



Australian Government
Department of Industry and Science

**National
Measurement
Institute**

**Certificate of Approval
NMI 14/3/30**

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

ABB Model AquaMaster3 FEV2 DN40 Water Meter

submitted by ABB Australia Pty Ltd
 Bapaume Road
 Moorebank NSW 2170

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 49-1 Water Meters Intended for the Metering of Cold Potable Water and Hot Water, *Part 1 Metrological and Technical Requirements*, dated April 2009 and NMI M 10-1 *Meters Intended for the Metering of Water in Full Flowing Pipes, Part 1 Metrological and Technical Requirements*, dated July 2010.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 6 provisionally approved – interim certificate issued	27/08/15
1	Pattern & variants 1 to 6 approved – certificate issued	21/08/17

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 14/3/30' and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked 'NMI P14/3/30' may be re-marked 'NMI 14/3/30' but only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

A handwritten signature in blue ink, appearing to be 'D Hines', written in a cursive style.

D Hines

TECHNICAL SCHEDULE No 14/3/30

1. Description of Pattern **approved on 21/08/17**

An ABB model AquaMaster3 FEV2 DN40 water meter (Figure 1) intended for the metering of cold potable and non-potable water.

1.1 Field of Operation

The field of operation of the ABB model AquaMaster3 FEV2 DN40 water meter is determined by the following characteristics:

Minimum flow rate, Q_1	0.13 m ³ /h
Transitional flow rate, Q_2	0.20 m ³ /h
Maximum continuous flow rate, Q_3	40 m ³ /h
Overload flow rate, Q_4	50 m ³ /h
Flow rate ratio, Q_3/Q_1	315
Maximum admissible temperature:	50 °C
Maximum admissible pressure:	1600 kPa
Pressure loss class:	Δp_{10}
Accuracy class:	2
Flow profile sensitivity class:	UX/DX – see clause 2
Electromagnetic class:	E1 & E2 (industrial)
Environmental class:	B & O (indoor & outdoor)
Orientation:	All positions
Flow Direction:	Forward and reverse

1.2 Features/Functions

The ABB model AquaMaster3 FEV2 DN40 Class 2 water meter consists of an ABB electromagnetic (full bore) flow sensor (Figure 2) and an ABB model AquaMaster3 signal transmitter (Figure 3).

Connection type:	Flanged end connections
Display:	The signal transmitter incorporates an electronic calculator and indicating device able to provide a maximum display of 9 999 999 m ³ in 0.01 m ³ increments. The indicating device can be switched to display in litres (L), allowing for a minimum volume indication of 0.01 litres.
Communications:	Pulse, MODBUS, RS232 local port, GSM/SMS modem and GSM antenna
Power supply:	AC mains 85 – 265 V AC
Software version:	VKK WAJC2103 01.05.01 04/04/2016
Meter length:	200 mm

2. Conditions:

a. Installation Conditions for Class 2 (NMI R 49):

No flow straightener or flow conditioner is required.

The flow profile sensitivity class is U0/D0.

b. Installation Conditions for Class 2.5 (NMI M 10):

No flow straightener or flow conditioner is required.

The meter is approved with the minimum upstream and downstream pipe lengths for the Disturbance Types listed in Table 1.

Table 1 minimum pipe lengths required by flow disturbance type

Disturbance Type	Minimum upstream pipe length	Minimum downstream pipe length
1	0	0
2	0	0
3	0	0

(*) For information on the different flow Disturbance Types which are examined as part of pattern approval, refer to NMI M 10-2.

c. Water Quality:

The meter is approved for use in the metering of potable and non-potable water supplies.

The meter was not tested for the effect of water quality; however some pattern approval testing was performed with a non-potable water of an un-specified nature.

The meter is approved for use in water with conductivity > 50 $\mu\text{S}/\text{cm}$

3. Verification Provision

Provision is made for the application of a verification mark.

4. Sealing Provision

Provision is made for the instrument to be sealed via the application of mechanical and electronic seals. The flow sensor is constructed such that unauthorized access is made tamper evident. The transmitter is mechanically sealed with sealing rings and connections are provided via MIL SPEC plugs.

