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BURKECALIBRATION.COM

NUFLO MC-III Flow Analyzer Transmitter and Totalizer

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Introduction

MC Series* flow totalizers are accessories for any manufacturer of turbine flowmeters or other meters that produce a pulse to represent a quantity of fluid. The totalizer counts each pulse and applies a scaling factor to provide the total accumulation of fluid and flow rate in the users preferred units of measure in volume, mass, or energy-based units.

Applications

- Gas
- Water
- Chemical
- Hydrocarbon liquids

Benefits

- Models for every level of automation
- Battery operation for low installed cost

Features

- Global certifications
- Stand-alone or networked solutions



NUFLO MC-III EXP explosion-proof flow totalizer.*









NUFLO MC-III WP weatherproof flow totalizer.*



NUFLO MC-II flow totalizer.*

Comparison Chart

								
	Model	NUFLO MC-I* flow totalizer	NUFLO MC-II* flow totalizer	NUFLO MC-III PM* panel-mount flow totalizer	NUFLO MC-III WP* weatherproof flow totalizer	NUFLO MC-III EXP* explosion-proof flow totalizer	Scanner* Model 2000 flow computer	
Application	Housing	Weatherproof	Weatherproof	Panel-mount	Weatherproof	Explosion-proof	Explosion-proof	
	Application	Local display	Local display	Local display with outputs				
	Pressure and temperature (P&T) compensation of the liquid or gas volume	–	Fixed, manually calculated	Fixed based on constant P&T entered in NUFLO MC-III totalizer PC software or manually calculated				Live, AGA 7 gas, or API 11.1 liquid
	Throttling control	–	–	–				Optional proportional-integral-derivative (PID)
Certifications	Explosion proof [†]	–	–	–	cCSAus	cCSAus	cCSAus	
	Flame proof [†]	–	–	–	–	ATEX/IEC	ATEX/IEC	
	Intrinsically safe	cCSAus	cCSAus or ATEX/IEC	–	Class 1 Div. 2 Nonincendive	–	–	
Construction	Enclosure material	Fiberglass and plastic	Plastic	Various, std. 1/4 DIN [3.62 in x 3.62 in]	Fiberglass and plastic	Epoxy-coated low copper aluminum or 316 stainless steel		
	Input	Low-amplitude turbine meter	1	1	1	1	1, 2 optional	
	Amplified square wave	–	–	–	–	–	1 optional	
Mounting		Portable	Direct or optional pipe	Panel	Direct or optional pipe or wall			
Outputs	Pulse	–	Limited application	•	•	•	•	
	4–20 mA	–	–	•	•	•	Optional	
	Amp and square	–	–	•	•	•	–	
Functions	Data logging	–	–	•	•	•	•	
	K-factor entry by keypad	•	•	•	•	•	•	
	Reset functions	By keypad		Option external push button, by keypad or serial communications				
	Turbine linearization	–	–	1 to 12 point				
	Adjustable input sensitivity	–	–	20–40 mV				20–200 mV
	Keypad password security	•	•	•	•	•	•	
	Alkaline battery option	•	–	–	Pack	Pack	–	
Power	Lithium battery power option	–	•	•	•	•	•	
	External power	–	–	6–30 VDC				
	Loop powered 4-20 mA	–	–	•	•	•	4 wire	
	RS-485	–	–	1 port			2 ports	
Communications	USB	–	–	Optional (uses one 485 port)				
	Modbus®/Enron® Modbus	–	–	•	•	•	•	
	FOUNDATION™ fieldbus	–	–	–	–	–	Optional	
	Wireless	–	–	–	–	–	Model 2100	
	PC configuration software available at no extra charge	–	–	•	•	•	•	

[†] Certifications vary by part number. All certifications are not available in one part number.

For a full list of features for each of the NUFLO MC totalizer, refer to technical data. For additional flow computer information, see separate publications by Cameron. Cameron also offers turbine electronic accessories, including preamplifiers, amplified pickup coils, and scaling circuit cards. See other associated publications.

– Not available or not applicable
• Standard feature

NUFLO MC-I Flow Totalizer

The portable NUFLO MC-I flow totalizer supports spot checking of flow rates on flowmeters that may not have a permanently installed totalizer or where the turbine electronics do not provide a local display.

