

Product Data Sheet

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Micro Motion[®] 7829 Viscomaster Dynamic[™] Viscosity Meter

Micro Motion[®] viscosity meters are built to tackle the most demanding process and marine applications. Rugged and reliable direct insertion meters with very low maintenance, they provide fully integrated “fit and forget” viscosity measurement.



High accuracy viscosity measurement

- Multi-variable measurement of dynamic viscosity, kinematic viscosity, and temperature
- Unique direct insertion design
- Integral-mount transmitter with analog and digital communications

Greatest installation flexibility

- Continuous, real-time measurement in various installation configurations
- Retrofit kits available for easy replacement of existing viscosity meter technologies

Superior reliability and safety

- Worldwide marine-approved design for aggressive environments
- Insensitive to vibration, temperature, and pressure variations



Micro Motion® 7829 Series Viscomaster Dynamic™ Viscosity Meter

About the 7829 Viscomaster Dynamic

The Micro Motion® 7829 Viscomaster Dynamic™ is a proven technology for the accurate, continuous real-time measurement and control of liquid viscosity.

The 7829 Viscomaster Dynamic viscosity meter has been designed for installation in fuel oil applications that supply engines, turbines, and burners in on-shore and off-shore applications.

As part of its unique and rugged design, the 7829 Viscomaster Dynamic viscosity meter directly measures dynamic viscosity and temperature. The meter is also programmable to output calculated density and kinematic viscosity measurements. The Viscomaster Dynamic can easily cope with a range of fuels from heavy fuel oil (HFO) to marine gas oil (MGO).

The Viscomaster Dynamic has worldwide marine-industry approvals including Lloyds Register, GL, DNV, ABS, and BV. For a complete list of marine approvals, see “Marine approval classifications” on page 7.

Advantages

- Fully integrated “fit and forget” digital viscosity and temperature measurement for monitoring and control
- Two 4–20 mA outputs of kinematic viscosity and temperature
- Modbus/RS-485 communications output of all parameters, including calculated density and calculated kinematic viscosity at operating temperature
- Continuous measurement
- No moving parts means virtually no maintenance
- PFA-coated tines for asphaltene rich fuels
- Integral Class B PT100 temperature sensor
- Hazardous-area approved (ATEX and CSA)
- Insensitive to vibration
- Direct insertion meter suitable for high-line pressure
- PC configuration tools for diagnostics and data logging

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Typical applications

- Heavy fuel oil (HFO) heater control to burners and engines
- Lube oil viscosity control

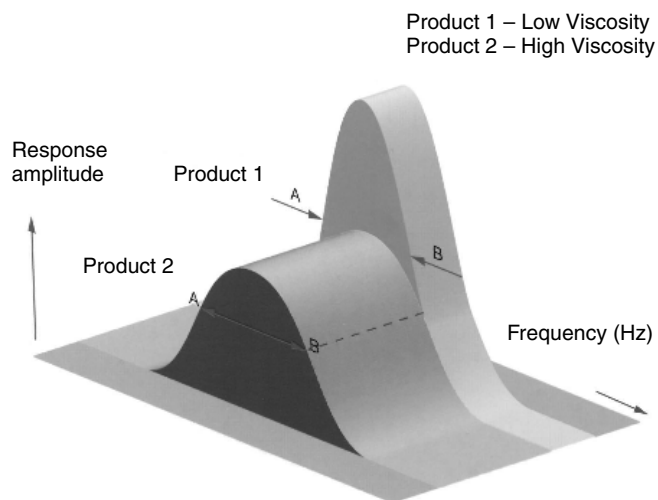
Typical industries

- Marine
- Power
- Heavy fuel oil (HFO) blending and bunkering

Principle of operation

The 7829 Viscomaster Dynamic viscosity meter uses vibrating fork technology to measure viscosity. Viscosity is measured by detecting the bandwidth around the fork's natural vibration frequency.

The following figure illustrates how the 7829 meter uses the frequencies at point A (the lower -3 db point) and at point B (the upper -3 db point) to digitally calculate bandwidth and quality factor. Quality factor is then used to define fluid viscosity using standard calibration techniques.



