

# Solartron

## Covimat variable speed rotational on-line viscometers

Data sheet  
IP7105



The Covimat 105 range of variable speed rotational on-line viscometers has been specifically designed for on-line measurement of viscosity at controlled shear rates, making it ideal for non-Newtonian fluids.

The system consists of an explosion-proof metering head which is magnetically coupled to a measurement cell containing the fluid to be measured.

Covimat is designed to minimise servicing costs. Thanks to its rugged construction and design, which eliminates glands and seals, service and maintenance is kept to a minimum, and for all configurations the metering head can be separated from the measuring cell without interrupting the production process.

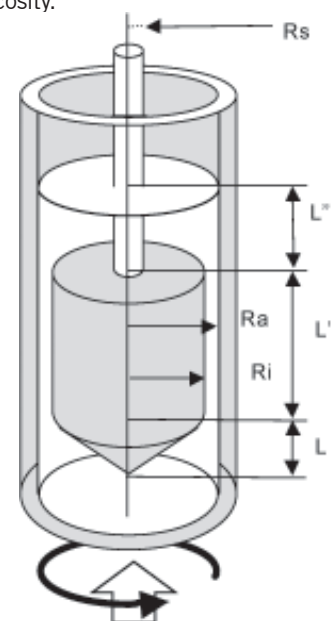
There are five standard rotational speeds available, and these can be reduced by a factor of 10 for the measurement of highly viscous products (Z version). In addition, an external rotational speed control is provided, enabling the meter to be controlled to any speed in the range 10 to 200 rpm or 1 to 20 rpm (Z version).

Immersion and in-line systems are available to suit a wide variety of different applications. The selection of a suitable measuring system is determined by the

viscosity range of the product, the pressure, temperature and flow rate.

### Principle of Operation

Covimat measures viscosity by the well proven rotational principle, allowing a direct comparison with laboratory results. A rotating bob in a stationary measurement cell is driven by a motor in the metering head at a constant speed through a magnetic coupling. The drive is coupled in the metering head via a torsion element. A change in viscosity of the product causes the angle of twist of the torsion element to alter. This change is measured inductively and when combined with the rotational speed and measuring bob geometry, provides a measurement of viscosity.



Rotation  
(bob or  
cylinder)

Flow  
(process  
instrument)

## Covimat Metering Head

The Covimat metering head is designed to be used with a range of measurement cells, which are chosen to meet the demands of the application.

The metering head is available in two versions:

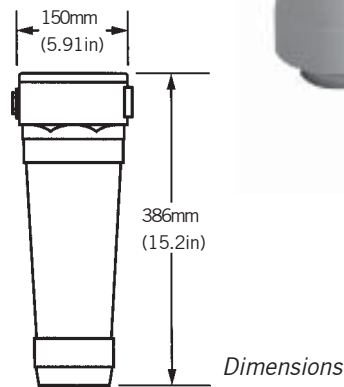
### Standard

PTB approved to EEx d IIB T6, this version enables the speed of rotation to be controlled via a 0-20mA or 0.5-10V input signal. The Z version reduces the speed by a factor of 10.

### Switch

This version is designed to be explosion-proof to EExd IIB T6. The speed of rotation is set to one of five pre-set speeds, using an internal switch; it can also be controlled by a 0-20mA input signal. The Z version reduces the pre-set speeds by a factor of 10.

The output of both versions is a 4-20mA signal proportional to the measured torque/viscosity. This signal can be used with the Solartron 795x Series of Signal Converters, as the basis of a complete viscosity measurement system offering enhanced functionality.