5. Software Versions

The meter is approved with the following software versions:

VKK WAJC2103 01.05.01 04/04/2016

6. Descriptive Markings and Notices

Instruments are marked with the following data, either grouped or distributed on the casing, the indicating device dial or an identification plate (Figure 4):

Manufacturer's name or mark	...
Serial number	...
Pattern approval number	NMI 14/3/30
Numerical value of maximum continuous flow rate, Q_3	...
Flow rate ratio, Q_3/Q_1	...
Unit of measurement	m^3 or L
Maximum admissible pressure	1600 kPa
Maximum pressure loss	10 kPa or $\Delta P10$
Flow profile sensitivity class ⁽¹⁾	UX/DX
Direction of flow	→ or similar
Accuracy class ⁽²⁾	...
IP Rating ⁽²⁾	IPXX

⁽¹⁾ Optional for U0/D0

⁽²⁾ Optional for class 2 meters

For instruments that incorporate electronic devices, the following information can either be physically marked on the instrument or provided electronically via the indicating device or similar means:

Electromagnetic class	E1 and/or E2
Environmental class	B and/or O
For meters with an external power supply	the voltage and frequency
For battery powered meters	a replacement date or similar indication of expected battery life

2. Description of Variant 1 **approved on 21/08/17**

The model AquaMaster3 FEV2 flow sensor may be connected to a WaterMaster signal transmitter, replacing the AquaMaster3 signal transmitter (Figure 5).

With regards to sealing provisions, access to the electronic settings in the Watermaster are restricted through the use of passwords and dual in-line package switches.

3. Description of Variant 2 **approved on 21/08/17**

The AquaMaster3 and WaterMaster signal transmitters are approved in both compact and remote arrangements.

In the compact arrangement, the signal transmitter is connected to the flow sensor as an integral unit (Figure 6).

In the remote arrangement, the flow sensor (Figure 7) and signal transmitter (Figure 8) are housed separately and connected via a cable with a maximum length of 100 metres.

4. Description of Variant 3 **approved on 21/08/17**

The meter may be powered by any of the following DC power supplies:

- a) 24 V DC (using WaterMaster signal transmitter)
- b) Battery supply, either 3.6 V lithium, manganese alkaline or lithium external pack
- c) Rechargeable battery supply (including via solar) 6 – 22 V DC

5. Description of Variant 4 **approved on 21/08/17**

The pattern and variants are approved as accuracy class 2.5 (NMI M 10) AquaMaster3 FEV2 series meters.

6. Description of Variant 5

approved on 21/08/17

When powered by AC mains, the model AquaMaster3 FEV2 water meter is approved for the meter sizes and flow rates as specified in Table 1 (parts a & b) below.

TABLE 1 (part a) – Approved models and specifications (AC powered)

Meter size	DN40	DN50	DN65	DN80
Minimum flow rate Q_1 (m ³ /h)	0.13	0.20	0.32	0.51
Transitional flow rate Q_2 (m ³ /h) *	0.20	0.32	0.50	0.81
Maximum continuous flow rate Q_3 (m ³ /h)	40	63	100	160
Overload flow rate Q_4 (m ³ /h)	50	79	125	200
Meter length (mm)	200	200	200	200
Ratio Q_3/Q_1	315	315	315	315
Verification Scale Interval (litres)	0.01	0.01	0.01	0.01

TABLE 1 (part b) – Additional approved models and specifications (AC powered)

Meter size	DN100	DN125	DN150	DN200
Minimum flow rate Q_1 (m ³ /h)	0.79	0.79	2.00	3.20
Transitional flow rate Q_2 (m ³ /h) *	1.30	1.30	3.20	5.10
Maximum continuous flow rate Q_3 (m ³ /h)	250	250	630	1000
Overload flow rate Q_4 (m ³ /h)	313	313	788	1250
Meter length (mm)	250	250	300	350
Ratio Q_3/Q_1	315	315	315	315
Verification Scale Interval (litres)	0.01	0.01	0.01	0.01

* For class 2 meters only.

