

# 4. MES Flowmeters

Used for Admixture Measurement  
Worldwide



**ManuFlo** <sup>®</sup>TM

(c) Manu Electronics 2018

# Admixtures – Flowmeter Selection Guide

ADMIX Chemicals & Conditions	Positive Displacement Flowmeters					Electromagnetic Flowmeters				
	MES20	MES20-T	MES25	MES32	MES40	CMM10	CMM20	CMM25	KMS25	KMS40
Water Based	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Corrosive	—	✓	—	—	—	✓	✓	✓	✓	✓
None Conductive	✓	✓	✓	✓	✓	—	—	—	—	—
Slurries / Oxides	—	—	—	—	—	—	—	✓	✓	✓
Excessive Vibration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.5 - 70 Litres/min	✓	✓	—	—	—	0.5-30	✓	✓	—	—
2.7 - 112 Litres/min	—	—	✓	—	—	✓	✓	✓	✓	✓
3.8 - 185 Litres/min	—	—	—	✓	—	—	—	✓	✓	✓
7.5 - 375 Litres/min	—	—	—	—	✓	✓	—	—	✓	✓
> 375 Litres/min	—	—	—	—	—	—	—	—	—	✓
*Pulses (> F) & (< R)	✓	✓	✓	✓	✓	—	—	—	✓	✓
Empty Pipe Detection	—	—	—	—	—	✓	✓	✓	✓	✓



+ New MES20N –compact body/chamber  
 + New “DSP” Digital Smart Pulse output pulse-head  
 + provides better performance & Vibration free pulsing.

- Simplistic technology easy to operate
- No issues with foaming product
- Most applications no solenoid valves required
- No flushing required
- Suitable for dosing applications
- AS1379 & NMI NSS1671 approved devices
- Easy calibration procedure & no need for expensive NATA approved personnel
- MM & KMS have on-board totaliser back up

# MES Series Flowmeters

Primary admixture flowmeter used worldwide since 1995 with over 45,000 used daily.

- Available in sizes 20, 25, 32, and 40mm.
- Pulse, Digital LCD, Mechanical display and combo options
- Nutating Disc operation allows a long operational life.
- Accuracy un-affected by Specific Gravity changes.
- New **MES20-NE** compact body with “DSP-OC” Digital Smart Pulse output pulse-head. Vibration Free (fr Aug.2018).



**MES-series flowmeters are the most commonly used device for measurement of admixtures.**

**POSITIVE DISPLACEMENT TYPE FLOWMETERS**  
MES Series – widely used for admixtures



# MES Flowmeters – Head Types



**Digital Smart Pulse (DSP-OC)**  
1000 ppL\*  
For 20mm (Round J-Box or Hex. type)

LCD Resettable  
Litres dec.pt  
Large Display

LCD Resettable  
Litres dec.pt  
+Rate Display

Non-resettable  
Mechanical Totaliser

**WARNING: Pulse output value (PPL) changes for the fitted body size.**

**WARNING: Use correct LCD head (size is on lid) for body size.**

**Now with Vibration Free technology -DSP**



**A Range of special  
sealing gaskets in  
Viton or EDPM  
and Bases available.**

**New Compact  
Body: MES20-NE**

Standard  
(gunmetal)

Teflon/Tefzel Coating for  
Acidic liquids (black or green)



**Various Body Sizes**  
for 20, 25, 32, and 40mm Ø pipes



# MES Flowmeter Sizes - Specifications

With DSP – no vibration issues – Pulses factory settable from 1 to 1000 PPL for all sizes).



Model Number	MES20-NE	MES25	MES32	MES40
Size	20mm (3/4")	25mm (1")	32mm (1¼")	40mm (1½")
Transistor NPN pulse output rate (pulses per Litre)	1000	555	261	116
Reed Switch pulse output rate (pulses per Litre)	61	34	16	7.2
Start flow @ ±5% (Litres/min)	0.6	1.1	1.5	3.0
Minimum accurate flow @ ±1.5% (Litres/min)	1.5	2.7	3.8	7.5
Nominal flow (Litres/min)	45	65	125	200
Maximum flow (Litres/min)				
Admixture (Specific Gravity 1.4)	54	80	132	268
Admixture (Specific Gravity 1.1)	68	102	168	340
Water (Specific Gravity 1.0)	75	112	185	375
Accuracy (Repeatability)	± 1.5% (± 0.2%)	± 1.5% (± 0.2%)	± 1.5% (± 0.2%)	± 1.5% (± 0.2%)
Voltage Supply	5 - 25 VDC	5 - 25 VDC	5 - 25 VDC	5 - 25 VDC
Supply Current (proportional to supply voltage)	5 - 25 mA	5 - 25 mA	5 - 25 mA	5 - 25 mA
Weight (# including connectors)	1.8 kg	2.6 kg	6 kg	17 kg #
Connection type	¾" BSP (male)	1" BSP (male)	1¼" BSP (male)	1½" (flanged)
Max. working pressure	1160 kPa	1160 kPa	1160 kPa	1034 kPa
Headloss at nominal flow	25 kPa (3m)	25 kPa (3m)	25 kPa (3m)	25 kPa (3m)
Max. liquid temperature	50°C	50°C	50°C	50°C



## MES-DSP/OC - field issues.

There are confirmed reports of some MES-DSP pulse-heads not being compatible with ManuFlo ME2000/08 & ME995 equipment systems. This is due to internal pull-up resistors already fitted in the inputs of the equip. From December 2019 MES20-DSP-OC (open collector) version will be supplied with (pull-up resistor removed) to solve any further field issues.

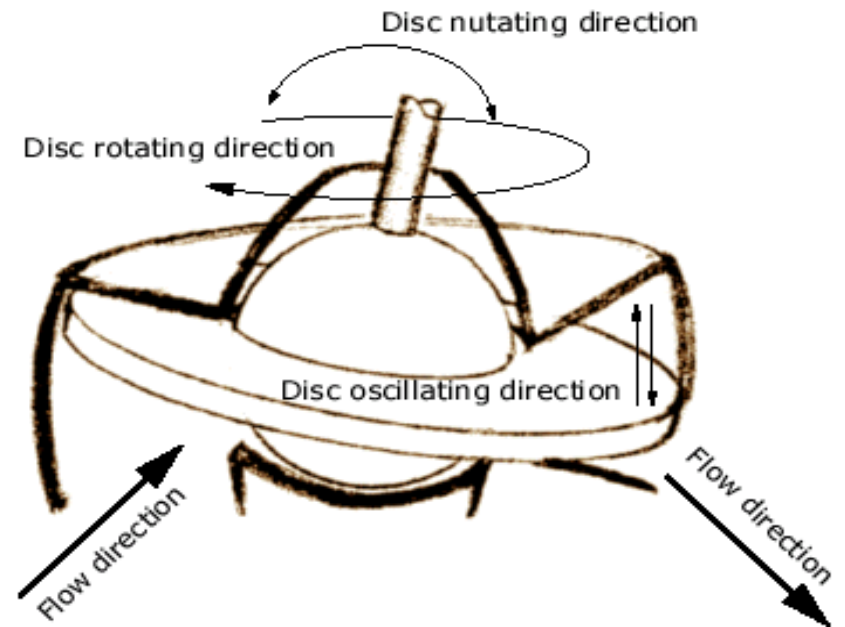
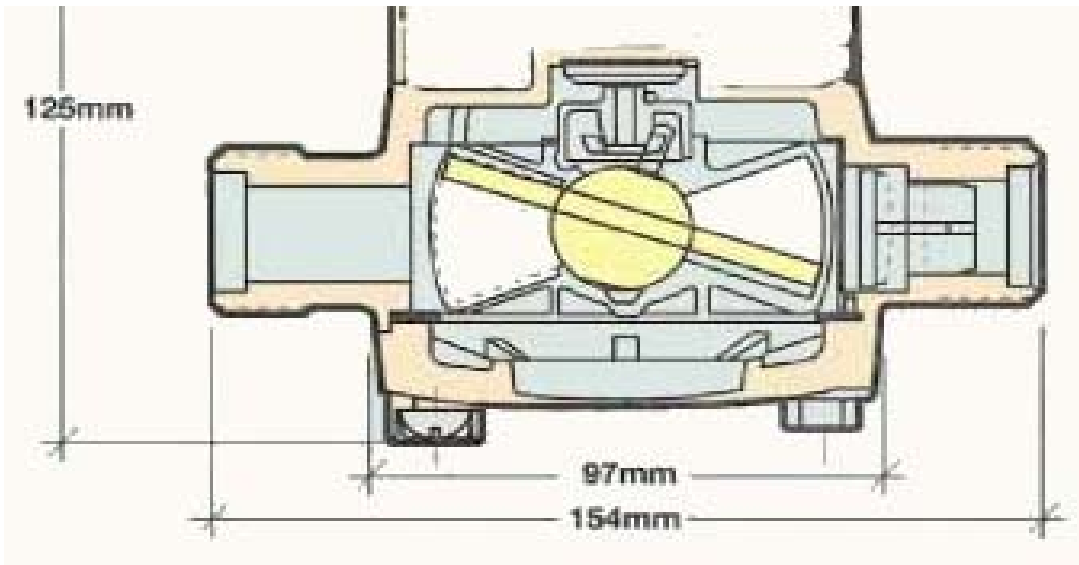
(As indicated on the J-Box label)



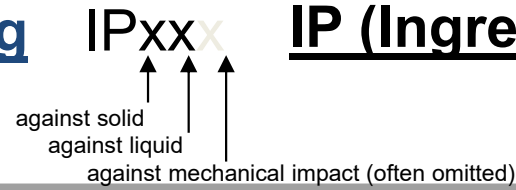
On some external non-ManuFlo equipment for DSP-OC heads a external pullup resistor 2K7 fitted across Pulse and +VDC is required to effect input switching.