It is easily transported from one location to another for use with turbine flowmeters of all sizes. The combination of NUFLO* measurement technology and a NUFLO MC-I flow totalizer indicates current flow rate and total volume.

In most applications, the turbine flowmeter will be permanently installed, and the operator will hold the pickup sensor to the second standard recess that is machined into NUFLO technology liquid flowmeters. In this way, there is no need to remove other existing electronics that may be installed on the flowmeter. The NUFLO MC-I flow totalizer may be used with other turbine brands and styles provided that there is an accessible sensing pocket available.

Low-power microprocessor technology enables the flow totalizer to operate a minimum of 1 year on an alkaline battery pack. Because of the long battery operating life, no power switch is necessary.

Features

- Magnetic pickup adapter allows for quick and easy reading of NUFLO measurement technology
- Setup and calibration from front panel—no disassembly required
- Durable weatherproof case with integral handle
- Easy reference chart of NUFLO technology sizes and flow information mounted inside the lid
- Nonhazardous alkaline battery power
- Calibration data is retained even without battery power; totals can be saved by pressing the ENTER/STOP button on the keypad

Display

- Six digits for total; user-selected decimal
- Six digits for rate; automatic decimal positioning
- Character height—0.5 in
- Update period: 4 s
- Units of measurement
 - Volume: bbl, galUS, m³, and L
 - Rate: bbl/d, galUS/min, m³/d, and L/min
 - User-defined units implemented by entering a divisor and selecting a rate time base (per day, per hour, per minute, per second)



NUFLO MC-I flow totalizer.

Specifications

- Calibration: To pair to a turbine being observed, the user enters calibration factor of meter and selects units of measurement
- Turbine meter input
 - Signal generated via magnetic pickup
 - Frequency range: 0–2,000 Hz
- Operating temperature: 0 to 130 degF [–18 to 55 degC]. Rating is established by the alkaline battery specifications. Experience indicates satisfactory operation over a broader temperature range.
- Humidity: 0%–90% non-condensing
- Hazardous area use: Class 1 Div. 1 intrinsically safe
- Power supply: Internal alkaline battery pack—one-year minimum life at recommended operating temperatures
- Enclosure
 - Black acrylonitrile butadiene styrene (ABS) plastic provides weatherproof protection when the lid is closed and latched
 - 3⁷/₁₆ in × 7⁷/₈ in × 8⁷/₈ in (height × depth × width), including hinge and handle

NUFLO MC-II Flow Totalizer

Intended for local display of flow rate and accumulated flow, the NUFLO MC-II flow totalizer provides separate, continuously illuminated LCD digital displays based on input from a turbine flowmeter. A single lithium battery inside the device powers the unit for three to five years. Together with a turbine flowmeter, the NUFLO MC-II totalizer delivers a low installed cost measurement solution.

Readings from the totalizer can be made in any desired volumetric units, and flow rates can be measured in units per second, minute, hour, or day. Rate and total are quickly and easily calibrated using the keypad on the front of the flow totalizer. The instrument is suitable for outdoor installation and requires no additional protection from the weather. It may be mounted directly on the turbine flowmeter or attached remotely.

Features

- Imbedded units of measure conversion factors simplifies calibration to popular units of measure
- Calibration data is retained even without battery; totals can be saved by pressing the ENTER/STOP button on the keypad
- Total reset: may be reset to zero from front panel
- Calibration: Settings made from front panel
- Security: Password security may be activated as a requirement to reset the total or change the calibration
- Swivel and tilting head for optimal viewing
- Weatherproof electrical connector and treaded union style direct mount connector for efficient installation

Specifications

- Size (W × H × L): 7.3 in × 8.3 in × 3.4 in [185 mm × 211 mm × 89 mm]
- Weight: 6 lbm including shipping container
- Power supply: One 3.6 volt lithium battery (restricted air transport regulations apply)
- Temperature range: -40 to 140 degF [-40 to 60 degC]
- Totalizer and flow rate display: six digits, bold, 6-in tall
- Divisor or calibration factor range: 0.001 to 999,999
- Standard units: bbl and bbl/d (other units of measure selectable during commissioning)
- Accuracy: ±1 count (totalizer)
- Input frequency: 0–3,500 Hz
- Input amplitude: 30–3,000 mV peak to peak

Optional selections

- Remote mount version with various cable length selections
- Pulse output: the NUFLO MC-III flow totalizer is recommended when outputs or communications are required. The NUFLO MC-II flow totalizer offers an optional pulse output for use in a nonhazardous area.



