



POSITIVE DISPLACEMENT FLOW METERS



**macnaught**

Built to last since 1948.

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# **ABOUT MACNAUGHT**

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Macnaught Pty Ltd is a privately owned manufacturing company based in Australia, established in 1948. Macnaught's experience in Positive Displacement Flow Meter technology extends back to 1964. Macnaught's mission is to always exceed industry standards with its products and services.

Macnaught continues to work closely with industry practitioners to deliver product improvements, new technologies and bespoke solutions.

Macnaught has become a highly sought after manufacturer of precision oval gear meter technology. This has been achieved through decades of industry experience and innovation derived from its cutting edge in-house Research and Development facility with full ISO 9001 and 14001 accreditation.

Macnaught also provide region specific accreditation as required.

Macnaught's Positive Displacement Flow Meters are suitable for a wide range of industrial applications including fuel and oil distribution, corrosive chemical or solvent measurement and high pressure applications to name a few.

Macnaught boasts a network of over 60 international distributors and a highly skilled global sales support network enabling access to its high performance and valued products simple, fast and efficient.

Decades of experience have resulted in simple, robust and highly accurate Positive Displacement Flow Meters. Specify Macnaught Positive Displacement Flow Meters with confidence for your flow measurement equipment requirements.

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	2" CUSTODY TRANSFER METERS (AU ONLY)	SUITABLE FOR FLOW RANGE 70-350L/MIN	66
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	3" CUSTODY TRANSFER METERS (AU ONLY)	SUITABLE FOR FLOW RANGE 140-700L/MIN	70
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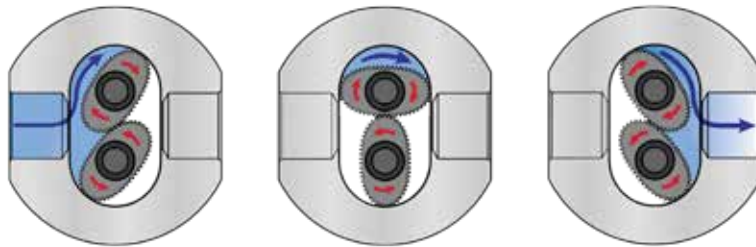
# INTRODUCTION

## RANGE OVERVIEW

Macnaught's Positive Displacement Flow Meters are suitable for a wide range of industrial applications including fuel and oil distribution, corrosive chemical, solvent measurement and high pressure applications to name a few.

Macnaught offers Positive Displacement Flow Meters featuring Oval Gear technology. The measuring principle includes two high precision toothed oval gears, which are driven by the flow of the medium and mesh with each other: in presence of a flow, defined volumes of fluid are transported through the meter for each rotation of oval gears pair. As the flow rate increases, so does the rotational speed of the rotors. The number of gear rotations is a measure of the amount of fluid that has passed through the meter; each rotation is detected by a sensor and the volume is calculated using a conversion factor (K factor).

**Figure 1:** Macnaught Positive Displacement Flow Meter operation.



A key distinction of positive displacement flow meters is that they offer direct measurement of the volumetric flow rate. Positive displacement flow meters are frequently specified as they offer high accuracy and repeatability. They readily provide measurement accuracy within  $\pm 0.5\%$  of the true value.

Additionally, positive displacement flow meters require no power to drive the gear operation with no special fluid conditioning (e.g. straight lengths of pipe) and are capable of handling high pressure, large flow variations and plant equipment vibration due to their robust design.

### Advantages:

- High accuracy and repeatability
- Suitable for viscous fluids
- Cost-effective
- Accuracy unaffected by changes in viscosity
- Requires minimal maintenance
- Ease of installation
- Exceptional turn-down ratio

Precision engineering and manufacturing methods are used by Macnaught using cutting edge CNC machining technology and mill certified materials to deliver highly repeatable accuracy and durability. All critical components are machined in-house with astute quality control monitoring the production process continuously.\*

NOTE: This catalogue is intended to provide general guidance on Macnaught's Positive Displacement Flow Meters. In order to select the most appropriate meter for your needs, please seek expert advice which is available free-of-charge from Macnaught's Technical Support Team.

As a result of over 50 years experience with Positive Displacement Flow Meter technology, Macnaught offers two comprehensive ranges that cater for the ever changing market needs. The latest innovation with the **MX-SERIES** range to the original **M-SERIES** range, Macnaught flow meters are designed to insist upon durability, reliability and excellence.

The **MX-SERIES** is the latest innovation featuring:

- High precision billet construction for enhanced material integrity and process reliability
- Programmable digital display and Pulse output options
- Unique bayonet assembly for added versatility and flexibility



The **M-SERIES** is Macnaught's original range of meters featuring:

Established design and cast construction for proven performance

Mechanical and pulse output options



**Figure 2:** Summary of the key features of Macnaught's Positive Displacement Flow Meters

	<b>MX-SERIES</b>	<b>M-SERIES</b>
<b>Meter Body</b>	Billet construction* Stainless Steel Aluminium	Cast construction** Stainless Steel Aluminium PPS
<b>Rotor</b>	PPS (Hastelloy or Stainless Steel) Aluminium (Carbon Bushing) 316 Stainless Steel (Carbon Bushing) High Viscosity Rotors (Stainless Steel with Carbon Bushing)	
<b>Output</b>		
Mechanical	×	Standard Mechanical Register Heavy Duty Mechanical Register
Output Electrical	Standard Pulse Intrinsically Safe Pulse High Temp. Pulse/temperature Pulse 4 - 20 mA output	Standard Pulse
Digital Display	Full programmable Meter Mount Digital Displays (PR & ER) Remote-mountable Digital Displays (PR & ER)	Full programmable Meter Mount Digital Displays (DR - CR025 only) Remote-mount Digital Display (PR & ER)

\*Billet construction across the MX meters up to 2"

\*\*M-SERIES all cast with the exception of the MH High Pressure Flow Meters (these are of billet construction)

# INTRODUCTION

## METER SELECTION GUIDE

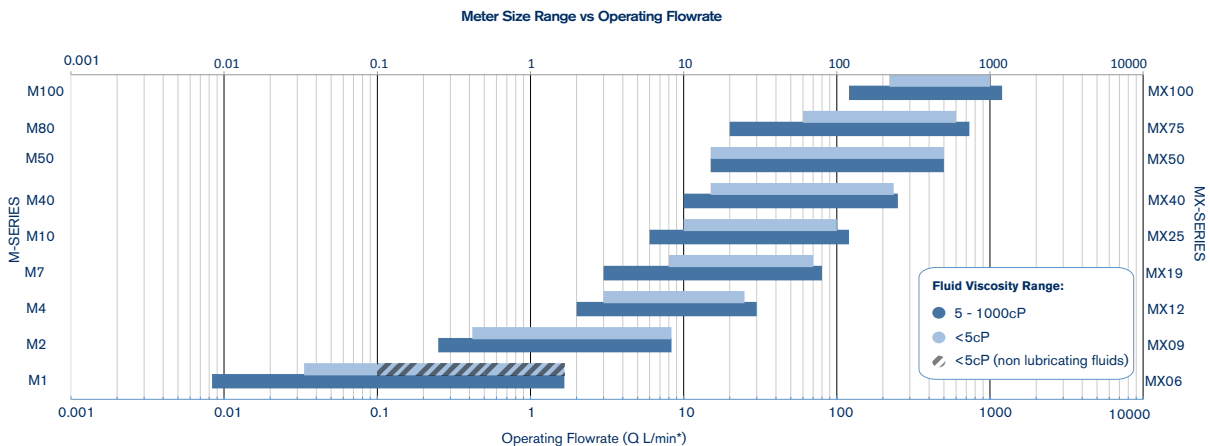
Correct specification of the appropriate meter is necessary to achieve desired accuracy and suitable data output, as well as to ensure safety in each application. While for most applications, the specification of the appropriate meter will be straightforward, using the specification process outlined below, for some applications there may be additional technical considerations which need to be assessed on a case-by-case basis. In all circumstances we recommend that you consult with Macnaught's Technical Support Team to select the most appropriate meter for your needs

The following steps are provided as general guidelines to assist with correct meter specification. However, to ensure accuracy of specification in relation to your application, we recommend seeking expert advice before making the final selection of the appropriate meter. Please note that Macnaught's Technical Support Team is available free-of-charge to assist in the specification and identification of a suitable meter.

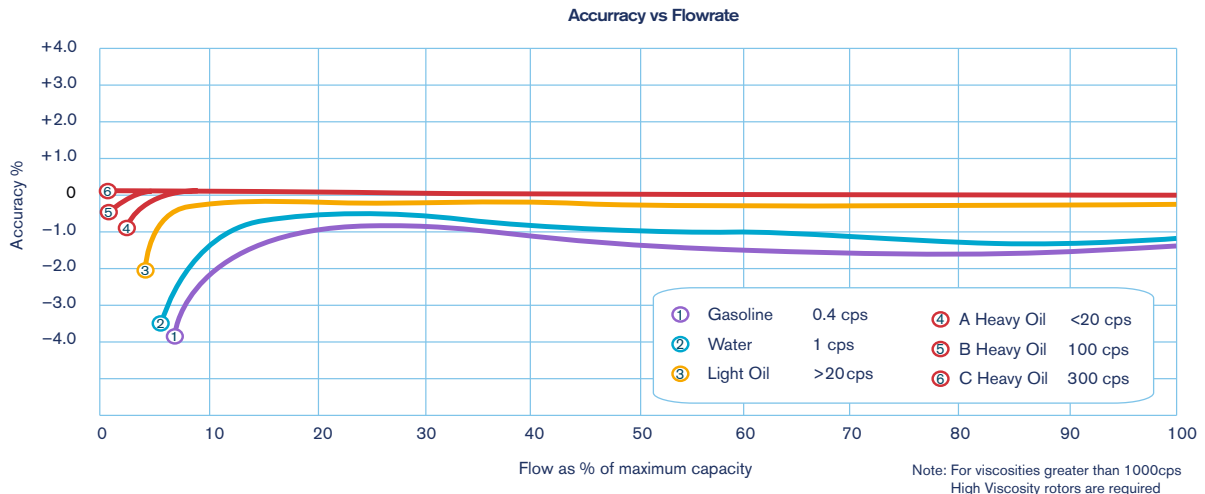
### Flow Meter Size

Macnaught Positive Displacement Flow Meters are available in a range of sizes that are engineered to provide high accuracy across a wide turn down ratio. Figure 3 assists in interpreting your process flow rate, which is an important determinant to the accuracy of your meter. The size of meter should be selected for maximum coverage for your operating flow rates. As shown in Figure 4, the accuracy of the meter is optimal near the mid-range of the meter flow range. In some instances the required flow rates can fall across two meter options, e.g. if the required flow rate is 3 L/min both the MX09 & the MX12 are suitable, in such cases it is recommended to select the meter where the flow range is within the upper 50% of the meter's flow range limits, i.e. the MX09 is preferred.

**Figure 3:** Macnaught Positive Displacement Flow Meters flow rate range selection chart



**Figure 4:** Impact of viscosity and flow range on meter accuracy



NOTE: The above graphs are based on generic industry-sourced data. The graphs are intended to be used for illustrative purposes only and may not be directly applicable to your specific applications. Please seek expert advice from Macnaught's Technical Support Team before final selection.

IMPORTANT: Do not use the above data for product selection.

Macnaught standard 'single point' calibration is carried out at mid-flow range where the individual K-factor is assigned to the meter.

Identifying the correct meter size for the operating flow rates will ensure the longevity of the meter and deliver optimal accuracy during its operation. For instances where operation is necessary outside the designated mid flow range of the meter, it is recommended that an optional 'multi-point' calibration is performed which will help ensure maximum accuracy is achieved. We recommend consulting Macnaught's Technical Support Team before final selection.

## Chemical Compatibility

To determine the most appropriate materials combination for each application it is essential that the wetted components of the meter assembly are confirmed for chemical compatibility. Macnaught meters are available in standard materials configurations, as shown on the quick reference table below (figure 5): common fluid types are listed and the recommended materials combination for each of them is indicated. For a more comprehensive chemical compatibility guide, please refer to Appendix E on page 93.

The chemical compatibility guides referred to above are intended to provide general guidance on chemical compatibility. It is highly recommended that the data is checked on a case-by-case basis, as individual process variations in chemical concentration and temperatures from those of the reference data can influence compatibility. We advise seeking expert advice from Macnaught's Technical Support Team to confirm the materials selection.

Figure 5: Quick reference chemical compatibility guide\*

BODY	PPS	AL	SS	AL
ROTOR	PPS	PPS	PPS/SS	SS
SEALS	FFKM	FKM	FEP	FEP
Avgas - Jet Fuel	✓	✓	✓	✓
Diesel Fuel	✓	✓	✓	✓
Ethylene Glycol	✓	✓	✓	✓
Gasoline, Unleaded	✓	✓	✓	✓
Kerosene	✓	✓	✓	✓
Adblue®	✓	—	—	—
Ammonia, anhydrous	—	—	—	✓
Citric Acid	✓	—	✓	—
Methyl Ethyl Ketone	✓	✓	✓	✓
Acetone	✓	—	✓	✓
Ethanol	✓	✓	✓	✓
Hexane	✓	✓	✓	✓
Methanol	✓	—	✓	✓
Toluene	—	—	—	✓
Phosphoric Acid	✓	—	—	—
Potassium Hydroxide	✓	—	✓	—
Sodium Hydroxide	✓	—	—	—
Sulphuric Acid	✓	—	—	—
Water	✓	—	✓	—

\*Refer to Appendix E - Chemical Compatibility Guide for general guidance on suitability

NOTE: This chart is intended to provide general guidance on chemical compatibility and should not be used for product selection. The chart is based on industry data and may not be directly applicable to your specific applications. Macnaught does not accept liability for chemical compatibility outside of the accuracy of the wetted component list. Please consult Macnaught's Technical Support Team before final selection.

## Temperature & Pressure Rating

All Macnaught flow meters are designed to be completely safe under normal operating conditions. However, to ensure user's safety, it is very important to select a flow meter that will operate within the process pressure and temperature conditions at all times.

Allowances should be made for any potential 'spikes' in pressure (e.g. as a result of sudden valve closures or as the pump initially starts). If the system pressure is expected to reach the meters maximum rating it may be necessary to incorporate a pressure relief valve into the system. Macnaught's Technical Support Team is available to provide advice in this regard.

There are a number of factors that influence the pressure and temperature ratings of a flow meter:  
Pressure rating:

- Presence of flanged ports causes a reduction of the pressure rating
- Other modifications to the materials properties

Temperature rating:

- Operational parameters such as the limitations of an attached LCD register and batteries
- Coefficient of expansion or
- Other modifications to the materials properties,

When factors combine, the individual effects could amplify and pose a safety risk. We therefore recommend seeking expert advice from Macnaught's Technical Support Team before final selection of the appropriate meter.

## Rotor Type

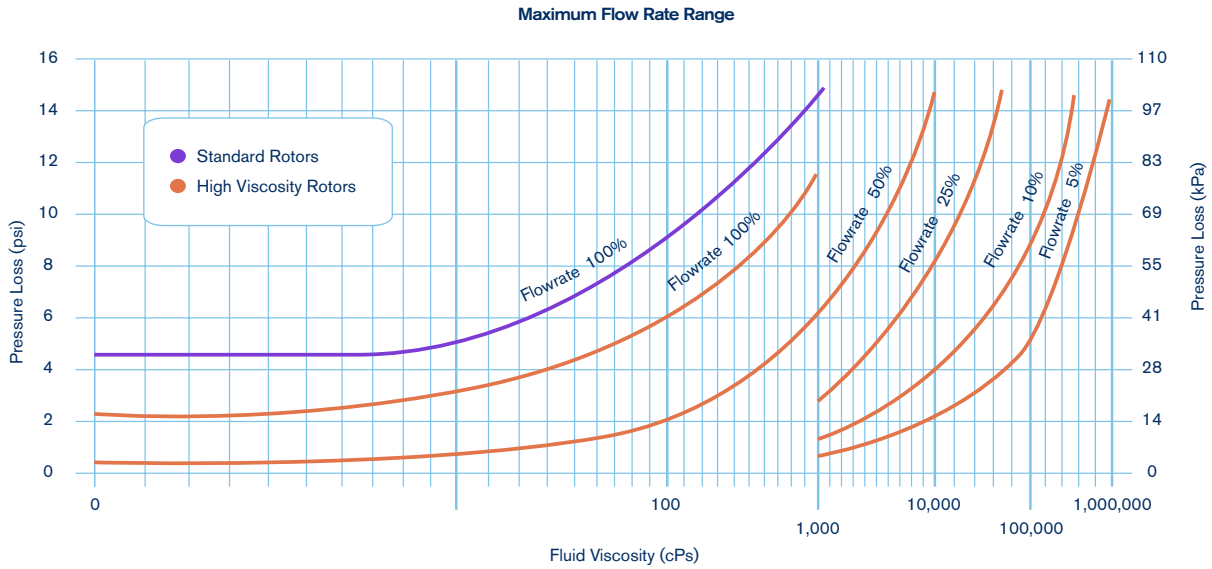
While Macnaught Positive Displacement Flow Meters are capable of processing a very wide range of fluid viscosities, the viscosity of fluids still need to be considered to aid the selection process. This value should always be taken at the applications operating temperature and flow rate. Note that typical fluid technical data sheets are not usually stated at operating conditions, so further research may be required to determine this information.

In cases where the fluid is non-Newtonian, additional allowances may be required to compensate for changes to viscosity between static and dynamic situations.

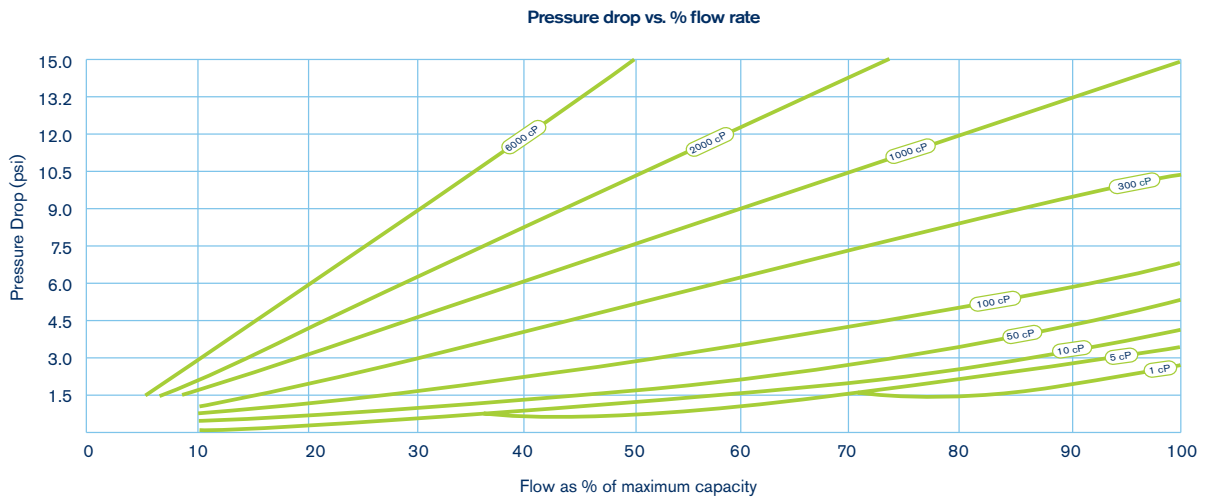
The higher the fluids viscosity the greater the pressure drop it will cause. As shown in Figure 7, the maximum flow rate will need to be reduced as the viscosity increases. Please contact Macnaught if you require further assistance. Alternatively, as shown in Figure 6, Macnaught offers High Viscosity (HV) rotors that have been modified to alleviate this pressure drop and still offer extended flow ranges. As a general rule if the viscosity is  $> 1000\text{cP}$  it is recommended to use HV rotors, but it is also important to look for notes on minimum viscosity as this can also affect the meters minimum flow rate.



**Figure 6:** Benefit of High Viscosity Rotors used to reduce pressure loss impact



**Figure 7:** Impact of viscosity on pressure loss for a range of flow rates



Note: For viscosities greater than 1000 cPs High Viscosity rotors are required

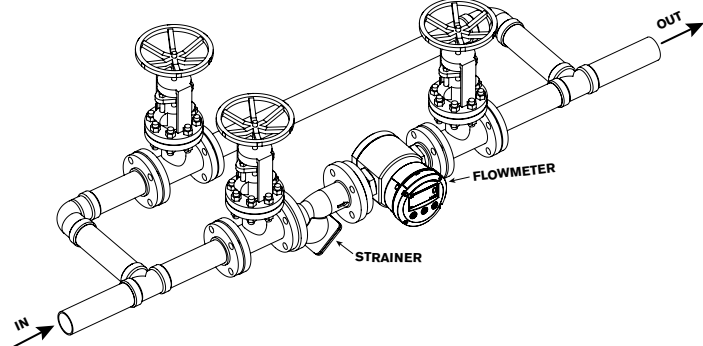
NOTE: The above graphs are based on generic industry-sourced data. The graphs are intended to be used for illustrative purposes only and may not be directly applicable to your specific applications. Please seek expert advice from Macnaught's Technical Support Team before final selection.

IMPORTANT: Do not use the above data for product selection.

## OPERATING GUIDELINES

While oval gear flow meters provide exceptional accuracy, reliability and a cost effective solution, there are some considerations for their usage. For example they should not be used to measure fluids with particles or air pockets in them and adequate filtration needs to be installed upstream of the meter. Inside the meter are moving components, so as good practice a routine inspection may be required. The frequency of the inspection should be based on the operating conditions; these will include the maximum flow rate, viscosity and the fluids lubricating properties. If the meter is used with a lubricating fluid, such as oil, and is well within the maximum flow range, then the meter will operate of many years maintenance free.

**Figure 8:** Recommended installation components for optimal meter operation



### Installation Guidelines

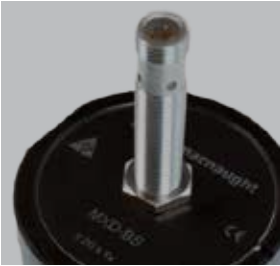
1. It is recommended that when setting up pipe work for meter installations a bypass line be included in the design. This provides the facility for a meter to be removed for maintenance without interrupting production
2. Use thread sealant on all pipe threads.
3. For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump. Check specified Meter Technical Data section for further details.
4. Install a wire mesh strainer, Y or basket type (refer to pg.82 for Y strainer options) as close as possible to the inlet side of the meter.
5. For M-series meters ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows (if applicable) embossed on the meter body.
6. The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Figure 9 below for correct installation). The register assembly may be orientated to suit the individual. Note: Incorrect installation can cause premature wear of meter components.
7. Do not over-tighten meter connections. It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.
8. Test the system for leaks.
9. Check the strainer for swarf or foreign material after the first 1 hour of operation. Check the strainer for swarf or foreign material periodically, particularly if the flow rate decrease .

**Figure 9:** Meter orientation for register assembly



# MX-SERIES FLOW METERS

MX-SERIES FLOW METERS



# MX-SERIES FLOW METERS

## DIGITAL FLOW METERS

The Digital Flow Meter range are the latest innovation from Macnaught. They feature billet construction\* offering optimal operational reliability and accuracy. Supplied with an individual Test Report, these meters are also marked with the actual K factor from calibration testing for an accuracy of +/- 0.5%. Their construction is modular allowing for simple in situ maintenance and system changes.

## EXPLODED DIAGRAM

### Output

Macnaught offer a range of digital output and display options that will suit most applications. Choose between display based on application needs

### Port connection

Based on desired pipe connection

### Meter size

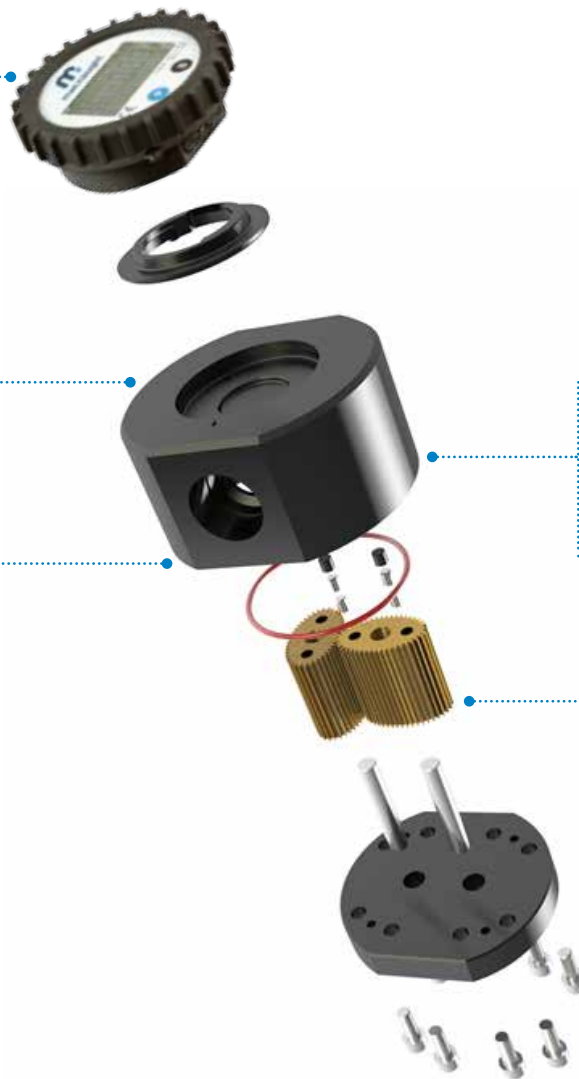
Choose meter size based on flow rate desired

### Materials of construction

Choose material based on pressure and fluid type

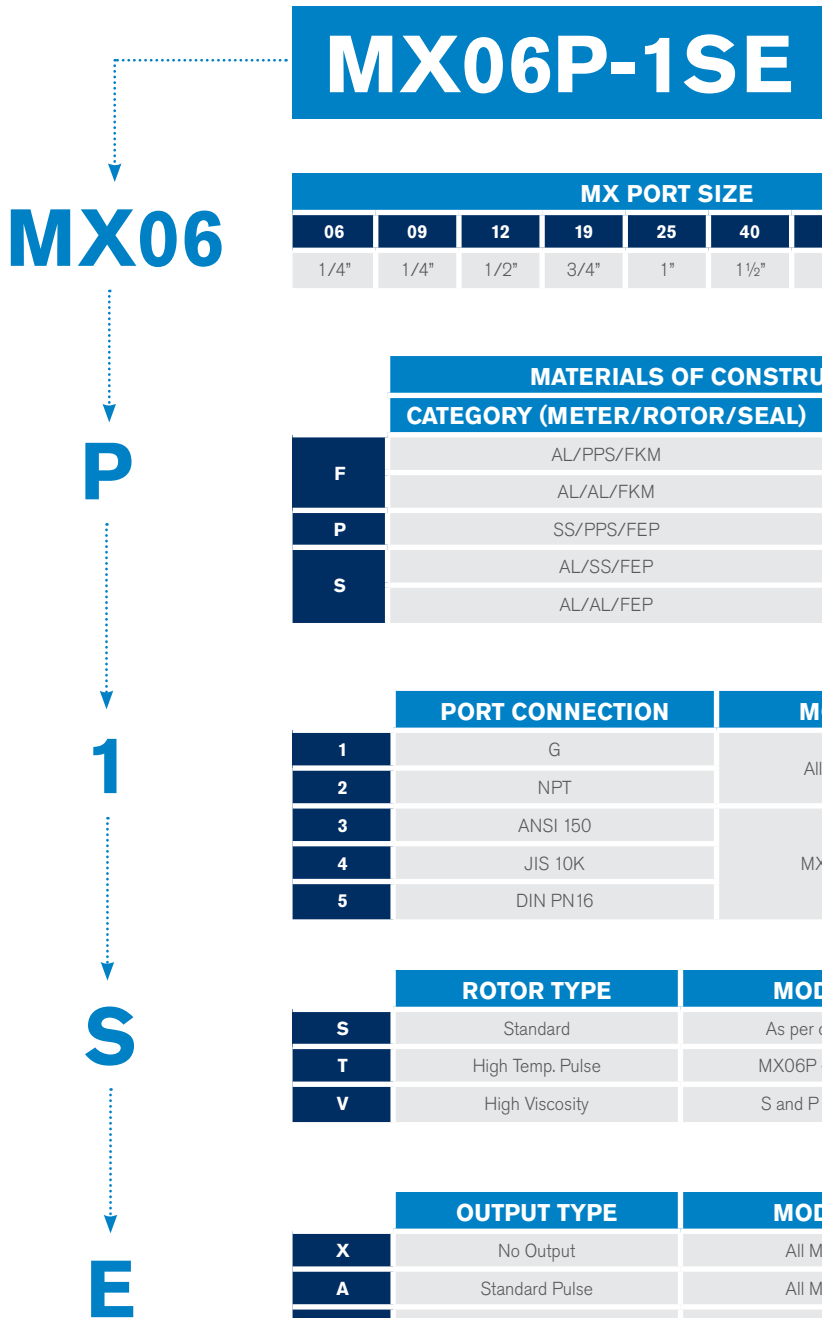
### Rotor type

Select rotor type based on the viscosity of the fluid and fluid type



\*Billet construction across the MX meters up to 2"

## PRODUCT IDENTIFICATION SYSTEM



# MX06P-1SE

MX PORT SIZE								
06	09	12	19	25	40	50	75	100
1/4"	1/4"	1/2"	3/4"	1"	1 1/2"	2"	3"	4"

MATERIALS OF CONSTRUCTION		
	CATEGORY (METER/ROTOR/SEAL)	MODELS
<b>F</b>	AL/PPS/FKM	MX06-50
	AL/AL/FKM	MX75-100
<b>P</b>	SS/PPS/FEP	MX06-50
<b>S</b>	AL/SS/FEP	MX06-25
	AL/AL/FEP	MX40-100

	PORT CONNECTION	MODEL
<b>1</b>	G	All Models
<b>2</b>	NPT	
<b>3</b>	ANSI 150	MX25-100
<b>4</b>	JIS 10K	
<b>5</b>	DIN PN16	

	ROTOR TYPE	MODELS
<b>S</b>	Standard	As per category
<b>T</b>	High Temp. Pulse	MX06P - MX50P
<b>V</b>	High Viscosity	S and P category

