

ALEXANDER WRIGHT

Division of G H Zeal Ltd A BS EN ISO 9001:2000 Company

**Wet Test Gas Flow Meters
Calorimeters**



WET TYPE GAS FLOW METERS TECHNICAL DATA

CONTENTS;

- [Introduction](#)
- [Corrosive gases](#)
- [Maximum operating pressures](#)
- [Operating instructions – please refer to separate Step x Step instructions](#)
- [Procedure for rectifying a leak from the stuffing box of a DM3A or DM3B Meter.](#)
- [Procedure for rectifying a leak from the stuffing box of a DM3C, D, E, F, G](#)
- [Flow rates, capacities](#)
- [Dimensions](#)

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INTRODUCTION

These Meters are of the positive displacement type. They consist essentially of a gas tight casing containing a measuring drum, with 4 separate compartments, mounted on a spindle that is free to revolve. The casing is filled to approximately 60% of its volume with water (or light oil). For "Normal principle" Meters the gas inlet is arranged so that the gas must pass through the measuring drum first; to do this each compartment of the drum must in turn be emptied of water and filled with gas, thus forcing the drum to revolve. The calibration of the measuring drum (i.e. the quantity of gas passed for each revolution) is determined by the height of the water in the casing. The normal calibration point of all Meters is shown by a water level indicating point that is visible in the sight box located on the right side of the Meter casing (see figure 3). This type of water level sight box is called a "Hyde" type and is now fitted as standard on all Meters, superseding the etched line type that was used on all DM3C to H Meters manufactured before 1995. The spindle through the drum is connected via a gearbox to a main pointer working over a dial graduated for the capacity of the Meter and to 3 small index pointers, or a revolution counter, to record the quantity of gas passed through the Meter.

The operating principle of this type of Meter is illustrated in figure 1 below.

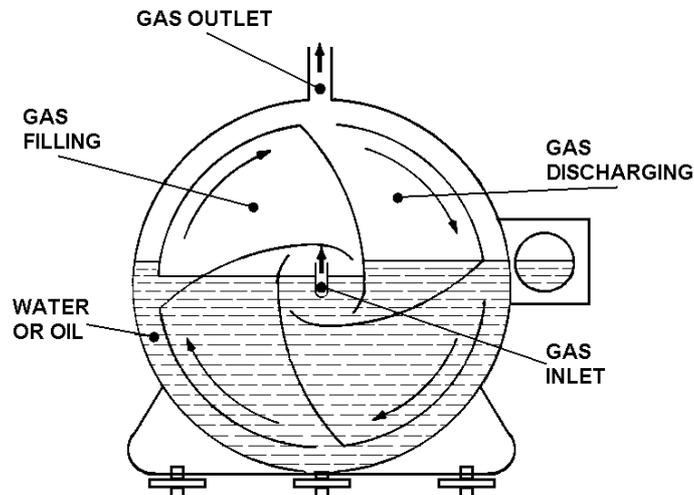


figure 1

Alternatively, some Meters are constructed on the "Hyde" principle, whereby the inlet of the Meter introduces gas into the space above the water in the outer casing and the gas must then pass through the drum to the outlet of the Meter.

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The operating principle of the "Hyde" type of Meter is illustrated in figure 2 below.

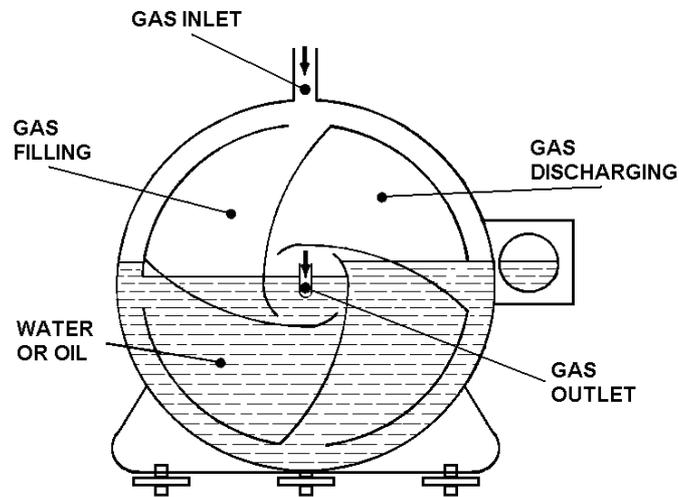


Figure 2

WATER LEVEL SIGHT BOX

The "Hyde" type water level sight box as fitted to all DM3C to DM3G Meters (since 1995) is shown in figure 3 below. Note: DM3A, DM3B Meters have sight boxes of a slightly different design.

