



MINISTRY OF CONSUMER AFFAIRS
MANATŪ KAIHOKOHOKO

MINISTRY OF CONSUMER AFFAIRS
Wellington, New Zealand

CERTIFICATE OF APPROVAL

Weights and Measures Regulations 1999
Part 1 Regulations 5 and 6

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Certificate 1883

Overseas Certificate No: NMI 5/6B/211

This certifies that the Macnaught WM Series, Liquid Measuring Instrument described overleaf has been approved as suitable for trade use subject to any conditions stated in the schedule:

Macnaught Model M50 flowmeter (with a Hontko HPN-6A series rotary encoder pulser)



S R Bobbala

J P Crane

Under delegated authority from the Chief Executive of The Ministry of Economic Development

Note: This is not an approval to any person but only with respect to the type and pattern of weight, measure, or weighing or measuring instrument.

SCHEDULE

Pattern:	Liquid Measuring Instrument
Make:	Macnaught
Model:	WM Series
Manufacturer:	Macnaught Pty Ltd, Australia
Submitter:	Macnaught Pty Ltd, Australia
Class:	0.5
Minimum Delivery:	See Table 1
Maximum flowrate:	See Table 1
Minimum flowrate:	See Table 1
Conditions of Approval:	<ol style="list-style-type: none">1. The verification and subsequent certifications of the instrument, must be carried out by Accredited Persons who are accredited under the Weights and Measures Act 1987 Section 30A2. The Macnaught Model WM (or M) Series flowmeters incorporated in a flowmetering system are approved to be used for bulk metering of petroleum products other than LPG.

Description:

The Macnaught Model WM Series (*) is positive displacement flowmeter built-in a bulk flowmetering system used for bulk metering of petroleum products other than LPG.

(*) Refer to Table 1 for a list of different Macnaught WM series flowmeters.

Components of the Macnaught Flowmetering System:

I. Tank

A supply tank may incorporate a detector for low liquid-level to prevent any further deliveries when the low liquid-level is reached, and prevents air from entering the pipework.

II. Pump

The system may use a positive displacement, centrifugal or submersible turbine type pump to provide flow through one or more flowmeters and shall be of sufficient capacity to ensure that each flowmeter can operate over its approved flow rate range.

III. Non-return Valve

To prevent any reverse flow and keep the pipework full of liquid a non-return valve is fitted upstream of the flowmeter.

IV. Gas Elimination Device

A Macnaught model MAE21-CA1 gas extractor (or any other equivalent approved gas elimination device) with an integral filter/strainer is fitted to prevent vapour entering the flow meter.

Note: Gas Elimination Device need not be fitted for Flowmetering Systems that handles liquid where viscosity exceeds 20 mPa.s at 20 °C, as the supply tank is equipped with low liquid-level detection.

V. Measurement Transducer

The measurement transducer is a Macnaught WM series positive displacement flowmeter. The flowmeter incorporates oval gear rotors with tow magnets per rotor that pass across a pulser circuit board with dual Hall Effect sensors that produce dual output signal proportional to the volume of the product handled.

Measurement Transducer characteristics (e.g. model WM50ARP-3E):

Input supply voltage 4.5 to 24 DC

Pulse output square wave output proportional to supply voltage

Nominal K-factor 6.68 pulses/litre per channel

Max pulse output 39 Hz per channel

Cyclic volume 299.40 mL

The flowmeter may be installed on horizontal or vertical pipelines provided the meter to the pulser is in the horizontal plane.

VI. Calibration Adjustment

The flowmeter calibration adjustment is achieved using the k-factor and/or meter factor facility provided by the compatible approved controller/indicator.

VII. Controller/Indicator

An Enraf contrec model Trac-40 controller/indicator or any other compatible approved indicator can be used.

VIII. Power Supply

Power supply to the transducer may be provided either by:

- a) connecting to the auxiliary power supply of the controller/indicator, or
- b) connecting to a common power source defined by wiring.

IX. Transfer Device

The transfer device is located downstream of the flowmeter and clearly defines the start and stop of the measured quantity. The transfer device may be in the form of a breakaway coupling, a nozzle or a positive shut-off component, such as a manually or automatically operated flow control valve.

Regardless what type of transfer device used, the pipework upstream of the transfer device shall be maintained full of liquid. The system may have more than one transfer point however the pipework design is such that once the measurement starts the flow continues through the intended transfer point until delivery is finalised; there is no possibility for diverting the measured quantity other than through the intended transfer point.

If a nozzle is used, the nozzle has an anti-drain valve installed either in the nozzle or immediately before it, and having a retaining pressure valve of not less than 55 kPa: the nozzle is the transfer device. The pipework between the gas eliminator device and the transfer point shall be kept full of liquid during the measurement and shutdown periods.

For systems with hose reel (see photos), the volume between the flowmeter and the transfer point shall not exceed the specified minimum measured volume (V_{min}) for the flowmeter.