	OUTPUT TYPE	MODELS
<b>X</b>	No Output	All Models
<b>A</b>	Standard Pulse	All Models
<b>B</b>	Ex approved (Ex ia)	Consult Macnaught Technical regarding availability
<b>D</b>	PR (LCD 12mm display)	All Models
<b>E</b>	PRA (LCD 12mm display)	All Models
<b>F</b>	ER (LCD 17mm display)	All Models*
<b>G</b>	ERA (LCD 17mm display)	All Models*
<b>H</b>	ERB (LCD 17mm display)	All Models*
<b>N</b>	Ex Approved (Ex ia NAMUR)	Consult Macnaught Technical regarding availability
<b>T</b>	High Temperature	All Models
<b>I</b>	Reed/Reed	Consult Macnaught Technical regarding availability
<b>J</b>	Hall/Hall	
<b>K</b>	High Resolution (omnipolar)	

MX-SERIES FLOW METERS

# MX06 – 1/4” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 0.5-100L/HR



**MX06P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX06 1/4” Digital Flow Meters are suitable for flows between 0.5-100L/hr. The 1/4” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX06F	MX06S	MX06P
<b>Materials of Construction</b> Meter Body	Aluminium (6061)	Aluminium (6061)	Stainless Steel (316)
	Rotor PPS	Stainless Steel (316)	PPS Stainless Steel (316)
	Seals Fluorocarbon (FKM)	PTFE Encapsulated (FEP)	PTFE Encapsulated (FEP)
<b>Design Specifications</b> Process Connections	1/4" G 1/4" NPT	1/4" G 1/4" NPT	1/4" G 1/4" NPT
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 2-100L/hr 0.5-26USG/hr	<b>&gt;5cP</b> 0.5-100L/hr 0.13-26USG/hr	<b>&lt;5cP</b> 2-100L/hr 0.5-26USG/hr
	<b>&gt;5cP</b> 0.5-100L/hr 0.13-26USG/hr	<b>&lt;5cP</b> 2-100L/hr 0.5-26USG/hr	<b>&gt;5cP</b> 0.5-100L/hr 0.13-26USG/hr
	Non-lubricating fluids 6-100L/hr 1.58-26USG/hr	6-100L/hr 1.58-26USG/hr	6-100L/hr 1.58-26USG/hr
	Operating Temperature Range* -40 - 80°C -40 - 176°F	-40 - 120°C -40 - 248°F	-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)
	Max. Operating Pressure 1000psi 69bar	1000psi 69bar	1000psi 69bar
	Accuracy +/- 0.5%	+/- 0.5%	+/- 0.5%
	Repeatability +/- 0.03%	+/- 0.03%	+/- 0.03%
	Nominal K-Factor 1000 Pulses/L	1000 Pulses/L	1000 Pulses/L

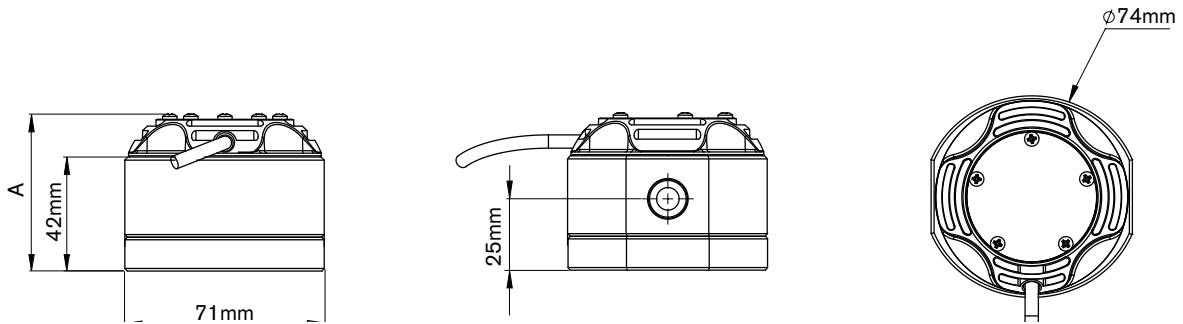
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## OUTPUTS TYPES

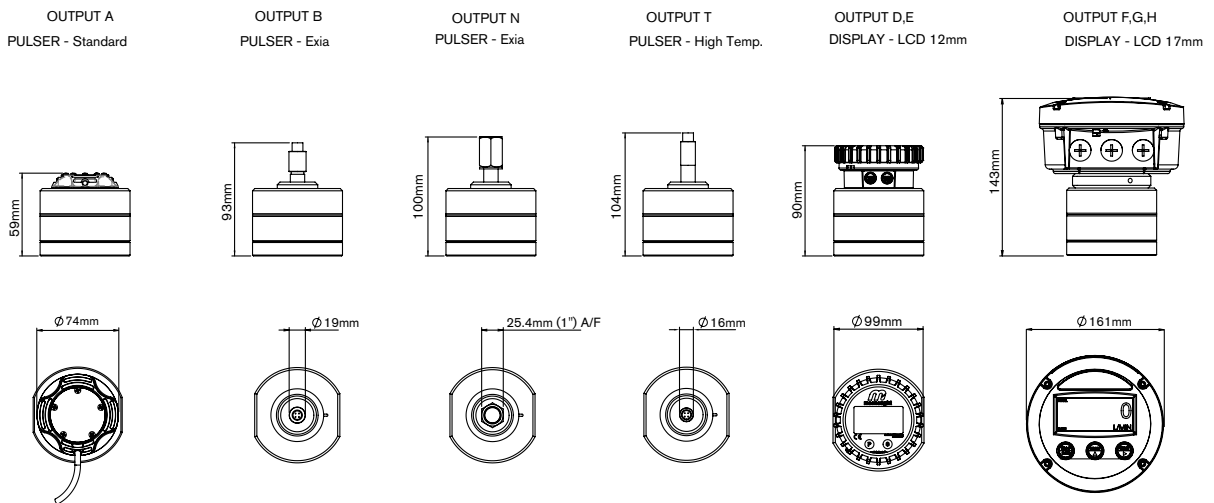
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX06F	MX06S	MX06P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

● Available    ✗ Not Available    S Only with stainless steel rotors    — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX09 – 1/4” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 15-500L/HR



**MX09P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX09 1/4" Digital Flow Meters are suitable for flows between 15-500L/hr. The 1/4" Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX09F	MX09S	MX09P
<b>Materials of Construction</b>			
Meter Body	Aluminium (6061)	Aluminium (6061)	Stainless Steel (316)
Rotor	PPS	Stainless Steel (316)	PPS Stainless Steel (316)
Seals	Fluorocarbon (FKM)	PTFE encapsulated (FEP)	PTFE encapsulated (FEP)
<b>Design Specifications</b>			
Process Connections	<b>Threaded</b> 1/4" G 1/4" NPT	<b>Threaded</b> 1/4" G 1/4" NPT	<b>Threaded</b> 1/4" G 1/4" NPT
<b>Technical Specifications</b>			
Flow rate	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr
Operating Temperature Range*	-40 - 80°C -40 - 176°F	-40 - 120°C -40 - 248°F	-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)
Max. Operating Pressure	1000psi 69bar	1000psi 69bar	1000psi 69bar
Accuracy	+/- 0.5%	+/- 0.5%	+/- 0.5%
Repeatability	+/- 0.03%	+/- 0.03%	+/- 0.03%
Nominal K-Factor	400 Pulses/L	400 Pulses/L	400 Pulses/L

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

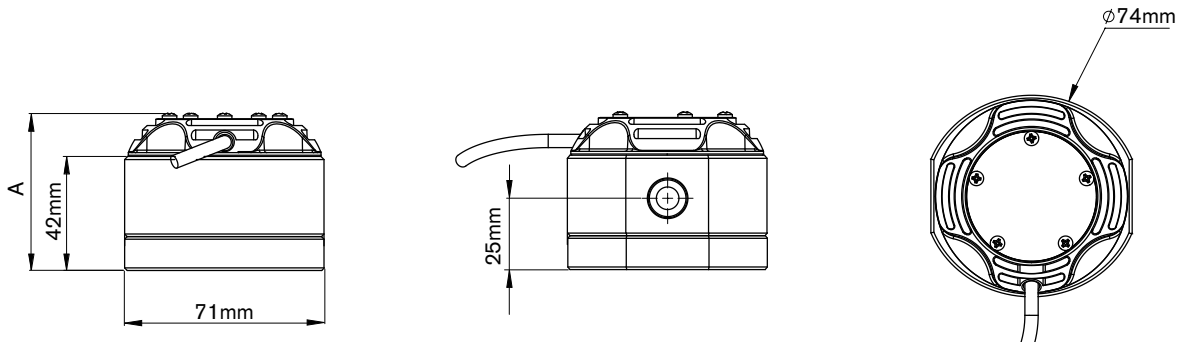


## OUTPUTS TYPES

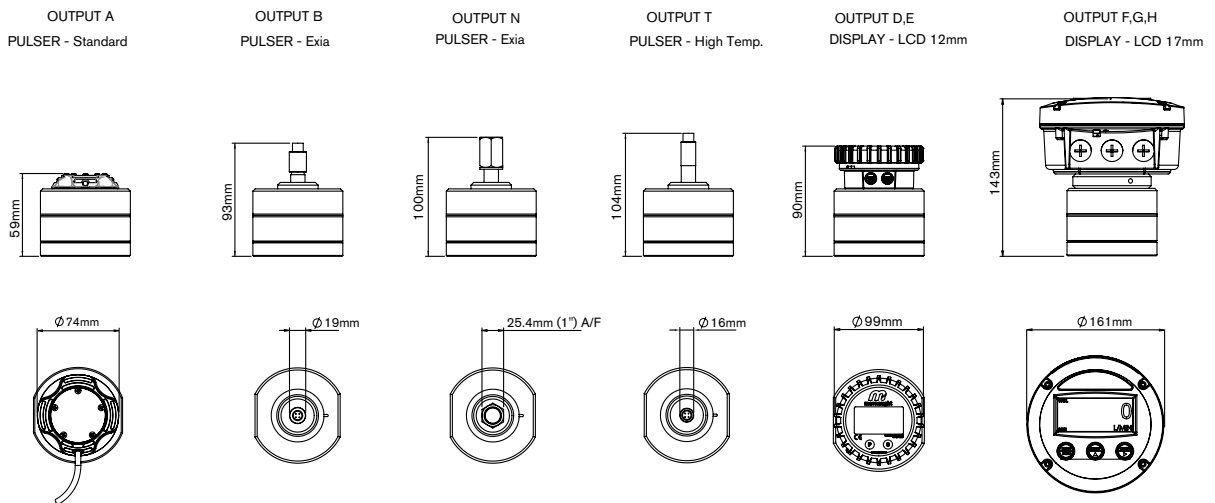
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX09F	MX09S	MX09P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

● Available   ✗ Not Available   S Only with stainless steel rotors   — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX12 – 1/2” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 2-30L/MIN



**MX12P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX12 1/2” Digital Flow Meters are suitable for flows between 2-30L/min. The 1/2” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX12F	MX12S	MX12P
<b>Materials of Construction</b> Meter Body	Aluminium (6061)	Aluminium (6061)	Stainless Steel (316)
Rotor	PPS	Stainless Steel (316)	PPS Stainless Steel (316)
Seals	Fluorocarbon (FKM)	PTFE encapsulated (FEP)	PTFE encapsulated (FEP)
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1/2" G 1/2" NPT	<b>Threaded</b> 1/2" G 1/2" NPT	<b>Threaded</b> 1/2" G 1/2" NPT
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 3-25L/min 0.6-6.6USG/min	<b>&gt;5cP</b> 2-30L/min 0.5-8USG/min	<b>&lt;5cP</b> 3-25L/min 0.6-6.6USG/min
Operating Temperature Range*	-40 - 80°C -40 - 176°F	-40 - 120°C -40 - 248°F	-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)
Max. Operating Pressure	2000 psi 138 Bar	2000 psi 138 Bar	2000 psi 138 Bar
Accuracy	+/- 0.5%	+/- 0.5%	+/- 0.5%
Repeatability	+/- 0.03%	+/- 0.03%	+/- 0.03%
Nominal K-Factor	112 Pulses/L	112 Pulses/L	112 Pulses/L

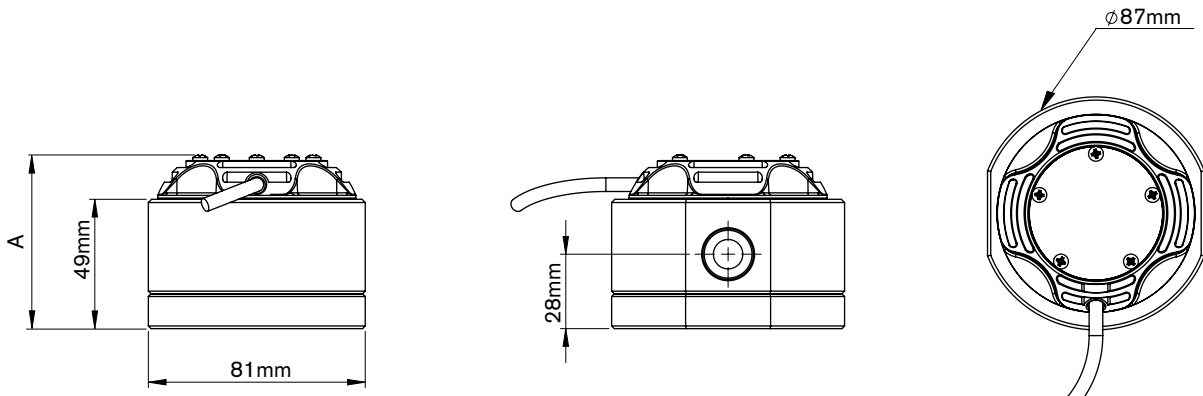
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## OUTPUTS TYPES

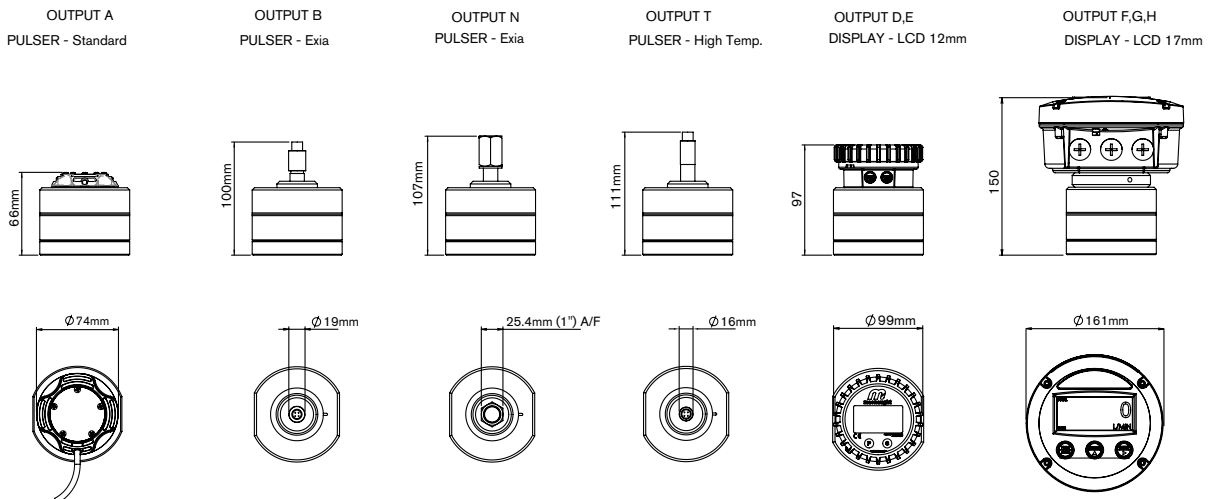
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX12F	MX12S	MX12P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

● Available   ✗ Not Available   S Only with stainless steel rotors   — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX19 – 3/4” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 3-80L/MIN



**MX19P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX19 3/4” Digital Flow Meters are suitable for flows between 3-80L/min. The 3/4” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX19F	MX19S	MX19P
<b>Materials of Construction</b> Meter Body	Aluminium (6061)	Aluminium (6061)	Stainless Steel (316)
Rotor	PPS	Stainless Steel (316)	PPS Stainless Steel (316)
Seals	Fluorocarbon (FKM)	PTFE encapsulated (FEP)	PTFE encapsulated (FEP)
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 3/4" G 3/4" NPT	<b>Threaded</b> 3/4" G 3/4" NPT	<b>Threaded</b> 3/4" G 3/4" NPT
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 8-70L/min 2-18.5USG/min	<b>&lt;5cP</b> 8-70L/min 2-18.5USG/min	<b>&lt;5cP</b> 8-70L/min 2-18.5USG/min
Operating Temperature Range*	<b>&gt;5cP</b> 3-80L/min 0.8-21USG/min	<b>&gt;5cP</b> 3-80L/min 0.8-21USG/min	<b>&gt;5cP</b> 3-80L/min 0.8-21USG/min
Max. Operating Pressure	-40 - 80°C -40 - 176°F	-40 - 120°C -40 - 248°F	-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)
Accuracy	2000 psi 138 Bar	2000 psi 138 Bar	2000 psi 138 Bar
Repeatability	+/- 0.5%	+/- 0.5%	+/- 0.5%
Nominal K-Factor	+/- 0.03%	+/- 0.03%	+/- 0.03%
	52 Pulses/L	52 Pulses/L	52 Pulses/L

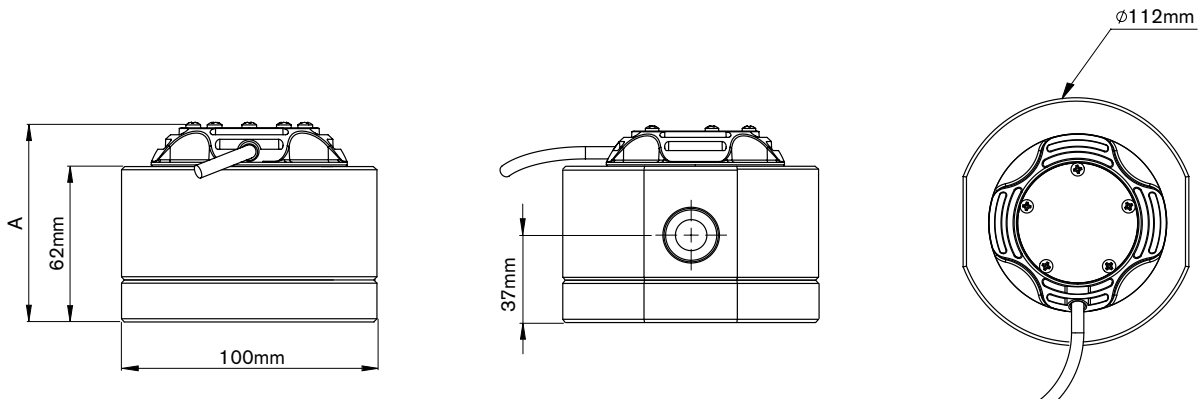
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## OUTPUTS TYPES

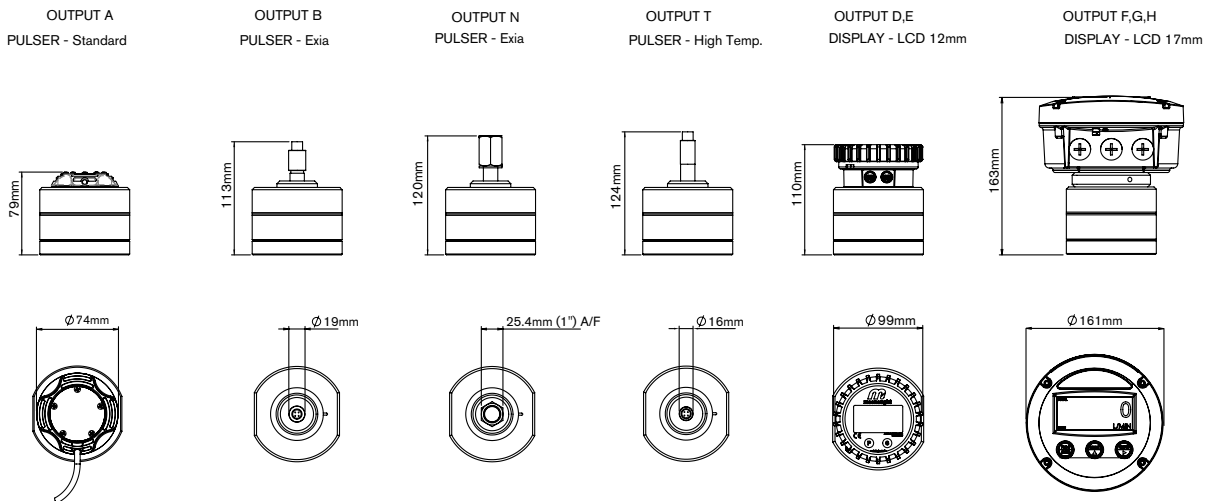
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX19F	MX19S	MX19P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

● Available   ✗ Not Available   S Only with stainless steel rotors   — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX25 – 1” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 6-120L/MIN



**MX25P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX25 1" Digital Flow Meters are suitable for flows between 6-120L/min. The 1" Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX25F		MX25S		MX25P	
<b>Materials of Construction</b> Meter Body	Aluminium (6061)		Aluminium (6061)		Stainless Steel (316)	
	Rotor		Stainless Steel (316)		PPS Stainless Steel (316)	
	Seals		PTFE encapsulated (FEP)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	1" G 1" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1" G 1" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1" G 1" NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min
	Operating Temperature Range*		-40 - 120°C -40 - 248°F		-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)	
	Max. Operating Pressure**		2000 psi 138 Bar		2000 psi 138 Bar	
	Accuracy		+/- 0.5%		+/- 0.5%	
	Repeatability		+/- 0.03%		+/- 0.03%	
	Nominal K-Factor		36 Pulses/L		36 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

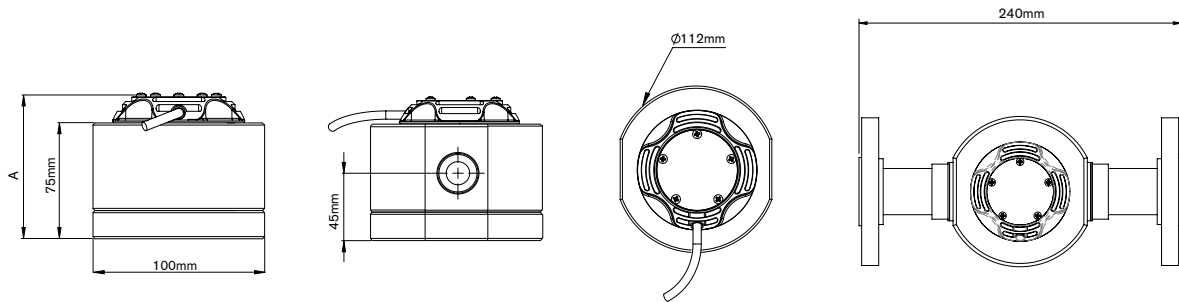
\*\* Pressure rating subject to change as per flange rating

## OUTPUTS TYPES

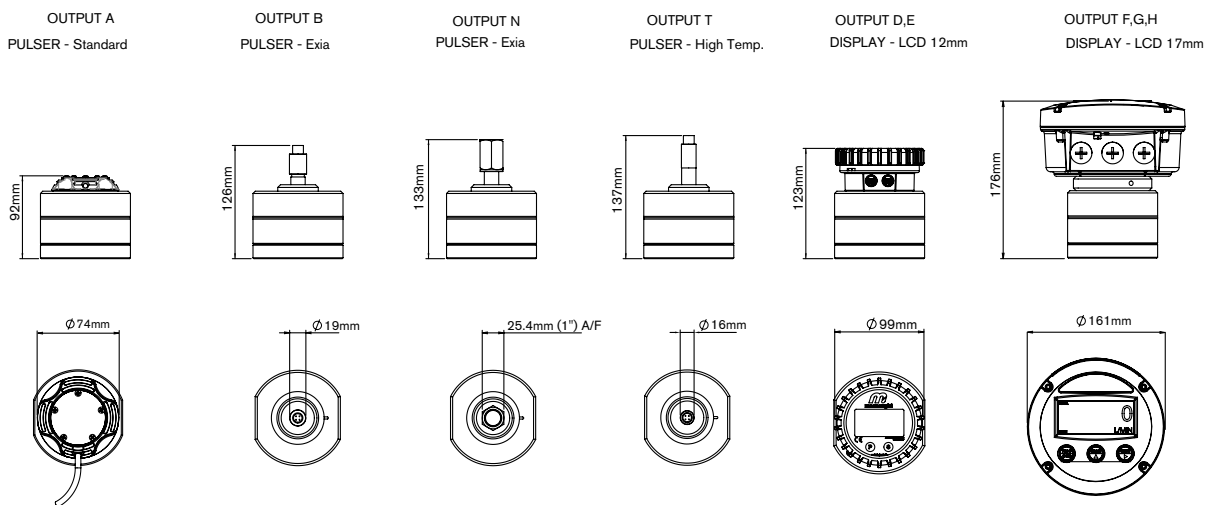
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX25F	MX25S	MX25P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✘	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

● Available   ✘ Not Available   S Only with stainless steel rotors   — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSAR AND DISPLAY HEIGHT - A



# MX40 – 1½” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 10-250L/MIN



**MX40P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX40 1½” Digital Flow Meters are suitable for flows between 10-250L/min. The 1½” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX40F		MX40S		MX40P	
<b>Materials of Construction</b> Meter Body	Aluminium (6061)		Aluminium (6061)		Stainless Steel (316)	
	Rotor		Aluminium (6061)		PPS Stainless Steel (316)	
	Seals		PTFE encapsulated (FEP)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	1½” G 1½” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1½” G 1½” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1½” G 1½” NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	15-235L/min 4-62USG/min	10-250L/min 2.6-66USG/min	15-235L/min 4-62USG/min	10-250L/min 2.6-66USG/min	15-235L/min 4-62USG/min	10-250L/min 2.6-66USG/min
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F		-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)	
Max. Operating Pressure**	1500 psi 103 Bar		1500 psi 103 Bar		1500 psi 103 Bar	
Accuracy	+/- 0.5%		+/- 0.5%		+/- 0.5%	
Repeatability	+/- 0.03%		+/- 0.03%		+/- 0.03%	
Nominal K-Factor	14.5 Pulses/L		14.5 Pulses/L		14.5 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\* Pressure rating subject to change as per flange rating

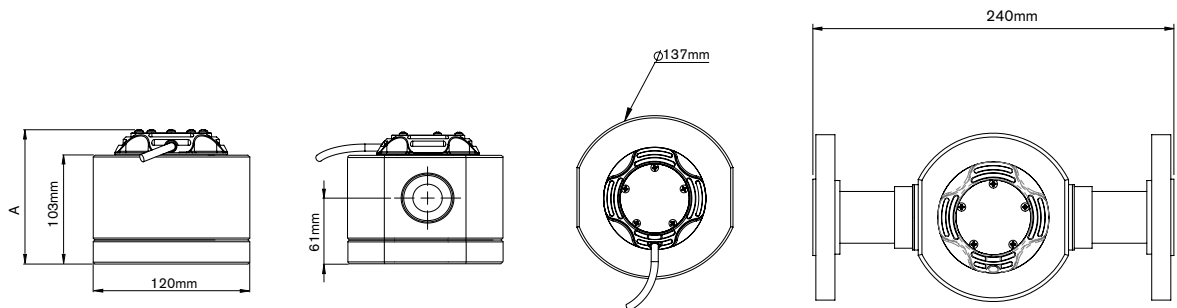


## OUTPUTS TYPES

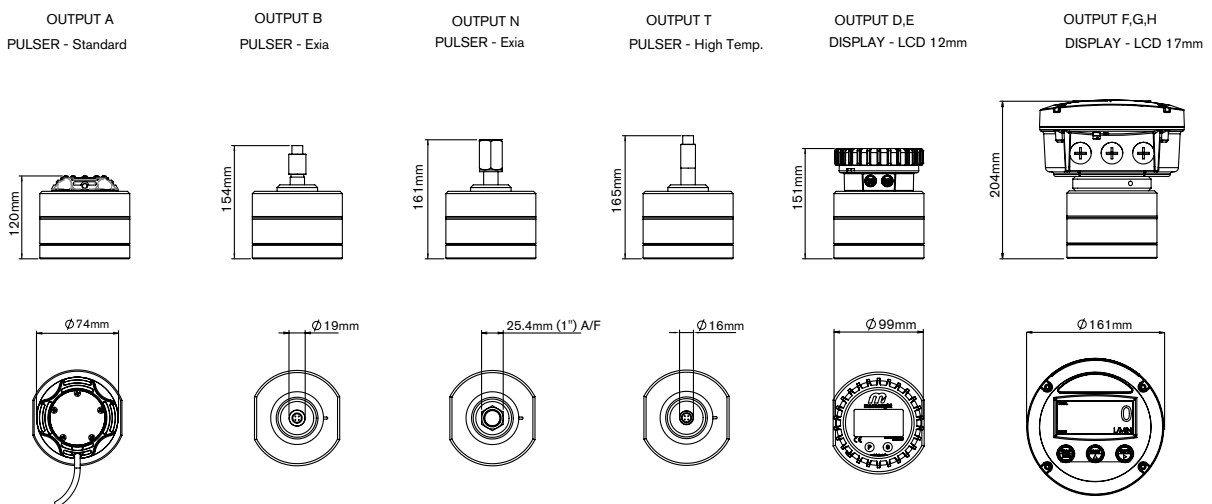
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX40F	MX40S	MX40P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1 m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1 m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1 m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1 m flying lead)	—	—	—

● Available    ✗ Not Available    S Only with stainless steel rotors    — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX50 – 2” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 15-500L/MIN



**MX50P-1SE**  
Stainless steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX50 2” Digital Flow Meters are suitable for flows between 15-500L/min. The 2” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX50F		MX50S		MX50P	
<b>Materials of Construction</b> Meter Body	Aluminium (6061)		Aluminium (6061)		Stainless Steel (316)	
	Rotor		Aluminium (6061)		PPS Stainless Steel (316)	
	Seals		PTFE encapsulated (FEP)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	2” G 2” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	2” G 2” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	2” G 2” NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	15-500L/min 4-130 USG/min	15-500L/min 4-130 USG/min	15-500L/min 4-130 USG/min	15-500L/min 4-130 USG/min	15-500L/min 4-130 USG/min	15-500L/min 4-130 USG/min
	Operating Temperature Range*		-40 - 120°C -40 - 248°F		-40 - 80°C (150°C with high temp. rotors) -40 - 176°F (302°F with high temp. rotors)	
	Max. Operating Pressure**		1200 psi 82 Bar		1200 psi 82 Bar	
	Accuracy		+/- 0.5%		+/- 0.5%	
	Repeatability		+/- 0.03%		+/- 0.03%	
	Nominal K-Factor		6.7 Pulses/L		6.7 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\* Pressure rating subject to change as per flange rating

