Sultan 234 - Acoustic Wave Technology

Solids / Liquids level and position measurements to 182m (597ft)

Principle of Operations

The SULTAN 234 emits a high powered acoustic wave transmit pulse which is reflected from the surface of the material being measured. The reflected signal is processed using specially developed software to enhance the correct signal and reject false or spurious echoes.

The transmission of high powered acoustic waves ensures minimal losses through the environment where the sensor is located. Due to the high powered emitted pulse, any losses have far less effect than would be experienced by traditional ultrasonic devices. More energy is transmitted hence more energy is returned. Advanced receiver circuitry is designed to identify and monitor low level return signals even when noise levels are high. The measured signal is temperature compensated to provide maximum accuracy to the outputs and display.

Primary Areas of Applications

- **Waste water/water:** River level, wet wells, inlet screens, tanks, sumps, pump stations, water towers, dams, basin levels, chemical storage, etc.
- **Mining:** Crushers, surge bins, ore passes, conveyor profile, blocked chute, stockpile, stackers, reclaimers, storage silos etc.
- **Power Stations:** Boiler bunkers, raw coal bunkers, ash pits, fly ash silos, etc.
- **Others:** Food, Cement, Plastics, Grain, Chemicals, Paper, Irrigation, Quarries

Function

The Sultan 234 is a non intrusive acoustic wave transmitter with flexibility, used for measuring level of liquids, slurries and solids.

Universal Supply

- 2 Wire Loop Powered
- 3 Wire DC
- 4 Wire AC/DC

Certifications

ATEX, SAA/IECEEx, CE, (CSA, FM pending)

Features:

- Non contact measurement
- High Power even with two wire loop supply
- Low cost per point
- Wide range of communications: Devicenet, Goshawk, HART, Modbus, Profibus (Fieldbus & Profibus PA pending)
- Pump Control x5 pumps
- Auto compensation for dust, steam and losses
- Protection class IP67, NEMA 4x (IP68 Transducer)
- Programmable fail safe mode
- High temp applications on request
- GSM/CMDA remote setup options/config
- Differential and average level control (2 transducers)
Typical Applications

Conical Shape Vessels
- High/Low/Continuous level
  - (Granular/Powder)
- Conveyed, pneumatic air slide

Solids Vessels
- High/Low/Continuous level
  - (Granular/Powder)
- Conveyed, pneumatic air slide

Horizontal Cylindrical/Ball Tanks
- High/Low/Continuous level
  - (Liquid/Chemical)

Storage Tanks
- High/Low/Continuous level
  - (Liquid/Chemical)

Sultan Acoustic Wave Transmitter
- Stockpiles, Stackers, Reclaimers

Sewage Wet Well
- High/Low/Continuous level
  - Up to 5 Pumps

Optional Remote GSM/CDMA

Remote Amplifier

Panel Mount

Sultan 234 Series
Integral Unit
AWI2SX30/40/50
AWI234SX30/40/50

Integral

Remote

1" BSP/NPT Nipple

3 x M16 Conduit entries

See Flange Table

See Flange Table

All home must protrude into the vessel by at least 50 mm (2 inches) past the mounting nozzle.

Integral Transmitter Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Selected Flange</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWI 5 kHz</td>
<td>10&quot;</td>
<td>455</td>
<td>17.9</td>
<td>840</td>
</tr>
<tr>
<td>AWI 10 kHz</td>
<td>10&quot;</td>
<td>415</td>
<td>16.3</td>
<td>540</td>
</tr>
<tr>
<td></td>
<td>* 8&quot;</td>
<td>280</td>
<td>11.0</td>
<td>440</td>
</tr>
<tr>
<td>AWI 15 kHz</td>
<td>10&quot;</td>
<td>455</td>
<td>17.9</td>
<td>440</td>
</tr>
<tr>
<td></td>
<td>* 8&quot;</td>
<td>280</td>
<td>11.0</td>
<td>440</td>
</tr>
<tr>
<td>AWI 20 kHz</td>
<td>4&quot;</td>
<td>280</td>
<td>11.0</td>
<td>390</td>
</tr>
<tr>
<td>AWI 30 kHz</td>
<td>4&quot;</td>
<td>280</td>
<td>11.0</td>
<td>350</td>
</tr>
</tbody>
</table>

*8" is non standard/please consult factory before selecting.