Bandwidth = Point B – Point A
Resonant Frequency = (Point A + Point B) / 2
Quality Factor = Resonant Frequency / Bandwidth

Features

The Viscomaster Dynamic offers features that are suited to specific applications and industry needs.

Process Requirement	7829 Viscomaster Dynamic
Dynamic viscosity	✓
Kinematic viscosity	✓
Temperature measurement	✓
Integrated density output	Calculated
Sensor type	Fork
Mounting arrangement	Bypass / Inline
Transmitter version	✓
mA outputs	Two 4–20 mA (1 configurable / 1 fixed)
Measurable liquid types	Heavy fuel oil
Principle markets	Marine/Power

No Field Calibration Required

The 7829 Viscomaster Dynamic viscosity meter is factory-calibrated and no field calibration is required. The calibration is traceable to UK National Standards through the Micro Motion onsite accredited laboratory.

Integral Electronics for Signal Processing

A configured microprocessor-based electronic module provides the full signal conditioning, calculation, and diagnostic facilities within these meters. The 7829 Viscomaster Dynamic does not require remote electronics for signal processing. This meter simultaneously measures real-time viscosity and temperature. The integrally mounted electronics can be configured to output a number of user-defined parameters.

RS-485/Modbus Communications Interface

All measurements are available digitally through the built-in RS-485/Modbus communications interface – including calculated density and calculated kinematic viscosity at operating temperature – for integration into plant data systems. You can use the ADView or ProLink II (v2.9 or later) software tools to configure or diagnose a meter via the RS-485/Modbus interface. See “ADView Software Tool Features” and “ProLink II Software Tool Features” for more information.

User-Configurable 4–20 mA Outputs

Two 4–20 mA outputs are available:

- mA output 1 is configurable to output parameters such as dynamic or kinematic viscosity.
- mA output 2 is set to output temperature, which you can configure for zero and span.

Any of a range of output parameters can be used to drive the two 4–20 mA outputs, enabling them to be used as the process variable in control applications without the need for additional processing electronics.

Following are the default settings for the two mA outputs.

Code	mA output 1		mA output 2	
	Viscosity (cSt)		Temp (°C)	
	4 mA	20 mA	4 mA	20 mA
H	0	25	0	150
J	0	50	0	150
Z	Custom			

Low Maintenance Required

Because the 7829 Viscomaster Dynamic viscosity meter has no moving parts, minimal maintenance is required, leading to lower overall operating costs. The vibrating forks are available with PFA coating to assist self-cleaning. PFA is ideal for hydrocarbon and fuel oil applications.

ADView Software Tool Features

ADView is a PC-based configuration and diagnostics tool that runs on a Microsoft® Windows® platform, communicates with the meter through a standard serial port, and provides the following functionality:

- Setting up a serial link to communicate with the 7829 transmitter
- Configuring the 7829 transmitter
- Displaying data real-time or as a graph
- Logging data to a file
- Verifying correct operation of the system and diagnosing faults

ProLink II Software Tool Features

The ProLink II software tool (v2.9 or later) can be used with the meter. ProLink II runs on a Microsoft Windows platform, communicates with the meter through a standard serial port or USB port, and provides the following functionality:

- Configuring the 7829 transmitter
- Viewing and logging process parameters
- Viewing meter diagnostics

Performance

Viscosity Calibrated Range	0.5 to 50 cP
Viscosity Accuracy	±1% span (±0.2 cP up to 10 cP)
Viscosity Repeatability	±0.5% of reading

Temperature specification

Process	−40 °F to +392 °F (−40 °C to +200 °C)
Ambient	−40 °F to +185 °F (−40 °C to +85 °C)

Integral temperature sensor

Technology	100 Ohms RTD (4 wire)
Accuracy	PT100 BS1904 Class B, DIN 43760 Class B

Pressure ratings

Maximum operating pressure⁽¹⁾	3000 psi (207 bar)
Test pressure	Tested to 1.5 x the maximum operating pressure
PED compliance	Outside the scope of European directive 97/23/EC on Pressure Equipment.

