

A Higher Level of Performance



Data Sheet

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## Sultan Flow

Real Time Flow Measurement for Liquids



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[www.hawk.com.au](http://www.hawk.com.au)

# Overview

## Sultan Flow



## Principle of Operation

The Sultan Flow measurement system operates by transmitting an ultrasonic signal from its transducer towards the liquid being monitored. The reflected signal or echo is received by the transducer and processed. The time between transmission of the ultrasonic signal and reception of the echo is measured, and using the speed of sound through air, the distance from the transducer to the liquid level is calculated. Flow through the channel or structure is then calculated from the level measurement and the user entered properties of the channel.

The Sultan Flow system uses sophisticated software to locate and track the correct echo without being affected by echos from fixed objects or changes in the liquid surface. When the liquid level or surface conditions change, the system follows preselected signal tracking parameters. In the event of a total loss of signal, the system adopts signal recovery routines to relocate the correct liquid level.

The system employs automatic gain control to compensate for changes in echo amplitude due to variations in environmental conditions. Continuous current, voltage and relay outputs are provided. These outputs can be programmed for failsafe conditions in the event of a loss of signal or system malfunction.

## Certifications

- CE, ATEX, CSA (Remote Transducer)
- Conforms to British standards for flow calculations

## Primary Areas of Application

- Open Channel Flow
- Water treatment
- Sewage treatment
- Irrigation
- Industrial waste water
- Power waste water
- Environmental monitoring
- Special flow requirements for unusual flow channels

## Features

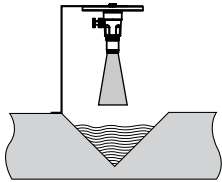
- Optimized frequency selections to suit the application environment
- Capable of monitoring liquid flow under the most difficult conditions
- Real time diagnostic display
- Flexible, multi point or calculated scaling of display and outputs
- Suits a broad range of flumes, weirs and flow control structures
- Programmable totalizer
- Programmable pulse per flow output
- Programmable failsafe mode
- Fast acting temperature compensation
- 3G remote setup options and configuration
- 4-20mA, HART, Modbus, Goshawk with 32 point flow table (via PC)

# Typical Applications

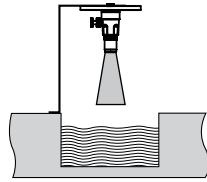
Sultan Flow



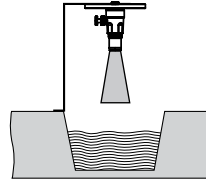
V-Notch Sharp-Crested Weir



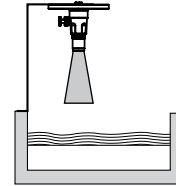
Rectangular Sharp-Crested Weir



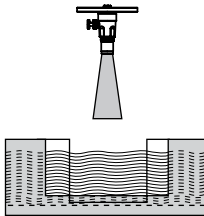
Trapezoidal Sharp-Crested Weir



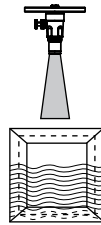
Rectangular Constricted Sharp-Crested Weir



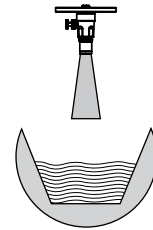
Parshall Flumes



Khafagi-Venturi Flumes



Palmer-Bowles Flumes



Sewerage inlet channel with parshall flume for flow measurement



Waste water channel, with a rectangular flume for flow measurement



Irrigation channel, with a rectangular sharp crested weir for flow measurement



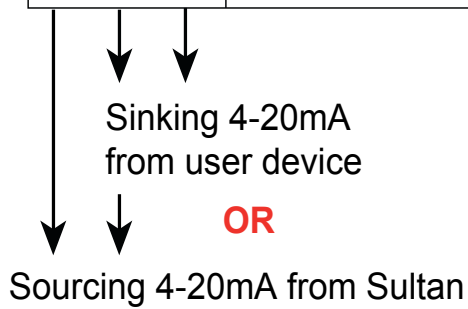




## AWFR Remote Transmitter

### AWFR234

RELAY 1			RELAY 2			RELAY 3			RELAY 4			RELAY 5		
NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>I<sub>s</sub></b>	<b>+</b>	<b>-</b>	<b>RED</b>	<b>BLACK</b>	<b>BLUE</b>	<b>WHITE</b>	<b>Test In</b>	<b>B</b>	<b>A</b>	<b>-</b>	<b>+</b>		<b>N</b>	<b>L1</b>
<b>4-20mA</b>			<b>TRANSDUCER</b>					<b>COMMS</b>		<b>DC-In</b>		<b>AC-In*</b>		



