7 TOILET AND WATER SUPPLY

Version: **1.1**



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Amendment and Revisions

Version	Date	Corrections	Remarks
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7.1. IR-DRDO Small Bio-Digester Tank for LHB Coaches

These tanks are made of stainless steel and having following constructional features The size of the tank is 515 X 766 X 1040 mm (HXWXL) with the provision of 02 no's inbuilt C-Type mounting system along the length of the tank. Each mounting is with the provision of 02 nos. M16 Size bolts which are tightened with the inner and outer head stocks.

7.1.2 Main Parts of the Bio Digester Tank

1. Stainless steel tank with 06 partition walls inside the tank
2. Poly grass mats for protection of bacteria inside the walls.
3. Ball valve with handle for operation during emergency for making toilet direct discharge in case of choking.
4. SS fasteners in place of MS on tank covers.
5. Stronger bonding of Colonized rubber mats with vertical walls

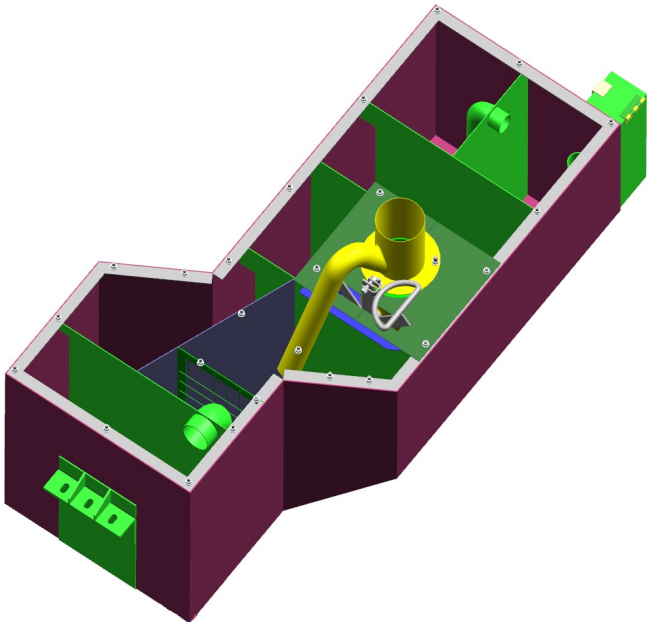


Figure-1.1

7.1.3 Important Dimensions & Volume of Bio-Digester Tank

1. Length - 1040 mm
2. Width - 766 mm
3. Height – 515 mm
4. Total Volume of Tank - 410 lt.
5. Working Volume of Tank – 332 lt
6. Empty Tank weight – 120 Kg.
7. Full Tank Weight – 425 Kg.
8. Height from Rail level -270 mm.

Note:- For detailed design and drawing of bio-digesters of LHB coaches refer IR-DRDO bio-toilet Compendium issued by CAMTECH

7.2. Bio-Vacuum Toilet System

Bio-Vacuum toilets are integration of vacuum toilet with existing IR-DRDO bio digester. Bio vacuum toilets shall be customized with existing lavatory module being fitted along with bio digester.

7.2.1 Principle of Working of Bio-Vacuum Toilet System

Vacuum evacuation system for Bio-tanks will transfer the fecal matter from the bowl/pan to the bio tank by positive suction and also clean the lavatory bowl/pan with pressurized jet automatically, without affecting functionality of bio digester. The vacuum evacuation is designed in such a way that it sucks out the waste from each toilet with minimum use of water into the Bio-digester tank installed under the

carriage. The toilet system is isolated from the bio-tank to avoid bad odor in the passenger area.

The main component of the system Lavatory pan/bowl (Indian squatting/Western design). Vacuum toilet system and pressurized flushing arrangement including interfacing for supplies like water & compressed air etc.

Pneumatic/Electro-pneumatic Control panel and associated accessories for the system operation.

Associated plumbing & water hoses, pneumatic piping, and electrical wiring, etc. Any other material and interface required with existing coach systems to make the vacuum toilet fully functional & operational without any constraints.