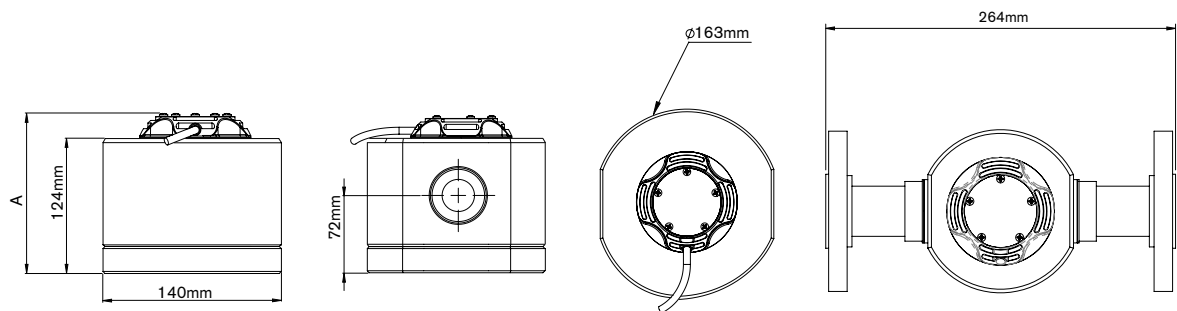
## OUTPUTS TYPES

	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX50F	MX50S	MX50P
<b>X</b>	No Output	-	No Output	●	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	S	S
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—	—

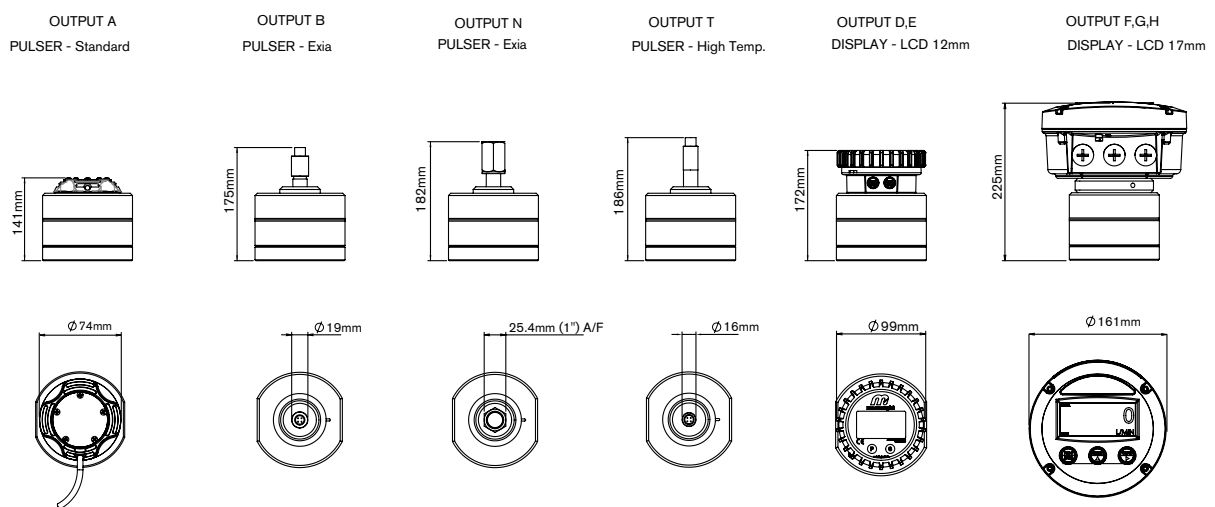
● Available   ✗ Not Available   S Only with stainless steel rotors   — Consult Macnaught Technical regarding availability

MX-SERIES FLOW METERS

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



# MX75 – 3” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 20-733L/MIN



**MX75F-1SE**  
Aluminium body with LCD register

Output variations:



**B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN  
**N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR  
**T - High Temp. Pulse**  
Max temp- 150°C



**F - ER**  
LCD Display (17mm)  
**G- ERA**  
LCD Display (17mm)  
**H- ERB**  
LCD Display (17mm)  
Batch controller



**D - PR**  
LCD Display (12mm)  
**E - PRA**  
LCD Display (12mm)  
with outputs



**A - Standard Pulse**  
Reel/Hall Effect  
**I - Standard Pulse**  
Reel/Reed Effect  
**J - Standard Pulse**  
Hall/Hall Effect  
**K - High Resolution**  
Hall NPN

The MX75 3” Digital Flow Meters are suitable for flows between 20-733L/min. The 3” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX75F		MX75S	
<b>Materials of Construction</b> Meter Body	Cast Aluminium (6061)		Cast Aluminium (6061)	
	Rotor	Aluminium (6061)	Aluminium (6061)	
	Seals	Fluorocarbon (FKM)	PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k
	<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 60-600L/min 17-170USG/min	<b>&gt;5cP</b> 20-733L/min 5-194USG/min	<b>&lt;5cP</b> 60-600L/min 17-170USG/min
Operating Temperature Range*	-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	175 psi 12 bar		175 psi 12 bar	
Accuracy	+/- 0.5%		+/- 0.5%	
Repeatability	+/- 0.03%		+/- 0.03%	
Nominal K-Factor	2.58 Pulses/L		2.58 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

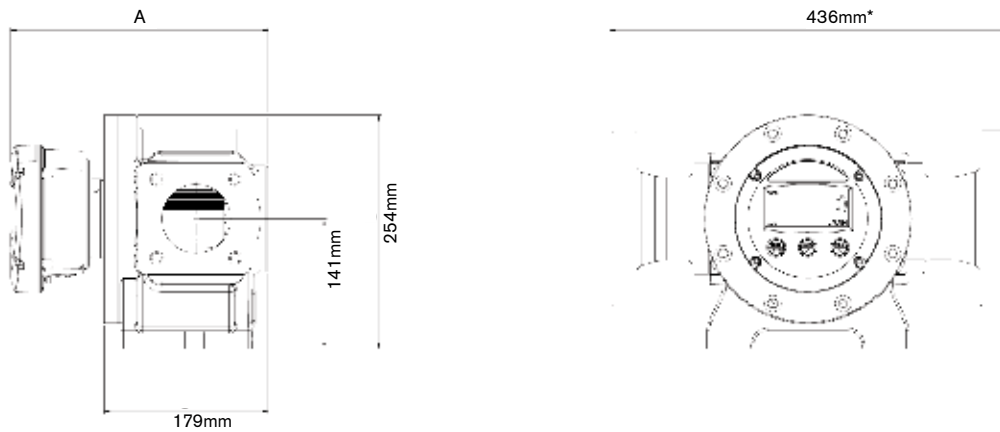
\*\* Pressure rating subject to change as per flange rating

## OUTPUTS TYPES

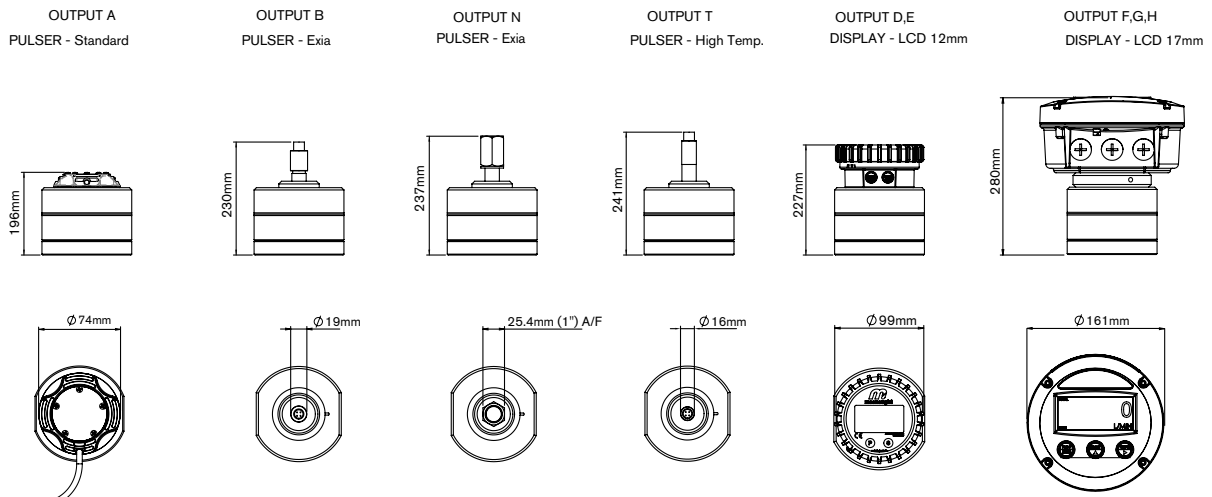
	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX75F	MX75S
<b>X</b>	No Output	-	No Output	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1 m flying lead)	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✗	●
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1 m flying lead)	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1 m flying lead)	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1 m flying lead)	—	—

● Available    ✗ Not Available    S Only with stainless steel rotors    — Consult Macnaught Technical regarding availability

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



\*Length subject to change refer to appendix B (pg. 88) for full dimension variations

# MX100 – 4” DIGITAL FLOW METERS

SUITABLE FOR FLOW RANGE 120-1200L/MIN



**MX100F-1SE**  
Aluminium steel body with LCD register

Output variations:



- B - Ex approved (Ex ia)**  
Intrinsically Safe - NPN
- N - Ex approved (Ex ia)**  
Intrinsically Safe - NAMUR
- T - High Temp. Pulse**  
Max temp- 150°C



- F - ER**  
LCD Display (17mm)
- G- ERA**  
LCD Display (17mm)
- H- ERB**  
LCD Display (17mm)  
Batch controller



- D - PR**  
LCD Display (12mm)
- E - PRA**  
LCD Display (12mm)  
with outputs



- A - Standard Pulse**  
Reel/Hall Effect
- I - Standard Pulse**  
Reel/Reed Effect
- J - Standard Pulse**  
Hall/Hall Effect
- K - High Resolution**  
Hall NPN

The MX100 4” Digital Flow Meter are suitable for flows between 120-1200L/min. The 4” Digital Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	MX100F		MX100S	
<b>Materials of Construction</b> Meter Body Rotor Seals	Cast Aluminium (6061)		Cast Aluminium (6061)	
	Aluminium (6061)		Aluminium (6061)	
	Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 3" G 3" NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k	<b>Threaded</b> 3" G 3" NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate Operating Temperature Range* Max. Operating Pressure** Accuracy Repeatability Nominal K-Factor	<b>&lt;5cP</b> 220-1000L/min 60-250USG/min	<b>&gt;5cP</b> 120-1200L/min 31.7-317USG/min	<b>&lt;5cP</b> 220-1000L/min 60-250USG/min	<b>&gt;5cP</b> 120-1200L/min 31.7-317USG/min
	-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F	
	175 psi 12 bar		175 psi 12 bar	
	+/- 0.5%		+/- 0.5%	
	+/- 0.03%		+/- 0.03%	
	2.3 Pulses/L		2.3 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\* Pressure rating subject to change as per flange rating

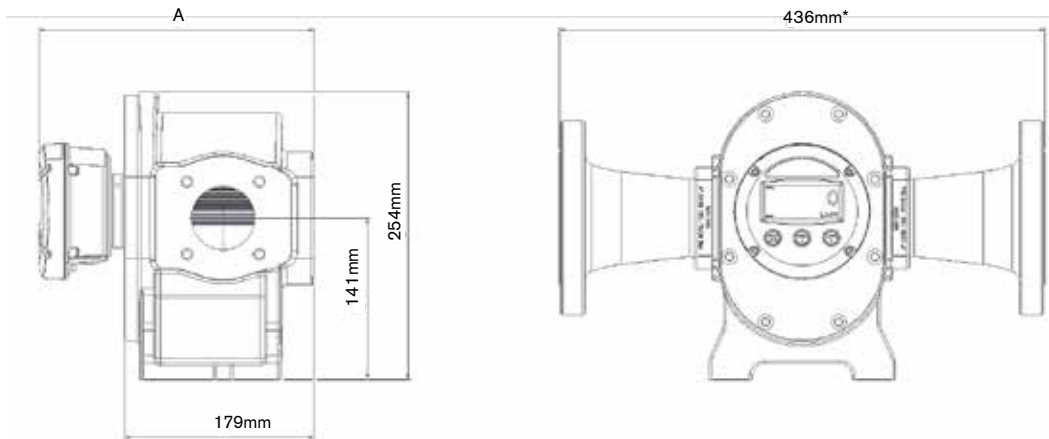
## OUTPUTS TYPES

	DESCRIPTION	SWITCH TYPE	OUTPUT TYPE	MX100F	MX100S
<b>X</b>	No Output	-	No Output	●	●
<b>A</b>	Standard Pulse	Reed /Hall (NPN)	Pulse (1m flying lead)	●	●
<b>B</b>	Ex approved (Ex ia)	Hall (NPN)	Pulse (2m DIN cable)	—	●
<b>D</b>	PR (LCD 12mm display)	-	Display 12mm	●	●
<b>E</b>	PRA (LCD 12mm display)	-	Display 12mm, 4-20mA output, Pulse	●	●
<b>F</b>	ER (LCD 17mm display)	-	Display 17mm	●	●
<b>G</b>	ERA (LCD 17mm display)	-	Display 17mm, 4-20mA output, Pulse	●	●
<b>H</b>	ERB (LCD 17mm display)	-	Display 17mm + Batch Control	●	●
<b>N</b>	Ex Approved (Ex ia NAMUR)	NAMUR	Pulse (2m DIN cable)	—	●
<b>T</b>	High Temp. Pulseerature	Hall (NPN)	Pulse	✘	●
<b>I</b>	Reed/Reed	Reed/Reed	Pulse (1m flying lead)	—	—
<b>J</b>	Hall/Hall	Hall/Hall	Pulse (1m flying lead)	—	—
<b>K</b>	High Resolution (omnipolar)	Hall (NPN)	Pulse (1m flying lead)	—	—

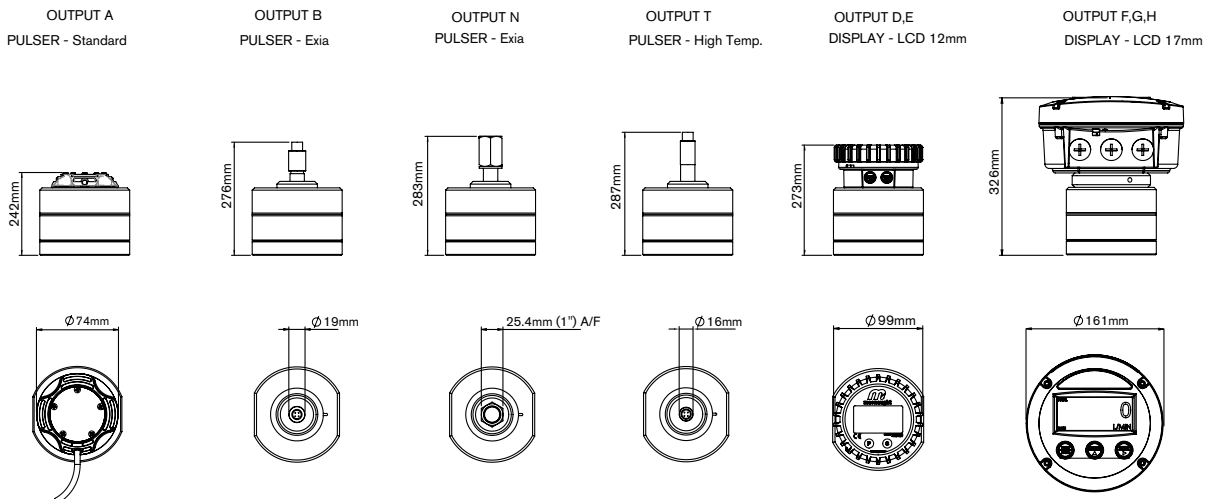
● Available    ✘ Not Available    S Only with stainless steel rotors    — Consult Macnaught Technical regarding availability

MX-SERIES FLOW METERS

## DIMENSIONS



PULSER AND DISPLAY HEIGHT - A



\*Length subject to change refer to appendix B (pg. 88) for full dimension variations





# M-SERIES FLOW METERS

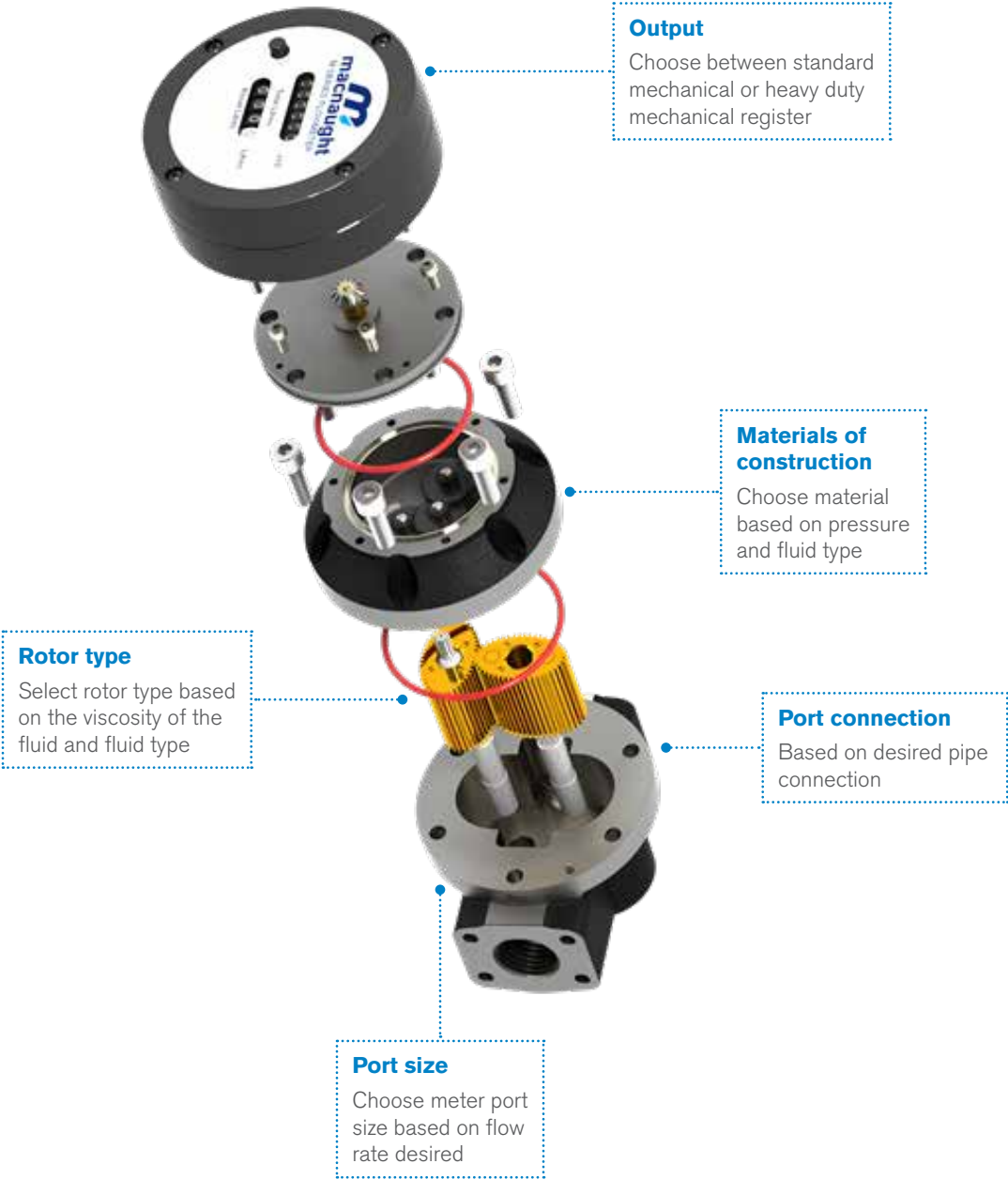


# M-SERIES FLOW METERS

## MECHANICAL FLOW METERS

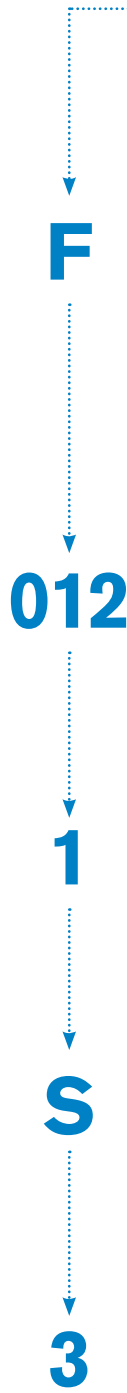
The Mechanical Flow Meters range is the original meter range from Macnaught. They are available with reliable mechanical displays offer a measurement option for unpowered or remote sites. All Macnaught Flow Meters are supplied with an individual Test Report.

## EXPLODED DIAGRAM



## PRODUCT IDENTIFICATION SYSTEM

# F012-1S3



MATERIALS OF CONSTRUCTION		
	CATEGORY (METER/ROTOR/SEAL)	MODELS
<b>F</b>	AL/PPS/FKM	F012 - 050
	AL/AL/FKM	F075 - 100
<b>M</b>	SS/PPS/FEP	M012 - 050
<b>S</b>	AL/SS/FEP	S025
	AL/AL/FEP	S040 - 100

PORT SIZE	
<b>012</b>	1/2"
<b>025</b>	1"
<b>040</b>	1 1/2"
<b>050</b>	2"
<b>075</b>	3"
<b>100</b>	4"

	PORT CONNECTION	MODELS
<b>1</b>	G (Litres Display)	All Models
<b>2</b>	NPT (US Gallons Display)	
<b>3</b>	NPT (Litres Display)	
<b>4</b>	BSP Rc (Litres Display)	

	ROTOR	MODELS
<b>S</b>	Standard Rotors	Category F and M
<b>T*</b>	High Temperature	Category M and S025
<b>V</b>	High Viscosity	PPS material for F012-F050 AL material for F075-F100, S040-S100 SS material for M025-M050

\*T type rotors are offered in Aluminium for category S040 to S100

	OUTPUT	MODELS
<b>3</b>	Standard Mechanical	012-050
<b>4</b>	Heavy Duty Mechanical	All Models

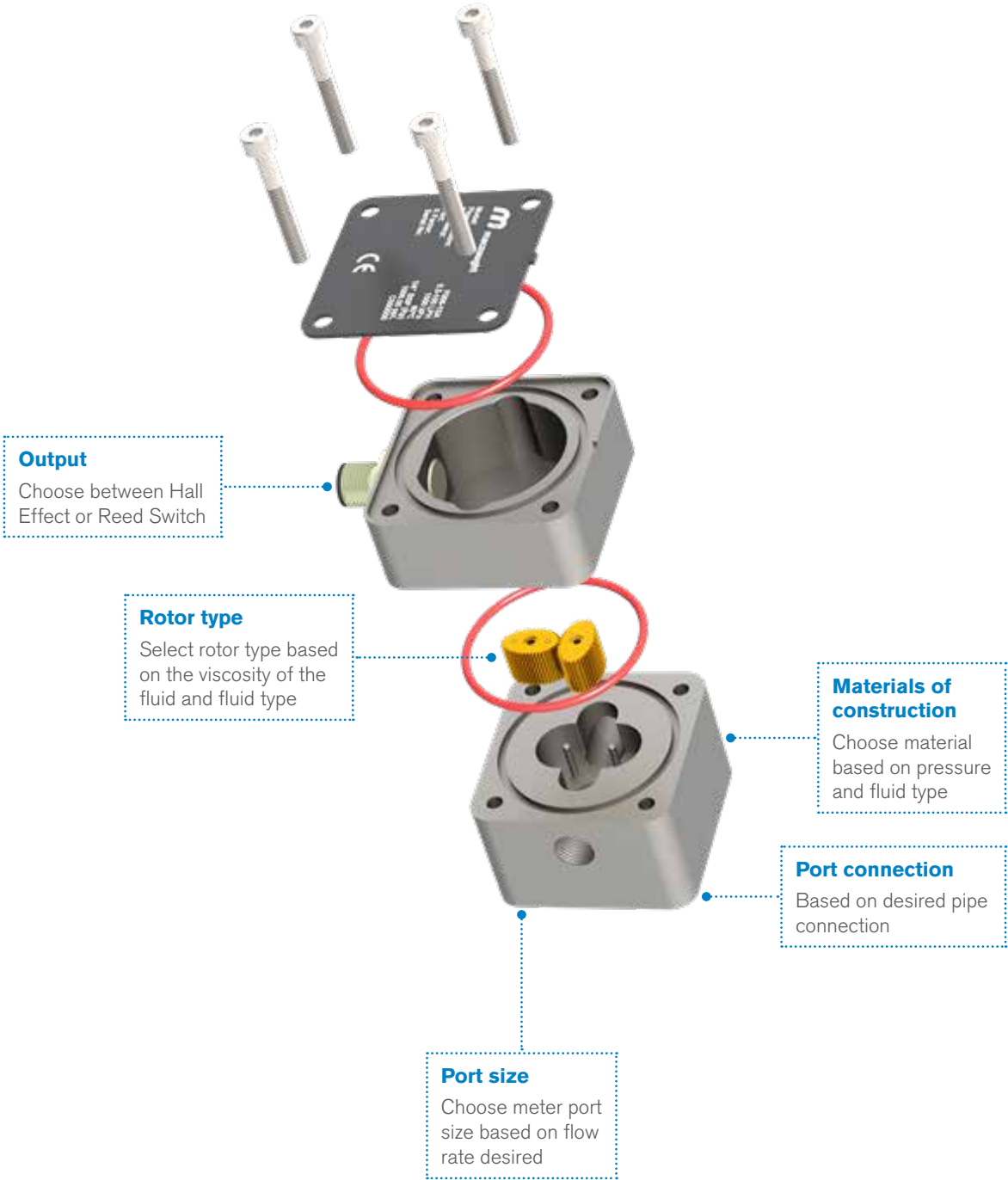
M-SERIES FLOW METERS

# M-SERIES FLOW METERS

## PULSE FLOW METERS (STANDARD)

The Macnaught Pulse Flow Meter range are the original meter range from Macnaught. They offer a compact and robust metal body, manufactured from high quality grades of cast aluminium and stainless steel. For highly corrosive chemical applications, BR42B grade PPS material is used to deliver superior stability\*.

## EXPLODED DIAGRAM



## PRODUCT IDENTIFICATION SYSTEM

# F006-1SA

F  
006  
1  
S  
A

### MATERIALS OF CONSTRUCTION

CATEGORY (BODY/ROTOR/SEAL)		MODELS
<b>F</b>	AL/SS/FFKM	All Models
<b>M</b>	SS/SS/FFKM	M006/M009
<b>S</b>	AL/SS/FFKM	S006/S009
<b>CR</b>	PPS/PPS/FFKM	CR006 and CR009
	PPS/PPS/FEP	CR025

### PORT SIZE

	PORT SIZE	MODELS
<b>006</b>	1/4"	All models
<b>009</b>	1/4"	All models
<b>025</b>	1"	Category CR only

### PORT CONNECTION

	PORT CONNECTION	MODELS
<b>1</b>	G	Category F, M and S only
<b>2</b>	NPT	All models
<b>4</b>	Rc	All models

### ROTOR TYPE

	ROTOR TYPE	MODELS
<b>S</b>	Standard	F and CR category only
<b>T</b>	High Temp. Pulse	M and S category only
<b>V</b>	High Viscosity	009 only; Not available for CR

### OUTPUT TYPE

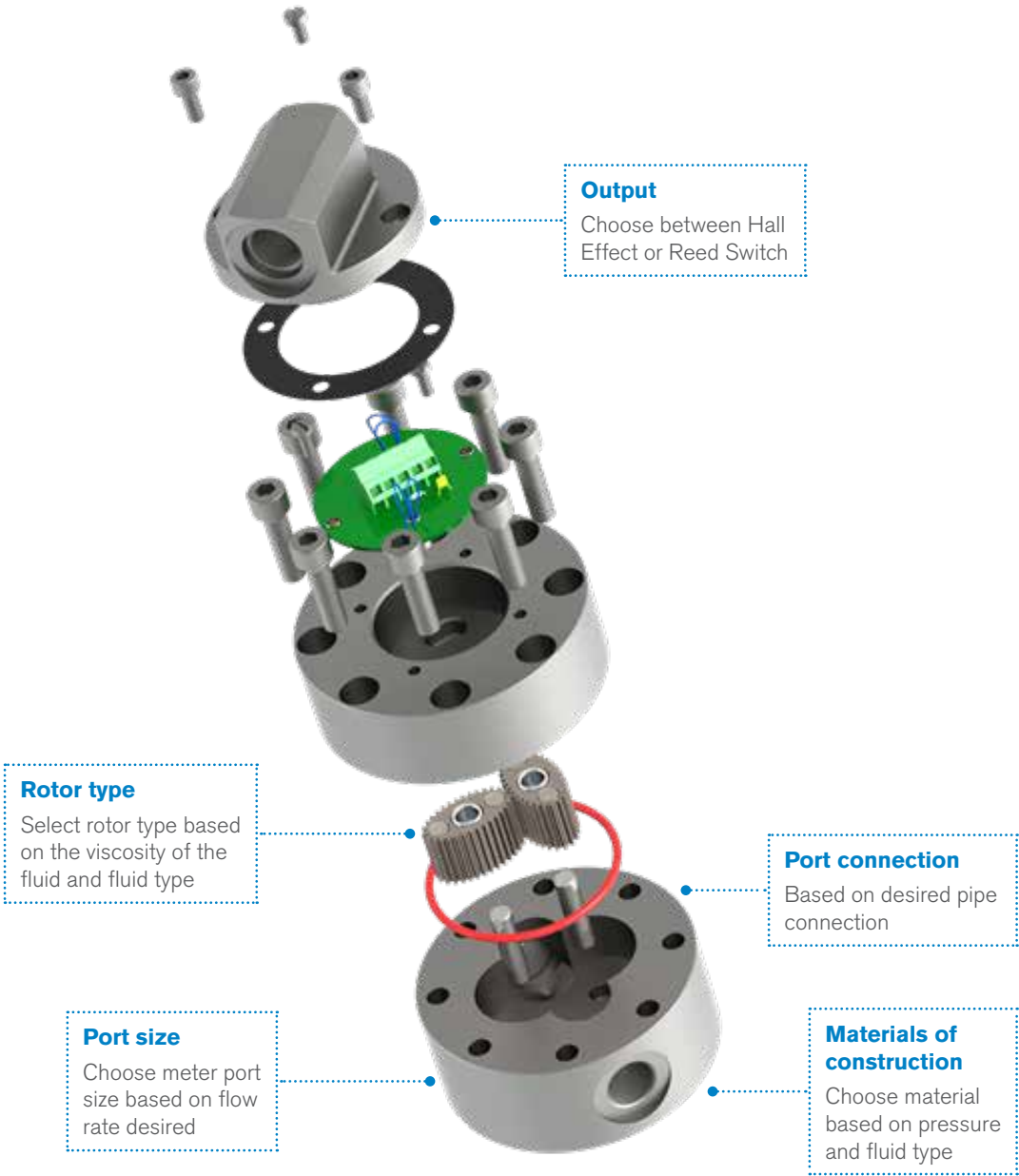
	OUTPUT TYPE	MODELS
<b>1</b>	Reed/Hall	Flying lead for 006/009 User connection for CR025
<b>2</b>	Reed/Reed	006/009 Single reed ONLY
<b>A</b>	Reed/Hall DIN connection	Not Available for CR025
<b>B</b>	Reed/Reed DIN connection	

# M-SERIES FLOW METERS

## PULSE FLOW METERS (HIGH PRESSURE)

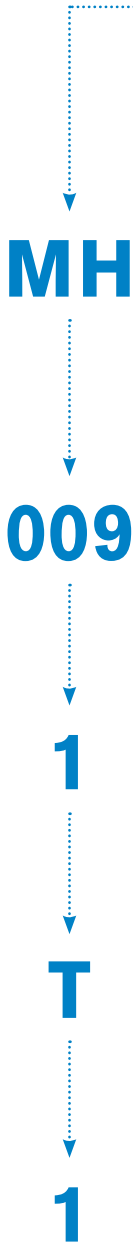
Macnaught High Pressure Flow Meters are manufactured from robust stainless steel body utilizing high quality billet suitable for use in the harshest environments. Designed to withstand pressures from 3000psi to 8000psi, the Macnaught High Pressure Flow Meters fit virtually any high pressure liquid measurement requirements. All Macnaught Flow Meters are supplied with an individual Test Report.

