Tecfluid

Instrumentation
for fluids

WE'VE GOT HART ABILITY

Volumetric Counters

Serie COVOL

COVOL Series
Volumetric Counters

Working pressure manufacturing according to PED 97/23/CE (Lloyd's Register Certificate Nº 031)

- Volumetric counter for liquids
- Precision ± 0.8%
- Construction in EN 1.4404(SS 316L), PVC, PP, PTFE
- DN 10 to DN100
- Viscosity up to 120.000 mPas.
- It can be easily cleaned and sterilized
- It will work in any position
- Mounting by means of steel PN16 EN 1092-1 standard flanges, ANSI flanges, NPT threads and sanitary connections on demand
- High pressure versions available on demand
- It can be mounted in hazardous areas (intrinsically safe)
- Complete range of electronic equipment available for counting, analog outputs etc.
- It does not need straight sections of pipe

Suitable for:

- Filling containers
- Batching and mixing
- Vapour condensation and fuel consumption metering
- Installation:
  - Counter and valves in the work area with protection according to the zone classification
  - Counter in the safe area and valves in the hazardous area
  - Full discharge pipe with air bleed or empty discharge pipe

Principle of Operation

By means of an oscillating piston and an annular metering chamber.

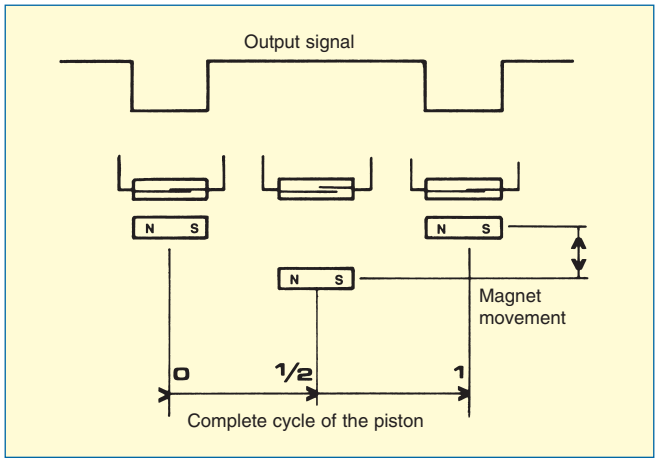
The drawings show how the piston is moved by the liquid as it flows through the metering chamber.
The piston contains a magnet which acts on an exterior reed switch once for each complete cycle.
The electric pulses are the input for the control equipment (counters, indicators etc.)

Technical Data

- Pipe connections
  Standard: EN 1092-1 steel flanges for PN16
  On demand: ANSI flanges, BSP threads, NPT, sanitary DIN 11851
- Precision: ± 0,8 %
- Repeatability: ± 0,3 %
- Measuring range: 30 : 1
- Working temperature:

EN1.4404(SS 316L)	-40°C	..... +	150°C
PTFE	-20°C	..... +	130°C
PP	-10°C	..... +	80°C
PVC	0°C	..... +	45°C

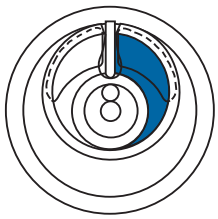
- Liquid Pressure:
  EN1.4404(SS 316L) PN16 (on demand up to PN250)
  PVC, PP, PTFE PN10
- Reed Switch connector: IP65
- Recommended cable: Shielded cable
- Reed Switch rating: 0,3 A 220 V
- EEx"d" housing on demand
- Body materials: EN1.4404(SS 316L), PTFE, PP, PVC
- Piston materials: PTFE with graphite, PTFE, Aluminium, etc.
- Heated or Refrigerated body on demand



Operation

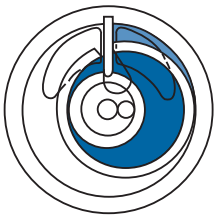
Position 1

The flow of a liquid through the COVOL volumetric counter exercises a pressure on the piston wich starts the metering movement.
In this position the liquid is filling the inside of the piston.



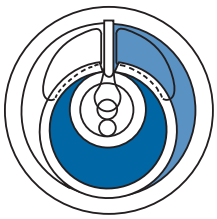
Position 2

The liquid starts to fill the cavity between the outside of the piston and the metering chamber, and continues to fill the inside of the piston.



Position 3

At this point the inside of the piston is totally full, and the liquid continues to fill the outside cavity.

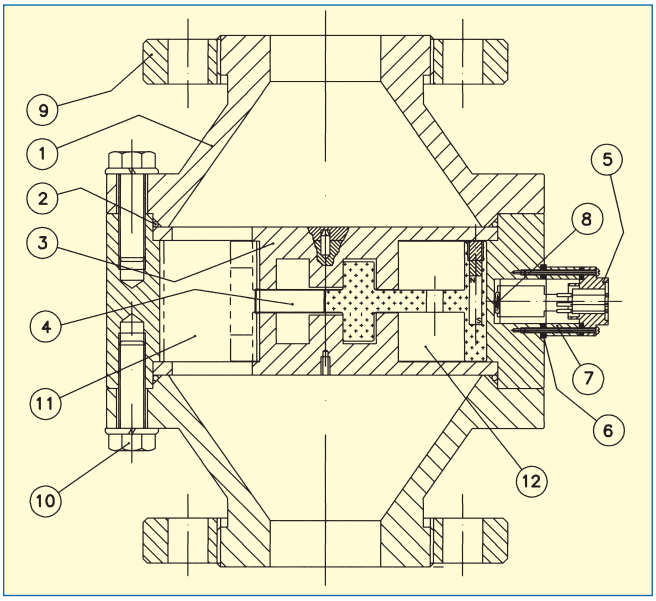


Position 4

The inside of the piston starts to empty through the outlet. The liquid starts to fill the inside of the piston for the next cycle and continues to fill the outside cavity.

From this point the piston repeats the cycle, moving a CONSTANT VOLUME of liquid for each cycle.

Construction Detail



Mounting & Installation

It can be mounted in any position and does not need straight sections of pipe before or after the counter.
A FILTER MUST BE INSTALLED before the COVOL to guarantee correct working and avoid expensive damage. The mesh filter should have 0,1 to 0,2 mm^2 section, depending on the size of the COVOL. With small sizes the mesh should be finer.