# MES20 Flowmeter – How it Measures

- Is a Positive Displacement type
  - Measures volume of liquid flowing by counting repeatedly the filling and discharging of a known fixed volume.
- Measuring chamber with nutating (wobbling) disk
  - Has a chamber that has inside it a nutating (wobbling) disk that creates fixed-volume discrete “parcels” from the passing liquid.
- Chamber is magnetically coupled to the pulsehead
  - The volume of the liquid that passes the chamber is found by counting the number of “parcels” (i.e. the number of revolutions of the nutating disk).



# MES20 Flowmeter – Installation - Rating



# IP (Ingress Protection) Rating

Protection rating against solids	Interpretation	Protection rating against liquids	Interpretation
X	No specific protection	X	No specific protection
0	Inherent degree of protection	0	Inherent degree of protection
1	Protected against solid objects larger than 50mm. (eg. accidental contact with the hand)	1	Protected against drops of water falling vertically.
2	Protected against solid objects larger than 12mm. (eg. accidental contact with finger)	2	Protected against water drops falling at up to 15 degrees from vertical.
3	Protected against solid objects larger than 2.5mm. (eg. tools and wires)	3	Protected against water drops falling at up to 60 degrees from the vertical.
4	Protected against solid objects larger than 1mm. (eg. fine tools and wires)	4	Protected against splashing water from all directions.
5	Protected against quantities of dust that could interfere with satisfactory operation	5	Protected against jets of water from all directions
6	Completely protected against dust	6	Protected against jets of water of similar force to heavy seas.
-	-	7	Protected against the effects of immersion.
-	-	8	Protected against the effects of submersion.

[http://www.greenhouse.gov.au/lgmodules/wep/toolkit/streetlighting/street\\_ip.html](http://www.greenhouse.gov.au/lgmodules/wep/toolkit/streetlighting/street_ip.html)

# MES20 Flowmeter – Installation - Location

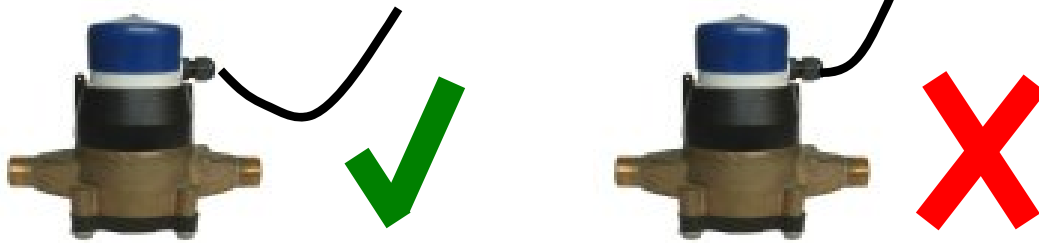
- Flush out pipes thoroughly before connecting flowmeter.
- **Install under cover**, in an accessible area for any future service.
- Multiple flowmeters should be **grouped together off the ground on a stand**.
- **Avoid high vibration areas** – move, use dampeners, or use MES20-DSP instead with ME2000, ME3000 or UIC/A.
- **Direction:** Arrow on meter body must coincide with flow direction.
- **Orientation:** in any plane, except upside down (to avoid deposits in chamber magnetic drive section).
- **Filter:** can pass small impurities & has internal strainer, but if liquid contains granules or many impurities, a filter box or strainer may be fitted before the flowmeter (800 micron cartridge filter recommended).
- Install any regulation valve preferably before the flowmeter.
- If injecting into water line, a solenoid may be needed at the discharge point to avoid syphoning.





# MES20 Flowmeter – Installation - Wiring

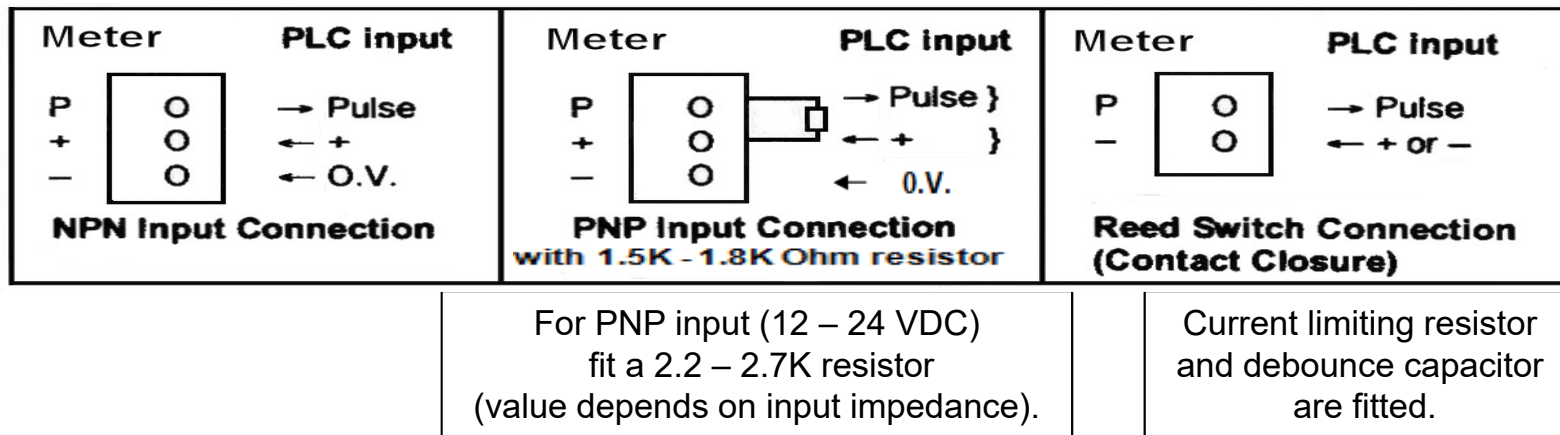
- To avoid water ingress into electronics, ensure cable entry glands are secure and loop cable down.



## To Wire:

- Remove colour cap
- Open Junction Box lid
- Pass cable through cable gland
- Strip cable ends
- Fit to terminal connector
- Check wiring
- Tighten gland
- Close Junction Box

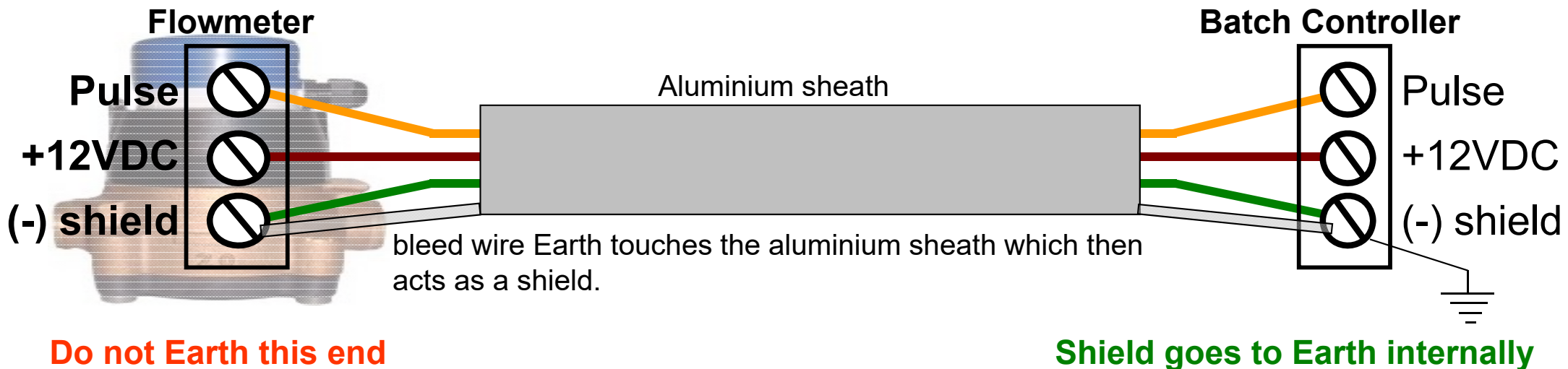
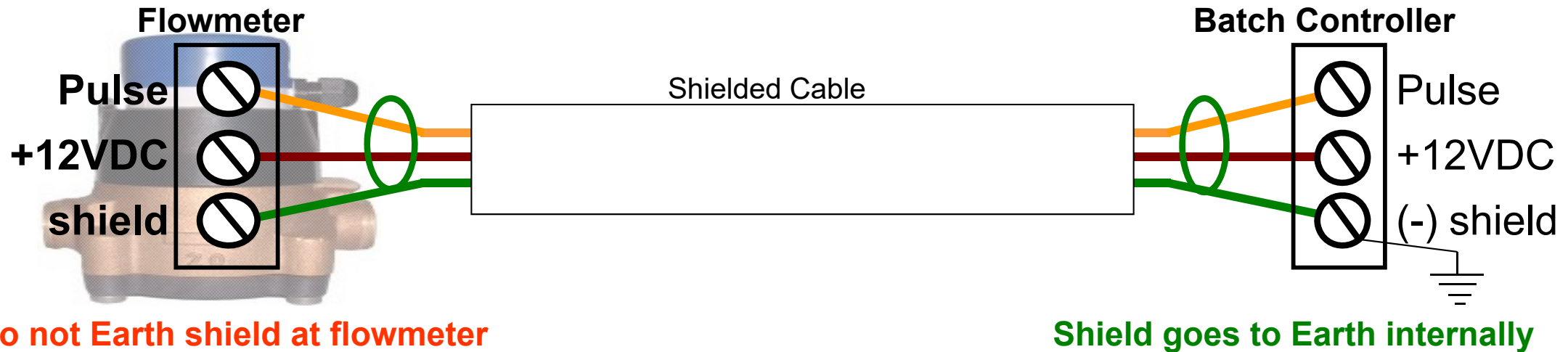
- Electrical connections:



- Interface cards are available to scale output pulses.
- To avoid interference, use only shielded cable.
- Ensure only regulated DC voltages used (when using external power).