### EXPLODED DIAGRAM



**PRODUCT IDENTIFICATION SYSTEM**

**MH009-1T1**



MATERIALS OF CONSTRUCTION		
	CATEGORY (METER/ROTOR/SEAL)	MODELS
MH	SS/SS/FFKM	MH006-009
	SS/SS/FEP SS/PPS/FEP	MH012

	PORT SIZE	MODELS
006	1/4"	All Models
009	1/4"	
012	1/2"	

	PORT CONNECTION	MODELS
1	G	All Models
2	NPT	

	ROTOR TYPE	MODELS
T	High Temp. Pulseerature	All Models
V	High Viscosity	MH009 and MH012

	OUTPUT	SWITCH TYPE
1	Pulse Output	Single Hall for MH006/009. Reed/Hall for MH012
2	Pulse Output	Single Reed for MH006/009. Dual Reed for MH012

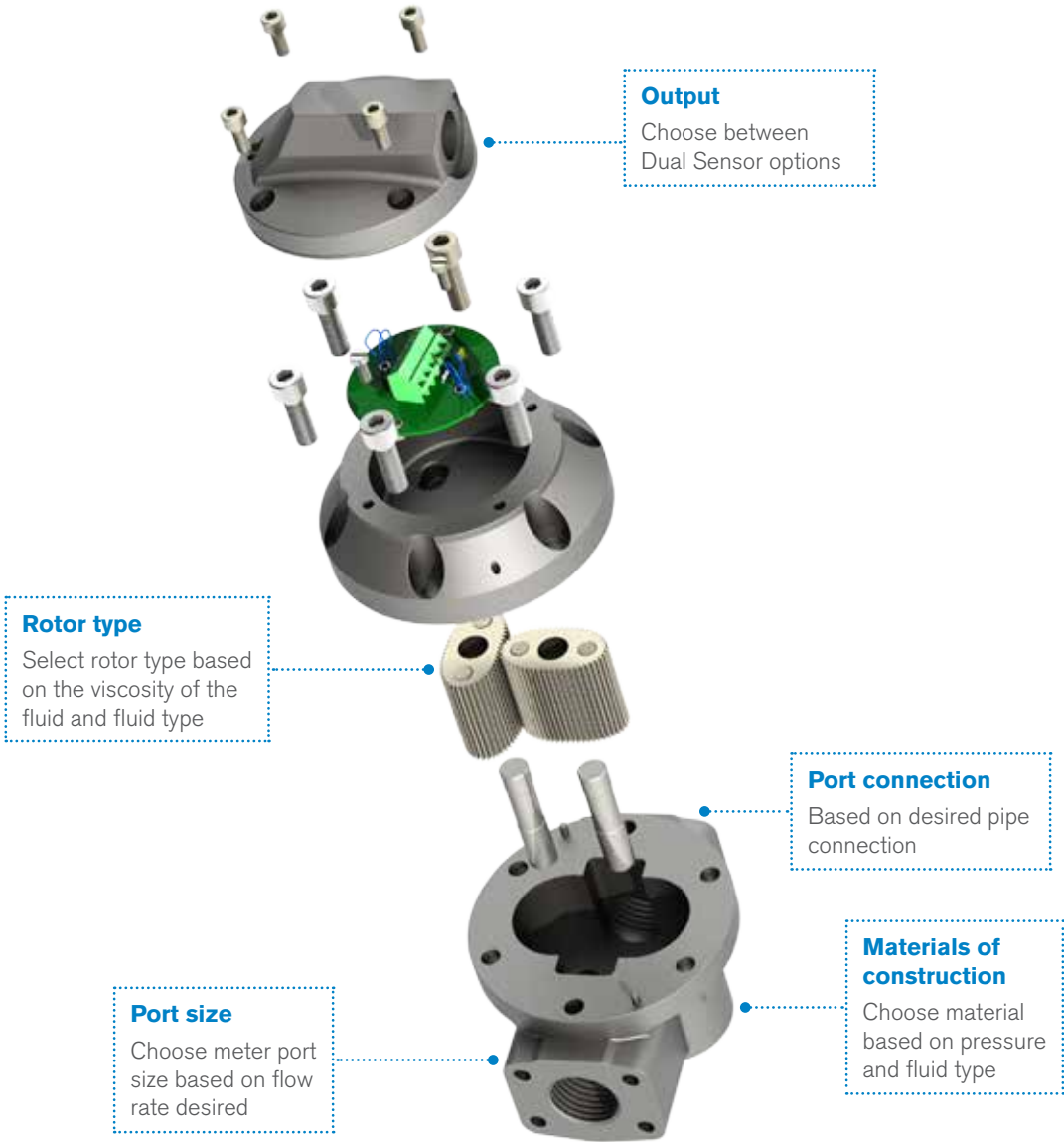
M-SERIES FLOW METERS

# M-SERIES FLOW METERS

## PULSE FLOW METERS (CUSTODY TRANSFER)

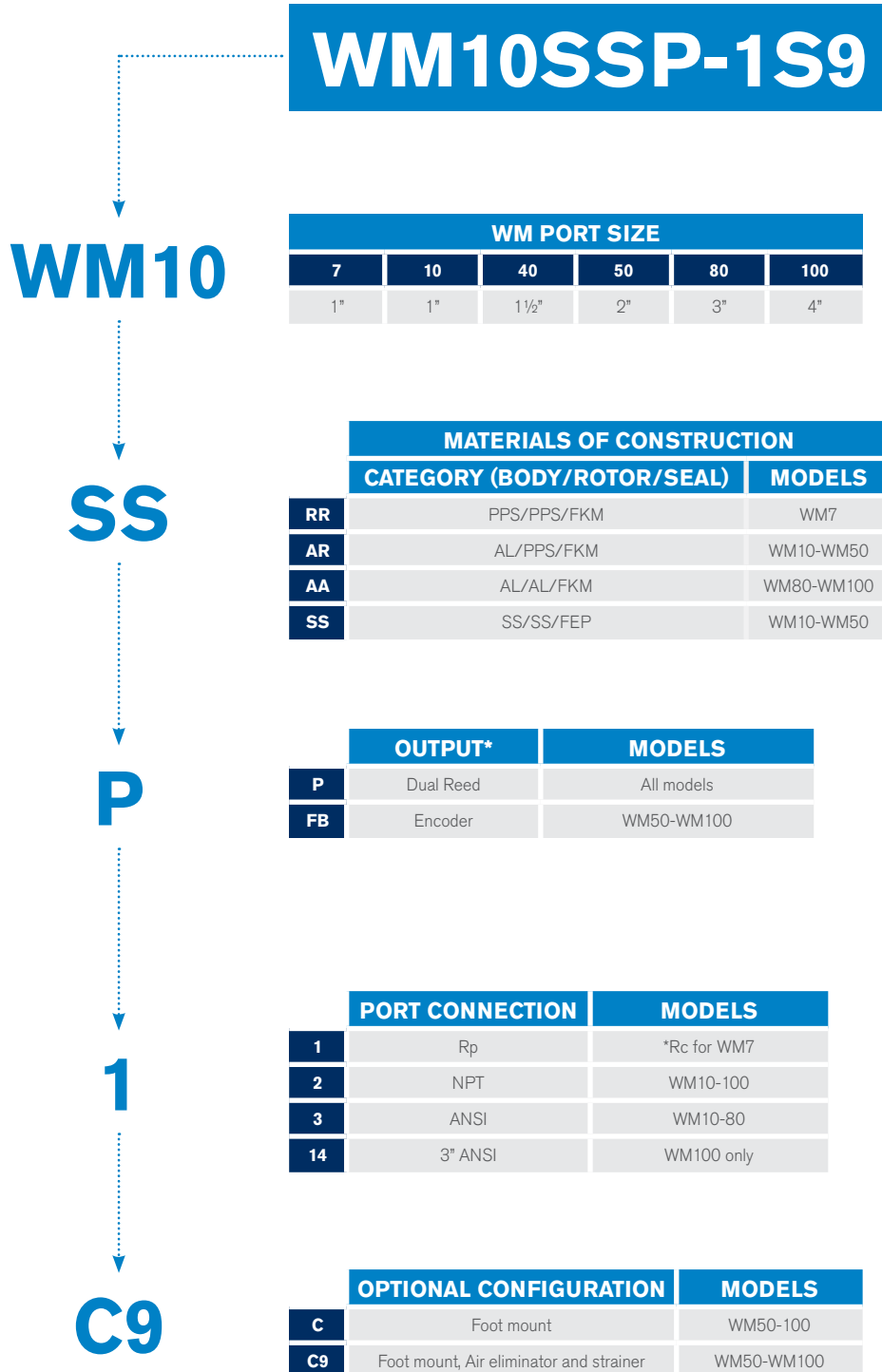
The Macnaught Custody Transfer meter range are the original meter range from Macnaught. They offer a compact and robust body manufactured from high quality grades of cast Aluminium and Stainless steel. Macnaught Custody Transfer meters are certified and approved by the National Measurement Institute (NMI) and supplied with an individual Test Report.

### EXPLODED DIAGRAM





## PRODUCT IDENTIFICATION SYSTEM



\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information

# M1 – 1/4” PULSE FLOW METERS

SUITABLE FOR FLOW RANGE 0.5-100L/HR



**F006-1S1**  
Aluminium body with flying lead



**CR006-1SA**  
PPS body with DIN variation

Macnaught 1/4” Pulse Flow Meters are a small capacity meter in the M-SERIES range. Differentiated by its flow rate capabilities. Suitable for flows between 0.5-100L/hr. The 1/4” Pulse Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	F006		S006		M006		CR006	
<b>Materials of Construction</b> Meter Body	Aluminium		Aluminium		Stainless Steel		PPS	
	Stainless Steel		Stainless Steel		Stainless Steel		PPS	
	Fluorocarbon (FKM)		Perfluoroelastomer (FFKM)		Perfluoroelastomer (FFKM)		Perfluoroelastomer (FFKM)	
<b>Design Specifications</b> Process Connections	1/4" G 1/4" NPT		1/4" G 1/4" NPT		1/4" G 1/4" NPT		1/4" BSP (Rc) 1/4" NPT	
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	2-100L/hr 0.5-26USG/hr	0.5-100L/hr 0.13-26USG/hr	2-100L/hr 0.5-26USG/hr	0.5-100L/hr 0.13-26USG/hr	2-100L/hr 0.5-26USG/hr	0.5-100L/hr 0.13-26USG/hr	2-100L/hr 0.5-26USG/hr	0.5-100L/hr 0.13-26USG/hr
Non-lubricating fluids	6-100L/hr 1.58-26USG/hr		6-100L/hr 1.58-26USG/hr		6-100L/hr 1.58-26USG/hr		6-100L/hr 1.58-26USG/hr	
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F		-40 - 80°C -40 - 176°F	
Max. Operating Pressure	800 psi 55 bar		800 psi 55 bar		800 psi 55 bar		75 psi 5 bar	
Accuracy	+/- 0.5%		+/- 0.5%		+/- 0.5%		+/- 0.5%	
Repeatability	+/- 0.03%		+/- 0.03%		+/- 0.03%		+/- 0.03%	
Nominal K-Factor	1000 Pulses/L		1000 Pulses/L		1000 Pulses/L		1000 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## OUTPUTS

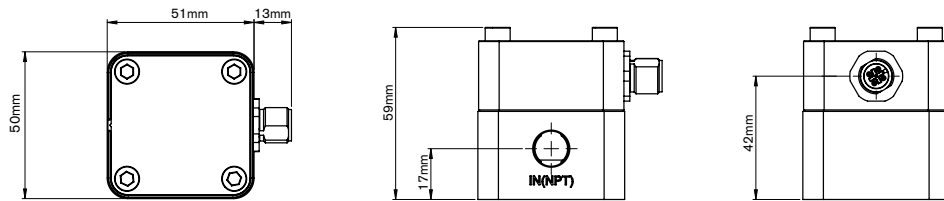
PREFIX	OUTPUT	SWITCH TYPE	F006	S006	M006	CR006
1	Pulse output	Reed/Hall Flying Lead	●	●	●	●
2	Pulse output	Reed Flying Lead	●	●	●	●
A	Pulse output	Reed/Hall DIN Connection	●	●	●	●
B	Pulse output	Reed/Reed DIN Connection	●	●	●	●

● Available    ✘ Not Available

## DIMENSIONS

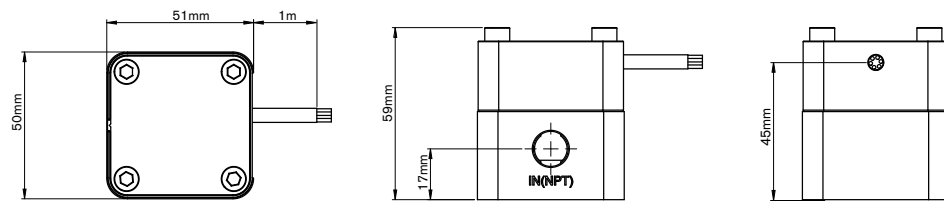
### M006/F006/S006

DIN variation



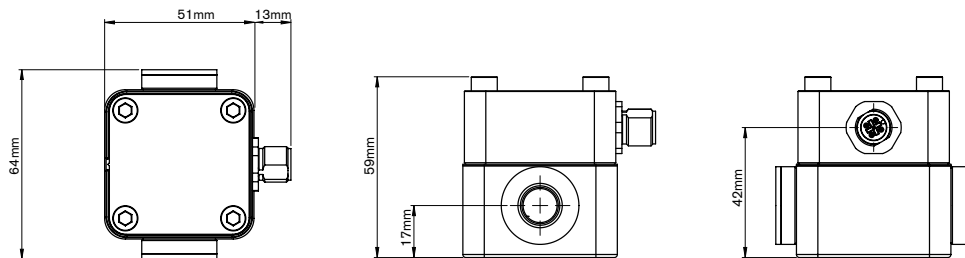
### M006/F006/S006

Flying Lead



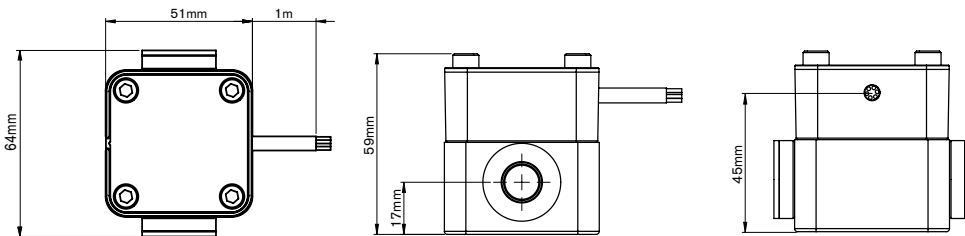
### CR006

DIN variation



### CR006

Flying Lead



# M1 – 1/4” HIGH PRESSURE FLOW METERS

SUITABLE FOR FLOW RANGE 0.5-100L/HR



Also available as optional accessories:



**DR**  
LCD Display (12mm)



**DRA**  
LCD Display (12mm) with outputs

## MH006-1T1

Stainless steel body with pulser cap

Macnaught 1/4" High Pressure Flow Meters are a small capacity meter in the M-SERIES range. Suitable for flows between 0.5-100L/hr. The 1/4" High Pressure Flow Meters are manufactured from high quality billet for enhanced material reliability with pressure ratings of up to 8000psi and have an accuracy of +/- 0.5% to provide exceptional levels of reliability and durability.

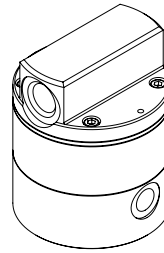
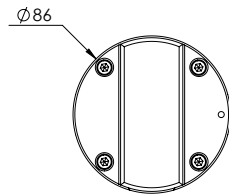
## SPECIFICATIONS

		MH006	
<b>Materials of Construction</b> Meter Body	Stainless Steel		
	Rotor	Stainless Steel	
	Seals	Perfluoroelastomer (FFKM)	
<b>Design Specifications</b> Process Connections	1/4" G 1/4" NPT		
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 2-100L/hr 0.5-26USG/hr	<b>&gt;5cP</b> 0.5-100L/hr 0.13-26USG/hr	
	Non-lubricating fluids	6-100L/hr 1.58-26USG/hr	
	Operating Temperature Range*	-40 - 120°C -40 - 248°F	
	Pressure	8000 psi 557 bar	
	Accuracy	+/- 0.5%	
	Repeatability	+/- 0.03%	
	Nominal K-Factor	1000 Pulses/L	
<b>Pulse Output Options</b> Pulser Pulser	Single Hall Effect Single Reed Switch		
<b>Local Display Options</b> Type DR	LCD display (12mm)	No Outputs	
	Type DRA	LCD display (12mm)	Outputs: Scaled Pulse, 4-20mA and Hi/Lo Flow Alarm

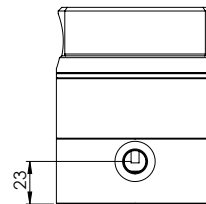
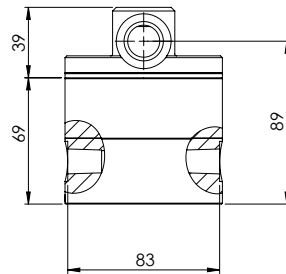
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## DIMENSIONS

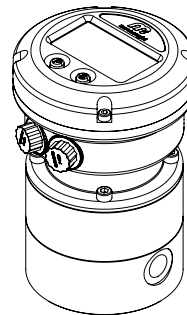
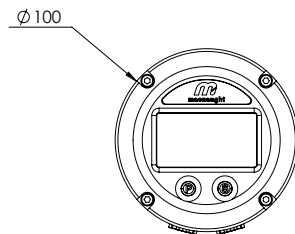
**MH006**



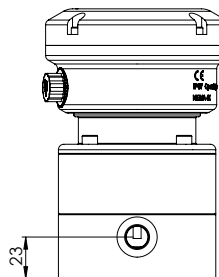
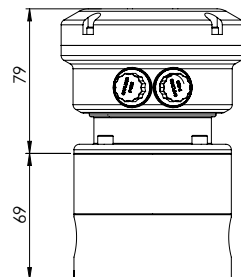
ISOMETRIC VIEW



**MH006 with DR Display**



ISOMETRIC VIEW



# M2 – 1/4” PULSE FLOW METERS

SUITABLE FOR FLOW RANGE 15-500L/HR



**F009-1S1**  
Aluminium body with flying lead



**CR009-1SA**  
PPS body with DIN variation

Macnaught 1/4” Pulse Flow Meters are a small capacity meter in the M-SERIES range. Differentiated by its flow rate capabilities. Suitable for flows between 15-500L/hr. The 1/4” Pulse Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

	F009		S009		M009		CR009	
<b>Materials of Construction</b> Meter Body	Aluminium		Aluminium		Stainless Steel		PPS	
	Rotor		Stainless Steel		Stainless Steel		PPS	
	Seals		Perfluoroelastomer (FFKM)		Perfluoroelastomer (FFKM)		Perfluoroelastomer (FFKM)	
<b>Design Specifications</b> Process Connections	1/4" G 1/4" NPT		1/4" G 1/4" NPT		1/4" G 1/4" NPT		1/4" BSP (Rc) 1/4" NPT	
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F		-40 - 80°C -40 - 176°F	
Max. Operating Pressure	800 psi 55 bar		800 psi 55 bar		800 psi 55 bar		75 psi 5 bar	
Accuracy	+/- 0.5%		+/- 0.5%		+/- 0.5%		+/- 1.0%	
Repeatability	+/- 0.03%		+/- 0.03%		+/- 0.03%		+/- 0.03%	
Nominal K-Factor	400 Pulses/L		400 Pulses/L		400 Pulses/L		400 Pulses/L	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## OUTPUTS

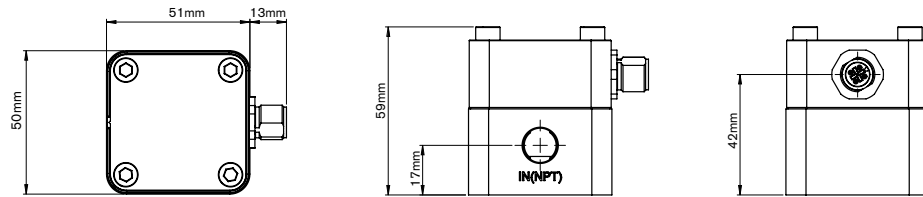
PREFIX	OUTPUT	SWITCH TYPE	F009	S009	M009	CR009
1	Pulse output	Reed/Hall Flying Lead	●	●	●	●
2	Pulse output	Reed Flying Lead	●	●	●	●
A	Pulse output	Reed/Hall DIN Connection	●	●	●	●
B	Pulse output	Reed/Reed DIN Connection	●	●	●	●

● Available    ✘ Not Available

## DIMENSIONS

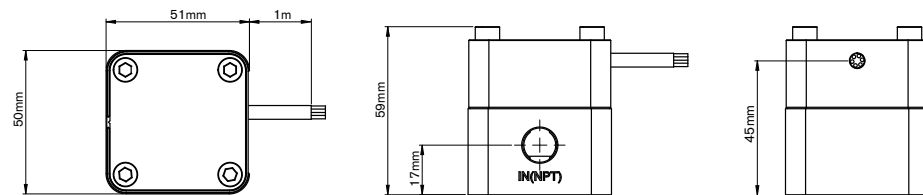
### M009/F009/S009

DIN variation



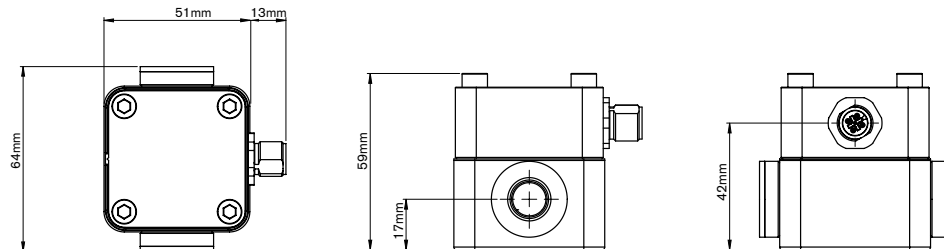
### M009/F009/S009

Flying Lead



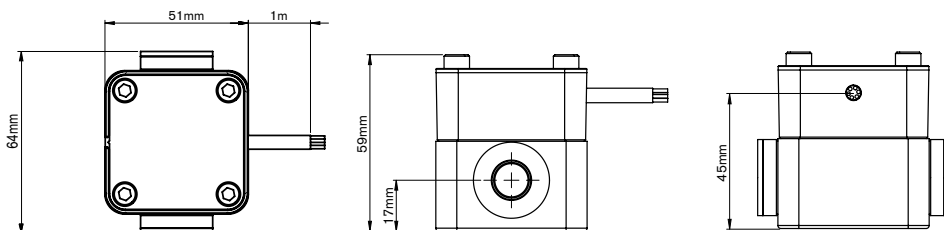
### CR009

DIN variation



### CR009

Flying Lead



# M2 – 1/4” HIGH PRESSURE FLOW METERS

SUITABLE FOR FLOW RANGE 15-500L/HR



Also available as optional accessories:



**DR**  
LCD Display (12mm)



**DRA**  
LCD Display (12mm) with outputs

## MH009-1T1

Stainless steel body with pulser cap

Macnaught 1/4” High Pressure Flow Meters are a small capacity meter in the M-SERIES range. Suitable for flows between 25-500L/hr. The 1/4” High Pressure Flow Meters are manufactured from high quality billet for enhanced material reliability with pressure ratings of up to 8000psi and have an accuracy of +/- 0.5% to provide exceptional levels of reliability and durability.

## SPECIFICATIONS

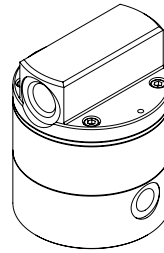
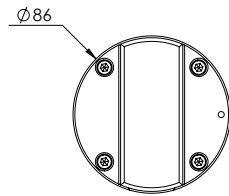
		MH009	
<b>Materials of Construction</b> Meter Body	Stainless Steel		
	Rotor	Stainless Steel	
	Seals	Perfluoroelastomer (FFKM)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1/4” G 1/4” NPT		
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 25-500L/hr 6.6-132USG/hr	<b>&gt;5cP</b> 15-500L/hr 4-132USG/hr	
	Operating Temperature Range*	-40 - 120°C -40 - 248°F	
	Max. Operating Pressure	8000 psi 557 bar	
	Accuracy	+/- 0.5%	
	Repeatability	+/- 0.03%	
	Nominal K-Factor	400 Pulses/L	
	<b>Pulse Output Options</b> Pulser Pulser	Single Hall Effect Single Reed Switch	
<b>Local Display Options</b> Type DR	LCD display (12mm)	No Outputs	
	Type DRA	LCD display (12mm)	Outputs: Scaled Pulse, 4-20mA and Hi/Lo Flow Alarm

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

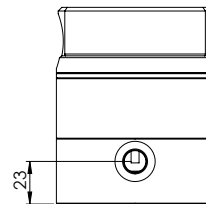
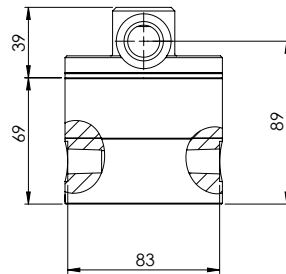


**DIMENSIONS**

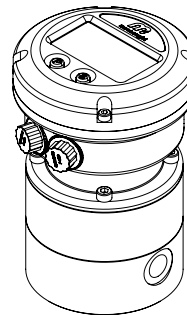
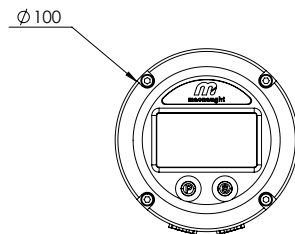
**MH009**



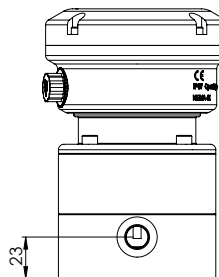
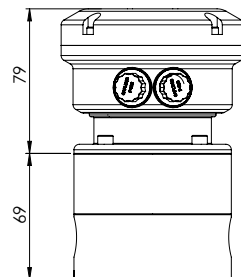
ISOMETRIC VIEW



**MH009 with DR Display**



ISOMETRIC VIEW



M-SERIES FLOW METERS

# M4 – 1/2” HIGH PRESSURE FLOW METERS

SUITABLE FOR FLOW RANGE 2-30L/MIN

Also available as optional accessories:



**DR**  
LCD Display (12mm)



**DRA**  
LCD Display (12mm) with outputs

## MH012-1T1

Stainless steel body with pulser cap

Macnaught 1/2” High Pressure Flow Meters are suitable for low to medium flow range of 2-30L/min. The 1/2” High Pressure Flow Meters are manufactured from high quality billet for enhanced material reliability with pressure ratings of up to 3000psi and have an accuracy of +/- 0.5% to provide exceptional levels of reliability and durability.