7.2.2 Line Diagram of Bio-Vacuum Toilet System

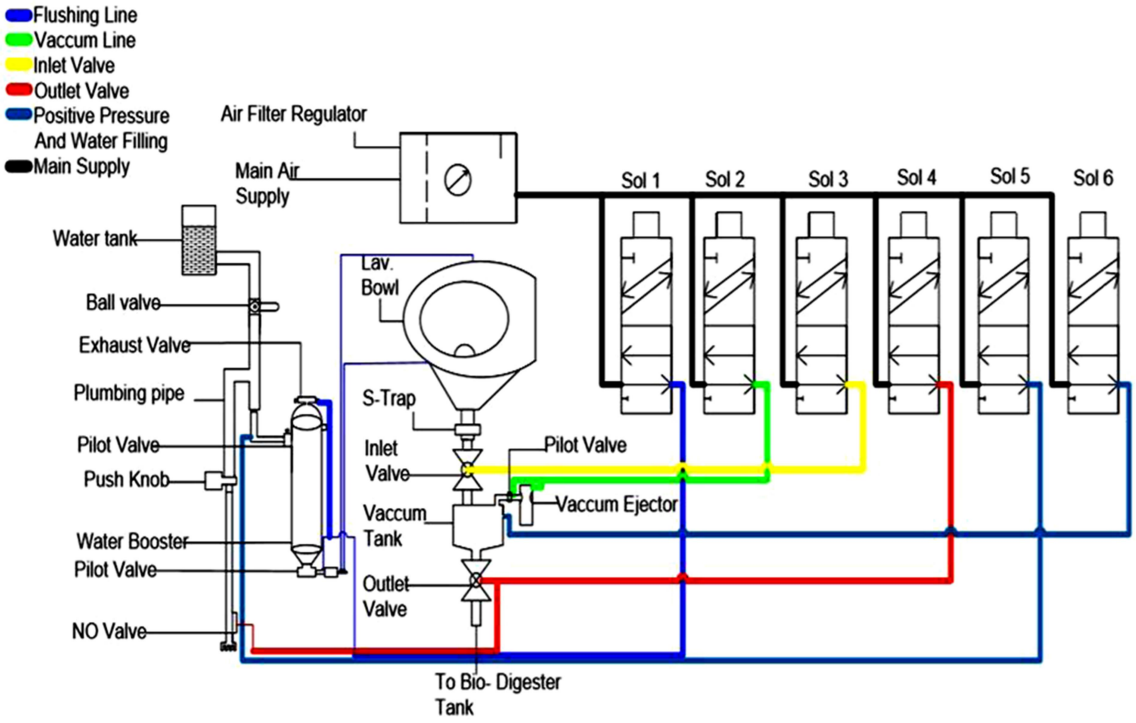


Figure-1.2

7.2.3 Actual Layout of Bio-Vacuum Toilet System

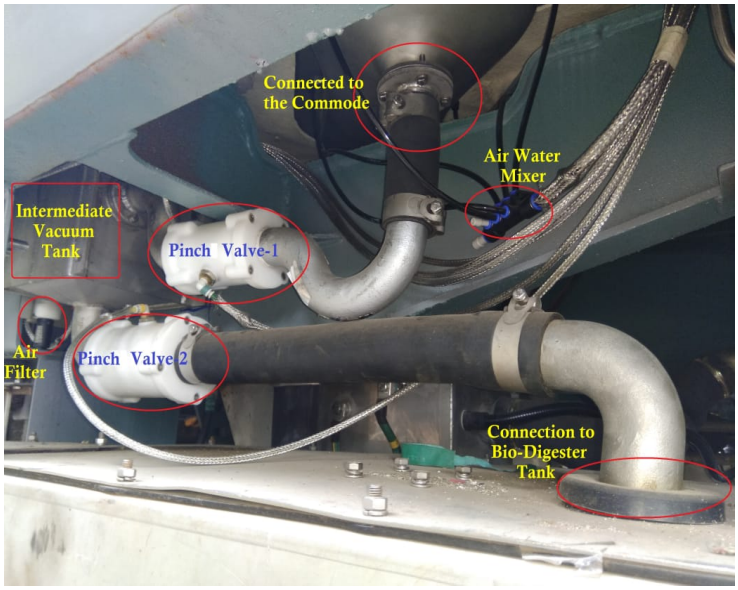


Figure-1.3

7.2.4 System Interface

1. Water Supply:

There is one tank of 30 ltr capacity available over each toilet at a height of about 2030 mm from toilet floor in air conditioned coaches whereas for non-AC LHB coaches tank of 390 litre is available at the same height. Water is pumped to these from under-frame mounted main water tanks. Water flow to the flushing valve is by gravity. These tanks are not pressurized and the water flow from these tanks is by gravity.

2. Pneumatic Supply:

i. A limited quantity of air supply of around 15 lit/min per coach can be made available connected to feed pipe at 6 kg/cm2 with provision of one 75 ltr. reservoir in the coach exclusively for toilet system.

ii. It is desirable that at least minimum 2 (two) number of usages are feasible when the air supply as specified above is disconnected/cut-off.

3. Power Supply:

i. 110 Volt AC/DC power supply is available in all AC LHB coaches. If any power is required, the equipments are so designed to withstand 30% voltage fluctuations. However 110V DC only is available in Non-AC coaches.

ii. AC-DC / DC-DC converter fitted which is able to withstand +/- 30% voltage fluctuations, 2 KVA surge, +/-10% ripple and complying with IEC 60571 or any equivalent international standards. Total peak power requirement per coach is 800 watts max.

4. Flushing System

The water consumption shall be minimum {with 0.5 liter (min.) to 0.8 liter (max.) water per flush} for 100 % cleaning of the commode or pan.

5. Water Pressuring Unit

Pressurised water through nozzles/spray ring is used for bowl cleaning. To avoid

splashing of fecal matter, pneumatic/electro pneumatic water pressuriser of max. allowable air of 15 litres per minute/coach is used.

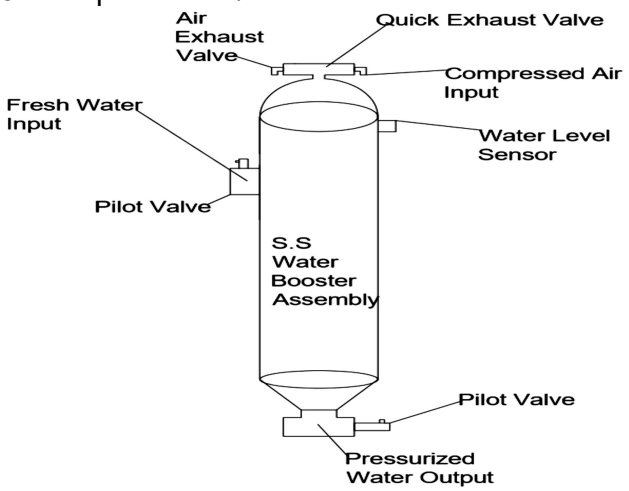


Figure-1.3

6. Toilet Pan/ Bowl /Trough Floor

Bowl of western commode and Indian style toilet pan is made up of SS AISI 316L or better grade with surface finish no.7. RCF Drawing no of RCF of western commode is LS63117 and Indian style toilet pan is LE63202 alt.2

Material	Bowl	Stainless Steel
Weight		Approx. 12.5 Kg
Supplies	Compressed air	4 to 10 bar
	Water	Pressure: 0.2 bar to 1.5 bar Minimum flow rate: 2 Lit/min
	Electrical	24 V DC
External Connections	Mechanical	Mounting holes Ø 6.5 mm (8x)
	Compressed air	Ø 6 mm
	Water	Ø 12 mm
	Outlet	Ø 48 mm

7. Interfaces of Toilet Pan

i. **Flush nozzle:** - The bowl is equipped with five plastic nozzles that will flush the bowl efficiently. Due to the design and placement of the flush nozzles the water consumption of the squatting is low, just approx. 0.5-0.7L.

ii. **Liquid Level Guard:** - The optical liquid level guard ensures that the bowl will not overflow. The sensor is activated with a delay to avoid accidental activation during the flush cycle or while cleaning. It is maintenance-free.

iii. **Pinch Valve:** - One Pinch valve is installed into the piping between squatting pan and the intermediate tank and one pinch valve is installed between the intermediate tank and the bio-digester.

iv. **Pressure Guard:** - The preset pressure guard controls the compressed air supply of the pinch valve. Switching point 300/250 Kpa.

