GX-Force FMEA (Failure Mode Effects Analysis)

Document No.GX-Force_SW207

Approval	Review	Preparation
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Date	Date	Date
2021/1/22	2021/1/22	2021/1/15

No.	Date	Version	Revised content	Remarks
Ex.	20XX/XX/XX	RevX.X	Create New	
1	2021/1/15	Rev1.0	Create New	
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No.	Request number	System name
1	req 1-1	NC (Combustible gas) concentration calculation
2	req 1-2	EC (Oxygen/Toxic Gas) concentration calculation
3	req 1-3	Calibration curve processing
4	req 1-9	Average calculation
5	req 1-10	STEL value calculation
6	req 1-12	TWA value calculation
7	req 1-14	Cumulative (AVRG) value calculation
8	req 2-1	Gas warning notification
9	req 3-1	Fault warning notification
10	req 3-2	Self-diagnosis
11	req 13-6	A/D converter
12	req 14-8	Buzzer
13	req 14-15	NC (Combustible) sensor
14	req 14-16	EC (Oxygen / Toxicity) sensor

		Sys	stem name		req1 - 1 NC (combustib	le ga	as) concentration calcula	ation FMEA Table												
		Cor	mponent		GX-Force	<u>GX-Force</u>														
(1)	(2)		(3)		(4)			Impact of failure	(7)	(8)	(9)	(10	(10	(10	(10	(11) (12) Counterm	neasure		(13)
No	Component and function .	No.	Failure mode	No	Probab (Why) Primary cause	No.		(5) Component (Primary)	Detectability of failure (Are there signs?)	Severity	Frequency	Avoidability	measure	Details	Responsible	3 Schedule	Result			
1	Concentration calculation	1	Does not update	1	No calculation	1	RAM error	Does not retain previous concentration nor detects gas	Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	OK			
	Calculate concentration		concentration		processing yet	2	FRAM fault	1	Nothing	4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK			
	value	2	Calculation result error	1	Sensor output error	1	Sensor output error	Concentration value uncertain	Nothing	4	1	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК			
						_	Abnormal temperature value	1	Nothing	4	1	СЗ	В	Fix temperature calculation range	Ikarashi	10/24	ОК			
				2	Zero point error	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK			
						2	FRAM fault	1	Nothing	4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK			
				3	Span coefficient error	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK			
						2	FRAM fault	1	Nothing	4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK			
				4	Temperature	_	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK			
					compensation coefficient error	2	FRAM fault	1	Nothing	4	2	СЗ	В	SUM check of FRAM	Ikarashi	10/24	ОК			
2	Temperature	1	Calculation result error	1	Temperature	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK			
	compensation processing				compensation coefficient error	2	FRAM fault	1	Nothing	4	1	СЗ		SUM check of FRAM	Ikarashi	10/24	ОК			
3	Intermittent measurement	1	Does not energize at	1	Periodic counter fault	1	RAM error	Sensor output cannot be obtained correctly	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK			
			specified period			2	Timer error	1	Nothing	4	1	C3		Monitor with WDT	Ikarashi	10/24	OK			
				2	Flammable sensor is	_	RAM error	Sensor output cannot be obtained correctly	Nothing	4	1	С3	_	RAM check at startup	Ikarashi	10/24	OK			
					set to OFF	2	FRAM fault	<u> </u>	Nothing	4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK			

For each numbered column, enter the following:

- (1) Sequential number.
 (2) The component and its function (below the component name). Be specific.
- (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditions during manufacturing, assembly, transport, usage, and servicing.
- (5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.
- (7) The detectability of failure.
- (8) The failure mode severity.

	Severity	Safety assessment	Product assessment						
(lr 3 2	,	Criteria	Criteria						
	4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable						
	3 Critical	Critical loss of function	Inoperative; Uncomfortable						
	2 Minor	Partial loss of function	Some functions inoperative						
	1 Very minor	Almost no impact	Almost no impact						
	Impact to safety and product integrity related to laws and regulations are Severity Level 4 (Catastrophic)								

(9) Frequency per cause

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Frequency	Approach							
4 Frequent	Same structure as things that caused problems in the past.							
3 Reasonably possible	structure similar to a thing that caused a problem in the past.							
3 Reasonably possible	Problems that occurred during development.							
2 Occasional	It is a similar structure to mass production, but it is new.							
1 Extremely unlikely	It is judged that it will not occur by desk inference.							

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)
C2: Usually avoidable (Avoidable more than 90% of the time)
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)