In all processes where air or vapour can be present, an air separator should be installed before the counter to avoid errors.

Cavitation should not occur in the counter, and to avoid this we must follow the A.P.I. 2534 norm, which states that “at the outlet of counters the pressure should be higher than twice the pressure loss of the counter plus 1.25 times the vapour pressure of the liquid or its most volatile component”.
Important: The installation of the cable between the COVOL and electronic equipment should not pass near mains or power cables in order to avoid picking up interferences wich may influence the electronic counters.

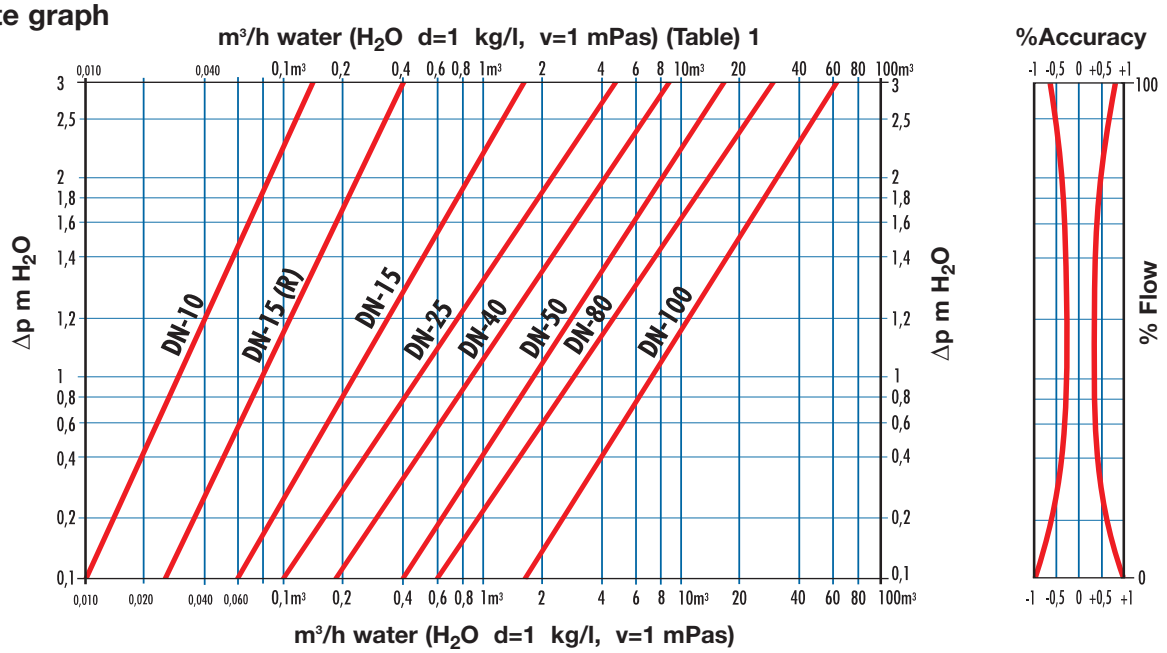
Density and Viscosity

The COVOL volumetric counters are calibrated using water (density = 1kg/l, viscosity = 1mPa.s) and the pulses per litre are given in the calibration sheet.

