
- Indication 'DRAINING' is shown on PWIP.

Then the water flows out of the potable water tanks and piping through the FWD drain nipple of the potable water FWD drain panel, and through the fill and drain nipple of the PWSP. When the draining is finished, the tank symbol at the FAP and the bar graphic at the PWIP indicate a water quantity level of "0".

There is no automatic closure of valves at the end of the draining operation. Use STOP button and PWS returns to its normal Water Supply Mode ("VALVE CLOSED" is displayed).

PWIP DISPLAY PAGE EXAMPLES

PWIP SERVICING, STOP

PWIP STATUS PAGE, DRAINING FAILED

PWIP DESINFECTON MODE ACTIVE

PWIP SERVICING, DRAINING
POTABLE WATER SYSTEM DRAINING (2)

WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

Potable Water Indication Failure (2)

All troubleshooting tasks must be done following maintenance documentation. This template is for information only.

In case a failure is detected, it might result in an incorrect function of the system for servicing/maintenance procedure or normal water supply mode.

A yellow box with "MAINTENANCE REQUIRED" is shown in the "individual area" of the PWIP display. Every time "MAINTENANCE REQUIRED" is shown, a hint of the possible root cause of the problem can be found in the PWIP Status Page e.g. when:

- Water level information is not available (Water Level Sensor Failure),
- One or more components have a failure (valves pump...),
- One of the hard buttons (FILL/DRAIN/STOP) has a failure,
- No CAN-Bus communication can be established.

The Status Page includes sub-pages which can be scrolled via left and right soft buttons; the current PWS Status is displayed on top of the page and right below an area of the display is reserved for page numbering.

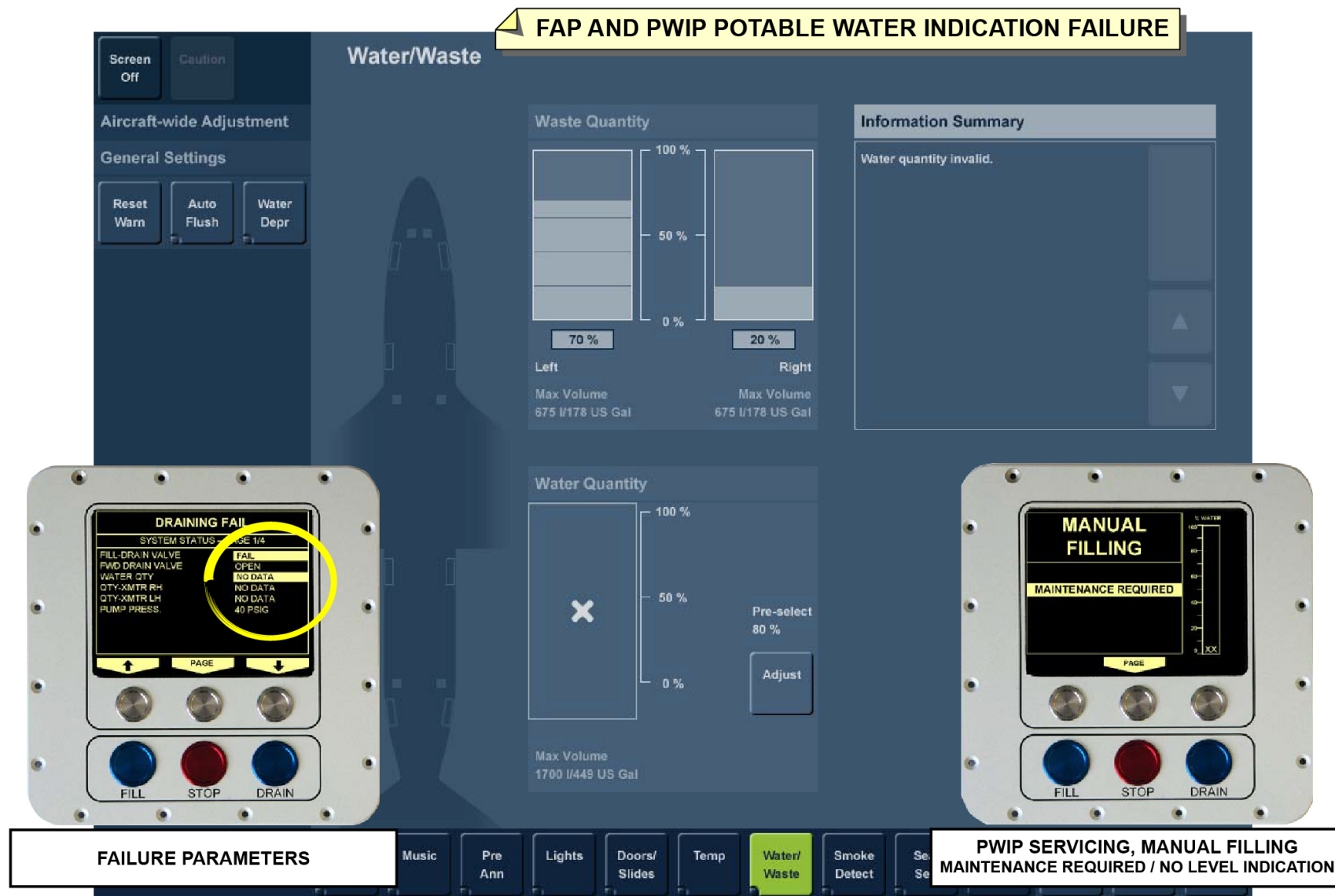
System and equipment information/parameters are displayed in order to support the system troubleshooting and maintenance.