Remote Transducer Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Selected Flange</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>D (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWRT 5 kHz</td>
<td>10&quot;</td>
<td>455</td>
<td>17.9</td>
<td>750</td>
</tr>
<tr>
<td>AWRT 10 kHz</td>
<td>10&quot;</td>
<td>415</td>
<td>16.3</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>* 8&quot;</td>
<td>280</td>
<td>11.0</td>
<td>450</td>
</tr>
<tr>
<td>AWRT 15 kHz</td>
<td>10&quot;</td>
<td>455</td>
<td>17.9</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>* 8&quot;</td>
<td>280</td>
<td>11.0</td>
<td>350</td>
</tr>
<tr>
<td>AWRT 20 kHz</td>
<td>4&quot;</td>
<td>280</td>
<td>11.0</td>
<td>300</td>
</tr>
<tr>
<td>AWRT 30 kHz</td>
<td>4&quot;</td>
<td>280</td>
<td>11.0</td>
<td>260</td>
</tr>
</tbody>
</table>

*8" is non standard/please consult factory before selecting.

STANDARD ANSI/DIN/JIS FLANGE DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE</th>
<th>FLANGE TYPE</th>
<th>A (PCD) mm</th>
<th>B (OD) mm</th>
<th>C (ID) mm</th>
<th>D (Hole) mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>FA4</td>
<td>190.5</td>
<td>228</td>
<td>100</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>FD4</td>
<td>180</td>
<td>220</td>
<td>100</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>FJ4</td>
<td>175</td>
<td>210</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>10&quot;</td>
<td>FA10</td>
<td>362</td>
<td>406</td>
<td>250</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>FD10</td>
<td>350</td>
<td>395</td>
<td>250</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>FJ10</td>
<td>355</td>
<td>400</td>
<td>250</td>
<td>23</td>
</tr>
</tbody>
</table>

NON STANDARD ANSI/DIN/JIS FLANGE DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE</th>
<th>FLANGE TYPE</th>
<th>A (PCD) mm</th>
<th>B (OD) mm</th>
<th>C (ID) mm</th>
<th>D (Hole) mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>FA6</td>
<td>240</td>
<td>285</td>
<td>150</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>FD6</td>
<td>240</td>
<td>280</td>
<td>150</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>FJ6</td>
<td>240</td>
<td>280</td>
<td>150</td>
<td>19</td>
</tr>
<tr>
<td>8&quot;</td>
<td>FA8</td>
<td>298.5</td>
<td>343</td>
<td>200</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>FD8</td>
<td>295</td>
<td>340</td>
<td>200</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>FJ8</td>
<td>290</td>
<td>330</td>
<td>200</td>
<td>19</td>
</tr>
</tbody>
</table>

Note: Other flange sizes available upon request.

FLANGE TYPE:
A = ANSI Flange
J = JIS Flange
D = DIN Flange
Others Available

DIN Flange
See note

FA10
FJ10
FA6
FD6
FJ6
FA8
FD8
FJ8

80mm (3.1")

9.5
11.0
11.2
11.4
11.6
11.8
12.0
12.2
12.5
12.7

150
150
150
200
200
200
22
22
22
22
22

Note: Other flange sizes available upon request.
2 inch Remote Mounting Dimensions
Screwtop with integral junction box

Ensure the face of the sensor intrudes into the vessel by more than 20mm

REMOTE ENCLOSURES - Field Mount
AWR2, AWR234

FRONT

BACK

SIDE

Panel Mount
Front

Side

Back

Cut-out Size 90 mm (3.54’’)

Dimensions
**Modbus and Profibus**

- Sultan 234 Series
- **Laptop or PC Communications** or PLC / DCS with MODBUS RTU Port
- Goshawk Software for inventory monitoring on PC
- GSM Network or CDMA Network

**Floatation Cells**

**Sultan Acoustic Wave Transmitter**
- Silo, bin levels, coal, plastic powder, woodchip, sawdust, cement, clinker, iron ore, lime etc.

**Gladiator Admittance Switch**

**Sultan Acoustic Wave Transmitter**
- Stockpiles, Stackers, Reclaimers

**Orca Sonar Interface**
- Thickener, CCD

**Sultan Acoustic Wave Switch**
- Blocked Chute Detection

**Sultan Smart Transducer**
- Farm Tanks, Grain Terminals

**Sultan Master/Slave Positioning System**

**GSM or CDMA Network**
- Typically up to 31 transmitters or switches per string.
- Maximum 250 transmitters or switches.
- Using GSM/CDMA network, transmitters and switches can be monitored, calibrated remotely.
- Alarm status, diagnostics can be monitored.
- Support from factory engineering for customer application problems.
- Specifications for all other communication systems, eg HART, Profibus, Modbus etc check instruction manual.

