

Solartron

Advanced 7845/46/47 Densitometer

Data sheet
B1024

The Solartron Mobrey Advanced 7845/46/47 range of industrial densitometers have been specifically designed to tackle the most demanding of applications found in modern processing plants. Three units are detailed below: The stainless steel 7845 designed for general process applications: The Hastelloy C22 7846 designed for corrosive applications and the 3A authorised 7847 designed for hygienic applications.

Specification

Parameter	Type 7845/46/47
Accuracy	0.00035 g/cc** Range 0.6-1.2 g/cc 0.0005 g/cc** Range 0.6 to 1.6 g/cc
Density range	0-3 g/cc
Repeatability	0.00005 g/cc
Temperature effect (Corrected)	+/-0.00005 g/cc/°C ±0.003 g/cc/100°F
Pressure effect (Corrected)	+/-0.000006 g/cc/bar ±0.0004 g/cc/psi
Max. operating pressure	7845 100bar (1450psi) or flange limit 7846 50bar (725psi) or flange limit 7847 20bar (290psi) or flange limit
Test pressure	1.5 x flange rating
Temperature range	-50° to +110°C (-58° to +230°F) (160°C (320°F) with high temp kit)
Mechanical features	
Wetted parts	Stainless steel 316L - 7846: Hastelloy C22
Case finish	Stainless steel 316
Flange materials	Stainless steel 316L - 7846: Hastelloy C22
Weight	22kg (48lb)
Material traceability	Optional
Electrical features	
Temp. measurement	100ohm PRT 4 wire
Power supply	18 to 28VDC at 80mA
Outputs	
Analog	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)
Safety (ATEX)	
	EEx ia IIB T4 (EEx ia IIC T4 Pending)

Features of the Solartron Mobrey Advanced 7845/46/47 Densitometer:

- Direct analog and digital communications outputs
- 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
- 7845/46 NACE compatible



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

** 0.0001 g/cc possible. Contact Sales office for information.

Advanced electronics options

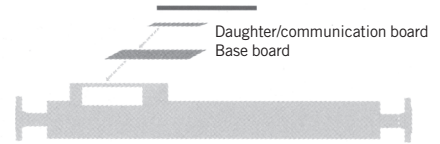
The Solartron Mobrey advanced electronics unit is located in the head of the transducer. It has been designed as a modular system which allows additional functionality to be added as required. The transducer can be interfaced directly to a DCS, PID controller or other plant processing equipment via the 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 daughter board
- ▶ Remote display and keyboard
- ▶ Signal converter



System capabilities

1. 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 analog 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

2. 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

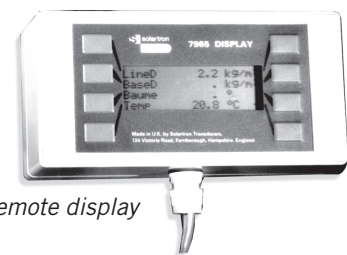
up to 100 meters away from the transducer.

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

3. 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

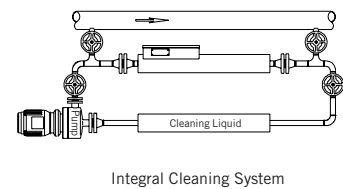
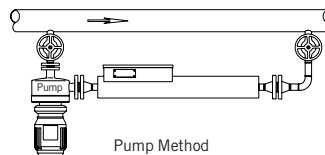
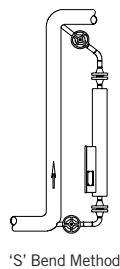
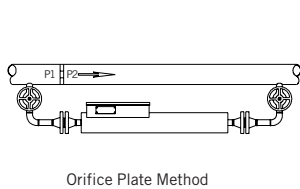
secondary pressure retaining capability. In the unlikely event of an instrument failure, the meter safely contains any leakage. As a further safety feature, all welds are qualified to the ASMI 9/BS/EN288 standards

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

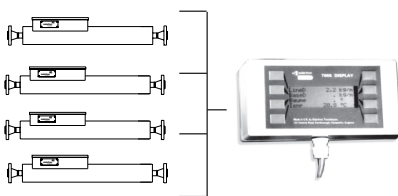
Heavy Industrial Environment

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

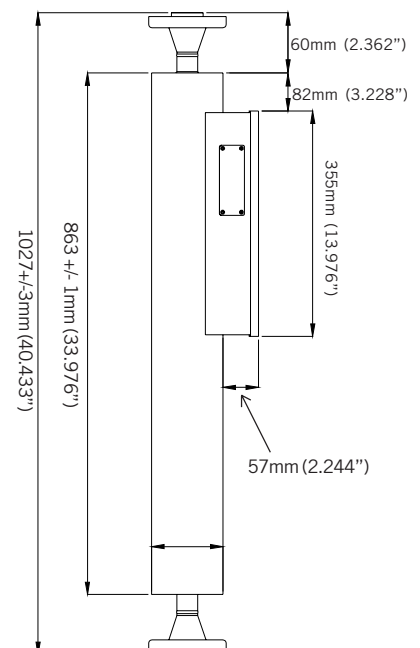


At least 24 transducers can be connected together in a multi-drop arrangement. Each transducer is given a unique slave address in the range 0 to 200. The 7965 display can interrogate one transducer at a time. Each transducer can be configured by setting the address and repoling.