*\*48VDC Sultan version will have these terminals marked as the 30-48VDC input*



## Sultan Flow Remote Electronics

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### Model

AWFR234 Remote Open Channel Flow Transmitter

### Housing

S Standard polycarbonate electronics housing

### Power Supply

B 12-30 VDC

U 90-260VAC and 12-30VDC

C 30-48 and 48-90VAC

### Output Configuration (PC comms Goshawk standard)

S Switch only. 5 relays

X 4-20mA analogue

I 4-20mA analogue with HART Isolated 4 wire (AWR234 only)

### Internal HawkLink Modem (not available)

X Not Available

### Approval Standard

A22 ATEX Grp II Cat 3 GD T85°C IP67 Tamb -40°C to 70°C

X Not Required

### Software Options

X Not required

**AWFR234 S U X X X X**



## Sultan Remote Transducer 2" Version

### Model

AWRT Acoustic Wave Remote Transducer

### Transducer Frequency

- 50 50kHz for liquid applications up to 5m
- 40 40kHz for liquid applications up to 7m
- 30 30kHz for liquid applications up to 11m

### Process Temperature - Facing material selection

T Tefzel 80°C (176°F)

### Transducer Housing Material

6 Tefzel

### Thread Standard

- TB BSP
- TN NPT

### Thread Size

20 2" thread

### Approval Standard

- X Not Required
- i0 IECEx Zone 0 Ex ia IIA T4 IP67 Tamb -20°C to 70°C
- A0 ATEX Grp II Cat 1 GD IP67 EEx ia IIA T4
- i1 IECEx Zone 1 Ex mb II IP68 T5(Tamb -20°C to 65°C) T6(Tamb -20°C to 50°C)
- A1 ATEX Grp II Cat 2 GD EEx m II IP68 T5(Tamb -20°C to 65°C) T6 (Tamb -20°C to 50°C)
- i20 IECEx Zone 20 DIP A20 TA85C IP68 Tamb -20°C to 75°C
- A20 ATEX Grp II Cat 1 D T85°C IP67 Tamb -20°C to 75°C
- A22 ATEX Grp II Cat 3 GD T85°C IP67 Tamb -40°C to 70°C
- GP CSA Equip Class 2; Pollution deg 2; Tamb -20°C to 75°C (Ordinary Locations)
- RN CSA Class I; Div 1/2; Group D; Zone 0; AEx/Ex ia IIA; T4
- KN CSA Class II; Div 2; Group F&G; Class III; T6 T85 for Tamb -20°C to 75°C
- QN CSA Class II; Div 1; Group E, F&G; Ex mb II; T5(T100) for Tamb -20°C to 65°C; T6(T85) for Tamb -20°C to 50°C

### Connection

C IP68 Sealed unit with cable

### Cable Length

- 6 6m cable
- 15 15m cable
- 30 30m cable
- 50 50m cable

### Mounting Accessories

- X Not Required
- CS Cable Suspension on end cap

### Software Options

- F Multifit shading flange with 1" threaded connection and fast temp compensation
- X Not Required

AWRT 30 T 6 TB 20 X C 6 X F



## Sultan Remote Transducer 3"

*AWRT30T4 or AWRT20 recommended for dirty process conditions which require enhanced self cleaning capabilities*

### Model

AWRT Acoustic Wave Remote Transducer

### Transducer Frequency

- 30 30kHz for applications up to 15m (4" cone required)
- 20 20kHz for applications up to 20m, (4" cone is required)

### Process Temperature - Facing material selection

- T Teflon 80°C (176°F)