Failures linked to the "MAINTENANCE REQUIRED" information are highlighted by inverting the parameters value background color (yellow). As soon as the failure condition disappears, the "MAINTENANCE REQUIRED" box disappears.

Through CAN bus and via CIDS, System status information is provided to CIDS and FAP, in order to allow cabin crew to have cabin system awareness. Any failure, following its level, will associated to information and caution messages on the FAP.

Via CIDS, OMS receives BITE, real time monitoring parameters. OMS is also used to perform maintenance and troubleshooting tasks.

V2414251 - V00T0MM0 - VM3811000002301



POTABLE WATER INDICATION FAILURE (2)

WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

FAP and Waste Service Panel Description (2)

The Vacuum Toilet System consists of two autonomous subsystems (left and right hand subsystems) without waste balancing.

Each subsystem has its own Waste Tank Module. The waste holding tanks have a net capacity of 595 l each. A non intrusive waste level measurement and a Waste Control Unit calculate the actual waste level. The waste measurement is used for tank "full" surveillance, as well as for continuous level measurement. The L/H and R/H waste level are indicated on the FAP.

AUTO FLUSH

Remaining waste and residual water in the system piping increases the risk of deposit built up or freezing, when the A/C is parked overnight and during winter. To avoid this, all relevant toilets and GWDUs (Galley Waste Disposal Unit) have to be flushed in a certain sequence after each flight and before the A/C is parked overnight during freezing conditions. This process can be performed automatically by pressing the Auto Flush soft key on the FAP (A/C on Ground only).

When the soft key is press, the function is activated and a blue window with the message "AUTO FLUSH ACTIVE" appears at the FAP A/C Symbols column .Once the auto flush is finished, the blue window disappears automatically.