NUFLO MC-II flow totalizer.

NUFLO MC-III Flow Totalizer

Cameron NUFLO MC-III flow totalizers provide local or remote indication of total and rate in the user's preferred units of measure and also acts as an interfacing device to transfer real-time or historical information by analog or digital serial communication techniques to SCADA or automation systems.

This product is optimized for use with gas or liquid turbine flowmeters but also accommodates any device that outputs a sine wave, pulse, or contact closure.

Features

- RS-485 Modbus communications
- Extensive log archival capacity
- High-speed data downloads
- Interactive software for quick and easy calibration and data access
- Simultaneous indication of rate and total
- Easy-to-read LCD displays
- Loop-powered analog output
- 12-point linearization
- Nonvolatile memory
- Password-protected security
- Optional hardware for daily log viewing and external laptop connection
- CSA, ATEX, IECEx, and CE approvals

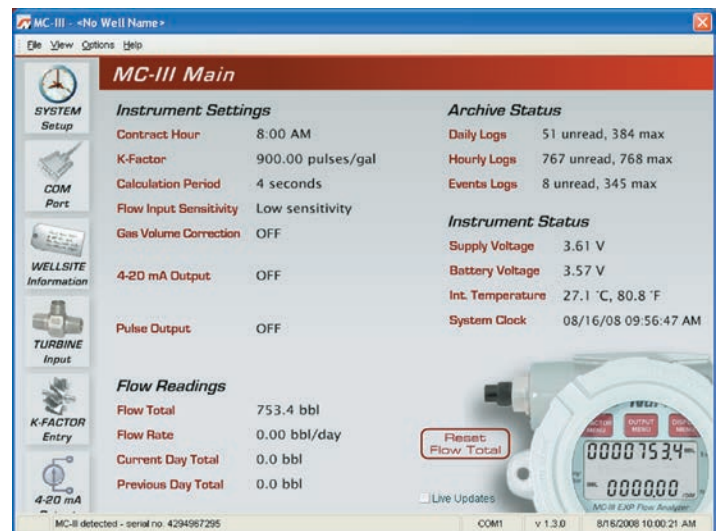
Three housing alternatives

- NUFLO MC-III PM panel-mount flow totalizer—enabling space saving and footprint reduction
- NUFLO MC-III WP weatherproof flow totalizer—delivering purchase and installation cost savings through utilization of nonarcing, nonheat-producing, and nonincendive protection techniques. This version is supplied with CSA Div. 2 North American hazardous location certifications. Other benefits of this model includes providing an unimpeded access to the keypad or the battery. When directly mounted to the flowmeter, the head may be swiveled and tilted for optimal viewing of the display.
- NUFLO MC-III EXP explosion-proof flow totalizer—offering a choice of global hazardous area certifications. To endure harsh offshore conditions, an all 316 stainless steel housing option with ATEX/IEC certification is available.

Record up to 384 daily flow logs, 768 hourly logs, and 345 event logs and downloads them to your computer via Modbus in less than 1 min. You can also use free-to-download Cameron software for added productivity.



NUFLO MC-III flow totalizer.



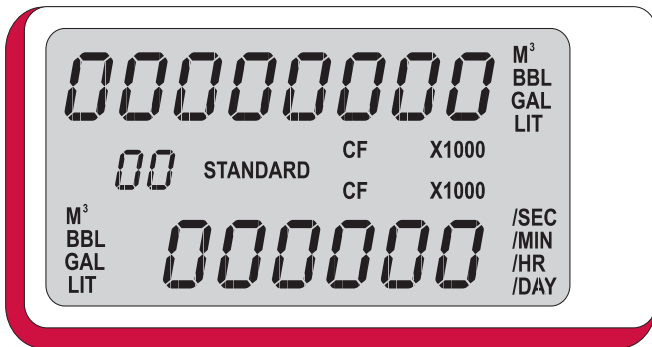
Users can access every configuration parameter from one screen.