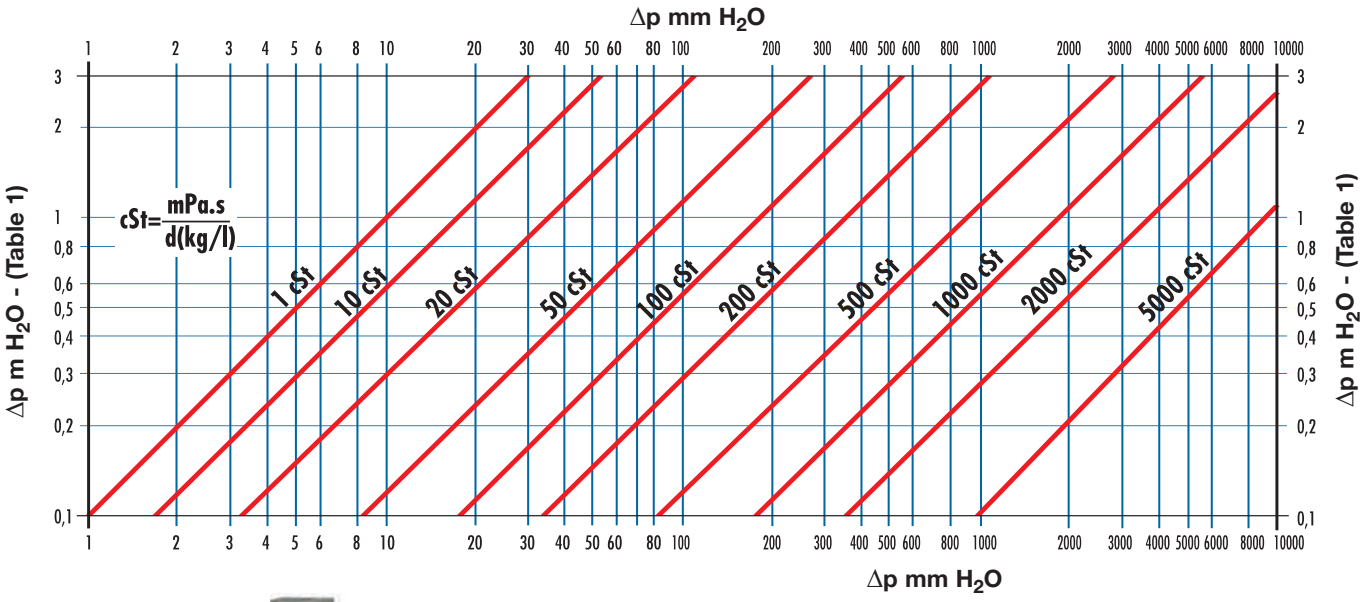
Materials

Nº	Part Name	INOX	PTFE	PVC / PP
1	Inlet/outlet chambers	EN 1.4404 (SS 316L)	PTFE	PVC / PP
2	Sealing ring	Nitrile Rubber / Viton	Viton / PTFE	Nitrile Rubber / Viton
3	End disc	EN 1.4404 (SS 316L)	PTFE	PVC / PP
4	Piston	PTFE-Graphite	PTFE-Graphite	PTFE-Graphite PVC / PP
5	Reed Connector	Brass / Plastic	Brass / Plastic	Brass / Plastic
6	Sealing washer	Nitrile Rubber	Nitrile Rubber	Nitrile Rubber
7	Connector support	EN 1.4404 (SS 316L)	EN 1.4404 (SS 316L)	EN 1.4404 (SS 316 L)
8	Reed switch	Glass	Glass	Glass
9	Flanges	Steel / EN 1.4404 (SS 316L)	Steel / PTFE	Steel-PVC / PP
10	Screws	EN 1.4404 (SS 316L)	EN1.4404 (SS 316L)	EN 1.4404 (SS 316L)
11	Separator Inlet/outlet	EN 1.4404 (SS 316L)	PTFE	PVC / PP
12	Metering chamber	EN 1.4404 (SS 316L)	PTFE	PVC / PP

Flow rate graph



Variations of Δp m H_2O with viscosity



COVOL / INOX + EEx d IIC T6 Enclosure

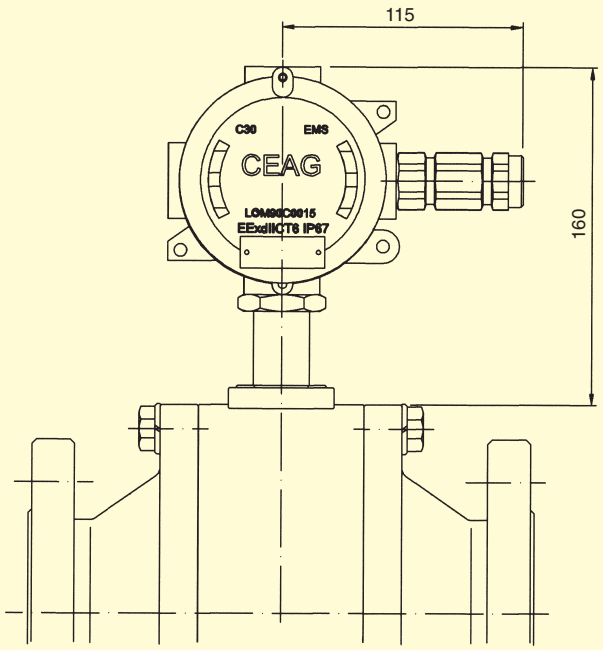
Variations of viscosity modify the pulses per litre factor of the counter but it does not affect the repeatability.
As a general norm, the variations of density and viscosity only affect the COVOL counters at the beginning of the working range. When the density and viscosity is less than 1 kg/l and 1 mPa·s the flow rate must be higher to start to move the piston, and with the density and viscosity greater than 1 kg/l and 1 mPa·s the flow rate will be lower to start to move the piston.
In any case, the variations in density do not produce important changes in the calibration of the counter, these changes are not greater than 5-7% with respect to the values obtained with water.

Flow rates for H_2O at 20°C

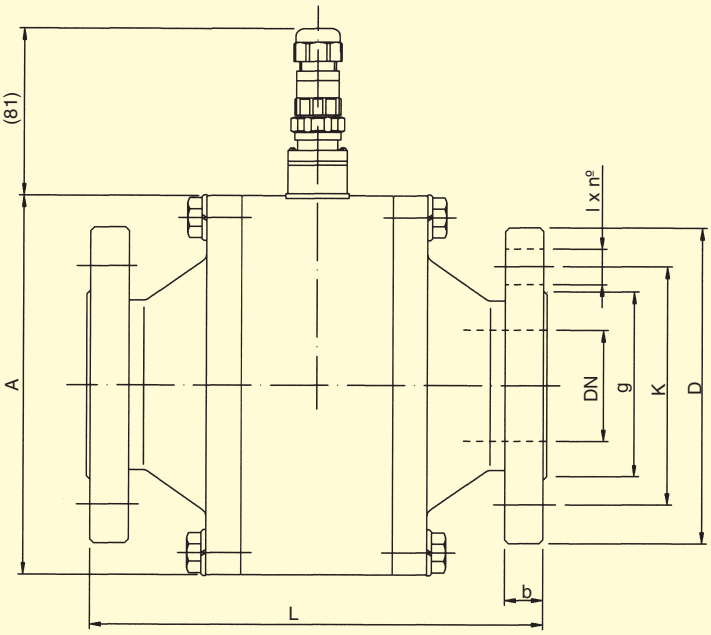
DN	Min. l/h	Max. m^3/h	Intermittent Max. m^3/h
10 / 1/4" (H)	8	0.150	0.5
10	20	0.350	0.8
15	60	1.5	2.7
25	100	4.5	9
40	200	8.5	15.5
50	400	16	28
80	600	28	50
100	800	60	104

DN	Pulses / l ± 10%	cc / pulse ± 10%
10 / 1/4" (H)	100	10
10	100	10
15	20	50
25	10	100
40	4	250
50	2	500
80	1	1000
100	0.2	5000

Pressure loss at Qmax for all models = 3 m H_2O



DN10 ... DN100
With Explosion Proof enclosure



DN10 ... DN100
With standard connector

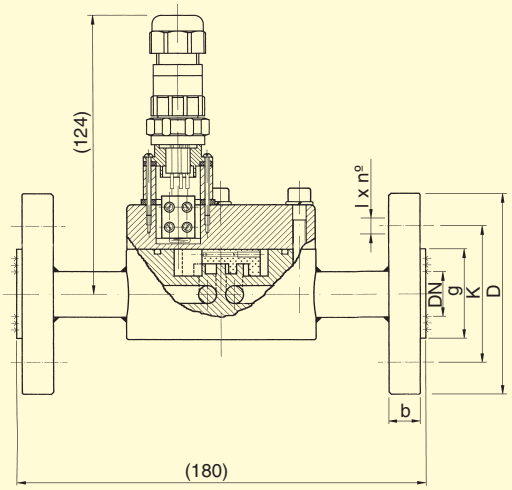
Dimensions and weights

DN	D	k	g	l x nº	b	L INOX*	L PVC/PTFE	A INOX*	A PVC/PTFE	Weight kg INOX*	Weight kg PVC/PTFE
10	90	60	40	14x4	14	180	210	85	125	6	5
15	95	65	45	14x4	14	180	210	105	140	9	8
25	115	85	68	14x4	16	200	230	140	170	10	9
40	150	110	88	18x4	16	220	250	180	200	18	15
50	165	125	102	18x4	18	240	270	200	230	26	21
80	200	160	138	18x8	20	260	330	250	290	37	30
100	220	180	158	18x8	20	340	450	360	420	92	80

