

Type examination certificate UK/0126/0059 Revision 13

Issued by:

NMO

Approved Body Number 0126

In accordance with the requirements of the Measuring Instruments Regulations 2016 (S.I. 2016 No. 1153), as amended, this type examination certificate has been issued to:

**Arad Ltd
Kibbutz Dalia
1923900
Israel**

In respect of a cold-water meter designated Gladiator utilising a volumetric rotary-piston measuring element and having a rated permanent flowrate Q_3 of 1.6 m³/h (R315), or 2.5 m³/h (R400), or 4.0 m³/h (R250).

The necessary data (principal characteristics, alterations, securing, functioning etc) for identification purposes and conditions (when applicable) are set out in the descriptive annex to this certificate.

This revision replaces previous versions of the certificate.

Issue date: 28 April 2021
Valid until: 27 April 2031



**Grégory Glas
Lead Technical Manager**

For and on behalf of the Head of NMO



0135

Descriptive Annex

1 INTRODUCTION

This pattern of a liquid measuring instrument is for measuring the volume of cold water which has passed through it. It is a concentric, semi-positive displacement cold-water meter having a Q_3 (permanent flowrate) of 1.6 m³/h and a Q_3/Q_1 turndown ratio of 315 (R315) or a Q_3 (permanent flowrate) of 2.5 m³/h and a Q_3/Q_1 turndown ratio of 400. It is not designed to measure reverse flow. The meter is shown in Figure 1.

2 DESCRIPTION

It incorporates a semi-positive displacement rotary piston measuring assembly mounted in a plastic body that is fitted into a thermoplastic injection moulded body for connection to a manifold in any orientation. The rotary piston drives a magnet that couples to a non-resettable totalising display (register) that indicates up to 99999.99995 m³. The register is positioned on the top of the measurement chamber and secured between the plastic snap-shut register cover and meter body.

The connection to the manifold is arranged via a British Pipe Thread G1½"A male threaded co-axial inlet/outlet at the base of the meter body. A cross section diagram is shown in Figure 2.

3 TECHNICAL DATA

3.1 Flow designation

3.1.1 Meter with $Q_3 = 1.6 \text{ m}^3/\text{h}$

Table 1 Related flowrates according to each Q_3/Q_1 designation

Q_3/Q_1 (R)	315	250	200	160
Q_2/Q_1	1.6	1.6	1.6	1.6
Q_1 Minimum flowrate (m ³ /h)	0.005	0.00640	0.0080	0.01
Q_2 Transitional flowrate (m ³ /h)	0.008	0.01024	0.0128	0.016
Q_3 Permanent flowrate (m ³ /h)	1.6	1.6	1.6	1.6
Q_4 Overload flowrate (m ³ /h)	2.0	2.0	2.0	2.0

3.1.2 Meter with $Q_3 = 2.5 \text{ m}^3/\text{h}$

Table 2 Related flowrates according to each Q_3/Q_1 designation

Q_3/Q_1 (R)	400	315	250	200	160
Q_2/Q_1	1.6	1.6	1.6	1.6	1.6
Q_1 Minimum flowrate (m ³ /h)	0.00625	0.008	0.01	0.0125	0.01563
Q_2 Transitional flowrate (m ³ /h)	0.01	0.0128	0.016	0.02	0.025
Q_3 Permanent flowrate (m ³ /h)	2.5	2.5	2.5	2.5	2.5
Q_4 Overload flowrate (m ³ /h)	3.125	3.125	3.125	3.125	3.125

3.1.3 Meter with $Q_3 = 4.0 \text{ m}^3/\text{h}$

Table 3 Related flowrates according to each Q_3/Q_1 designation

Q_3/Q_1 (R)	250
Q_2/Q_1	1.6
Q_1 Minimum flowrate (m^3/h)	0.016
Q_2 Transitional flowrate (m^3/h)	0.026
Q_3 Permanent flowrate (m^3/h)	4.0
Q_4 Overload flowrate (m^3/h)	5.0