(11) Countermeasure level

A: Design change
 B: Assessment of test result or study
 C: No action

			Sys	stem name		req 1 - 2 Calculation of	EC (Oxygen/Toxic Gas) Cor	ncentration FMEA Table									
			Cor	mponent		<u>GX-Force</u>												
((1)	(2)		(3)		(4	(4)		Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) Counterm	easure		(13)
١.	.	Component and function		Failure mode		Probabl	le ca	use	(7) 0	1	(0	Ţ	₽	٦.	(,	1		4
ľ	No.		No.]	No.	(Why) Primary cause	No.	. (Why) Secondary cause	(5) Component (Primary)	Detectability of failure (Are there signs?)	Severity	Frequency	Avoidability	Counter- measure	Details	Responsible	Schedule	Result
		Concentration calculation	1	Does not update	1	Not calculated	1	RAM error	Previous concentration value retained, no gas detected	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
		Calculate concentration		concentration			2	FRAM fault	1	Nothing	4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK
	V	alue	2	Calculation result error	1	Sensor output error	1	Sensor output error	Concentration value uncertain	Nothing	4	1	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК
							2	Abnormal temperature value	1	Nothing	4	1	СЗ	В	Fix temperature calculation range	Ikarashi	10/24	ОК
					2	Zero point error	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
							2	FRAM fault	1	Nothing	4	2	C3		SUM check of FRAM	Ikarashi	10/24	OK
					3	Span coefficient error	1	RAM error	Concentration value uncertain	Nothing	4	1	C3		RAM check at startup	Ikarashi	10/24	OK
							2	FRAM fault	1	Nothing	4	2	C3		SUM check of FRAM	Ikarashi	10/24	OK
					4	Temperature	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
						compensation coefficient error	2	FRAM fault	1	Nothing	4	2	СЗ	В	SUM check of FRAM	Ikarashi	10/24	ОК
		Temperature	1	Calculation result error	1	Temperature	1	RAM error	Concentration value uncertain	Nothing	4	1	C3	В	RAM check at startup	lkarashi	10/24	OK
	C	compensation processing				compensation coefficient error	2	FRAM fault	1	Nothing	4	1	C3	В	SUM check of FRAM	Ikarashi	10/24	ОК

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes

considering the conditioins during manufacturing, assembly, transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

(7) The detectability of failure.

Safety assessment

regulations are Severity Level 4 (Catastrophic)

(8) The failure mode severity.

	Severity								
(ln 3 (Criteria	Criteria						
	4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable						
	3 Critical	Critical loss of function	Inoperative; Uncomfortable						
ŀ	2 Minor	Partial loss of function	Some functions inoperative						
	1 Very minor	Almost no impact	Almost no impact						
	Impact to safety and product integrity related to laws and								

(9) Frequency per cause

Frequency	Approach						
4 Frequent	Same structure as things that caused problems in the past.						
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(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

System name					req 1-3 Calibration curve processing FMEA Table													
	Component				GX-Force													
(1)	(2)		(3)		(4)			Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) C	Countermea	asure		(13)
No	Component and function		Failure mode		Probable cause			(5) Component	Detectability of	တ္ဆ	Fre	Avoi	3 C					Re
		No.		No.	. (Why) N Primary cause	No.	(Why) Secondary cause	(Primary)	failure (Are there signs?)	verity	Frequency	idability	Counter- measure	Details	Responsible	Schedule		
1	Calibration curve	1	Calculation result error		Calibration curve data error	1	RAM error	Sensor output value uncertain	Nothing	4	1	СЗ	В	RAM check at startup		Ikarashi	10/24	OK
	processing Calibration curve data is					2	FRAM fault	\uparrow	Nothing	4	2	СЗ	В	SUM check of FRAM		Ikarashi	10/24	OK
	applied to sensor output and			1	Gas data error	1	RAM error	Sensor output value uncertain	Nothing	4	1	СЗ	В	RAM check at startup		Ikarashi	10/24	OK
	linear sensor output is calculated					2	FRAM fault	1	Nothing	4	2	СЗ	В	SUM check of FRAM		Ikarashi	10/24	ОК
2	Reverse calibration curve	1	Calculation result error		Calibration curve data	1	RAM error	Sensor output value uncertain	Nothing	4	1	C3	В	RAM check at startup		Ikarashi	10/24	OK
	processing Calibration curve data is				error	2	FRAM fault	\uparrow	Nothing	4	2	СЗ	В	SUM check of FRAM		Ikarashi	10/24	OK
	applied to sensor output and			1	Gas data error	1	RAM error	Sensor output value uncertain	Nothing	4	1	СЗ	В	RAM check at startup		Ikarashi	10/24	OK
	linear sensor output is calculated					2	FRAM fault	1	Nothing	4	2	СЗ	В	SUM check of FRAM		Ikarashi	10/24	OK

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component

name). Be specific.
(3) The Failure mode that negates function in (2).

(4) The cause of failure (3).

Write as many possible causes considering the conditions during manufacturing, assembly, transport, usage, and servicing. (5) The impact of failure mode (4) on the component.This may be omitted if impact is obvious.(7) The detectability of failure.

(8) The failure mode severity.

Severity	Safety assessment	Product assessment					
covonty	Criteria	Criteria					
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable					
3 Critical	Critical loss of function	Inoperative; Uncomfortable					
2 Minor	Partial loss of function	Some functions inoperative					
1 Very minor	Almost no impact	Almost no impact					
	and product integ Severity Level 4 (0	grity related to laws and Catastrophic)					

(9) Frequency per cause

Frequency	Approach					
4 Frequent	Same structure as things that caused problems in the past.					
3 Reasonably possible	A structure similar to a thing that caused a problem in the past.					
3 Reasonably possible	Problems that occurred during development.					
2 Occasional	It is a similar structure to mass production, but it is new.					
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(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

(12) Countermeasure.

