IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx UL 10.0015X**

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Status: **Current**

Issue No: 12

Date of Issue: 2021-06-17

Applicant: **Moog Controls (India) Private Limited**
KIADB Industrial Area, No. 99P
100P and 41 P Electronic City Phase II, Hosur Road
Bangalore - 560 100 Karnataka
India

Equipment: **Brushless Servomotor, G493, G495 and G496**

Optional accessory:

Type of Protection: **Flameproof "db", Dust Ignition Protection by Enclosure "tb"**

Marking: Ex db IIC Tx Gb
Ex db IIB Tx Gb
Ex tb IIIC Tx Db IP65/67

Please see Annex for temperature ranges.

Certificate history:

Issue 11 (2021-05-14)
Issue 10 (2020-09-25)
Issue 9 (2020-05-15)
Issue 8 (2017-11-03)
Issue 7 (2017-04-20)
Issue 6 (2016-08-04)
Issue 5 (2013-09-13)
Issue 4 (2012-07-30)
Issue 3 (2012-06-19)
Issue 2 (2011-05-17)

Approved for issue on behalf of the IECEx Certification Body: **Katy A. Holdredge**

Position: **Senior Staff Engineer**

Signature: (for printed version)

Date:

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2. This certificate is not transferable and remains the property of the issuing body.
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Certificate issued by:

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096
United States of America

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Manufacturer: **Moog Controls (India) Private Limited**
KIADB Industrial Area, No. 99P
100P and 41 P Electronic City Phase II, Hosur Road
Bangalore - 560 100 Karnataka
India

Additional manufacturing locations: **MOOG GmbH**
Hanns-Klemm-Str. 28
71034 Böblingen
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-1:2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

US/UL/ExTR16.0125/00
US/UL/ExTR16.0125/01
US/UL/ExTR16.0125/02
US/UL/ExTR16.0125/03
US/UL/ExTR16.0125/04
US/UL/ExTR16.0125/05
US/UL/ExTR16.0125/06

Quality Assessment Reports:

DE/TPS/QAR12.0004/05
GB/ITS/QAR17.0008/02

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EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

Product is a Brushless Servomotor for use in Gas, or Gas and Dust atmospheres of model numbers G493, G495, and G496. The three models are similar in design but vary in size, volume and electrical parameters. The motor has two versions for IP rating, IP 65 and IP 67. The motor has a built-in temperature-limiting device of NTC, PTC or KTY type. A primary thermistor which is a PTC type only and is to be connected to a temperature monitoring device, which would trip power supply to drive on field. An optional secondary thermistor which can be of the PTC/NTC or KTY type can also be connected. The enclosure is made of aluminum alloy. The dimensions and flame paths remain constant for a particular motor model and only the torque and power ratings vary. The motor is available in various stack lengths.

Please see Annex for additional information.

SPECIFIC CONDITIONS OF USE: YES as shown below:

- For ambient temperatures below –10 °C and above +60 °C use field wiring suitable for both minimum and maximum ambient temperature.
- Contact Moog for information on the dimensions of the flameproof joints.
- Yield strength of the front and rear cover assembling fasteners shall not be less than 640 MPa.
- The drive used with the servo motor shall be of specification as detailed by manufacturer and suitable for the motor electrical specifications and operating characteristics.
- Refer to duty ratings for maximum torque permitted per duration time of use.
- Each motor shall use a suitable thermal protector based on its rated ambient and surface temperature class (T-code).
- The painted surface of motor may store electrostatic charge and become a source of ignition in applications, operating Instruction CB07398 provides guidance for the user to minimize the risk from electrostatic discharge.

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

Issue 1: Revisions were made to the nomenclature for the G493 motors to distinguish the difference between -40ºC motors and -20ºC motors. A correction was made on drawing CA91180, sheet 4/4, for a typo on one of the electrical ratings table. Also, a correction was made on the marking in the installation instructions. There were no construction changes.