Calibration

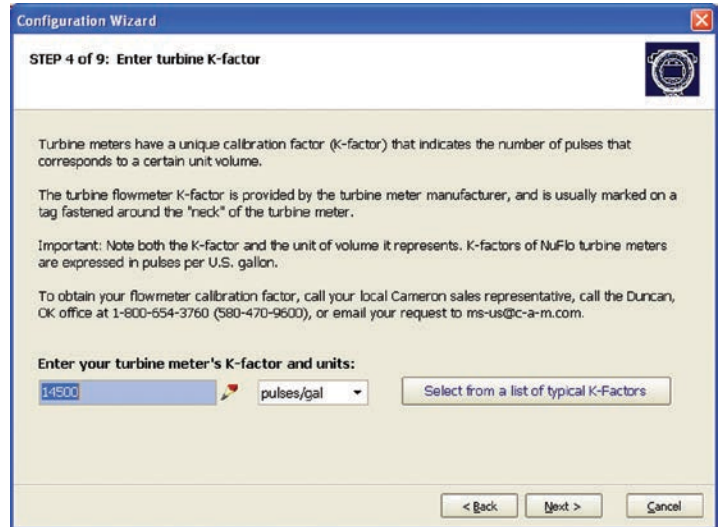
Calibrating the NUFLO MC-III flow totalizer is as easy as entering the calibration factor of the flowmeter and selecting the desired units of measurement. The instrument automatically calculates its own divisor.

The wide variety of unit options for total and rate gives users the freedom to customize the display, inputs, and outputs for specific needs.

With the built-in wizard that guides users step by step through the configuration process, even first-time users will get dependable results in just minutes.



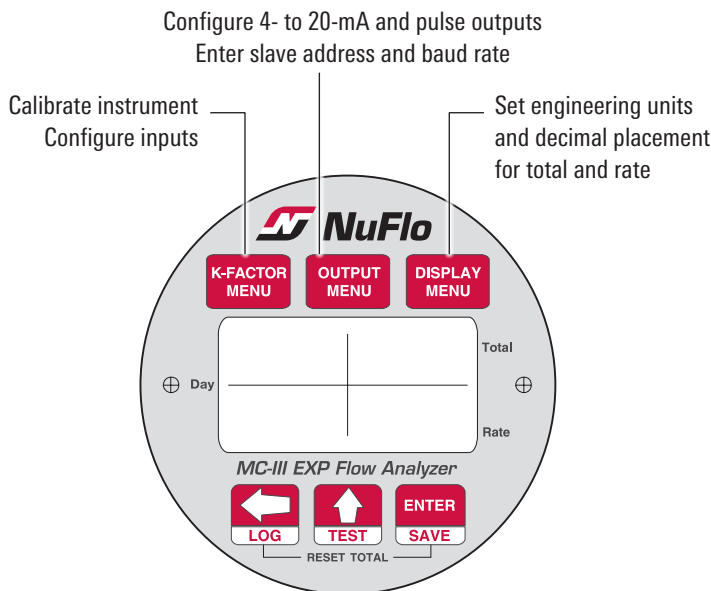
The flow totalizer LCD displays volume and flow rate in a variety of commonly used engineering units.



The NUFLO MC-III EXP flow totalizer can be calibrated by entering the flowmeter's calibration factor and selecting the desired measurement units.

Keypad or configuration

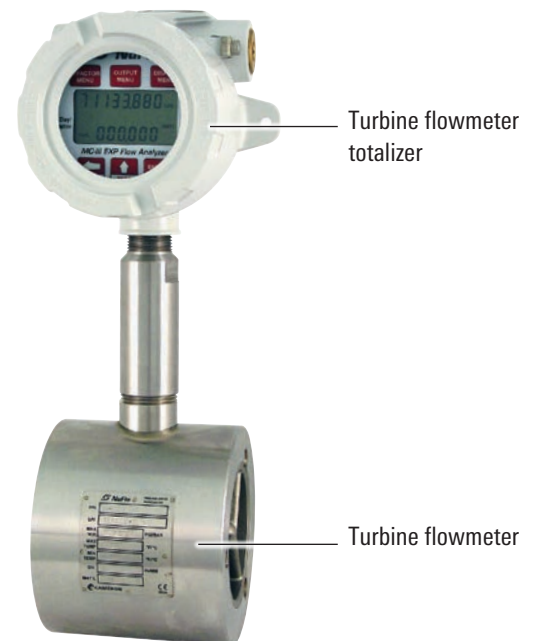
The NUFLO MC-III flow totalizer can be configured with either the software interface or the six-button keypad on the front of the instrument. Built-in shortcuts to common functions simplify configuration, reducing the user's time spent on site. The software supports remote changes, access to advanced capabilities, and data collection and reporting tools.