(13) Countermeasure implementation result

		Syst	em name		req1 - 9 average value c	calculation	FMEA Table									
		Com	ponent		GX-Force											
(1) (2)		(3)		(4)	.)	Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) Counterme	easure		(13)
No	Component and function		Failure mode		Probable	e cause	(5) Component	Detectability of	S	F	AV	∃ 0		1	1	1
INC). 	No.		No.	(Why) Primary cause	No. (Why) Secondary cause	(Why) (Primary) fa	failure (Are there signs?)	failure 🍎	Frequency	idability	Counter- measure	Details	Responsible	Schedule	dule Result
1	Average value calculation processing	1	Calculation result error		Cumulative concentration error	1 RAM error	Average value uncertain	Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	ОК
	Calculate the average concentration with the concentration data every					2 Concentration error	f	Nothing	4	2	СЗ	В	Do not perform average processing at concentrations exceeding F. S.	Ikarashi	10/24	ОК
	second for every minute			1	Cumulative count fault	1 RAM error	Average value uncertain	Nothing	4	1	СЗ	В	RAM check at startup	lkarashi	10/24	ОК

For each numbered column, enter the following:

- (1) Sequential number.
 (2) The component and its function (below the component name). Be specific.
- (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditions during manufacturing, assembly, transport, usage, and servicing.
- (5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious. (7) The detectability of failure.
- (8) The failure mode severity.

Severity	Safety assessment	Product assessment							
	Criteria	Criteria							
4 Catastrophic (Inevitable)		Inoperative; Unbearable							
3 Critical	Critical loss of function	Inoperative; Uncomfortable							
2 Minor	Partial loss of function	Some functions inoperative							
1 Very minor	Almost no impact	Almost no impact							
Impact to safety and product integrity related to laws and regulations are Severity Level 4 (Catastrophic)									

(9) Frequency per cause									
Frequency	Approach								
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(11) Countermeasure level

A: Design change

B: Assessment of test result or study
C: No action

(12) Countermeasure.

(13) Countermeasure implementation

result

		Sys	tem name		req 1 - 10 STEL value ca	alcula	ation_	FMEA Table									
		Con	mponent		GX-Force	_											
(1)	(2)		(3)		(4)	1)		Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) Counterme	easure		(13)
No.	Component and function		Failure mode		Probable	e cau	se	(5) Component	Detectability of	Se	Ŧ	Ą	∃ 0	(12)	1	1	
NO.		No.		No.	(Why) Primary cause	No.	(Why) Secondary cause	(Primary) failure		failure there signs?)	Frequency	oidability	Counter- measure	Details	Responsible	Schedule	Result
1	STEL value calculation processing	1	Calculation result error		Cumulative concentration error	1	RAM error	Average value uncertain	Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	ОК
	Calculate the average concentration of 15 minutes from the concentration					2 (Concentration error	1	Nothing	4	2	СЗ	В	Do not perform average processing at concentrations exceeding F. S.	Ikarashi	10/24	ОК
	calculated every second			1	Cumulative count fault	1	RAM error	Average value uncertain	Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	ОК

For each numbered column, enter the following:
(1) Sequential number.

- (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2).
- (4) The cause of failure (3). Write as many possible causes considering the conditions during manufacturing, assembly, transport, usage, and servicing.
- (5) The impact of failure mode (4) on the component.This may be omitted if impact is obvious.(7) The detectability of failure.
- (8) The failure mode severity.

Severity	Safety assessment	Product assessment							
Coverny	Criteria	Criteria							
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable							
3 Critical	Critical loss of function	Inoperative; Uncomfortable							
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1 Very minor	Almost no impact	Almost no impact							
Impact to safety and product integrity related to laws and regulations are Severity Level 4 (Catastrophic)									

(9) Frequency per cause

Frequency	Approach					
4 Frequent	Same structure as things that caused problems in the past.					
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- C1: Easily avoidable (Avoidable more than 99% of the time) C2: Usually avoidable (Avoidable more than 90% of the time) C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)

- (11) Countermeasure level
- A: Design change
- B: Assessment of test result or study C: No action
- (12) Countermeasure.
- (13) Countermeasure implementation result

	System name req1 - 12 TWA value calculation		FMEA Table														
		Cor	mponent		GX-Force												
(1)	(2)		(3)		(4	,		Impact of failure	(7)	(8)	(9)	(10	(11	(12) Counterm	easure		(13)
	Component and function		Failure mode		Probable	ca	use	(5) 0	1	တ	Ţ	₹	me	, , , , ,	1	1	-
No.	·	No.		No.	(Why) Primary cause	No.	(Why) Secondary cause	(5) Component (Primary)	Detectability of failure (Are there signs?)	severity	Frequency	da	neasure	Details	Responsible	Schedule	Result
	TWA value calculation	1	Calculation result error		Cumulative	1	RAM error	Average value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
	processing Calculate the average concentration in 8 hours from the concentration calculated				concentration error	2	Concentration error	f	Nothing	4	2	C3	В	Do not perform average processing at concentrations exceeding F. S.	Ikarashi	10/24	ОК
	every second			1	Cumulative count fault	1	RAM error	Average value uncertain	Nothing	4	1	C3	В	RAM check at startup	lkarashi	10/24	OK

For each numbered column, enter the following:
(1) Sequential number.