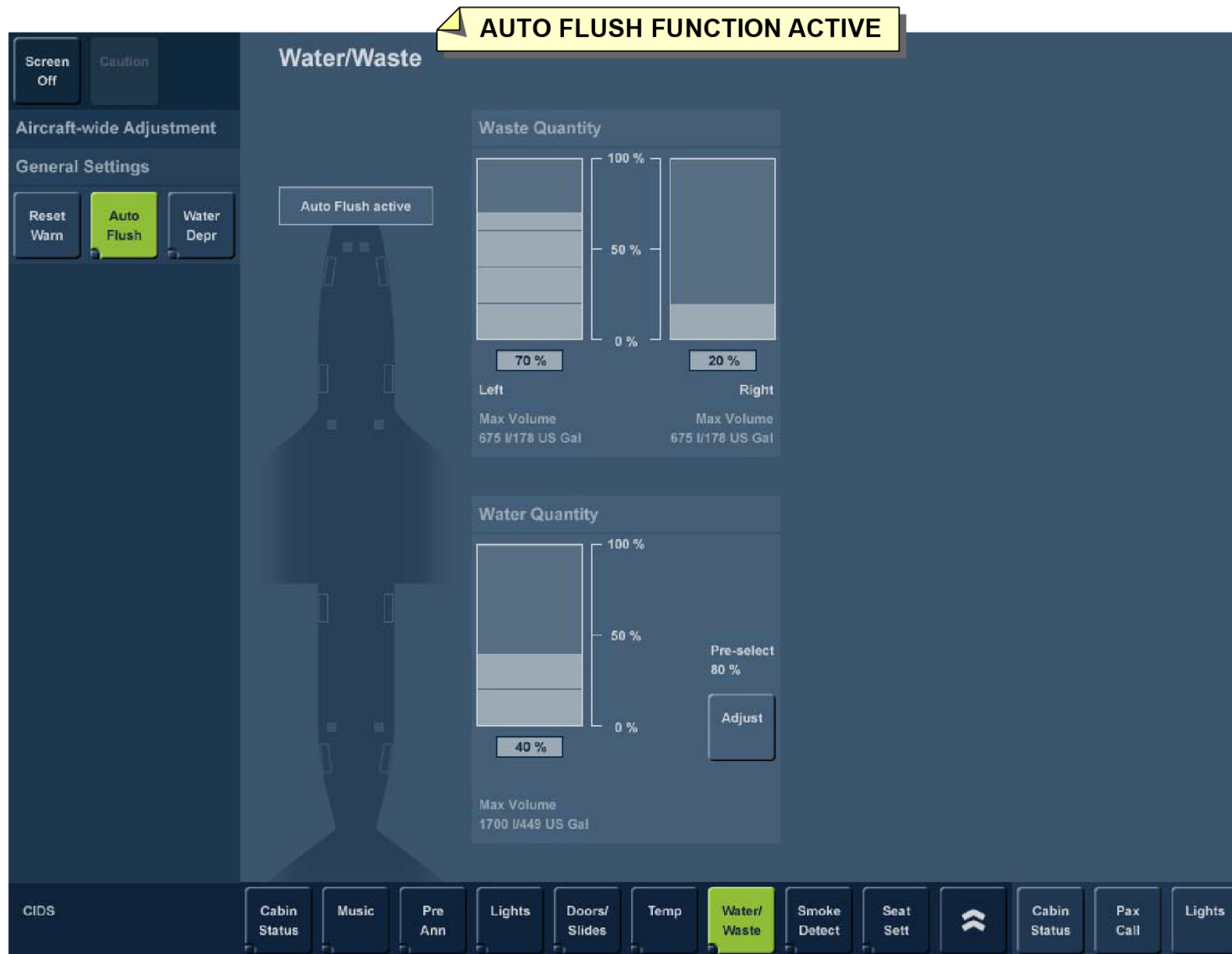
In maintenance disinfection mode, the 'disinfection procedure' of the Potable Water System (PWS) requires also the same Auto Flush request. This process performs a modified flush cycle. The rinse and flush valves open for a longer period to allow for an increased flow of disinfection fluid.

THE SERVICING FOR THE WASTE TANKS IS MADE THROUGH THE WASTE SERVICE PANEL.

At the service panel, there is a door switch connected with the vacuum generator controller units. When the service panel is open:

- A signal is send from this switch to these controllers to inhibit the operation of the vacuum generators,

- The message "WASTE SERVICE DOOR OPEN" appears at the information column of the FAP,
- Any Flushing demand (Auto flush demand included) stays in 'Queue'.



FAP AND WASTE SERVICE PANEL DESCRIPTION (2)

WATER AND WASTE SYSTEM CONTROL AND INDICATING (2)

Waste System Servicing (2)

All servicing tasks must be done following maintenance documentation.

This template is for information only.

Tank full status inhibits only the concerning L/H or R/H toilet subsystem.

Don't work on Potable Water and Waste Systems at the same time, to avoid contamination.

The waste tank servicing is made through the waste service panel. On the panel you will find one waste valve cap drain, two actuation units (control handles), two caps/rinse heated nipples and one door switch. The draining line from each waste tank is closed with a Waste Drain Valve. Each valve is mechanically connected to an Actuation Unit (control handle) at the waste service panel. The draining lines from the tanks are connected together by a Waste Valve, Cap Drain.

