Base Load Power Hub (BLPH)

PRESSURE TEST PROCEDURES
VARIABLE AREA FLOWMETERS 3809G

Document Number: 1724000791-QC-PRO-00007

Document Class: 2

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Rev.	Date	Description	Prepared	Reviewed	Approved

BROOKS INSTRUMENT
Beyond Measure

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3	Revision / Change Log	X	X	X	X				
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Revision / Change Log

Rev.	Description
00	ISSUE FOR REVIEW (IFR)
01	ACCEPTED FOR CONSTRUCTION (AFC)
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03	ACCEPTED FOR CONSTRUCTION (AFC)

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Document addendum

Form QA-18-A-004

Subject	PRESSURE TEST PROCEDURES
Customer	ROSETTI MARINO S.p.A
Reference to customer procedure/ specification	1724000791-QC-PRO-00007
PO number	1724000791
Item description/scope	Flow Meter (Rotameter)
TAG numbers	As per order

Test Pressure Details:

All values are expressed in barg and PSIG at 21°C / 69.8°F

Modelcode	Tag number	Connection size	Flange material	Pressure test duration (min)	Pressure test medium	Pressure value (barg)	Acceptance criteria
3809GCA10AGBC3D2C0AC	25-FT-031	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCA10AGBC3D2C0AC	25-FT-032	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCA10AGBC3D2C0AC	25-FT-033	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCA10AGBC3D2C0AC	25-FT-034	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCA10AGBC3D2C0AC	25-FT-036	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCA10AGBC3D2C0AC	25-FT-038	1" 300 Lbs	316SS /316L SS	2	Water	75	No visual leakage
3809GCC08BFBC9A0V0AC	64-FG-001	1" 150 Lbs	316SS /316L SS	2	Water	29	No visual leakage

REV	DATE	CREATED BY	INIT.
2	30/10/2024	Krisztian Pohorlyak	KP
1	10/07/2024	Krisztian Pohorlyak	KP

FULL QUALITY ASSURANCE CERTIFICATE

Certificate No.:
10000454590-PA-ACCREDIA-NLD

Initial date:
2002-07-03

Validity:
05 July, 2023 - 04 July, 2026

This certificate consists of 2 pages

This is to certify that the quality system of:

Brooks Instrument LLC

407 West Vine Street, PA 19440 Hatfield, United States of America

has been assessed and found to comply with respect to the conformity assessment procedure described in:

ANNEX III MODULE H OF DIRECTIVE 2014/68/EU ON PRESSURE EQUIPMENT

This certificate is valid for the following scope:

Type of Pressure Equipment	**Pressure Accessories**
Product Name	**Precision fluid measurement and control instruments**

Place and date:
Vimercate, 04 July 2023

Check Validity

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

SGQ N° 003 A
SGA N° 003 D
SGE N° 007 M
SCR N° 004 F
EMAS N° 009 P
PRD N° 003 B
PRS N° 094 C
SSI N° 002 G

Membro di MLA EA per gli schemi di accreditamento SGQ, SGA, PRD, PRS, ISP, GHG, LAB e LAT, di MLA IAF per gli schemi di accreditamento SGQ, SGA, SSI, FSM e PRD e di MRA ILAC per gli schemi di accreditamento LAB, MED, LAT e ISP

For the issuing office:
Notified Body 0496, Italy
DNV Business Assurance Italy S.r.l.

Maurizio Bellina
Management Representative

Certificate No.: 10000454590-PA-ACCREDIA-NLD
Place and date: Vimercate, 04 July 2023
Revision No.: 1

Jurisdiction

Application of Directive 2014/68/EU and Decreto Legislativo n. 26 of 15 February 2016.

Certificate history:

Revision	Description	Issue Date
02-SKM-H-146535-00	Certification Brooks Instrument B.V. by DNV, PED 97/23/EC, Module H	2002-07-03
05-PED-ROT-H-05.3960-00	Re-Certification	2005-11-16
08-PED-ROT-H-08.4390-01	Re-Certification Brooks Instrument LLC by DNV	2008-06-06
11-PED-ROT-H-11.007820-01	Re-Certification	2011-07-03
14-PED-ROT-H-14.A0006826-01	Re-Certification	2014-07-03
14-PED-ROT-H-14.A0006826-01, R1	Revision DNV GL entity	2016-07-19
17-PED-ROT-H-16.Z0553001-01	Re-certification	2017-07-04
17-PED-ROT-H-16.Z0553001-01 R1	Location Veenendaal removed from certificate, ISO 9001:2015 certificate reference updated	2019-03-13
20-PED-ROT-H-16.Z0553001-01	Re-certification	2020-09-03
10000454590-PA-ACCREDIA-NLD rev. 0	Transfer of certificate to EU-CAB 0496	2021-10-04
10000454590-PA-ACCREDIA-NLD rev. 1	Re-certification	2023-07-04