- (2) The component and its function (below the component name). Be specific. (3) The Failure mode that
- negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditions during manufacturing, assembly, transport, usage, and servicing.
- (5) The impact of failure mode (4) on the component.This may be omitted if impact is obvious.(7) The detectability of failure.
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Severity	Safety assessment	Product assessment				
,	Criteria	Criteria				
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable				
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(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

(12) Countermeasure. (13) Countermeasure implementation

result

		Sys	tem name		req1 - 14 Cumulative (A	VRG	s) value calculation	FMEA Table									
		Cor	mponent		GX-Force												
(1)	(2)		(3)		(4)		Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) Counterme	easure		(13)
No.	Component and function		Failure mode		Probable	cau	ıse	(5) 0]	m	Ţ	₽	me				4
NO.	·	No.		No.	(Why) Primary cause	No.	(Why) Secondary cause	(5) Component (Primary)	Detectability of failure (Are there signs?)	severity	requency	oidability	neasure	Details	Responsible	Schedule	Result
	Integrated value	1	Calculation result error		Cumulative	1	RAM error	Average value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
	calculation processing Calculate the average concentration in 1 hour from the concentration calculated				concentration error	2	Concentration error	1	Nothing	4	2	СЗ		Do not perform average processing at concentrations exceeding F. S.	Ikarashi	10/24	ОК
	every second			1	Cumulative count fault	1	RAM error	Average value uncertain	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3).

Write as many possible causes

considering the conditioins during manufacturing, assembly, transport, usage, and servicing.

- (5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

 (7) The detectability of failure.
- (8) The failure mode severity.

Severity	Safety assessment	Product assessment
	Criteria	Criteria
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable
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(11) Countermeasure level

A: Design change B: Assessment of test result or study	(11) Oddittolillodddio lovol
	A: Design change
	B: Assessment of test result or study
	C: No action

- (12) Countermeasure.
- (13) Countermeasure implementation

		Sys	stem name	req	2 - 1 Gas warning report			FMEA Table										
		Cor	mponent	GX-	Force													
(1)	(2)		(3)		(4	,		Impact of failure	(7)		(8)	(9)	(10)	, ,	(12) Counterm	easure		(13)
No.	Component and function	No.	Failure mode	No.	Probabli (Why) Primary cause	No		(5) Component (Primary)	Detectability failure (Are there sign	of s?)	Severity	Frequency	Avoidability	Counter- measure	Details	Responsible	Schedule	Result
1	Gas warning decision Perform judgment of warning		Cannot judge the gas alarm		Current concentration value error	1	Concentration calculation error	Gas alarm does not appear/false alarm	Nothing		4	1	СЗ		Verification conducted by simulation	Ikarashi	10/24	ОК
				2	Gas warning point fault	1	RAM error	1	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
						2	FRAM fault	1	Nothing		4	2	С3	В	SUM check of FRAM	Ikarashi	10/24	OK
2	Gas alarm output		Outputs even though the	1	Output device error	1	Device error	Outputs when uncertain	Nothing		3	2	СЗ	В	Device confirmation at startup	Ikarashi	10/24	OK
	Output to LED/buzzer/vibration		alarm is stopped			2	RAM error	1	Nothing		3	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
	EED/Bd22ei/Vibration					3	FRAM fault	1	Nothing		3	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK
		2	No output although in	1	Output device error	1	Device error	No output at gas alarm	Nothing		4	2	C3	В	Device confirmation at startup	Ikarashi	10/24	OK
			alarm state			2	RAM error	1	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
						3	FRAM fault	1	Nothing		4	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK
		3	Output persists	1	RAM error	1	RAM error	Outputs when uncertain	Nothing		3	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
3	Gas alarm cancellation judgment	1	Cannot judge to cancel gas alarm		Current concentration value error	1	Concentration calculation error	Gas alarm is not cancelled	Nothing		3	1	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК
	Decide to cancel alarm			2	Gas warning point fault	1	RAM error	1	Nothing		3	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
						2	FRAM fault	1	Nothing		3	2	C3	В	SUM check of FRAM	Ikarashi	10/24	OK
4	Message display Display gas alarm	1	Does not display even though an alarm is	1	RAM error	1	RAM error	Misunderstood alarm level	Nothing		4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	ОК

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditioins during manufacturing, assembly,

transport, usage, and servicing.

(5) The impact of failure mode (4) on the component.

This may be omitted if impact is obvious.

(7) The detectability of failure.
(8) The failure mode severity.

(b) The fallate fi	lode severity.							
Severity	Safety assessment	Product assessment						
,	Criteria	Criteria						
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable						
3 Critical	Critical loss of function	Inoperative; Uncomfortable						
2 Minor	Partial loss of function	Some functions inoperative						
1 Very minor	Almost no impact	Almost no impact						
	and product integ Severity Level 4 (rity related to laws and Catastrophic)						

(9) Frequency per cause

Frequency	Approach							
4 Frequent	Same structure as things that caused problems in the past.							
3 Reasonably possible	A structure similar to a thing that caused a problem in the past.							
3 Reasonably possible	Problems that occurred during development.							
2 Occasional	It is a similar structure to mass production, but it is new.							
1 Extremely unlikely	It is judged that it will not occur by desk inference.							