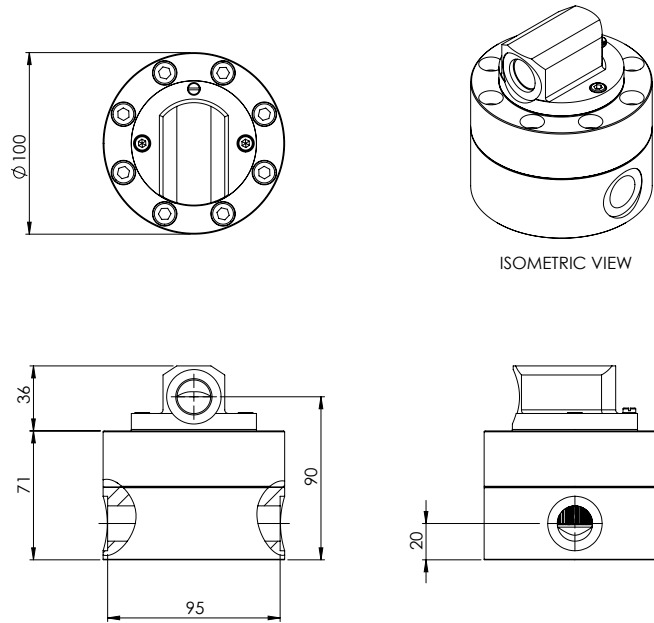
## SPECIFICATIONS

		MH012	
<b>Materials of Construction</b> Meter Body	Stainless Steel		
	Rotor	Stainless Steel PPS option	
	Seals	PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1/2” G 1/2” NPT		
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 3-25L/min 0.6-6.6USG/min	<b>&gt;5cP</b> 2-30L/min 0.5-8USG/min	
	Operating Temperature Range*	-40 - 120°C -40 - 248°F	
	Pressure	3000psi 207 Bar	
	Accuracy	+/- 1.0%	
	Repeatability	+/- 0.03	
	Nominal K-Factor	112 Pulses/L	
	<b>Pulse Output Options</b> Pulser Pulser	Dual Reed/Hall Dual Reed Switch	
<b>Local Display Options</b> Type DR	LCD display (12mm)	No Outputs	
	Type DRA	LCD display (12mm)	Outputs: Scaled Pulse, 4-20mA and Hi/Lo Flow Alarm

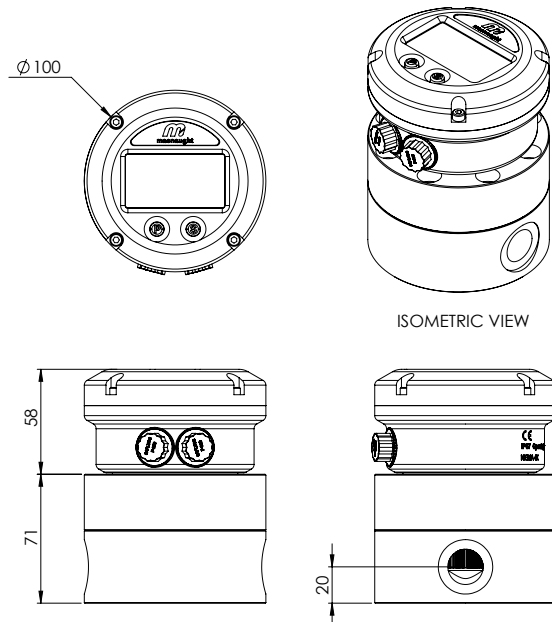
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## DIMENSIONS

### MH012



### MH012 with DR Display



# M4 – 1/2” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 2-30L/MIN



Output variations:



**Type 3**  
Standard Mechanical Display



**Type 4**  
Heavy Duty Mechanical Display

## F012-1S3

Aluminium body with standard mechanical display

Designed and built to suit a broad range of industrial applications, the Macnaught 1/2” Mechanical Meters are suitable for flows between 2-30L/min. The 1/2” Mechanical Meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

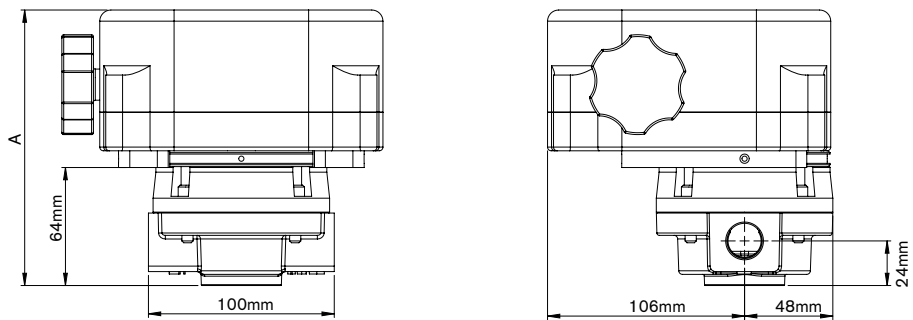
## SPECIFICATIONS

	F012	M012
<b>Materials of Construction</b> Meter Body	Cast Aluminium	Cast Stainless Steel
Rotor	PPS	PPS Stainless Steel
Seals	Fluorocarbon (FKM)	PTFE encapsulated (FEP)
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1/2” G 1/2” NPT	<b>Threaded</b> 1/2” G 1/2” NPT
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 3-25L/min 0.6-6.6USG/min	<b>&lt;5cP</b> 3-25L/min 0.6-6.6USG/min
Max. Operating Temperature*	-40 - 80°C -40 - 176°F	-40 - 80°C -40 - 176°F
Max. Operating Pressure	500 psi 35 bar	500psi 35 bar
Accuracy	+/- 1.0%	+/- 1.0%
Repeatability	+/- 0.03%	+/-0.03%
<b>Mechanical Display</b> Type 3 - Standard	Polypropylene (IP56)	Polypropylene (IP56)
Type 4 - Heavy Duty	Aluminium (IP67)	Aluminium (IP67)

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

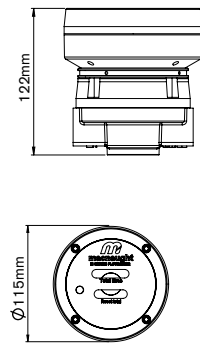
## DIMENSIONS

F012  
M012

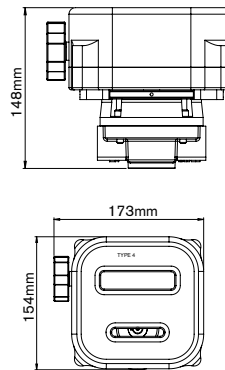


DISPLAY HEIGHT - A

TYPE 3  
MECHANICAL REGISTER - STANDARD



TYPE 4  
MECHANICAL REGISTER - HEAVY DUTY



# M7 – 1" PULSE FLOW METERS

SUITABLE FOR FLOW RANGE 3-80L/MIN



**CR025-2S1**  
PPS body with pulser cap

Also available as optional accessories:



**DR**  
LCD Display (12mm)  
**DRA**  
LCD Display (12mm) with outputs



**ER**  
LCD Display (17mm)  
**ERA**  
LCD Display (17mm) with outputs  
**ERB**  
LCD Display (17mm) with batch control output

The Macnaught 1" Pulse Flow Meters are specialised meters suitable for aggressive chemicals and water based products. Suitable for flows between 3-80L/min. The 1" Pulse Flow Meters have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

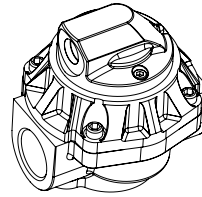
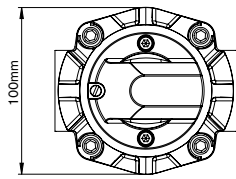
## SPECIFICATIONS

		CR025	
<b>Materials of Construction</b> Meter Body	PPS		
	Rotor	PPS	
	Seals	PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1" BSP (Rc) 1" NPT		
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 8-70L/min 2-18.5 USG/min	<b>&gt;5cP</b> 3-80L/min 0.8-21 USG/min	
	Operating Temperature Range*	-40 - 80°C -40-176°F	
	Max. Operating Pressure	150 psi 10 Bar	
	Accuracy	+/- 0.5%	
	Repeatability	+/- 0.03%	
	Nominal K-Factor	52 Pulses/L	
	<b>Pulse Output Options</b> Pulser Pulser	Reed/Hall Effect Reed/Reed Switch Dual Hall	
<b>Local Display Options</b> Type DR	LCD display (12mm)	No Outputs	
	Type DRA	LCD display (12mm)	Outputs: Scaled Pulse, 4-20mA and Hi/Lo Flow Alarm

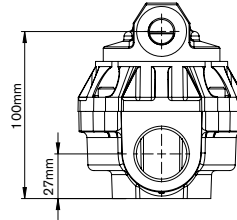
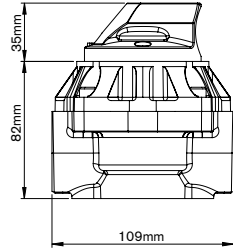
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

## DIMENSIONS

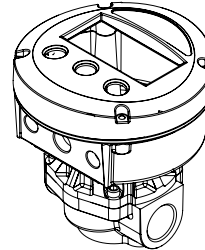
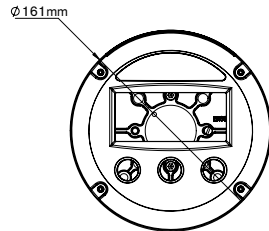
**CR025**



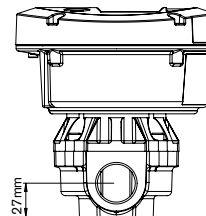
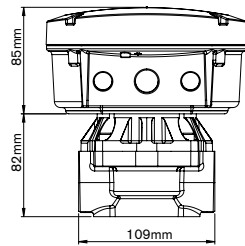
ISOMETRIC VIEW



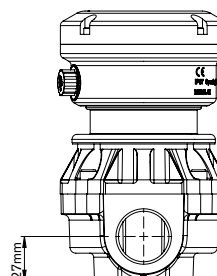
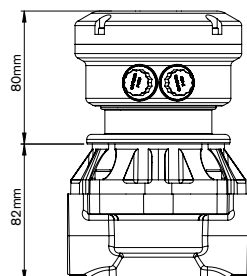
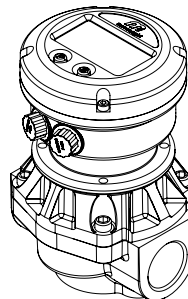
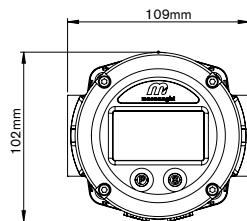
**CR025 with ER Display**



ISOMETRIC VIEW



**CR025 with DR Display**



# M7 – 1” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 14-70L/MIN



## WM7RRP-1

PPS body with pulser cap

The Macnaught 1” Custody Transfer meters are specialised meters suitable for aggressive chemicals and water based products. Suitable for flows between 14-70L/min. The 1” Pulse Flow Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

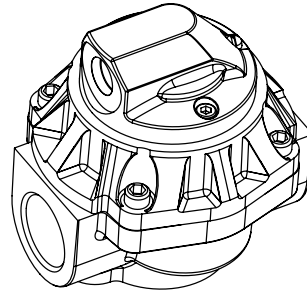
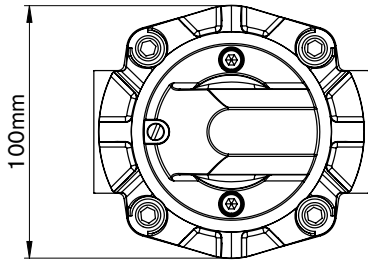
		WM7
<b>Materials of Construction</b> Meter Body	PPS	
	Rotor	PPS
	Seals	Fluorocarbon (FKM)
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1” BSP Rc 1” NPT	
<b>Technical Specifications</b> Flow rate	14-70L/min 3.6-19.8USG/min	
Operating Temperature Range*	-40 - 80°C -40 - 176°F	
Max. Operating Pressure	150psi 10 Bar	
Accuracy	+/- 0.5%	
Repeatability	+/- 0.03%	
Nominal K-Factor	52 Pulses/L	
<b>Pulse Output Options</b> Pulser Pulser Pulser	Dual Hall Effect Dual Reed Reed/Hall Effect	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

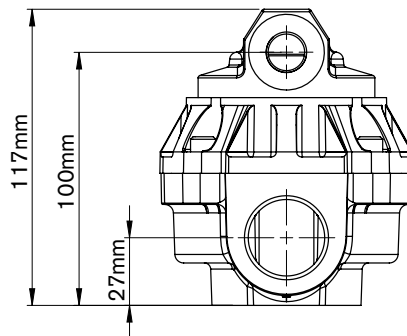
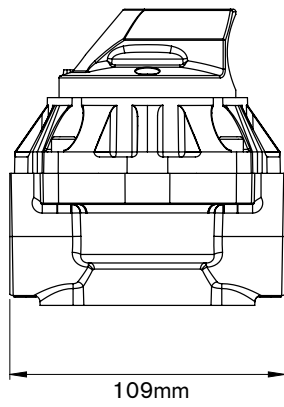


## DIMENSIONS

WM7



ISOMETRIC VIEW



# M10 – 1” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 6-120L/MIN



Output variations:



**Type 3**  
Standard Mechanical Display



**Type 4**  
Heavy Duty Mechanical Display

## F025-1S3

Aluminium body with standard mechanical display

Designed and built to suit a broad range of industrial applications, the Macnaught 1” Mechanical Meters are suitable for flows between 6-120L/min. The 1” mechanical meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

## SPECIFICATIONS

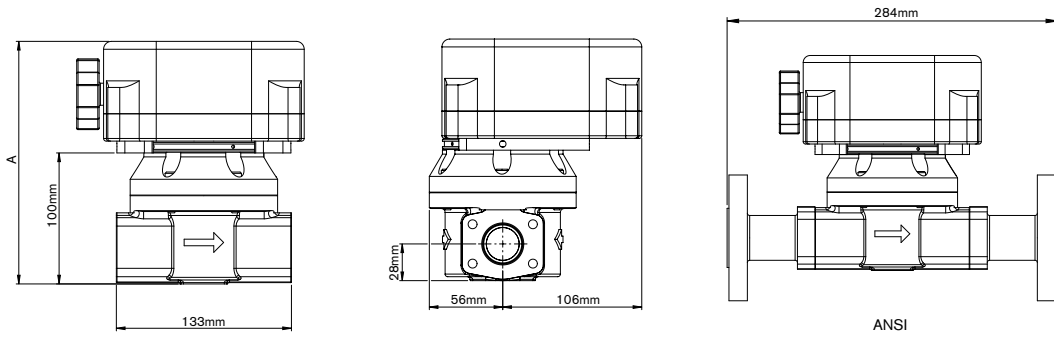
	F025		M025		S025	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel		Cast Aluminium	
	Rotor		PPS Stainless Steel		Stainless Steel	
	Seals		Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	1” G 1” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1” G 1” NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1” G 1” NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min	10-100L/min 2.6-26USG/min	6-120L/min 1.6-32USG/min
	Operating Temperature Range*		-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F	
	Max. Operating Pressure**		500 psi 35 Bar		500 psi 35 Bar	
	Accuracy		+/- 1.0%		+/- 1.0%	
	Repeatability		+/- 0.03%		+/- 0.03%	
<b>Mechanical Display</b>	Type 3 - Standard		Polypropylene (IP56)		Polypropylene (IP56)	
	Type 4 - Heavy Duty		Aluminium (IP67)		Aluminium (IP67)	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

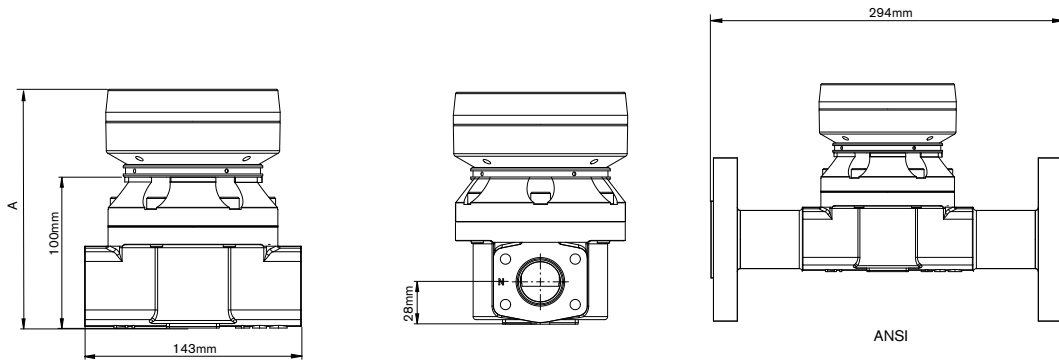
\*\*Pressure subject to change as per flange rating

## DIMENSIONS

F025  
S025

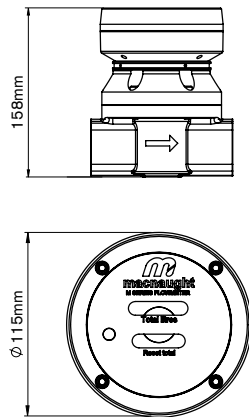


M025

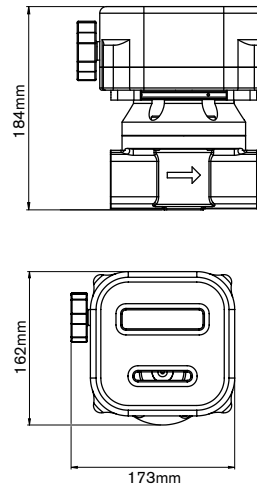


DISPLAY HEIGHT - A

TYPE 3  
MECHANICAL REGISTER - STANDARD



TYPE 4  
MECHANICAL REGISTER - HEAVY DUTY



# M10 – 1” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 24-120L/MIN



## WM10SSP-1

Stainless steel body with pulser cap

The 1” Custody Transfer Meters are the medium capacity meter in the M-SERIES range. Suitable for flows between 24-120L/min. The 1” Custody Transfer Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability. It has ability to handle a wide range of fluid viscosities with exceptional levels of repeatability and durability.

## SPECIFICATIONS

	WM10AR		WM10SS	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel	
	Rotor PPS		Stainless Steel	
	Seals Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1” G 1” NPT	<b>Flange</b> ANSI CLASS 150	<b>Threaded</b> 1” G 1” NPT	<b>Flange</b> ANSI CLASS 150
<b>Technical Specifications</b>				
Flow rate	24-120L/min 6.3-31.7USG/min		24-120L/min 6.3-31.7USG/min	
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	1000 psi 69 Bar		1200 psi 83 Bar	
Accuracy	+/- 0.5%		+/- 0.5%	
Repeatability	+/- 0.03%		+/- 0.03%	
Nominal K-Factor	36 Pulses/L		36 Pulses/L	
<b>Pulse Output Options*</b> Pulser	Dual Reed switch Dual Hall switch		Dual Reed switch Dual Hall switch	

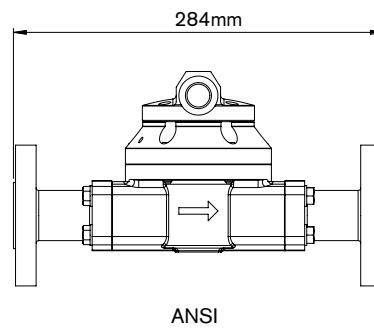
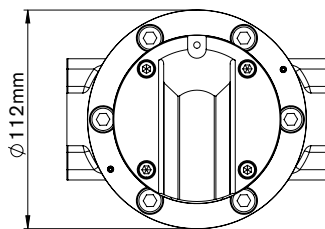
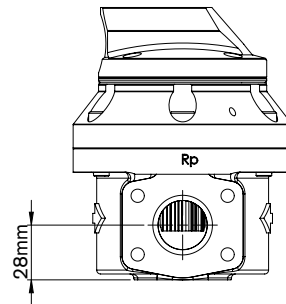
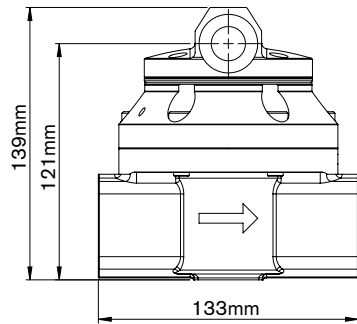
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\*Pressure subject to change as per flange rating

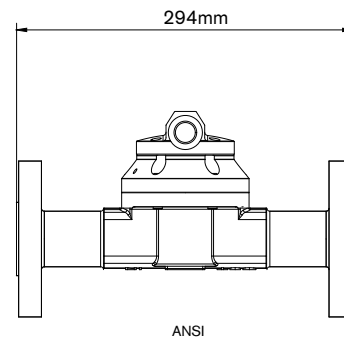
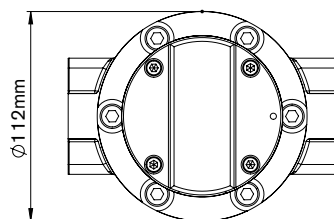
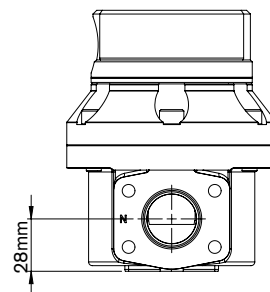
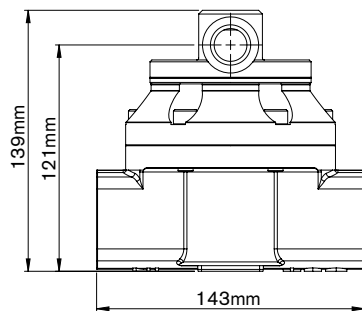
\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information

**DIMENSIONS**

**WM10AR**



**WM10SS**



# M40 – 1 1/2” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 10-250L/MIN



Output variations:



**Type 3**  
Standard Mechanical Display



**Type 4**  
Heavy Duty Mechanical Display

## F040-1S3

Aluminium body with standard mechanical display

Designed and built to suit a broad range of industrial applications, the Macnaught 1 1/2” Mechanical Meters are suitable for flows between 10-250L/min. The 1 1/2” Mechanical Meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

## SPECIFICATIONS

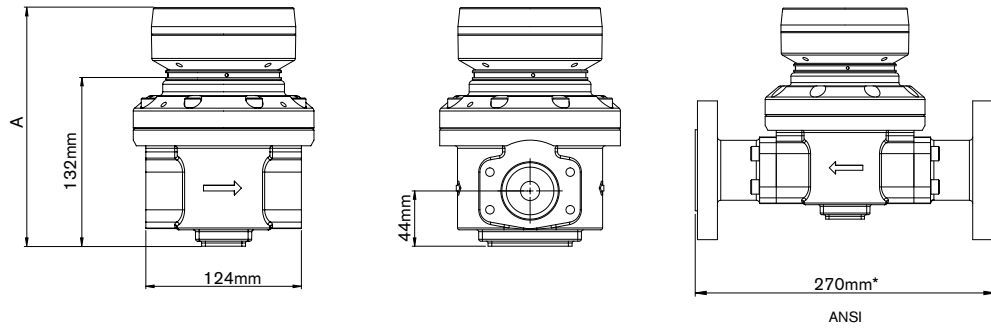
	F040		M040		S040	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel		Cast Aluminium	
	Rotor		PPS Stainless Steel		Aluminium Stainless Steel	
	Seals		PTFE encapsulated (FEP)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	1 1/2" G 1 1/2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1 1/2" G 1 1/2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	1 1/2" G 1 1/2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	15-235L/min 4-62USG/min	10-250L/min 2.6-66 USG/min	15-235L/min 4-62USG/min	10-250L/min 2.6-66 USG/min	15-235L/min 4-62USG/min	10-250L/min 2.6-66 USG/min
	Operating Temperature Range*		-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F	
	Max. Operating Pressure**		500 psi 35 Bar		500 psi 35 Bar	
	Accuracy		+/- 1.0%		+/- 1.0%	
	Repeatability		+/- 0.03%		+/- 0.03%	
<b>Mechanical Display</b>	Type 3 - Standard		Polypropylene (IP56)		Polypropylene (IP56)	
	Type 4 - Heavy Duty		Aluminium (IP67)		Aluminium (IP67)	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\*Pressure subject to change as per flange rating

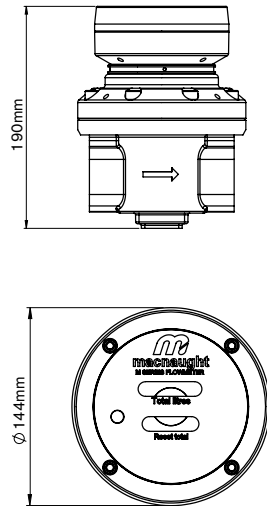
## DIMENSIONS

F040  
M040  
S040

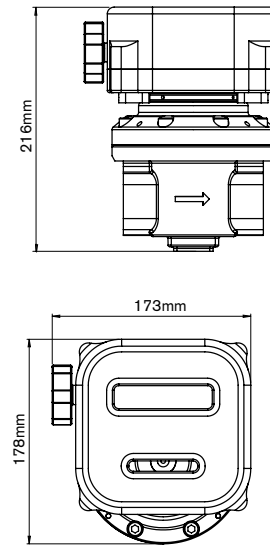


DISPLAY HEIGHT - A

TYPE 3  
MECHANICAL REGISTER - STANDARD



TYPE 4  
MECHANICAL REGISTER - HEAVY DUTY



\*Length subject to change refer to appendix B (pg. 89) for full dimension variations

# M40 – 1 1/2” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 50-250L/MIN



**WM40AR**  
Aluminium body with pulser cap



**WM40SS**  
Stainless steel body with pulser cap

The 1 1/2” Custody Transfer Meters are the medium to large capacity meter in the M-SERIES range. Suitable for flows between 50-250L/min. The 1 1/2” Custody Transfer Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability. It has ability to handle a wide range of fluid viscosities with exceptional levels of repeatability and durability.

## SPECIFICATIONS

	WM40AR		WM40SS	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel	
Rotor	PPS		Stainless Steel	
Seals	Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 1 1/2” G 1 1/2” NPT	<b>Flange</b> ANSI CLASS 150	<b>Threaded</b> 1 1/2” G 1 1/2” NPT	<b>Flange</b> ANSI CLASS 150
<b>Technical Specifications</b> Flow rate	50-250L/min 13-66USG/min		50-250L/min 13-66USG/min	
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	800 psi 55 Bar		1000 psi 69 Bar	
Accuracy	+/- 0.5%		+/- 0.5%	
Repeatability	+/- 0.03%		+/- 0.03%	
Nominal K-Factor	14.5 Pulses/L		14.5 Pulses/L	
<b>Pulse Output Options</b> Pulser Pulser	Dual Reed switch Dual Hall Switch		Dual Reed switch Dual Hall Switch	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

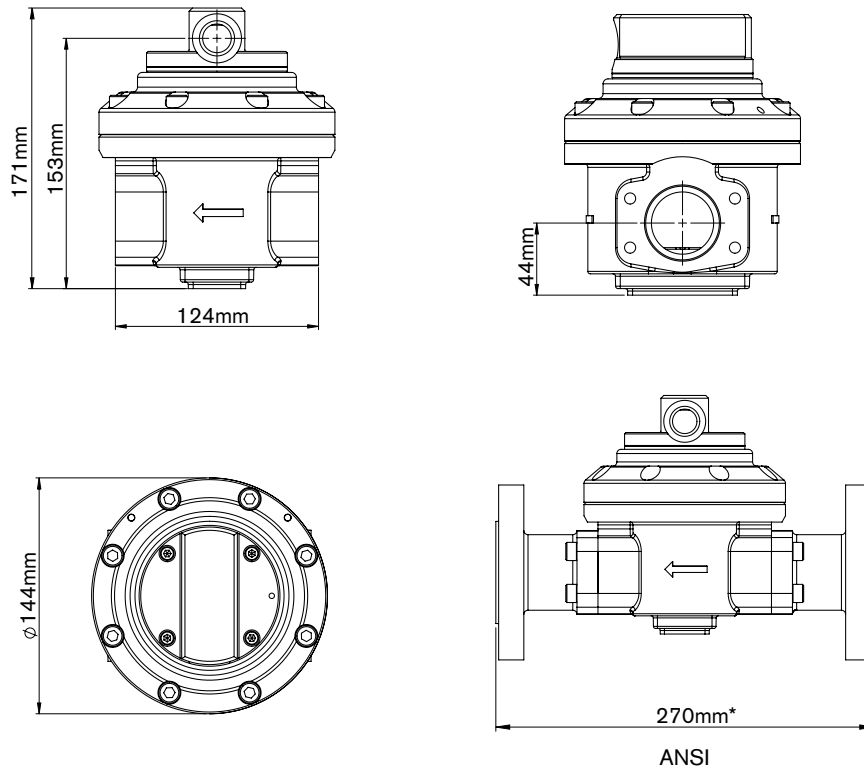
\*\*Pressure subject to change as per flange rating

\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information



## DIMENSIONS

WM40AR  
WM40SS



\*Length subject to change refer to appendix B (pg. 89) for full dimension variations  
Refer to appendix B (pg. 92) for dimensions of air eliminators

# M50 – 2” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 15-500L/MIN



Output variations:



**Type 3**  
Standard Mechanical Display



**Type 4**  
Heavy Duty Mechanical Display

## F050-1S3

Aluminium body with standard mechanical display and BSP thread adaptors

Designed and built to suit a broad range of industrial applications, the Macnaught 2” Mechanical Meters are suitable for flows between 15-500L/min. The 2” Mechanical Meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

## SPECIFICATIONS

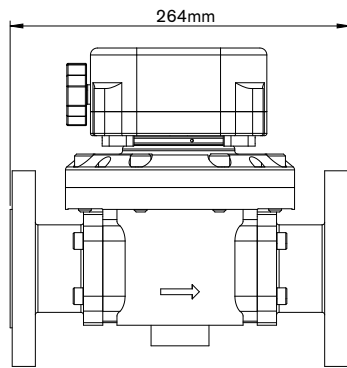
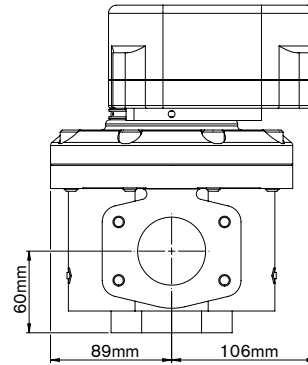
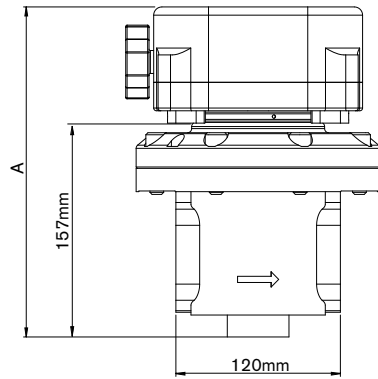
	F050		M050		S050	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel		Cast Aluminium	
	Rotor		PPS Stainless Steel		Stainless Steel Aluminium	
	Seals		Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>	<b>Threaded</b>	<b>Flange</b>
	2" G 2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	2" G 2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k	2" G 2" NPT	ANSI CLASS 150 DIN PN16 JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>	<b>&lt;5cP</b>	<b>&gt;5cP</b>
	15-500L/min 4-130USG/min	15-500L/min 4-130USG/min	15-500L/min 4-130USG/min	15-500L/min 4-130USG/min	15-500L/min 4-130USG/min	15-500L/min 4-130USG/min
Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	500psi 35 Bar		500psi 35 Bar		500psi 35 Bar	
Accuracy	+/- 1.0%		+/- 1.0%		+/- 1.0%	
Repeatability	+/- 0.03%		+/- 0.03%		+/- 0.03%	
<b>Mechanical Display</b>	Type 3 - Standard		Polypropylene (IP56)		Polypropylene (IP56)	
	Type 4 - Heavy Duty		Aluminium (IP67)		Aluminium (IP67)	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

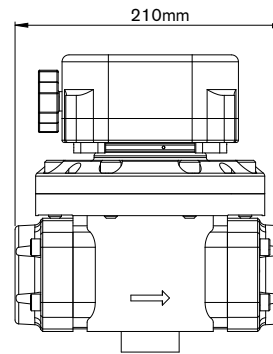
\*\*Pressure subject to change as per flange rating

## DIMENSIONS

F050  
M050  
S050



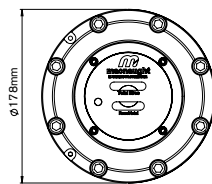
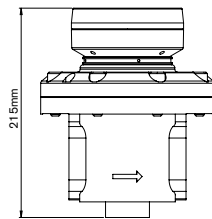
ANSI/DIN/JIS



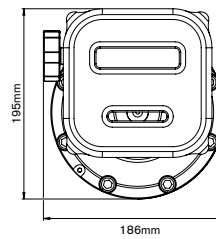
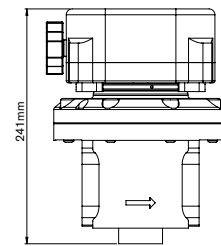
G/NPT

### DISPLAY HEIGHT - A

TYPE 3  
MECHANICAL REGISTER - STANDARD



TYPE 4  
MECHANICAL REGISTER - HEAVY DUTY



# M50 – 2” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 70-350L/MIN



### WM50AR

Aluminium body with pulser cap and BSP thread adaptors



### WM50SS

Stainless steel body with pulser cap and ANSI flanges

The 2” Custody Transfer Meters are the large capacity meter in the M-SERIES range. Suitable for flows between 70-350L/min. The 2” Custody Transfer Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability. It has ability to handle a wide range of fluid viscosities with exceptional levels of repeatability and durability.