Issue 2: The label was revised to show the applicant's address instead of the manufacturer's address.

Issue 3: New format and update of the address on the nameplate. Minor dimension changes not affecting the protection method. Change of enclosure material from ENAW 2007 T4 to ENAW 2012 T6, which is a higher grade. Addition of M25 and M32 cable gland entries. Addition of a M6 earth plug for the motors. Adding an alternate PTC temperature limiting device with the same opening temperatures and tolerances. Revised marking to add an option for a lower ambient range of -20°C instead of -40°C.

Issue 4: Addition of G496 motor series and update to the 6th Edition of IEC 60079-0.

Issue 5: Manufacturer requested for the addition of new manufacturing location Moog GmbH in the certificate and also added an alternate material for the shaft.

Issue 6: Increase ambient temperature range on G495 to 90°C, 100°C,110°C and 120°C for only Group II applications. Updated to latest standards, updated marking string for all models and removed German manufacturing location.

Issue 7: Included Gas Group IIB in the marking.

Issue 8: Revision of manufacturer's documentation to reflect change of IECEx QAR. Minor editorial changes, not affecting safety.

Issue 9: Standard updated to latest Edition IEC 60079-0, 7th Edition. Manufacturer changed the quality assessment certification body, the manual and marking label were revised to address this change.

Issue 10: Typos corrected in the schedule drawings. Clarification of the temperature markings.

Issue 11: For G493 series, included an option of enclosure with internal additional clearance. NPT threaded cable entry options included for G493 series, G495 series and G496 series.

Issue 12: Corrected typo errors and included additional manufacturing location.

Annex:

Annex to IECEx UL 10.0015X Issue 12.pdf

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TYPE DESIGNATION

Nomenclature for types G493, G495 and G496:

G	3	L	M	2	010	00	00	01	01	000
I	II	III	IV	V	VI	VII	VIII	IX	X	XI

I – Motor Series
G (Global) – Series designation

II – Motor Size
3 (493) – 70 mm square flange
5 (495) – 140 mm square flange
6 (496) – 190 mm square flange

III – Design
L – Moog Ex Design UL

IV – Winding Voltage
M – Low voltage
V – High voltage

V – Stack Length
0 – Non-standard stack length, between L05 and L40 for G493, between L10 and L50 for G495, and between L15 and L90 for G496
2 – L05 (G493) or L10 (G495) or L15 (G496)
4 – L15 (G493) or L20 (G495) or L30 (G496)
6 – L25 (G493) or L30 (G495) or L45 (G496)
8 – L40 (G493) or L50 (G495) or L60 (G496)
9 – L90 (G496)

VI – Nominal Speed, RPM
Any number between X – XXX, followed by motor RPM code, where the RPM code designation given as = RPM/100

VII – Electrical Option

	Brake Options		Cable gland position		Internal clearance for connection	
	1	2	Top	Back	No Additional clearance	Additional clearance
00	-	-	X	-	X	-
01	X	-	X	-	X	-
02	-	X	X	-	X	-
03	-	-	-	X	X	-
04	X	-	-	X	X	-
05	-	X	-	X	X	-
06	-	-	X	-	-	X
07	X	-	X	-	-	X
08	-	X	X	-	-	X
09	-	-	-	X	-	X
10	X	-	-	X	-	X
11	-	X	-	X	-	X
99	Special version – not affecting the electrical performance or protection methods of the device as described in the documents					

Note: Additional clearance for internal clearance for connection is applicable only for G493 models.