Products covered by this Certificate:

Product Name	Product Description	Type of material	Applied product standard
Pressure Accessories	Precision fluid measurement and control instruments	Austenitic stainless steels Nickel Chrome alloys Titanium alloys	AD 2000 Merkblätter ASME B31.3 ASME VIII, div. 1

Sites covered by this certificate

Site Name	Site Address	Audited by	Date	Report ref
Central Office - Brooks Instrument LLC Manufacturing by assembly and testing	407 West Vine Street, Hatfield, PA, 19440, USA	R-J Kaagman	2023-06-29&30	SC239685-2023-AP-RC-00
Manufacturing location - Brooks Instrument Kft Manufacturing by welding, assembly and testing	Berényi út 72-100, Székesfehérvár, Hungary	Peter Éros	2023-06-21&22	239685-2023/06/21–RP/RC-00

Terms and conditions

Valid terms and conditions are found in the DNV´s PED Certification Requirements

End of Certificate

Test Specification	
Description:	**PRESSURE TEST FOR 38xxG SUPERFAMILY**

1. OBJECT

1.1 A pressure-technical test description of all products, which are used in the product group, referred to in the heading.

2. APPLICATION

2.1 This specification includes tables, which partly relate to basic components like flanged or threaded flow meters, with or without valves or controllers directly related to final products. The weakest link in the construction must be the determining factor for the pressure test values.

2.1.1 Table 1 listed the flange pressure if applicable.
2.1.2 Table 2 and 3 : Lists the Tube pressure for Threaded meters
2.1.3 Table 4 and 5: List the optional Flow Controller or Valve options.

Example: Model #10-MT 3809, 1" flange ANSI 300 LBS RF (PN50) 316L is assembled together with 8830 Flow Controller.
Max. pressure for 3809: 49.6bar (720psi), Acc. to ANSI B16.5.
Max. pressure for 8830: 21bar (305psi).
The weakest link is the 8830 FC. This is then the determining factor for the test pressure. The instrument mentioned above should be pressure-tested at 31bar (450psi).

2.2 The pressure-test factor used by Brooks is 1.5 x of the maximum (design / tube) pressure and all values are indicated in bar and PSI.

2.3 Valves, as indicated in the table on page 7, depend on the supplier. If for some reason needle valves are purchased from a different supplier than indicated on Purchase specification, the applicable maximum/test pressure should be considered again used the pressure value which is permitted by the supplied valve.

i.e. Flange material with equal or higher tensile strength than 316 SS.

2.4 The maximum pressure rating for flanges is partly dictated by their construction material. The table on page 3 indicates that relatively great differences exist depending on the material used. This should be taken into consideration in assessing jobs assigned by customers and in the design.
This does not apply to pressure tests for our standard range of flanges: ANSI 150 (PN20), ANSI 300 (PN50), ANSI 600 (PN100), DIN PN40, JIS 10K, JIS 20K. These nominal pressure values are assumed in determining the pressure test values.

Rev.	No.	Description	Revised by	Chk.	Date
H	GR11	Added acceptance criteria for test	AD	JPP	Nov-20-2023
G	GK98	Rewrittem to new format, Section 6 added	AD	RBS	Apr-22-2022
F	FW14	Corrected values for threaded female St'd pressude design for ELF	NRM	JJR	Jul. 22. 2019
E	FK66	Add instruction for assembled units (see 3.3): Pressure test time 10min	AL	JvL	Aug. 29. 2016
D	FC58	Update Pressure values according to ASME B16.5	JES	JvL	July 23. 2015

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HATFIELD, PA
19440 USA
FCI NO. 4ZW64

Form: 834E100 Rev 1

3. METHOD

3.1 The pressure test is carried out with the appropriate test equipment.

Hydrostatic pressure tests with water: at ambient temperature
Pneumatic pressure tests with air or nitrogen: at ambient temperature
(Water must be clean and have chloride content lower than 30 ppm)

3.2 Pressure should be built up as smoothly as possible and all safety precautions must be observed.

3.3 The duration of the pressure test of **individual units must be at least two minutes** at test pressure, except where otherwise stated on the order routing. (i.e. CRN orders needs to be pressure tested at least 10 minutes)

The duration of the leak test of units **assembled with valve or flowcontroller** must be at least **ten** minutes at test pressure of weakest link in the construction.
Pressure test shall be conducted after any other treatments or applicable examinations (e.g.: heat treatment, LDP..etc) BUT needs to be executed before primed and painted.
In case the pressure rating of the individual units are the same, only testing as a complete assembly for the duration mentioned above, is sufficient.