8. Intermediate tank/Vacuum tank

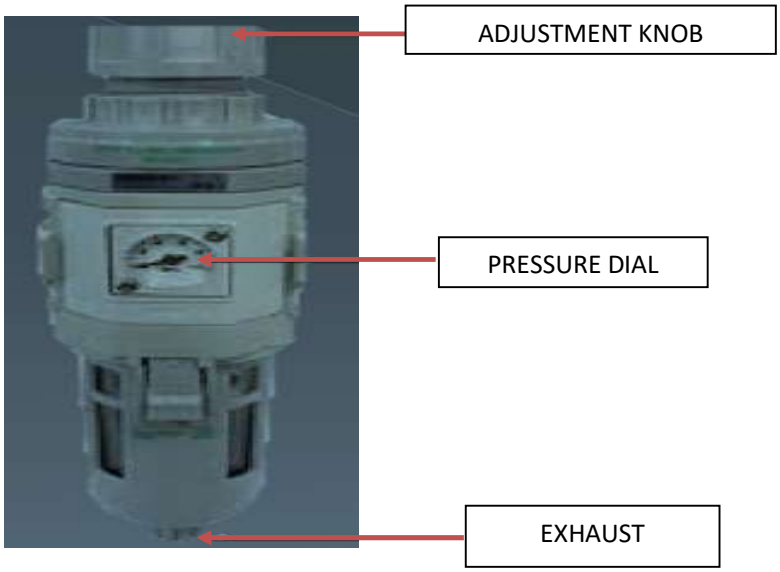
Intermediate tank is the vacuum reservoir and hence is also commonly called as vacuum tank. The negative pressure is generated here which will eventually create suction action in the bowl. This tank is to also hold the waste during the flush cycle which will be flushed out to the waste tank with a positive pressure. The intermediate tank can handle -80KPa of working pressure

9. Vacuum Ejector

Generates the vacuum by a flow of compressed air in the vacuum tank. It also exhausts the unwanted gases from the system

10. Air filter Regulator:-

The unit is fitted before the Control panel box and it provides a clean air input to the solenoid valves in the Control panel. This unit also helps to regulate the desired air pressure as per system requirement.



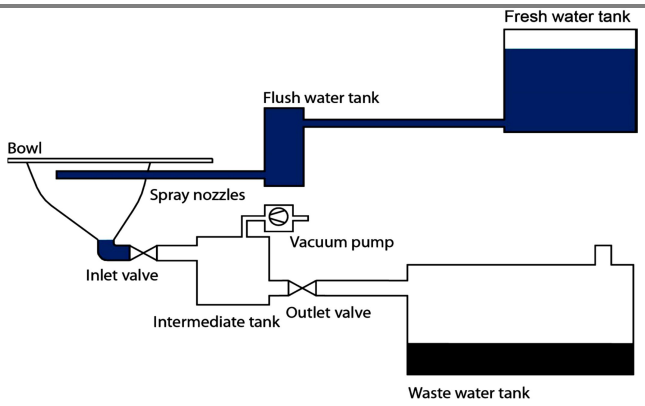
11. Electronic Control Panel:-

The control board controls and monitors the functionality of the compact toilet system and consists of a RS-Box, a DC/DC converter, the control unit (STC), an LED board vacuum pressure switch, vacuum pressure switch, pneumatic solenoid valves, digital pressure switch and a Human machine interface(HMI) integrated with PLC. Control unit which designed with the PLC/Microcontroller/Microprocessor Control unit, having IP67 protection from dust. Control unit and other electronic/electro-pneumatics are enclosed in a box with lockable opening doors/panel. The panel is provided in the space mentioned in the RCF drawing no. MI005425.

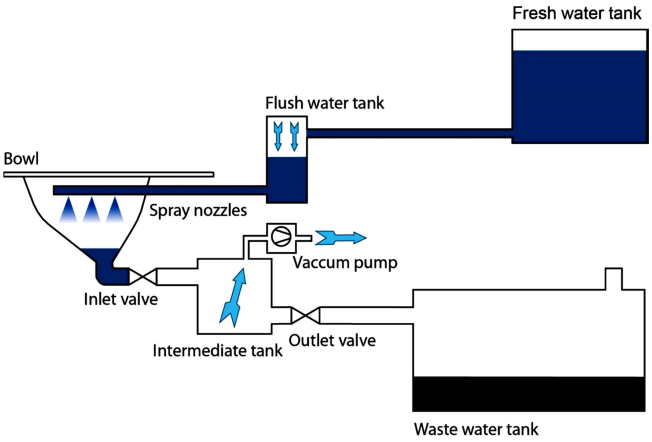
7.2.5 Operating Description

Squatting toilet assembly is designed to transport human waste from the toilet bowl to bio-digester. The complete process is described as follows.

