

# Product Guide



Level and Flow Measurement

# High Accuracy OCM FlowCERT, DUET and Speedy

# FlowCERT:

High accuracy flow on weirs, flumes and area x velocity

Pulsar's FlowCERT system gives you everything you need for the industry's highest accuracy non-contacting ultrasonic measurement of open channel flows. Designed for flumes and weirs, FlowCERT gives temperature-independent, reliable measurement and logging facilities. It includes five alarm/control relays plus 4-20mA output, datalogging, digital input with the ability to accept a velocity sensor input for non PMD applications. Programming the unit is a simple, menu-driven process. MCERTs class 1 approval when used with DUET.

- **Five control/alarm relays**
  - Choice of transducers
  - I.S. transducer (EEx ia) option
  - Wall mounted
- **Alarm functions**
  - High/Low level
  - In band/out of band
  - Rate of level rise/fall
  - High/Low temperature
  - Loss of Echo
- **Data logs (all date/time stamped)**
  - Flow rate (variable time intervals)
  - Total flow (and daily totals etc)
  - Average flow rate
  - Temperature (max/min)
  - Echo confidence and more...
- **Flow totalisation and outputs**
  - Relay closure assignable to totalised flow for remote totaliser
  - Relay closure assignable for flow volume or time for a flow sampler
  - Ten days logged flow at 24 hour intervals recorded by date and accessible via the key pad.
- **Open channel flow elements**
  - Simple exponential (venturi, parshall, trapezoidal weir etc)
- **Selected primary element to BS 3680, ISO 1438:2008 & 4359:1983 etc.**
  - Flumes: rectangular, u-throated
  - Thin-plate weirs (standard v-notch)
  - Thin-plate weirs (rectangular and v-notch 90° and 60°)
  - Other international standards (Palmer-Bowlus, H-flume etc)
- **Universal flow calculation (32 setpoints)**
- **Penstock control using step time**
- **Option: Speedy velocity sensor for area x velocity (Q=VA calculation) in channels or pipes**

## Features

- Most accurate OCM in the world (MCERTs class 1)
- Can be used for Area x Velocity
- Easy prompt set up
- Large standard on board memory gives 1 year log at 10 min intervals
- Modbus and Profibus options
- Combined performance characteristic of 0.044% when used with DUET transducer. As tested for MCERTs Class 1 Certified Sira MC090154/00



Sira MC090154/00

MCERTS is a UK effluent flow monitoring performance standard.



# DUET:

## Dual Ultrasonic Echo Transducer

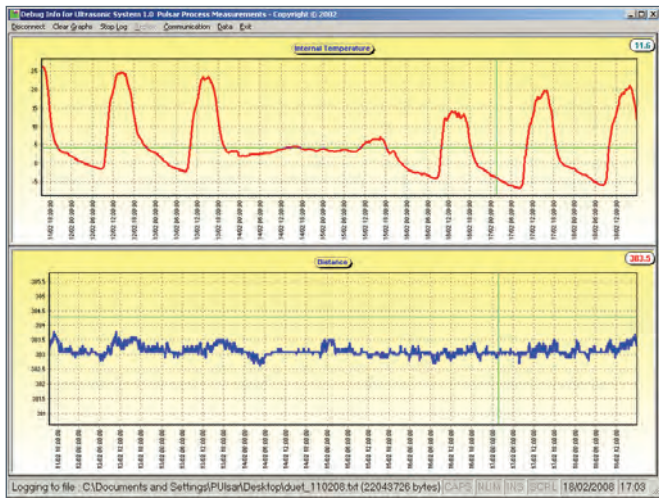
### Features

- Unique patented non contacting transducer
- Insensitive to air temperature variations
- 300mm deadband
- MCERTs class 1 when used with FlowCERT

FlowCERT and Pulsar's unique twin-transducer DUET, provides the highest accuracy non-contact ultrasonic flow measurement system available.

