

Item / Function	Failure Mode	Cause(s) / Mechanism(s) of Failure	Effect(s) of Failure	End Result(s) of Failure	S e v e r i t y	O c c u r r e n c e	D e t e c t i o n	R. P. N.	CODE	Current Design Controls	CODE	Recommended Actions	CODE
A. Level Sensor	Wrong Location (in tank)	Out Of Position	Sensor Level Too High	Sensor Level Too High	3	3	1	9	On High Level - Close Fill, Open Drain, fill slower than drain				
	Wrong Location (out tank)	Out Of Position	Sensor Level Too Low	Sensor Level Too Low	3	3	1	9	On Low Level - Close Valves, turn off pump				
	Erroneous Reading	Any Reason	Sensor Makes No Sense	Sensor Makes No Sense	3	2	1	6	On Bad Sensor - Close Valves, turn off pump				
	Intermittent Reading	Bubbles	Sensor Gives Random Readings	Wrong Action (oscillation)	5	2	2	20	STOP				
										Always check sensor multiple times			
B. Inlet	Clogged	Any Reason	No Filter Flow	No Filter Flow	2	3	3	18	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
	Not In Tank	Out Of Position	Flood	Flood	5	2	4	40	Visual Check - Leak Sensor - Low Level Action		Tie lines together		
C. Pump	Not Pumping	Any Reason	No Filter Flow	No Filter Flow	3	2	1	6	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
			Drain May Not Work		3	2	1	6	Visual Check - Not a big problem which will be found in time				
	Tube Disconnected	Out Of Position	No Filter Flow	No Filter Flow	3	2	2	12	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
			Drain May Not Work		3	2	1	6	Visual Check - Not a big problem which will be found in time				
			Flood	Flood	5	2	4	40	On Low Level - Close Valves, turn off pump		Tie lines together		
	Not In Tank	Out Of Position	No Filter Flow	No Filter Flow	3	2	2	12	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
			Drain May Not Work		3	2	1	6	Visual Check - Not a big problem which will be found in time				
			Flood	Flood	5	1	1	5	Visual Check - Leak Sensor - Low Level Action				
C1. Vacuum Break	Clogged	Any Reason	Tank Drain	Dead Fish	5	1	3	15	Redundant Vacuum Breaks - Low Level Action				
	Leaks (too big)	Holes too big	Poor Filter Flow		2	1	3	6	Visual Check				
C2. Flow Sensor	Clogged	Any Reason	No Filter Flow	No Filter Flow	2	3	3	18	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
	Leaks	Any Reason	Flood	Flood	4	2	3	24	Redundant Vacuum Breaks - Low Level Action		Position above water level		
	Wrong Reading (flow when noflow)	Any Reason	Flow when no flow	Might trigger wrong error		2	3		Easily Testable				
	Wrong Reading (noflow when flow)	Any Reason	No flow when flow	Might trigger wrong error		2	3		Easily Testable				
D. Disconnect	Comes Loose	Any Reason	Flood	Flood	5	1	3	15	Redundant Vacuum Breaks - Low Level Action		Position above water level		
	Clogged	Any Reason	No Drain		3	1	2	6	Drain timeout Error				
			No Fill		3	1	2	6	Fill timeout Error				
	Leaks	Any Reason	Flood	Flood	4	2	3	24	Redundant Vacuum Breaks - Low Level Action		Position above water level		
E. 5um Filter	Clogged	Any Reason	No Filter Flow	No Filter Flow	3	4	2	24	Visual Check - Not a big problem which will be found in time		Flow Sensor/Indicator		
	Leaks	Any Reason	Flood	Flood	4	2	2	16	Redundant Vacuum Breaks - Low Level Action		Position above water level		
F. Fill Valve	Stuck Open	Any Reason	Flood	Flood	5	2	4	40	On High Level - Close Fill, Open Drain, fill slower than drain				
	Stuck Closed (clogged)	Any Reason	No Fill	No Fill	3	2	2	12	Fill timeout Error				
	Leaks	Any Reason	Flood	Flood	4	2	2	16	Redundant Vacuum Breaks - Low Level Action		Position above water level		
F1. Backflow Valve	Stuck Open	Any Reason	Water Contamination	Water Contamination	4	1	4	16	Unlikely				
	Stuck Closed (clogged)	Any Reason	No Fill	No Fill	3	1	2	6	Fill timeout Error				
	Leaks	Any Reason	Flood	Flood	4	1	2	8	Leak Sensor		Position above water level		
G. Drain valve	Stuck Open	Any Reason	Dry Tank	Dead Fish	3	2	3	18	Redundant Vacuum Breaks - Low Level Action				
	Stuck Closed (clogged)	Any Reason	No Drain	No Drain	3	2	3	18	Drain timeout Error				
	Leaks	Any Reason	Flood	Flood	4	2	2	16	Redundant Vacuum Breaks - Low Level Action		Position above water level		
H. Carbon Filter	Clogged	Any Reason	No Fill	No Fill	3	1	1	3	Fill timeout Error				
	Leaks	Any Reason	Flood	Flood	4	2	2	16	Leak Sensor		Slow leak - Leak Sensor		
	Old (Carbon Dead)	Left in too long	Water Contamination	Water Contamination	4	2	1	8	Change every year				
I. Input Valve	Stuck Open	Any Reason	Can't Shut Off Water (there)	Can't Shut Off Water (there)	1	1	1	1	Unlikely and easy to spot with no damage				
	Stuck Closed	Any Reason	No Fill	No Fill	3	1	1	3	Unlikely and easy to spot with no damage				
	Leaks	Any Reason	Flood	Flood	4	2	2	16	Leak Sensor		Slow leak - Leak Sensor		