3.4 After testing the inside of the product, must be cleaned and dried. The dismantling of the assembled instruments is no longer permitted after this time.

3.5 When pressure tests are being carried out on the meter bodies, the Certification Tag or Log File should be completed with details of the actual pressure values. The assembled meters, including FC 88/8900 series and 8830 should be supplied with a stamped PT sticker. The sticker should be placed in a position where it can easily be seen, but it must not deface the instrument. The assembled meters should be supplied with a stamped PT sticker.

3.6 Pressure test equipment must be controlled within the test equipment control program for traceability and periodical calibration.

4. ASSEMBLED MODELS

If a number of pressure-tested components are built together to form an assembly (e.g. 38xxG with Flow Controller), which may not be tested on water, the assembly should be tested for any signs of leakage by using compressed air or nitrogen.
The test pressure has to be determined by the components with the lowest permissible working pressure.

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5. DEFINITIONS

- The ambient temperature referred to in the pressure test should be 21°C ± 5°C (69.8°F ± 9.0 ºF).

6. ACCEPTANCE CRITERIA

- The acceptance criteria through the duration of the test are that there will be no breakage or permanent distortion of any structural member and be totally leak free by visual inspection.
- No formation of a water drop is allowed during the whole cycle of the pressure test.

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FIGURES RELATING TO PRESSURE TEST FOR FLANGES

According to ANSI B 16.5, EN1092-1 and JIS B 2220

Pressure should be built up gradually to the value below -0% to +8% to the nearest increment on the gage. All values are expressed in bar and PSIG at 21°C / 69,8°F
The duration of the test must be at least two minutes, except where otherwise stated on order routing (See 3.3)

Table 1:

Flange Rating	316SS dual cert.			
	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
150 lbs / PN 20	19	275	29	425
300 lbs / PN 50	49.6	720	75	1100
600 lbs / PN 100	99.3	1440	149	2175
900 lbs / PN 150	148.9	2160	224	3250
1500 lbs / PN 250	248.2	3600	372	5400
2500 lbs / PN 420	413.7	6000	621	9000
PN 16	16	232	24	350
PN 25	25	363	38	550
PN 40	40	580	60	875
PN 64	64	928	96	1400
PN 100	100	1450	150	2200
10 K (JIS)	14	203	21	325
20 K (JIS)	34	493	51	750

Flange Rating	Hastelloy C276, Inconel 625				Titanium GR 2			
	Max. Pressure		Test Pressure		Max. Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)
150 lbs / PN 20	20	290	30	450	16.1	234	24	350
300 lbs / PN 50	51.7	750	78	1125	42.2	612	63	925
600lbs / PN 100	103.4	1500	155	2250	84.4	1224	126	1850
900lbs / PN 150	155.1	2250	233	3375	126.6	1836	191	2775
1500lbs / PN 250	258.6	3750	388	5625	211	3060	317	4600
2500lbs / PN 420	430.9	6250	647	9375	351.6	5100	528	7650
PN 16	16	232	24	350	13.6	197	21	325
PN 25	25	363	38	550	21.3	309	32	475

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PN 40	40	580	60	875	34	493	51	750
PN 64	64	928	96	1400	54.4	789	82	1200
PN 100	100	1450	150	2200	85	1233	128	1850
10 K (JIS	14	203	21	325	11.9	173	18	275
20 K (JIS)	34	493	51	750	28.9	419	44	650

Notes: For other pressure values or unspecified flange norms where the pressure test values are not indicated on the routing, please consult the engineer responsible.

FIGURES RELATING TO PRESSURE TEST FOR THREADED METERS.

Pressure should be built up gradually to the value below -0% to +8% to the nearest increment on the gage. All values are expressed in bar and PSIG at 21°C / 69,8°F
The duration of the test must be at least two minutes, except where otherwise stated on order routing (See 3.3)

Table 2:

Meter Size	316 SS DUAL CERT.							
	Threaded Female St'd Pressure Design				Threaded Female High Press.			
	Maximum Pressure		Test Pressure		Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)
ELF	177	2567	266	3875	414	6000	621	9000
7/8	177	2567	266	3875	414	6000	621	9000
10	160	2321	240	3500	414	6000	621	9000
12	133	1929	200	2900	414	6000	621	9000
13	120	1740	180	2625	-	-	-	-

Meter Size	HASTELLOY C276			
	Threaded Female St'd Pressure Design		Threaded Female High Press.	
	Maximum Pressure	Test Pressure	Maximum Pressure	Test Pressure