* EN 1.4404 (SS 316L)

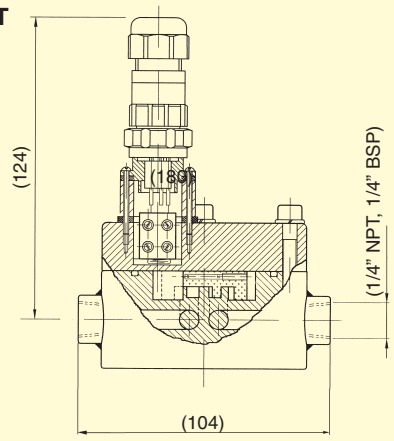
Dimensions DN10 (Horitzontal)

Flanges EN 1092-1



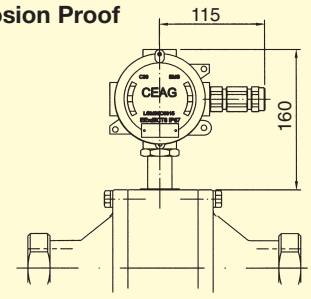
DN	D	k	g	l x nº	b
10	90	60	40	14x4	14

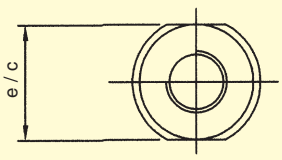
Thread BSP / NPT



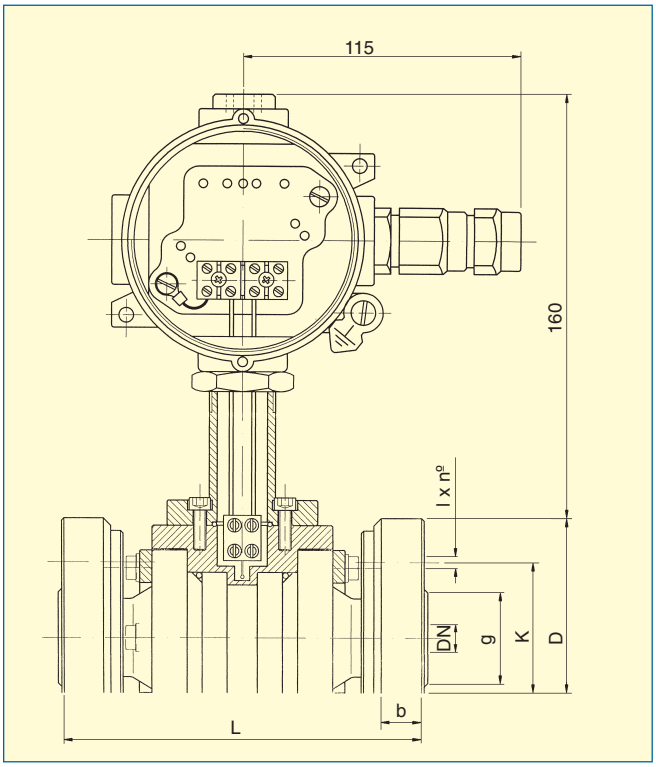
Thread connection

With Explosion Proof enclosure



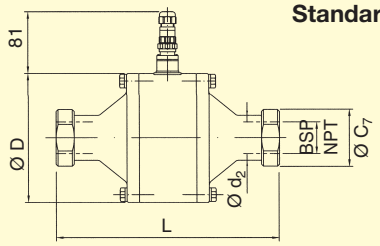


Dimensions PVC - PTFE - PP
Enclosure (EEx d IIC T6) DN10...DN100



DN	D	k	g	l x nº	b	L
10	95	60	40	M10x4	25	210
15	100	65	44	M12x4	45	210
25	120	85	64	M12x4	45	230
40	150	110	84	M16x4	45	250
50	175	125	98	M16x4	45	270
80	230	160	138	M16x4	55	330
100	250	180	158	M18x8	65	450

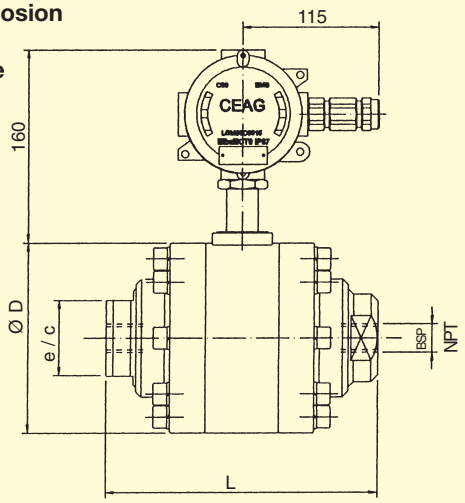
Standard Connector



DN	10	15	25	40	50	80
Ø C_7	45	45	65	85	98	125
Ø d_2	45	35	53	73	86	125
Ø D	79,5	104,5	138	178	198	248
e/c	41	40	55	75	88	115
L	130	180	200	220	240	260