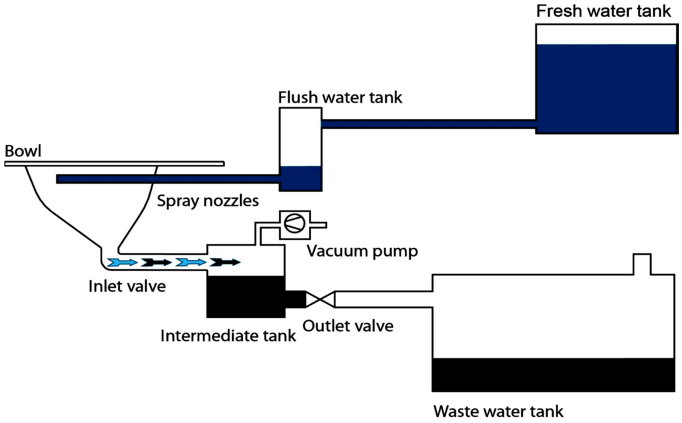
Stand-By: - In stand-by the squatting bowl is filled with an initial water supply, the flush water tank on the water system panel is filled up and the base unit is empty. Inlet Pinch valve and outlet Pinch Valve are closed and the LED on the flush button illuminates permanently



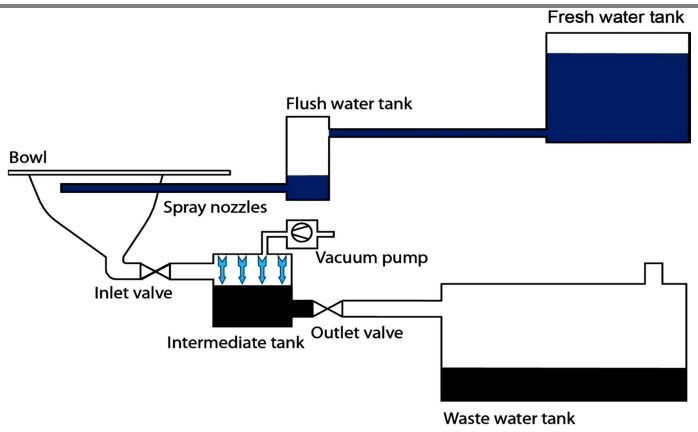
Flushing the Toilet Bowl and Evacuating the Intermediate tank: - The flush button is pressed, the LED on the flush button begins to flash and the squatting toilet starts the flush cycle. The complete cycle takes approx. 25 seconds. Compressed air is pressed into the flush water tank, positioned on the water system panel. Flush water is pressed through the spray nozzles by the pressurized flush water tank. The squatting bowl is flushed with high efficiency. At the same time the vacuum pump evacuates the Intermediate tank until the necessary vacuum level - 0.05 to -0.5 bar is reached.



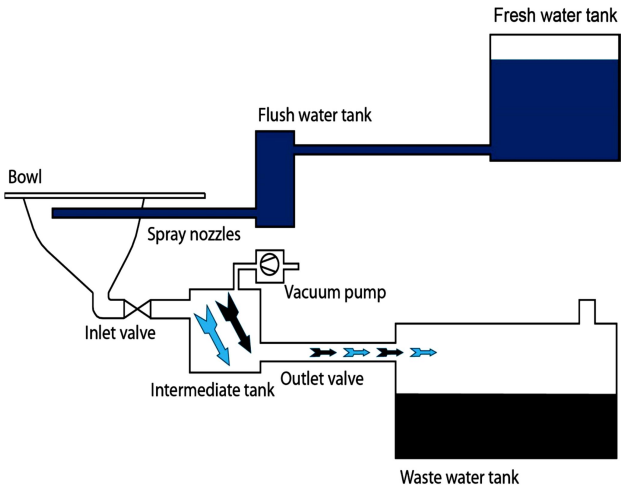
Emptying the Bowl: - As soon as the required level is reached the pinch valve between squatting bowl and intermediate tank is opened for a short time. The vacuum inside the intermediate tank sucks the contents of the bowl into the base unit



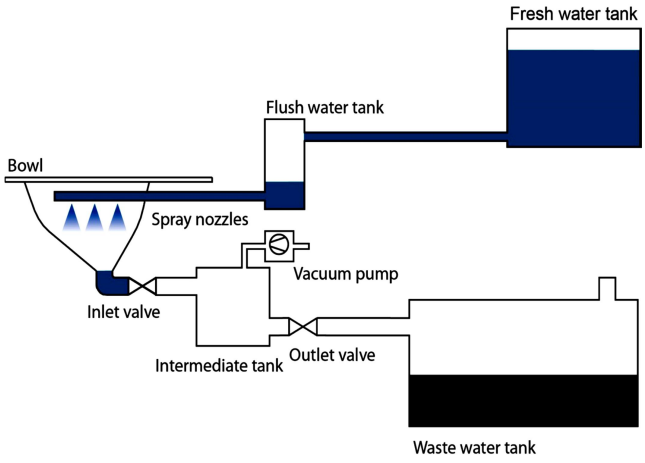
Pressure Built-Up Intermediate Tank: - The pinch valve is closed and now compressed air is blown into the Intermediate tank until a pressure of approx. +0.6 bar is reached



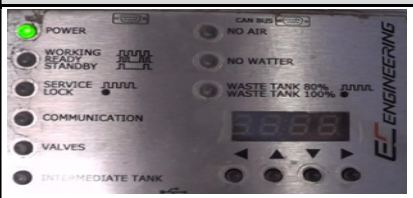
Emptying the Intermediate Tank: - The Outlet valve shortly opens the piping to the Bio digester. Two pressure surges emptied the contents of the Intermediate tank into the Bio digester. At the same time the water inlet valve positioned on the water system panel opens and the flush water tank is refilled.