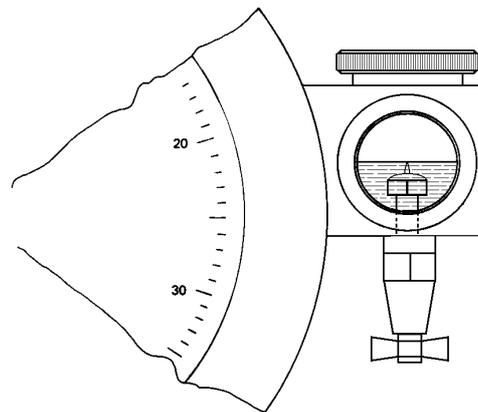


figure 3

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CORROSIVE GASES

We can coat the meter wetted parts with a corrosion inhibitor at the time of manufacture. Please let us know if you require this option. Other ways you can reduce the effects of long term corrosion;

- Do not allow the meter to stand for long periods of time with contaminated water. If the meter is to be "stood down" always empty it of water, flush through a number of times and store "dry"
- In regular use change the water on a regular basis. Contaminates will increase the acidity levels in the water and over time this will attack the meter, whatever the levels of inhibitor used.

PRESSURE CONDITIONS

The Meters are suitable for use under pressure conditions not exceeding:-

65 millibars positive or negative for Meters DM3A, DM3B

85 millibars positive or negative for Meters DM3C to DM3G.

When pressures in excess of these limits are to be dealt with it is often possible to suggest a satisfactory procedure. Full particulars of the test and proposed applications of the Meter should always be stated in enquiries.

The Meters register the volume passing under actual conditions of use, but where "free air" volumes are required the Meter pressure correction should be applied, which is very approximately 1% of the reading for every 10 millibars.

WARNING

**DO NOT EXCEED RECOMMENDED PRESSURES
DO NOT EXCEED RECOMMENDED FLOW RATES
USE EXTREME CARE WHEN DEALING WITH CORROSIVE GASES
ALWAYS SHUT OFF THE GAS SUPPLY INTO THE METER BEFORE
SHUTTING OFF THE OUTLET**

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OPERATING INSTRUCTIONS

Please refer to the separate instructions for Step by step setting up

If the gases being measured are partially soluble in water, it will be necessary to pass a quantity through the Meter sufficient to saturate the water before accurate measurements can be obtained.

When a Meter that has been filled with water is subsequently required to be filled with oil, care must be taken to ensure that all the water is completely drained and that the stuffing box packing is changed to an oil proof type.

If water should leak from the Meter between the dial bezel and the case, it means that the stuffing box cap may need tightening. See page 6 for details of the relevant procedure.

Procedure for rectifying a leak from the stuffing box of a DM3A or DM3B Meter.

Lay the Meter flat in its' back, remove the 3 screws holding the bezel in place and carefully remove it from the case. Pull the pointer off the dial then undo the 2 screws holding the dial in place. Carefully remove the dial ensuring that the 2 washers behind it are retained.

Caution: If a shaft encoder is fitted to the Meter ensure that the encoder disc is not damaged during handling of the gearbox.

Hold the index gearbox in one hand, remove the screws and washers at either side and carefully lift it out. If a shaft encoder is fitted to the gearbox, note the orientation of the encoder connector before disconnecting it.

The stuffing box cap should then be turned clockwise until it is tight, then turned back anti-clockwise slightly. If the stuffing box cap is already tight or tightening it does not stop the leak, remove the cap, pack a small amount of petroleum jelly into the stuffing box, then replace the cap and tighten it down clockwise. When the cap is tight it should be turned back anti-clockwise slightly, and any surplus petroleum jelly should be wiped off.