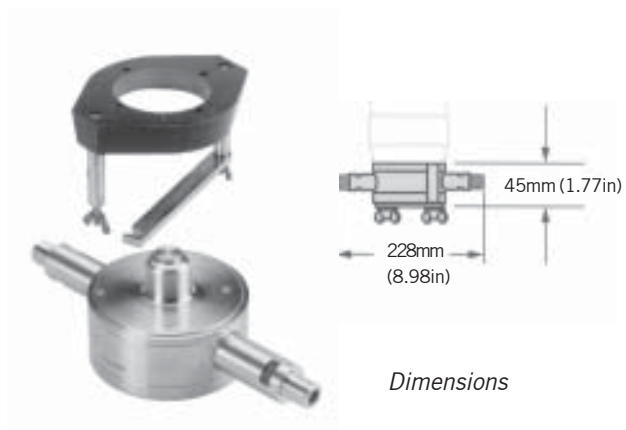
### Specification

Viscosity range	Depends on measurement cell
Achievable accuracy	±1% FS
System repeatability	±0.5% of reading
Motor speed range: Standard	10 to 200 rpm
Fixed speeds: Switched	1 to 20 rpm (Z version) 10, 21, 44.7, 94.6, 200 rpm 1, 2.1, 4.47, 9.46, 20 rpm (Z version)
External speed control	0 to 20mA or 0 to 10V
Transfer function	10 rpm/mA or 20 rpm/V
Rotational speed accuracy	±0.4% of set value at 20°C (68°F)
Temperature coefficient - speed	-0.02%/°C
Output signal	4-20mA proportional to torque/viscosity
Torsion angle measurement	Inductive
Maximum torque	4mN-m
Torque tolerance	±0.3% at 20°C (68°F) at output 1-5V
Temperature coefficient - torque	+1.3%/°C (+0.07%/°F)
Linearity	±0.3%
Temperature range	0 to 50°C (32 to 122°F)
Supply voltage range	+20 to 28Vdc
Supply current	<200mA at 24Vdc
Weight	8.1kg (17.86lb)
Safety	ATEX II 2G EEx d IIB T6
EMC rating	EN 61326

## Covimat 105-DD

**Application:** Low-viscosity, homogeneous products.

Utilises both single and twin gap designs for the flow-through cell. The small measuring cell volume is also an advantage for batch processes where there are only limited amounts of the product.



Dimensions

### Specification

Viscosity range	1 to 13,200cP
Achievable accuracy	±1% FS
Max. temperature of product	90°C (194°F)
Max. pressure	20 bar (290 psig)
Max. flow rate	5 l/min (1.32 USgal/min)
Material of measuring cell	Corrosion-resistant stainless steel 316 S11
Material of seal	Synthetic rubber/NBR
Weight	11.1 kg (24.4lb)

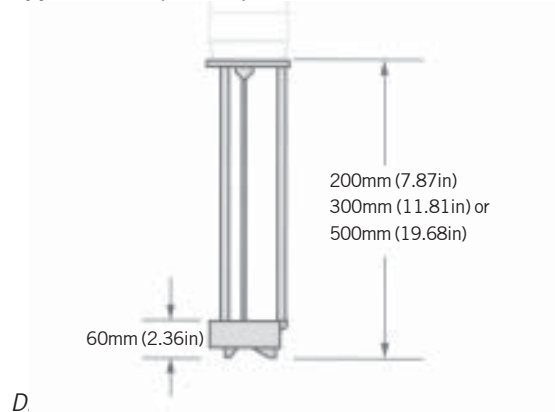
### Viscosity range (via interchangeable cylinders)

Model	Viscosity range (cP)
DDA005 *	1 to 460
DDA006 *	5 to 1,350
DDA007 *	10 to 3,100
DDA008	15 to 5,000
DDA009 *	30 to 8,800
DDA010	40 to 11,200
DDA011	50 to 13,200