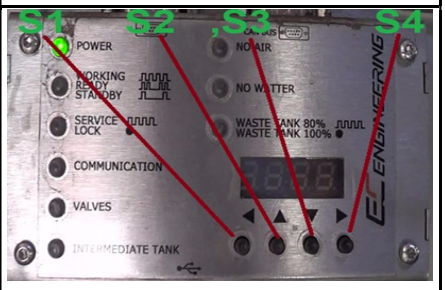


Initial Water Supply: - Compressed air is pressed into the flush water tank and presses water through the spray nozzles and in the toilet bowl again. The bowl is flushed efficiently and an initial water supply is build up. The system switches to stand-by mode



7.2.6 Trouble Shooting

Sr. No	Fault/ Errors	Check Points	Figure
1	**No Power**	In case of no power (110 V DC) to control panel , the LED will be OFF. Power indicator should be always ON.	
2	**Air Fault**	• Air supply lever should be open. • Air pressure value to be confirmed from air filter regulator / digital switch inside the Panel. • Positive Pressure wire connection to be checked. • Air pressure must be at least 4 bar. Lower pressure can cause the toilet to be plugged. Pressure below 2.5 to 3.5 bar will cause the toilet to shut down and no air indicator will light up.	 Low Pressure  Normal Pressure
3	**Water Fault**	• There is a sensor inside the water tank overhead. If water level goes below it, NO WATER indicator will light up. • Water supply lever should be open. • Check the water in overhead water tank. • Water sensor wire connection to be checked.	
4	**No Flushing**	• Flush wire connection to be checked at dual flush knob and terminal block inside the panel box. • Pan sensor functionality to be checked in HMI display. • Output end of solenoid valve to be checked for air pressure. • Nozzle blockage to be cross checked. • No tangling of outlet water pipe from water booster.	
5	**Chocking**	• If the intermediate tank gets filled up to its limit, the indicator will light up. • Operate manually solenoids 2, 3, 6 and 4 of flushing cycle. Conduct the steps repeatedly,	

		for optimum restoration of system (in Oasis System). • Close the air input to switch the complete system in manual mode and press knob to flush water gravitationally in order to keep system operational. • Foreign material presence from S trap end to Pinch valve outlet.	
6	**No Vacuum Generation**	• Output end of solenoid valve to be checked for air pressure. • No tangling of tube (green) from solenoid valve outlet to Vacuum ejector inlet.	
7	**Damaged/ Loose/Open connection of system:-**	This problem may due to hitting of foreign particles or lose connection due to any reasons which may cause no air, no vacuum or spread over of fecal matter over tank.	
8	**Soft Reverse (in old design Bio-Vacuum toilet system & in Amit Engineers System)**	For soft reverse press and hold S1,S2 and S3 for 3 seconds. Pinch hole open and suck the clogging about 20 to 25 times. This is recommended in en-route trouble.	 
9	**Hard Reverse (in old variant of Bio-Vacuum toilet system)**	• It is just opposite of Soft reverse. In this mode waste moves in the opposite direction to the one used in normal operation. In this process bowl should be closed/covered. • The purpose is to remove or clear the blockage of bowl/pipe which are unable to suck by Pinch Valve. • Procedure- Press S1,S2 and S4 and hold for 3 sec to activate and then confirm the mode by pressing S3.	

7.2.7 Maintenance Instruction of Vacuum Bio Toilet

- Do not dean polished stainless steel toilet pan with a brush as it may scratch the surface of the toilet pan. The polished surface prevents any dirt from sticking to it and shortens the time needed for cleaning the toilet.
- Use only water and approved washing agents during regular maintenance works on the toilet.
- Discoloration on the surface can be removed using mild soap solution.
- Do not use any chemical agents. like aggressive acids or strong bases for cleaning/maintenance.
- Using such chemical agents may result in weakening of the rubber elements inside the valves which may result in the loss of tightness and incorrect operation of the vacuum toilet.
- Such chemicals on entering bio-toilet will affect the bacteria culture.
- Water supplied to the toilet must flow through mesh filter/Y-strainer to avoid chocking of pan nozzles.
- Toilet pan has to be covered during hard reserve cycle for safety reason while removing the major block in toilet pan.

7.2.8 Following Instruction to Be Followed While Using Vacuum Bio Toilet System

Note: Instruction as mentioned below can be pasted beside toilet so that it can be easily read

- The manufacturer recommends not to throw any objects like cigarettes, cotton swabs, medicine, needle, paper towels, wipers, diapers, sanitary napkins. gutka or toffee wrappers, pencil, pen, bottles, plastic /metal objects, chemical substances etc or any other object inside the toilet pan, since it can cause break down.
- Do not flush the toilet while seated.
- Close the lid before flushing and open the lid after flushing cycle is completed.

7.3. Electro Pneumatic Pressurized Flushing System

7.3.1 Introduction

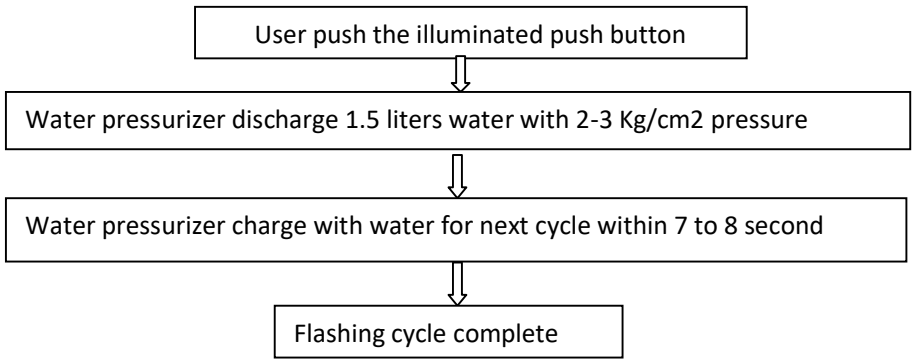
Electro Pneumatic Pressurized Flushing System (EPPFS) is positive displacement type having “Piston-Cylinder arrangement” type set up for creating pressurized water supply without allowing water coming into contact with pressurized air and has been designed to provide long trouble free service and uses standard components easily available from globally renowned manufacturers who have been operating in India for a long time and are well known for quality. While designing the System, safety and convenience of the passengers have been paid special consideration. The system is non corrosive type and would render satisfactory performance for a long time.