The parts should then be refitted as follows;

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Turn the gear on the back of the index gearbox so that the last digit of the digital counter is 0. If a shaft encoder is fitted to the gearbox, re-connect the connector in the same orientation as noted above. Refit the gearbox, fixing screws and washers to the Meter then tighten the screws until the gearbox is just free to move on the slotted holes. Next move the gearbox sideways as necessary to ensure that the gear on the back of the gearbox only just meshes with the gear on the drum spindle. **It should be noted that a small amount of play between the gears is essential for free rotation of the drum.** Once the gearbox position is established, tighten the fixing screws fully home. Next refit the dial and fixing screws, ensuring that there is a washer between the dial and the gearbox on each screw hole. Check that the last digit of the index counter still shows 0, (turning the gear on the back of the gearbox if necessary), then push the pointer onto the shaft so that it points to the top of the dial (0.25 or 1.0 depending on the Meter model). Refit the bezel, tightening the screws finger tight, **do not over-tighten.**

Run the Meter checking that the pointer turns smoothly. If the pointer stops turning or hesitates re-set the alignment of the gearbox as above. If the Meter still leaks it should be returned to our works for repair.

Procedure for rectifying a leak from the stuffing box of a DM3C, D, E, F, G

For DM3C & D Meters remove the 3 screws holding the bezel in place and remove the bezel. For DM3E to G Meters the bezel is held in place by clips so it will be necessary to insert a large flat screwdriver between the bezel and the case and carefully lever it out.

Hold the dial and index gearbox assembly in place with one hand and undo the 3 retaining nuts (1 at the top and 1 each side near the bottom). Carefully withdraw the assembly straight out, until the pin on the gearbox drive arm is out of the fork on the drum shaft. If a shaft encoder is fitted to the gearbox, note the orientation of the encoder connector before disconnecting it. Lay the gearbox assembly very carefully **dial face down** on some soft material.

Warning: Irreparable damage can be caused to the index drive pin and arm if the assembly is placed dial face upwards.

The stuffing box cap should then be turned clockwise until it is tight, then turned back anti-clockwise slightly. If the stuffing box cap is already tight or tightening it does not stop the leak, remove the cap, pack a small amount of petroleum jelly into the stuffing box, then replace the cap and tighten it down clockwise. When the cap is tight it should be turned back anti-clockwise slightly, and any surplus petroleum jelly should be wiped off.

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The parts should then be refitted as follows:-

If a shaft encoder is fitted to the gearbox, re-connect the connector in the same orientation as noted above. Carefully locate the pin on the gearbox drive arm in the fork on the drum shaft, locate the 3 holes in gearbox mounting arms onto the index pillars making sure that the pin does not come out of the fork. Hold the gearbox in position, refit the 3 nuts and tighten them down. Turn the large pointer on the dial both ways ensuring that there is some resistance, if the pointer turns freely one way but not the other, check that the pin is securely located in the fork as above. The bezel can now be re-fitted. If the Meter still leaks it should be returned to our works for repair.

WET TYPE LABORATORY GAS FLOW METERS

Flow rates

Model Ref. No.	Measuring Drum Capacity	Dial Capacity per Rev.	Minimum Dial Division	Maximum Registration	Normal hourly rate accuracy within $\pm 0.25\%$ fsd	Minimum* hourly rate accuracy within $\pm 0.5\%$ fsd	Maximum* hourly rate accuracy within $\pm 0.5\%$ fsd
DM3A	dm 0.5 ³	0.25 dm ³	0.005 dm ³	99,999.9 dm ³	60 dm ³	30 dm ³	90 dm ³
DM3B	dm 1.0 ³	1.0 dm ³	0.01 dm ³	99,999 dm ³	120 dm ³	60 dm ³	180 dm ³
DM3C	dm 2.0 ³	1.0 dm ³	0.01 dm ³	3 Dial cumulative index 10 dm ³ , 100 dm ³ , 1m ³	240 dm ³	120 dm ³	360 dm ³
DM3C 2.5	2.5 dm ³	2.5 dm ³	0.02 dm ³	3 Dial cumulative index 25 dm ³ , 250 dm ³ , 2.5m ³	300 dm ³	150 dm ³	450 dm ³
DM3D	dm 5.0 ³	10.0 dm ³	0.1 dm ³	3 Dial cumulative index 100 dm ³ , 1m ³ , 10 m ³	600 dm ³	300 dm ³	900 dm ³
DM3E	dm10.0 ³	10.0 dm ³	0.1 dm ³	3 Dial cumulative index 100 dm ³ , 1m ³ , 10 m ³	1.2 m ³	600 dm ³	1.8 M ³
DM3F	dm20.0 ³	10.0 dm ³	0.1 dm ³	3 Dial cumulative index 100 dm ³ , 1 m ³ , 10 m ³	2.4 m ³	1.2 m ³	3.6 M ³
DM3G	dm50.0 ³	100.0 dm ³	1.0 dm ³	3 Dial cumulative index 1 m ³ , 10 m ³ , 100 m ³	6.0 m ³	3.0 m ³	9.0 M ³