The speed of sound varies with air density change; as the temperature varies, so does the time it takes for an echo to reflect from the target, and

therefore the accuracy of the measurement is significantly affected. Temperature compensation of various types may help, but are heavily dependent upon good siting and are slow to respond. The air temperature gradient between the liquid surface and the air is often large and temperature sensors are not representative of the variation in air density. Only DUET features Pulsar's unique, patented, approach to the issue. Both transducers fire together. By continuously monitoring the phase difference of the echoes, and because the distance between the transducer faces is known and constant, the speed of sound is continuously updated in real time on the process. The resulting accuracy and stability is exceptional.



THIS CHART SHOWS HOW A MEASUREMENT OF DISTANCE VARIES (LOWER TRACE) AGAINST CHANGES IN TEMPERATURE OVER THE PERIOD OF A WEEK. DESPITE TEMPERATURES RANGING FROM OVER 25°C DOWN TO -7°C, THE MEASUREMENT REMAINED EXTREMELY CONSTANT, WITHIN  $\pm 0.5\text{MM}$ , ON A RANGE OF 383.5MM.



Sira MC090154/00

MCERTS is a UK effluent flow monitoring performance standard.



# Speedy:

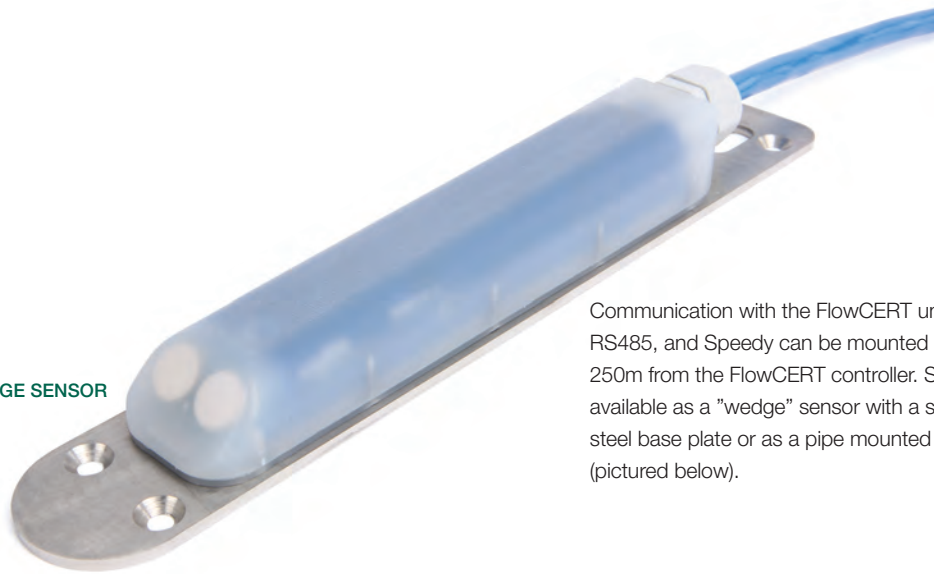
## Liquid velocity sensor

The latest version of Pulsar's popular "Speedy" velocity sensor, for use in channels, pipes or sections where no Primary Measurement Device (PMD) exists. New Speedy performs all its calculations internally, removing the need for a separate converter unit.

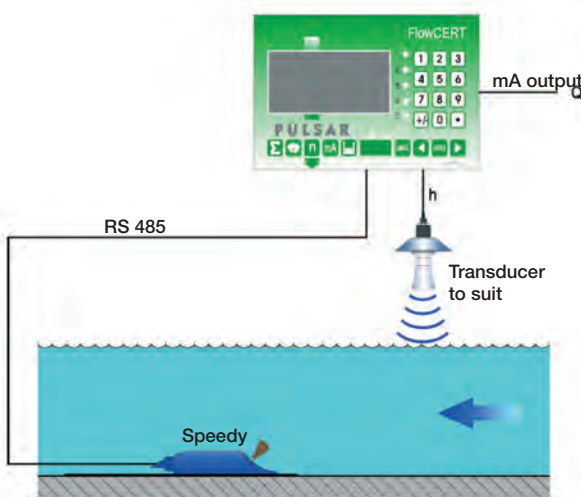
### Features

- streamlined, easy to fit sensor
- In channels, pipes where no PMD is fitted
- Wedge base mount or pipe mount option
- Reliable proven and easy set up