3.2 Other designations

	Q_3 1.6 m^3/h	Q_3 2.5 m^3/h	Q_3 4.0 m^3/h
Temperature class:	T50 (0.1°C – 50°C)		
Orientation requirements	None		
Revs/litre of measuring chamber	26.13		
Maximum admissible pressure (MAP)	16 bar		
Pressure Loss at Q_3	$\Delta P16$	$\Delta 40$	
Climatic environment:	-10°C to 55°C		
Mechanical environment:	M1		
Electromagnetic environment:	n/a		
Location:	Open/closed, condensing/non-condensing		
Reverse Flow:	The meter is not designed to measure reverse flow		
Minimum straight length of inlet/outlet pipe	D0/U0		

4 PERIPHERAL DEVICES AND INTERFACES

4.1 Mechanical register with electronic unit: 3G, LoRa, Homerider (Birdz), or Sigfox

The register is similar to the standard mechanical register but contains an electronic communication device (3G, LoRa, Homerider (Birdz), or Sigfox) solely for remote reading of the measurement. The transmission of measurement data using this device is not covered by this approval. This device has a number of powering variations: one powered by "A" cell batteries, the second powered by "AA" cell batteries and a third powered by Lithium Batteries. An additional capacitor may be added depending on the register configuration.

4.2 Peripheral devices

The instrument may be connected to any peripheral device that has been issued with Parts Certificate by an Approved Body responsible for Module B under the Measuring Instruments Regulations 2016 (S.I. 2016 No. 1153), as amended, and bears the marking of conformity to the relevant regulations ; or

A peripheral device without a Parts certificate may be connected under the following conditions:

- it bears the marking of conformity to the EMC Regulations;
- it is not capable of transmitting any data or instruction into the measuring

- instrument, other than to release a printout, checking for correct data transmission or validation;
- it prints measurement results and other data as received from the measuring instrument without any modification or further processing; and
- it shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the measuring instrument.

5 APPROVAL CONDITIONS

The certificate is issued subject to the following conditions:

5.1 Inscriptions

The instrument shall bear the following inscriptions:

- UKCA or CE UKNI marking (as appropriate)
- Supplementary metrology marking
- Manufacturer's name, registered trade name or registered trade mark and postal address
- Identification number of the Approved Body responsible for the production control phase
- Information in respect of its accuracy

and, when applicable:

- Information in respect of the conditions of use
- Measuring capacity
- Identity marking (a type, batch or serial number or other element allowing their identification)
- Number of the type examination certificate
- Information whether or not additional devices providing metrological results comply with the provisions of Measuring Instruments Regulations 2016 (S.I. 2016 No. 1153), as amended, on legal metrological control

The markings and inscriptions shall fulfil the requirements of Part 4, Chapter 4 of the Measuring Instruments Regulations 2016 (S.I. 2016 No. 1153), as amended in Great Britain and Northern Ireland.

5.2 The required markings may be positioned on the shroud instead of the register as shown in Figure 9.

5.3 Inscriptions in accordance with the requirements listed in Section 5.1 are demonstrated on the Gladiator meter as shown in Figure 11.

6 LOCATION OF SEALS AND VERIFICATION MARKS

6.1 Securing method

The measuring assembly is secured by locating the snap fit plastic cover to the meter body. The register is positioned between the plastic cover and the meter body. The plastic cover and meter body have integrally moulded clips and once fitted, unauthorised dismantling is not possible without leaving evidence of tampering.

6.2 Location of verification markings

The verification markings identified in 5.1 are permanently etched on the top surface of the shroud.

7 ALTERNATIVES

Note: The electronic registers CZ-4000 and Allegro (detailed in Sections 7.1 and 7.6) are retained in this certificate for information only and do not form part of Revision 13 to this certificate.

7.1 Electronic Register – CZ-4000

Note: This register is not approved under Revision 13 to this certificate. Section 7.1 is retained for information only.

Having an electronic register model CZ-4000 as described in Evaluation Certificate GB-1414.

7.2 Inline Meter Groups PD 15 and PD 20

As described in the certificate, but configured for in-line connection into the water pipe. The meter is sealed as shown in Figure 6. The meters body's length range is 110 to 190 mm, having two options of strainers (finger or basket type). The meters are dedicated for ½" and ¾" pipe lines, coupling threads inlet/outlet ¼" and 1", BSP/NPSM types, examples of the ½" are shown in Figure 7.

