



## Introduction

Tri-gear Flowmeters are precise, reliable and rugged instruments for the volumetric flow of liquids in general industrial, petroleum and chemical applications that require high degrees of accuracy and repeatability. They operate on the Positive Displacement principle using advanced gear technology and offer a competitive alternative to their Oval Gear, Sliding Vane and Bi-Rotor alternatives.

## Principal of operation

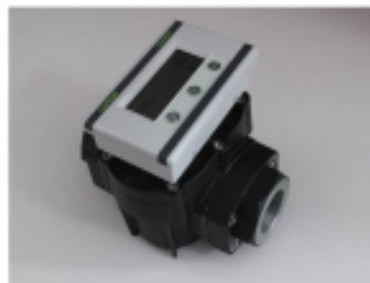
Liquid Passes into the single case measuring chamber and displaces two Tri-gears. Each rotation of a Tri-gear is proportional to a discrete unit of volume, in turn, the speed at which the gears rotate is directly proportional to flowrate. Reed and Hall Effect sensors mounted outside the pressure boundary detect the movement of the Tri-gears, thus allowing local or remote instruments to display flow total, rate of flow or facilitate batching applications.

Meters can be fitted with additional sensors to provide in phase or out of phase signals for applications such as bi-directional flow.

The Tri-Gear based flowmeter outperforms its competitors when it comes to the accurate metering of the majority of clean liquids including Solvents, Alcohols, Fuels, Oils, additives, chemicals, food bases, paints and viscous emulsions whether pumped or gravity fed. Additionally it is an excellent, higher accuracy replacement for transmitting variable area (Rotameter) flowmeters.

## Benefits

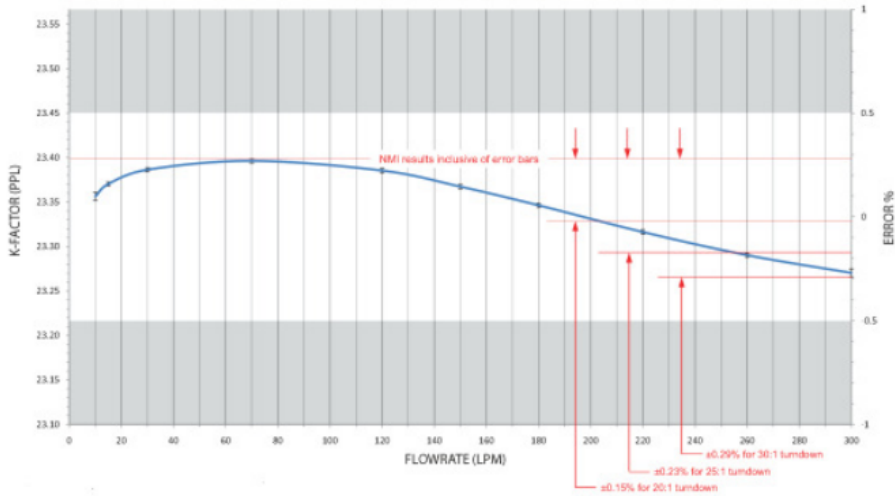
- High Resolution Digital Output
- Wide Rangeability
- Bi-directional flow capability
- Digital or Analogue Outputs available.
- HART Output option.
- Less slippage than oval gear meters.
- Smoother and quieter than Oval Gear Meters.
- Dual Output standard (reed and hall effect)
- Low Mass Tri-gears facilitate fast response time to step changes in flowrate.