Brake option

Brake Option				
Motor Size		G493	G495	G496
Low -T	1	2 Nm	14.5 Nm	22 Nm
High -T	2	4.5 Nm	22 Nm	72 Nm
	Code			

VIII – Mechanical Option

Code	Keyway	Shaft exit seal
00	None provided	X
01	X	X
99	Special version – not affecting the electrical performance or protection methods of the device as described in the documents	

IX – Feedback Option

Any two digit number - Not related to the protection method

X – Surface Temperature Class

	Ignition Temperature Class / Ambient (°C)+																	
	-20 to +40	-20 to +50	-20 to +60	-20 to +70	-20 to +80	-20 to +90	-20 to +100	-20 to +110	-20 to +120	-40 to +40	-40 to +50	-40 to +60	-40 to +70	-40 to +80	-40 to +90	-40 to+100	-40 to 110	-40 to +120
00	-	-	-	-	-	-	-	-	-	-	-	-	-	T4	-	-	-	-
01	-	T4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02	-	-	T4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03	T4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04	-	-	-	T4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05	-	-	-	-	T4	-	-	-	-	-	-	-	-	-	-	-	-	-
06	-	-	-	-	-	-	-	-	-	T4	-	-	-	-	-	-	-	-
07	-	-	-	-	-	-	-	-	-	-	T4	-	-	-	-	-	-	-
08	-	-	-	-	-	-	-	-	-	-	-	T4	-	-	-	-	-	-

	Ignition Temperature Class / Ambient (°C)+																	
	-20 to +40	-20 to +50	-20 to +60	-20 to +70	-20 to +80	-20 to +90	-20 to +100	-20 to +110	-20 to +120	-40 to +40	-40 to +50	-40 to +60	-40 to +70	-40 to +80	-40 to +90	-40 to+100	-40 to 110	-40 to +120
09	-	-	-	-	-	-	-	-	-	-	-	-	T4	-	-	-	-	-
10	T5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	T5	-	-	-	-	-	-	-	-
12	T6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	T6	-	-	-	-	-	-	-	-
14	T3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	T3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	T3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	T3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	T3	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	T3	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	T3	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	T3	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	T3	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	T3	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	T3	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	T3	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T3	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T3	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T3	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T3

	Ignition Temperature Class / Ambient (°C)+																	
	-20 to +40	-20 to +50	-20 to +60	-20 to +70	-20 to +80	-20 to +90	-20 to +100	-20 to +110	-20 to +120	-40 to +40	-40 to +50	-40 to +60	-40 to +70	-40 to +80	-40 to +90	-40 to+100	-40 to 110	-40 to +120
30	-	-	-	-	-	-	-	T3	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	T3	-	-	-	-	-	-	-	-	-
99	Special version – not affecting the electrical performance or protection methods of the device as described in the documents																	
+ - T3 ignition temp class for motor size 3 & 5 up to 80°C only. + - T3 ignition temp class for motor size 5 between 80ºC to 120ºC only gas code.																		

XI – Special Version

Any three digit number - Not related to the protection method

PARAMETERS RELATING TO THE SAFETY

Power ratings with corresponding range of parameters for motors are as below:

For G493:

Stack Length	Power, W	Speed, rpm	Rated Torque, Nm	Peak Torque, Nm	Ambient Rating, °C	Temperature Class
L05	0	0	0.52	1.6	-40 to +40 -20 to +40	T4/T135°C
	359	7800	0.44	1.6		
L40	0	0	3.26	13.2		
	1117	3800	2.82	13.2		
L05	0	0	0.5	1.6	-40 to +50 -20 to + 50	T4/T135°C
	341	7800	0.42	1.6		
L40	0	0	3.13	13.2		
	1059	3800	2.66	13.2		
L05	0	0	0.46	1.6	-40 to +60 -20 to +60	T4/T135°C
	304	7800	0.37	1.6		
L40	0	0	2.88	13.2		
	942	3800	2.37	13.2		
L05	0	0	0.41	1.6	-40 to +70 -20 to +70	T4/T135°C
	253	7800	0.31	1.6		
L40	0	0	2.56	13.2		
	786	3800	1.97	13.2		
L05	0	0	0.34	1.6	-40 to +80 -20 to +80	T4/T135°C
	177	7800	0.22	1.6		
L40	0	0	2.14	13.2		
	552	3800	1.38	13.2		
L05	0	0	0.43	1.6	-40 to +40 -20 to +40	T5/T100°C
	273	7800	0.33	1.6		
L40	0	0	2.74	13.2		
	847	3800	2.12	13.2		
L05	0	0	0.32	1.6	-40 to +40 -20 to +40	T6/T85°C
	118	7800	0.14	1.6		
L40	0	0	1.99	13.2		
	364	3800	0.91	13.2		