(1) Actual maximum operating pressures are limited by the process connection rating.

Hazardous area classifications

ATEX

ATEX-approved: Certification for use in Europe

ATEX II2G Ex d IIC, T4

CSA C-US

CSA-approved: Certification for use in Canada and USA

Class I, Division 1 Groups C & D, T4

Marine approval classifications

Marine Approval

Country

American Bureau of Shipping

USA

Lloyds London

United Kingdom

Germanische Lloyd

Germany

Det Norske Veritas

Norway

Bureau Veritas

France

RINA

Italy

Nippo Kaiji Kyokai

Japan

Russian Maritime Register of Shipping

Russia

South Korean Register of Shipping

South Korea

General classifications

Electromagnetic compatibility

All versions conform to the latest international standards for EMC, and are compliant with EN 61326/IEC 61326.

Environment

- Weather rating: IP66

Materials of construction

Wetted parts	316L Stainless steel
Tine finish	PFA laminated ⁽¹⁾
Electronics enclosure	Sand cast low copper alloy Polyurethane paint finish

(1) PFA is applied only to the tines for its anti-stick properties not for corrosion protection.

Weight

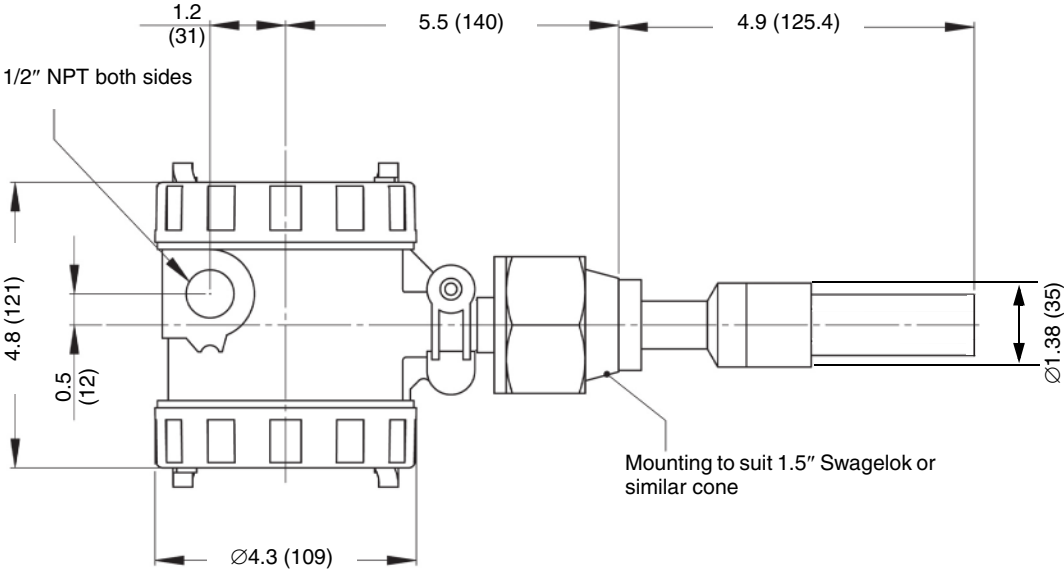
Weight	7.5 lb (3.4 kg) typical
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Electrical

Power supply requirement	For transmitter For mA outputs	20 to 28 VDC, 50 mA 22 mA per output
Outputs	mA Accuracy Repeatability Out-of-range System alarm Communications	Two externally powered 4–20 mA ±0.1% of reading, ±0.05% of full scale at 68 °F (20 °C) ±0.05% of full scale, over range –40 °F to +185 °F (–40 °C to +85 °C) 3.9 or 20.8 mA on 4–20 mA 2 or 22 mA on 4–20 mA (Programmable alarm state) RS-485 (Modbus)
Electrical connection	Screw terminal, cable entry to suit ½" NPT gland (20 mm adaptor available)	

Dimensions

Dimensions in inches (mm)