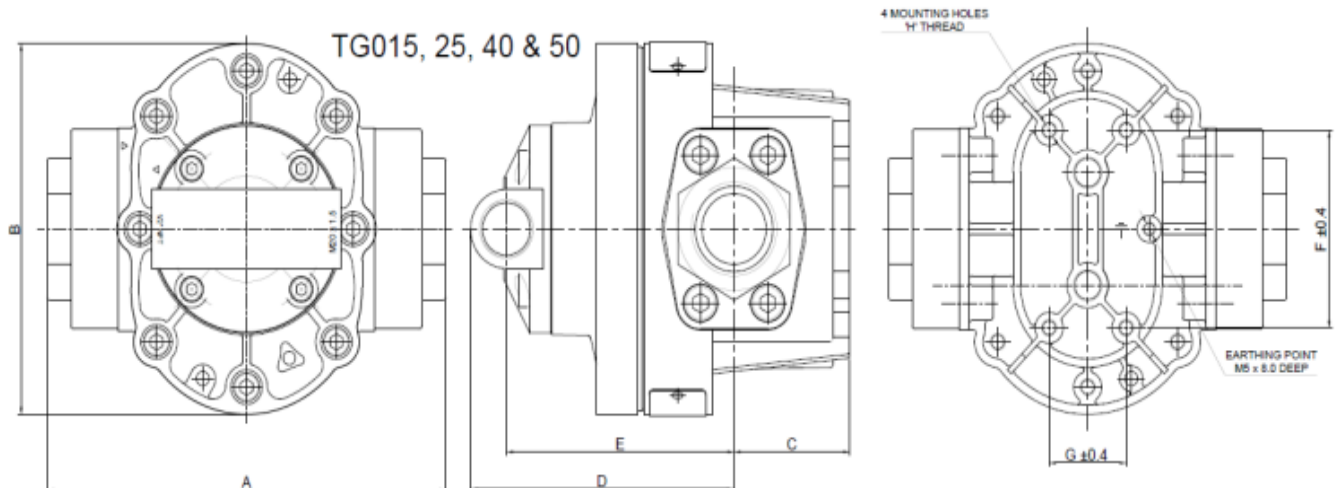
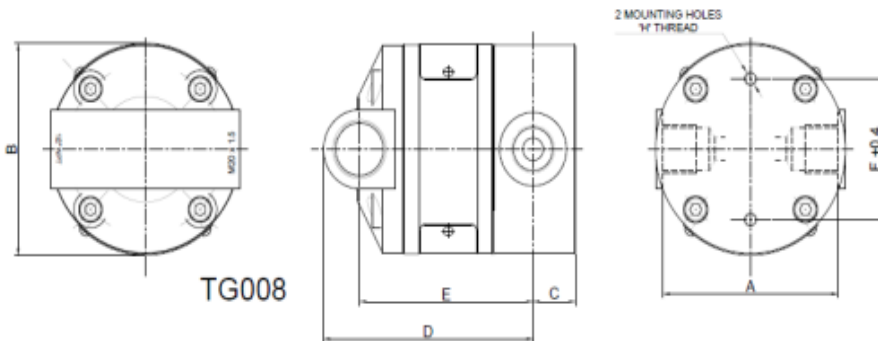
## Performance and Specifications

Model prefix:	TG008	TG015	TG020	TG025	TG040	TG050
Capacity group:	small capacity	medium capacity				
Nominal size (inches)	8mm (3/8")	15mm (1/2")	20mm (3/4")	25mm (1")	40mm (1.5")	50mm (2")
*Flow range – litres/min – US gal/min	0.25 ~ 9.2 0.07 ~ 2.4	1-40 0.3 ~ 10.5	2 ~ 50 0.6 ~ 13	5 ~ 150 1.3 ~ 40	10 ~ 250 2.6 ~ 66	20 ~ 500 5 ~ 132
**Accuracy @ 3cp	± 0.5% of reading	± 0.25% of reading (15:1 turndown), ± 0.5% of reading (25:1 turndown)				
Repeatability	typically ± 0.01% of reading					
Temperature range	-20°C ~ +120°C (-4°F ~ +250°F), refer factory for lower & higher temperatures					
<b>Maximum pressure (threaded meters) bar (PSI)</b>						
Aluminium meters	30 (440)					
316 Stainless Steel meters	34 (495)	30 (440)				
High Pressure models	refer factory					
<b>Electrical – for pulse meters (see below for optional outputs)</b>						
Output pulse resolution	Pulses/litre (pulses/US gallon) – nominal					
Reed Switch and Hall Effect	670 (2546)	77 (292.6)	77 (292.6)	33.5 (125.4)	11.5 (43.7)	6.5 (24.7)
High Resolution Hall / Quadrature	1340 (5092)	154 (585.2)	154 (585.2)	67 (254.6)	23 (87.4)	13 (49.4)
Reed Switch output	30Vdc x 200mA max. (maximum thermal shock 10°C (50°F)/minute)					
Hall Effect output (NPN)	3 wire open collector, 5 ~ 24Vdc max., 20mA max.					
Optional outputs	4 ~ 20mA, scaled pulse, quadrature pulse, flow alarms or two stage batch control					
<b>Physical</b>						
Protection class	IP66/67 (NEMA4X), integral ancillaries can be supplied Intrinsically Safe					
Noise generation @ maximum flow	-	75db				
Dimensions	refer data sheet					
Pressure drop chart	refer data sheet					
Min. filtration – microns (mesh)	75 microns (200 mesh)	150 microns (100 mesh)				
<b>Approximate shipping weights (basic threaded meter) kg</b>						
Stainless Steel	2.2	3.0	3.0	4.0	9.0	12.0
Aluminium	1.0	1.5	1.5	2.0	4.0	6.0