For G495:

Stack Length	Power, W	Speed, rpm	Rated Torque, Nm	Peak Torque, Nm	Ambient Rating, °C	Temperature Class
L10	0	0	4.32	13.08	-40 to +90 -20 to +90	T3
	1240	4000	2.96	13.08		
L50	0	0	19.22	67.53		
	2692	1800	14.28	67.53		
L10	0	0	3.96	13.05	-40 to +100 -20 to +100	T3
	1005	4000	2.4	13.05		
L50	0	0	17.71	67.53		
	2237	1800	11.87	67.53		
L10	0	0	3.57	13.03	-40 to +110 -20 to +110	T3
	777	3500	3.24	13.03		
L50	0	0	15.94	67.53		
	1726	1600	10.3	67.53		
L10	0	0	3.12	13	-40 to +120 -20 to +120	T3
	577	2700	2.04	13		
L50	0	0	13.94	67.53		
	1220	1400	8.32	67.53		
L10	0	0	5.79	12.2	-40 to +40 -20 to +40	T4/T135°C
	2173	4800	4.32	12.2		
L50	0	0	25.39	61.2		
	4388	2000	20.95	61.2		
L10	0	0	5.47	12.2	-40 to +50 -20 to +50	T4/T135°C
	1969	4800	3.92	12.2		
L50	0	0	24	61.2		
	4046	2000	19.32	61.2		
L10	0	0	5.15	12.2	-40 to +60 -20 to +60	T4/T135°C
	1746	4800	3.47	12.2		
L50	0	0	22.6	61.2		
	3682	2000	17.58	61.2		
L10	0	0	4.81	12.2	-40 to +70 -20 to +70	T4/T135°C
	1489	4800	2.96	12.2		
L50	0	0	21.14	61.2		
	3283	2000	15.67	61.2		
L10	0	0	4.3	12.2	-40 to +80 -20 to +80	T4/T135°C
	1035	4800	2.06	12.2		
L50	0	0	18.87	61.2		
	2604	2000	12.43	61.2		
L10	0	0	5.09	12.2	-40 to +40 -20 to +40	T5/T100°C
	1581	4800	3.15	12.2		
L50	0	0	22.35	61.2		
	3474	2000	16.6	61.2		
L10	0	0	4.03	12.2	-40 to +40 -20 to +40	T6/T85°C
	645	4800	1.47	12.2		
L50	0	0	17.68	61.2		
	1640	2000	7.83	61.2		

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For G496:

Stack Length	Power, W	Speed, rpm	Rated Torque, Nm	Peak Torque, Nm	Ambient Rating, °C	Temperature Class
L15	0	0	13	40	-40 to +40 -20 to +40	T3/T200°C
	3464	4000	8	40		
L90	0	0	70	240		
	8378	2000	40	240		
L15	0	0	13	40	-40 to +50 -20 to +50	T3/T200°C
	3179	4000	8	40		
L90	0	0	66	240		
	8378	2000	40	240		
L15	0	0	12	40	-40 to +60 -20 to +60	T3/T200°C
	2886	4000	7	40		
L90	0	0	64	240		
	8378	2000	40	240		
L15	0	0	11	40	-40 to +70 -20 to +70	T3/T200°C
	2346	3200	7	40		
L90	0	0	58	240		
	6053	1700	34	240		
L15	0	0	10	40	-40 to +80 -20 to +80	T3/T200°C
	1926	2800	7	40		
L90	0	0	53	240		
	5027	1500	32	240		
L15	0	0	9	40	-40 to +90 -20 to +90	T3/T200°C
	1330	2300	6	40		
L90	0	0	46	240		
	4241	1500	27	240		
L15	0	0	8	40	-40 to +100 -20 to +100	T3/T200°C
	928	2000	4	40		
L90	0	0	40	240		
	3142	1250	24	240		
L15	0	0	13	40	-40 to +40 -20 to +40	T4/T135°C
	3464	4000	8	40		
L90	0	0	70	240		
	8378	2000	40	240		
L15	0	0	13	40	-40 to +50 -20 to +50	T4/T135°C
	3179	4000	8	40		
L90	0	0	66	240		
	8378	2000	40	240		
L15	0	0	12	40	-40 to +60 -20 to +60	T4/T135°C
	2622	4000	6	40		
L90	0	0	62	240		
	7459	1800	39	240		
L15	0	0	11	40	-40 to +70 -20 to +70	T4/T135°C
	2346	3200	7	40		
L90	0	0	58	240		
	6053	1700	34	240		
L15	0	0	10	40	-40 to +80 -20 to +80	T4/T135°C
	1926	2800	7	40		
L90	0	0	53	240		
	5027	1500	32	240		
L15	0	0	10	40	-40 to +40 -20 to +40	T5/T100°C
	1875	2700	7	40		
L90	0	0	55	240		
	4765	1300	35	240		

Stack Length	Power, W	Speed, rpm	Rated Torque, Nm	Peak Torque, Nm	Ambient Rating, °C	Temperature Class
L15	0	0	9	40	-40 to +40 -20 to +40	T6/T85°C
	1256	2100	6	40		
L90	0	0	47	240		
	3110	1100	27	240		

The above ratings are continuous 100% duty cycle. The change in torque ratings with respect to duty cycle is as given below:

Duty Cycle	Torque rating increases by
25%	85%
40%	50%
60%	25%

The duty cycle for peak torque condition is 10% i.e. 6 seconds ON and 54 seconds OFF, in a cycle time of 1 minute.
For ratings between the above stack lengths, refer to page 4 of schedule drawings CA91180, CA91181 and CB35199.
All the above ratings are at DC bus voltage of 325 volts, maximum DC bus voltage rating is 750 volts, ratings remain the same for all voltages and hence the losses also remain the same.

TEMPERATURE RANGE:

The relation between ambient temperature and the assigned temperature class See Electrical data. The temperature class and ambient are related based on the power supply rating to the motor at a specific ambient range.

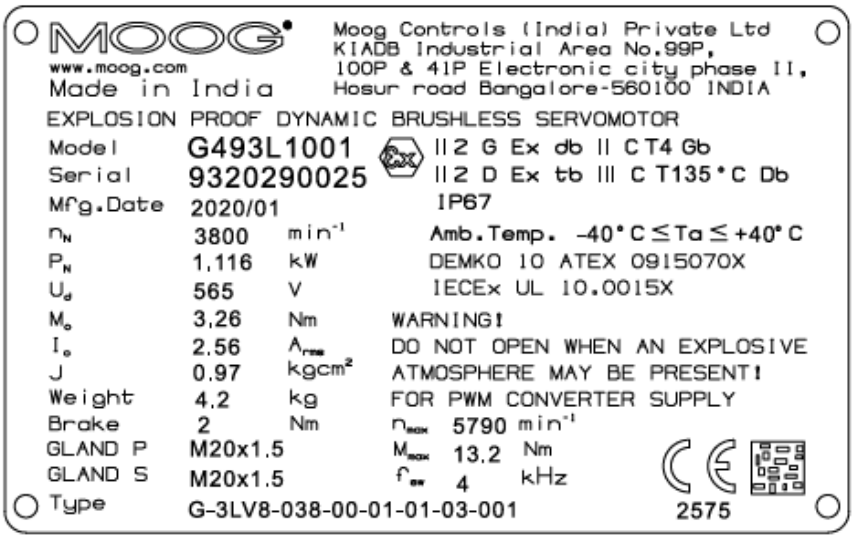
MARKING

Marking has to be readable and indelible; it has to include the following indications:

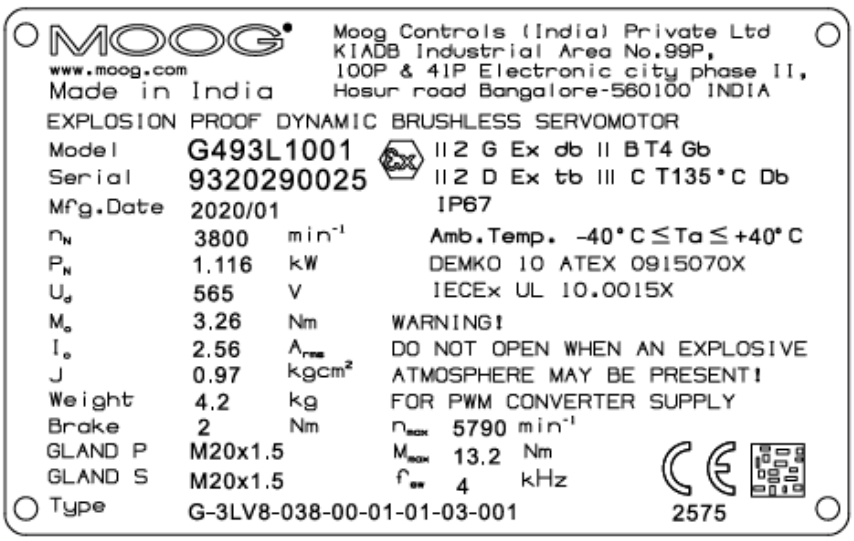
Gas & Dust:

Note: Engraved label, Version CB05597-001 & CB05597-003, are for the motor produced in Moog Control India Private Limited.