### Transducer Housing Material

- 4 Polypropylene

### End Cap Mounting Thread

- X Not Required (Standard Flange Mount)
- TB BSP

### End Cap Mounting Thread Sizes

- X Not Required (Standard Flange Mount)
- 30 3" for 30, 20kHz

### Approval Standard (consult safety instructions)

- X Not Required
- i0 IECEX Zone 0 Ex ia IIA T4 IP67 Tamb -20°C to 70°C
- A0 ATEX Grp II Cat 1 GD IP67 EEx ia IIA T4
- i1 IECEX Zone 1 Ex mb II IP68 T5(Tamb -20°C to 65°C) T6(Tamb -20°C to 50°C)
- A1 ATEX Grp II Cat 2 GD EEx m II IP68 T5(Tamb -20°C to 65°C) T6(Tamb -20°C to 50°C)
- i20 IECEX Zone 20 DIP A20 TA85C IP68 Tamb -20°C to 75°C
- A20 ATEX Grp II Cat 1 D T85°C IP67 Tamb -20°C to 75°C
- A22 ATEX Dust (Grp II Cat 3 D T85C IP67)
- GP CSA Equip Class 2; Pollution deg 2; Tamb -20°C to 75°C (Ordinary Locations)
- RN CSA Class I; Div 1/2; Group D; Zone 0; AEx / Ex ia IIA; T4
- KN CSA Class II; Div 2; Group F&G; Class III; T6 T85 for Tamb -20°C to 75°C
- QN CSA Class II; Div 1; Group E, F&G; Ex mb II; T5(T100) for Tamb -20°C to 65°C; T6(T85) for Tamb -20°C to 50°C

### Connection

- C IP68 Sealed unit with cable

### Cable Length

- 6 6m cable
- 15 15m cable
- 30 30m cable
- 50 50m cable

### Mounting Accessories

- X Not Required
- CS End Cap Cable Suspension 30 / 20kHz only

### Accessories

- F Multifit shading flange with 1" threaded connection and fast temp compensation
- X Not Required

**AWRT 30 T 4 X X X C 6 X X**





## Flange Selection

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### F Flange

#### Dimension Standard

- A ANSI
- D DIN
- J JIS

#### Flange Sizes

- 2N 2" NPT flange 2" NPT transducer thread body mounted only
- 2B 2" BSP flange (2" BSP transducer thread body mounted only)
- 4 4" acoustically isolated flange (fits 3" units & 2" units with cone)
- 6 6" acoustically isolated flange (fits 3" & 3.5" units)
- 8 8" acoustically isolated flange (fits 3" & 3.5" units)
- 10 10" acoustically isolated flange (fits 3" & 3.5" units)

#### Flange Mounting Position

- A Cone Mounted (standard)
- B Transducer Body Mounted
- C Angled flange piece only

#### Flange Material

- 4 Polypropylene

F A 4 A - 4

## Cone Selection

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### C Focaliser Cone

#### Cone Size-Matching Transducer

- 02N C04 cone for 2" NPT transducer (fits FA4A-4 flange)
- 02B C04 cone for 2" BSP transducer (fits FA4A-4 flange)
- 04 4" cone for 20kHz and 3" 30kHz transducers

#### Cone Material

- 4 Polypropylene
- 7A Carbon Fibre. Comes attached to Carbon Fibre ANSI Flange
- 7D Carbon Fibre. Comes attached to Carbon Fibre DIN Flange
- 7J Carbon Fibre. Comes attached to Carbon Fibre JIS Flange
- 8 Polyurethane

C 04 - 4

### Special Cone/Flange

**C03-4-Z** OD72mm cone for 20kHz and 3" 30kHz

**FA3A-4** 3" ANSI flange for C03-4-Z



## Accessories

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### HAWKLink Data Modem

#### Model

HLR Remote stand alone HAWKLink system

#### Power Supply

B 12-30VDC

U 12-30VDC and 90-260VAC

#### Network Type

G3 3G Autoband

#### Sim Card

S3 Australian Sim Card expires after 3 month

S12 Australian Sim Card expires after 12 month

X Not Required

**HLR U G3 S3**

HAWKLink USB PC connector for GosHawkII

#### HAWKLink-USB

Stainless Steel Sunhood

#### SUNHOOD

Junction Box for twin Transducer applications

AWRT-JB-01

AWRT-JB-06 (includes 6m cable)

**Extra Cable** (Belden 3084A)

**CA-TXCC-R-C15** 15m cable

**CA-TXCC-R-C30** 30m cable

**CA-TXCC-R-C50** 50m cable

**CA-TXCC-R-C100** 100m cable

# Specifications

## Sultan Flow



### Frequency

- 20kHz, 30kHz, 40kHz, 50kHz

### Operating Voltage

- 12 - 30Vdc (residual ripple no greater than 100mV)
- 90 - 265Vac 50/60Hz
- 48Vdc, 48Vac-90Vac 50/60Hz

### Power Consumption

- <3W @ 24Vdc
- <10VA @ 240Vac
- <4W @ 48Vdc, <7VA @ 48Vac – 90Vac.