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.



7845	316L St. Steel Liquid Density Transducer										
	Code	Process Connections									
	C	1" ANSI 300 RF									
	H	25mm DIN 2635 DN25/PN40									
	J	25mm DIN 2635/2512 GVD DN25/PN40									
	K	1" ANSI 600 RF									
	L	25mm DIN 2637 RF DN25/PN100									
	Z	Special: Use this letter code during quotation request									
	Code	Material Options									
	B	Wetted parts: 316L St. Steel, 316L St. Steel out case									
	D	Wetted parts: Hestelloy bellows, 316L St. Steel tube and flanges, 316L St. Steel outer case. NACE									
	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									
	B	Advanced base board, giving 2 x 4-20mA outputs									
	D	Advanced base board + HART board/3 x 4-20mA outputs									
	F	Entrained Gas, Advanced base board, giving 2 x 4-20mA outputs									
	H	Entrained Gas, Advanced base board + HART board/3 x 4-20mA outputs									
	Code	Safety approval and label									
	J	ATEX intrinsically safe									
	Code	Default configuration									
	A	API Degrees (Americas)									
	B	Base density to API tables (metric configuration)									
	C	Line density only									
	D	General Process including Matrix (user data required)									
	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)									
7845	C	B	A	F	B	J	A	A	A	A	Typical ordering code

7846	Hastelloy C22 Liquid Density Transducer										
	Code	Process Connections									
	C	1" ANSI 300 RF									
	H	25mm DIN 2635 DN25/PN40									
	J	25mm DIN 2635/2512 GVD DN25/PN40									
	Z	Special: Use this letter code during quotation request									
	Code	Material Options									
	C	Hastelloy wetted parts, 316L St. Steel outer case. NACE									
	Code	Transducer outer containment									
	A	Standard st. stl., for tube mounted amplifiers or remote amplifier									
	B	Outer containment (¼" NPT), st. stl., for tube mounted amplifiers or remote amplifier									
	C	Secondary containment B31.3 (½" 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									
	B	Advanced base board, giving 2 x 4-20mA outputs									
	D	Advanced base board + HART board /3 x 4-20mA outputs									
	F	Entrained Gas, Advanced base board, giving 2 x 4-20mA outputs									
	H	Entrained Gas, Advanced base board + HART board /3 x 4-20mA outputs									
	Code	Safety approval and label									
	J	ATEX intrinsically safe									
	Code	Default configuration									
	A	API Degrees (Americas)									
	B	Base density to API tables (metric configuration)									
	C	Line density only									
	D	General Process including Matrix (user data required)									
	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)									
7846	C	C	A	F	B	J	A	A	A	A	Typical ordering code

Ordering information

7847	316L St. Steel Liquid Density Transducer (Hygienic)										
Code	Process Connections										
C	1" ANSI 300 RF										
H	25mm DIN 2635 DN25/PN40										
J	25mm DIN 2635/2512 GVD DN25/PN40										
P	1" Ladish Tri-clamp (Hygienic)										
R	25mm ISO 2853 ISS (IDF)										
S	25mm DIN 11851										
Z	Special: Use this letter code during quotation request										
Code	Material Options										
B	Wetted parts: 316L St. Steel, 316L St. Steel outer case										
Code	Transducer outer containment										
A	Standard st. stl., for tube mounted amplifiers or remote amplifier										
B	Outer containment (¼" NPT), st. stl., for tube mounted amplifiers or remote amplifier										
Code	Amplifier enclosure										
F	Tube mounted flat box in stainless steel										
Code	On board electronics										
B	Advanced base board, giving 2 x 4-20mA outputs										
D	Advanced base board + HART board/3 x 4-20mA outputs										
F	Entrained Gas, Advanced base board, giving 2 x 4-20mA outputs										
H	Entrained Gas, Advanced base board + HART board/3 x 4-20mA outputs										
Code	Safety approval and label										
J	ATEX intrinsically safe										
T	Sale area only, 3A's approval label										
Code	Default configuration										
A	API Degrees (Americas)										
B	Base density to API tables (metric configuration)										
C	Line density only										
D	General Process including Matrix (user data required)										
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)										
7845	P	B	A	F	B	J	C	A	A	A	Typical ordering code

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