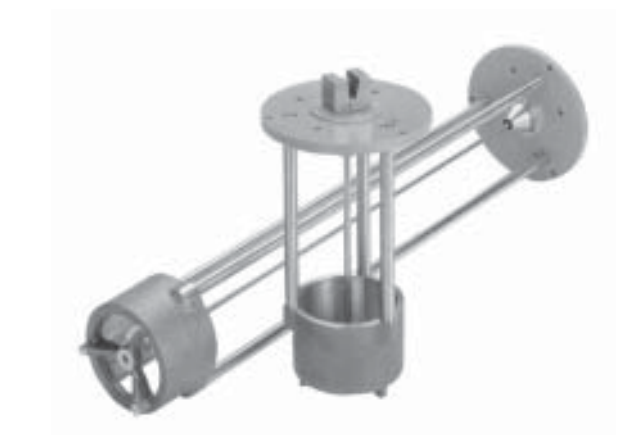
\* Twin gap measuring cells

## Covimat 105-TO

**Application:** Open, unpressurised vessels



D



### Specification

Viscosity range	2 to 358,000cP
Achievable accuracy	±1% FS
Max. temperature of product	65°C (150°F)
Max. pressure	Atmospheric
Material of measuring cell	Corrosion-resistant stainless steel 316 S11
Measurement system bearing	Teflon/hard metal
Immersion lengths (mm)	200, 300 or 500
Weight	10 kg (22lb)

### Viscosity range (via interchangeable bobs)

Dia. (mm)	Viscosity range (cP)	
	Standard	with Z option
69.5	2 to 189	20 to 1,890
68.0	3 to 895	30 to 8,950
63.0	12 to 2,460	120 to 24,600
46.0	31 to 10,865	310 to 108,650
31.0	175 to 35,800	1,750 to 358,000

## Covimat 105-DC range

**Application:** For high temperatures and pressures

### DC40D

The DC40D range is suitable for continuous measurement of viscosity at high temperatures and high pressures. To prevent heat losses - and to avoid crystallisation and hardening processes at low throughputs or at high temperatures - the DC40D cells have an isothermal (jacketed) wall. A range of flange options is available and for direct measurement or the product temperature, a thermowell is provided for a temperature sensor.

### DC40E

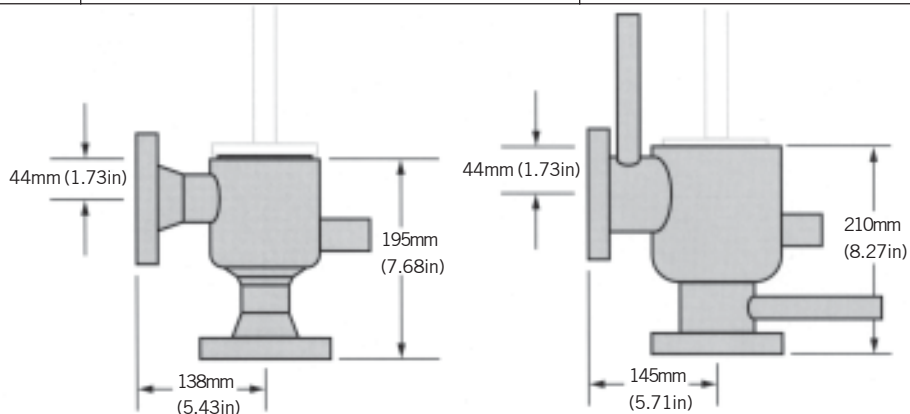
The DC40E range is designed for continuous measurement of viscosity at low pressures and high temperatures. A thermowell is provided to accept a temperature sensor for direct measurement of the product temperature. There is a range of flange options.



