TECHNICAL REPORT

Product	Portable gas detector, GX-Force
Name and address of the applicant	RIKEN KEIKI Co., Ltd. 2-7-6, Azusawa, Itabashi-Ku, Tokyo, 174-8744, Japan
Rating and principal characteristics	Battery powered, single secondary cell Panasonic type NCR18650GA. Nominal voltage: 3,6V Maximum open circuit voltage: 4,2V The charging terminal is USB TYPE C, and only a use of a charger exclusively specified for it, IEC60950-certified SELV power supply, or IEC62368-1-certified ES1 power supply is approved for charging. Charging method is CCCV. (Charging only in non-hazardous area.) Charging terminal, Um: 6V
Trade mark (If any)	RIKEN KEIKI Co., Ltd.
Model/type	GX-Force Three different gas sensors are used: Model ESR-A1DP: measures CO/H_2S (electrochemical principle) Model ESR-X13P: measures O_2 (electrochemical principle) Model NCR-6309: measures flammables (catalytic)
DNV certificate no.	DNV 22 ATEX 05201X issue 0
Ex-code for component / electrical apparatus	Ex II 1 G Ex da ia IIC T4 Ga, T_{amb} -20°C to +60°C (Including flammable sensor.) Ex II 1 G Ex ia IIC T4 Ga, T_{amb} -20°C to +60°C (Not including flammable sensor.)
Additional information	N / A
Report issue No.	0
Tested according to	EN IEC 60079-0:2018 (IEC 60079-0 ed. 7) — Explosive atmospheres, Part 0: Equipment – General requirements EN 60079-1:2014 (IEC 60079-1 ed. 7) — Equipment protection by flameproof enclosures “d” EN 60079-11:2012 (IEC 60079-11 ed. 6) — Electrical apparatus for potentially explosive atmospheres Equipment protection by intrinsic safety “i”
Name and address of the testing laboratory	**DNV Product Assurance AS** **Veritasveien 1** **1363 Høvik** **Norway** **Tel:** +47 67 57 88 00 **e-mail:** ex@dnv.com **Web:** www.dnv.com
Prepared by	Gunnar Nielsen — 2022-07-04
Reviewed by	Bjørn Spongsveen — 2022-07-04
Approved by	Asle Kaastad — 2022-07-04

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General remarks:
The test results presented in this Technical Report relate only to the item or product tested.
The technical content of this report shall not be reproduced except in full without the written approval of the issuing Notified Body.

Appendix; Part 0 (IECEx TEST REPORT, IEC 60079-0)
Appendix; Part 1 (IECEx TEST REPORT, IEC 60079-1)
Appendix; Part 2 (IECEx TEST REPORT, IEC 60079-11)

Description of equipment under test:

GX-Force is a portable suction type gas detector which can measure 4 kinds of gases. For gas sensors, electrochemical type and catalytic type are used. For the battery, one cell of 18650 type lithium ion secondary battery is used, which must be charged in a non-hazardous location. Users will never have to replace the battery.

This unit contains 2 buttons, LCD display screen, and LEDs for alarm on both sides and top. Internally, one each pump, buzzer, and vibration motor are mounted. When the power is supplied, the pump will be activated for suction, and the unit starts gas detection. Gas concentration is always displayed on the LCD screen. When a gas is detected, the indicator value on the LCD screen goes up, and when it reaches to the alarm level, LED buzzer, vibration motor will be activated and notify the user that the gas was detected.

The sensors to be mounted are electrochemical type and catalytic type. The electrochemical type sensor detects CO (carbon monoxide), H_2S (hydrogen sulfide), and O2 (oxygen). The catalytic type sensor detects flammable gases. It uses catalyst, and therefore needs to apply with “da”.

Charging shall be done in a non-hazardous location. The charging terminal is USB TYPE C, and only a use of a charger exclusively specified for it, IEC60950-certified SELV power supply, or IEC62368-1-certified ES1 power supply is approved for charging. Charging method is CCCV, and a control is performed by a dedicated IC. Rechargeable temperature range is between +10°C and +40°C.