(10) Risk avoidability

(1-), 1
C1: Easily avoidable (Avoidable more than 99% of the time)
C2: Usually avoidable (Avoidable more than 90% of the time)
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)

(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

		System name			3 - 1 Fault warning notifie	catio	o <u>n</u>	FMEA Tab	<u>ble</u>									
		Cor	mponent	GX-	Force													
(1)	(2)		(3)		(4	,		Impact of failure		(7)	(8)		(10)		(12) Counterm	easure		(13)
No	Component and function .	No.	Failure mode	No.	Probabli (Why) Primary cause	e ca	_	(5) Component (Primary)		Detectability of failure (Are there signs?)	Severity	Frequency	Avoidability	Counter- measure	Details	Responsible	Schedule	Result
1	Failure warning judgment Perform judgment of warning	1	Cannot judge a fault alarm		It is judged that maintenance is underway and no self- diagnosis is carried out	1	RAM error	No fault alarm is issued		Nothing	4	1	СЗ		RAM check at startup	lkarashi	10/24	ОК
					Self-diagnosis error judgment	1	RAM error	1		Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	ОК
2	Fault alarm output	1	Outputs even though	1	Output device error	1	Device error	Outputs when uncertain		Nothing	3	2	СЗ	В	Device confirmation at startup	Ikarashi	10/24	OK
	Output to LED/buzzer/vibration		alarm is stopped			2	RAM error	1		Nothing	3	1	СЗ	В	RAM check at startup	Ikarashi	10/24	OK
	LLD/buzzei/vibration					3	FRAM fault	1		Nothing	3	2	СЗ	В	SUM check of FRAM	Ikarashi	10/24	OK
		2	Does not output although	1	Output device error	1	Device error	Outputs when uncertain		Nothing	4	2	СЗ	В	Device confirmation at startup	Ikarashi	10/24	OK
			it is alarming			2	RAM error	1		Nothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	OK
						3	FRAM fault	1		Nothing	4	2	СЗ	В	SUM check of FRAM	Ikarashi	10/24	OK
		3	Persistent output	1	RAM error	1	RAM error	Outputs when uncertain		Nothing	3	1	СЗ	В	RAM check at startup	Ikarashi	10/24	OK
3	Failure alarm cancellation judgment Decide to cancel alarm	1	Cannot judge cancellation of fault alarm		Self-diagnosis error judgment	1	RAM error	Will false alarm		Nothing	3	1	C3	В	RAM check at startup	Ikarashi	10/24	ок
4	Alarm message display Display gas alarm	1	Does not display even though an alarm is	1	RAM error	1	RAM error	Misunderstand the details of the fault		Nothing	4	1	СЗ	В	RAM check at startup	lkarashi	10/24	ок

For each numbered column,

enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditioins

during manufacturing, assembly, transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

(7) The detectability of failure.(8) The failure mode severity.

	Severity	Safety assessment	Product assessment						
4 Ca (Inex 3 Cri 2 Mii 1 Ve Impa	,	Criteria	Criteria						
	4 Catastrophic (Inevitable)		Inoperative; Unbearable						
	3 Critical	Critical loss of function	Inoperative; Uncomfortable						
3 2 1	2 Minor	Partial loss of function	Some functions inoperative						
	1 Very minor	Almost no impact	Almost no impact						
		and product integ Severity Level 4 (grity related to laws and Catastrophic)						

(9) Frequency per cause

Frequency	Approach							
4 Frequent	Same structure as things that caused problems in the past.							
3 Reasonably possible	structure similar to a thing that caused a problem in the past.							
3 Reasonably possible	roblems that occurred during development.							
2 Occasional	It is a similar structure to mass production, but it is new.							
1 Extremely unlikely	It is judged that it will not occur by desk inference.							
	•							

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)	
C2: Usually avoidable (Avoidable more than 90% of the time)	
C3: Impossible or difficult to avoide (Avoidable less than 90% of the time)	

(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

		Sys	stem name	req:	3 - 2 Self-diagnosis			FMEA Table										
		Cor	mponent	GX-	Force	_												
(1)	(2)		(3)		(-	4)		Impact of failure	(7)		(8)	(9)	(10)	(11)	(12)	Countermeasure		(13)
	Component and function		Failure mode		Probab	le ca	use					I	₽		(12)	Countenneasure		/
No.	Component and tanodon	No.		No.	(Why) Primary cause	No.	(Why) Secondary cause	(5) Component (Primary)	Detectab failur (Are there	e	Severity	Frequency	Avoidability	Counter- measure	Details	Responsible	e Schedul	Result
1	System check	1	Misjudge as failure	1	Judgment error	1	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	В	RAM check at startup	lkarashi	10/24	4 OK
	ROM/RAM/FRAM/FLASH	2	Cannot judge a failure	1	Judgment error	1	RAM error	<u> </u>	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	
	Built-in clock check	1	Misjudge as failure	1	Judgment error	1	RAM error	Cannot perform due to misjudgment when normal	Nothing		2	1	C3		RAM check at startup	Ikarashi	10/24	
	RTC	2	Cannot judge a failure	1	Judgment error	_	RAM error	<u>↑</u>	Nothing		2	1	C3	_	RAM check at startup	lkarashi	10/24	
3	Circuit voltage check		Misjudge as failure	_	Judgment error	_	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3		RAM check at startup	Ikarashi	10/24	
	Circuit voltage	_	Cannot judge a failure	_	Judgment error	_	RAM error	<u>↑</u>	Nothing		4	1	C3		RAM check at startup	Ikarashi	10/24	
4	Thermistor check	_	Misjudge as failure		Judgment error		RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	_	RAM check at startup	Ikarashi	10/24	
	Thermistor		Cannot judge a failure	_	Judgment error	_	RAM error	<u>↑</u>	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	
5	Sensor check	_	Misjudge as failure		Judgment error		RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	
	Gas sensor		Cannot judge a failure		Judgment error		RAM error	↑	Nothing		4	1	C3		RAM check at startup	Ikarashi	10/24	
6	EC connection check	_	Misjudge as failure	1	Judgment error	_	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3		RAM check at startup	Ikarashi	10/24	
	EC gas sensor		Cannot judge a failure	1	Judgment error	_	RAM error	1	Nothing		4	1	C3		RAM check at startup	Ikarashi	10/24	
	Battery voltage check	_	Misjudge as failure	_	Judgment error	_	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	_	RAM check at startup	Ikarashi	10/24	
	Power supply voltage sensor		Cannot judge a failure	_	Judgment error	-	RAM error	Ť.	Nothing		4	1	C3	_	RAM check at startup	Ikarashi	10/24	
8	Sensor circuit error check	1	Misjudge as failure	1	Judgment error	1	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	4 OK
	Sensor circuit	2	Cannot judge a failure	1	Judgment error	1	RAM error	↑	Nothing		4	1	C3		RAM check at startup	lkarashi	10/24	
9	Flow error check	1	Misjudge as failure	1	Judgment error	1	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	В	RAM check at startup	Ikarashi	10/24	4 OK
	Pressure sensor	2	Cannot judge a failure	1	Judgment error	1	RAM error	1	Nothing		4	1	C3	В	RAM check at startup	lkarashi	10/24	4 OK
10	Pump error check	1	Misjudge as failure	1	Judgment error	1	RAM error	Cannot perform due to misjudgment when normal	Nothing		4	1	C3	В	RAM check at startup	lkarashi	10/24	4 OK
	Pump	2	Cannot judge a failure	1	Judgment error	1	RAM error	1	Nothing		4	1	C3	В	RAM check at startup	lkarashi	10/24	4 OK

