

Solartron

Advanced 7835 densitometer

Data sheet
B1026

Description

The Advanced 7835 is designed for the fiscal metering of crude oil, refined hydrocarbons and non-aggressive process liquids. It offers the highest accuracy with excellent repeatability under pipeline operating conditions. The vibrating element is manufactured from Ni-Span-C for excellent long term and temperature stability and low temperature coefficient. All other wetted parts are AISI 316L stainless steel.

Specification

Parameter	Type 7835
Accuracy	0.00015 g/cc**
Density range	0-3 g/cc
Factory calibrated range	0-3-1.1 g/cc
Repeatability	0.00002 g/cc
Temperature effect (Corrected)	+/-0.000005 g/cc/°C +/-0.0003 g/cc/100°F
Pressure effect (Corrected)	+/-0.000003 g/cc/bar +/-0.0002 g/cc/100psi
Max. operating pressure	150bar (2175psi) or flange limit
Test pressure	1.5 x flange rating
Temperature range	-50° to +110°C (-58° to +230°F)

Mechanical features

Wetted parts	Ni-Span-C and Stainless steel 316L
Case finish	Stainless steel 316
Flange materials	Stainless steel 316L
Weight	22kg (48lb)
Material traceability	Contact sales office for further information

Electrical features

Temp. measurement	100ohm PRT 4 wire Class A
Power supply	18 to 28V dc at 80mA

Outputs

Analogue	2 (+1 with HART option board)
Accuracy	+/-0.1% of reading plus 0.05% of full scale
Repeatability	+/-0.025%
Out of range capability	2-22mA on 4-20mA (Programmable alarm state)
Pulse output	Open collector o/p. Alarm status or frequency

Communications	RS485, Modbus (standard) HART optional
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Safety approval	ATEX EEx ia IIB T4
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** UKAS calibration available for improved accuracy

Features

- ▶ Direct analogue & digital communications outputs
- ▶ CE Marked
- ▶ Modular electronics design
- ▶ Straight-through flow path
- ▶ Continuous high accuracy measurement
- ▶ Hermetically sealed construction
- ▶ Pipeline quality - all welded construction
- ▶ Insensitive to mounting position, plant vibration, flow rate and pressure
- ▶ Intrinsically safe designs
- ▶ Zero maintenance



Typical installation. Note how the transducer is rigidly clamped, isolation valves are provided for easy maintenance.



Advanced electronics options

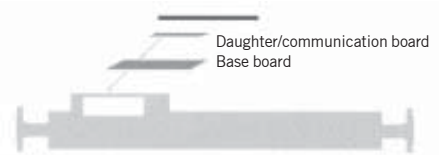
The Solartron Mobrey advanced electronics unit is located in the head of the transducer. It has been designed as a modular system which allows additional functionality to be added as required. The transducer can be interfaced directly to a DCS, PID controller or other plant processing equipment via the digital communications link or via the 4-20mA outputs. In the majority of cases there is no need for additional electronics, since most standard calculations are performed within the

unit, thus providing a very cost effective solution.

The transducer leaves the factory with all calibration factors and an initial configuration stored in EPROM on the meter. This means that from initial power up the transducer provides an accurate output of line density and temperature, without the need for extensive programming. The only additional configuration which may be required is the optimisation of the outputs to suit the particular application.

Depending on the functionality required, the system can be built from the following modules:

- ▶ Base board containing the microprocessor
- ▶ Communication and configuration daughter boards
- ▶ Remote display and keyboard
- ▶ Signal converter



System capabilities

1. Base board and switch configuration board

The system is configured via switches contained on the daughter board

Field configuration settings

- ▶ Output variables: line density, API, °API and line temp. (°C or °F)
- ▶ 4-20mA ranges: zero and span

- ▶ Units
- ▶ Averaging time
- ▶ Pressure
- ▶ Alarm settings

Outputs

- ▶ Analog output 1 - configured to

- either line density, API or °API
- ▶ Analog output 2 - Temp. °F or °C
- ▶ One configurable pulse output (tube frequency or system alarm status)

2. Base board and communication board

The system can be configured via one of the following communication daughter boards: HART. (RS485 fitted as standard)

Field configuration settings

- ▶ Output variables
- ▶ 4-20mA ranges
- ▶ Units
- ▶ Pressure
- ▶ Averaging time
- ▶ Calibration factors
- ▶ Alarm settings

Outputs

(via digital link or analogue outputs)

- ▶ Two configurable 4 to 20mA outputs (3 for HART option)
- ▶ One configurable pulse output
- ▶ Line density
- ▶ Line temperature

- ▶ Referred density
- ▶ API referred density (15°C or 60°F)
- ▶ Special functions, % volume, % mass, °Brix, °API, °Baume, Specific gravity
- ▶ Calibration factors
- ▶ Averaged parameters
- ▶ Sensor serial number
- ▶ Manufacturers name
- ▶ Calibration and re-calibration date
- ▶ Diagnostics

3. Base board and remote display/keyboard

The system is configured via a keypad on the remote display unit communicating with the baseboard via the modbus protocol.