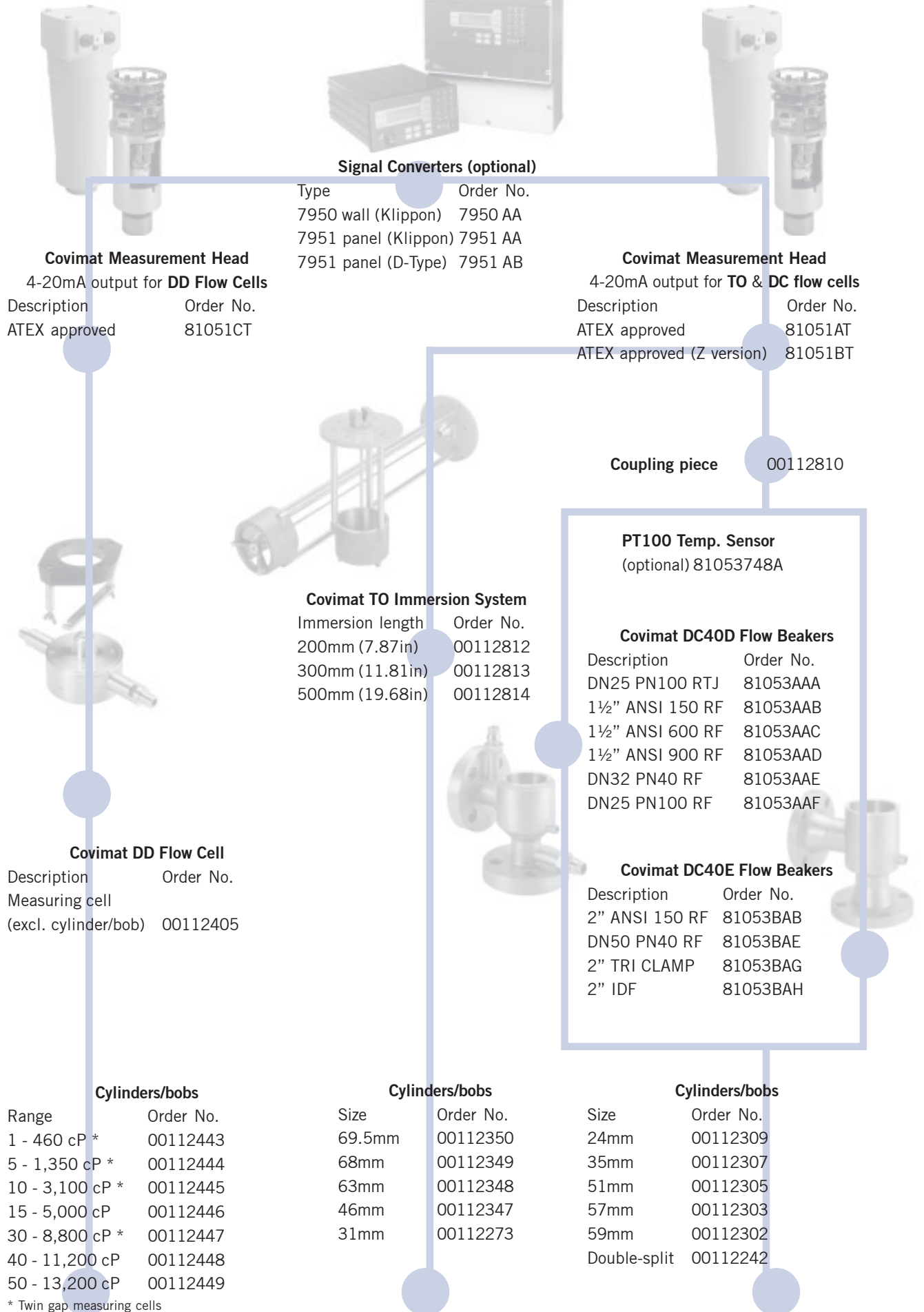
Specifications	Covimat DC40E	Covimat DC40D
Viscosity range		1 to 720,000cP
Achievable accuracy		± 1% FS
Max. temp. of product	250°C (482°F)	300°C (572°F)
Max. pressure	25 bar (362 psig) or to flange rating	170 bar (2,465 psig) or to flange rating
Max. flow rate		40 l/min (10.57 USgall/min)
Material of measuring cell		316L stainless steel
Material of seal		Asbestos free
Approx. weight of cell + adapter (depends on flange)	9.5 kg (20.95 lb)	18 kg (39.69 lb)

\*Twin gap measuring cells

Viscosity ranges (via interchangeable cylinders)		
	Covimat DC40E	Covimat DC40D
<i>Dia. (mm)</i>	<i>Standard (cP)</i>	<i>with Z option (cP)</i>
DS*	1 to 190	10 to 1,900
59	9 to 920	90 to 9,200
57	20 to 2,000	200 to 20,000
51	60 to 6,000	600 to 60,000
35	240 to 24,000	2,400 to 240,000
24	720 to 72,000	7,200 to 720,000



# Covimat 105 Ordering Matrix



### Signal Converters (optional)

Type	Order No.
7950 wall (Klippon)	7950 AA
7951 panel (Klippon)	7951 AA
7951 panel (D-Type)	7951 AB