7.2.1 Inline Group PD 15 Specifications

7.2.1.1 Related flowrates according to each Q₃/Q₁ designation

Q ₃ /Q ₁ (R)	400	315
Q ₂ /Q ₁	1.6	1.6
Q ₁ Minimum flowrate (m ³ /h)	0.00625	0.005
Q ₂ Transitional flowrate (m ³ /h)	0.01	0.008
Q ₃ Permanent flowrate (m ³ /h)	2.5	1.6
Q ₄ Overload flowrate (m ³ /h)	3.125	2

7.2.1.2 Other designations

Temperature class	T50 (0.1 °C-50°C)
Orientation requirements	None
Revs/litre of measuring chamber	26.13
Maximum admissible pressure (MAP)	16 bar
Pressure Loss at Q ₃ =2.5 [m ³ /h]	ΔP 63
Pressure Loss at Q ₃ =1.6 [m ³ /h]	ΔP 25
Climatic environment	(-)10 °C + (+)55 °C
Mechanical environment	M1
Electromagnetic environment	NA
Location	Open/closed. condensing/non condensing
Reverse flow	Not designed to measure reverse flow
Minimum straight length of inlet/outlet pipe	D0/U0

7.2.1.3 Meter options

Model name	Inlet ϕ (mm)	Outlet ϕ (mm)	Length (mm)	Height (mm)	Threads Connections (mm)	Register type
PD1/2	15	15	110	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	115	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	122	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	130	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	134	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	152	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	154	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	165	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	170	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	190	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical

7.2.2 Inline Group PD 20 Specifications

7.2.2.1 Related flowrates according to each Q_3/Q_1 designation

Q_3/Q_1 (R)	400	315
Q_2/Q_1	1.6	1.6
Q_1 Minimum flowrate (m ³ /h)	0.00625	0.008
Q_2 Transitional flowrate (m ³ /h)	0.01	0.0128
Q_3 Permanent flowrate (m ³ /h)	2.5	2.5
Q_4 Overload flowrate (m ³ /h)	3.125	3.125

7.2.2.2 Other designation

	Q_3 2.5 m ³ /h	Q_3 4.0 m ³ /h
Temperature class	T50 (0.1 °C-50°C)	
Orientation requirements	None	
Revs/litre of measuring chamber	26.13	19.93
Maximum admissible pressure (MAP)	16 bar	
Pressure Loss at $Q_3 = 2.5$ [m ³ /h]	ΔP 40	ΔP 63
Climatic environment	(-)10 °C ÷ (+)55 °C	
Mechanical environment	M1	
Electromagnetic environment	NA	

Location	Open/closed condensing /non condensing
Reverse flow	Not designed to measure reverse flow
Minimum straight length of inlet/outlet pipe	D0/U0

7.2.2.3 Meter options

Model name	Inlet ϕ (mm)	Outlet ϕ (mm)	Length (mm)	Height (mm)	Threads Connections (mm)	Register type
PD3/4	20	20	110	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	115	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	134	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	140	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	152	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	154	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	165	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	170	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	190	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical

7.3 Alternative Dial Face Printing (Figures 4 and 5)

As described in the certificate but having the resolution of the last dial with a minimum division of 0.02 l instead of 0.5 l, therefore the display (register) indicates up to 99999.99998 m³.

7.4 Inline Meter Groups PD 15 GV-5 FWA and PD 20 GV-5 FWA

As described in section 7.2 of the certificate, but manufactured with GV-5 material. The meter is sealed as shown in Figure 6. The meters body's length range is 110 to 190 mm, having two options of strainers (finger or basket type). The meters are dedicated for 1/2" and 3/4" pipe lines, coupling threads inlet/outlet 3/4" and 1", BSP/NPSM types.