The remote display offers a convenient means for displaying measurement information and for configuring the system.

The display is designed for use in hazardous areas and can be operated

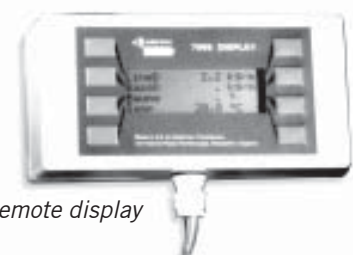
up to 100 meters away from the transducer.

It is suitable for hand or wall mount operation.

The menu structure is easy to use without a handbook following a few minutes familiarisation.

One display unit can be used to configure any number of units.

Field configuration settings and



Remote display

outputs (via display or analogue outputs) ▶ As option 2

4. Base board and signal converter

For applications which require full system capabilities the transducer may be interfaced to Solartron Mobrey's range of flow computers and signal converters.

Inputs

- ▶ 1 Flow meter (dual pulse)
- ▶ 4 Density transducers
- ▶ 8 Analog
- ▶ 4 Temperature RTD
- ▶ 8 Status inputs

Outputs

- ▶ 8 4-20mA outputs
- ▶ 8 Status/alarms
- ▶ 3 Communication ports. RS232/485

Fluid containment

Recognising the increased emphasis on safety by chemical, hydrocarbon and process markets alike, Solartron Mobrey transducers have enhanced the densitometer range by the introduction of an optional outer or

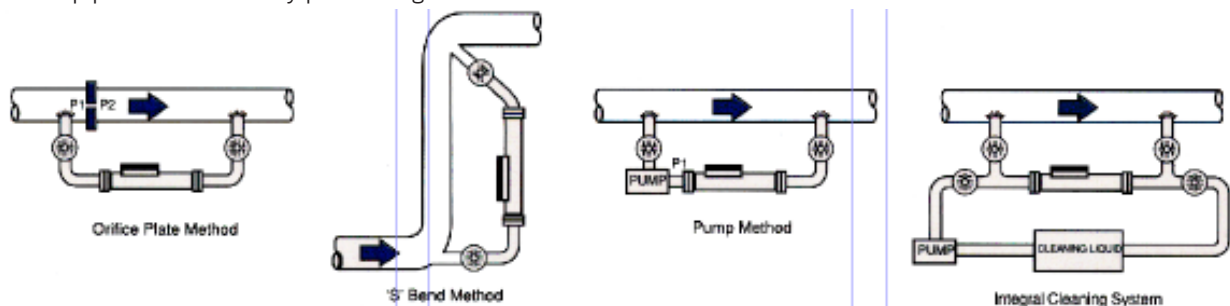
secondary pressure retaining capability. In the unlikely event of an instrument failure, the meter safely contains any leakage. As a further safety feature, all welds are qualified to the ASME 9/BS/EN288 standards

and can undergo dye penetration testing to ASNI standards if required. Furthermore, the flange welds may be x-rayed to most recognised international standards.

	Standard	Optional outer containment	Optional secondary containment
Design pressure		50 bar (725 psi) Standard engineering practice	100 bar (1450 psi) designed to B31.3
Yield pressure	The unit is fitted with a burst disc which will fail between 20-30 bar (290-435psi)	100 bar (1450psi)	N/A
Failure pressure		200 bar (2900psi)	395bar (5727psi) Glass to metal seal failure

Typical pipework configurations

Installing the transducer in a by-pass configuration allows it to be removed for servicing or calibration without affecting the main pipeline. Possible by-pass configurations are shown below.



Electro-magnetic Compatibility (EMC)

All versions conform to the latest international standards for EMC and are certified compliant with:

Emissions: BS EN 50081-2: 1994 Heavy Industrial Environment

Radiated emissions in the range 30Mhz to 1000Mhz and conducted emissions in the range 0.15Mhz to 30Mhz comply with standard EN 55011.

Immunity: BS EN 50082-2: 1995

Heavy Industrial Environment

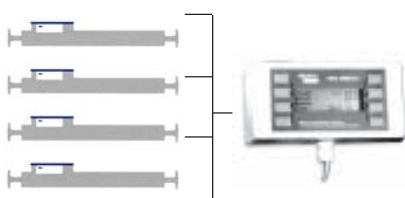
Performance criteria A: The equipment continues to operate as intended, no degradation takes place outside the specified instrument accuracy for the following tests:

- Radiated RF, 80Hz to 1Ghz, standard IEC 801-3
- Conducted RF, 0.15Mhz to 80Mhz, standard TC 65 (sec) 144

- Power magnetic fields, 50Hz 10A/m
- Performance criteria B: No loss of performance is allowed outside the specified instrument accuracy after the test, for the following tests:

- Clamped and conducted electrical fast transients (EFT), 2KV on 5Hz repetition, standard IEC 801-4
- Electrostatic discharge, 4KV contact, 8KV air, standard IEC 801-2

RS485 Multidrop

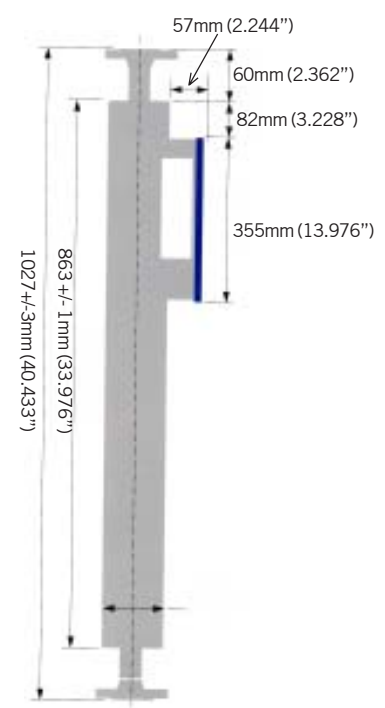


At least 24 transducers can be connected together in a multi-drop arrangement. Each transducer is given a unique slave address in the range 0 to 200. The 7965 display can interrogate one transducer at a time. Each transducer can be configured by setting the address and repoling.

Mechanical installation and dimensional drawing

The transducer can be mounted at any angle but it is recommended that at low flow rates, e.g. 750 litres/hour (2.7 gal/min), it is vertically mounted or at an incline, with the liquid flowing in an upwards direction. For

continuous high flow rates, e.g. 2000-3000litres/hour (7.4-11.1 gal/min), the mounting position can be selected to simplify the associated pipework and help minimise the pressure and temperature losses.



Ordering information

7835	Ni Span C Liquid density transducer										
Code	Process Connections										
A	1" ANSI 900 RF										
B	1" ANSI 600 RF										
D	1" ANSI 600 RTJ										
E	1" ANSI 900 RTJ										
F	1" ANSI 600 RF Smooth Face										
H	25mm DIN 2635 RF DN25/PN40										
J	25mm DIN 2635/2512 GVD DN25/PN40										
L	25mm DIN 2637 RF DN25/PN100										
Z	Special: Use this letter code during quotation request.										
Code	Material Options										
A	Wetted parts: Ni Span tube, SS bellows and input, SS outer case										
E	Wetted parts: Ni Span tube, SS bellows and input, Hastelloy outer case										
F	Wetted parts: Ni Span tube, SS bellows and input, Duplex outer case										
Code	Transducer outer containment										
A	Standard st. stl., for tube mounted amplifiers or remote amplifier										
B	Outer containment (1/4 NPT), st. stl., for tube mounted amplifiers or remote amplifier										
C	Secondary containment B31.3 (1/2"NPT), for tube mounted or remote amplifiers (up to 100 Bar)										
Code	Amplifier enclosure										
F	Tube mounted flat box in stainless steel										
Code	On board electronics										
A	St'd frequency output - EEx ia IIC T6 (-40°C to +40°C) or EEx ia IIC T4 (-40°C to +70°C)										
B	Advanced base board, giving 2 x 4-20mA outputs - EEx ia IIB T4 (-40°C to +60°C)										
D	Adv. base board + HART board /3 x 4-20mA outputs - EEx ia IIB T4 (-40°C to +60°C)										
Code	Safety approval and label										
J	ATEX intrinsically safe (see rating above in ON BOARD ELECTRONICS)										
Code	Default configuration										
A	API Degrees (Americas)	(Adv. board only)									
B	Base density to API tables (metric configuration)	(Adv. board only)									
C	Line density only	(Adv. board only)									
D	General Process including Matrix (user data required)	(Adv. board only)									
T	Frequency version - no software	(Frequency board only)									
Z	Special: Use this letter code during quotation request.										
Code	Calibration										
A	Instrument standard										
D	UKAS calibration (Water)										
E	UKAS calibration (3 liquids)										
Z	Special: Use this letter code during quotation request.										
Code	ASME IX										
A	None										
B	Dye penetration (internal welds)										
C	Dye penetration (all welds)										
D	Radiography of flange welds + B above										
E	Radiography of flange welds + C above										
F	Radiography of flange welds										
Code	Traceability										
A	None										
X	Certificates of material traceability (per single order)										
7835	B	A	A	F	A	J	T	A	A	A	Typical ordering code

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
Solartron Mobrey Ltd
Solartron Mobrey sp z o o
Solartron Mobrey AB
Solartron Mobrey SA
Solartron Mobrey SA-NV

Deutschland tel: 0211/99 808-0
China tel: 021 6353 5652
Polska tel: 022 871 7865
Sverige tel: 08-725 01 00
France tel: 01.30.17.40.80
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