7. Description of Variant 6

approved on 21/08/17

When powered by DC supply (variant 3), the model AquaMaster3 FEV2 water meter is approved for the meter sizes and flow rates as specified in Table 2 (parts a & b) below.

TABLE 2 (part a) – Approved models and specifications (DC powered)

Meter size	DN40	DN50	DN65	DN80
Minimum flow rate Q ₁ (m ³ /h)	0.25	0.39	0.63	1.00
Transitional flow rate Q ₂ (m ³ /h) *	0.40	0.63	1.00	1.60
Maximum continuous flow rate Q ₃ (m ³ /h)	40	63	100	160
Overload flow rate Q ₄ (m ³ /h)	50	79	125	200
Meter length (mm)	200	200	200	200
Ratio Q ₃ /Q ₁	160	160	160	160
Verification Scale Interval (litres)	0.01	0.01	0.01	0.01

TABLE 2 (part b) – Additional approved models and specifications (DC powered)

Meter size	DN100	DN125	DN150	DN200
Minimum flow rate Q ₁ (m ³ /h)	1.60	1.60	3.93	6.25
Transitional flow rate Q ₂ (m ³ /h) *	2.50	2.50	6.30	10
Maximum continuous flow rate Q ₃ (m ³ /h)	250	250	630	1000
Overload flow rate Q ₄ (m ³ /h)	313	313	788	1250
Meter length (mm)	250	250	300	350
Ratio Q ₃ /Q ₁	160	160	160	160
Verification Scale Interval (litres)	0.01	0.01	0.01	0.01

* For class 2 meters only.

FIGURE 1 – 14/3/30



The Pattern – showing both an ABB electromagnetic (full bore) flow sensor and an ABB model AquaMaster3 signal transmitter

FIGURE 2 – 14/3/30



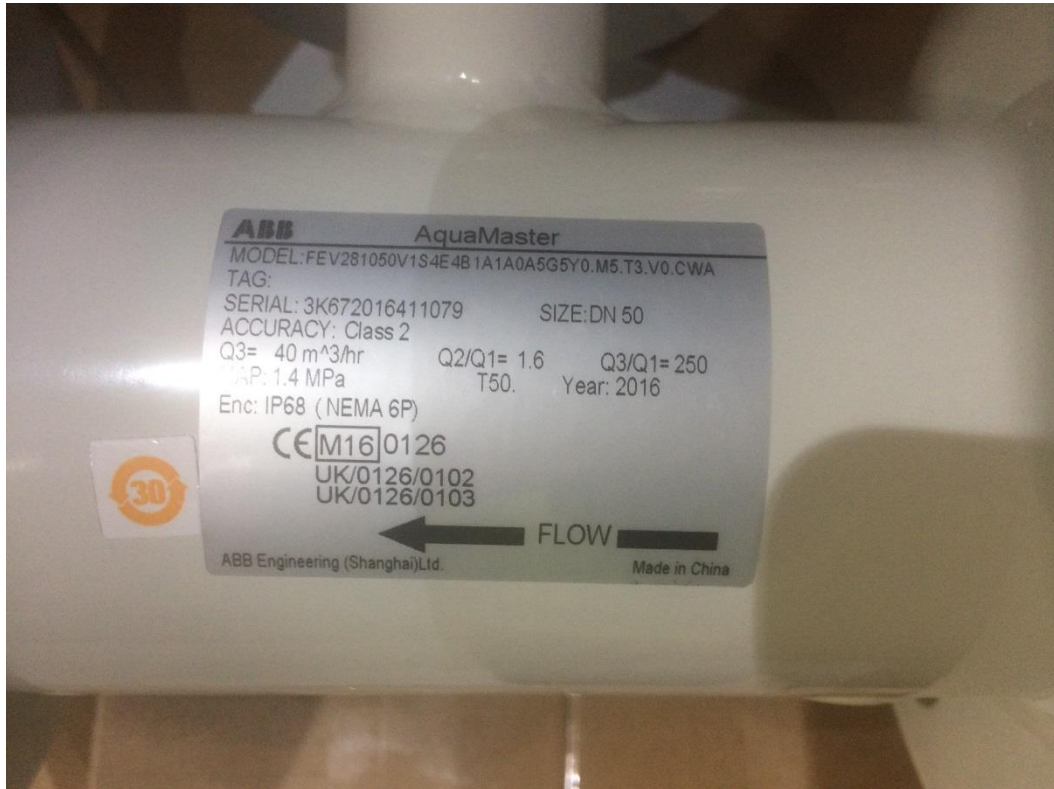
The Pattern – an ABB electromagnetic (full bore) flow sensor