7.4.1 Inline Group PD 15 Specifications

7.4.1.1 Related flowrates according to each Q₃/Q₁ designation

Q ₃ /Q ₁ (R)	400	315
Q ₂ /Q ₁	1.6	1.6
Q ₁ Minimum flowrate (m ³ /h)	0.00625	0.005
Q ₂ Transitional flowrate (m ³ /h)	0.01	0.008
Q ₃ Permanent flowrate (m ³ /h)	2.5	1.6
Q ₄ Overload flowrate (m ³ /h)	3.125	2

7.4.1.2 Other designations

Temperature class	T50 (0.1 °C-50°C)
Orientation requirements	None
Revs/litre of measuring chamber	26.13
Maximum admissible pressure (MAP)	16 bar
Pressure Loss at Q3 = 2.5 [m ³ /h]	ΔP 63
Pressure Loss at Q3 = 1.6 [m ³ /h]	ΔP 25
Climatic environment	(-)10 °C + (+)55 °C
Mechanical environment	M1
Electromagnetic environment	NA
Location	Open/closed. condensing/non condensing
Reverse flow	Not designed to measure reverse flow
Minimum straight length of inlet/outlet pipe	D0/U0

7.4.1.3 Meter options

Model name	Inlet φ (mm)	Outlet φ (mm)	Length (mm)	Height (mm)	Threads Connections (mm)	Register type
PD1/2	15	15	110	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	115	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	122	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	130	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	134	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	152	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	154	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	165	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	170	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD1/2	15	15	190	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical

7.4.2 Inline Group PD 20 GV-5 FWA Specifications

7.4.2.1 Related flowrates according to each Q₃/Q₁ designation

Q ₃ /Q ₁ (R)	400	315
Q ₂ /Q ₁	1.6	1.6
Q ₁ Minimum flowrate (m ³ /h)	0.00625	0.008
Q ₂ Transitional flowrate (m ³ /h)	0.01	0.0128

Q ₃ Permanent flowrate (m ³ /h)	2.5	2.5
Q ₄ Overload flowrate (m ³ /h)	3.125	3.125

7.4.2.2 Other designation

	Q ₃ 2.5 m ³ /h	Q ₃ 4.0 m ³ /h
Temperature class	T50 (0.1 °C-50°C)	
Orientation requirements	None	
Revs/litre of measuring chamber	26.13	19.93
Maximum admissible pressure (MAP)	16 bar	
Pressure Loss at Q ₃ = 2.5 [m ³ /h]	ΔP 40	ΔP 63
Climatic environment	(-)10 °C ÷ (+)55 °C	
Mechanical environment	M1	
Electromagnetic environment	NA	
Location	Open/closed condensing /non condensing	
Reverse flow	Not designed to measure reverse flow	
Minimum straight length of inlet/outlet pipe	D0/U0	

7.4.2.3 Meter options

Model name	Inlet φ (mm)	Outlet φ (mm)	Length (mm)	Height (mm)	Threads Connections (mm)	Register type
PD3/4	20	20	110	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	115	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	134	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	140	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	152	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	154	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	165	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	170	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical
PD3/4	20	20	190	94	NPSM / BSP	Standard / AMR / Optical / AMR + Optical

7.5 MR Register

Having an alternative register designated MR, with an eight-digit display and pulse output resolution of 1L per revolution (Figure 8).

7.6 Allegro register

Note: This register is not approved under Revision 13 to this certificate. Section 7.6 is retained for information only.

Having an alternative electronic register designated Allegro with RF communication. This has an LCD displaying cubic metres and its multiples which are indicated by a bar under each digit. Sub multiples for verification purposes are without a bar.

The register incorporates a non-replaceable battery. A low battery indicator appears when there is at least 180 days of useful battery life to operate the meter.

The software version number shall be 3.21.

Additional legends to those specified at section 5.1:

- Software version number (marked on the faceplate, see Figure 10)
- Replacement date of the meter

Environmental classes:

Climatic environment	5 °C to 30 °C Open, condensing
Mechanical environment	M1
Electromagnetic environment	E1