(Limited Modbus query rate for Switches only)

**Communication Network Overview**

Modbus and Profibus
Terminal Connections for DC Supply – Model dependant

a) 2 Wire DC Loop Powered

User DC Supply

+ DC

– DC

PLC

DCS

IND

4-20mA

Use shielded cable

Note: RL Max = 600Ω if user DC Supply 24V

b) 3 Wire DC – Modulating from Common User Supply (RL to +DC)

User DC Supply

+ DC

– DC

PLC

DCS

IND

4-20mA

Use shielded cable

Note: RL Max = 750Ω if user DC Supply 24V

c) 3 Wire DC – Modulating from Common User Supply (RL to GND)

User DC Supply

+ DC

– DC

PLC

DCS

IND

4-20mA

Use shielded cable

Note: RL Max = 750Ω if user DC Supply 24V

d) 4 Wire DC – Driving from Internal Isolated Supply (Is)

User DC Supply

+ DC

– DC

PLC

DCS

IND

4-20mA

Use shielded cable

Note: Isolated current output can be made common with +DC or GND if required. (e.g. RL – connected to GND)
Terminal Connections for AC Supply – Model dependant

e) Modulating from User’s External DC Supply (RL to Pos.)

90 - 265Vac Supply

- +

User DC Supply

+ -

PLC DCS IND

RL 250 Ω

4-20mA

Use shielded cable

Active = L1
Neutral = N
Earth = Ω

Note: RL Max = 750Ω if user DC Supply 24V

f) Modulating from User’s External DC Supply (RL to Neg.)

90 - 265Vac Supply

- +

User DC Supply

+ -

PLC DCS IND

RL 250 Ω

4-20mA

Use shielded cable

Active = L1
Neutral = N
Earth = Ω

Note: RL Max = 750Ω if user DC Supply 24V

g) 4 Wire AC – Driving from Internal Isolated Supply (Is)

90 - 265Vac Supply

- +

User DC Supply

+ -

PLC DCS IND

RL Max 250 Ω

4-20mA

Use shielded cable

Active = L1
Neutral = N
Earth = Ω

Note: Isolated current output can be made common with external DC Supply Positive or Negative if required. (e.g. RL – connected to GND)

AW Series Transmitter
Integral Version (2 Relays)

AW Series Transmitter
Remote, Field or Panel Version (5 Relays)
## Sultan AW Remote Electronics

### Model
- **AWR2**: Remote 2 Wire, Housing / Facia Display Connection Board/Process Module, No relays
- **AWR234**: Remote 2/3/4 Wire 5 relays, Housing / Facia Display Connection Board/Process Module, 5 relays
- **AWFR234**: Remote 2/3/4 Wire 5 relays, Housing / Facia Display Connection Board/Process Module, 5 relays for Flow

### Housing
- **S**: Standard polycarbonate electronics housing
- **P**: Panel Mount Housing

### Power Supply
- **B**: 24 VDC standard
- **C**: 48 VDC for 2/3/4 units only
- **U**: Universal AC power supply (90-260 VAC input) for 2/3/4 units only

### Output Configuration (PC comms Goshawk standard)
- **S**: Switch only. 5 relays for AWR234 only
- **X**: 4-20mA analogue output module, includes Modbus comms
- **H**: HART 2 wire only
- **I**: HART Isolated 4 wire 2/3/4 only
- **W**: Modbus Comms only (not available for 2 wire Sultan)
- **P**: Profibus DP***
- **E**: Ethernet
- **D**: Devicenet
- **Z**: Special Request

### Internal HawkLink Modem (not available with ATEX 0/20 approval)
- **X**: Not Required
- **G2**: GSM Frequency 800/1900 MHz/19200 Baud for USA, Canada, Argentina, Chile for Sultan 234 only
- **G4**: GSM Frequency 900/1800 MHz/19200 Baud for Australia, Europe, Chile for Sultan 234 only

### Approval Standard
- **A0**: Intrinsic Safe (AWR2 only): IECEx Zone 0 (Ex ia IIA T4) / ATEX (Grp II Cat 1 GD IP67 EEx ia IIA T4)

### Position Unit / Crane Master Options for Sultan 234 Only
- **PS**: Position Slave
- **CM**: Crane Master
- **X**: Not required