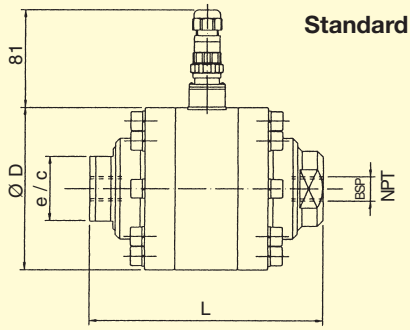
Thread connection-High Pressure

With Explosion Proof enclosure



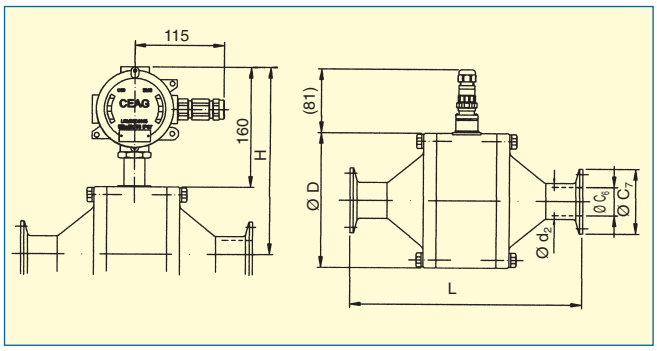
PN 100

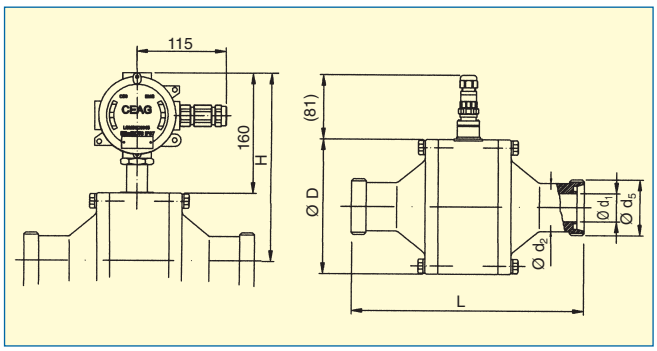
Standard Connector

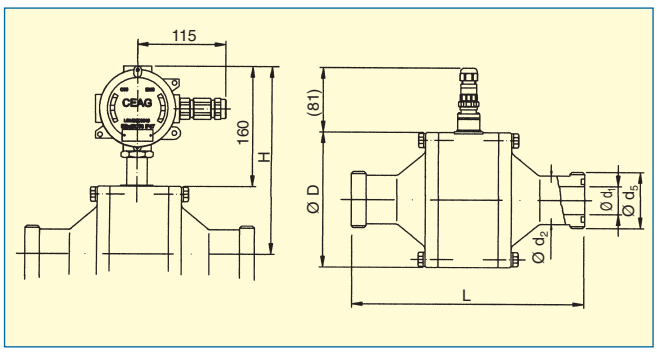


DN	10	15	25	40	50	80
Ø D	79,5	104,5	138	178	198	248
e/c	41	40	55	75	88	115
L	130	180	200	220	240	260
kg	10	16	30	40	58	76

Sanitary connections, with Explosion Proof enclosure and Standard connections







CLAMP ISO 2852 : 1993

EN1.4404(SS 316L)

dimensiones de conexión	1/2"	-	1"	1 1/2"	2"	3"
Diametro exterior tubo	12,7	17,2	25	38	51	76,1
Ø C_6	10,7	15,2	22,6	35,6	48,6	72,9
Ø C_7	34	34	50,5	50,5	64	91
Ø d_2	25	25	42	42	55	104
Ø D	79,5	104,5	138	178	198	248
L	130	180	200	220	240	260
H	200	212	230	250	260	285
DIN Equiv.: DN	10	15	25	40	50	80

DIN 11851

EN1.4404(SS 316L)

Ø d_1	10	16	26	38	50	81
Ø d_5	Rd 28 x 1/8"	Rd 34 x 1/6"	Rd 52 x 1/6"	Rd 65 x 1/6"	Rd 76 x 1/6"	Rd 110 x 1/4"
Ø d_2	24,8	30,8	47,7	60,7	73,7	103,6
Ø D	79,5	104,5	138	178	198	248
L	130	180	200	220	240	260
H	200	212	230	250	260	285
DIN Equiv.: DN	10	15	25	40	50	80

SMS 1145 : 1957

EN1.4404(SS 316L)

Ø d_1	22,5	35,5	48,5	72,9
Ø d_5	Rd 40 x 1/8"	Rd 60 x 1/6"	Rd 70 x 1/6"	Rd 96 x 1/4"
Ø d_2	35,7	55,7	65,7	93,7
Ø D	138	178	198	248
L	200	220	240	260
H	230	250	260	285
DIN Equiv.: DN	25	40	50	80

MC-01/MT-02 series Electronic Control Units

The MC-01 and MT-02 series, are panel mounting micro-processor based control instruments for batching control.

They are fully user programmable and will adapt directly to any TM-44 turbine, COVOL, TTL output, or equivalent pulse generating output trasducers.

MC-01

Applications

- Automated process control in any industry with flow rate

Benefits

- Direct interface to Turbines, Covol etc.
- Direct interface for analog inputs
- Fully programmable by user
- Battery back-up stores all data on power failure
- Flow rate readout in l/h and m^3/h
- Adaptive filter gives stable flow rate readings
- Volume totalizing counter
- Volume partial counter
- Batching relay
- 16 character x 2 line LCD alpha-numeric display
- Optional remote start push button for batching
- Analog output for process control 0...4-20 mA, 0-10V
- Standard DIN 96 x 96 panel mounting
- Plug in connections with screw terminals for easy installation and maintenance
- Optional IP65 front protection
- Power supply 110, 220-240, 24 V ac 50-60 Hz
  12 (not with analog output), 24 Vdc
- Power consumption < 3 VA
- Input signal TM-44 20 mV... 3 V ac, 0....2000 Hz
- Input signal COVOL Reed contact, 0....100 Hz
- Input signal Analog 0-20 mA, 4-20 mA,0-5 V dc, 0-10 V dc, 1-5 V dc, 2-10 V dc
- Remote batch start By means of a push button
- Precision 0.01% (0.4% analog input)
- Temperature range -10°C.....60°C
- Analog output 12 bit resolution
- Relay 1 A, 250 V ac, 60 VA

MC-01
(with optional front protection)

MT-02

Applications

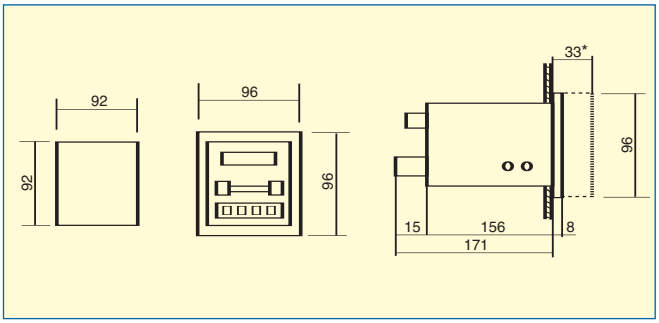
- Automated process control in any industry with batching or volume control