Warning markings;

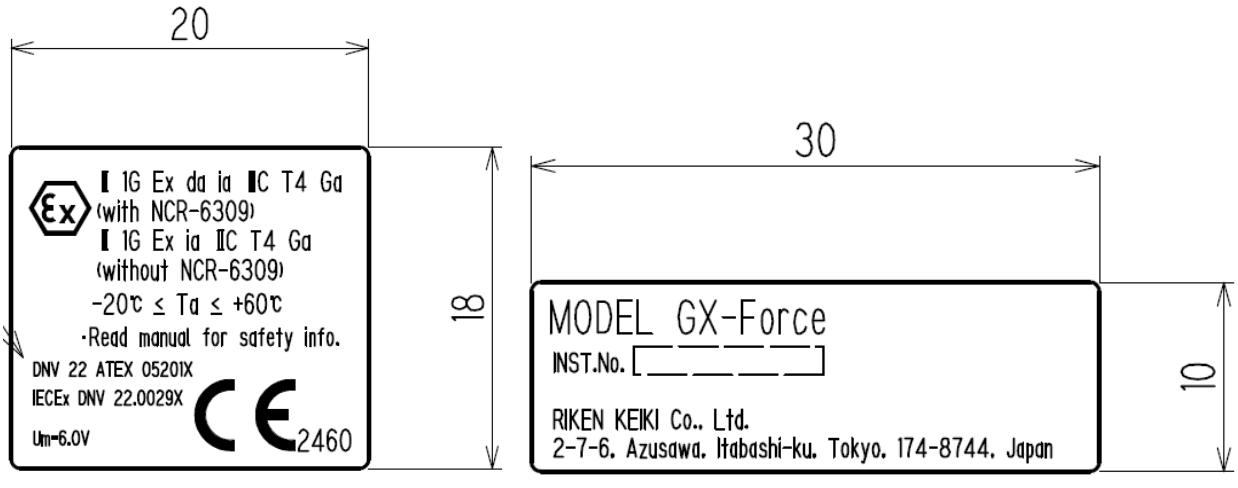
N / A

Descriptive documents;

Drawing No.	Name/Title	Rev.	Date	Page/-s
E4-6991-6235-70-01K	INDEX GX-Force	8	2022-06-16	1

(See at the end of the report for details.)

Copy of marking plate:



Tested according to additional information:
N / A
Other requirements:
N / A
Additional information:
• Pump, Riken Keiki RP-12, is already certified in IECEx PRE 17.0070/Presafe 17ATEX11584. • Battery, Panasonic NCR18650GA, is already tested in NO/PRE/ExTR20.0043. • Vibration motor, LEXIN LE4A3GS1G4, is already certified in IECEx DEK 17.0050X/DEKRA 17ATEX0103X. Enclosure materials: • PC L-1225Z100M: is already certified in IECEx DEK 17.0050X/ DEKRA 17 ATEX0103X. • TPE LSB9959R: is already certified in IECEx DEK 11.0045/DEKRA 11 ATEX0123. • PET PE84-0.125t: is already certified in IECEx PRE 17.0020/ Presafe 17 ATEX9760.

Calibration:	**All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.**
Measurement uncertainty:	**Measurement uncertainties are calculated for all instruments and instrument set-ups given in this report. Calculations are based on the principles given in the standard EA-4/02 (Oct 2013). Further information about measurement uncertainties will be given on request**
Laboratory accreditation	NORWEGIAN ACCREDITATION TEST 274 **Testing laboratory satisfy requirements in NS-EN ISO/IEC 17025**

Possible test case verdicts:
- test case does not apply to the test item…..: N / A
- test item does meet the requirement…….: Pass