The keypad on the front of the flow totalizer enables configuration.

Bundled solutions

NUFLO MC-III EXP and WP flow totalizers are ideal companions to a NUFLO or BARTON* measurement technology.



When used together, Cameron totalizers and flowmeters offer greater efficiency.

Specifications

Display

- 8-digit display of total
- 6-digit display of rate (11-segment characters for easy-to-read prompts)
- Character height: 0.3 in
- Adjustable contrast and update period
- User-selectable units of measurement
 - Total: bbl, galUS, L, m³, ft³, standard ft³, user-defined units (and all units ×1,000)
 - Rate: Any of the above total engineering units per day, hour, minute, or second

Calibration

- Liquid flowmeter: User enters calibration factor of meter and selects units of measurement
- Gas flowmeter: User enters calibration factor of meter, pressure and temperature parameters, and supercompressibility factor via user-interface software

Power supply options

- 3.6-VDC lithium battery pack
 - Two-year life typical (main or backup power supply)
 - Transport subject to hazardous-goods restriction
- Alkaline battery pack option (main or backup power supply) CSA approved only; not recommended for temperatures consistently below 20 degF [–7 degC]
- External power supply (6–30 VDC) with internal battery backup
- Loop-powered (4- to 20-mA output) with internal battery backup

Temperature range

- Lithium battery: –40 to 158 degF [–40 to 70 degC]
- Alkaline battery pack [CSA only]: 20 degF to 140 degF [–7 to 60 degC]
- LCD contrast is reduced below –4 degF [–20 degC]

Communications and archive retrieval

- RTU-mode Modbus
- Enron Modbus
- 16-bit slave address supported
- Data printouts in tabular or chart formats
- Data export to spreadsheet (.xls and .csv formats)

Inputs

Turbine meter input

- Configurable sensitivity adjustment and low-frequency cutoff
- Zero voltage crossing sine wave
- Frequency range: 0–3,500 Hz

Remote reset input

- Optically isolated
- Supply range: 3.0–30 VDC external reset switch (option)
- Explosion proof
- Daily log viewing capabilities

Pulse input

- Optically isolated
- Voltage range: 3.0–30 VDC
- Frequency range: 0–3,500 Hz

Outputs

Analog output

- 4–20 mA, loop-powered (two-wire)
- 16-bit resolution
- Accuracy: 0.1% of full scale at 77 degF [25 degC], 50-ppm/degC temperature drift
- Loop power: 8.0–30 VDC
- Zero and full-scale engineering values configurable from front panel
- Cannot be used simultaneously with amp and square output

RS-485 communications

- Baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and up to 115.2K
- Optional external communications adapter simplifies frequent local connection of a PC. Mounts on side of the enclosure, suitable for hazardous location
 - USB type (CSA approved)
 - RS-485 type (CSA and ATEX approved)

Pulse output

- Typically scaled to match displayed units of volume measure
- Solid-state relay
- Output rating: 60-mA maximum at 50 VDC
- Configurable pulse duration and scaling factor

Amp and square output

- Zero latency preamplifier like output. Output pulses match the input pulses one for one.

- Open-drain transistor output of turbine meter input signal
- Output rating: 50 mA at 30 VDC
- Cannot be used simultaneously with analog output

Certification

NUFLO MC-III EXP totalizer—aluminum housing

- CSA approved for US and Canada
 - Class I, Div. 1, Groups B, C, D (explosion-proof) Type 4 enclosure
 - T6 temperature class
- ATEX/IECEX approved
 - Category II, Group 2 (gas and dust)
 - Ex d IIC T6 Gb
 - Ex tD A21 IP66 T85 degC
- CE approved
- Complies with EMC Directive 2004/108/EC

NUFLO MC-III EXP totalizer—316 stainless steel housing

- ATEX/IECEX approved
 - Ex db IIC T6 Gb (gas)
 - Ex tb IIIC T85 degC
- CE approved
- Complies with EMC Directive 2004/108/EC