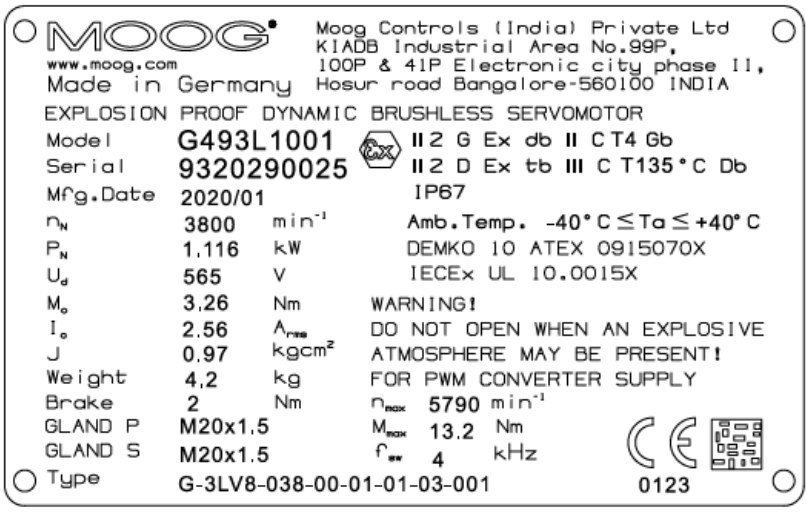
CB05597-001



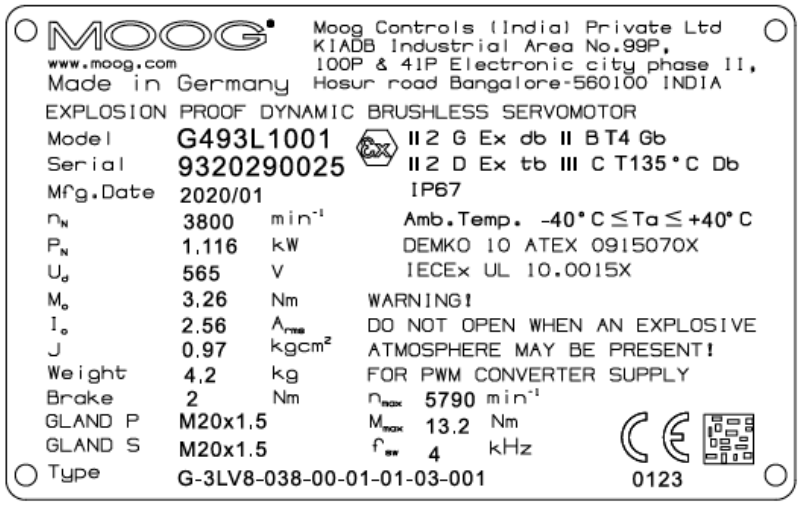
CB05597-003



CB05597-005



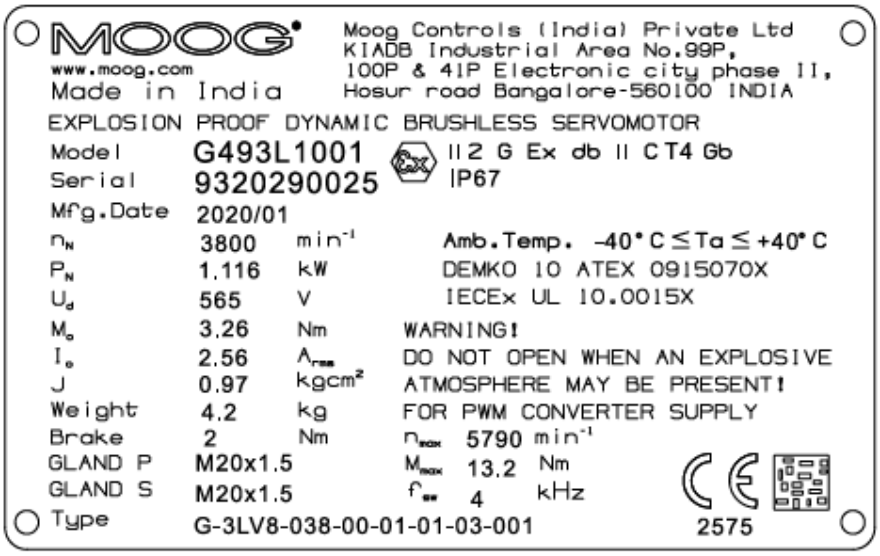
CB05597-006



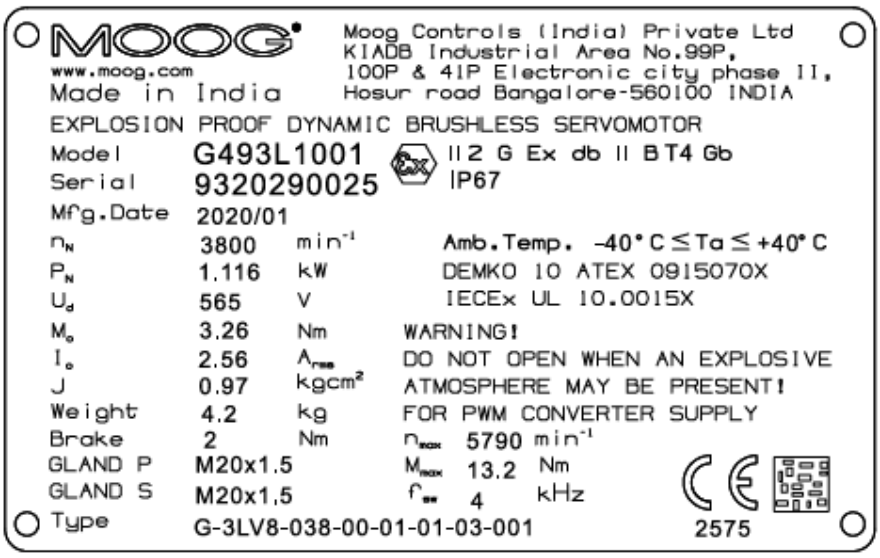
Gas Only:

Note: Engraved label, Version CA94541-001 & CA94541-003 , are for the motor produced in Moog Control India Pvt Ltd.

