

Function Based FMEA

Failure Modes & Effects Analysis

System Name: SMART Data Collection and Display (HVAC)
 Major Function: To create awesome Energy use systems
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 Assumptions:

FMEA Number: 1
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Component/ Process	Function or Requirement	Potential Failure Modes	Potential Causes of Failure	Occurrence	Local Effects	End Effects on Product, User, Other Systems	Severity	RPN	Actions Recommended to Reduce RPN	Responsibility and Target Completion Date		
Device	Heat Pump											
	Boiler											
	Chiller											
	AHU											
	Blower											
	Other											
Sensor and or Meter	Sense Physical Properties	No Data Output	Physical Failure	3	No Data Received	No Data Displayed	9	27	Testing Sensors before installation and manually adjusting if failure occurs after installation. Suggest a Maintenance Plan to Verify Sensor Functionality and calibration before installation			
			Electrical Failure	3	No Data Received	No Data Displayed	9	27				
			Incorrect installation	1	No Data Received	No Data Displayed	3	3				
		Incorrect Data output	Miscalibration	1	Incorrect Data Received	Data Displayed is Incorrect	3	3				
			Incorrect installation	1	Incorrect Data Received	Data Displayed is Incorrect	3	3				
	Transmit Sensd Properties	No Data received	Broken connection (ethernet cable etc)	3	No Data Processed	No Data Displayed	9	27	Ensure quality of cables and create redundant system (wireless) for critical components			
			Network Protocol Error	1	No Data Processed	No Data Displayed	9	9				
			Slowed Data transmission	9	Poor System Functionality	Slow System Response	1	9				
			Overloaded Network	9	Poor System Functionality	Slow System Response	1	9				
											Limit size of data transmitted	
Server	Data Storage	Doesn't Store Data	Server Failure	9	No Data Processed	No Data Displayed	9	81	Thin Stored data or allow for additional space Limit access to qualified users, add user verification Make sure devices are grounded Debug program code prior to release			
			Broken connection (ethernet cable etc)	3	No Data Processed	No Data Displayed	9	27				
			Network Protocol Error	1	No Data Processed	No Data Displayed	9	9				
			Server at Storage Capacity	1	No Data Processed	No Data Displayed	9	9				
	Data Erased		Human Error	1	No Data Processed	No Data Displayed	9	9				
			Physical Failure	1	No Data Processed	No Data Displayed	9	9				
			Electrical Failure	1	No Data Processed	No Data Displayed	9	9				
			Programming error	1	No Data Processed	No Data Displayed	3	3				
			Sensor output misalignment	1	No Data Processed	No Data Displayed	3	3				
Filter Data	Select Relevant Data	Incorrect Data received	Human Error	3	Data Processed is Incorrect	Data Displayed is Incorrect	3	9	Limit access to qualified users, add user verification Debug program code prior to release Debug program code prior to release			
			Incorrect Algorithm	1	Data Processed is Incorrect	Data Displayed is Incorrect	3	3				
		No Data received	Incorrect format selected in design	1	No Data Processed	No Data Displayed	9	9				
			Server Failure	3	No Data Processed	No Data Displayed	9	27				
Analyze/Calculate	Process Filtered Data	Incorrect Data Calculation	Incorrect Algorithm	1	Data Processed is Incorrect	Data Displayed is Incorrect	9	9	Debug program code prior to release			
	Check Data	Failure to Detect Error	No Baseline Data	1	Data Processed is Incorrect	Data Displayed is Incorrect	3	3			Incorporate Alarm functions which alert Admins to action	
			Skewed Data	3	Data Processed is Incorrect	Data Displayed is Incorrect	3	9				
Display Data	Medium for User Interface	Unreadable Data	Poor Layout (GUI)	1	Data Cannot be Understood	User cannot make informed Decisions	3	3	Consult GUI Experts before release, verify customer buy-in			
			Physical Failure	1	Data Cannot be Understood	User cannot make informed Decisions	3	3				
			Electrical Failure	1	Data Cannot be Understood	User cannot make informed Decisions	3	3				