# MES20 Flowmeter – Installation - Wiring

The shield is internally Earthed at the Batch Controller end only and not at the flowmeter end. (Earthing both ends would create a ground loop antenna).



# MES Flowmeter – Installation -Multiple

Multiple wiring and plumbing MES20 installation examples



**MES Flowmeters are IP64 rated only. Keep under cover do not expose to direct rain or water jets.**

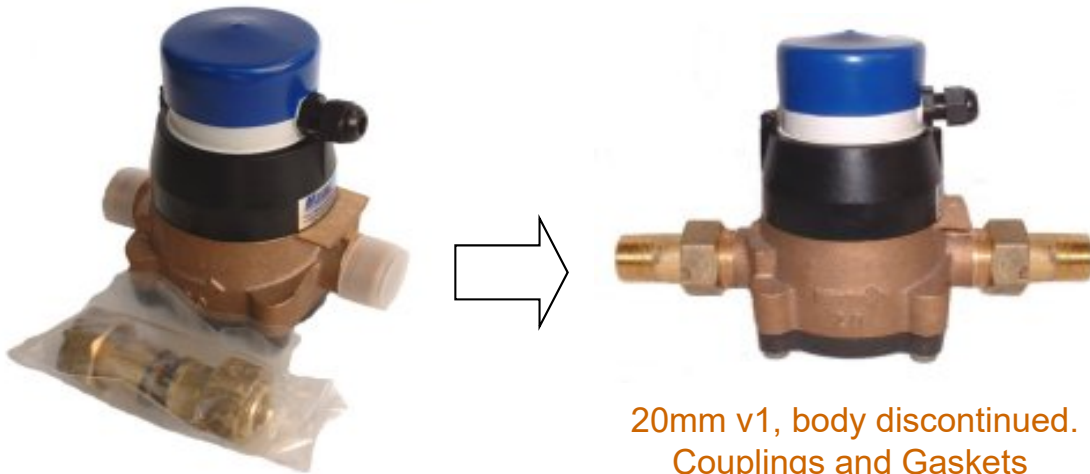


**MES Flowmeters now with new “DSP” Digital Smart Pulse. Vibration Free Pulseheads**



# MES Flowmeters – Body Types

## Old Body



20mm v1, body discontinued.  
Couplings and Gaskets  
still available.

- Body end threads are 25 mm gas metric.
- Shipped with 20mm (3/4") BSP (male) coupling connectors.
- Couplings are screwed on for connecting to pipe.

## Current Body

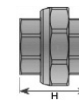
MES20



V2, V3

V1-new(compact fr. June.2018)

- 20mm (3/4") BSP (male) threaded ends.
- **Barrel Union Plastic Connectors**  
Now optionally available





# MES20 Flowmeter – Operational flow range

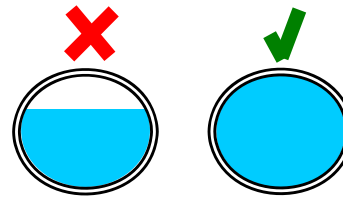
- Do not exceed operating specifications as this can damage the meter



- Don't exceed recommended maximum flowrate\* (75 Litres/min for MES20) - damage/overdose can occur.

- Must have full pipe at all times:

- For accurate measurement,
- To avoid dry chemical deposits (through exposure to air)
- Fouling meter chamber



- A calibration check is recommended every 6 to 12 months.
- Replace chamber if accuracy out by  $> 5\%$  (low replacement cost).

\* Note: The higher the Specific Gravity of the liquid, proportionally the lower the maximum flowrate.

# MES20 Flowmeter – Head Removal

- Pulsehead is self-contained, and is attached to meter body via a bayonet turn and lock fitting mechanism.
- Don't deform the pulsehead copper face as that could damage internal parts.
- Push in the locking pin with a screwdriver.

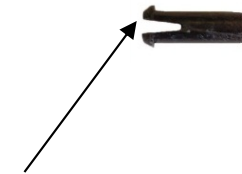


Locking pin



**MES20** *Body Types* **MES20-N**  
V1,V2,V3 V1 from fr. June.2018

- Turn pulsehead anti-clockwise 1/8 turn, then lift pulsehead off. **Don't lose pin.**



- To re-attach, reverse sequence, and tap-in locking pin (split end goes in first).

# MES20 Flowmeter – Operational Points



The MES20 (25,32,40mm) are high-resolution flowmeters (MES20 =1000 pulses/Litre). Note: **false counts** is usually due to excessive high **vibration** – either directly due to the meter installation, or in extreme rare cases from extreme plant vibration of the liquid.

This can be dealt with by:

- **Checking the pulse-head is secured to the body (especially if swapped) and no free movement, if there is then a simple hammer tap to the grip wings will be sufficient to better secure the pulse-head tolerance clearances.**
- If possible, install flowmeter **away from vibration areas**; or
- Using **rubber dampeners** to buffer the flowmeter from vibration e.g. from a nearby compressor, alternate pumps; or
- **Or swap with MES20N Digital Smart Pulse output pulsehead. (from Aug. 2018).**  
(Bi-Directional intelligent –free of any vibration issues)



Tap



Tap

Available as a complete flowmeter, or pulse-head only  
(which is interchangeable with the MES20 / MES20-N pulse-head).



## Also:

- Counts can result if a **Non-Return Valve** is faulty, and allows liquid to drain back (Back-Flow) into the storage tank. Replace the Valve if required.
- Ensure hoses are tied down to avoid unnecessary liquid vibration.
- Failing this the pulse cables may not be shielded.

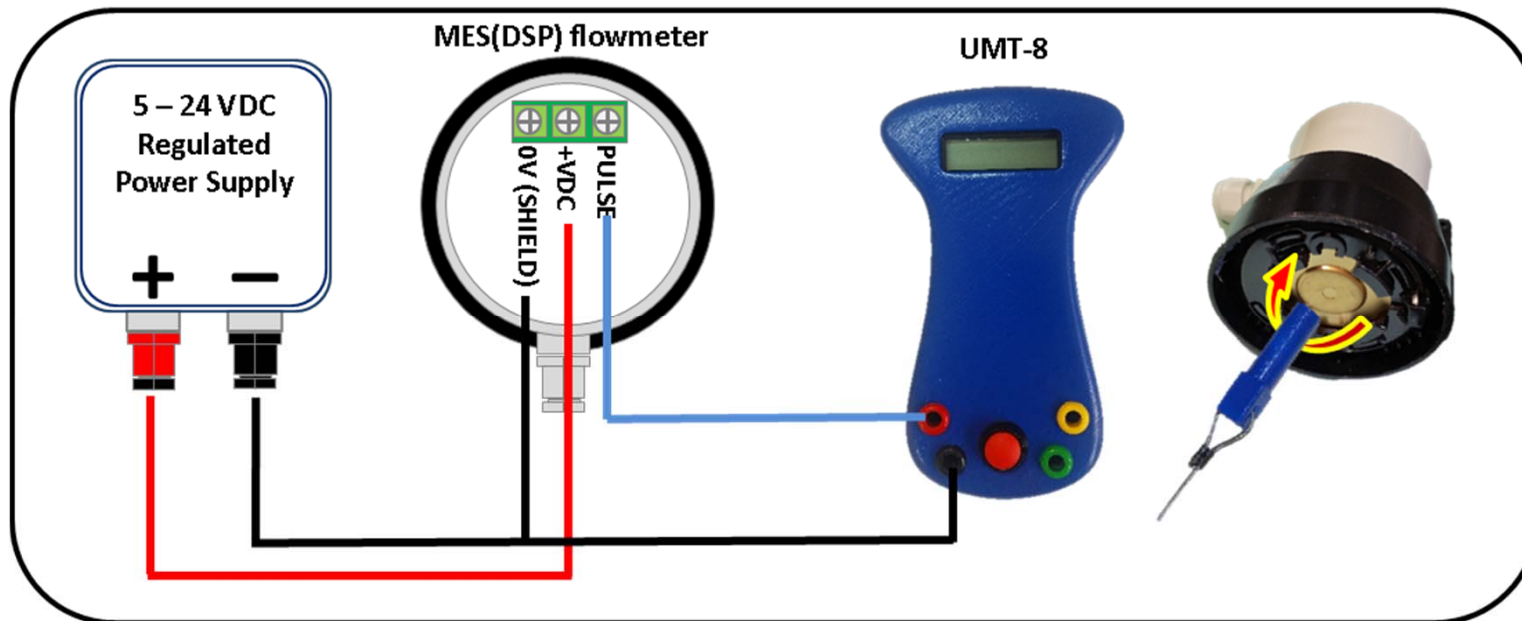


# UMT8 – Multifunction Tester with MES

ManuFlo<sup>®</sup>™

- A must have for any MANUFLO product tester / technician
- Resettable 8-digit LCD resettable counter.
- Compatible for testing both Active (source) and Passive (sinking) Digital inputs / outputs.
- Internal signal generator function allows testing
- Digital inputs such as ME2008, ME995 controllers, UIC, counters, PLCs & etc.
- Magnetic reset wand can be also used for testing the new MES-DSP pulse-heads.
- An ideal commissioning or troubleshooting shooting device.







NEW



For existing systems already wired up with +5-24vdc from ME2000, ME995 etc, simply circulate the magnet wand on the underside of the copper housing to generate counts on the pre-existing equipment (ME995/ME2008 etc in the batch room.