TG040A - Accuracy vs. Flowrate



## Stainless Steel Threaded Meter



METER SIZE	DIMENSION							H <small>max</small>
	A	B	C	D	E	F	G	
TG008	68	75	16.5	81.5	87.5	50	-	M5 x 12 DEEP
TG015	130	108	35	95.5	81.5	55	25	M5 x 10 DEEP

## Model Designation

Size		
TG	008	3/8" (8mm) aluminium or stainless steel
TG	015	1/2" (15mm) aluminium or stainless steel
TG	020	3/4" (20mm) aluminium or stainless steel
TG	025	1" (25mm) aluminium or stainless steel
TG	040	1 1/2" (40mm) aluminium or stainless steel
TG	050	2" (50mm) aluminium or stainless steel

### Body material

S	316L Stainless Steel
A	Aluminium

### Tri-gear material

1	PPS (Ryton)
2	PEEK (FDA Approved Material)
6	Keishi cut PPS (Ryton) - for high viscosity liquids
8	Keishi cut PEEK - for high viscosity liquids

### Bearing type

1	PPS (Ryton)
2	PEEK (FDA Approved Material)

### O-ring material

1	Viton (standard)
2	EP R - (Ethylene Propylene Rubber)
3	Teflon encapsulated viton
4	Buna-N (Nitrile) 100 °C (212 °F) max.

### Temperature limits

1	80°C (180°F) No Heat Insulation - maximum for meter mounted readout.
2	120°C (250°F) - Use Heat Insulator (Option 5) if meter mounted readout.
5	120°C (250°F) - Heat Insulator fitted for meter mounted readout

### Process connections

1	BSP female threaded
2	NPT female threaded
4	ANSI-50 RF flanges
5	ANSI-300 RF flanges
6	PN16 DIN flanges
9	Customer nominated

### Cable entries

0	M 6 x 1.5mm (exclusive to FRT Rate Totaliser)
1	M 20 x 1.5mm
2	1/2" NPT

### Integral options

HR	High Resolution Hall Effect output
420	Analog output - 4 wire, 4-20mA output option
ExH	Explosion proof - Exd IIB T4/T6 (Hall Effect)
ISH	Intrinsically safe (IS) Hall Effect output
RS	Reed Switch only
F1	FRT-00 Flow Rate Totaliser - No output - display only
F2	FRT-AP Flow Rate Totaliser - 4-20mA output proportional to flowrate & scaled pulse output
F3	FRT-ALP Flow Rate Totaliser - Alarm and/or scaled pulse output
F4	FRT-BC Flow Rate Totaliser - 2 stage batch control
102	Cortrec 102 Rate Totaliser
202	Cortrec 202DI ATEX IS. Flowrate Totaliser
SB	Specific build requirement



TG025	130	45	102.5	68.5	70	30	M6 x 10 DEEP
TG040	166	56	118.5	104.5	105	35	M6 x 13 DEEP
TG050	206	67	121.5	107.5	120	40	M6 x 16 DEEP

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Meters can be fitted with additional sensors to provide in phase or out of phase signals for applications such as bi-directional flow.

The Tri-Gear based flowmeters outperform its competitors when it comes to the accurate metering of the majority of clean liquids including Solvents, Alcohols, Fuels, Oils, additives, chemicals, food bases, paints and viscous emulsions whether pumped or gravity fed. Additionally it is an excellent, higher accuracy device suitable for terminal applications such as tanker loading and bunkering.

## Benefits

- High Resolution Digital Output
- Wide Rangeability
- Bi-directional flow capability
- Digital or Analogue Outputs available.
- HART Output option.
- Less slippage than oval gear meters.
- Smoother and quieter than Oval Gear Meters.
- Dual Output standard (reed and hall effect)
- Low Mass Tri-gears facilitate fast response time to step changes in flowrate.