The System would dispense 1.5 Liter water @ pressure of 2-3 Kg/cm² each time with

light pressing the Push Button Switch having metallic body and would be ready for next use in 7-8 Seconds.

System is user friendly, modular in design, durable, portable and very easy to use install and maintain. All the electrical, electronic and pneumatic parts of the system are shock and vibration proof and comply with IEC 61373 category -2 or equivalent international standard.

7.3.2 Function Block Diagram



7.3.3 Specifications

Pressurization time	7-8 Seconds
Flushing Pressure	2-3 Kg/nm²
Water Consumption	1.5 Liters
Air Consumption	3 Liters approx
Power Consumption	≤10 Watt

7.3.4 Method of Measurement

Water Pressure	By Dial Gauge
Water Volume	Measurement by Measuring Flask after 10 Cycle & taking average
Cycle time	By HMI of test bench

i. The electro pneumatic pressurized flushing system will be ready to use within maximum 8 seconds after each use.
ii. Maximum discharge of water during the flush will be 1.5 liters.
iii. No mix of air and water will be released in the bowl at the time of flushing.
iv. There will be no leakage from the system at 5 bar pressure and dispense approx. 1.5 liters of water at the time of flushing.
v. Consumption of air will be 3 liters per flushing operation.
vi. Electro pneumatic pressurized flushing system is designed for a usage of minimum 150 times within 24 hours.
vii. Total peak power per coach will not exceed 40 watts.
viii. Railway grade components are used in all electrical and electronic items.
ix. The system has been so designed that it doesn't require day to day maintenance

7.3.5 Preventive Maintenance Plan

SN	Period	Description
1	Every day	i. Cleaning the surface of the lavatory bowl/pan a regular intervals. If water is not coming out there may be a chance of clogging of lavatory pan nozzles. ii. Clean the Y-Strainer. If water is not coming out there may be a chance of Strainer filter Chock
2	Every Month	i. Check whether there is water or air leakage on Western Style Module/ Indian Style Module. ii. Check all the Hose Pipes Under frame, replace them if necessary.
3	Every six Months	i. Rubber Seal Kit of Water Pump to be cleaned / replaced . ii. Spool Seal Kit of Pneumatic Valve to be cleaned / replaced. iii. Spring of NRV , 2/2 Valve and Piston valve to be checked / replaced.
4	Every Year	i. Filling 4% lemon acid solutions into the lavatory bowl/pan. The liquid should cover the spray nozzles. Immerse for one hour and then clean the lavatory bowl/pan with clean water and soft brush. ii. Clean the lavatory bowl/pan nozzles. iii. Check the leak tightness of the discharge valve (2/2 Piston Valve) iv. Check the ageing condition of Hose under the Coach, and replace it if necessary. v. Remove the safety Valve on the interim tank, repair or replace it if necessary.
5	Every 3 Years	i. Replace all the Hoses and Rubber Joints under the Coach. ii. Disassemble the discharge Valve completely, replace the seal components, and replace it completely if necessary. iii. Disassemble the nozzles, waste pipeline fittings and water pipe fittings, and clean these components after steeping them with 4% citric acid solution for 1 hour. iv. Check the pneumatic valve and other parts, and replace them if necessary. v. Reassemble the system, and conduct a comprehensive test according to the requirements of test program.

7.3.6 Troubleshooting

General Problems	Remedial Actions
Airline not working properly	i. Check pneumatic connections as per assembly drawing 270-04-00-000 ii. Check input pressure using pressure gauge. iii. Check air Ball Valve is open. iv. Check the Air Line for any clogging. v. Check output pressure from pressure regulator using pressure gauge.
Water line not working properly	i. Check water connections as per the assembly drawing 270-05-00-000 ii. Check input connection from the overhead tank to the pressuriser unit. iii. Check water ball valve is open iv. Check the water line for any clogging. v. Check output connection of water pressurization system up-to the toilet pan/bowl.
Water output not available in the toilet pan/bowl.	i. Check the all connections as per the assembly drawing 270-03-00-000 ii. Check pneumatic connections of Solenoid Valve in Penal. iii. Check pneumatic connections of pressuriser unit. iv. Check air pressure available. v. Check the input N.R.V and output 2/2 valve for any

	Clogging. vi. Check the Power Supply is Working or not vii. Check the Timer and Relay