# MES20 Flowmeter – Service

- Flush the flowmeter with water if the pipe runs dry.  
(Admixture dries and crystalizes if in contact with air and seizes the chamber /pumps/valves etc).
- If measuring chamber is blocked, there will be pressure loss on output and loss of flowrate and possible overdose may occur. Blockage will be detected by ME995, ME2000/2008, ME3000 systems with warning alarms or messages.
- If flow becomes excessively restricted, or meter is out of calibration or pulsehead stops sending pulses, then:
  - Reset the connected controller. 
  - Remove flowmeter pulse-head. 
  - Shake pulse-head (MES-P only) left-right to check if there are pulses (counts appear on Batch Controller etc).
    - If no pulses: (or use a magnet for the new DSP-OC digital pulse heads)
      - Check wiring cable connector and that 12VDC is delivered to pulsehead. If wiring/power OK:
      - Switch off connected equipment and replace pulsehead.
    - If receiving pulses, then check chamber:
      - Access chamber and inspect. Either: 
      - For minimum service time, use a new chamber (E.G. Order Code: 20-5); or
      - Clean chamber parts in warm soapy water or diluted HC-acid (5 water : 1 acid).  
**After use with chemicals, if MES20 removed from pipeline, always flush out working chamber with water.**  
Ensure wobble disc roller pin (20-5D) is in place, shutter plate (20-5B) is refitted  and the square O'ring chamber gasket (20-6) is also positioned. 
- Re-assemble flowmeter 
- **Always perform a calibration check of the flowmeter after any service.**



# MES20 Flowmeter - Maintenance



- **Abrasive particles** can wear out the chamber and create inaccuracy over time (detect this through calibration checks).  
In Australia, the admixture standard allows  $\pm 5\%$  tolerances. (AS-1379).
- Liquids should be **free of particles** to increase the accuracy life of the chamber to 20+ years – use **filters** if necessary.  
**(or use a Filter or AMM20 or KMS magflows –no moving parts)**
- **A calibration check** is recommended every 6 to 12 months (admixtures only).
- **If calibration is within +/- 3 to 4% there is no need to inspect the working chamber.**
- If  $5\% >$  then if required, **clean chamber** parts in warm detergent water or diluted acid 5:1.
- If after cleaning still out of tolerance, **then replace chamber** if out by more than 5%.  
(or change K-factors on input device).
- After use with chemicals, **if MES20 is removed** from pipeline, be sure to **flush out working chamber** with water.
- To **avoid water damage to electronics**, ensure all cable entry glands are secure, cables are looped downwards and the meters are under cover and not prone to flooding.
- Treat underside of pulseheads with care – **do not deform** the copper face.
- **After any service perform a calibration check of meter.**

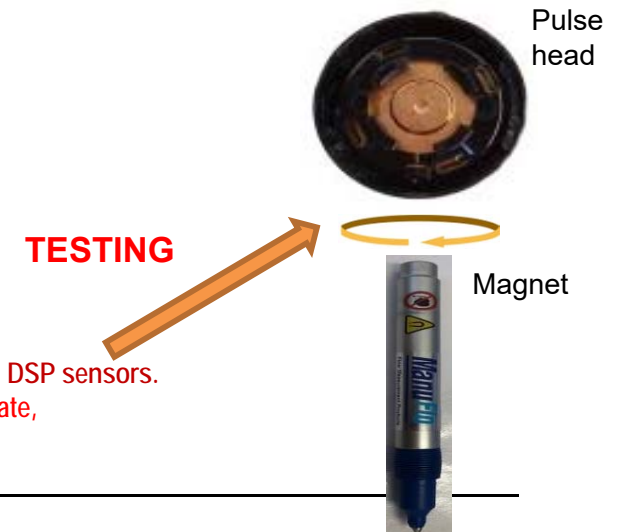
## MES20 – Introducing Upgraded Flowmeters MES20N

Specification Parameter	Original Models MES20 (since 1995)	New Models MES20N (from May 2018)	Difference	Inter-changeable MES20 ↔ MES20N
Insertion length end to end	191 mm	191 mm	None	Yes
Connection thread	¾" BSP	¾" BSP	None	Yes
Pulse Head & resolution LCD head	Transistor, 1000 PPL Reset Total &/or Flow Rate	<b>DIGITAL-DSP</b> , 1000 PPL Reset Total &/or Flow Rate	None None	Yes (same pulse head) Yes (same LCD head)
Performance (Full range)	Acc. +/- 1.5%, Rate: +/- 0.2%	Acc. +/- 1.5%, Rate +/- 0.2%	None	Yes
Measuring chamber type	Nutating disc with shrouded mag.	Nutating disc with shrouded mag. Improved chamber	Slightly lower dome height but with <b>Faster Flowrates</b>	No
Meter body / base plate / base sealer gasket ring	Gun metal / nylon / NBR rubber	Gun metal / nylon / NBR rubber	Slightly lower height size, lighter weight.	(YES – for some parts)

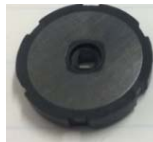
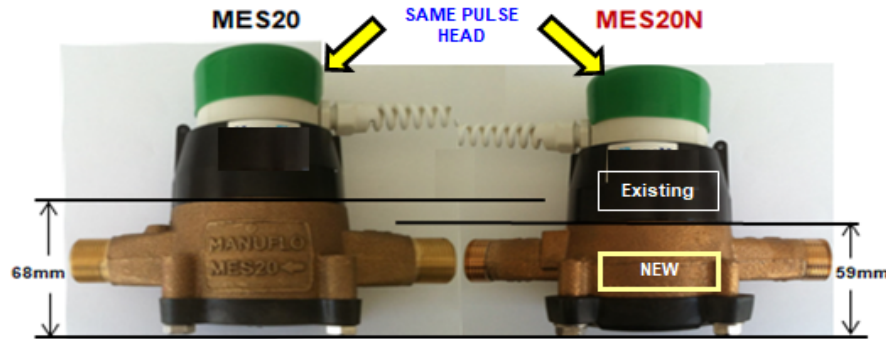
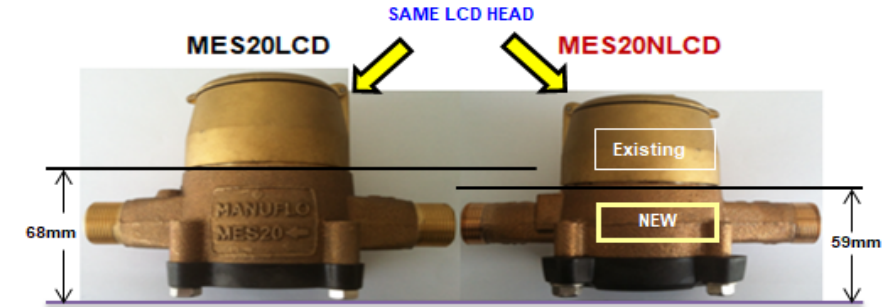
New: Digital Smart Pulse "DSP" technology (vibration free) Pulsehead from Sept-2018 as standard  
(Added features: Optional bi-directional pulse, forward/reverse pulse, pulse division programmable option e.g. 100ppl).

### F.A.Q.

- Q) The existing MES20 flowmeters work well, why are ManuFlo introducing a new model?
  - A) The Meter body is lighter weight & chamber section of the flowmeter has been upgraded. Model 'N' is a compact improved design with better manufacturing uniformity for mass production with lower cost spare parts.
- Q) Can a current model MES20 be swapped out in their entirety for the new 'N' models?
  - A) Yes this is a like for like exchange, with same threaded connections & insert length so no pipe mods. needed.
- Q) What if you want to swap a pulse head or LCD head from the new MES20N to an old MES20/LCD & vice versa?
  - A) No problem exactly the same pulse head & LCD head is used in the N versions with turn/snap fit coupling.
  - B) For testing the pulse-head you can no-longer "shake" it to generate pulses (old model), you need a Magnet to activate the internal DSP sensors. (Instead of shaking pulsehead, just approach the underside of the pulse head with pen/stick magnet (or chamber magnet) and rotate, this will generate pulses for testing).
- Q) Can I use any of the internal measuring chambers from the new 'N' models in an MES20 & vice versa?
  - A) Generally No, however we will be keeping metering section spares of the existing MES20 for atleast the next 10 yrs. (Note: Base plate, base and chamber gaskets, chamber base, shutter and roller, S/S screws interchangeable).



## MES20 flowmeters –new improved body model **MES20N-(DSP)-OC** + digital smart pulse



Existing

NEW = "-N"

### New MES-DSP options / field issues.

There are confirmed reports of some MES-DSP pulseheads not being compatible with ManuFlo ME2000/08 and ME995 equipment systems. This is due to internal pull-up resistor fitted.

From December 2019 the MES20-DSP-OC (open collector) version will be supplied to solve any further field issues.