FIGURE 3 – 14/3/30



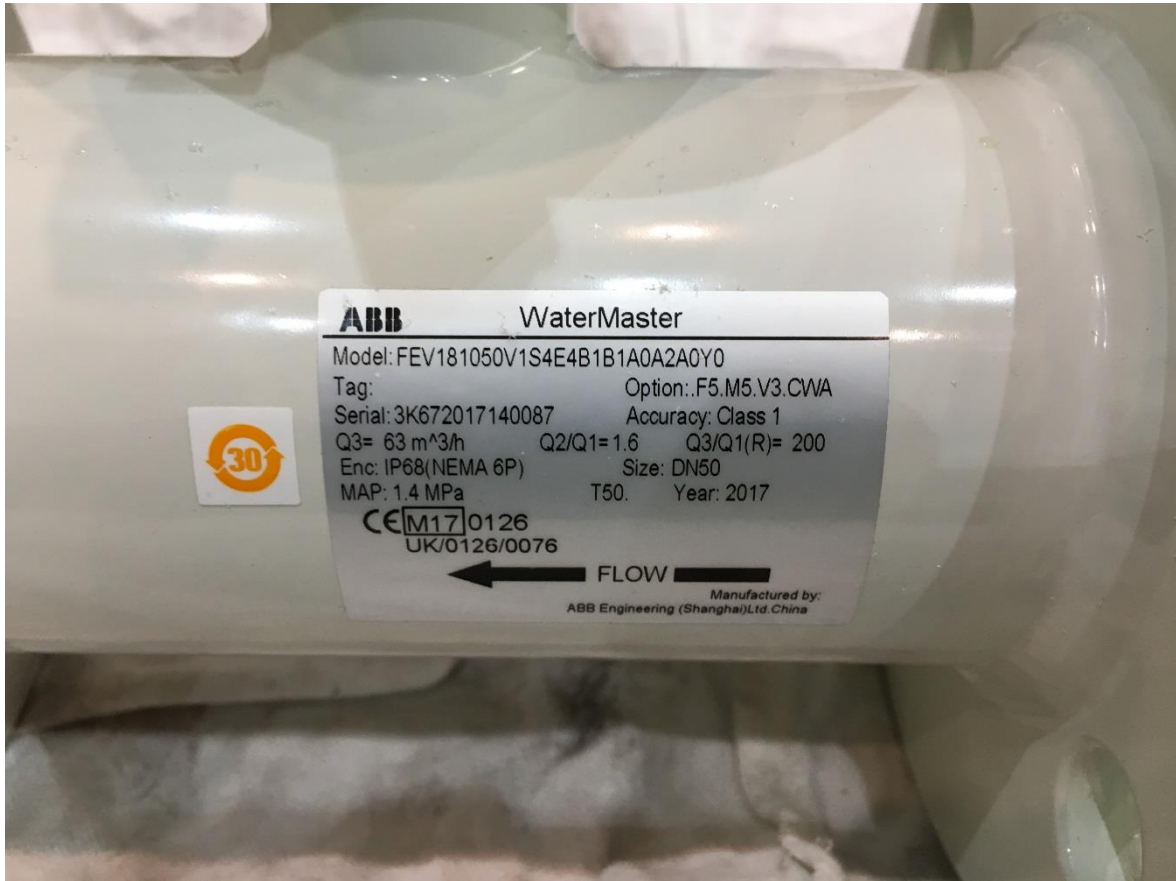
The Pattern - ABB model AquaMaster3 signal transmitter