8 ILLUSTRATIONS

- Figure 1 Gladiator Concentric Meter
- Figure 2 Sectional view of Gladiator Concentric Meter
- Figure 3 Gladiator Meter dial face and markings
- Figure 4 Alternative Gladiator Meter dial face and markings $Q_3 = 1.6 \text{ m}^3/\text{h}$
- Figure 5 Alternative Gladiator Meter dial face and markings $Q_3 = 2.5 \text{ m}^3/\text{h}$
- Figure 5.a Gladiator Meter dial face and markings $Q_3 = 4.0 \text{ m}^3/\text{h}$
- Figure 6 Gladiator In-line meter sealing
- Figure 7 Sectional views of Gladiator In-line meter options
- Figure 8 MR Register
- Figure 9 Alternative location of markings
- Figure 10 Allegro register
- Figure 11 Gladiator with inscriptions - UKCA

CERTIFICATE HISTORY

ISSUE NO.	DATE	DESCRIPTION
UK/0126/0059	22 nd October 2009	Type examination certificate first issued.
UK/0126/0059 Revision 1	2 nd February 2009	Figure 3 Updated to show positioning of Certificate Number
UK/0126/0059 Revision 2	25 August 2011	Section 4.1 edited to allow for 2 types of 3G register. Section 7 Authorised Alternatives added, subsequent sections renumbered Section 7.1 added, Electronic register Section 7.2 added, In line meter
UK/0126/0059 Revision 3	17 January 2012	Section 3.1.2 added, Q ₃ of 2.5m ³ /h, reference to Q ₃ of 2.5m ³ /h also added to front page. Section 3.2 Q ₃ of 2.5 m ³ /h characteristics added. Pressure loss of Q ₃ of 1.6 m ³ /h corrected to ΔP25 from ΔP63 Section 7.2, extra description of inline meter added, including examples in Figure 5.
UK/0126/0059 Revision 4	22 March 2012	Section 7.3 added, Alternative Dial Face printing. Associated Figures 4 and 5 added, subsequent figures renumbered.
UK/0126/0059 Revision 5	15 March 2013	Section 3.2 Minimum straight length of inlet/outlet pipe D0/U0 added, Pressure Losses at Q3 corrected from ΔP25 to ΔP16 and ΔP63 to ΔP 40 Section 7.2 title updated to include in line Meter Group PD 20 Sections 7.2.1 and 7.2.2 added
UK/0126/0059 Revision 6	1 July 2014	Section 3.1.1 Table 1 updated to include R160. Section 3.1.2 Table 2 updated to include R200 and R160 Section 4.1 Lithium battery option added.
UK/0126/0059 Revision 7	14 January 2016	Front page and section 3.2 Q ₃ 4.0 m ³ /h added. Section 7.2.1 Table 7.2.1.3 – addition meter options added Section 7.2.2 Table 7.2.2.1 – added Q3=4 parameters Section 7.2.2 Table 7.2.2.2 – added Q3=4 parameters Section 7.2.2 Table 7.2.2.3 – addition meter options added Section 8 Figure 5.a added, Figures 4 and 5 have updated – new Arad Logo has added.
UK/0126/0059 Revision 8	03 February 2016	Section 7.4 added, PD15 GV-5 FWA and PD20 GV-5 FWA

UK/0126/0059 Revision 9	08 June 2017	References to 2004/22/EC updated to 2014/32/EU. Section 4.1.2 added. Postal address added to section 5.1. Figure 7 drawing (11309109MID) updated to include the LoRa and VE dial plates.
UK/0126/0059 Revision 10	23 January 2018	Section 5.1, 7.5, Figure 8 and Figure 9 added.
UK/0126/0059 Revision 11	08 April 2019	Section 7.6 and Figure 10 added.
UK/0126/0059 Revision 12	30 May 2019	Section 4.1.2 removed and incorporated in section 4.1 with minor detail modifications.
UK/0126/0059 Revision 13	28 April 2021	Certificate expired on 27 October 2020. Certificate renewed for a further 10 years, on 28 April 2021. EU references replaced with UK equivalent throughout the certificate. Front page: Change of address from Dalia - Ramot Menashe POB19239 Dalia Israel Addition of Sections 4.2 and 5.3. Notes added to Sections 7, 7.1 and 7.6 (excluding the registers from this revision to the certificate). Figures 3, 8 and 9 corrected to reflect meter resolution on the dial plates from 0.00005 m ³ to 0.00002 m ³ . Figure 11 added.



Figure 1 **Gladiator Concentric Meter**