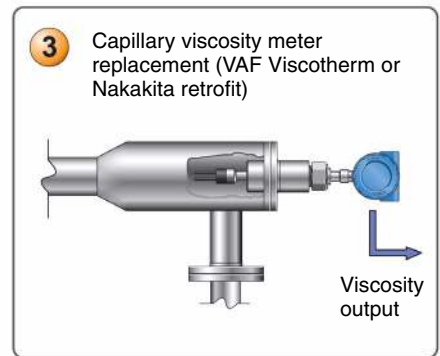
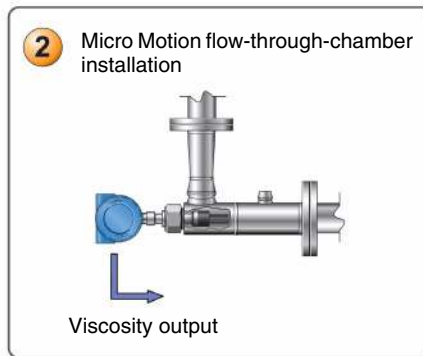
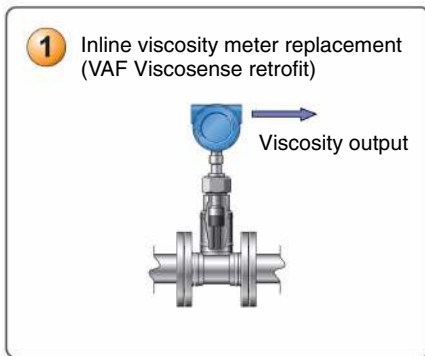
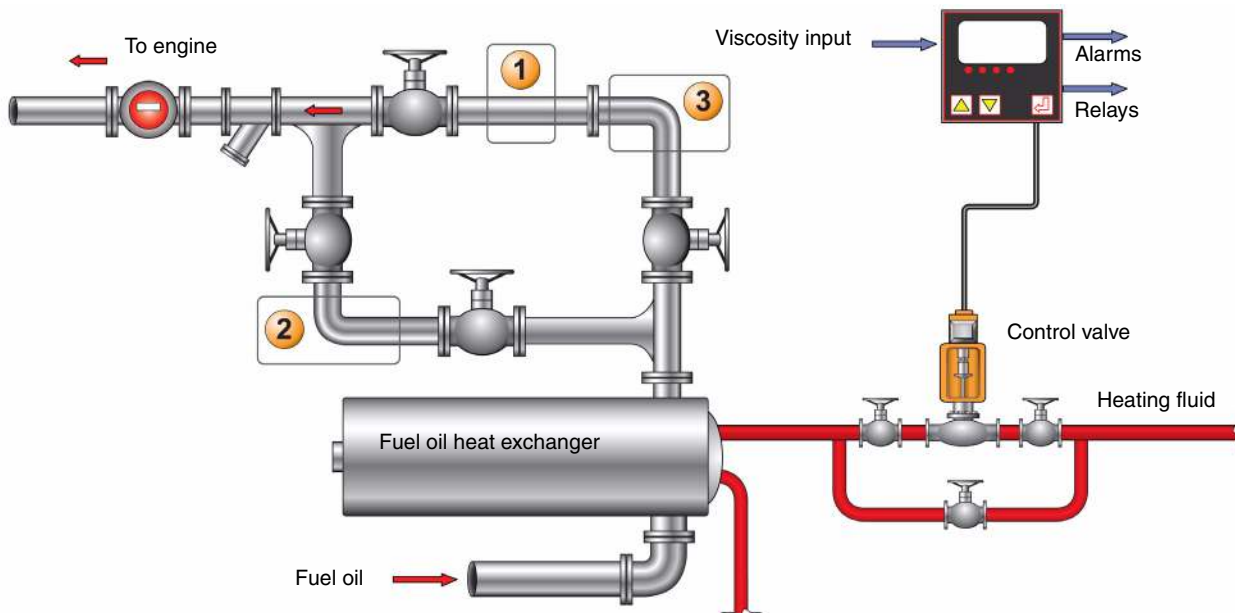
Installation

A variety of installation accessories are available for both inline and slipstream/bypass installations. Additionally, retrofit adapter kits are available for easy replacement of other viscosity measurement technologies. For more information on these installation accessories, see the Micro Motion® 7829 Viscomaster® Series Accessories product data sheet available at www.micromotion.com.