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J. Domestic Water	Loss Of Pressure	Any Reason	No Fill	No Fill	3	3	2	18	Fill timeout Error	
			Back Flow	Back Flow	4	2	4	32	Anti-backflow Valve	
K. Computer Controller	Shorted Control Line Open Control Line Loss Of DC Power	Any Reason	Driver Damage	Driver Damage	4	0	3	0	Proper design	
		Any Reason	No Function	No Function	3	2	2	12	Unlikely and easy to spot with no damage	
		Any Reason	System Off	System Off	3	2	3	18	Fails in place	
L. Pump Relay	Stuck Short Stuck Open	Any Reason	Pump Always On	Pump Always On	2	1	2	4	Unlikely and easy to spot with no damage	
		Any Reason	Pump Always Off	Pump Always Off	3	1	2	6	Unlikely and easy to spot with no damage	Flow Sensor/Indicator
M. Fill Relay	Stuck Short Stuck Open	Any Reason	Fill Relay Always On	System Overflow	5	1	4	20	On High Level - Close Fill, Open Drain, fill slower than drain	
		Any Reason	Fill Relay Always Off	System Low Level	3	1	2	6	Fill timeout Error	
N. Drain Relay	Stuck Short Stuck Open	Any Reason	Drain Relay Always On	Dead Fish	3	1	3	9	Redundant Vacuum Breaks - Low Level Action	
		Any Reason	Drain Relay Always Off	System won't drain	3	1	3	9	Drain timeout Error	
O. Light Relay	Stuck Short Stuck Open	Any Reason	Lights Always On	Lights Always On	1	1	1	1	Unlikely and easy to spot with no damage	
		Any Reason	Lights Always Off	Lights Always Off	1	1	1	1	Unlikely and easy to spot with no damage	
P. Display	Bad LED Bad SonoLert	Any Reason	Bad Panel Information	Bad Panel Information	2	1	2	4	Test	
		Any Reason	No Alarm	No Alarm	5	1	3	15	Test	
Q. Control	Bad Switch	Any Reason	No Control	No Control	2	1	1	2	Unlikely and easy to spot with no damage	
R. USB	No Communication (passive)	Any Reason	Unable to Program	Unable to Program	1	2	1	2	Unlikely and easy to spot with no damage	
S. AC Power	No AC Power	Any Reason	System Off	System Off	3	4	1	12	Fails in place	
T. Power Supply	No DC Power	Any Reason	System Off	System Off	3	1	1	3	Fails in place	
U. Leak Sensor	Open Shorted Closed	Any Reason	Possible leak with no audio alarm	No Leak Alarm	5	1	2	10	Test	
		Any Reason	Alarm Sounds	Alarm Sounds	2	2	1	4	Alarm will sound	
V. Domestic Drain	Clogged Not In Drain	Any Reason	Water drains overflow	Flood	5	1	3	15	Check to be sure	Check/Test
		Out Of Position	Water drain to wrong place	Flood	5	2	2	20	Be sure it is in drain	Check/Test

Severity

- 5 Big Problem
- 4 Some Damage
- 3 System Does Not Work
- 2 Works Some
- 1 Works OK
- 0 No Problem

Occurrence

- 5 Always Happens
- 4 Good Chance
- 3 Maybe
- 2 Possible
- 1 Unlikely
- 0 Never Happens

Detectability

- 5 Not Detectable
- 4 Very Late
- 3 Too Late
- 2 Might Catch It
- 1 Really Should Catch It
- 0 Always Detectable