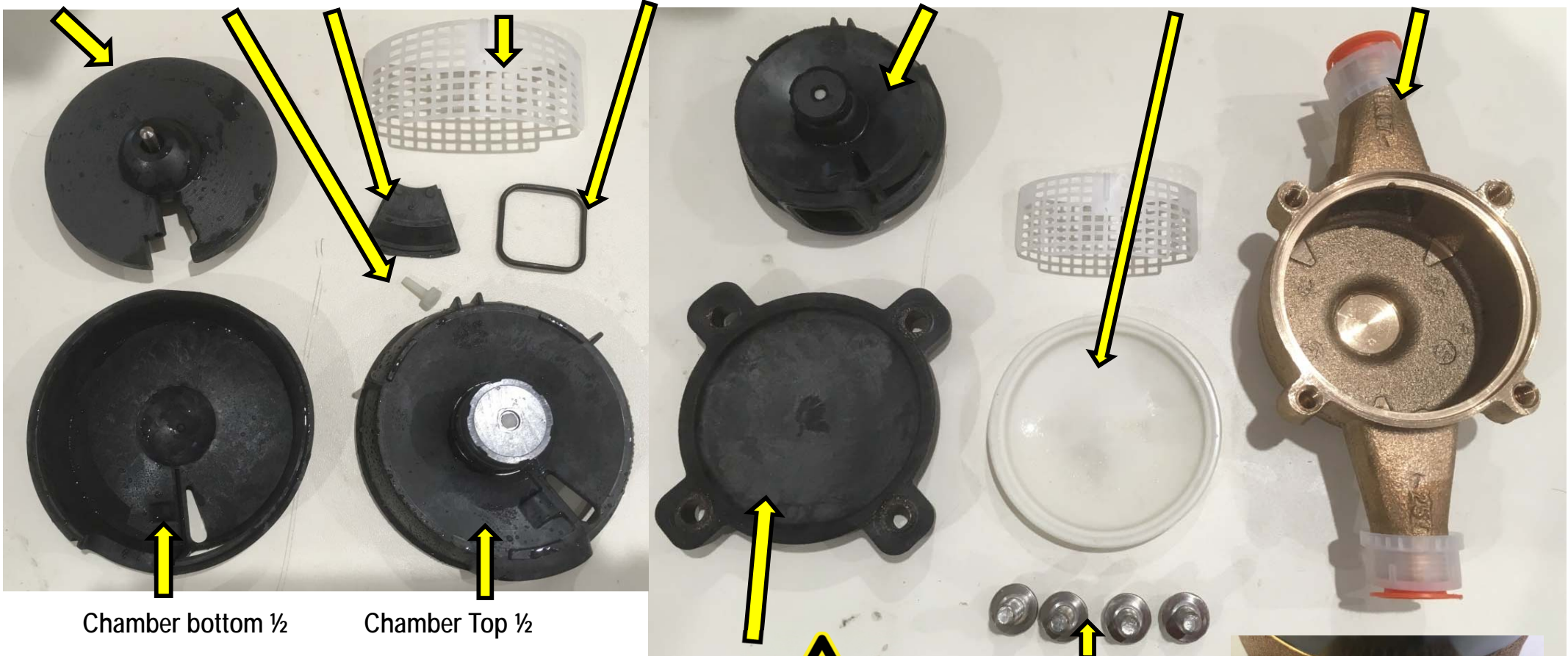




May 2018

# MES20-N flowmeter: Body & Chamber Parts Dissected

Nutating disc., Roller, Shutter Plate, Filter Spacer, Chamber Gasket, 20-5N complete chamber, Bottom body gasket, Body casting



Chamber bottom 1/2

Chamber Top 1/2

Base Plate,

S/S310 /316 screws x4

Isolated cases (AEA) shrinkage of white rubber base gasket.

Then order new:-  
EDPM black base gasket  
Part # 20-7-E

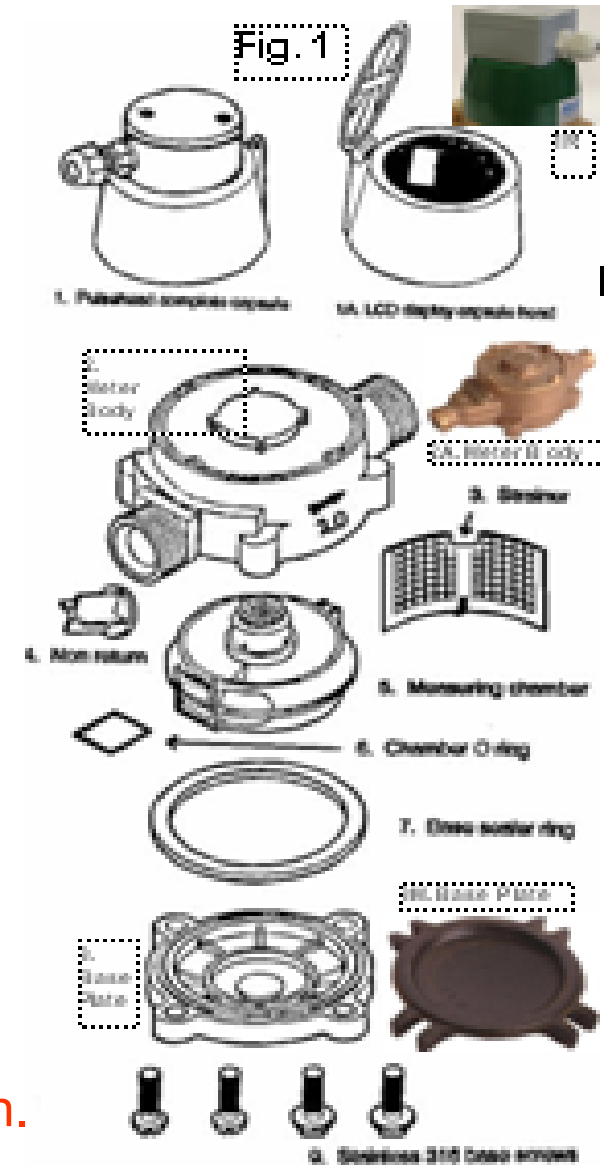


Fitted as standard **MES20-NE**



# MES20 Flowmeter – Chamber Access

- (1) Rotate or remove meter body from pipe.
- (2) Unscrew the 4 base screws



- (3) Remove baseplate and base seal ring.
- (4) Using long nose pliers, pry and pull out white strainer/locator, so unlocking the measuring chamber assembly.

**\*Note: Don't lose strainer, as it also acts as a spacer/positioning element.**

**For any body gaskets that swell, replace with EDPM/VITON option.**

# MES Flowmeters - Components

Genesis of the MES flow measuring chamber. Part # 20-5 for 20mm size



**Original Ferrite Magnet**  
(White driver shaft)  
Discontinued old



**CBM magnet**



**Ceramic Magnet (-CSM)**  
(Black driver shaft)  
For upgrade of old chambers



**MES20 standard meter**  
**Ceramic-Barium Magnet c/w**  
**Plastic Shroud** (White driver shaft)



**MES20-N compact profile**  
**flowmeter chamber with**  
**Ceramic-Barium Magnet Shroud.**

latest

Superseded to -

Over the last 50 years ingredient composition of liquid chemical admixtures have changed. ManuFlo as a result have also introduced improvements in material technology to maintain compatibility and suitability of use.

From 1<sup>st</sup> July 2016: MES20 flowmeters measurement chambers are fitted with Ceramic-Barium Magnet Plastic Shroud magnet, the latest magnet technology to cater for many liquid additives.

From July 2019 the new MES20-N lower profile meter was introduced and in Jan.2020 with new MES20-NE EDPM seal.



Fitted as standard **MES20-NE**



# MES20 Flowmeter - Spares

For MES spare parts, the Product Code format is “*size-code*”

e.g. “20-5” is a spare measuring chamber for a 20mm size MES flowmeter

e.g. “25-5” is a spare measuring chamber for a 25mm size MES flowmeter

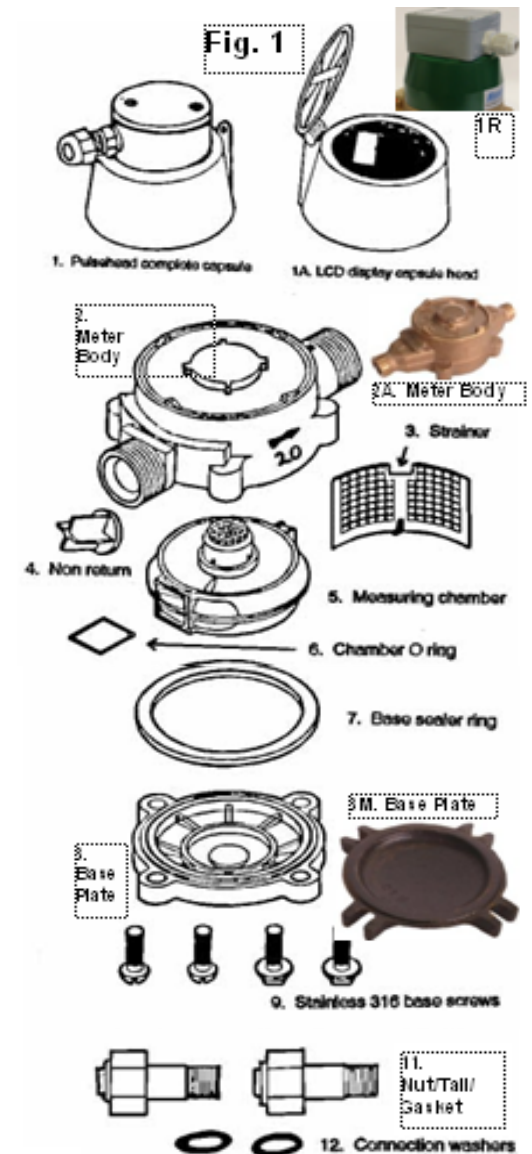
Part No.	Description
1	Pulsehead complete NPN output (Round junction box)
1R	Pulsehead complete REED output (Square junction box)
1A	LCD Litres display capsule
1B	LCD Litres dec. pt display capsule
2	Meter body(old type) *
2A	Meter body(new type, coupling-free) *
3	Strainer
4	Non-return valve
5	<b>Measuring chamber (complete)</b>
6	Chamber O-ring
7	Base sealer ring
8 or 8M	Base plate (8: plastic, 8M: metal)
9	Stainless 316 base screw
11	Nut/Tail/Gasket connection kit (pair)
12	Connection washer (each)
13	Oval flange kit (pair)
BC	Chamber and Body (parts 2 to 9)
20-5-S	Special Ryton-MTL Chamber chemical/petroleum resistant



**NEW Compact Chamber**  
20mm size: Part # 20-5-N



**Measuring Chamber**  
20mm size: Part # 20-5



\* body comes without measuring chamber and without any couplings.