Figure 4 – 14/3/30



AquaMaster3 markings

FIGURE 5 – 14/3/30



WaterMaster flow sensor including markings

FIGURE 6 – 14/3/30



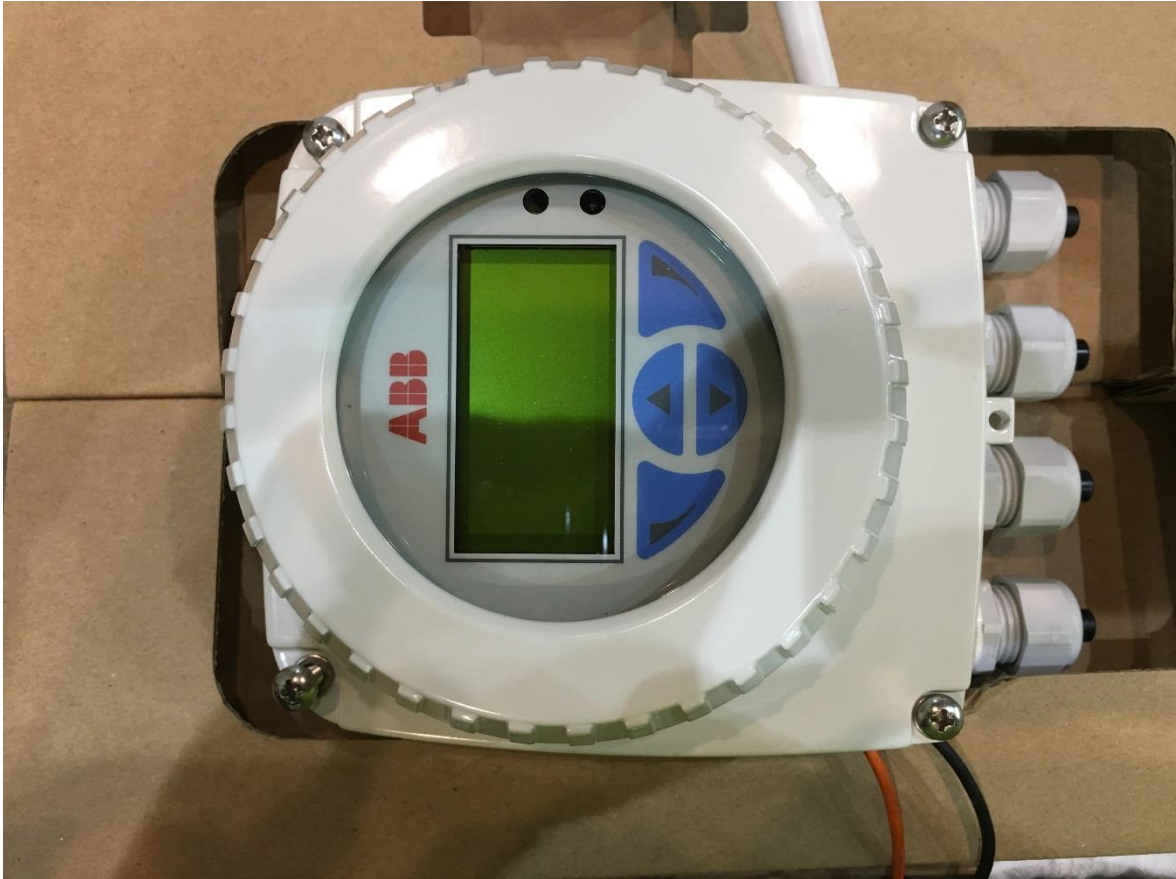
WaterMaster – Compact arrangement

FIGURE 7 – 14/3/30



WaterMaster – Remote arrangement flow sensor

FIGURE 8 – 14/3/30



WaterMaster – Remote arrangement signal transmitter

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