## SPECIFICATIONS

	WM50AR		WM50SS	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Stainless Steel	
	PPS		Stainless Steel	
	Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 2” G 2” NPT	<b>Flange</b> ANSI CLASS 150	<b>Threaded</b> 2” G 2” NPT	<b>Flange</b> ANSI CLASS 150
<b>Technical Specifications</b> Flow rate	70-350L/min 18-92.4USG/min		70-350L/min 18-92.4USG/min	
	Operating Temperature Range*	-40 - 80°C -40 - 176°F		-40 - 120°C -40 - 248°F
	Max. Operating Pressure**	800 psi 55 Bar		800 psi 55 Bar
	Accuracy	+/- 0.5%		+/- 0.5%
	Repeatability	+/- 0.03%		+/- 0.03%
	Nominal K-Factor	6.68 Pulses/L		6.68 Pulses/L
<b>Pulse Output Options*</b>	Dual Reed Switch		Dual Reed Switch	
	Pulsar		Dual Hall Switch	
	Dual Hall Switch		Encoder	
	Pulsar			

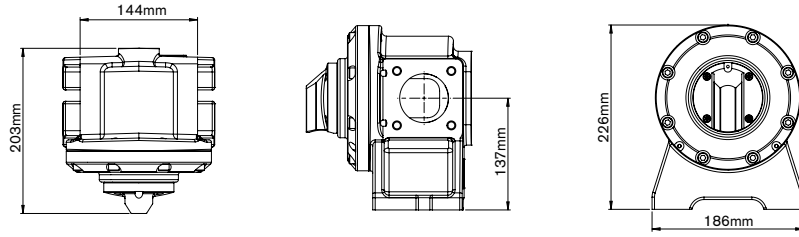
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\*Pressure subject to change as per flange rating

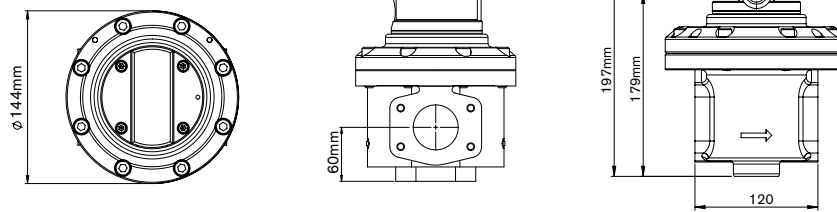
\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information

## DIMENSIONS

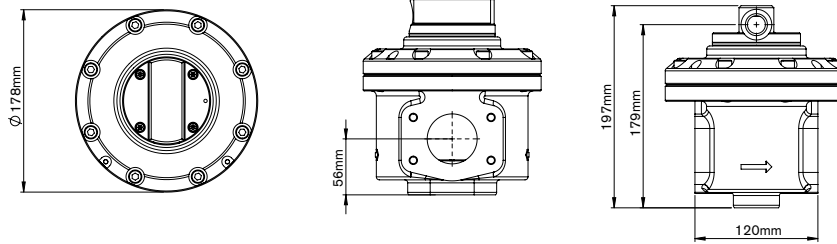
### WM50ARP Foot Mount Option



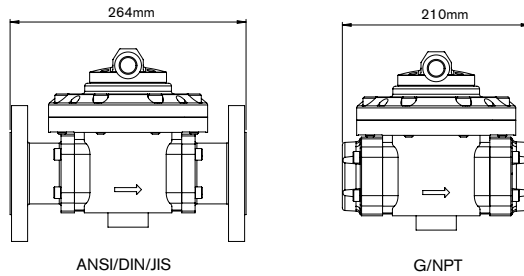
### WM50ARP



### WM50SSP



### Flange Connections



# M80 – 3” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 20-733L/MIN

Output variations:



**Type 4**  
Heavy Duty Mechanical Display



## F075-1S4

Aluminium body with heavy duty mechanical display and ANSI flanges

Designed and built to suit a broad range of industrial applications, the Macnaught 3” Mechanical Meters are suitable for flows between 20-733L/min. The 3” Mechanical Meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

## SPECIFICATIONS

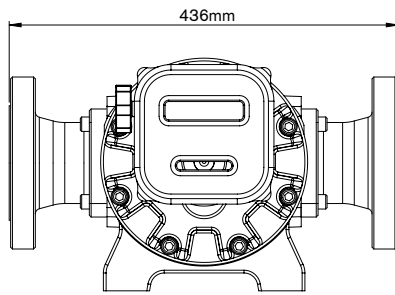
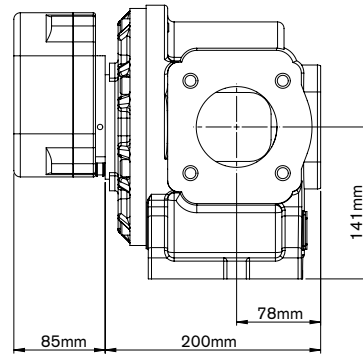
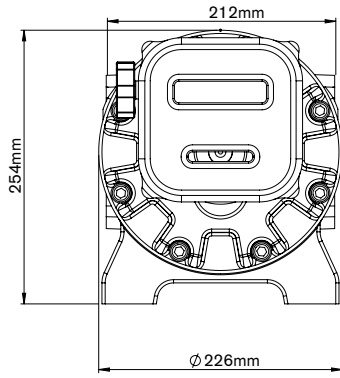
	F075		S075	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Aluminium	
	Rotor Aluminium		Aluminium	
	Seals Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> ANSI CLASS 150 DIN PN16 JIS 10k
	<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 60-600L/min 17-170USG/min	<b>&gt;5cP</b> 20-733L/min 5-194USG/min	<b>&lt;5cP</b> 60-600L/min 17-170USG/min
Operating Temperature Range*	-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	175 psi 12 Bar		175 psi 12 Bar	
Accuracy	+/- 1.0%		+/- 1.0%	
Repeatability	+/- 0.03%		+/- 0.03%	
<b>Pulse Output Options</b> Type 4 - Heavy Duty	Aluminium (IP67)		Aluminium (IP67)	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

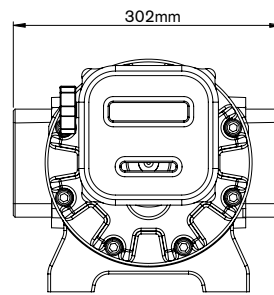
\*\*Pressure subject to change as per flange rating

**DIMENSIONS**

F075  
S075



ANSI/DIN/JIS



G/NPT

# M80 – 3” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 140-700L/MIN



## WM80AAP-3

Aluminium body with pulser cap and ANSI flanges

The 3” Custody Transfer Meters are the large capacity meter in the M-SERIES range. Suitable for flows between 140-700L/min. The 3” Custody Transfer Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability. It has ability to handle a wide range of fluid viscosities with exceptional levels of repeatability and durability.

## SPECIFICATIONS

		WM80AA		
<b>Materials of Construction</b> Meter Body	Cast Aluminium			
	Aluminium			
	Fluorocarbon (FKM)			
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	3” G	<b>Flange</b>	
		3” NPT	ANSI CLASS 150	
<b>Technical Specifications</b> Flow rate	140-700L/min			
	36.9-184.9USG/min			
	Operating Temperature Range*	-40 - 120°C		
		-40 - 248°F		
	Max. Operating Pressure**	175psi		
		12 Bar		
	Accuracy	+/- 0.5%		
Repeatability	+/- 0.03%			
Nominal K-Factor	2.58 Pulses/L			
<b>Pulse Output Options*</b>	Pulser	Dual Reed switch		
	Pulser	Dual Hall switch		
	Pulsar	Encoder		

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

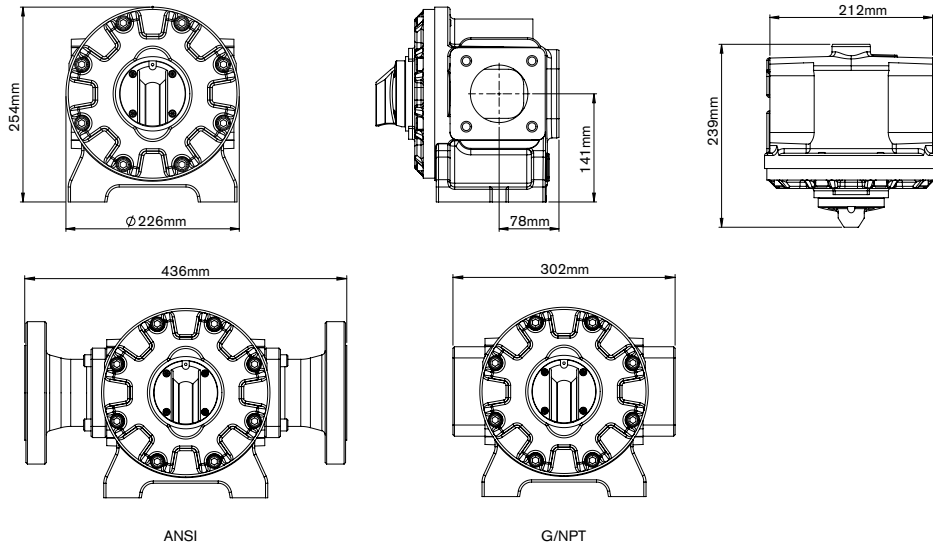
\*\*Pressure subject to change as per flange rating

\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information



## DIMENSIONS

### WM80AAP-3



# M100 – 4” MECHANICAL METERS

SUITABLE FOR FLOW RANGE 120-1200L/MIN



Output variations:



**Type 4**  
Heavy Duty Mechanical Display

## F100-1S4

Aluminium body with heavy duty mechanical display with ANSI flanges

Designed and built to suit a broad range of industrial applications, the Macnaught 4” Mechanical Meters are suitable for flows between 120-1200L/min. Suitable for fuels, lubricants and non-corrosive fluids of up to a viscosity of 1000cP. The 4” Mechanical Meters have an accuracy of +/- 1.0% and provides exceptional levels of reliability and durability. These meters are an ideal solution for remote sites or where ease of installation, accuracy and reliability are the priority.

## SPECIFICATIONS

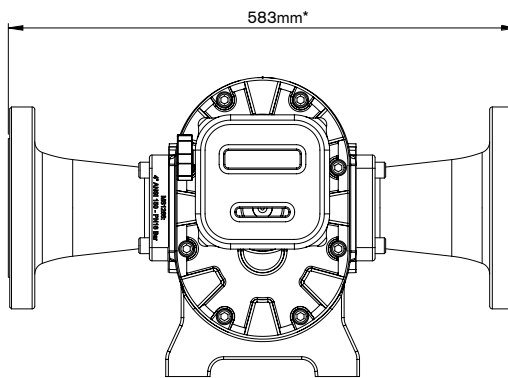
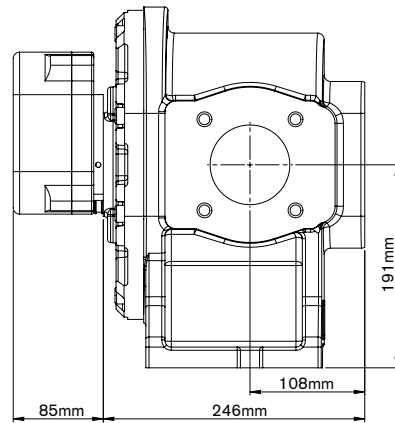
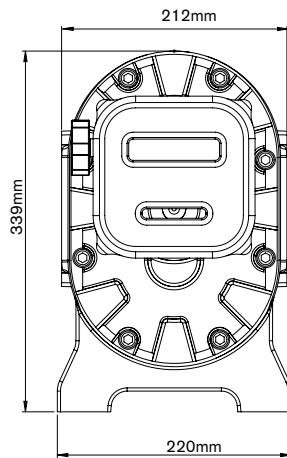
	F100		S100	
<b>Materials of Construction</b> Meter Body	Cast Aluminium		Cast Aluminium	
Rotor	Aluminium		Aluminium	
Seals	Fluorocarbon (FKM)		PTFE encapsulated (FEP)	
<b>Design Specifications</b> Process Connections	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> 4” ANSI CLASS 150 4” DIN PN16 4” JIS 10k	<b>Threaded</b> 3” G 3” NPT	<b>Flange</b> 4” ANSI CLASS 150 4” DIN PN16 4” JIS 10k
<b>Technical Specifications</b> Flow rate	<b>&lt;5cP</b> 220-1000L/min 60-250USG/min	<b>&gt;5cP</b> 120-1200L/min 31.7-317USG/min	<b>&lt;5cP</b> 220-1000L/min 60-250USG/min	<b>&gt;5cP</b> 120-1200L/min 31.7-317USG/min
Operating Temperature Range*	-40 - 120°C -40 - 248°F		-40 - 120°C -40 - 248°F	
Max. Operating Pressure**	175 psi 12 Bar		175 psi 12 Bar	
Accuracy	+/- 1.0%		+/- 1.0%	
Repeatability	+/- 0.03%		+/- 0.03%	
<b>Pulse Output Options</b> Type 4 - Heavy Duty	Aluminium (IP67)		Aluminium (IP67)	

\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

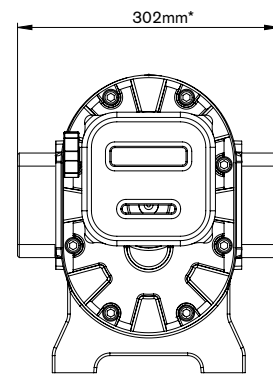
\*\*Pressure subject to change as per flange rating

## DIMENSIONS

F100-1S4  
S100-1S4



ANSI/DIN/JIS



G/NPT

\*Length subject to change refer to appendix B (pg. 89) for full dimension variations  
Refer to appendix B (pg. 90) for dimensions of air eliminators

# M100 – 4” CUSTODY TRANSFER METERS

SUITABLE FOR FLOW RANGE 240-1200L/MIN



## WM100AAP-3

Aluminium Body with Pulsar Cap with Flanges

The 4” Custody Transfer Meters are the large capacity meter in the M-SERIES range. Suitable for flows between 240-1200L/min. Suitable for fuels, lubricants and corrosive fluids (stainless steel only) of up to a viscosity of 1000cP. The 4” Custody Transfer Meters are NMI approved and have an accuracy of +/- 0.5% and provides exceptional levels of reliability and durability.

## SPECIFICATIONS

		WM100AA
<b>Materials of Construction</b> Meter Body	Cast Aluminium	
	Rotor	Aluminium
	Seals	Fluorocarbon (FKM)
<b>Design Specifications</b> Process Connections	<b>Threaded</b>	<b>Flange</b>
	3” G 3” NPT	4” ANSI CLASS 150
<b>Technical Specifications</b> Flow rate	240-1200L/min 63.4-317USG/min	
	Operating Temperature Range*	-40 - 120°C -40-248°F
	Max. Operating Pressure**	175 psi 12 Bar
	Accuracy	+/- 0.5%
	Repeatability	+/- 0.03%
	Nominal K-Factor	2.3 Pulses/L
<b>Pulse Output Options</b>	Pulsar	Dual Reed switch
	Pulsar	Dual Hall switch
	Pulsar	Encoder

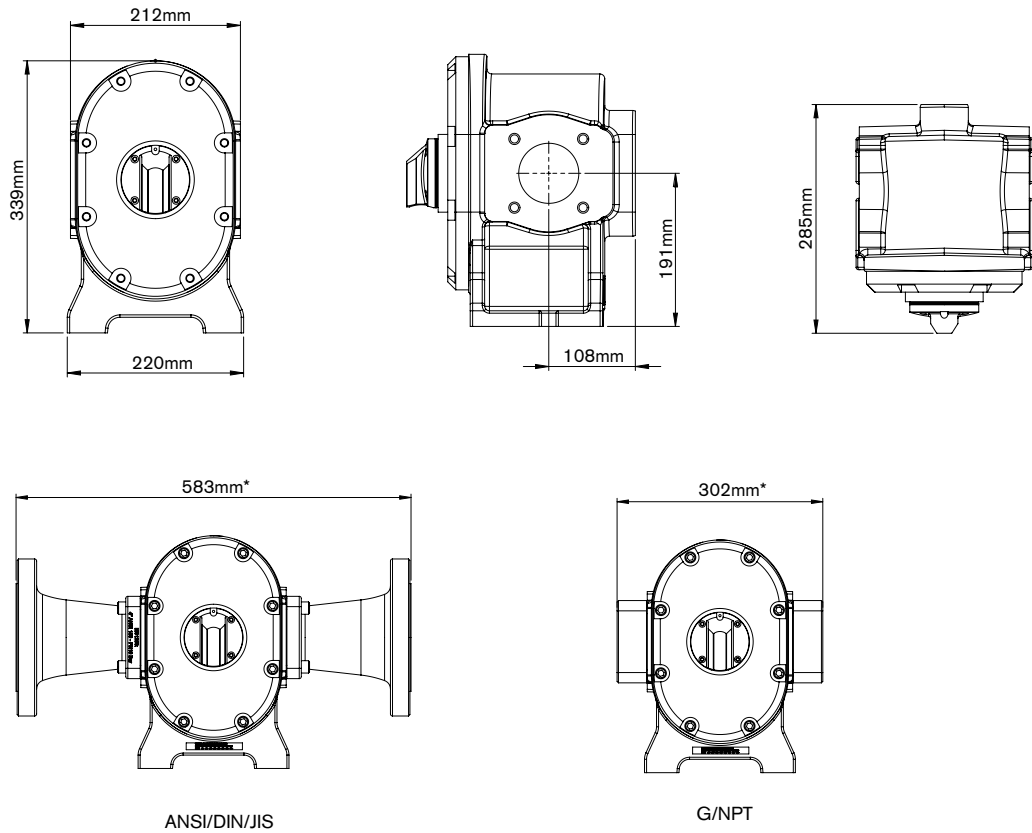
\*Temperature based on standard pulse output - subject to change dependant on rotor and output type, contact Macnaught technical support for further investigations

\*\*Pressure subject to change as per flange rating

\*Additional output options also available as accessories. Contact Macnaught Technical Support Team for more information

## DIMENSIONS

### WM100AAP-3



ANSI/DIN/JIS

G/NPT

\*Length subject to change refer to appendix B (pg. 89) for full dimension variations  
Refer to appendix B (pg. 90) for dimensions of air eliminators



# ACCESSORIES



# ACCESSORIES

## PULSER MODULES

The Pulsar Output Options are designed to complement the MX Blind meters series. These options provide the flexibility to apply a style of housing that best satisfies the application requirements.



	TYPE A STANDARD PULSE*	TYPE B INTRINSICALLY SAFE	TYPE N INTRINSICALLY SAFE	TYPE T HIGH TEMP. PULSE RATURE
Switch Type	Reed/Hall Effect	NPN open collector	NAMUR	NPN open collector
Construction	PP (polypropylene)	Stainless Steel	Cuzn, Chrome plated	Stainless Steel
IP rating	IP67	IP67	IP67	IP67
Max temp	120°C (248°F)	85°C (185°F)	85°C (185°F)	150°C (302°F)
Intrinsically safe	✗	✓	✓	✗
Approvals	✗	ATEX, CSA, FM II I G Ex ia IIC T6	ATEX, IECEx II G Ex ia IIC T4..T6 Ga II 1 D Ex ia IIIC T115OC Da	✗

\*Options of lengths: 1m, 5m and 10m

## PULSER MODULE OPTIONS

Macnaught offer a range of Pulsar modules to suit a wide variety of industrial flow metering needs. Incorporating Reed and NPN Open Collector switching technology and locking mechanism to facilitate simple integration into any logging and control system.



	DIN COMPACT			INDUSTRIAL PULSER CAP	
Output	Pulsar			Pulsar	
Cable connection	(M12) DIN socket			M20 or 1/2" NPT	
Switch Type	Reed/Hall Effect Dual Reed Switch Dual Hall Effect			Reed/Hall Effect Dual Reed Switch	
Construction	PP (polypropylene)			Aluminium or Stainless Steel	
IP rating	IP67			IP67	
Max temp	120°C (248°F)			120°C (248°F)	
Part number	Hall/Hall Switch MXD-HH	Reed/Reed Switch MXD-RR	Reed/Hall Switch MXD-RH	Aluminium MXD-ACM-1 (Reed/Hall) MXD-ACM-2 (Reed/Reed) MXD-ACN-1 (Reed/Hall) MXD-ACN-2 (Reed/Reed)	Stainless Steel MXD-SCM-1 (Reed/Hall)



## PR DIGITAL DISPLAY SERIES (12MM DIGIT)

The PR Series is a fully programmable 12mm LCD Digital Register displaying Flow Rate, Accumulated (Non-resettable) and Batch (Resettable) Totals. The output options available include 4-20mA output, scaled pulse output and a Hi/Lo Flow Alarm. Rated at IP67, the UV resistant glass reinforced polypropylene housing makes the PR Series suitable for both indoor and outdoor use in light-medium duty industrial applications. The PR display is also available in both Meter Mount and Remote Mount version



METER MOUNT	TYPE D PR DISPLAY	TYPE E PRA DISPLAY
<b>Description</b>	Liquid Crystal Display	Liquid Crystal Display with outputs
<b>Construction</b>	PP (polypropylene)	PP (polypropylene)
<b>Wall mount option</b>	PR-WM	PRA-WM
<b>IP rating</b>	IP67	IP67
<b>Max temp</b>	60°C (140°F)	60°C (140°F)
<b>Display</b> Digit size (upper/lower)	12mm/8mm	12mm/8mm
Accumulated total	✓	✓
Resettable total	✓	✓
Preset total	✗	✗
Flow rate	✓	✓
<b>Outputs</b> 4-20 mA (passive)	✗	✓
Pulse/Transistor Output	✗	✓
Flow Alarm	✗	✓
Batch Control output	✗	✗

## DR DIGITAL DISPLAY SERIES (12MM DIGIT)



METER MOUNT	DR	DRA
<b>Description</b>	Reflective, UV resistant numeric and alphanumeric LCD	Reflective, UV resistant numeric and alphanumeric LCD
<b>Construction</b>	Aluminium exterior with polycarbonate windows	Aluminium exterior with polycarbonate windows
<b>Wall mount option</b>	DR-WM	DRA-WM
<b>IP rating</b>	IP67	IP67
<b>Max temp</b>	60°C (140°F)	60°C (140°F)
<b>Display</b> Digit size (upper/lower)	12mm/8mm	12mm/8mm
Accumulated total	✓	✓
Resettable total	✓	✓
Preset total	✗	✗
Flow rate	✓	✓
<b>Outputs</b> 4-20 mA (passive)	✗	✓
Pulse/Transistor Output	✗	✓
Flow Alarm	✗	✓
Batch Control output	✗	✗

# ACCESSORIES

## ER DIGITAL DISPLAY SERIES (17MM DIGIT)

The ER Series is a fully programmable 17mm LCD Digital Register displaying Flow Rate, Accumulated (Non-resettable) and Batch (Resettable) Totals. The output options available include 4-20mA and scaled pulse output. Rated at IP67, the robust Aluminium housing makes the ER Series suitable for both indoor and outdoor use in heavy duty industrial applications. The ER display is also available in both Meter Mount (Aluminium) and Remote Mount (Aluminium or plastic) versions.



METER MOUNT	TYPE F ER DISPLAY	TYPE G ERA DISPLAY	TYPE H ERB DISPLAY
<b>Description</b>	Liquid Crystal Display	Liquid Crystal Display with outputs	Single stage Batch Controller
<b>Construction</b>	Aluminium	Aluminium	Aluminium
<b>IP rating</b>	IP67	IP67	IP67
<b>Max temp</b>	120°C (248°F)	80°C (176°F)	80°C (176°F)
<b>Display</b>			
Digit size (upper/lower)	17mm/8mm	17mm/8mm	17mm/8mm
Accumulated total	✓	✓	✓
Resettable total	✓	✓	✓
Preset total	✗	✗	✓
Flow rate	✓	✓	✓
<b>Outputs</b>			
4-20 mA (passive)	✗	✓	✗
Pulse/Transistor Output	✗	✓	✗
Flow Alarm	✗	✗	✗
Batch Control output	✗	✗	✓



REMOTE MOUNT	ER-RMP ER-RMA	ERA-RMP ERA-RMA	ERB-RMP ERB-RMA
<b>Description</b>	Liquid Crystal Display	Liquid Crystal Display with outputs	Single stage Batch Controller
<b>Construction</b>	Aluminium or GRP (plastic)	Aluminium or GRP (plastic)	Aluminium or GRP (plastic)
<b>IP rating</b>	IP67	IP67	IP67
<b>Mounting</b>	Wall mount	Wall mount	Wall mount
<b>Display</b>			
Digit size (upper/lower)	17mm/8mm	17mm/8mm	17mm/8mm
Accumulated total	✓	✓	✓
Resettable total	✓	✓	✓
Preset total	✗	✗	✓
Flow rate	✓	✓	✓
<b>Outputs</b>			
4-20 mA (passive)	✗	✓	✗
Pulse/Transistor Output	✗	✓	✗
Mechanical relay output	✗	✗	✗
Flow Alarm	✗	✗	✗
Batch Control output	✗	✗	✓
<b>Ex approved part numbers</b>	ERX-RMA (Aluminium) ERX-RMP (Plastic)	ERAX-RMA (Aluminium) ERAX-RMP (Plastic)	ERBX-RMA (Aluminium) ERBX-RMP (Plastic)

## ER DIGITAL DISPLAY SERIES (17MM DIGIT)



REMOTE MOUNT	ERB-PM	ERS-RMP ERS-RMA
<b>Description</b>	Two stage Batch Controller	Differential Flow Computer
<b>Construction</b>	Aluminium front panel	Aluminium or GRP (plastic)
<b>IP rating</b>	IP67 (NEMA 4X)	IP67 (NEMA 4X)
<b>Mounting</b>	DIN panel mount	Wall mount
<b>Display</b>	17mm/8mm	17mm/8mm
Digit size (upper/lower)		
Accumulated total	✓	✓
Resettable total	✓	✓
Preset total	✓	✗
Flow rate	✓	✓
<b>Outputs</b>		
4-20 mA (passive)	✗	✓
Pulse/Transistor Output	✓	✓
Mechanical relay output	✓	✗
Flow Alarm	✓	✗
Batch Control output	✓	✗

# ACCESSORIES

## AIR ELIMINATOR & STRAINER



### DESCRIPTION

- Aluminium body
- SS 316 basket
- Viton® Seals
- Mesh size: 100 Mesh (150µ)
- Air eliminators are available in 3 sizes:
  - **50mm**: Part Number BSA050
  - **75mm**: Part Number BSA075
  - **100mm**: Part Number BSA100

## Y TYPE STRAINER



### DESCRIPTION

- Body: CF8M
- Screen: SS316
- Working press: 800 psi/PN40
- Y-type strainers are available in 4 sizes:
  - » **1/4" 200 mesh (74µ)**:  
Part Number YS800-01 (BSP) YS800-02 (NPT)
  - » **1/2" 60 mesh (250µ)**:  
Part Number YS012-01 (BSP) YS012-02 (NPT)
  - » **1" 60 mesh (250µ)**:  
Part Number YS025-01 (BSP) YS025-02 (NPT)
  - » **1 1/2" 60 mesh (250µ)**:  
Part Number YS040-01 (BSP) YS040-01 (NPT)

## WALL MOUNT BRACKET



### DESCRIPTION

- Aluminium wall mount bracket to suit models MX06-25
  - » **Suitable for MX06**: Part Number MXA-06-WM
  - » **Suitable for MX09**: Part Number MXA-09-WM
  - » **Suitable for MX12**: Part Number MXA-12-WM
  - » **Suitable for MX19-25**: Part Number MXA-25-WM

## SIGNAL CABLE



### DESCRIPTION

- The Sensor Cable is a M12 5 position female connector cable, to supplement the DIN Pulser Module
- Manufactured from polyurethane, the sensor cable is highly resistant to acids, alkaline solutions, solvents and salt water
- The Sensor cable is available in 4 options:
  - » **1.5 meters (right angle):** Part Number MXD-C1.5
  - » **5 meters (right angle):** Part Number MXD-C5
  - » **10 meters (right angle):** Part Number MXD-C10
  - » **1.5 meters (straight):** Part Number MXD-C1-5S

**Please note:** The Sensor cable should be ordered separate to the DIN Pulser Module.

## FIELD ATTACHABLE CONNECTOR



### DESCRIPTION

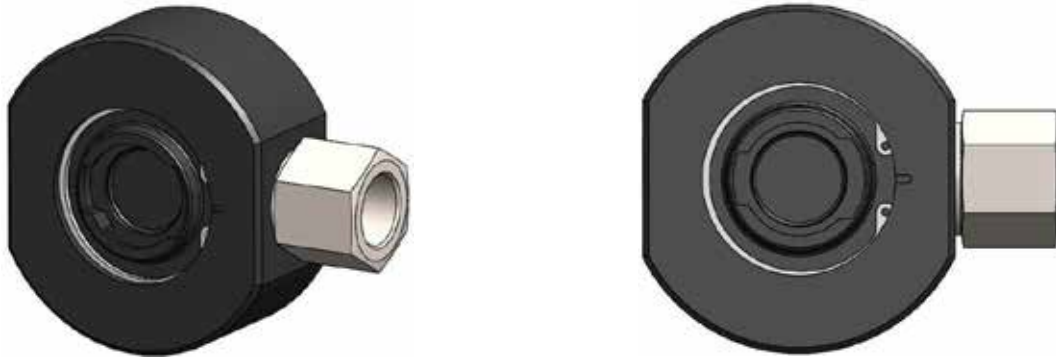
- The Field Attachable Connector is a M12, right angled female connector, to complement the DIN Pulser Module.
- The connector offers flexible on-site assembly via its 5 position, screw connection facility
- Part Number MXD-CF

# ACCESSORIES

## DIGITAL FLOW METER EXTENSION ADAPTORS

Macnaught Digital Flow Meter Extensions Adaptors are manufactured from Stainless Steel 316 are suitable for upgrading M-SERIES Flow Meters\* (early models) to MX SERIES Flow Meters. Since end-to-end length of MX Series flow meters are smaller than M-Series flow meters, these extension adaptors allow for users to compensate the extra length and will adjust perfectly in existing pipework.