NUFLO MC-III WP totalizer

- CSA approved for US and Canada
- Class I, Div. 2, Groups A, B, C, D
- Type 4 enclosure
- T5 temperature class

Interface software

- Provided at no additional charge
- Complete configuration
- Real-time data
- Downloads and exports
- Wizard offers step-by-step calibration procedure
- Windows® XP, 7, or 10 required

Flow archive

- 384 daily logs
- 768 hourly logs
- 345 event logs
 - K-factor changes
 - Input setting changes

How to Order

NUFLO MC-I Totalizer Ordering Information

Description	Part Number
Portable assembly with pickup coil	2350445-01



NUFLO MC-I flow totalizer.

NUFLO MC-II Totalizer Ordering Information

Certification	Direct Mount [†]	Remote Mount [‡]	Part Number
CSA	●	—	9A-100005130
	—	●	9A-100005129
ATEX/IEC [§]	●	—	9A-50179070
	—	●	9A-50179071

[†] For mounting to 1-in-NPT NUFLO technology turbines. Add 3/4-in reducing bushing part number 2295669-01 to mount to BARTON technology turbines.

[‡] Remote mount includes

- 2-in pipe mount brackets
- 10-ft cable assembly for connection to turbine. Includes plastic 1-in NPT weatherproof cover for turbine pickup coil.

[§] An ATEX/ IEC and PED certified Cameron turbine is recommended.

Longer Length Assemblies (CSA Certified Only)

Cable Assembly, ft	Part Number
10 [†]	9A-100005117
15	9A-100005169
20	9A-100080014
25	9A-100079898
30	9A-100079880
50	9A-100005168
100	9A-100079879
200	9A-100005128
300	9A-100079687

[†] Standard on remote mount.



NUFLO MC-II flow totalizer.

NUFLO MC-III PM Totalizer Ordering Information

Certification	Battery	Part Number
None	Lithium	2350341-01



NUFLO MC-III PM totalizer.

NUFLO MC-III WP Totalizer Ordering Information

Certification	Battery	Direct Mount [†]	Remote Mount [‡]	Part Number
CSA	Lithium	●	—	9A-50179076
		—	●	9A-50179078
	Alkaline	●	—	9A-50179075
		—	●	9A-50179077
	None	●	—	9A-50179079
		—	●	9A-50179080

[†] For mounting to 1-in NPT NUFLO technology turbines. Add 3/4-in reducing bushing part number 2295669-01 to mount to BARTON technology turbines

[‡] Remote mount includes

- 2-in pipe mount brackets, not used when wall mounting

- 10-ft cable assembly for connection to turbine. Includes plastic 1-in NPT weatherproof cover for turbine pickup coil. See NUFLO MC-II totalizer section for longer-length cables.

[§] An ATEX/ IEC and PED certified Cameron turbine is recommended.



NUFLO MC-III WP waterproof flowmeter totalizer.



NUFLO MC-III EXP totalizer with painted aluminium housing.



NUFLO MC-III EXP totalizer with stainless steel housing.

Order information for popular models of NUFLO MC-III EXP totalizer with painted aluminum housings. Additional configurations, including those with stainless steel housings, are available.

MC-III EXP Ordering Information

Certification	Direct Mount Capability	Battery	USB Communication Adapter (Left Side)	External Reset Switch (Right Side)	Part Number
CSA	1-in NPT for NUFLO technology turbines. Add 3/4-in reducing bushing part number 2295669-01 to mount to BARTON technology turbines. Includes direct mount union.	Lithium	—	—	9A-50179024
			●	—	9A-50179089
			—	●	9A-50179027
		Alkaline	●	●	9A-50179091
			—	—	9A-50179025
			—	●	9A-50179029
	None	—	—	9A-50179032	
		—	●	9A-50179031	
		—	—	—	
ATEX/ IEC [†]	1-in NPT for NUFLO technology turbines	Lithium	—	—	2296695-01
			—	●	2296703-01
			—	—	2296696-01
		None	—	●	2296704-01
			—	—	2296697-01
			—	●	2296705-01
	3/4-in NPT for BARTON technology turbines	Lithium	—	—	2296698-01
			—	●	2296706-01
			—	—	—

[†] An ATEX/IEC and PED certified Cameron turbine is recommended.

NUFLO MC Series



cameron.slb.com/measurement

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