GX-Force
Comprehensive Test Specification

Document No.GX-Force_SW007

Approval	Review	Preparation
Name: Engineering Div. 2 Mutou	Name: Engineering Div. 2 Hirao	Name: Engineering Div. 2 Ikarashi
Date 2021/11/26	Date 2021/11/26	Date 2021/10/4

No.	Date	Version	Revised content	Remarks
Ex.	20XX/XX/XX	RevX.X	Create New	
1	2021/10/4	Rev1.0	Create New	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

Comprehensive Test Specification

Test details and method

1. Verify that all required software specifications are satisfied.

Implementation	Verify that the details in "SW001_Software Request Specification & Test Specification" and "SW103_Safety Requirement Spec & Test Specification" are satisfied with the GX-Force. Record the results. Note: Verification results to be also indicated in the table below.
Schedule	2021/10/4 to 10/29
Tested software version	Main MCU : 07244.mot Sensor MCU : 07245.mot

Software request check results

Request number	Requirements	Safety item	Results	Test date	Owner
req[1]	Concentration measurement	○			Ikarashi
req[2]	Gas alarm	○			Ikarashi
req[3]	Fault alarm	○			Ikarashi
req[4]	Test	-			Ikarashi
req[5]	Sensor adjustment	-			Ikarashi
req[6]	Equipment adjustment	-			Ikarashi
req[7]	External communication	-			Ikarashi
req[8]	Data logger	-			Ikarashi
req[9]	Mode select	-			Ikarashi
req[10]	Device information announcement	-			Ikarashi
req[11]	Sales request	-			Ikarashi
req[12]	Engineering request	-			Ikarashi
req[13]	Microcomputer	○			Ikarashi
req[14]	Microcomputer connection device	○			Ikarashi

2. Perform operation test assuming actual operation.

Implementation	Perform the tests in the table below with the GX-Force and record the results in the table on the next page.
Schedule	2021/11/1 to 11/24
Tested software version	Main MCU : 07244.mot Sensor MCU : 07245.mot

Test purpose		Repeat power ON / OFF and zero calibration / adjustment operation in multiple cases to simulate real world operation and confirm that there are no problems .
Measurement gas specification		CH4 (0-100%LEL) O2 (0.0-40.0%) CO (0-2000ppm) H2S (0.0-200.0ppm)
Test units and quantity		GX-Force: 2 units
Type of exam and schedule		11/1-11/3: Short-time operation simulation test
		11/8-11/10: Long-running operation simulation test
		11/15-11/17: 1 day (including lunch break) operation simulation test
		11/22-11/24: 1-day operation simulation test
Short-time operation assumption test	Contents of the test	Confirm the operation when it is repeatedly used for a short time (about 30 min) a day.
	Procedure	1) Power ON 2) Zero calibration / adjustment 3) Energization (29min) 4) Power OFF (1min) Note: Repeat 1) thru 4) 20 times a day.
Long-running operation assumption test	Contents of the test	Confirm the operation when using for a long time (about 24 h) continuously.
	Procedure	1) Power ON 2) Zero calibration / adjustment 3) Energization (23.5h) 4) Power OFF (30min)
1 day (including lunch break) operation	Contents of the test	Confirm the operation when assuming that the working hours of the day are 8 h (midday break 1 h).

assumption test	Procedure	1) Power ON 2) Zero calibration / adjustment 3) Energization (4h) 4) Power OFF 5) Break (1h) 6) Power ON 7) Energization (4h) 8) Power OFF (15h)
1-day operation assumption test	Contents of the test	Confirm the operation when using the workday of the day assuming 8 hours (no break).
	Procedure	1) Power ON 2) Zero calibration / adjustment 3) Energization (8h) 4) Power OFF (16h)

Short-time operation simulation test results

Test execution date	Test contents	Result
2021/11/1	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (29 min)	
	4) Power OFF (1 min)	
	Note: Repeat 1) to 4) 20 times a day	
2021/11/2	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (29 min)	
	4) Power OFF (1 min)	
	Note: Repeat 1) to 4) 20 times a day	
2021/11/3	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (29 min)	
	4) Power OFF (1 min)	
	Note: Repeat 1) to 4) 20 times a day	

Long-running operation simulation test results

Test execution date	Test contents	Result
2021/11/8	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (23.5h)	
	4) Power OFF (30min)	
2021/11/9	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (23.5h)	
	4) Power OFF (30min)	
2021/11/10	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (23.5h)	
	4) Power OFF (30min)	

1 day (including lunch break) operation simulation test results

Test execution date	Test contents	Result
2021/11/15	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (4h)	
	4) Power OFF	
	5) Break (1h)	
	6) Power ON	
	7) Energization (4h)	
	8) Power OFF (15h)	
2021/11/16	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (4h)	
	4) Power OFF	
	5) Break (1h)	
	6) Power ON	
	7) Energization (4h)	
	8) Power OFF (15h)	
2021/11/17	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (4h)	
	4) Power OFF	
	5) Break (1h)	
	6) Power ON	
	7) Energization (4h)	
	8) Power OFF (15h)	

1-day operation simulation test results

Test execution date	Test contents	Result
2021/11/22	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (8h)	
	4) Power OFF (16h)	
2021/11/23	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (8h)	
	4) Power OFF (16h)	
2021/11/24	1) Power ON	
	2) Zero calibration/adjustment	
	3) Energization (8h)	
	4) Power OFF (16h)	