Benefits

- Very easy to use
- Bright LED display, 7 digit data, 1 digit mode
- Direct interface to Turbines, Covol etc.
- Fully programmable by user
- Battery back-up stores all data on power failure
- Volume totalizing counter
- Volume partial counter
- Batching relay
- Remote start push button for batching
- Standard DIN 96 x 96 panel mounting
- Plug in connections with screw terminals for easy installation and maintenance
- Dual relay version for fast aproximation and slow finish (two control valves)
- Centesimal version for small flowmeters.
- Optional interface with 12 and 5 volt proximity detectors.
- Power supply 110, 220-240, 24 V ac 50-60 Hz
  24 Vdc

MT-02

Dimensions



*with optional front protection

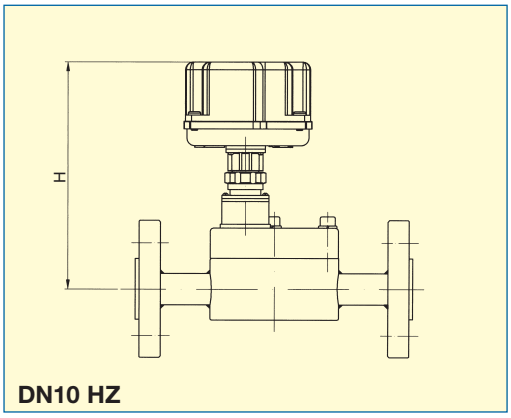
CIP, CIP II Compact mounted Covol volume counter

Compact system featuring:

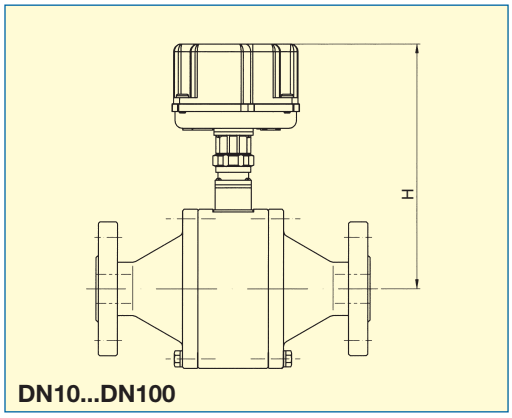
- Covol body and electronic counter mounted together to form a compact unit.
- Same flow rates, pressures and other working conditions as for covol series.
- CIP electronic counter mounted in IP65 housing with an injected aluminium base and U.V. treated polycarbonate cover.
- Programmable pulses/unit factor.
- Button battery power supply lasts for 30.000 hours (3-4 years)
- CIP: 7 digit, 9 mm digit size
- CIP II: 7 digit, 8 mm digit size for totalizer counter
  5 digit, 6 mm digit size for partial counter
- Counter reset by means of internal push button or external magnet (CIP II totalizer counter cannot be reset).

Covol with CIP, CIP II & CH420L

Dimensions Covol with CIP, CIP II & CH420L



DN10 HZ

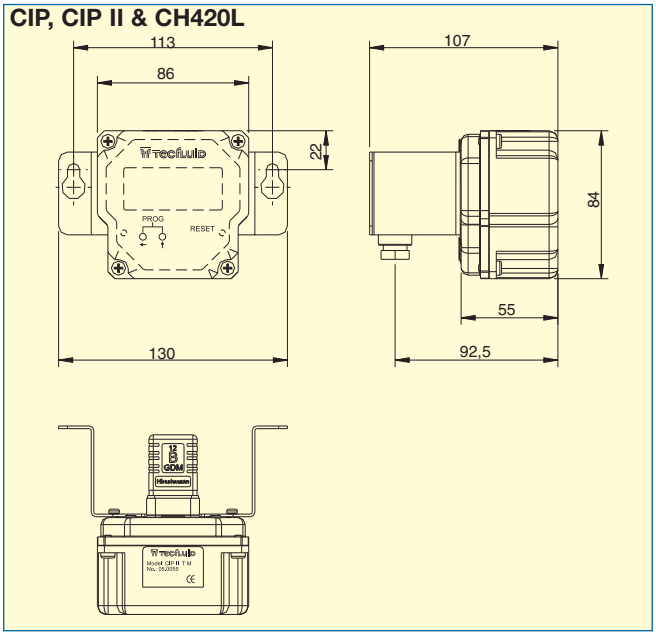


DN10...DN100

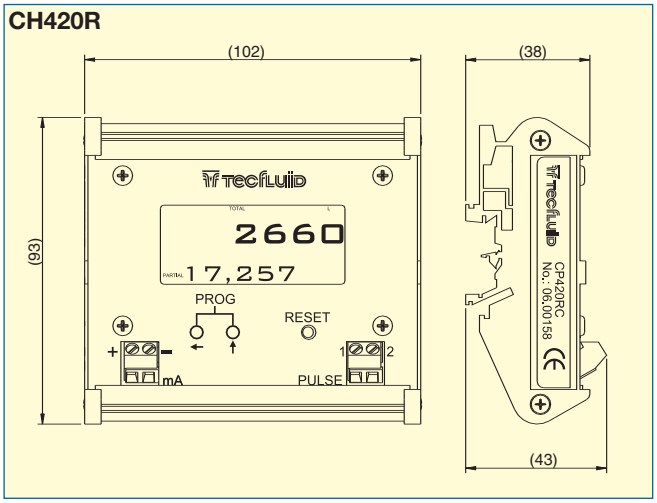
DN	H
DN10	142
DN10	148
DN15	161
DN25	170
DN40	192
DN50	202
DN80	227
DN100	267