Fuel heater control example

Most marine and land-based engine/burner applications use a fuel booster module to precondition the heavy fuel oil (HFO) prior to injection. These modules usually consist of a number of supply pumps fed by either HFO or MDO, a flow meter, in-line filters to remove the impurities, and a holding/mixing tank. Following the supply section, the fuel is usually sent to booster pumps that increase the flow rate up to a maximum of 20 m³/hr and then through a series of heat exchangers (liquid or electric) to change the product viscosity for efficient combustion.

Following is a graphic that shows the different installation options for the 7829 Viscomaster Dynamic in a fuel booster module.



Ordering Information

Model	Product description
7829	Viscosity meter
Code	Material of wetted parts
F	316L Stainless steel, PFA laminated tines
Code	Amplifier system
E	Advanced: 4–20 mA output, ATEX Ex d IIC T4, < 200 °C
F	Advanced: 4–20 mA output, CSA Class 1 Division 1, Groups C & D, < 200 °C
Code	Amplifier enclosure
A	Aluminium alloy [T4 (< 40 °C < Ta < +110 °C)]
Code	Process connections
N	1.5" Cone seat compression fitting
Code	Stem length
A	0 mm: no stem extension and with standard spigot
Code	Default software configuration of 4–20 mA output 1 ⁽¹⁾
H	0 to 25 cSt
J	0 to 50 cSt
Z	ETO custom configuration
Code	Calibration range
R	0.5 to 50 cP; no density calibration
Code	Calibration type
A	Free stream
B	2" schedule 40 boundary (200 cP limit)
E	3" schedule 80 boundary ⁽²⁾
H	2-1/2" schedule 40 boundary
J	80 mm boundary ⁽³⁾
Z	ETO calibration type
Code	Factory Set
B	Reserved for future use
Code	Traceability
A	None
X	Certificates of material traceability (per single order)
Typical model number: 7829FEANAHRABA	

(1) 4–20 mA output 2 default setting is temperature.

(2) Compatible with DN80 XS pipework.

(3) With a minimum wall thickness of 0.24 in (6 mm).

Micro Motion—The undisputed leader in flow and density measurement



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Technology leadership

Micro Motion introduced the first reliable Coriolis meter in 1977. Since that time, our ongoing product development has enabled us to provide the highest performing measurement devices available.

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From compact, drainable process control to high flow rate fiscal transfer—look no further than Micro Motion for the widest range of measurement solutions.

Unparalleled value

Benefit from expert phone, field, and application service and support made possible by more than 750,000 meters installed worldwide and over 30 years of flow and density measurement experience.

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Emerson Process Management

Micro Motion Americas

Worldwide Headquarters
7070 Winchester Circle
Boulder, Colorado USA 80301
T: 800 522 6277
T: +1 (303) 527 5200
F: +1 (303) 530 8459
Mexico T: 52 55 5809 5300
Argentina T: 54 11 4837 7000
Brazil T: 55 15 3238 3527
Venezuela T: 58 26 1792 1858

Emerson Process Management

Micro Motion Europe/Middle East

Central & Eastern Europe T: +41 41 7686 111
Dubai T: +971 4 811 8100
France T: 0800 917 901
Germany T: 0800 182 5347
Italy T: 8008 77334
The Netherlands T: (31) 318 495 555
Belgium T: +32 (0) 2 716 77 11
Spain T: +34 913 586 000
U.K. T: 0870 240 1978
Russia/CIS T: +7 495 981 9811

Emerson Process Management

Micro Motion Asia Pacific

Australia T: (61) 3 9721 0200
China T: (86) 21 2892 9000
India T: (91) 22 6662 0566
Japan T: (81) 3 5769 6803
South Korea T: (82) 2 3438 4600
Singapore T: (65) 6 777 8211

For a complete list of contact information and websites, please visit: www.emersonprocess.com/home/contacts/global.