The following variants are allowed on the Flowmetering system:

1. The dual Hall Effect sensors replaced by dual Reed switches. They have a contact rating of 15 VA and a maximum voltage rating of 150 V DC.
2. Dual Hall Effect sensors replaced with a single reed switch and a single Hall Effect sensor.
3. Certain other Macnaught WM series flowmeters as detailed in Table 1 may also be known as M series of the same models.
A base mount housing type meters have the inlet and outlet ports that may be either threaded or flanged (see photographs)
4. With the pulser of the pattern replaced by certain models of the Hontko HPN-6A (*) series of rotary encoder pulsers.

(*) The full model number of the pulser has additional alphanumeric suffixes.

The pulser characteristics are as follows:

Supply voltage: 8 to 26 V DC

Pulse output: Square wave output proportional to supply voltage.

Max shaft rotation: 2000 rpm

Number of outputs: Three channels (A, B and Z).

Resolution:

(i) WM10, WM40, WM50 flowmeters may be fitted with a pulser that has 100 pulses per shaft revolution for channels A and B; 50 pulses per shaft revolution for channel Z.

(ii) M80 and M100 are fitted with a pulser that has 1000 pulses per shaft revolution for channels A and B; 500

pulses per shaft revolution for channel Z.

When this pulser is fitted to the WM50, WM80 or WM100 flowmeters (or their M series versions), the minimum delivery (V_{min}) is 100 litres.

The full model number of the meter is as detailed below:
For e.g. 'WM50ARP-3xxEx' (or M50ARP-3xxEx) where

WM' (or 'M') designates meter series.

'50' designates nominal meter size in mm, e.g. the pattern (model WM50) is nominally 50 mm (2 inch).

'A' designates meter body material, namely

A = aluminium; or
B = bronze; or
S = 316 stainless steel.

'R' designates rotor material, namely

R = resin (WM10, WM40 & WM50 (or M equivalents) only);
S = 316 stainless steel (all models); or
A = aluminium (WM80 & WM100 (or M equivalents) only).

'P' designates output, namely

P = integral pulser; or
FB = high resolution pulser.

'-3' designates process connections, e.g. 3 = ANSI-150 flanges (can be in the range 1 – 17 representing the meter port size and 'Form, e.g. ANSI flanged or BSPP threaded).

'x' designates construction type, namely

Blank = pipe mount;
P = plant (foot mount); or
C = compact (foot mount).

'x' designates configuration, namely

Blank = pipe mount meter; or
0 - 9 = meter configuration (for foot mount meter only).

'E' designates sensor type, namely

Blank = dual Reed PCB;
E = dual Hall Effect PCB; or
ER = Reed/Hall Effect PCB.

'x' designates seal (O-ring) material, namely

Blank = Nitril (NBR);
V = Viton;
K = Teflon encapsulated; or
J = EDPM.

The field of operation of the measuring system incorporating a Macnaught model WM50 flowmeter is determined by the following characteristics:

- Minimum measured quantity, V_{min} 200 L (*)
- Maximum flow rate, Q_{max} 350 L/min
- Minimum flow rate, Q_{min} 35 L/min
- Maximum pressure of the liquid, P_{min} 1800 kPa
- Minimum pressure of the liquid, P_{min} 90 kPa (**)
- Dynamic viscosity 0.5 to 250 mPa.s (at 20°C) (#)
- Liquid temperature range -10°C to 50°C (##)
- Ambient temperature range -25°C to 55°C
- Accuracy class 0.5

(*) The calculator/indicator indicates the volume at least in 1 L increments.

(**) As specified for the gas elimination device for effective operation.

(#) The flowmeter is adjusted to be correct for the liquid for which it is to be verified/certified as marked on the data plate.

(##) Range may be reduced by the calculator/indicator volume conversion for temperature to 15 °C facility.

Sealing:

As provided on the approved controller/indicator.

Mark of Verification:

An adhesive destructible label or an approved type seal that inhibits access to calibration should carry a Mark of Verification. Removal of seal deems the instrument not verified.

TABLE 1

Flowmeter Model (#)	Minimum Flow Rate (Q_{min}) (L/min)	Maximum Flow Rate (Q_{max}) (L/min)	Minimum Delivery (V_{min}) (L)
WM10	24 (#2)	120	20
WM40	50 (#2)	250	50
WM50 (#3)	70 (#2)	350	200
WM80 (#1) (#3)	140 (#2)	700	200
WM100 (#1) (#3)	240 (#2)	1200	200

- (#) The full model number of the meter is in the form 'WM50ARP-3××E×' (or M50ARP-3××E×) as set out overpage.
- (#1) Fitted with model MAE21-CA1 gas extractor or any other compatible approved gas extractor.
- (#2) The minimum flow rate Q_{min} reduced to be 1/10 of Q_{max} when using the linearisation facility of the Enraf Trac-40 controller/indicator or any other compatible approved controller/indicator used.
- (#3) When these model flowmeters are fitted with the rotary encoder pulser of Variant 4, the minimum delivery (V_{min}) is 100 litres.

WM (or M) Series Flowmeter with Base (Foot) Mount Body



Macnaught Model MAE21-CA1 Air Eliminator_Gas Extractor



Macnaught Model WM50ARP-3E Flowmeter With Integral Pulser



Macnaught Model WM100 (or M100) With Flange Ports



Model WM10 (or M10) with threaded ports



Macnaught Model WM50 Flowmetering System (includes delivery system with Hose Reel)