7.3.7 Schematic Diagram for Electro Pneumatic Water Pressuriser

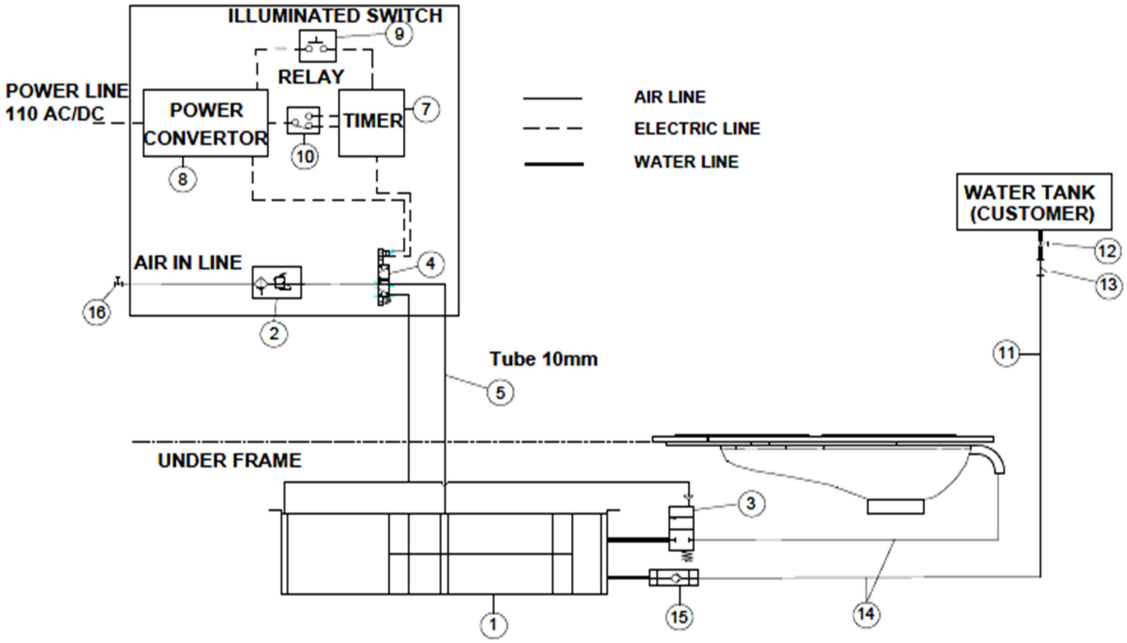


Figure-1.4

ITEMS LIST					
SN	**DESCRIPTION**	**QPA**	**UNIT**	**MODEL NO.**	**MAKE**
1	Pressuriser Cylinder	1	Nos	AACT-100-1.5LE	A&A
2	Fillter Regulator (3Bar)	1	Nos	W1000-8-W-F1	CKD
3	Piston Valve	1	Nos	SAB1W-20A-08	CKD
4	5/2 Valve 24VDC	1	Nos	4GB210R-08-E2-3	CKD
5	Nylon Tube (10mm)	8	Mtr	EA1080B	PISCO
6	Timer	1	Nos	H3DKZ-A1DC24-240	OMRON
7	Power Converter	1	Nos	S8FS-G01524C	OMRON
8	Illuminated Green Push button	1	Nos	2ALRF3L24VDC	TECHNIC
9	Relay	1	Nos	MY2N-GS24VDC	OMRON
10	SS Pipe 3/4"	1	Nos	SS304	
11	Ball Valve 3/4"	1.5	Mtr.	SS304	HITTCO
12	Y-Stainer 3/4"	1	Nos	SS304	HITTCO
13	Hose Pipe 3/4"	1	Nos	THARMO PLAST	KESARA
14	Check Valve	3	Nos	SBM20	SANT
15	Bally Valve 1/4"	1	Nos	NIL	TECHNO

7.4. Water Supply System

Filling water in LHB coaches, kindly refer to RDSO Pamphlets No. C- 7601 & C- 9009 respectively**.**

Types of water tanks:

1st type:

Volume of water contained	685 liters
Material:	Stainless steel
Dimensions:	
Length:	2760 mm
Diameter:	591 mm

The tanks are installed in twos, are fixed with frames and are secured by safety belts. The tanks must contain only water. The 685-liter-tanks installed in the under frame constitute the fresh water reserves in the passenger coaches.

2nd type :

Volume of water contained:	450 liters
Material :	Stainless steel
Dimensions :	
Length :	2037 mm
Diameter	591 mm

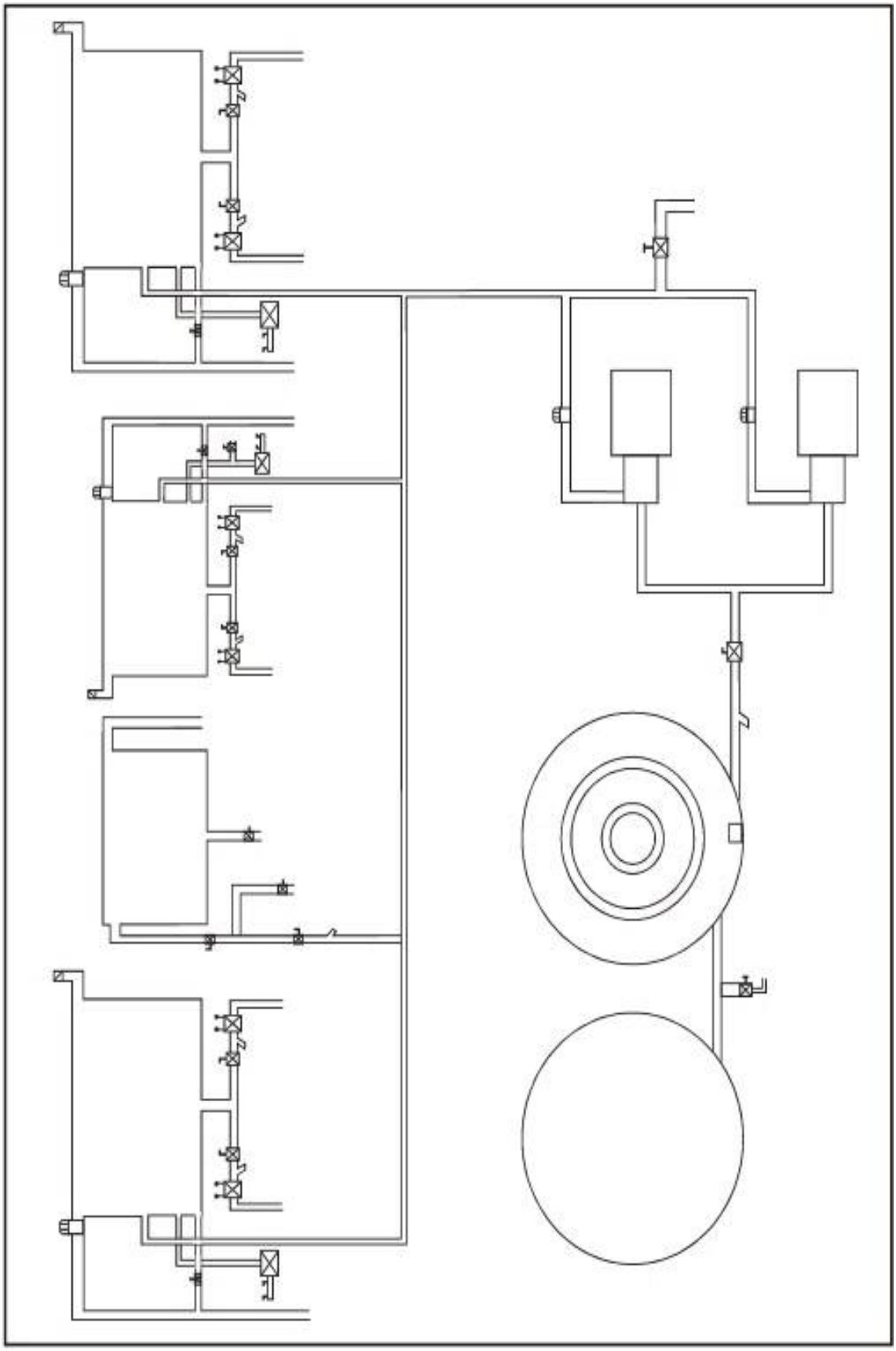
The tanks are installed alone, are fixed with frames and are secured by safety belts. The tanks must contain only water. The 450-liter-tanks installed in the under frame constitute the fresh water reserves in the generator cars.