## Specification

## Ordering information

<b>Basic Model No.</b>	<b>BB025A</b>
Size	25mm
Process connections	burner block footprint
Flow range Litres/hr (US gal/min)	120 ~ 3000 (0.5 ~ 13.2)
Accuracy & Repeatability	+/- 1% of rate, +/- 0.1% repeatability typical with steady flows
Max. pressure – Aluminium	30 bar (440psi)
Temperature range	-40°C ~ +150°C (-40°F ~ +300°F)
Meter Materials	Aluminium
Piston Materials	PEEK (polyether ether ketone) or ERTALYTE
O-ring Material	Viton (Std), EPR, Teflon or Buna-N (nitrile)
Reed Switch output	24Vdc max./50mA max. (current limited)
Pulses/litre (nominal) (Pulses/US gal nom.)	20 (76)
Square Wave output (optional)	5~ 24Vdc max./20mA max. sink current (3 wire NPN open collector)
Pulses/litre (nominal) (Pulses/US gal)	100 (380)
Protection class	IP66 (NEMA4X) – optional, Explosion proof Exd IIB T4 (class 1, Div.1)
Conduit entry port	M20 x 1.5mm female threaded (with terminal cover optin)
Suggested filtering (mesh)	250 microns (50)

<b>Size</b>	
<b>BM</b>	025 3/4" (25mm) Hamworthy rectangular footprint
<b>BB</b>	025 1" (25mm) Saacker or Hamworthy round footprint

### Body material

**A** Aluminium

### Piston material

**2** PEEK (polyether ether ketone)

### Partition material

**2** 316L Stainless Steel

### O-ring material

**1** Viton (standard - 150°C max.)

### Temperature limits

<b>1</b>	- 40 to 60°C
<b>2</b>	120°C max. *(see below)
<b>3</b>	150°C max. *(includes two integral cooling fins & 150°C piston)
<b>5</b>	120°C max. *(included integral cooling fin)

### Mounting

<b>H</b>	"H" configuration burner block footprint (Hamworthy round footprint)
<b>S</b>	"S" configuration burner block footprint (Saacker round footprint)
<b>HR</b>	"HR" Hamworthy MKII burner block footprint (Rectangular)
<b>HA</b>	"HA" Hamworthy AWM KI burner block footprint (Square)

### Cable entries

<b>0</b>	M16x1.5 (exclusive to FRT Rate Totaliser)
<b>1</b>	M20 x 1.5mm
<b>2</b>	1/2" NPT

### Integral options

<b>00</b>	No options
<b>GN</b>	GRN terminal cover
<b>SS</b>	Stainless steel terminal cover
<b>F1</b>	FRT-00 Flow Rate Totaliser - No output - display only
<b>F2</b>	FRT-AP Flow Rate Totaliser - 4-20mA output proportional to flowrate & scaled pulse output
<b>F3</b>	FRT-ALP Flow Rate Totaliser - Alarm and/or scaled pulse output
<b>F4</b>	FRT-BC Flow Rate Totaliser - 2 stage batch control
<b>R2</b>	RT 12 rate totaliser with outputs
<b>R3</b>	IS, intrinsically safe RT 12 including output

Model No. Example

**BB 025 A 1 2 1 - 2 S 0 R2**

## Ordering information

### Meter size

<b>CM01</b>	1" (25mm)
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### Body material

<b>A</b>	Aluminium
<b>S</b>	316L Stainless Steel

### Piston material

<b>2</b>	PEEK
<b>9</b>	Special purpose materials, e.g. for 200°C

### Partition material

<b>2</b>	Stainless Steel
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### O-ring material

<b>1</b>	Viton (standard - 204°C max.)
<b>2</b>	Ethylene Propylene Rubber to 150°C
<b>3</b>	Teflon encapsulated viton to 150°C
<b>4</b>	Buna-N (Nitrile - 100°C max.)

### Temperature limits

<b>1</b>	60°C (140°F)
<b>2</b>	120°C (250°F) (see note 1)
<b>3</b>	150°C max. (PEEK piston & NPN Hall Effect output)
<b>5</b>	120°C (see note 2)
<b>6</b>	200°C max. (S/S meter, aluminum piston, coil output)

### Process connections

<b>1</b>	BSP (RP) female threaded
<b>2</b>	NPT female threaded
<b>3</b>	1 1/2" Tielamp Ferrule
<b>4</b>	ANSI150-RF Flanges
<b>5</b>	ANSI300-RF Flanges
<b>6</b>	DIN PN16 Flanges
<b>9</b>	Customer nominated