For each numbered column, enter the following:

- (1) Sequential number.
- (2) The component and its function (below the component name). Be specific. (3) The Failure mode that
- negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditioins

during manufacturing, assembly, transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

(7) The detectability of failure.

(6) The failure if	lode severity.							
Severity	Safety assessment	Product assessment						
Coroney	Criteria	Criteria						
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable						
3 Critical	Critical loss of function	Inoperative; Uncomfortable						
2 Minor	Partial loss of function	Some functions inoperative						
1 Very minor	Almost no impact	Almost no impact						
	and product integ Severity Level 4 (grity related to laws and Catastrophic)						

(9) Frequency per cause

Frequency	Approach							
4 Frequent	Same structure as things that caused problems in the past.							
3 Reasonably possible	A structure similar to a thing that caused a problem in the past.							
3 Reasonably possible	Problems that occurred during development.							
2 Occasional	It is a similar structure to mass production, but it is new.							
1 Extremely unlikely	It is judged that it will not occur by desk inference.							

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)	
C2: Usually avoidable (Avoidable more than 90% of the time)	
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)	

(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

System name				req	13 - 6 A/D converter			FMEA Table	<u>e</u>									
Component			mponent	GX-	GX-Force													
(1)	(2)		(3)		(4			Impact of failure		(7)	(8)	(9)	(10)	(11)	(12) Count	termeasure		(13)
No	Component and function		Failure mode		Probabl	e ca	use	(5) Composit		Data data in incident	m	Ŧ	Avoi	- 0	. ,	1	1	
INO.		No.]	No.	(Why) Primary cause	No.	(Why) Secondary cause	(5) Component (Primary)		Detectability of failure Are there signs?)	everity	Frequency	oidability	Counter- measure	Details	Responsible	Schedule	Result
1	ADC setting Set operation setting value	1	Cannot set prescribed value	1	Microcomputer error	1	ADC fault	Cannot acquire A/D value normally	N	lothing	4	1	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК
	Set operation setting value		Value	2	Setting value error	1	RAM error	1	N	lothing	4	1	СЗ	В	RAM check at startup	Ikarashi	10/24	OK
2	Acquire A/D Acquire sensor output	1	Cannot get the A/D value	1	Sensor output error	1	Sensor error	Cannot acquire A/D value normally	N	lothing	4	1	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК
						2	RAM error	<u> </u>	N	lothing	4	1	СЗ	В	RAM check at startup	lkarashi	10/24	OK
		2	A/D value is abnormal		Outside acquisition range of A/D value	1	Sensor error	Cannot acquire A/D value normally	N	lothing	4	2	СЗ	В	Verification conducted by simulation	Ikarashi	10/24	ОК
						2	RAM error	1	N	lothing	4	1	C3		RAM check at startup	lkarashi	10/24	OK
				2	ADC setting error	1	RAM error	Cannot acquire A/D value normally	N	lothing	4	1	С3	В	RAM check at startup	Ikarashi	10/24	OK

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditioins

during manufacturing, assembly, transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

(7) The detectability of failure.

(8) The failure mode severity.

Severity	Safety assessment	Product assessment						
Coroney	Criteria	Criteria						
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable						
3 Critical	Critical loss of function	Inoperative; Uncomfortable						
2 Minor	Partial loss of function	Some functions inoperative						
1 Very minor	Almost no impact	Almost no impact						
	and product integ	grity related to laws and Catastrophic)						

(9) Frequency per cause

Frequency	Approach								
4 Frequent	Same structure as things that caused problems in the past.								
3 Reasonably possible	structure similar to a thing that caused a problem in the past.								
3 Reasonably possible	Problems that occurred during development.								
2 Occasional	It is a similar structure to mass production, but it is new.								
1 Extremely unlikely	It is judged that it will not occur by desk inference.								