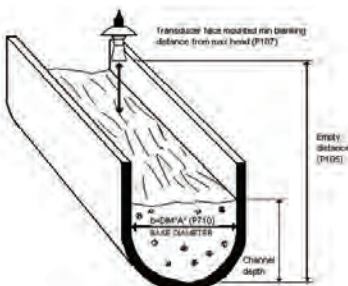
WEDGE SENSOR



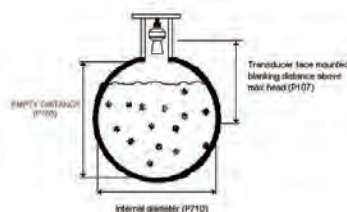
Communication with the FlowCERT unit is via RS485, and Speedy can be mounted up to 250m from the FlowCERT controller. Speedy is available as a "wedge" sensor with a stainless steel base plate or as a pipe mounted sensor (pictured below).



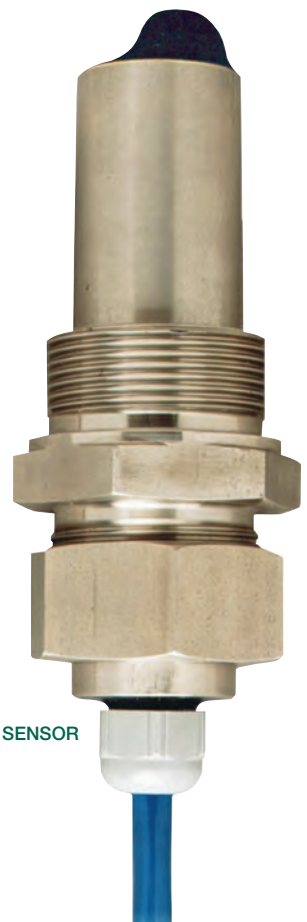
### U-TROATED RECTANGULAR OR TRAPEZOIDAL CHANNELS



### CIRCULAR PIPES



PIPE INSERTION SENSOR





# Speedy Interface:

## Digital to analogue converter

### Features

- Allows Modbus or Profibus comms when using Speedy sensor
- Gives backwards compatibility to previous Speedy units

Pulsar's Speedy Interface is a digital to analogue converter that works with the latest Speedy velocity sensor in two important ways. It frees up the RS485 output from a FlowCERT controller in applications where digital communications are required, and allows users of Pulsar's older equipment to upgrade to the latest Speedy sensor. It also provides the option of alarms based on flow velocity.

Pulsar's Speedy velocity sensor communicates digitally and is designed to connect to Pulsar's FlowCERT open channel flow monitor via FlowCERT's on-board RS485 interface board, where it provides the velocity measurement for velocity x head calculations of flow volume where no primary measurement device exists. However, there are some applications where external digital communications are required, for example to network flow measurements or to modify the programming of the unit. Speedy Interface converts the digital output of the Speedy doppler velocity sensor into a 4-20mA signal proportional to flow velocity, which can then be

fed into the analogue input terminal on the FlowCERT controller. This then leaves the RS485 connection included in the FlowCERT unit free to be used for digital bus communications.

Speedy interface is easily configured using the integral keyboard, and includes a display of flow velocity. There are two on-board relays that can provide alarms or control signals on high or low flow velocity. The Speedy Interface is self-contained to the extent that it can be used without the FlowCERT controller where a simple alarm on flow velocity or a 4-20mA signal proportional to velocity is required.