# MES Flowmeters – Summary points

## MESLCD Resettable range pictured



### Advantages

- High resolution PD measurement
- Ideal for admixtures
- Internal Battery powered, no external power required, so is ideal in remote sites.
- Simple and cost effective.
- Sizes 20 to 40mm

## MES-P Pulse-output range pictured



### Advantages

- High resolution PD measurement for accurate batching.
- Accuracy largely un-affected by S.G changes
- Ideal for admixtures (used worldwide)
- Safeties can be added via other equipment e.g. ME Batch Controllers, ME2008, PLC/Computer.
- Simple and cost effective. Sizes 20 to 40mm
- With new DSP Digital Smart Pulse –scalable
- **VIRTUALLY VIBRATION FREE**

MES20



MES20-N



# Flowmeters – Summary Advise

- Always perform a calibration check after any service.
- For admixtures we recommend a calibration test in 1 year cycles.
- MES pulseheads can be swapped between different flowmeter body sizes provided the **Pulses per Litre setting** is changed accordingly in the ME2000 / ME2008 / ME3000 / ME995-7 / UIC or other scalable devices.
- All ME995 Batch Controllers (except ME995-7 and ME3000) are only for use with MES20 / AMM15-20 / or other 1000ppl flowmeters (because of the fixed 1 pulse/1ml. input needed to Batch Controller).
- Never swap LCD display heads between different flowmeter body sizes (display counts will not represent actual volume as they are pre-calibrated to the specific size meter).
- If in doubt, call ManuFlo.



# 6. Achieving Faster Delivery/Volume Rates

## Advantages and Considerations

### Advantages

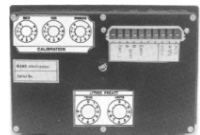
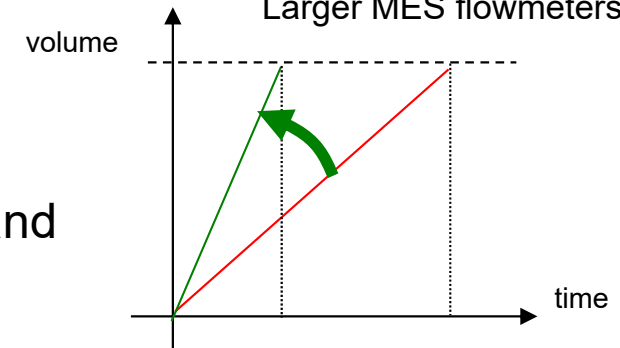
- Faster delivery rates.
- Can upsize MES20 flowmeter to MES25, 32, 40 or 50mm.
- Can use AMM/KMS Electromagnetic Flowmeters (faster max flows, no blockages, virtually maintenance free).

### Considerations

- Must upsize flowmeter or swap out to magflows or upsize pumps and upsize pipe diameters.
- Increased costs incurred
- Possible lower resolution - flowmeter pulse may represent a larger liquid unit quantity e.g. MES20 = 1000 pulse/Litre, MES25 =555 pulses/Litre.
- Accuracy can suffer if small quantities are attempted batched quickly.
- Not suitable with standard Batch Controllers models ME995-1 to ME995-6 (they are for MES20 1000ppl flowmeters). **For larger flowmeters, use only Batch Controllers ME995-7, ME995-7D, ME995-7D-S or ME3000 with K-factor calibration adjustment**, or use ME2000, or UIC Interface cards to interface to computer.
- If injecting into water line, flowmeter selected must deliver the admix within the time cycle prior to end of water batch cycle



Larger MES flowmeters

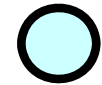


# Plumbing Install Guide (Admixtures)

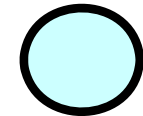
## Selection of Pipeline Diameters



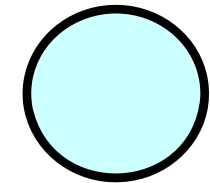
▶ For low flowrates and small batch quantities of liquid (approx < 2000mls), use 1/2" diameter pipe or hose (after the flowmeter).



▶ For medium to high flowrates, use 3/4" to 1" diameter pipe.



▶ For very high flowrates, use 1 1/4".



NOTE: Pipeline can be

- Flexible reinforced hose (NOT flexible expandable soft hose)
  - Rigid PVC
  - Metallic
- For higher density chemicals, higher head requirements or injecting into water lines, consider positive displacement pumps to maintain or increase flowrates.
  - **For faster flow, consider larger flowmeters (MES25, MES32, MES40. or Magflows)**



# Dispensing options for ADMIXTURE into concrete mix

## 1.

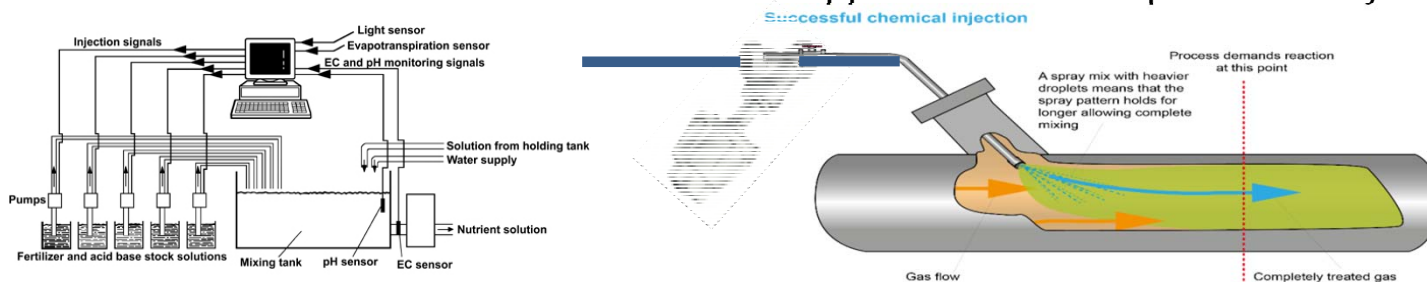
### Admixtures injected into the waterline –within the flowmetered water batch time cycle.

Admixture lines can be plumbed into the waterline and admixture sequenced to batch during the water dump time cycle when flowmetered. (Excellent for thoroughly mixing the admix).

Bigger admix flowmeters MES or MAGS sometimes required to batch with say 30 seconds.

Must use pneumatic solenoid valves at end of line near injection point to avoid syphoning issues.

Or admixture can be batched into the water hopper within the required time cycle.



## 2.

### Admixture Discharge line locations and sequencing direct to the Sok (loading point chute) of truck inlet barrel.

• For further info refer to the ManuFlo website links:-

• <http://www.manuelectronics.com.au/pdfs/Admix-Discharge.pdf>

• <https://www.ccanz.org.nz/page/Admixtures.aspx>

Discharge Line Location #	Admixture Group Discharge Sequence Requirements					
	Air Entraining Agents (a)	Water Reducers (b)	Set Retarders (c)	Mid Range Water Reducers (d)	High-Range Water Reducers (e)	All Other Products not listed on this row (f) DCI Products (g)
1. Plant water discharge pipe	Discharge the AAA when the water starts to discharge.	Start discharge after all material* enters the mixer but before the "tail-end" water is discharged.	Directly after water reducers and/or set retarders but before the "tail-end" water is discharged.	Directly after water reducers and/or set retarders but before the "tail-end" water is discharged.	Directly after water reducers, retarders and/or MRWR but before the "tail-end" water is discharged.	Directly after water reducers, type products but before set accelerators, DCI products and "tail-end" water enter the mix.
2. Central or truck mixer		Start discharge after all material* enters the mixer but before the "tail-end" water is discharged.	Directly after water reducers and set retarders but before the "tail-end" water is discharged.	Directly after water reducers and set retarders but before the "tail-end" water is discharged.	Directly after water reducers, retarders and MRWR but before the "tail-end" water is discharged.	Directly after water reducers, type products but before set accelerators, DCI products and "tail-end" water enter the mix.
3. Water-holding tank	Not Recommended!	Into the water-holding tank as the tank is filling and before the tank starts to discharge.	Into the water-holding tank after the water reducers and set retarders and before the tank starts to discharge.	Into the water-holding tank after the water reducers and set retarders and before the tank starts to discharge.	Into the water-holding tank after the water reducers and set retarders and mid-range water reducers and before the tank starts to discharge.	Not Recommended! Not Recommended!

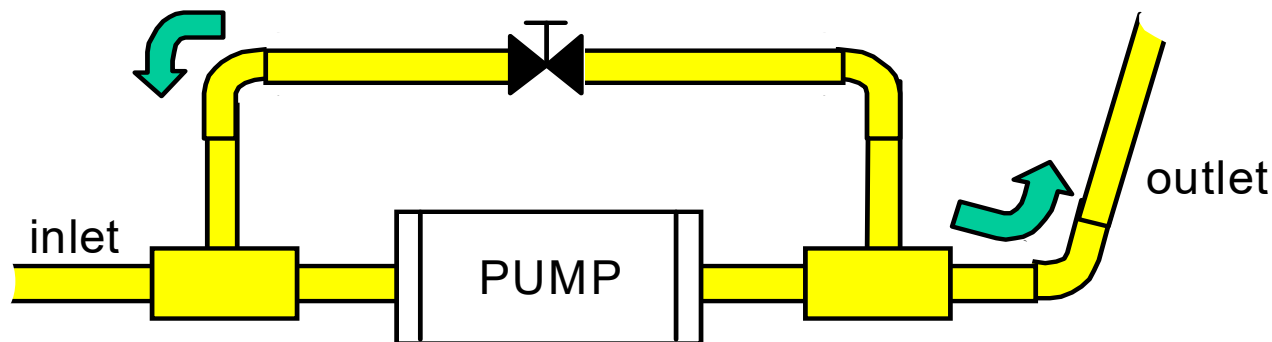


# Pump Selection -Admixtures

- ▶ When 20mm MES20 flowmeters are used with fluids of specific gravity 1 - 1.25, then use **centrifuge pumps** of 0.5 - 1 horse power (e.g. 1" Onga 413 or Davey SJ35-04 pumps. When using larger capacity flowmeters, a proportionally larger pump will apply). A flowrate upto 1.0 Litre per second can be achieved, depending on head height. You can restrict pump speed without damage to these type of pumps.