The Waste Valve, Cap Drain is the connection point to the waste-servicing vehicle.

The Waste Valve, Cap Drain has 2 levers:

- One to open/close the outer cap,
- One lever to open/close the inner flap.

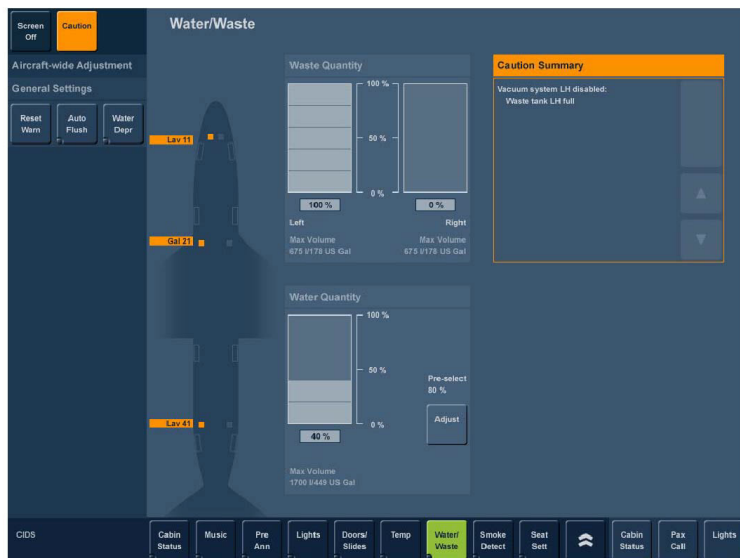
To connect the hose, the cap must be open using outer cap operating lever.

Once the hose is connected and before opening each tank Waste Drain Valve, it's necessary to open the Waste Valve inner flap, using lever.

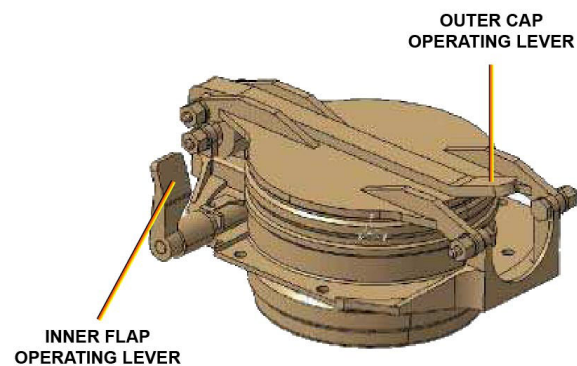
To empty each waste tank is necessary to pull the actuation unit that will open its respective Waste Drain Valve.

To avoid the waste transfer between the different tanks it's important to open the drain valves one by one.

Once the tanks are empty, it's necessary to flush/rinse them and perform a pre-charge with a disinfectant fluid.

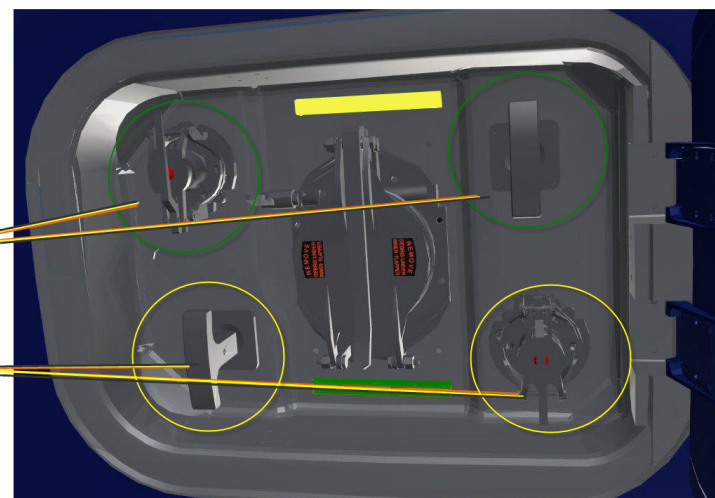


WASTE LH TANK FULL



R/H WASTE TANK

L/H WASTE TANK



WASTE SERVICE PANEL, DOOR OPEN

WASTE SYSTEM SERVICING (2)



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