### Covimat Measurement Head

4-20mA output for **DD Flow Cells**

Description	Order No.
ATEX approved	81051CT

### Covimat Measurement Head

4-20mA output for **TO & DC flow cells**

Description	Order No.
ATEX approved	81051AT
ATEX approved (Z version)	81051BT

**Coupling piece** 00112810

**PT100 Temp. Sensor**  
(optional) 81053748A

### Covimat TO Immersion System

Immersion length	Order No.
200mm (7.87in)	00112812
300mm (11.81in)	00112813
500mm (19.68in)	00112814

### Covimat DC40D Flow Beakers

Description	Order No.
DN25 PN100 RTJ	81053AAA
1½" ANSI 150 RF	81053AAB
1½" ANSI 600 RF	81053AAC
1½" ANSI 900 RF	81053AAD
DN32 PN40 RF	81053AAE
DN25 PN100 RF	81053AAF

### Covimat DC40E Flow Beakers

Description	Order No.
2" ANSI 150 RF	81053BAB
DN50 PN40 RF	81053BAE
2" TRI CLAMP	81053BAG
2" IDF	81053BAH

### Covimat DD Flow Cell

Description	Order No.
Measuring cell (excl. cylinder/bob)	00112405

### Cylinders/bobs

Range	Order No.
1 - 460 cP *	00112443
5 - 1,350 cP *	00112444
10 - 3,100 cP *	00112445
15 - 5,000 cP	00112446
30 - 8,800 cP *	00112447
40 - 11,200 cP	00112448
50 - 13,200 cP	00112449

\* Twin gap measuring cells

### Cylinders/bobs

Size	Order No.
69.5mm	00112350
68mm	00112349
63mm	00112348
46mm	00112347
31mm	00112273

### Cylinders/bobs

Size	Order No.
24mm	00112309
35mm	00112307
51mm	00112305
57mm	00112303
59mm	00112302
Double-split	00112242

## Installation accessories

Correct installation is a key factor in the quest for accurate long-term measurement, particularly where viscosity is used as a critical control parameter and where line values must be referred to base conditions.

The flow through chamber is designed for installation as a local fast loop (slipstream) on a main pipeline, and gives the following advantages:

- minimizes the need for on-site calibration
- improves accuracy
- enhances viscosity referrals
- increases tolerance of solids and entrained gas
- reduces maintenance

Flow through chambers are available with 1" or 2" NB inlet/outlet tubes, with a choice of weld ends, compression fittings or flanges, and an optional thermal jacket.

For direct pipeline fitting and improved thermal performance, Solartron's range of prepared collars (weldolets) are available for pipe diameters of 4", 6", 8" or 10" nominal bore.

See data sheet B782703 for more details

**More details of Solartron transducers, signal converters and flow computers are given in the following brochures:**

Density transducers	IP7003
Gas Density and Specific Gravity Products	B1253
795x Series Signal Converters	B1251
795x Series Flow Computers for the gas industry	B1248
795x Series Flow Computers for oil and refined products	B1249
Installation accessories	B782703

### Solartron Mobrey Limited

158 Edinburgh Avenue Slough  
Berks UK SL1 4UE  
Tel: 01753 756600  
Fax: 01753 823589  
e-mail: sales@solartron.com  
www.solartronmobrey.com

### Solartron Mobrey

19408 Park Row, Suite 320,  
Houston TX 77084 USA  
Tel: 281 398 7890  
Fax: 281 398 7891  
e-mail: sales@solartron.com  
www.solartronusa.com



Solartron Mobrey GmbH	Deutschland	tel: 0211/99 808-0
Solartron Mobrey Ltd	China	tel: 021 6353 5652
Solartron Mobrey sp z o o	Polska	tel: 022 871 7865
Solartron Mobrey AB	Sverige	tel: 08-725 01 00
Solartron Mobrey SA	France	tel: 01.30.17.40.80
Solartron Mobrey SA-NV	Belgium	tel: 02/465 3879



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