- ▶ For higher density fluids, **positive displacement (PD) pumps** or other types of positive displacement pumps (e.g. Mono) are more suitable. Because of the pressures generated by PD pumps, the flow is best controlled by using an inlet-to-outlet bypass flow valve to recirculate the flow line. (can push air)



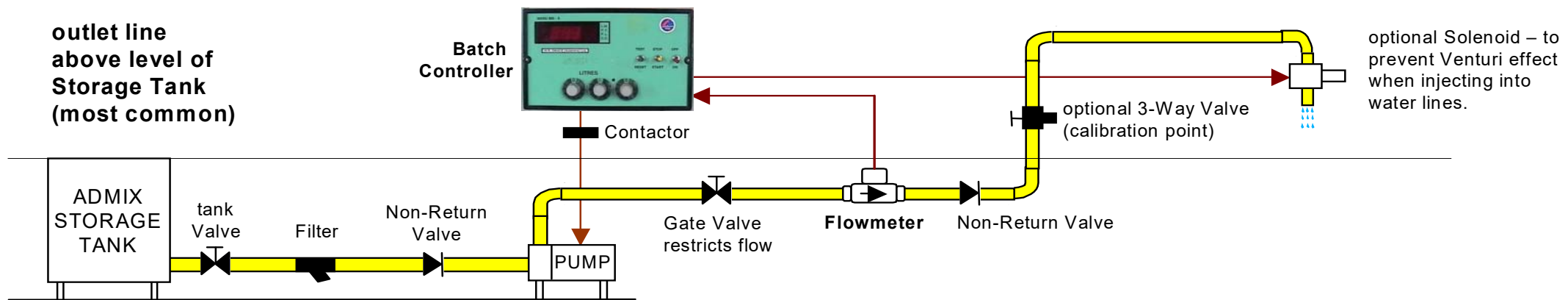
**Note:** This method of restriction of flow eliminates air being counted by MES flowmeters when admix storage tank is empty.

# Plumbing Install Guide (Admixtures)

## Typical admixture dispensing system setup with MES flowmeters

If the outlet point is above the top of the storage tank (the most commonly used setup), you will at least require the following equipment:

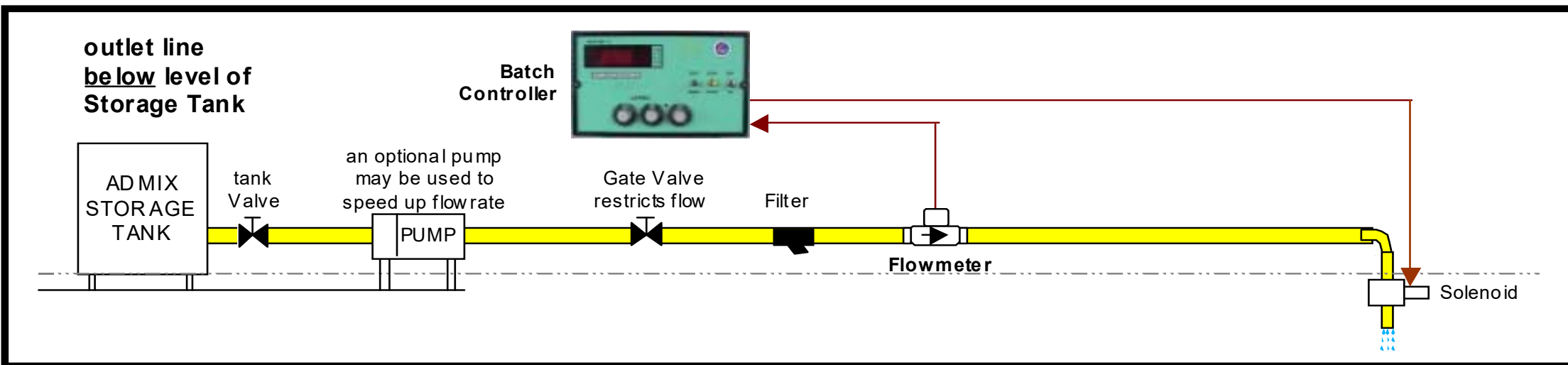
- A pump,
- Non-return valves or spring loaded check valves (12psi),
- Flow restriction gate or ball valve, a flowmeter with pulse output and, optionally:
  - A solenoid valve (air-assisted ball valve type) for instant shut off of flow, recommended to prevent the Venturi effect when injecting into water lines, but may not be required if the installation has reasonable head height.
  - A 3-Way Valve to provide an easily accessible calibration point.



# Plumbing Install Guide (Admixtures)

If the outlet point is below the level of the storage tank, then the equipment you will at least require is:

- a flow control solenoid valve,
- a flow restriction gate or ball valve, and
- a flowmeter with pulse output.





# Operational Issues - Piping

Common causes of batch overrun:

- Flowmeter is clutching, or chamber is worn out.

Clutching can cause more liquid to be dispensed than is measured, but if significant then the ME995 or ME2008 Systems will Pulse Fail consistently.

- clean or replace chamber.

- After flowmeter, any restriction (e.g. valve) at end of flexible hose will allow expansion of hose line in hot conditions, introducing a contraction/expansion “squeegee” effect that affects the amount dispensed at the end of a batch.

- move restriction to before flowmeter;

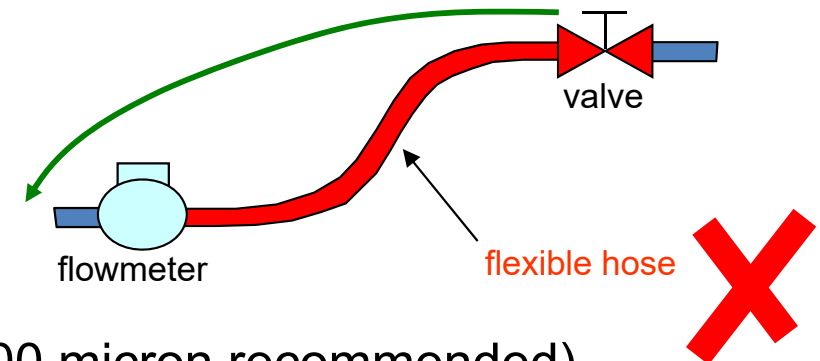
- use rigid/reinforced hose/pipe.

- Fluid particles block meter.

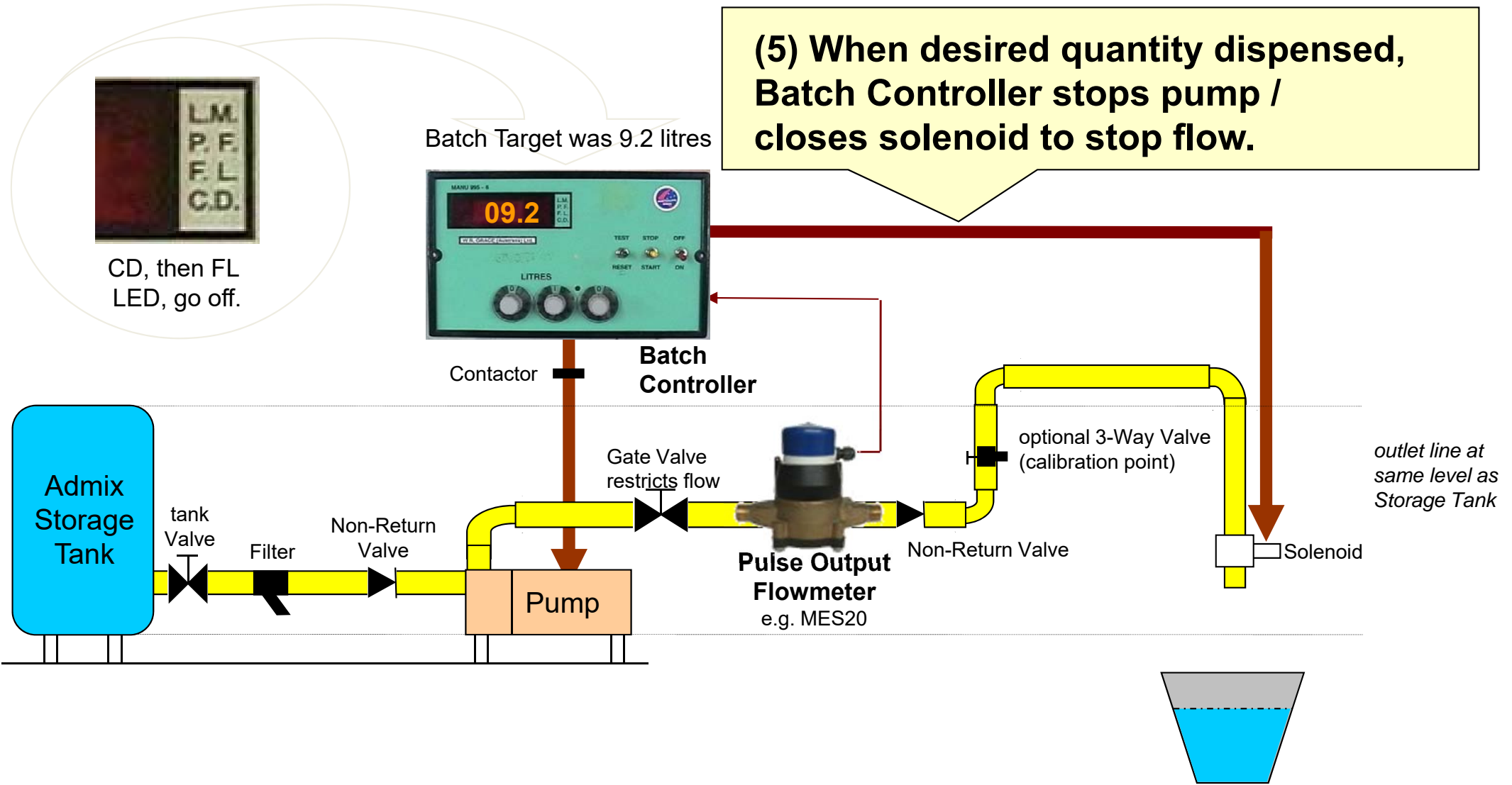
- clean measuring chamber;

- install filter prior to flowmeter (800 – 1000 micron recommended).