<table>
<thead>
<tr>
<th>Model</th>
<th>Housing</th>
<th>Power Supply</th>
<th>Output Configuration</th>
<th>Internal HawkLink Modem</th>
<th>Approval Standard</th>
<th>Position Unit / Crane Master Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWR2</td>
<td>S</td>
<td>B/C/U</td>
<td>S</td>
<td>X</td>
<td>X</td>
<td>PS, X</td>
</tr>
<tr>
<td>AWR234</td>
<td>B</td>
<td>C/U</td>
<td>X</td>
<td>G2/G4</td>
<td>A0</td>
<td>PS, CM, X</td>
</tr>
<tr>
<td>AWFR234</td>
<td>P</td>
<td>U</td>
<td>X</td>
<td>G4</td>
<td>A0</td>
<td>PS, CM, X</td>
</tr>
</tbody>
</table>

AWR2  S  B  X  G4  X  X
## Sultan AW Remote Transducer

**Model**

<table>
<thead>
<tr>
<th>Model</th>
<th>Acoustic Wave Remote Transducer</th>
</tr>
</thead>
</table>

**Transducer Frequency**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 kHz</td>
<td>50kHz for applications up to 5m, available in 2” only</td>
</tr>
<tr>
<td>40 kHz</td>
<td>40kHz for applications up to 7m, available in 2” only</td>
</tr>
<tr>
<td>30 kHz</td>
<td>30kHz for applications up to 11m for 2” and 15m for 3” (4” cone is recommended for 3” units)</td>
</tr>
<tr>
<td>20 kHz</td>
<td>20kHz for applications up to 20m, available in 3” only (4” cone is recommended)</td>
</tr>
<tr>
<td>15 kHz</td>
<td>15kHz for applications up to 30m, available in 3” only (10” cone is recommended)</td>
</tr>
<tr>
<td>10 kHz</td>
<td>10kHz for applications up to 40m, available in 3.5” only (10” cone is recommended)</td>
</tr>
<tr>
<td>09 kHz</td>
<td>9kHz for high power extended range applications up to 170m (10” cone is recommended)</td>
</tr>
<tr>
<td>05 kHz</td>
<td>5kHz for applications up to 60m maximum, available in 3.5” only (10” cone is recommended)</td>
</tr>
<tr>
<td>04 kHz</td>
<td>4kHz for high power extended range applications up to 170m (10” cone is recommended)</td>
</tr>
</tbody>
</table>

**Process Temperature - Facing material selection**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Standard Temperature Dry Atmosphere only, (Polyolfin face) for 4, 5, 9, 10 and 15kHz only</td>
</tr>
<tr>
<td>T</td>
<td>Standard Temperature Wet Atmosphere, (Teflon face)</td>
</tr>
<tr>
<td>Y</td>
<td>High Temperature Wet and Dry Atmosphere, 150C, (Titanium face) for 10kHz only</td>
</tr>
<tr>
<td>Z</td>
<td>Special Request</td>
</tr>
</tbody>
</table>

**Transducer Housing Material**

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Polypropylene, not available for 2”</td>
</tr>
<tr>
<td>6</td>
<td>Tefzel for 2” (standard). For 3” Tefzel please contact factory</td>
</tr>
</tbody>
</table>

**Thread Standards**

<table>
<thead>
<tr>
<th>Thread</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Not Required (Standard Flange Mount, see flange &amp; cone selection)</td>
</tr>
<tr>
<td>TB</td>
<td>BSP</td>
</tr>
<tr>
<td>TN</td>
<td>NPT</td>
</tr>
</tbody>
</table>

**Mounting Thread Sizes**

<table>
<thead>
<tr>
<th>Thread</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Not Required (Standard Flange Mount, see flange &amp; cone selection)</td>
</tr>
<tr>
<td>20</td>
<td>2” thread for 50,40,30 kHz in Tefzel housing only</td>
</tr>
<tr>
<td>30</td>
<td>3” thread on the back cap for 30,20,15 kHz only. For 15kHz use “B” type flange.</td>
</tr>
<tr>
<td>50</td>
<td>3.5” thread on the end cap for 10 and 5kHz only</td>
</tr>
</tbody>
</table>

**Approval Standard**

<table>
<thead>
<tr>
<th>Approval</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Not Required</td>
</tr>
<tr>
<td>A0</td>
<td>Intrinsic Safe: IECEx Zone 0 (Ex ia IIA T4)/ATEX (GrpII Cat1 GD IP67 EEex ia IIA T4)</td>
</tr>
<tr>
<td>A1</td>
<td>ATEX Encapsulated (Grp II Cat 2 GD EEex m II IP68)</td>
</tr>
<tr>
<td>A20</td>
<td>ATEX Dust (Grp II Cat 1 D T85C IP67)</td>
</tr>
<tr>
<td>A21</td>
<td>ATEX Dust (Grp II Cat 2 D T85C IP67)</td>
</tr>
<tr>
<td>A22</td>
<td>ATEX Dust (Grp II Cat 3 D T85C IP67)</td>
</tr>
</tbody>
</table>