### Analog Output

- 4 -20mA  
(750 ohms @ 24Vdc User supply, 250 ohms internally driven)

### Communications

- Goshawk, HART, Modbus, Profibus DP, DeviceNet  
(Foundation Fieldbus & Profibus PA pending)
- Multi Drop mode can address 1-250 units over 4 wire

### Relay Outputs: (5)

- Form 'C' (SPDT) contacts, rated 0.5A at 240Vac non-inductive.
- All relays have independently adjustable dead bands.
- Remote failsafe test facility for one relay.

### Blanking Distance

- 50kHz = 0.25 m (10")
- 40kHz = 0.30 m (12")
- 30kHz = 0.35 m (14")
- 20kHz = 0.45 m (17")

### Maximum Range

- |               |       |         |
|---------------|-------|---------|
| • 5 m (16ft)  | 50kHz | liquids |
| • 7 m (22ft)  | 40kHz | liquids |
| • 10 m (33ft) | 30kHz | liquids |
| • 20 m (65ft) | 20kHz | liquids |

### Resolution

- 1 mm (0.04") 50, 40, 30, 20 kHz

### Electronic Accuracy

- +/- 0.25% of maximum range

### Operating Temperature

- Remote electronics -40°C (-40°F) to 80°C (176°F)
- Remote transducer -40°C (-40°F) to 80°C (176°F)

### Transducer/Amplifier Separation

- up to 1000m (3281ft) using appropriate RS485 cable

### Cable

- 4 conductor shielded twisted pair instrument cable
- Conductor size dependent on cable length.
- BELDEN 3084A, DEKORON or equivalent.
- Max: BELDEN 3084A = 500m (1640 ft)
- Max: DEKORON IED183AA002 = 350m (980 ft)

**IMPORTANT**  
"USE SPECIFIED  
CABLE ONLY"

### Maximum Operating Pressure

- +/- 7.5 PSI (+/- 0.5 Bar)

### Beam Angle

- |        |                   |                   |
|--------|-------------------|-------------------|
| • 7.5° | without focaliser | 50kHz/40kHz/30kHz |
| • 4°   | with focaliser    | 50kHz/40kHz       |
| • 6°   | with focaliser    | 30kHz/20kHz       |

### Display

- 2 line x 12 character alphanumeric LCD
- LED Back-lit display

### Memory

- Non-Volatile (No backup battery required)
- >10 years data retention

### Enclosure Sealing

- Remote Electronics IP65 (Nema 4x)
- Remote Transducer IP68

### Cable Entries

- Remote: 3 x 20mm, 1 x 16mm knock outs.

### Mounting

- 6" Multifit ANSI/DIN/JIS Flange

### Typical Weight

Sultan AW System with appropriate flange and cone

Frequency	(in kHz)	kg	lb
20/30	20 or 30kHz (3") Transducer	3	6.6
30/40/50	30 (2"), 40 or 50kHz Transducer	1	2.2

### Configuration kg lb

R6	Remote system with 6m cable	1	2.2
R15	Remote system with 15m cable	3	6.6
R30	Remote system with 30 m cable	6	13.2
R50	Remote system with 50m cable	10	22.0



## HAWK, Since 1988

Hawk Measurement Systems Pty Ltd (HAWK) was established in 1988. It's founding members saw the universal requirement of various industries requiring improved process control and efficiency in their operations.

## We Can Help

HAWK understands the difficulties customers face when seeking accurate level measurement. Every application is different, involving a multitude of environmental factors. This is where HAWK excels. Our aim is to ensure that customers not only feel comfortable with our technology, but also to ensure a consistent and reliable solution is in place for the long term. We believe that a combination of application and product expertise, as well as forward thinking and proactive support policies are the foundation of successful customer-supplier relationships.

## Progressive Technical Support

HAWK believes that the future of the Level Measurement Industry revolves around the quality of pre and post sales - support. Our aim is for all sales & support staff to be product experts, and more importantly application experts making our customers applications as efficient and consistent as possible.

## Knowledge Sharing

HAWK believes that knowledge sharing is key to creating long term relationships. Empowering our customers and our worldwide distribution network, whilst being available at all times to lend a helping hand, is the perfect recipe for long term solutions and relationships. HAWK openly extends an invitation to share our 25 plus years of level measurement experience, and ensure that your day to day processes are efficient, understood, and always working.

Additional product warranty and application guarantees upon request. Technical data subject to change without notice.

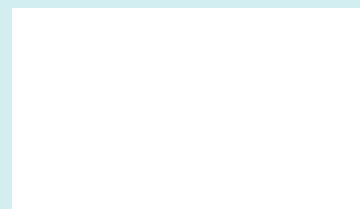
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