- Maximum & Minimum rates are intended as a guide only.
- All meters can be calibrated outside these values. Please contact our technical sales dept.

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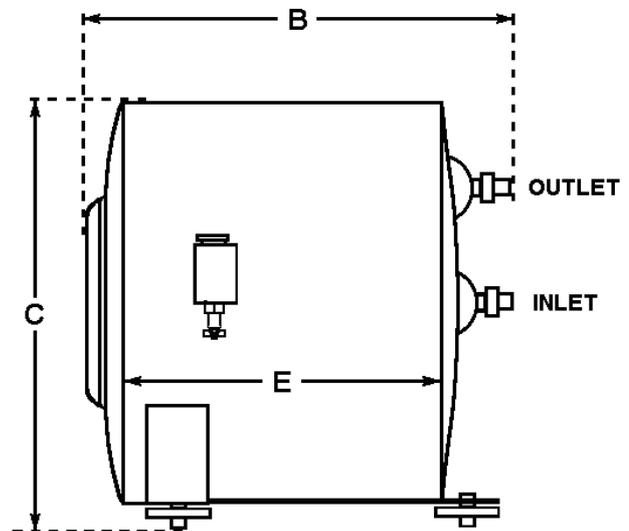
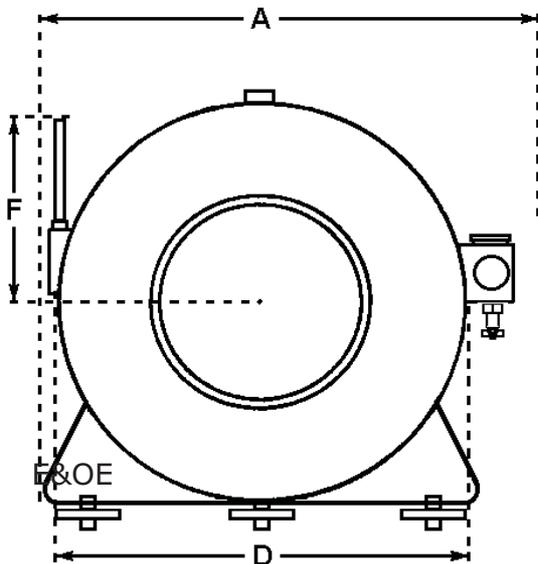
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APPROXIMATE DIMENSIONS

Model Ref. No.	A	B	C	D	E	F	Weight (Kgs)	Approximate Quantity of Filling (litres)
DM3A,	23 cm	19 cm	24 cm	16 cm	15 cm	n/a	3.5	1.2
DM3B	23 cm	22 cm	24 cm	16 cm	18 cm	n/a	4.0	1.8
DM3C	33 cm	28 cm	32 cm	23 cm	21 cm	22 cm	6.0	4.2
DM3D	33 cm	34 cm	32 cm	23 cm	25 cm	22 cm	7.0	6.4
DM3E	42 cm	37 cm	39 cm	31 cm	31 cm	25 cm	10.0	17.5
DM3F	56 cm	52 cm	53 cm	45 cm	40 cm	28 cm	17.0	39.5
DM3G	64 cm	69 cm	62 cm	49 cm	52 cm	31 cm	32.0	64.7

Drawings are representative only and not to scale



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