## Technical Specification: FlowCERT/DUET/Speedy

FLOWCERT CONTROLLER	
<b>Volt free contacts:</b>	5 form C (SPDT) 5A, 110V ac
<b>Outside dimensions:</b>	235 x 184 x 120mm (9.25 x 7.24 x 4.72in)
<b>Cable entry:</b>	10 cable entries - 5 x M20, 1 x M16 underside, 4 x 18mm (0.16 x 0.71in) at rear
<b>Weight:</b>	Nominal 1kg (2.2lbs)
<b>Case material:</b>	Polycarbonate, flame resistant to UL94-V2
<b>IP rating:</b>	IP65
<b>Max and min temp. (electronics):</b>	-20°C to +55°C (-4°F to +131°F)
<b>Flammable atmosphere approval:</b>	Safe area: compatible with approved dB transducers (see transducer specification sheet)
<b>CE Approval:</b>	EMC approval to BS EN 50081-1:1992 for emissions and BS EN 50082-2:1995 for immunity, and to BS EN 61010-1:1993 for low voltage directive.
<b>Echo processing:</b>	Patented DATEM (Digital Adaptive Tracking of Echo Movement)
<b>Analogue output x2:</b>	Isolated output 4-20mA or 0-20mA into 500Ω (user programmable), 0.1% resolution
<b>Serial output:</b>	Full duplex RS232 via RJ11 port
<b>Digital output:</b>	RS485 conn for Modbus with Profibus DP V0 or V1 options
<b>Display:</b>	6 digits plus 12 character text, plus bargraph with direction indicators, remote communicator identifier and program/run/test mode indicators
<b>Data logging:</b>	Via RJ11 port has 256kb giving 1 year at 10 min intervals (needs ultralog PC software)
<b>Programming:</b>	Integral keypad. Also PC Programming via RS232 (RJ11 port) or RS485
<b>Programming security:</b>	Via password (user selectable and adjustable)
<b>Programmed data integrity:</b>	Via non-volatile RAM, plus backup
<b>Power supply:</b>	115V ac +5% -10% 50/60Hz, 230V ac +5% -10%, 18-36V dc
DUET	
<b>Mode of operation:</b>	Twin transducers, fixed distance apart, firing together
<b>Transducer types:</b>	2 x Pulsar dBMACH3, 125KHz frequency, beam angle 10° (@ -3dB)
<b>Accuracy:</b>	<1mm or MCERTS combined performance characteristic of 0.044% (Certificate number: Sira MC090154/00)
<b>Range:</b>	300mm - 2m (0.98ft-6.5ft) (from face of lower transducer)
<b>Hazardous area:</b>	ATEX EEx m II T6 for Zone 1 and 2. FM/FMC available
<b>Transducer cable:</b>	Three core screened, can be extended with 2 or 3 core screened
<b>Maximum separation:</b>	500m (1640ft) from transducer to control unit
SPEEDY VELOCITY SENSOR	
<b>Measurement principle:</b>	Doppler (flow velocity). Flow velocity sensor with v measurement using Doppler principle and temperature measurement to compensate temperature effects on speed of sound.
<b>Measurement frequency:</b>	1MHz
<b>Protection:</b>	IP68
<b>Operating temperature:</b>	-20°C to +50°C (-4°F to +122°F)
<b>Storage temperature:</b>	-30°C to +70°C (-22°F to +158°F)
<b>Operating pressure:</b>	max 4bar (58psi)
<b>Cable length:</b>	Up to 50m (164ft)
<b>Cable types:</b>	LiC11Y 2x1.5 + 1x2x0.34
<b>Cable diameter:</b>	8.4mm ± 0.25mm (0.33in ± 0.01in)
<b>Constructions:</b>	Wedge sensor for installation on channel bottom Pipe sensor for installation using nozzle and cutting ring screw joint in pipes
<b>Contacting materials:</b>	Wedge sensor: Polyurethane, stainless steel 1.4571, PVDF, PA Pipe sensor: stainless steel 1.4571, Polyurethane, FEP coated cable
<b>Measurement range:</b>	-6m/s - +6m/s (-20ft/s to +20ft/s)
<b>Zero point drift:</b>	0 - absolutely stable zero point
<b>Sonic lobe:</b>	±5 degrees
<b>Temp. measurement:</b>	-20°C to +60°C ±0.5°C (-4°F to +140°F ± 32.9°F)
<b>Accuracy:</b>	1% of the measured range or ±0.03m/s (±0.1ft/s)



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