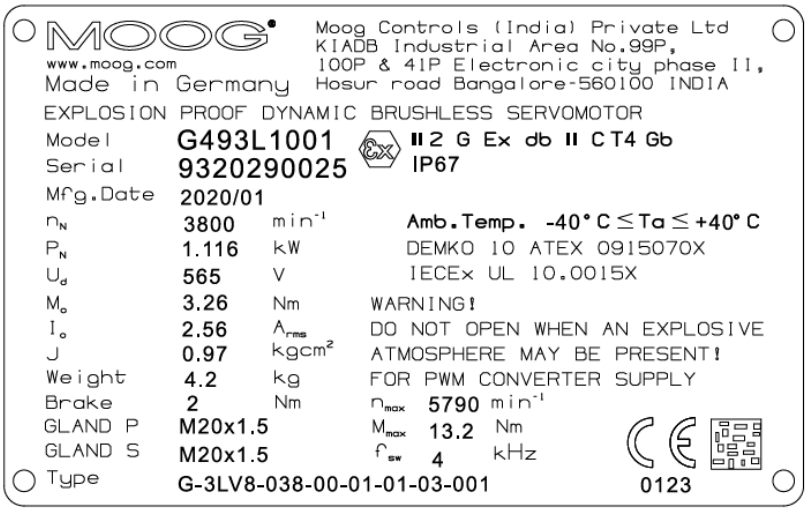
CA94541-001



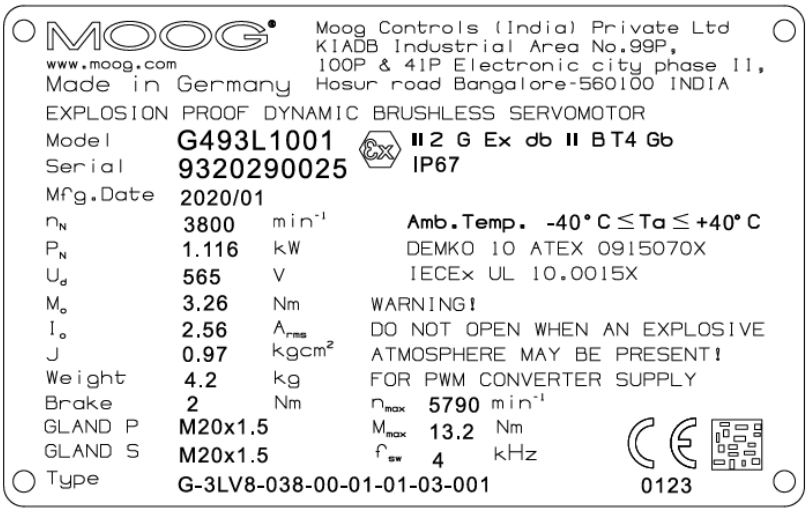
CA94541-003



CA94541-005



CA94541-006



ROUTINE EXAMINATIONS AND TESTS

Routine tests hydrostatic pressure test according to IEC 60079-1 cl. 16 are to be carried out in accordance with work instruction WI005306, for type G493 motors (only models with no additional clearance) rated below -20°C as the enclosures have been tested at 1.5 times the reference pressure.

All other type G493 motors rated -20°C and above, have successfully been tested at four times the reference pressure and routine tests are not required.

IECEx Certificate of Conformity

Routine tests according to IEC 60079-1 cl. 16 are not required, for all the type G495, G496 and G493 with increased additional clearance motors as the enclosures have been successfully tested at four times the reference pressure.