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)	
C2: Usually avoidable (Avoidable more than 90% of the time)	
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)	

(11) Countermeasure level

A: Design change

B: Assessment of test result or study

C: No action

System name				req	14 - 8 Buzzer			FMEA Tab	ole_									
Component					GX-Force													
(1)	(2)		(3)		(4	,		Impact of failure		(7)	(8)	(9)	(10)	, ,	(12) Counterm	easure		(13)
No.	Component and function	No.	Failure mode	No.	Probable (Why) Primary cause	No.		(5) Component (Primary)		Detectability of failure Are there signs?)	Severity	Frequency	Avoidability	Counter- measure	Details	Responsible	Schedule	Result
	PWM output Buzzer output	1	Buzzer does not sound	1	Device error		Piezoelectric element error	Buzzer does not sound when alarming	N	lothing	4	1	С3	В	Device confirmation at startup	lkarashi	10/24	ОК
						2	PWM error	1	N	lothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
				2	Frequency is different	2	RAM error	Buzzer does not sound when alarming	N	lothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
		2	An abnormal sound is heard	1	Device error		Piezoelectric element error	An abnormal sound is heard	N	lothing	4	1	СЗ	В	Device confirmation at startup	lkarashi	10/24	ОК
						2	PWM error	1	N	lothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
				2	Frequency is different	2	RAM error	An abnormal sound is heard	N	lothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK
	Frequency setting	1	Frequency cannot be set		PWM function is	1	Microcomputer error	Buzzer does not sound	N	lothing	4	1	C3	В	Device confirmation at startup	Ikarashi	10/24	OK
	Set buzzer frequency				abnormal	2	RAM error	<u> </u>	N	lothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	OK

For each numbered column, enter the following:
(1) Sequential number.
(2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditions

during manufacturing, assembly, transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious. (7) The detectability of failure. (8) The failure mode severity.

Severity	Safety assessment	Product assessment					
	Criteria	Criteria					
4 Catastrophic (Inevitable)		Inoperative; Unbearable					
3 Critical	Critical loss of function	Inoperative; Uncomfortable					
2 Minor	Partial loss of function	Some functions inoperative					
1 Very minor	Almost no impact	Almost no impact					
	and product integ Severity Level 4 (prity related to laws and Catastrophic)					

(9) Frequency per cause

Frequency	Approach		
4 Frequent	Same structure as things that caused problems in the past.		
3 Reasonably possible	structure similar to a thing that caused a problem in the past.		
3 Reasonably possible	Problems that occurred during development.		
2 Occasional	It is a similar structure to mass production, but it is new.		
1 Extremely unlikely	It is judged that it will not occur by desk inference.		

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)	
C2: Usually avoidable (Avoidable more than 90% of the time)	
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)	

(11) Countermeasure level

A: Design change
B: Assessment of test result or study
C: No action

- (12) Countermeasure. (13) Countermeasure implementation result

		Sys	stem name	req	14 - 15 NC (combustibl	e) se	nsor	FMEA Table										
		Cor	mponent	GX-	Force	_												
(1)	(2)		(3)		(4)		Impact of failure	(7)	(8)	(9)	(10)	(11)	(12) Cou	untermeasure			(13)
	Component and function		Failure mode		Probab	le ca	use				Ð	≱	l	()	untermeasure			ı
No.		No.		No.	(Why) Primary cause	No.	(Why) Secondary cause	(5) Component (Primary)	Detectability of failure (Are there signs?)	Severity	Frequency	Avoidability	Counter- measure	Details	Respons	ible Sch	hedule	Result
1	Obtain sensor output	1	Sensor output cannot be	1	ADC fault	1	ADC device error	The concentration cannot be calculated normally	Nothing	4	1	C3	В	Monitor the A/D value	lkaras	hi 1	10/24	OK
			acquired			2	RAM error	1	Nothing	4	1	C3	В	RAM check at startup	lkaras	hi 1	10/24	OK
				2	Abnormal sensor	1	Sensor disconnection	The concentration cannot be calculated normally	Nothing	4	2	C3	В	Monitor the A/D value	lkaras	hi 1	10/24	OK
						2	Sensor deterioration	1	Nothing	4	2	СЗ	В	Check if it is within the output specification range during calibration	lkaras	hi 1	10/24	ОК
		2	Acquire abnormal sensor	1	ADC fault	1	ADC device error	The concentration cannot be calculated normally	Nothing	4	1	C3	В	Monitor the A/D value	lkaras	hi 1	10/24	OK
			output			2	RAM error	1	Nothing	4	1	C3	В	RAM check at startup	lkaras	hi 1	10/24	OK
				2	Abnormal sensor	1	Sensor disconnection	The concentration cannot be calculated normally	Nothing	4	2	C3	В	Monitor the A/D value	lkaras	hi 1	10/24	OK
						2	Sensor deterioration	1	Nothing	4	2	СЗ	В	Check if it is within the output specification range during calibration	lkaras	hi 1	10/24	OK
3	Element energization	1	The element is not	1	Device error	1	PORT fault	Cannot detect gas	Nothing	4	1	C3	В	Monitor the A/D value	lkaras	hi 1	10/24	OK
	Energize the elements of the sensor		energized			2	Sensor power supply error	1	Nothing	4	1	СЗ		Monitor the A/D value	lkaras		10/24	ОК
						3	Sensor disconnection	↑	Nothing	4	2	C3		Monitor the A/D value	lkaras	hi 1	10/24	OK
					Flammable sensor is		RAM error	Cannot detect gas	Nothing	4	1	C3		RAM check at startup	lkaras			OK
					set to OFF	2	FRAM fault	↑	Nothing	4	2	C3	В	SUM check of FRAM	lkaras	hi 1	10/24	OK

For each numbered column, enter the following: (1) Sequential number. (2) The component and its function (below the component name). Be specific. (3) The Failure mode that negates function in (2). (4) The cause of failure (3). Write as many possible causes considering the conditions during manufacturing, assembly,

transport, usage, and servicing.