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Test Specification	
Description:	**PRESSURE TEST FOR 38xxG SUPERFAMILY**

	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)
ELF	242	3510	363	5275	431	6250	647	9375
7/8	242	3510	363	5275	431	6250	647	9375
10	218	3162	327	4750	431	6250	647	9375
12	182	2640	273	3975	431	6250	647	9375
13	164	2379	246	3575	-	-	-	-

Meter Size	**INCONEL 625**							
	Threaded Female St'd Pressure Design				**Threaded Female High Press.**			
	Maximum Pressure		Test Pressure		Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)
ELF	279	4047	419	6075	431	6250	647	9375
7/8	279	4047	419	6075	431	6250	647	9375
10	251	3640	377	5475	431	6250	647	9375
12	210	3046	315	4575	431	6250	647	9375
13	189	2741	284	4125	-	-	-	-

Meter Size	**TITANIUM GRADE 2**							
	Threaded Female St'd Pressure Design				**Threaded Female High Press.**			
	Maximum Pressure		Test Pressure		Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)
ELF	148	2147	222	3225	352	5100	528	7650
7/8	148	2147	222	3225	352	5100	528	7650
10	133	1929	200	2900	352	5100	528	7650
12	111	1610	167	2425	352	5100	528	7650
13	100	1450	150	2200	-	-	-	-

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Form: 834E100 Rev 1

Table 3:

Meter Size	316 SS DUAL CERT. Threaded Male			
	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
ELF	414	6000	621	9000
7/8	324	4699	486	7050
10	261	3785	392	5700
12	254	3684	381	5550

Meter Size	HASTELLOY C276 Threaded Male			
	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
ELF	431	6250	647	9375
7/8	344	4989	516	7500
10	356	5163	534	7750
12	347	5033	521	7550

Meter Size	INCONEL 625 Threaded Male			
	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
ELF	431	6250	647	9375
7/8	397	5758	596	8650
10	411	5961	617	8950
12	400	5802	600	8725

Meter Size	TITANIUM GR 2 Threaded Male			
	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
ELF	352	5100	528	7650

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7/8	210	3046	315	4575
10	217	3147	326	4725
12	212	3075	318	4625

FIGURES RELATING TO HYDROSTATIC PRESSURE TEST FOR MODEL 38xxG (316 SS, E/TFE LINED)

The practical operating and test pressures are determined by the type of flange. See Table 1 page 3 for 316SS dual cert values.

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FIGURES RELATING TO HYDROSTATIC PRESSURE TESTS FOR NEEDLE VALVES

This part of this procedure is only applicable where 38xx instruments are used in combination with a mounted needle valve. For mounted needle valves see table 1 or 2 (when applicable, 316SS only) whichever is the lowest operating pressure.

Pressure should be built up gradually to the value below -0% to +8% to the nearest increment on the gage. All values are expressed in bar and PSIG at 21°C / 69,8°F
The duration of the test must be at least **ten minutes**, except where otherwise stated on order routing (See 3.3)

Table 4:

NEEDLE VALVE size	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
088Z080BMF - Brooks Industrial 1/4" ELF	138	2000	207	3000
947B360BMA - 1/4" 947B359BMA - 1/2" 947B364BMA - 3/4" 947B365BMA - 1"	210	3045	315	4575
947B521BMA - 1½"	100	1450	150	2200

Notes:

1. Always use the lowest permissible test pressure for the components in the final product related to the lowest operating pressure from one of the components.
2. The pressure test values shown above are maximum permissible pressures and may not be exceeded, even if a higher value is permitted by a flange pressure class. Please consult the engineer responsible if in doubt.

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FIGURES RELATING TO PNEUMATIC PRESSURE TESTS

FOR FLOW CONTROLLERS

(Technical air or nitrogen)

Pressure should be built up gradually to the value below -0% to +8% to the nearest increment on the gage. All values are expressed in bar and PSIG at 21°C / 69,8°F
The duration of the test must be at least **ten minutes.**
For mounted Flow Controller see table 1 or 2 (when applicable) whichever is the lowest operating pressure.

Table 5:

FLOWCONTROLLER TYPE	Maximum Pressure		Test Pressure	
	(bar)	(PSI)	(bar)	(PSI)
316SS 8802/12 – 8902/12	21	305	31	450
316SS 8805/15 – 8905/15	69	1000	104	1500
316SS 8830	21	305	31	450

Notes:

1. Always use the lowest permissible test pressure for the components in the final product related to the lowest operating pressure from one of the components.
2. The pressure test values shown above are maximum permissible pressures and may not be exceeded, even if a higher value is permitted by a flange pressure class. Please consult the engineer responsible if in doubt.

NOTICE
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