### Cable entries

<b>0</b>	M16x1.5 (exclusive to FRT Rate Totaliser)
<b>1</b>	M20 x 1.5mm
<b>2</b>	1/2" NPT

### Model No. Example

<b>CM01</b>	<b>S</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>R2</b>
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### Integral options

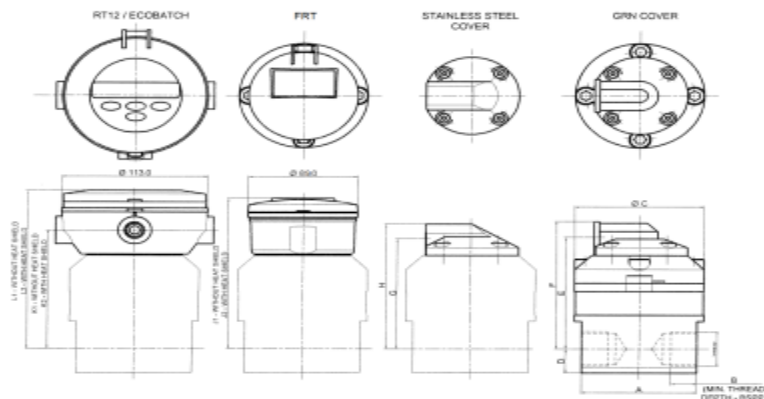
Glass reinforced nylon	<b>00</b>	GRN terminal cover
	<b>SS</b>	Stainless terminal cover
No output - display only	<b>F1</b>	FRT-00 FlowRate Totaliser
4-20mA output proportional to flowrate & scaled pulse output	<b>F2</b>	FRT-AP Flow Rate Totaliser
Alarm and/or scaled pulse output	<b>F3</b>	FRT-ALP Flow Rate Totaliser
2 stage batch control	<b>F4</b>	FRT-BC FlowRate Totaliser
Alarms & 4-20mA	<b>R2</b>	RT12 flowrate totaliser
	<b>R3</b>	Intrinsically Safe RT12
Scaled pulse output	<b>R4</b>	RT40 large LCD flowrate totaliser
Ecobatch	<b>E0</b>	EB10 batch controller
Consult factory	<b>SB</b>	Specific build requirement



## Specifications

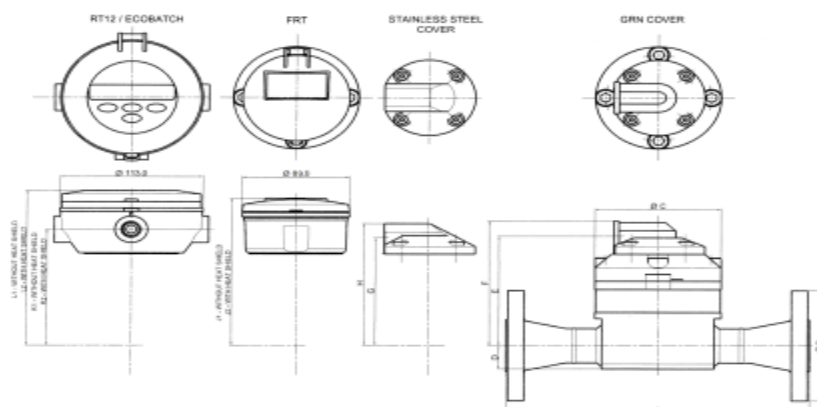
Model prefix	CM01 A	CM01 S
Nominal size (inches)	25mm (1")	25mm (1")

### Threaded Meter Dimensions



Meter	Thread	A	B	Ø C	D	E	F	G	H	J1	J2	K1	K2	L1	L2
CM01	1" BSPP or NPT	89	20	100	23	107	122	105.5	119.5	144	163	113.5	132.5	151.5	170.5

### Flanged Meter Dimensions



Meter	Thread	A	Ø B	Ø C	D	E	F	G	H	J1	J2	K1	K2	L1	L2
CM01	1" CL150	240	108	100	23	107	122	105.5	119.5	144	163	113.5	132.5	151.5	170.5
	1" CL300	250	124												
	DN25 PN16/40	210	115												

### Optional functions (with FRT instruments):

- Flow rate display : 7 digits, programmable engineering units
- Resettable total : 7 digits, programmable eng. units
- Accumulated total : 7 digits, programmable eng. units
- Preset batching : 7 digits, programmable eng. units

### Optional outputs (with FRT instruments):

- Analogue : 4~20mA programmable zero & span



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