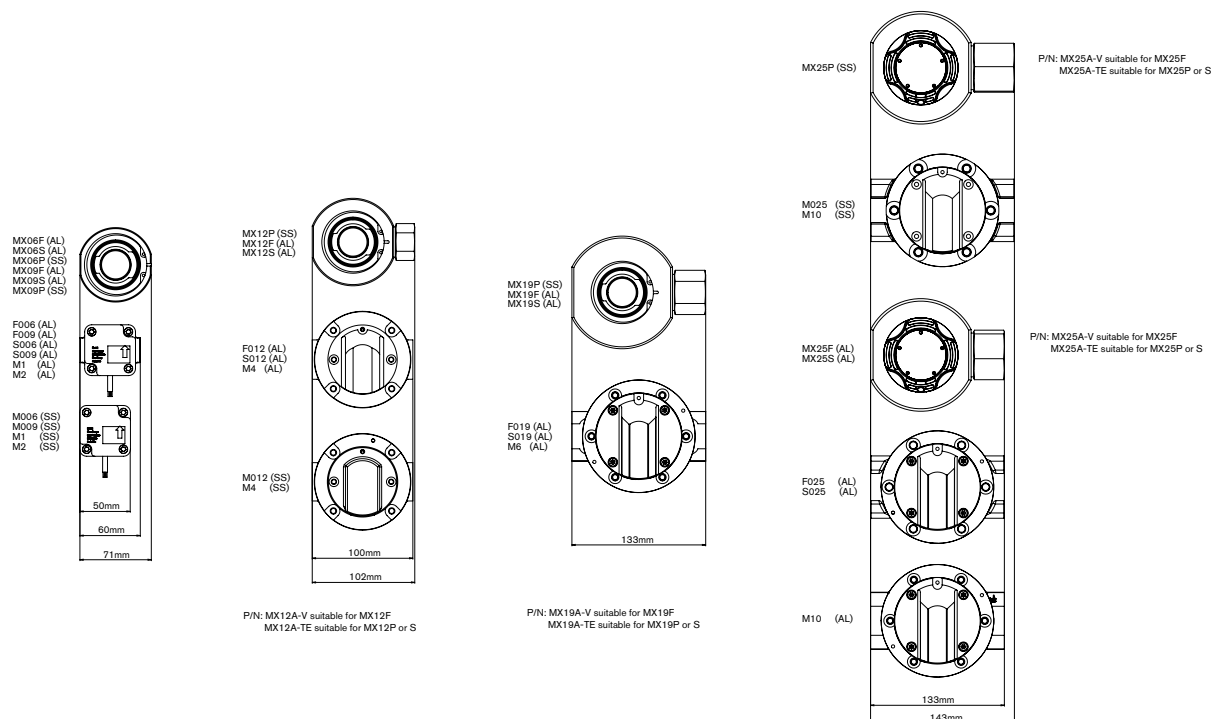
Macnaught offers these extension adaptors free of charge on request with every purchase of a MX meter.



## SPECIFICATIONS

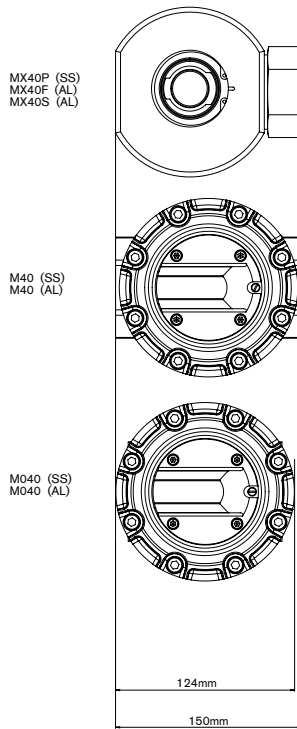
	MX12	MX19	MX25	MX40	MX50
<b>Part Number</b> Teflon Seals	MX12A-TE	MX19A-TE	MX25AA-TE MX25AS-TE MX25AA-V	MX40A-TE	MX50A-TE
Viton Seals	MX12A-V	MX19A-V		MX40A-V	MX50A-V
<b>Size</b>	1/2"	3/4"	1"	1 1/2"	2"
<b>Suits models</b>	MX12	MX19	MX25	MX40	MX50

## DIMENSIONS

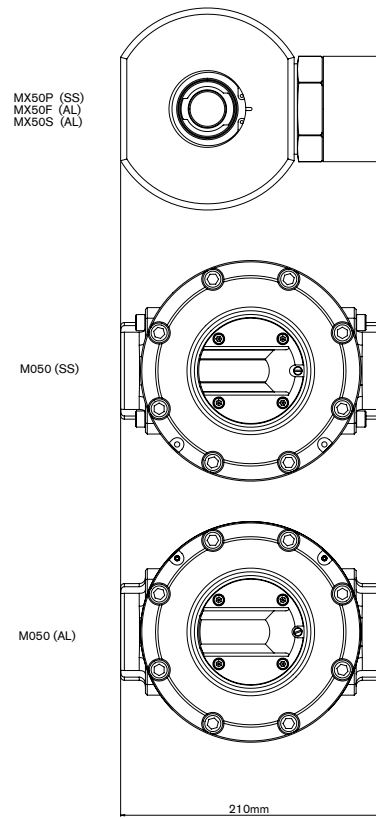


\*Applicable only for flow meters from 1/2" to 2" with BSP threaded connections.

## DIMENSIONS



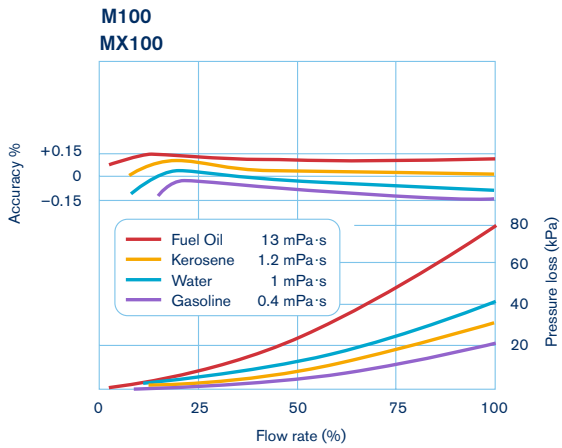
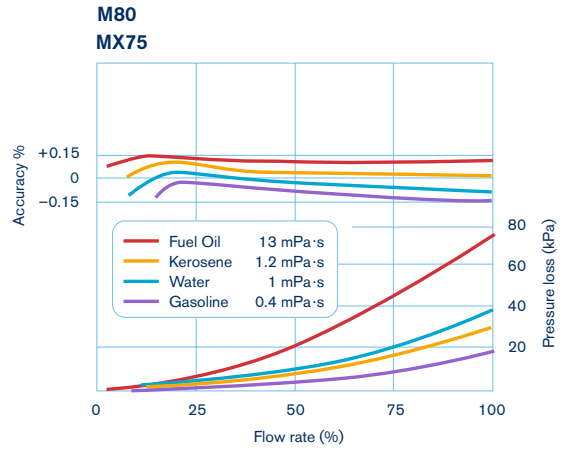
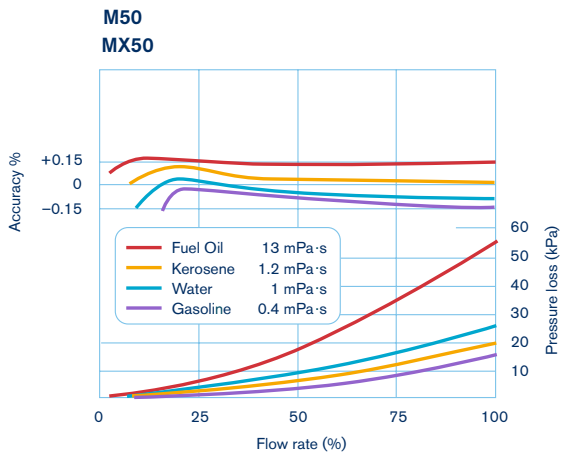
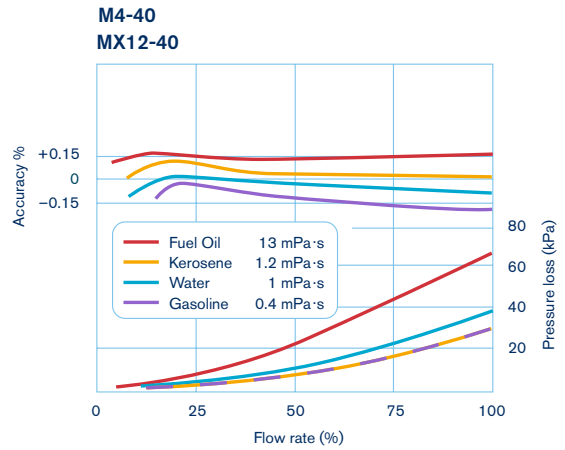
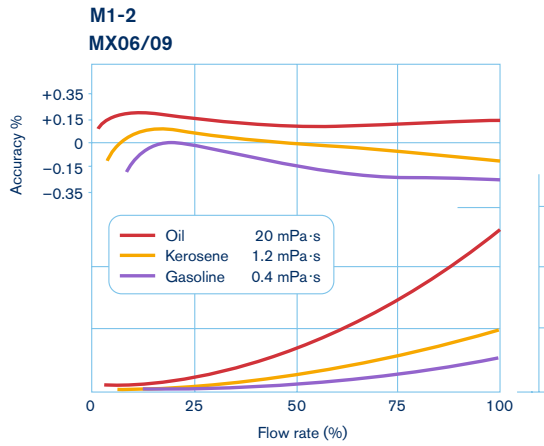
P/N: MX40A-V suitable for MX40F  
MX40A-TE suitable for MX40P or S



P/N: MX50A-V suitable for MX50F  
MX50A-TE suitable for MX50P or S

# APPENDIX A

## FLOW METER ACCURACY & PRESSURE LOSSES

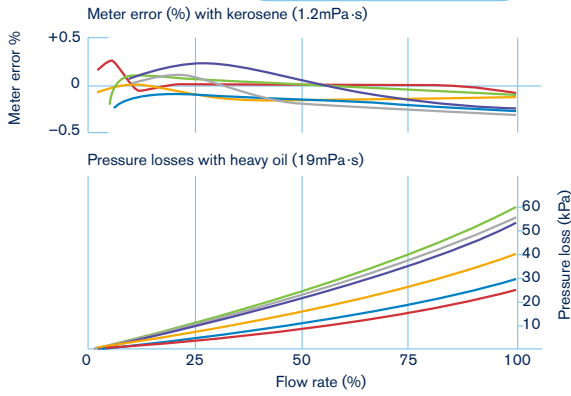




# FLOW METER ACCURACY & PRESSURE LOSSES

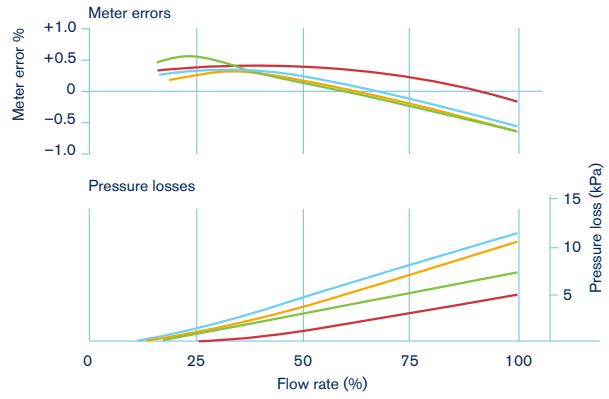
## For Oil Service

Meter Sizes	
M-SERIES	MX SERIES
M4	MX12
M10	MX25
M40	MX40
M50	MX50
M80	MX75
M100	MX100



## For Water Service

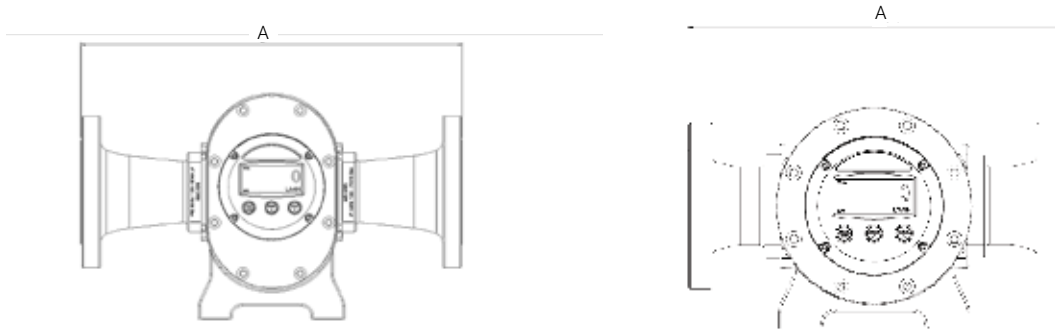
Meter Sizes	
M-SERIES	MX-SERIES
M4	MX12
M7	MX19
M10	MX25
M40	MX40



# APPENDIX B

## ACCESSORY DIMENSIONAL DATA

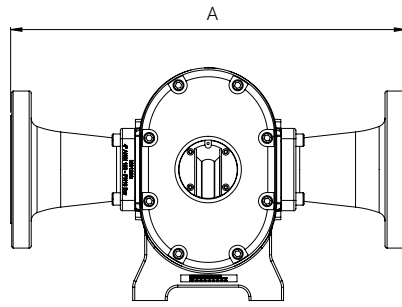
### MX-Series Flange Dimension Data



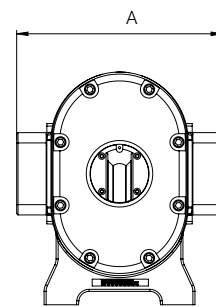
METER SIZE	PORT SIZE	FLANGE TYPE	LENGTH A
MX75 ALUMINIUM	3"	ANSI	436mm
		DIN	436mm
		JIS	436mm
		G	302mm
		NPT	302mm
MX100 ALUMINIUM	4"	ANSI	574mm
		DIN	574mm
		JIS	574mm
	3"	G	302mm
		NPT	302mm

## ACCESSORY DIMENSIONAL DATA

### M-Series Flange Dimension Data



ANSI/DIN/JIS



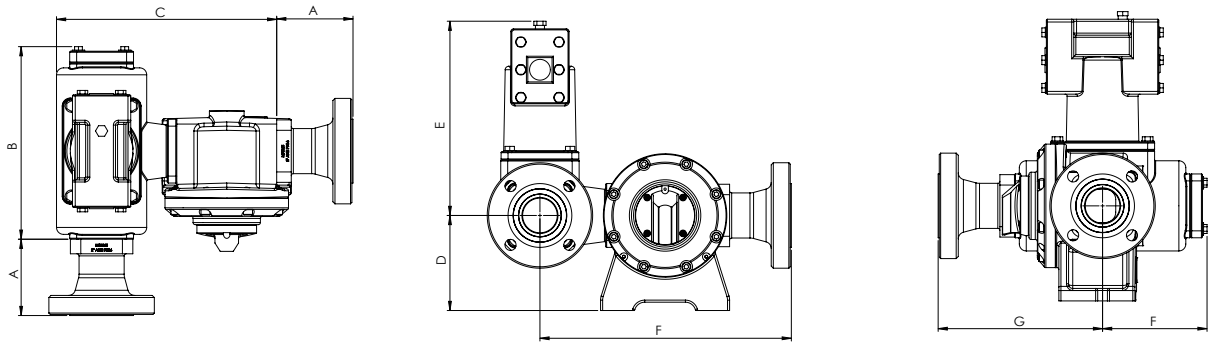
G/NPT

METER SIZE	PORT SIZE	FLANGE TYPE	LENGTH A
F040 S040 M040	1½"	ANSI	270mm
		DIN	262mm
		JIS	266mm
WM40AR WM40SS	1½"	ANSI	270mm
		DIN	262mm
		JIS	266mm
F100 S100	3"	G	302mm
		NPT	302mm
		ANSI	436mm
	4"	DIN	436mm
		JIS	436mm
		G	302mm
WM100	3"	NPT	302mm
		ANSI	436mm
		DIN	436mm
	4"	JIS	436mm
		G	302mm
		NPT	302mm
		ANSI	574mm
		DIN	574mm
		JIS	574mm

# APPENDIX B

## ACCESSORY DIMENSIONAL DATA

### Air Eliminator Dimension Data



METER SIZE	FLANGE TYPE	A	B	C	D	E	F	G	H
WM50	G	43	278	317	137	280	296	170	151
	NPT	43	278	317	137	280	296	170	151
	ANSI	110	278	317	137	280	362	273	151
WM80	G	43	279	410	141	290	383	172	151
	NPT	43	279	410	141	290	383	172	151
	ANSI	110	279	410	141	290	450	239	151
WM100 F100 S100	G	43	279	410	141	290	384	172	151
	NPT	43	279	410	141	290	384	172	151
	ANSI 3"	110	279	410	141	290	451	239	151
	ANSI 4"	181	279	410	141	290	522	310	151

## VISCOSITY FACTOR

To achieve the lowest possible pressure drop, a range of special cut high viscosity optional rotors is available for the MX09/M2, MX12/M4, MX19/M7, MX25/M10, MX40/M40 & MX50/M50 meter models.

The MX and M-SERIES™ range of oval gear type Positive Displacement Flow Meters has a distinct advantage in measuring extremely viscous materials with the pressure drop being the only limiting factor.

With fluids above 1000cP, meter sizing and required flow rate become important decisions.

For example:

With SAE90 gear oil @ 20°C/68°F with a viscosity of 1000cP, the maximum pressure drop of an M10 at its maximum flow rate (120lpm/32USGM) would be 100kPa/14.5psi/1BAR. However, the pressure drop with the M40 or M50 meters, at the same flow rate would be

M40: Max 50kPa/7.2psi/0.5BAR

M50: Max 35kPa/5.0psi/0.35BAR

To approximately determine the expected maximum flow rate for different high fluid viscosities for each M-SERIES™ model at a 100kPa/14.5psi/1BAR pressure drop using high viscosity rotors, the following coefficient factors are applied and Macnaught has created the table at the bottom of this page as a guide:

COEFFICIENT VISCOSITY FACTOR		MX09/M2		MX12/M4		MX19/M7		MX25/M10		MX40/M40		MX50/M50	
		L/Hr	USG/Hr	L/min	USG/min	L/min	USG/min	L/min	USG/min	L/min	USG/min	L/min	USG/min
1	<2500cP	500	132.09	30	7.93	80	21	120	31.70	250	66.04	350	92.5
0.9	<3000cP	450	118.88	27	7.13	72	19	108	28.53	225	59.44	324	86
0.8	<4000cP	400	105.67	24	6.34	64	17	96	25.36	200	52.83	280	74
0.7	<5000cP	350	92.46	21	5.55	48	13	84	22.19	175	46.23	245	65
0.6	<8000cP	300	79.25	18	4.76	40	11	72	19.02	150	39.63	210	56
0.5	<12000cP	250	66.04	15	3.96	24	6.3	60	15.85	125	33.02	175	46
0.4	<25000cP	200	52.83	12	3.17	16	4.2	48	12.68	100	26.42	140	37
0.3	<40000cP	150	39.63	9	2.38	8	2.1	36	9.51	75	19.81	105	28
0.2	<95000cP	100	26.42	6	1.59	4	1.06	24	6.34	50	13.21	70	18.5
0.1	<450000cP	50	13.21	3	0.79	-	-	12	3.17	25	6.60	35	9.25
0.05	<1000000cP	25	6.60	1.5	0.40	-	-	6	1.59	12.5	3.30	17.5	4.6

# APPENDIX D: WARRANTIES & CERTIFICATIONS

## WARRANTIES & CERTIFICATIONS

### EU DECLARATION OF CONFORMITY

All Macnaught flow meters are designed & manufactured under the guidelines of Directive 2014/68/EU covering Pressure Equipment placed into the EU marketplace. These meters have been assessed to fall within the classification of ‘Piping’ and comply with Article 4(1) (c)(ii) Table 8 or 9 depending on fluid group 1 or 2 respectively. All meters comply with Article 4, paragraph 3 Sound Engineering Practice and shall be accompanied by adequate instructions for use. In all cases the flow meters EU Declaration of conformity shall be taken as the controlling document that outlines any restrictions on pressure ratings. It is important to always check this document before ordering a meter since it will be updated in line with any changes to the directives



### INTRINSICALLY SAFE APPROVAL

For current list of all intrinsically safe approval certificates, Please refer to [Macnaught.com.au/approvals](http://Macnaught.com.au/approvals)

### FLANGE TECHNICAL INFORMATION

Macnaught meter flanges are sized to flange requirements in the ASME B31.3 Code of Pressure Piping at the stated meter flange’s rated pressure (this may differ from the meter’s rated pressure); the sizing is based on the meter material properties taken at ambient temperature. Gasket factors used for stainless steel flanges to develop adequate installation and operation gasket seating force are:

Raised face type flange ‘m’ = 5 and ‘y’ = 15 MPa requiring bolts of grade ASTM A193-B7.

Flat face type flange ‘m’ = 1 and ‘y’ = 1.4 MPa, typical of soft rubber or neoprene, requiring bolts of grade ASTM A193-B7.

The use of gaskets with factors larger than those stated above for the respective flange face types is the responsibility of the end user/installer. For materials other than stainless steel offered in the Macnaught meter range please consult the Macnaught web site for current technical data on flange size, material specification, and pressure rating.

### FLOW METER TEST REPORT

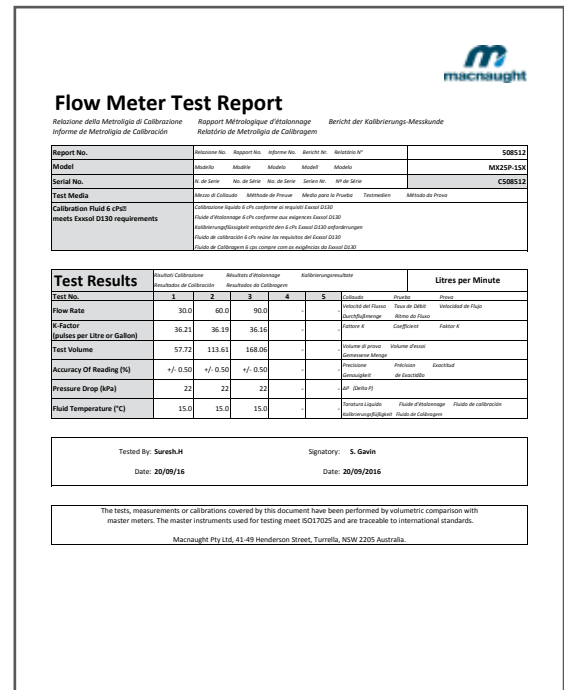
#### Nominal K-Factor - Mechanical

Each meter is checked for accuracy after being manufactured. The process is to enter the nominal “K Factor” for that meter and to verify using a one point calibration at the mid range of flow rate of the meter against an approved master meter. Macnaught standard test is at one point, additional points can be done on request and would incur additional costs.

#### Specific K-Factor - All other meters

A specific K-Factor is calculated by measuring the actual pulses relative to the approved master meter.

A certificate as illustrated below is included in the documentation package with the meter. Master meters have their accuracy checked and proving certificates are issued by the National Measurement Institute, on regular basis.



## CHEMICAL COMPATIBILITY GUIDE

**DISCLAIMER:** This chart is intended to provide general guidance on chemical compatibility and should not be used for product selection. The chart is based on industry data and may not be applicable to your specific applications. Temperature, fluid concentration and other process conditions may affect the material compatibility. If there is uncertainty about the suitability of the material with the process chemical, Macnaught recommends physical testing of the sample material with the chemical. If further assistance is required, Macnaught's Technical Support Team can provide advice to assist with selection.

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Acetaldehyde	✓	✓	✓	✓	✓	—	✓	✓
Acetamide	✓	—	✓	✓	✓	✓	✓	✓
Acetate Solvent	✓	—	✓	✓	✓	—	✓	—
Acetic Acid	—	—	✓	✓	✓	✓	✓	—
Acetic Acid 20%	✓	✓	✓	✓	✓	✓	✓	✓
Acetic Acid 80%	—	—	✓	✓	✓	✓	✓	—
Acetic Acid, Glacial	—	✓	✓	✓	✓	—	✓	✓
Acetic Anhydride	✓	✓	✓	✓	✓	—	✓	✓
Acetone	✓	✓	✓	✓	✓	✗	✓	—
Acetyl Chloride (dry)	✓	—	—	✓	✓	✓	✓	✓
Acetylene	✓	✓	✓	✓	✓	✓	✓	✓
Acrylonitrile	✓	—	✓	—	✓	—	✓	✓
Adipic Acid	✓	—	✓	✓	✓	✓	✓	✓
Alcohols: Amyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Benzyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Butyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Diacetone	✓	—	✓	—	—	—	✓	—
Alcohols: Ethyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Hexyl	✓	—	✓	—	—	—	✓	—
Alcohols: Isobutyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Isopropyl	✓	—	✓	—	—	✓	✓	—
Alcohols: Methyl	✓	—	✓	—	—	—	✓	—
Alcohols: Octyl	✓	—	✓	—	—	✓	—	—
Alcohols: Propyl	✓	—	✓	—	—	✓	✓	—
Aluminum Chloride	✓	✓	—	✓	✓	✓	✓	✓
Aluminum Chloride 20%	—	✓	—	✓	✓	✓	✓	✓

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Aluminum Fluoride	—	—	✓	—	✓	✓	✓	✓
Aluminum Hydroxide	✓	✓	✓	—	✓	✓	✓	—
Aluminum Nitrate	✓	✓	—	—	✓	✓	✓	—
Aluminum Potassium Sulfate 10%	✓	—	—	—	✓	✓	✓	—
Aluminum Sulfate	✓	✓	✓	—	✓	✓	✓	✓
Alums	—	—	✓	—	—	✓	✓	—
Amines	✓	—	✓	—	✓	—	✓	—
Ammonia 10%	✓	—	✓	✓	✓	✗	✓	—
Ammonia Nitrate	✓	—	—	—	—	✗	✓	—
Ammonia, anhydrous	✓	—	✓	—	—	✗	✓	✓
Ammonia, liquid	✓	—	✓	—	✓	✗	✓	—
Ammonium Acetate	✓	—	✓	✓	—	✓	✓	—
Ammonium Bifluoride	—	—	✓	—	✓	✓	✓	—
Ammonium Carbonate	✓	—	✓	—	✓	✓	✓	✓
Ammonium Chloride	—	✓	✓	—	✓	✓	✓	✓
Ammonium Hydroxide	✓	✓	✓	—	✓	✓	✓	✓
Ammonium Nitrate	✓	✓	✓	—	✓	✓	✓	✓
Ammonium Oxalate	✓	—	—	✓	—	—	—	—
Ammonium Persulfate	✓	—	—	—	✓	✓	✓	✓
Ammonium Phosphate, Dibasic	✓	—	✓	—	✓	✓	✓	—
Ammonium Phosphate, Monobasic	✓	—	✓	—	—	✓	✓	—
Ammonium Phosphate, Tribasic	✓	—	✓	—	—	✓	✓	—
Ammonium Sulfate	✓	✓	✓	—	✓	✓	✓	✓
Ammonium Sulfite	✓	—	—	—	—	—	✓	—
Amyl Acetate	✓	✓	✓	✓	✓	—	✓	✓
Amyl Alcohol	✓	✓	✓	✓	✓	✓	✓	✓

# APPENDIX E

## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Amyl Chloride	✓	—	✓	✓	✓	✓	✓	—
Aniline	✓	—	—	—	✓	✓	✓	✓
Antifreeze	—	✓	✓	✓	—	✓	—	—
Aqua Regia (80% HCl, 20% HNO3)	—	✓	—	—	—	✓	✓	✓
Arochlor 1248	✓	—	✓	✓	—	✓	✓	✓
Aromatic Hydrocarbons	—	—	✓	—	—	✓	—	—
Arsenic Acid	✓	—	—	—	✓	✓	✓	✓
Asphalt	✓	✓	✓	✓	✓	✓	✓	✓
Barium Carbonate	✓	—	—	—	✓	✓	✓	—
Barium Chloride	✓	✓	—	—	✓	✓	✓	✓
Barium Cyanide	✓	—	—	✓	—	✓	✓	—
Barium Hydroxide	✓	✓	—	—	✓	✓	✓	✓
Barium Nitrate	✓	—	✓	—	✓	✓	✓	—
Barium Sulfate	✓	✓	✓	✓	✓	✓	✓	✓
Barium Sulfide	✓	—	—	—	✓	✓	✓	✓
Beer	✓	—	✓	✓	✓	✓	✓	✓
Beet Sugar Liquids	✓	—	✓	✓	✓	✓	✓	✓
Benzaldehyde	✓	—	✓	✓	✓	—	✓	✓
Benzene	✓	—	✓	—	✓	✓	✓	✓
Benzene Sulfonic Acid	✓	—	—	—	✓	✓	✓	✓
Benzoic Acid	✓	—	✓	—	✓	✓	✓	✓
Benzol	✓	—	✓	—	✓	✓	✓	—
Borax (Sodium Borate)	✓	✓	✓	—	✓	✓	✓	✓
Boric Acid	✓	—	✗	✓	✓	✓	✓	✓
Butadiene	✓	✓	✓	—	✓	✓	✓	✓
Butane	✓	✓	✓	✓	✓	✓	✓	✓
Butanol (Butyl Alcohol)	✓	✓	✓	—	✓	✓	✓	✓
Butter	—	—	✓	✓	—	✓	✓	—
Buttermilk	✓	—	✓	✓	✓	✓	✓	—

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Butyl Amine	—	—	✓	—	✓	—	✓	✓
Butyl Ether	—	✓	✓	—	✓	—	✓	—
Butyl Phthalate	✓	—	✓	—	✓	—	✓	—
Butylacetate	✓	—	✓	—	—	✗	✓	—
Butylene	✓	✓	✓	✓	✓	✓	✓	✓
Butyric Acid	✓	—	✓	✓	✓	✓	✓	—
Calcium Bisulfide	✓	—	—	✓	—	✓	✓	—
Calcium Bisulfite	✓	—	—	—	✓	✓	✓	✓
Calcium Carbonate	✓	—	—	—	✓	✓	✓	—
Calcium Chloride	—	✓	✗	✓	✓	✓	✓	✓
Calcium Hydroxide	✓	—	—	✓	✓	✓	✓	✓
Calcium Nitrate	—	✓	✓	—	✓	✓	✓	✓
Calcium Oxide	✓	—	—	✓	—	✓	✓	—
Calcium Sulfate	✓	✓	—	—	✓	✓	✓	—
Calgon	✓	—	—	—	—	✓	—	—
Cane Juice	✓	—	✓	—	—	✓	✓	—
Carbolic Acid (Phenol)	✓	—	✓	✓	✓	✓	✓	✓
Carbon Bisulfide	✓	—	✓	—	—	✓	—	✓
Carbon Dioxide (dry)	✓	✓	✓	✓	✓	✓	✓	✓
Carbon Dioxide (wet)	✓	✓	✓	✓	✓	✓	✓	✓
Carbon Disulfide	✓	✓	✓	—	✓	✓	✓	—
Carbon Monoxide	✓	—	✓	—	✓	✓	✓	✓
Carbon Tetrachloride (wet)	✓	—	✗	—	✓	—	✓	✓
Carbonated Water	✓	✓	✓	✓	✓	✓	—	✓
Carbonic Acid	✓	✓	✓	✓	✓	✓	✓	✓
Catsup	✓	—	—	✓	—	✓	—	—
Chlorine (dry)	✓	—	—	✓	✓	✓	✓	✓
Chloroacetic Acid	✓	—	—	✓	✓	—	✓	✓
Chlorobenzene (Mono)	✓	—	✓	✓	✓	✓	✓	✓