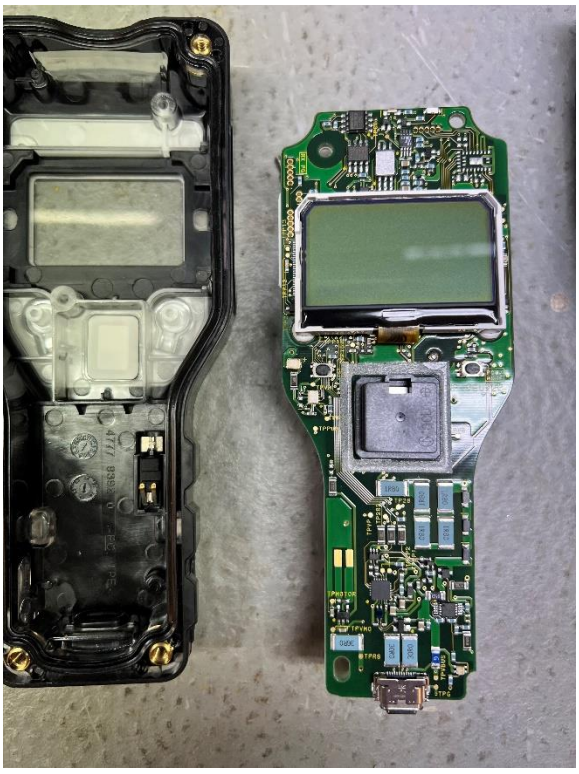
Report History		
Issue No.	Date of revision	Description
0	2022-07-04	Original report

Equipment tested:

DNV Sample ID.	Date received	Description (size, colour, material, prototype modification, version no. etc)	Serial no. (if any)
1	2021-12	Empty PCB	N / A
2	2021-12	Fully populated PCB	N / A
3	2021-12	PCB with only safety components mounted	N / A
4	2022-01-04	Empty protect PCB	N / A
5	2022-01-04	Fully populated trotect PCB	N / A
6	2022-01-04	Protect PCB with only safety components mounted	N / A

7	2022-01-04	Gas detector GX-Force	N / A
8	2022-01-04	Gas detector GX-Force	N / A
9	2022-02-24	PCB with only safety components mounted, new layout	N / A
Gas Sensor, Type NCR-6309:			
2-1	2022-01-05	Samples for multistep joint verification	N / A
2-2	2022-01-05	Samples for multistep joint verification	N / A
2-3	2022-01-05	Samples for multistep joint verification	N / A
2-4	2022-01-05	Samples for multistep joint verification	N / A
2-5	2022-01-05	Samples for multistep joint verification	N / A
3-1	2022-01-05	Samples for FNT testing (test sequence).	N / A
3-2	2022-01-05	Samples for FNT testing (test sequence).	N / A
3-3	2022-01-05	Samples for FNT testing (test sequence).	N / A
3-4	2022-01-05	Samples for FNT testing (test sequence).	N / A
3-5	2022-01-05	Samples for FNT testing (test sequence).	N / A
4-1	2022-01-05	Samples for impact test	N / A
4-2	2022-01-05	Samples for impact test	N / A

Photos of equipment



Photos of equipment

EN IEC 60079-0:2018			
Clause	Requirement - Test	Result - Remark	Verdict
Endorsement notice: The text of the International Standard IEC 60079-0:2017 was approved by CENELEC as a European Standard without any modifications Additional information relating to the European ATEX directive 2014/34/EU (informative):			
Annex ZY.1	**Equipment groups and categories**		
Annex ZY.2	**Instructions** In clause 30.1 under: “instructions for safety addressing the following areas – installation and erection;” “Information other than the general requirements given in IEC 60079-14” Is replaced by “Information other than the general requirements given in EN 60079-14 and EN 50628”		Pass
Annex ZY.3	**Marking**	Refer to checklist for MARKING: -ADDITIONAL REQUIREMENTS ACCORDING TO ATEX DIRECTIVE	Pass
Annex ZY.4	**Fans** Clause 17.2.5 “Room ventilating fans” is to be supplemented by the requirements given in EN 14986 “Design of fans working in potentially explosive atmospheres”	No “room ventilating fans” in EUT.	N / A

EN 60079-1:2014			
Clause	Requirement - Test	Result - Remark	
Endorsement notice: The text of the International Standard IEC 60079-1:2014 was approved by CENELEC as a European Standard without any modifications.			

EN 60079-11:2012			
Clause	Requirement - Test	Result - Remark	
Endorsement notice: The text of the International Standard IEC 60079-11:2011 was approved by CENELEC as a European Standard without any modifications.			