(5) The impact of failure mode (4) on the component. This may be omitted if impact is obvious.

(7) The detectability of failure.

(8) The failure mode severity.

Severity	Safety assessment	Product assessment					
,	Criteria	Criteria					
(Inevitable)	Involves deaths	Inoperative; Unbearable					
3 Critical	Critical loss of function	Inoperative; Uncomfortable					
2 Minor	Partial loss of function	Some functions inoperative					
1 Very minor	Almost no impact	Almost no impact					
Impact to safety and product integrity related to laws and regulations are Severity Level 4 (Catastrophic)							

Approach Frequency 4 Frequent Same structure as things that caused problems in the past. A structure similar to a thing that caused a problem in the past. 3 Reasonably possible Problems that occurred during development. 2 Occasional It is a similar structure to mass production, but it is new.

1 Extremely unlikely It is judged that it will not occur by desk inference.

(10) Risk avoidability

(9) Frequency per cause

C1: Easily avoidable (Avoidable more than 99% of the time)
C2: Usually avoidable (Avoidable more than 90% of the time)
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)

(11) Countermeasure level

A: Design change B: Assessment of test result or study C: No action

(12) Countermeasure.

(13) Countermeasure implementation

	System name			req 14 - 16 EC (Oxygen / Toxicity) sensor FMEA Table													
		Cor	mponent	GX-	GX-Force												
(1)	(2)		(3)		(4)		Impact of failure	(7)	(8)	(9)	(10	(11	(12) Countern	neasure		(13
No.	Component and function	No.	Failure mode	No.	Probab (Why) Primary cause	No.	_	(5) Component (Primary)	Detectability of failure (Are there signs?)	Severity	Frequency	Avoidability	measure		Responsible	e Schedule	Result
1	Obtain sensor output		Sensor output cannot be	1	ADC fault	1	ADC device error	The concentration cannot be calculated normally	Nothing	4	1	C3	В	Monitor the A/D value	Ikarashi	10/24	Oł
			acquired			2	RAM error	<u> </u>	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	Oł
				2	Abnormal sensor	1	Sensor disconnection	The concentration cannot be calculated normally	Nothing	4	2	C3	В	Monitor the A/D value	Ikarashi	10/24	OI
						2	Sensor deterioration	1	Nothing	4	2	C3	В	Check if it is within the output specification range during calibration	Ikarashi	10/24	Oł
			Acquire abnormal sensor	1	ADC fault	1	ADC device error	The concentration cannot be calculated normally	Nothing	4	1	C3	В	Monitor the A/D value	Ikarashi	10/24	Oł
			output			2	RAM error	1	Nothing	4	1	C3	В	RAM check at startup	Ikarashi	10/24	Oł
				2	Abnormal sensor	1	Sensor disconnection	The concentration cannot be calculated normally	Nothing	4	2	C3	В	Monitor the A/D value	Ikarashi	10/24	Oł
						2	Sensor deterioration		Nothing	4	2	C3	В	Check if it is within the output specification range during calibration	Ikarashi	10/24	Oł

For each numbered column, enter the following:
(1) Sequential number.
(2) The component and its function (below the component name). Be specific.
(3) The Failure mode that negates function in (2).
(4) The cause of failure (3).

Write as many possible causes

considering the conditioins during manufacturing, assembly, transport, usage, and servicing.

- (5) The impact of failure mode (4) on the component.
- This may be omitted if impact is obvious.

 (7) The detectability of failure.
- (8) The failure mode severity.

Severity	Safety assessment	Product assessment				
,	Criteria	Criteria				
4 Catastrophic (Inevitable)	Involves deaths	Inoperative; Unbearable				
3 Critical	Critical loss of function	Inoperative; Uncomfortable				
2 Minor	Partial loss of function	Some functions inoperative				
1 Very minor	Almost no impact	Almost no impact				
	and product integ Severity Level 4 (grity related to laws and Catastrophic)				

(9) Frequency per cause

Frequency	Approach		
4 Frequent	Same structure as things that caused problems in the past.		
3 Reasonably possible	structure similar to a thing that caused a problem in the past.		
3 Reasonably possible	Problems that occurred during development.		
2 Occasional	It is a similar structure to mass production, but it is new.		
1 Extremely unlikely	It is judged that it will not occur by desk inference.		

(10) Risk avoidability

C1: Easily avoidable (Avoidable more than 99% of the time)
C2: Usually avoidable (Avoidable more than 90% of the time)
C3: Impossible or difficult to avoide (Avoidalbe less than 90% of the time)

(11) Countermeasure level

(11) Countenneasure level
A: Design change
B: Assessment of test result or study
C: No action