Dimensions

CIP, CIP II & CH420L



CH420R



Flow Transmitters and Volume Counters
Series CIP, CIP II, CH420L and CH420R

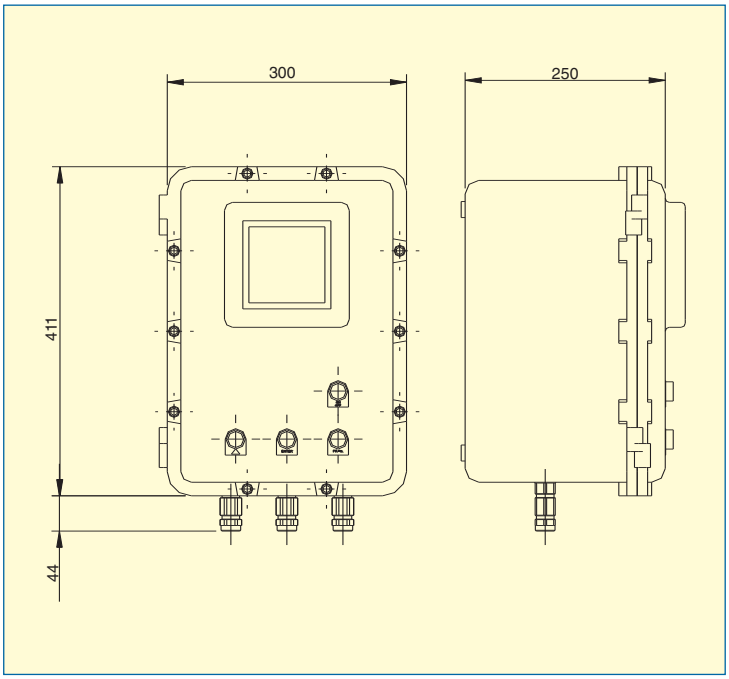
CH420L

CH420R

Characteristics

- HART protocol communications, for models CH420L/CH420R
- Connects directly to a COVOL or TM-44 turbine
- CH420L for compact mounting (local)
- CH420R for DIN rail mounting (DIN 46277)
- Programmable pulses/litre
- Programmable beginning and end of analog scale
- Selection of various types of units for flow rate and totalizer.
- Power supply from two wire current loop
- Working voltage: 7,5...36 Vdc
- Current consumption: less or equal to 20 mA
- Totalizer: 7digits, 8 mm digit size
- Flow rate: 5 digits, 6 mm digit size
- Totalizer reset by means of a push button
- Ingres protection: IP65(CH420L) IP30(CH420R)
- Ambient temperature: 0...+60°C

EExd IIC T6 Enclosure



DFD-2 Series Electronics Frequency Dividers

The DFD-2 Series are rail mounting (DIN 46277) micro-processor based control instruments for frequency division. They are fully user programable and will adapt directly to any TM-44 turbine, COVOL output, or equivalent pulse generating output transducers.

Applications

- Automater process control in any industry with batching or volume control for interfacing with PLC
- Interface with slow scanning PLC inputs
- Interface with PLC without calculations capacity
- Interface with simple counters
- Interface for electromechanical totalizing counters

Benefits

- Very simple to use
- Direct interface to Turbines, Covol etc.
- Fullt programable by user
- Standard DIN rail mounting
- Connections with screw terminals for easy installation and maintenance
- No batteries needed, BCD switch programming

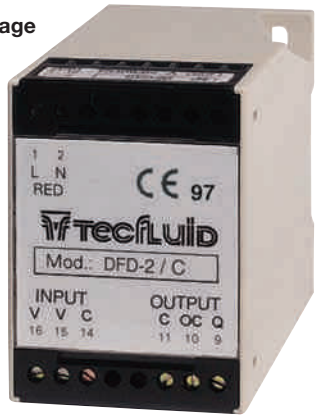
Technical Data

• Power supply	110, 230, 240, 24 V ac 50-60 Hz 12 V dc
• Power consumption	< 1 VA
• Input signal TM-44	20 mV...3 V ac, 0....2000 Hz
• Input signal COVOL	Reed contact, 0....100 Hz
• Precision	No lost pulses
• Temperature range	-10ºC.....60ºC
• Output / input range	0.00000001.....0.4999
• Output signal	Open Collector 0.1 A 40 V TTL (5V)
• Output pulse width	approx. 50% duty circle

Ordering Information

DFD-2 / **a** / **vvv**

a	=	**Input Type**
	= **1**	COVOL
	= **2**	Turbine Pick-up
	= **3**	TTL
	= **4**	for 12 volt proximity detectors
	= **5**	for 5 volt pulse generators or open collector
vvv	=	**Power supply voltage**
	= **110**	110 V ac 50/60 Hz
	= **230**	230 V ac 50/60 Hz
	= **240**	240 V ac 50/60 Hz
	= **024**	24 V ac 50/60 Hz
	= **12d**	12 V dc



CI-420 series Electronic Frequency to Analog Converters

The CI-420 series are rail mounting (DIN 46277) micro-proccesor based control instruments for frequency to analog conversion. They are fully user programable and will adapt directly to any TM-44 turbine, COVOL output, or equivalent pulse generating output transducers.

Applications

- Automated process control in any industry with flow rate or volume control for interfacing with PLC and other instruments
- Interface with PLC inputs
- Interface with analog indicators or alarms

Benefits

- Very simple to use, just select frequency for full scale output
- Direct interface to Turbines, Covol etc.
- Fully progamable by user
- No batteries needed, BCD switch programming
- Standard DIN rail mounting
- Connections with screw terminals for easy installation and maintenance
- 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 2-10 V or 1-5 V output options
- Adaptive filter for stable output

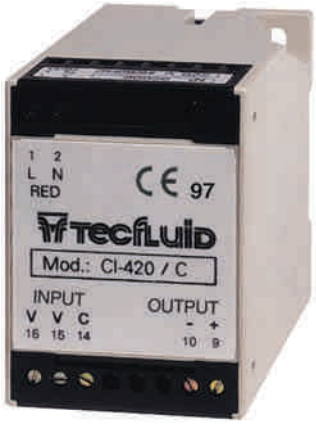
Technical Data

• Power supply	110, 230, 240, 24 V ac 50-60 Hz 24 V dc
• Power consumption	< 1 VA
• Precision	0.2 % Full Scale
• Temperature range	-10ºC.....60ºC
• Frequency range	0.1.....9999 Hz for full scale
• Cutout frequency	0.04 Hz
• Input signal TM-44	20 mV...3 V ac, 0....2000 Hz
• Input signal COVOL	Red contact, 0....100Hz
• Consult Tecfluid for other inputs	