3rd type :

Volume of water contained:	30 liters
Material :	Stainless steel
Dimensions	
Length:	927 mm
Diameter :	220 mm

The tanks are installed alone and are fixed with 2 supports which are equipped with belts. The tanks must contain only water. The 30-liter tanks are installed in the roof and are continuously freshwater-fed by means of pumps. They maintain the good running of water supply of the barometrical capacitor at each station, thanks to their exposed positioning. The tanks are complete and welded as well as the support frames. The elastic joints (glued) of the frames and the waterproof-ness joints of the flanges are mounted. The screws and bolts of the tanks are installed. Only the screws and bolts of the frames are separately delivered. In case of necessary repairing, references of glued joints and of glue are provided.

Layout of Water Supply System



7.4.1 Cleaning of the Water System of the LHB Coaches With Vinegar to Wash Out Chalk Deposit

Due to the quality of the water with a high hardness used in service for the LHB coaches a regular cleaning of the water system with vinegar is required to avoid the negative effect of lime scale on the function of the water system.

It is advisable to execute the cleaning at three levels:

Type	Name	Time interval
Level -1	Rinsing of the water pumps	every 4 weeks, but latest all 8 weeks
Level -2	Rinsing of the pipes	every 3 months
Level -3	Rinsing of the system	every 6 months

The following work steps have to be executed on the different levels:

Type	Description
Level - 1	**Rinsing of the water pumps:** • Drain off the water from the 685 Ltr. tanks through the valve on the tank bottom (water scheme, pos. 45, No. 1) except for 100 Ltr. per tank • Fill 4 Ltr. vinegar in each tank. • Open the draining for both pumps (water scheme, pos. 43, No. 2). • Drain off 10 Ltr. from each pump and close the draining. • Loosen the pipe for water supply behind the pump container (water scheme, pipe with diameter 22 mm, No. 3). • Start fist pump and let 20 Ltr. out, switch pump off. • Start second pump and let 20 Ltr. out, switch pump off. • Wait for min 6 hours (max 10 hours). • Drain off the water from the 685 Ltr. tanks (water scheme, pos. 45, No. 1). • Open the draining for both pumps (water scheme, pos. 43, No. 2). • Drain off water from each pump and close the draining again. • Fill each 685 Ltr. tank with 100 l each. • Rinse both pumps alternating. • Drain off the water from the 685 Ltr. tanks (water scheme, pos. 45, No. 1). • Fix the pipe for water supply behind the pump container (water scheme, pipe with diameter 22 mm, No. 3). • Fill the system with water.
Level -2	**Rinsing of the pipes** • Close valve for water supply for pantry (below wash basin) (water scheme, pos. 42, No. 4) • Drain off the water from the 685 Ltr.tanks through the valve on the tank bottom (water scheme, pos. 45, No. 1) except for 200 Ltr. per tank • Fill 6 Ltr. vinegar in each tank • Open the return valve above the control panel for each of the 3 water tanks for the toilets (water scheme, pos. 42, No, 5) • Start pump and rinse for an hour • Drain off the water from the 685 Ltr. tanks through the valve on the tank bottom (water scheme, pos. 45, No. 1) • Fill 400 Ltr.in each tank • Start pump and rinse for an hour • Drain off the water from the 685 l tanks through the valve on the tank bottom (water scheme, pos. 45, No. 1) • Close the return valve above the control panel for each of the 3 water tanks for the toilets (water scheme, pos. 42, No, 5) • Fill system with water

Type	Description
	• Open valve for water supply for pantry (below wash basin) (water scheme, pos. 42, No. 4)
Level - 3	**<u>Rinsing of system</u>** • Close valve for water supply for pantry (below wash basin) (water scheme, pos. 42, No. 4) • Drain off the water from the 685 Ltr. tanks through the valve on the tank bottom (water scheme, pos. 45, No. 1) except for 150 l per tank • Fill 10 Ltr. vinegar in each tank • Open the return valve above the control panel for each of the 3 water • tanks for the toilets (water scheme, pos. 42, No, 5) • Start pump and rinse for 30 minutes • Close the return valve above the control panel for each of the 3 water tanks for the toilets (water scheme, pos. 42, No. 5) • Use WC flush, wash basin flush and mug flush 3-times each • Wait for 24 hours • Drain off all water from the tank above toilets (water scheme, pos. 42, No.5) • Drain off all water 685 l tanks (water scheme, pos. 45, No. 1) and pumps (water scheme, pos. 43, No. 2) • Fill the 685 Ltr. tanks • Start the pump and rinse for 10 minutes • Use WC flush, wash basin flush and mug flush 3-times each • Drain off all water from the tank above toilets (water scheme, pos. 42, No.5) • Drain off all water 685 Ltr. tanks (water scheme, pos. 45, No. 1) and pumps (water scheme, pos. 43, No. 2) • Fill system with water • Open valve for water supply for pantry (below wash basin) (water scheme, pos. 42, No. 4)

Water System of LHB Coach