- or replace with MAGFLOWS



# Semi-Automatic Batching



# Batch Controller Calibration Test



## Volumetric Calibration Test should be performed when commissioning installation

- place a **calibrated vessel** at the discharge point
- on the Batch Controller, **select an amount** of liquid e.g. 1000 mls.
- press Reset, then Start to **batch** the quantity
- at the calibrated container, **check** that the amount dispensed is as requested.

An overflow may occur due to the inability of the pump to stop instantly. The amount of overflow will depend on how fast the liquid is being dispensed and/or the closing time of the solenoid valve. The Batch Controller will count the overflow as part of the displayed total dispensed.

- if the system is totally controlled via PLC/Computer, overflow will be adjusted by the computer; otherwise,
- where a ME995 series Batch Controller is fitted with a Preact, simply set the Preact to the amount of overflow i.e.  
overflow =  
(actual amount dispensed, as shown on the Batch Controller display)  
minus (amount requested).

If required:

- slow down flow velocity by using a restriction gate valve;
- avoid over-batching by using the Preact function, or installing a quick-acting solenoid valve.



**Note: If the flow is restricted excessively, Batch Controller Pulse Fail circuitry will shut down the system for safety reasons, in which case open up the restriction gate valve.**

# Batch Controllers - Maintenance

- A calibration check should be performed periodically (say every 6-12 months).
- Return for service after 5-10 years, especially for manual plants.
  - In winter, liquid can thicken because of the cold, and so can flow slower.  
If Pulse Fail continually occurs in winter on a ME995 series Batch Controllers (Even ME2008's), **THROTTLE UP PUMP SPEED** or adjust the pulsefail flowrate timing (T1).



Note: The ME3000 Batch Controller (and ME2008) are programmable, so do not require any hardware modifications.



# Pulse Output Resolution Guide (DC input)

## BEST OUTPUT PULSE RESOLUTION VALUES

with MES flowmeters to DC input CommandBatch Computers

Model	Size	Pulse Output value	Max Safe Flowrate not to exceed computers Current DC digital input count limit speed of 35-40Hz ( & flowmeter max) (set in Max. Out Rate) ↓		
MES20	20mm	<b>10 mls per pulse</b>	0.4 litres/sec.	24 litres/min.	40hz
"	"	<b>20 mls per pulse</b>	0.8 litres/sec	48 litres/min.	40hz
"	"	<b>25 mls per pulse</b>	1.0 litres/sec	60 litres/min.	40hz
"	"	<b>30 mls per pulse</b>	1.2 litres/sec	72 litres/min	40hz
"	"	<b>40 mls per pulse</b>	1.40 litres/sec	84 litres/min	40hz
"	"	<b>50 mls per pulse</b>	1.40 litres/sec	84 litres/min	40hz
MES25	25mm	<b>40 mls per pulse</b>	1.60 litres/sec	96 litres/min.	40hz
"	"	<b>50 mls per pulse</b>	1.75 litres/sec	105 litres/min.	35hz
MES32	32mm	<b>100 mls per pulse</b>	3.00 litres/sec	180 litres/min.	30hz
MES40	40mm	<b>100 mls per pulse</b>	4.00 litres/sec	240 litres/min.	40hz

NOTE: ME2000 can emit 1mls/1 pulse if PLC computer input cards have high speed input capability  
**(Output overrun is set to 35 to 40Hz to safeguard the system settings).**

FOR OTHER FLOWMETERED OPTIONS : CONSULT MANUFLO e.g. MAGFLOWS

# Pulse Output Resolution Guide (AC input)

## BEST OUTPUT PULSE RESOLUTION VALUES

with MES flowmeters to AC input CommandBatch/Eagle Computers

Model	Size	Pulse Output value	Max Safe Flowrate not to exceed computers Current AC digital input count limit speed of 14Hz (set in Max. Out Rate) ↓		
MES20	20mm	<b>10 mls per pulse</b>	0.14 litres/sec.	8.4 litres/min.	14hz
"	"	<b>20 mls per pulse</b>	0.28 litres/sec	16.8 litres/min.	14hz
"	"	<b>25 mls per pulse</b>	0.35 litres/sec	21.0 litres/min.	14hz
"	"	<b>30 mls per pulse</b>	0.42 litres/sec	25.2 litres/min	14hz
"	"	<b>50 mls per pulse</b>	0.70 litres/sec	42.0 litres/min.	14hz
"	"	<b>100 mls per pulse</b>	<b>1.40 litres/sec</b>	<b>84.0 litres/min</b>	<b>14hz</b>
MES25	25mm	<b>100 mls per pulse</b>	1.40 litres/sec	84.0 litres/min.	14hz
MES32	32mm	<b>150 mls per pulse</b>	2.10 litres/sec	126.0 litres/min.	14hz
MES40	40mm	<b>200 mls per pulse</b>	2.80 litres/sec	168.0 litres/min.	14hz

NOTE: (Output overrun is set to 14Hz to safeguard the system settings).

FOR OTHER FLOWMETERED OPTIONS : CONSULT MANUFLO e.g. MAGFLOWS

Most practical safe setting for MES20 is 50mls per pulse output for current AC inputs.  
(Allows 42 litres/min. ME2000/2008 flowrate display will indicate)

# ME2008 - Typical Settings – MES20



		big dose	big dose	AEA small dose	AEA small dose	AEA small dose	
		20mm	20mm	20mm	20mm	20mm	
Parameter		MES20	MES20	MES20	MES20	MES20	
Input (p/l)		1000.00	1000.00	1000.00	1000.00	1000.00	<u>Pulses per litres</u>
or	Output (l/p) to ac computer *#	00.100	00.050	00.050	00.020	00.010	<u>Millilitres / pulse</u>
	Output (l/p) to DC computer *#	00.050	00.025	00.025	00.010	00.005	<u>Millilitres / pulse</u>
	Min. Flow (l/s)	00.100	00.100	00.010	00.010	00.010	<u>Litres per sec.</u>
	Max. Flow (l/s) *#	01.250	00.750	00.750	00.300	00.150	<u>Litres per sec.</u>
	Dose Limit (l) #	050.000	050.00	010.000	010.000	010.000	<u>Litres</u>
	Max Backflow (l) #	000.500	000.500	000.100	000.100	000.100	<u>Litres</u>
	Difference (%)	05.0	05.0	05.0	05.0	05.0	
	Start Delay (s) #	02.0	02.0	02.0	02.0	02.0	<u>Seconds</u>
	Stop delay (s) #	02.0	02.0	02.0	02.0	02.0	<u>Seconds</u>
	Diff. Channels	1	1	1	1	1	
or	Max Out rate (Hz) to ac computer	0015	0015	0015	0015	0015	<u>Output Overrun</u>
	Max Out rate (Hz) to DC computer	0035	0035	0035	0035	0035	<u>(counts/second)</u>

# = Adjust to whatever is suitable for your application.

$$* = \text{For ac output pulses: } \frac{\text{Max. Flow (l/s)} \leq 15}{\text{Output (l/p)}}$$

$$* = \text{For DC output pulses } \frac{\text{Max. Flow (l/s)} \leq 35}{\text{Output (l/p)}}$$

# ME2008 - Typical Settings – MES (20,25,32,40mm)



Parameter		20mm	25mm	32mm	40mm	
		MES20R	MES25	MES32	MES40	
or	Input (p/l)	0061.00	555.00	0261.00	0116.00	<u>Pulses per litres</u>
	Output (l/p) to ac computer *#	00.100	00.150	00.200	00.500	<u>Millilitres / pulse</u>
	Output (l/p) to DC computer *#	00.050	00.100	00.100	00.200	<u>Millilitres / pulse</u>
	Min. Flow (l/s)	00.100	00.100	00.150	00.250	<u>Litres per sec.</u>
	Max. Flow (l/s) *#	01.100	01.800	03.000	05.500	<u>Litres per sec.</u>
	Dose Limit (l) #	050.000	100.000	100.000	150.000	<u>Litres</u>
	Max Backflow (l) #	000.500	000.500	001.000	001.000	<u>Litres</u>
	Difference (%)	05.0	05.0	05.0	05.0	
	Start Delay (s) #	02.0	02.0	02.0	02.0	<u>Seconds</u>
	Stop delay (s) #	02.0	02.0	02.0	02.0	<u>Seconds</u>
	Diff. Channels	1	1	1	1	
or	Max Out rate (Hz) to ac computer	0015	0015	0015	0015	<u>Output Overrun</u>
	Max Out rate (Hz) to DC computer	0035	0035	0035	0035	<u>(counts/second)</u>

# = Adjust to whatever is suitable for your application.

\* = For ac output pulses:  $\frac{\text{Max. Flow (l/s)}}{\text{Output (l/p)}} \leq 15$

\* = For DC output pulses  $\frac{\text{Max. Flow (l/s)}}{\text{Output (l/p)}} \leq 35$