MARKING: -ADDITIONAL REQUIREMENTS ACCORDING TO ATEX DIRECTIVE			
Clause	Requirement - Test	Result - Remark	Verdict
	Where reference is made to Directive 2014/34/EU, the marking shall also include (Annex II, 1.0.5)		Pass
	• **name, registered trade name or registered trade mark, and address of the manufacturer,**	RIKEN KEIKI Co., Ltd. 2-7-6, Azusawa, Itabashi-ku, Tokyo, 174-8744, Japan	Pass
	• **the year in which the equipment was constructed**	According to “Safety information” document: INST. No. 00 0 000 0000 00 A B C D E A: Year of manufacture (0 to 9) B: Month of manufacture (1 to 9 for Jan.-Sep.; XYZ for Oct., Nov., Dec.)	Pass
	• **the specific marking of explosion protection Ⓔx followed by the symbol of the equipment-group and the category**	Ⓔx II 1	Pass
	• **CE marking with identification number to the notified body involved in the production control phase**	CE 2460	Pass
	• **If ATEX component, no CE mark, only NB number**	EUT is not an Ex component.	N / A
	for equipment Group II:		Pass
	• **the letter ‘G’ where explosive atmospheres caused by gases, vapours or mists are concerned and/or**	G	Pass
	• **the letter ‘D’ where explosive atmospheres caused by dusts are concerned**	No dust certification.	N / A

Descriptive documents;

		DRAWING NAME	DRAWING No.	REV	DATE
	1	BLOCK DIAGRAM GX-Force	E4-6991-6236-40-01K	0	2021.10.6
	2	DIAGRAM FOR I.S. KEEP GX-Force	E3-6991-6230-10-01K	2	2022.6.3
	3	OUTER STRUCTURE GX-Force	M2-4777-31-01K	3	2022.4.15
	4	DETAIL DRAWING 1 GX-Force	M3-4777-31-01K	2	2022.4.15
	5	DETAIL DRAWING 2 GX-Force	M3-4777-31-02K	1	2022.4.15
	6	SCHEMATIC MAIN PCB GX-Force	E3-6991-6237-10-01K	1	2022.1.14
	7	SCHEMATIC MAIN PCB GX-Force	E3-6991-6237-10-02K	0	2021.10.6
	8	SCHEMATIC MAIN PCB GX-Force	E3-6991-6237-10-03K	1	2022.1.14
	9	SCHEMATIC MAIN PCB GX-Force	E3-6991-6237-10-04K	1	2022.1.14
	10	PARTS LIST OF MAIN PCB GX-Force	PLT-6991-6237-10 (1/4)	2	2022.6.3
	11	PARTS LIST OF MAIN PCB GX-Force	PLT-6991-6237-10 (2/4)	0	2021.11.18
	12	PARTS LIST OF MAIN PCB GX-Force	PLT-6991-6237-10 (3/4)	1	2022.1.14
	13	PARTS LIST OF MAIN PCB GX-Force	PLT-6991-6237-10 (4/4)	1	2022.1.14
	14	MAIN PCB GX-Force	E3-6991-6237-10-01A	1	2022.1.17
	15	MAIN PCB GX-Force	E3-6991-6237-10-02A	1	2022.1.17
	16	BP-Force	M3-4777-31-03K	0	2021.11.26
	17	PROTECT PCB BP-Force	E3-6991-6238-90-01K	1	2022.1.24
	18	PUMP RP-12	M4-4181-61-03K	1	2022.2.3
	19	3EC SENSOR TYPE-ESR	M4-4482-02-01K	2	2018.3.29
	20	4EC SENSOR TYPE-ESR	M4-4488-19-01K	2	2018.3.29
*	21	COMBUSTIBLE GAS SENSOR NCR-6309	M3-4463-10-02K	7	2022.6.16
	22	LABEL GX-Force	M4-4777-31-01K	2	2022.3.24
	23	Safety information	-	3	2022.3.24

注 記 NOTES 21,		改版担当者 REV. BY	改版日 REVISED	名 称 NAME INDEX
改版回数 REV. 8	総頁数 PAGES 1	古舘優作	2022.6.16	GX-Force
承 認 APPROVED	検 討 CHECKED	製 図 DRAWN	作成日 DATE	図 番 DWG.NO.
北村正英	小野圭	古舘優作	2021.10.6	E4－6991－6235－70－01K

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