Please refer to disclaimer on page 93



## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Chlorobromomethane	—	—	—	—	—	✓	✓	✓
Chloroform	✓	—	✓	✓	✓	✓	✓	✓
Chocolate Syrup	✓	—	✓	—	—	✓	✓	—
Chromic Acid 10%	✓	—	—	—	✓	✓	✓	✓
Chromic Acid 30%	✓	—	—	—	✓	✓	✓	✓
Chromic Acid 5%	✓	—	—	—	✓	✓	✓	✓
Cider	✓	—	✓	✓	—	✓	—	—
Citric Acid	✓	—	—	✓	✓	✓	✓	✓
Citric Oils	✓	—	—	✓	—	✓	—	—
Cloroxr (Bleach) 5.25% NaClO	✓	✓	✗	✓	—	✓	✓	✓
Coffee	✓	—	✓	✓	—	✓	—	—
Copper Chloride	—	✓	—	✓	—	✓	✓	✓
Copper Cyanide	✓	—	—	✓	✓	✓	✓	✓
Copper Nitrate	✓	—	—	—	✓	✓	✓	—
Copper Sulfate>5%	✓	✓	—	✓	✓	✓	✓	✓
Copper Sulfate 5%	✓	✓	—	✓	✓	✓	✓	✓
Cream	✓	—	✓	—	—	✓	✓	—
Cresols	✓	—	✓	—	✓	✓	—	✓
Cresylic Acid	✓	—	✓	—	✓	✓	✓	✓
Cyanic Acid	✓	—	—	—	✓	✓	✓	—
Cyclohexane	✓	✓	✓	—	✓	✓	✓	✓
Cyclohexanone	✓	✓	✓	✓	✓	—	✓	✓
Detergents	✓	✓	✓	—	✓	✓	✓	✓
Diacetone Alcohol	✓	—	✓	✓	✓	—	✓	✓
Dichlorobenzene	—	—	✓	✓	✓	—	✓	—
Dichloroethane	✓	—	✓	✓	✓	—	✓	—
Diesel Fuel	✓	✓	✓	✓	✓	✓	✓	✓
Diethyl Ether	✓	✓	✓	✓	✓	—	✓	✓
Diethylamine	✓	—	✓	✓	✓	—	✓	✓

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Diethylene Glycol	✓	—	✓	✓	✓	✓	✓	✓
Dimethyl Aniline	✓	—	✓	—	✓	—	✓	✓
Dimethyl Formamide	✓	✓	✓	✓	—	—	✓	✓
Diphenyl	✓	—	✓	—	—	✓	✓	—
Diphenyl Oxide	✓	—	✓	—	—	✓	✓	✓
Dyes	✓	—	✓	—	—	✓	—	—
Epsom Salts (Magnesium Sulfate)	✓	—	✓	—	✓	✓	✓	—
Ethane	✓	✓	—	—	✓	✓	✓	✓
Ethanol	✓	✓	✓	✓	✓	✓	✓	✓
Ethanolamine	✓	—	✓	—	✓	—	✓	✓
Ether	✓	—	✓	—	✓	—	✓	—
Ethyl Acetate	✓	✓	✓	✓	✓	—	✓	✓
Ethyl Chloride	✓	—	✓	—	✓	✓	✓	✓
Ethyl Ether	✓	✓	✓	—	✓	—	✓	✓
Ethylene Bromide	✓	—	✓	—	✓	✓	✓	—
Ethylene Chloride	✓	—	✓	✓	✓	✓	✓	✓
Ethylene Chlorohydrin	✓	—	✓	—	✓	✓	✓	—
Ethylene Diamine	✓	—	✓	—	—	✓	✓	✓
Ethylene Dichloride	✓	—	✓	—	✓	✓	✓	✓
Ethylene Glycol	✓	✓	✓	✓	✓	✓	✓	✓
Ethylene Oxide	✓	—	—	✓	✓	—	✓	✓
Fatty Acids	✓	—	✓	✓	✓	✓	✓	✓
Ferric Chloride	—	✓	—	—	✓	✓	✓	✓
Ferric Nitrate	✓	—	—	—	✓	✓	✓	✓
Ferric Sulfate	✓	—	—	—	—	✓	✓	✓
Ferrous Chloride	—	✓	—	—	✓	✓	✓	—
Ferrous Sulfate	✓	—	✓	—	✓	✓	✓	—
Fluoboric Acid	✓	—	—	✓	✓	✓	✓	✓
Fluorine	—	—	✓	—	—	—	—	✓

# APPENDIX E

## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Fluosilicic Acid	—	✓	—	—	✓	✓	✓	✓
Formaldehyde 100%	—	✓	✓	✓	—	—	✓	✓
Formaldehyde 40%	✓	✓	✓	✓	✓	✓	✓	✓
Formic Acid	✓	✓	✓	✓	✓	—	✓	✓
Freon 12	✓	—	✓	✓	—	✓	✓	—
Freon 22	✓	—	—	✓	—	—	✓	—
Freon TF	✓	—	—	✓	—	✓	✓	—
Freon 11	✓	—	—	✓	—	✓	✓	—
Fruit Juice	✓	—	✓	✓	—	✓	✓	—
Fuel Oils	✓	✓	—	✓	✓	✓	✓	✓
Furan Resin	✓	✓	✓	—	—	—	✓	✓
Furfural	✓	✓	✓	—	✓	—	✓	✓
Gallic Acid	✓	—	—	—	—	✓	✓	✓
Gasoline (high-aromatic)	✓	✓	—	✓	✓	✓	✓	✓
Gasoline, leaded, ref.	✓	✓	✓	✓	✓	✓	✓	✓
Gasoline, unleaded	✓	✓	✓	✓	✓	✓	✓	✓
Gelatin	✓	—	✓	✓	✓	✓	✓	✓
Glucose	✓	—	✓	✓	✓	✓	✓	✓
Glue, P.V.A.	✓	—	✓	✓	✓	✓	✓	✓
Glycerin	✓	—	✓	✓	✓	✓	✓	✓
Glycolic Acid	✓	✓	—	✓	✓	✓	✓	—
Gold Monocyanide	✓	—	—	—	—	✓	—	—
Grape Juice	✓	—	—	—	—	✓	✓	—
Grease	—	—	—	✓	✓	✓	✓	✓
Heptane	✓	✓	✓	✓	✓	✓	✓	—
Hexane	✓	✓	✓	✓	✓	✓	✓	✓
Honey	✓	—	✓	✓	—	✓	✓	—
Hydraulic Oil (Petro)	✓	✓	✓	✓	—	✓	✓	✓
Hydraulic Oil (Synthetic)	✓	✓	✓	✓	—	✓	✓	✓

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Hydrazine	✓	—	—	—	—	✓	✓	✓
Hydrocyanic Acid	✓	—	✓	✓	✓	✓	✓	✓
Hydrofluoric Acid 100%	✓	✗	✗	—	—	✓	✓	✓
Hydrogen Gas	✓	✓	✓	✓	✓	✓	✓	✓
Hydrogen Peroxide 5%	✓	✓	✓	✓	—	✓	✓	✓
Hydrogen Peroxide 30%	✓	—	✓	✓	—	✓	✓	✓
Hydrogen Peroxide 50%	✓	✗	✓	✓	—	✓	✓	✓
Hydrogen Peroxide 100%	✓	✗	✓	✓	✗	✓	✓	✓
Hydrogen Sulfide (aqua)	—	✓	✓	✓	✓	—	✓	✓
Hydrogen Sulfide (dry)	—	✓	✓	✓	✓	—	✓	✓
Hydroquinone	✓	—	✓	—	✓	✓	✓	✓
Iodine	—	—	✓	✓	—	✓	✓	✓
Iodine (in alcohol)	—	—	✓	—	—	—	—	✓
Iodoform	✓	—	—	—	—	—	—	✓
Isooctane	✓	—	✓	✓	✓	✓	✓	✓
Isopropyl Acetate	—	—	—	—	✓	—	✓	✓
Isopropyl Ether	✓	—	✓	✓	✓	—	✓	✓
Jet Fuel (JP3, JP4, JP5)	✓	✓	✓	✓	✓	✓	✓	—
Kerosene	✓	✓	✓	—	✓	✓	✓	✓
Ketones	✓	—	✓	✓	✓	✗	✓	—
Lacquer Thinners	✓	—	✓	✓	✓	✗	✓	✓
Lacquers	✓	—	✓	✓	✓	✗	✓	✓
Lactic Acid	✓	✓	✓	—	✓	✓	✓	✓
Lard	✓	—	✓	✓	✓	✓	✓	✓
Latex	✓	—	✓	✓	—	✓	✓	—
Lead Acetate	✓	—	—	—	✓	—	✓	✓
Lead Nitrate	✓	—	—	—	✓	✓	✓	✓
Lime	✓	—	✓	✓	✓	✓	✓	✓
Linoleic Acid	✓	—	✓	✓	✓	✓	✓	✓

Please refer to disclaimer on page 93

## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Lithium Chloride	✓	—	—	—	✓	✓	✓	—
Lithium Hydroxide	✓	—	—	—	—	—	✓	—
Lubricants	✓	✓	✓	✓	✓	✓	✓	✓
Lye: Ca(OH) <sub>2</sub> Calcium Hydroxide	✓	—	—	✓	✓	✓	✓	✓
Lye: KOH Potassium Hydroxide	✓	—	—	—	—	✓	✓	✓
Lye: NaOH Sodium Hydroxide	✓	—	—	—	—	✓	✓	✓
Magnesium Bisulfate	✓	—	—	—	✓	—	✓	—
Magnesium Carbonate	✓	—	✓	—	—	✓	✓	—
Magnesium Chloride	—	✓	—	✓	✓	✓	✓	✓
Magnesium Hydroxide	✓	✓	—	✓	✓	✓	✓	✓
Magnesium Nitrate	✓	—	✓	✓	—	✓	✓	—
Magnesium Oxide	✓	—	✓	✓	—	—	✓	—
Magnesium Sulfate (Epsom Salts)	✓	—	✓	—	✓	✓	✓	✓
Maleic Acid	✓	—	✓	—	✓	✓	✓	✓
Maleic Anhydride	✓	—	✓	✓	—	✓	✓	✓
Malic Acid	✓	—	✓	—	—	✓	✓	✓
Manganese Sulfate	✓	—	✓	✓	✓	✓	✓	—
Mash	✓	—	✓	✓	—	✓	—	—
Mayonnaise	—	—	✓	✓	—	✓	✓	—
Mercurous Nitrate	✓	—	—	✓	—	✓	✓	—
Mercury	✓	—	—	✓	—	✓	✓	✓
Methane	✓	✓	✓	✓	—	✓	✓	✓
Methanol (Methyl Alcohol)	✓	✓	✓	✓	✓	✗	✓	✓
Methyl Acetate	✓	—	✓	✓	✓	—	✓	✓
Methyl Acetone	✓	—	✓	—	✓	—	✓	—
Methyl Acrylate	✓	✓	—	—	—	—	—	✓
Methyl Alcohol 10%	✓	✓	✓	✓	✓	—	✓	✓
Methyl Bromide	✓	—	—	—	✓	✓	✓	✓
Methyl Butyl Ketone	✓	—	—	—	—	—	—	✓

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Methyl Cellosolve	✓	—	✓	—	✓	—	✓	✓
Methyl Chloride	✓	—	—	—	✓	✓	✓	✓
Methyl Ethyl Ketone	✓	✓	✓	✓	✓	✗	✓	✓
Methyl Isobutyl Ketone	✓	✓	✓	✓	✓	—	✓	✓
Methyl Isopropyl Ketone	✓	—	✓	—	✓	—	✓	—
Methyl Methacrylate	✓	✓	—	—	—	—	—	✓
Methylamine	✓	—	✓	—	✓	—	✓	—
Methylene Chloride	✓	—	—	—	✓	✓	✓	✓
Milk	✓	—	✓	✓	✓	✓	✓	✓
Mineral Spirits	✓	—	✓	—	✓	✓	✓	—
Molasses	✓	—	✓	✓	✓	✓	✓	—
Monochloroacetic acid	✓	—	—	✓	—	—	✓	—
Monoethanolamine	✓	—	✓	—	✓	—	✓	✓
Morpholine	—	—	✓	✓	✓	—	✓	—
Motor oil	✓	✓	✓	✓	✓	—	✓	✓
Mustard	✓	—	✓	✓	✓	—	✓	—
Naphtha	✓	✓	✓	—	✓	✓	✓	✓
Naphthalene	✓	—	✓	✓	✓	✓	✓	✓
Natural Gas	✓	—	✓	✓	—	✓	✓	✓
Nickel Nitrate	✓	—	—	—	—	✓	✓	—
Nickel Sulfate	✓	—	—	—	✓	✓	✓	✓
Nitric Acid (5-10%)	✓	—	✗	✓	✓	✓	✓	✓
Nitric Acid (20%)	✓	✗	✗	✓	✓	✓	✓	✓
Nitric Acid (50%)	✓	✗	✗	—	—	✓	✓	✓
Nitric Acid (Concentrated)	✓	✗	✗	—	—	✓	✓	✓
Nitrobenzene	✓	—	✓	—	—	✓	✓	✓
Nitromethane	✓	—	✓	✓	✓	—	✓	✓
Nitrous Acid	✓	—	—	—	—	✓	✓	—
Nitrous Oxide	✓	—	✓	—	—	✓	✓	—

# APPENDIX E

## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM		316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Oils: Aniline	✓	—	—	—	—	—	✓	—	Oils: Tanning	✓	—	—	—	—	✓	—	—
Oils: Castor	✓	—	✓	—	—	✓	✓	—	Oils: Transformer	✓	—	✓	—	✓	✓	✓	—
Oils: Cinnamon	✓	—	—	—	—	✓	✓	—	Oils: Turbine	✓	—	✓	—	✓	✓	✓	—
Oils: Citric	✓	—	✓	—	—	✓	✓	—	Oleic Acid	✓	—	✓	✓	✓	✓	✓	—
Oils: Clove	✓	—	✓	—	—	✓	✓	—	Oleum 100%	✓	—	✓	—	—	✓	✓	—
Oils: Coconut	✓	—	✓	—	—	✓	✓	—	Oleum 25%	✓	—	✓	✓	—	✓	✓	—
Oils: Cod Liver	✓	—	✓	—	—	✓	✓	—	Oxalic Acid (cold)	✓	—	✓	—	—	✓	✓	✓
Oils: Corn	✓	—	✓	—	—	✓	✓	—	Ozone	✓	—	✓	—	—	✓	✓	✓
Oils: Cottonseed	✓	—	✓	—	—	✓	✓	—	Palmitic Acid	✓	—	✓	—	✓	✓	✓	✓
Oils: Creosote	✓	—	✓	—	—	✓	✓	—	Paraffin	✓	—	✓	—	✓	✓	✓	—
Oils: Diesel Fuel (20, 30, 40, 50)	✓	—	✓	—	✓	✓	✓	—	Pentane	—	—	✓	—	—	✓	✓	—
Oils: Fuel (1, 2, 3, 5A, 5B, 6)	✓	—	—	—	✓	✓	✓	—	Perchloroethylene	✓	—	—	—	✓	✓	✓	✓
Oils: Hydraulic Oil (Petro)	✓	—	✓	—	✓	✓	✓	—	Petrolatum	✓	—	—	✓	✓	✓	—	—
Oils: Hydraulic Oil (Synthetic)	✓	—	✓	—	✓	✓	✓	—	Petroleum	✓	—	—	—	✓	✓	✓	✓
Oils: Lemon	✓	—	✓	—	—	✓	✓	—	Phenol (10%)	✓	—	✓	—	✓	✓	✓	✓
Oils: Linseed	✓	—	✓	—	—	✓	✓	—	Phenol (Carbolic Acid)	✓	—	✓	✓	✓	✓	✓	✓
Oils: Mineral	✓	—	✓	—	✓	✓	✓	—	Phosphoric Acid (>40%)	✗	✓	✗	✓	—	✓	✓	✓
Oils: Olive	✓	—	✓	—	✓	✓	✓	✓	Phosphoric Acid (crude)	—	✓	✗	—	—	✓	✓	✓
Oils: Orange	✓	—	✓	—	—	✓	—	—	Phosphoric Acid (<40%)	—	✓	✗	✓	✓	✓	✓	✓
Oils: Palm	✓	—	—	—	—	✓	✓	—	Phosphorus	✓	—	✓	✓	—	—	✓	—
Oils: Peanut	✓	—	✓	—	—	✓	✓	—	Phosphorus Trichloride	✓	✓	—	✓	✓	✓	✓	✓
Oils: Peppermint	✓	—	—	—	—	✓	✓	—	Photographic Developer	✓	—	—	—	✓	✓	✓	—
Oils: Pine	✓	—	✓	—	—	✓	✓	—	Photographic Solutions	—	—	—	—	✓	✓	✓	—
Oils: Rapeseed	✓	—	—	—	—	✓	✓	—	Phthalic Acid	✓	—	✓	—	✓	✓	✓	—
Oils: Rosin	✓	—	✓	—	—	✓	✓	—	Phthalic Anhydride	✓	—	✓	✓	✓	✓	✓	—
Oils: Sesame Seed	✓	—	—	—	—	✓	✓	—	Picric Acid	✓	—	—	—	✓	✓	✓	✓
Oils: Silicone	✓	—	✓	—	—	✓	✓	—	Plating Solutions, Antimony Plating 130°F	✓	—	✓	—	—	✓	✓	✓
Oils: Soybean	✓	—	✓	—	—	✓	✓	—	Plating Solutions, Arsenic Plating 110°F	✓	—	✓	—	—	✓	✓	✓
Oils: Sperm (whale)	✓	—	—	—	—	✓	✓	—	Plating Solutions (Brass): High-Speed Brass Bath 110°F	—	—	✓	—	—	✓	✓	✓

Please refer to disclaimer on page 93

## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Plating Solutions (Brass): Regular Brass Bath 100°F	✓	—	✓	—	—	✓	✓	✓
Plating Solutions (Bronze): Cu-Cd Bronze Bath R.T.	✓	—	✓	—	—	✓	✓	✓
Plating Solutions (Bronze): Cu-Sn Bronze Bath 160°F	✓	—	✓	—	—	✓	✓	✓
Plating Solutions (Bronze): Cu-Zn Bronze Bath 100°F	✓	—	✓	—	—	✓	✓	✓
Plating Solutions (Cadmium): Cyanide Bath 90°F	—	—	✓	—	—	✓	✓	✓
Plating Solutions (Cadmium): Fluoborate Bath 100°F	✓	—	✓	—	—	✓	✓	✓
Plating Solutions, (Chromium): Black Chrome Bath 115°F	—	—	✓	—	—	—	✓	✓
Plating Solutions, (Chromium): Chromic-Sulfuric Bath 130°F	—	—	✓	—	—	—	✓	✓
Plating Solutions, (Chromium): Fluoride Bath 130°F	—	—	✓	—	—	—	✓	✓
Plating Solutions, (Chromium): Fluosilicate Bath 95°F	—	—	✓	—	—	—	✓	✓
Plating Solutions (Copper) (Acid): Copper Fluoborate Bath 120°F	✓	—	✓	—	—	✓	✓	✓
Plating Solutions (Copper) (Acid): Copper Sulfate Bath R.T.	—	—	✓	—	—	✓	✓	✓
Plating Solutions (Copper) (Cyanide): High-Speed Bath 180°F	—	—	✓	—	—	✓	✓	✓
Plating Solutions (Copper) (Cyanide): Rochelle Salt Bath 150°F	—	—	✓	—	—	✓	✓	✓
Plating Solutions (Copper) (Misc): Copper (Electroless)	—	—	✓	—	—	✓	✓	✓
Plating Solutions (Copper) (Misc): Copper Pyrophosphate	—	—	✓	—	—	✓	✓	✓
Potash (Potassium Carbonate)	✓	—	—	—	✓	✓	—	—
Potassium Bicarbonate	✓	—	—	—	✓	✓	✓	—
Potassium Bromide	✓	—	—	—	✓	✓	✓	—
Potassium Chlorate	✓	—	✓	—	✓	✓	✓	—
Potassium Chloride	—	✓	✗	✓	✓	✓	✓	✓
Potassium Chromate	✓	—	✓	✓	✓	✓	✓	—
Potassium Cyanide Solutions	✓	—	—	—	✓	✓	✓	✓
Potassium Dichromate	✓	—	✓	—	✓	✓	✓	✓
Potassium Ferricyanide	✓	—	✓	—	✓	✓	✓	—
Potassium Ferrocyanide	✓	—	✓	—	✓	✓	✓	—
Potassium Hydroxide (Caustic Potash)	✓	✓	✗	—	✗	✓	✓	✓
Potassium Hypochlorite	—	✓	✗	✓	—	—	✓	✓
Potassium Iodide	✓	—	✓	✓	✓	✓	✓	—

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Potassium Nitrate	✓	—	✓	—	✓	✓	✓	✓
Potassium Oxalate	✓	—	✓	✓	✓	—	✓	—
Potassium Permanganate	✓	—	✓	✓	—	✓	✓	—
Potassium Sulfate	✓	—	—	—	✓	✓	✓	✓
Potassium Sulfide	✓	—	—	—	✓	✓	✓	—
Propane (liquefied)	✓	✓	✓	✓	✓	✓	✓	✓
Propylene	✓	✓	✓	—	✓	✓	✓	✓
Propylene Glycol	✓	✓	✓	—	—	✓	✓	—
Pyridine	✓	—	✓	—	✓	—	✓	✓
Pyrogalllic Acid	✓	—	✓	—	✓	✓	✓	—
Rosins	✓	—	✓	—	✓	✓	✓	—
Rum	✓	—	—	—	—	✓	—	—
Rust Inhibitors	✓	—	—	—	—	✓	—	—
Salad Dressings	✓	—	✓	—	—	✓	—	—
Salicylic Acid	✓	—	✓	✓	✓	✓	✓	✓
Salt Brine (NaCl saturated)	✓	—	✓	✓	✓	✓	✓	✓
Sea Water	✓	—	—	✓	✓	✓	✓	✓
Shellac (Bleached)	✓	—	✓	—	✓	✓	✓	—
Shellac (Orange)	✓	—	✓	—	✓	✓	✓	—
Silicone	✓	—	✓	—	✓	✓	✓	—
Silver Nitrate	✓	—	—	✓	✓	✓	✓	✓
Soap Solutions	✓	—	—	✓	✓	✓	✓	✓
Soda Ash (see Sodium Carbonate)	✓	—	—	—	—	✓	✓	✓
Sodium Acetate	✓	✓	✓	✓	✓	—	✓	✓
Sodium Aluminate	✓	—	—	—	✓	✓	✓	—
Sodium Benzoate	—	—	✓	✓	✓	✓	✓	—
Sodium Bicarbonate	✓	✓	—	—	✓	✓	✓	✓
Sodium Bisulfate	—	✓	—	—	✓	✓	✓	—
Sodium Bisulfite	✓	—	—	—	✓	✓	✓	✓

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# APPENDIX E




## CHEMICAL COMPATIBILITY GUIDE

- ✓ Recommended
- Data not available
- ✗ Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM		316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Sodium Borate (Borax)	✓	—	—	✓	✓	✓	✓	✓	Starch	✓	—	✓	—	✓	✓	✓	—
Sodium Carbonate	✓	✓	—	✓	✓	✓	✓	—	Stearic Acid	✓	—	✓	—	✓	✓	✓	✓
Sodium Chlorate	✓	—	—	—	—	✓	✓	—	Stoddard Solvent	✓	✓	✓	✓	✓	✓	✓	✓
Sodium Chloride	✓	✓	—	✓	✓	✓	✓	✓	Styrene	✓	—	✓	—	✓	✓	✓	✓
Sodium Chromate	✓	—	✓	✓	✓	✓	✓	—	Sugar (Liquids)	✓	—	✓	✓	✓	✓	✓	✓
Sodium Cyanide	✓	✓	—	✓	✓	✓	✓	✓	Sulfate (Liquors)	✓	—	—	—	✓	✓	✓	—
Sodium Ferrocyanide	✓	—	✓	✓	✓	✓	✓	—	Sulfur Dioxide	—	✓	✓	—	✓	✓	✓	✓
Sodium Fluoride	—	—	✓	✓	✓	✓	✓	—	Sulfur Dioxide (dry)	—	✓	✓	—	✓	✓	✓	✓
Sodium Hydrosulfite	—	✓	✓	✓	—	✓	✓	—	Sulfur Trioxide	✓	—	✓	—	—	✓	✓	✓
Sodium Hydroxide (20%)	✓	✓	✗	—	✓	—	✓	✓	Sulfur Trioxide (dry)	—	—	✓	—	—	✓	✓	✓
Sodium Hydroxide (50%)	✓	✓	✗	—	✓	✗	✓	✓	Sulfuric Acid (<10%)	—	✓	—	✓	✓	✓	✓	✓
Sodium Hydroxide (80%)	—	✓	✗	—	—	✗	✓	✓	Sulfuric Acid (10-75%)	✗	✓	✗	✓	✓	✓	✓	✓
Sodium Hypochlorite (<20%)	✗	—	✗	—	✓	✓	✓	✓	Sulfuric Acid (75-100%)	✗	✓	✗	✓	✗	✓	✓	✓
Sodium Hypochlorite (100%)	✗	—	✗	—	—	✓	✓	✓	Sulfuric Acid (cold concentrated)	✗	✓	✗	✓	—	✓	✓	✓
Sodium Hyposulfate	✓	—	—	—	—	—	✓	—	Sulfuric Acid (hot concentrated)	✗	✓	✗	—	✗	✓	✓	✓
Sodium Metaphosphate	✓	—	—	—	✓	✓	✓	✓	Sulfurous Acid	✓	—	✓	—	✓	✓	✓	✓
Sodium Metasilicate	✓	—	—	✓	—	✓	✓	—	Tallow	✓	—	✓	—	✓	✓	✓	—
Sodium Nitrate	✓	✓	✓	—	—	✓	✓	✓	Tannic Acid	✓	—	—	—	✓	✓	✓	✓
Sodium Perborate	✓	—	—	—	—	✓	✓	✓	Tanning Liquors	✓	—	✓	—	—	✓	✓	—
Sodium Peroxide	✓	—	—	—	✓	✓	✓	✓	Tartaric Acid	—	—	✓	—	✓	✓	✓	✓
Sodium Polyphosphate	✓	—	—	✓	✓	✓	✓	—	Tetrachloroethane	✓	—	—	✓	✓	✓	✓	—
Sodium Silicate	✓	—	✓	—	✓	✓	✓	✓	Tetrahydrofuran	✓	✓	—	✓	✓	—	✓	✓
Sodium Sulfate	✓	✓	✓	—	✓	✓	✓	✓	Toluene (Toluol)	✓	—	✓	✓	✓	✗	✓	✓
Sodium Sulfide	✓	✓	—	—	✓	✓	✓	—	Tomato Juice	✓	✓	✓	—	✓	✓	✓	✓
Sodium Sulfite	✓	—	—	—	✓	✓	✓	—	Trichloroethane	✓	—	—	✓	✓	✓	✓	✓
Sodium Tetraborate	✓	—	—	—	—	✓	✓	—	Trichloroethylene	✓	—	—	✓	✓	✓	✓	✓
Sodium Thiosulfate (hypo)	✓	✓	✓	—	—	✓	✓	✓	Trichloropropane	✓	—	—	✓	—	✓	✓	—
Sorghum	✓	—	—	—	—	✓	—	—	Tricresylphosphate	✓	—	—	✓	✓	✓	✓	✓
Soy Sauce	✓	—	✓	—	—	✓	—	✓	Triethylamine	✓	—	—	—	✓	—	✓	✓

Please refer to disclaimer on page 93

## CHEMICAL COMPATIBILITY GUIDE

-  Recommended
-  Data not available
-  Not recommended

	316 STAINLESS STEEL	PPS RYTON	ALUMINIUM 6061 SERIES	HASTELLOY C-276	CARBON	VITON	PTFE	FKMM
Trisodium Phosphate	✓	✓	-	-	-	✓	✓	-
Turpentine	✓	✓	✓	-	✓	✓	✓	✓
Urea	✓	-	✓	-	✓	✓	✓	-
Uric Acid	✓	-	-	-	✓	-	✓	-
Urine	✓	-	✓	-	✓	✓	✓	-
Varnish	✓	-	✓	✓	✓	✓	✓	✓
Vegetable Juice	✓	✓	-	-	-	✓	✓	✓
Vinegar	✓	✓	-	✓	✓	✓	✓	✓
Vinyl Acetate	✓	-	✓	-	✓	✓	✓	-
Vinyl Chloride	✓	-	✓	✓	✓	✓	✓	✓
Water, Acid, Mine	✓	-	-	✓	✓	✓	✓	✓
Water, Deionized	✓	✓	✓	✓	✓	✓	✓	✓
Water, Distilled	✓	✓	✓	✓	✓	✓	✓	✓
Water, Fresh	✓	✓	✓	✓	✓	✓	✓	✓
Water, Salt	✓	✓	✓	✓	✓	✓	✓	✓
Weed Killers	✓	-	-	-	-	✓	-	-
Whey	✓	-	✓	-	-	✓	✓	-
Whiskey & Wines	✓	-	-	-	-	✓	✓	✓
White Liquor (Pulp Mill)	✓	-	✓	✓	✓	✓	✓	-
White Water (Paper Mill)	✓	-	-	-	-	✓	-	-
Xylene	✓	-	✓	✓	✓	✓	✓	✓
Zinc Chloride	✓	✓	-	-	✓	✓	✓	✓
Zinc Hydrosulfite	✓	-	-	-	-	-	✓	-
Zinc Sulfate	✓	-	-	✓	✓	✓	✓	✓

# NOTES

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