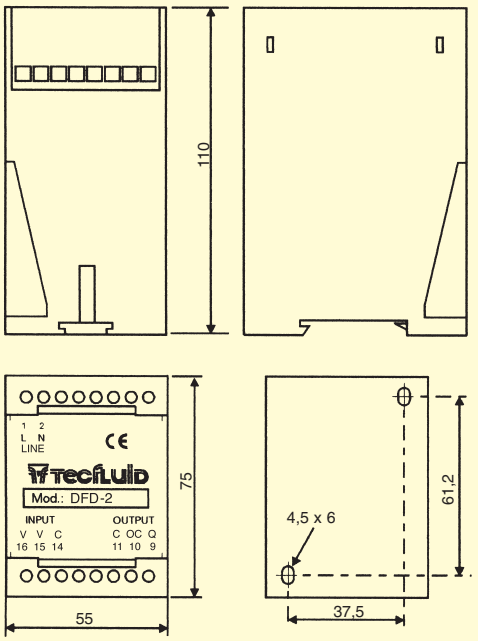
Ordering information

CI-420/ **a** / **b** / **vvv**

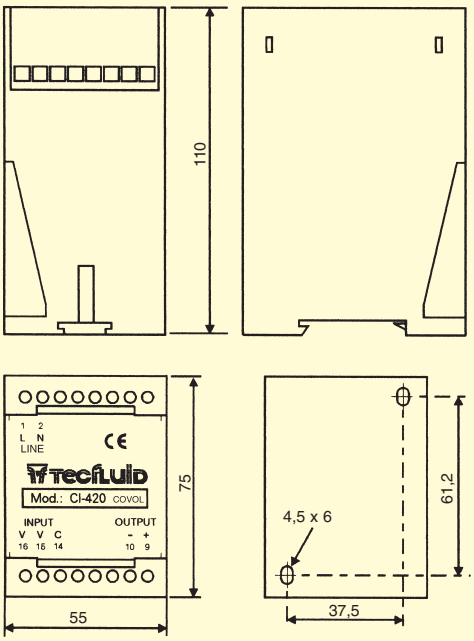
a	=	**Output signal**
	= **A**	0 - 20 mA
	= **B**	4 - 20 mA
	= **D**	0 - 5 V dc
	= **E**	0 - 10 V dc
	= **F**	1 - 5 V dc
	= **G**	2 - 10 V dc
b	=	**Input Type**
	= **1**	COVOL
	= **2**	Turbine Pick-up
	= **3**	TTL
	= **4**	for 24 volt proximity detectors
	= **5**	for 5 volt pulse generators or open collector
vvv	=	**Power supply voltage**
	= **110**	110 V ac 50/60 Hz
	= **230**	220-230 V ac 50/60 Hz
	= **240**	240 V ac 50/60 Hz
	= **024**	24 V ac 50/60 Hz
	= **24d**	24 V dc



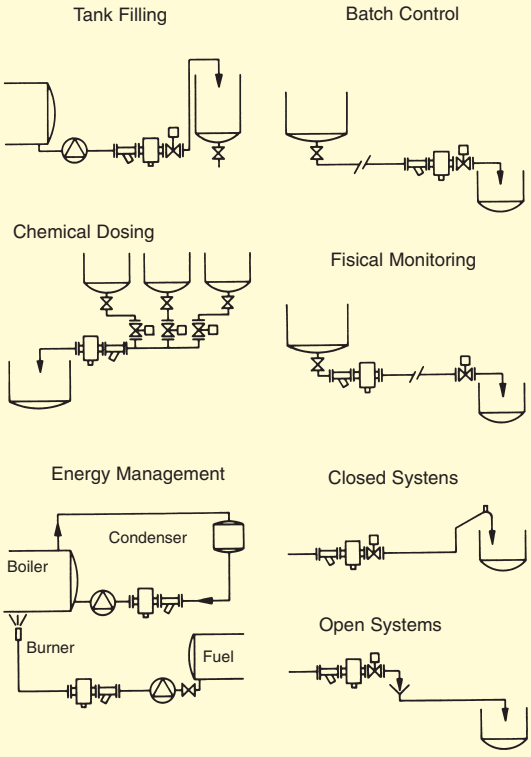
Dimensions: Series DFD-2 (rail DIN 46277)



Series CI-420 (rail DIN 46277)



Covol Volumetric Counter Applications



Liquids

Acetic Acid
Acetone
Acrilonitrile
Alcohol
Ammonia
Ammonia Liquids
Ammonium Nitrate
Anti-coagulants
Benzene
Butadiene
Butane
Butene
Chlorates
Chlorine
Condensate
Decalcifiers
Demineralised Water
Dichloroethane
Dimethylammine
Diphenoltetrachloride
Distilate
Esters
Ethers
Ethiloxide
Food products
(Cream, Syrups, Fruit, Chocolate,
Juicea, Vinegar, Wine)
Flocculants
Food Oils
Freon
Gasoline
Gelatine
Glycerine
Glycol
Hidraulic Oils
Hidrocarbons
Hidrochloric Acid
Industrial Water
Inles
Isocianate
Isopropylammine
Kerosine
Liquid Helium
Magnesium Sulphate
Methanol
Methylated Spirits
Mineral Oils
Menomers
Molten Sulphur
Natural Gas (Liquidfied)
Nitric Acid
Nitrochlorobenzene
Oil & Water
Oils and Acids
Organic Products
Oxigen (Liquidfied)
Oxigenated Water
Pentane
Petrol
Phosohoric Acid
Polybutane
Polyol
Propane
Propylene
Propyloxide
Silicates
Sodium
Solvents
Sulphuric Acid
Toluene
Tributyl Phosphate
Trichloroethane
Vinyl Chlorides
Water & Corrosion Water
Winhibitors
Xylene

Ref. COVOL/0307 P-3479

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The technical data in this pamphlet is subject to modification without notification, if the technical innovations in the product or manufacturing processes so require.