**Connection**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Not Required</td>
</tr>
<tr>
<td>C</td>
<td>IP68 Sealed unit with cable</td>
</tr>
<tr>
<td>S</td>
<td>Screwtop with integral junction box (available only for 2” units)</td>
</tr>
</tbody>
</table>

**Cable Length**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6m cable (Standard)</td>
</tr>
<tr>
<td>15</td>
<td>15m cable</td>
</tr>
<tr>
<td>30</td>
<td>30m cable</td>
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<tr>
<td>50</td>
<td>50m cable</td>
</tr>
<tr>
<td>X</td>
<td>Not Required</td>
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**Mounting Accessories**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Not Required</td>
</tr>
<tr>
<td>CS</td>
<td>Cable Suspension for remote 50/40/30/20kHz only</td>
</tr>
</tbody>
</table>

**Position Unit/Crane Master/Software Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS</td>
<td>Position Slave</td>
</tr>
<tr>
<td>FP</td>
<td>Fast Pulsing</td>
</tr>
<tr>
<td>X</td>
<td>Not Required</td>
</tr>
</tbody>
</table>

**Part Numbering**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWRT 30 T 4 X X X C 6 X X</td>
<td>Sultan AW Remote Transducer</td>
</tr>
</tbody>
</table>
Sultan AW Integral Transmitter

Model
AWI2  Integral 2 Wire, Housing / Facia Display Connection Board/Process Module, No relays
AWI234 Integral 2/3/4 Wire, Housing / Facia Display Connection Board/Process Module, 2 relays
AWFI234 Integral 2/3/4 Wire, Housing / Facia Display Connection Board/Process Module, 2 relays for Flow

Housing
S Standard Valox 357U moulded electronics housing

Power Supply
B 24 VDC standard
C 48VDC for 2/3/4 only
U Universal AC power supply (90-260 VAC input) and 12-30VDC, For 2/3/4 only

Transducer Frequency
50 50kHz for applications up to 5m, available in 2” only
40 40kHz for applications up to 7m, available in 2” only
30 30kHz for applications up to 11m for 2” and 15m for 3” (4” cone required for 3” units)
20 20kHz for applications up to 20m, available in 3” only (4” cone required)
15 15kHz for applications up to 30m, available in 3” only (10” cone required)
10 10kHz for applications up to 40m, available in 3.5” only (10” cone required)
09 9kHz for high power extended range applications up to 170m (10” cone required)
05 5kHz for applications up to 60m maximum, available in 3.5” only (10” cone required)
04 4kHz for high power extended range applications up to 170m (10” cone required)

Process Temperature - Facing material selection
S Standard Temperature Dry Atmosphere only, (Polyolfin face)
T Standard Temperature Wet Atmosphere, (Teflon face)
Y High Temperature Wet and Dry Atmosphere, 150°C, (Titanium face) for 10kHz only

Transducer Housing Material
4 Polypropylene
6 Tefzel for 2” (standard). For 3” Teflon please contact us

Thread Standards
X Not Required (Standard Flange Mount, see flange & cone selection)
TB BSP
TN NPT

Mounting Thread Sizes
X Not Required (Standard Flange Mount, see flange & cone selection)
20 2” thread for 50,40,30 kHz in Tefzel housing only
30 3” thread on the back cap for 30, 20, 15 kHz only. For 15kHz use “B” type flange.
50 3.5” thread on the end cap for 10 and 5kHz only

Output Configuration (PC comms Goshawk standard)
S Switch only, 5 relays for AWR234 only
X 4-20mA analogue output module, 2/3/4 includes Modbus comms
H HART 2 wire only
I HART Isolated 4 wire 2/3/4 only
W Modbus Comms only (not available for 2 wire Sultan)
P Profibus DP
E Ethernet
D Devicenet
Z Special Request

Approval Standard
X Not Required
A0 Intrinsic Safe: IECEx Zone 0 (Ex ia IIA T4) / ATEX (Grp II Cat 1 GD IP67 EEx ia IIA T4)
A22 ATEX Dust (Grp II Cat 3 D T85C IP67)

Position / Crane master/Software Options for Sultan 234 Only
FS Position Slave
CM Crane Master
X Not required
### Flange Selection

**Flange**

<table>
<thead>
<tr>
<th>Dimension Standard</th>
<th>A ANSI</th>
<th>D DIN</th>
<th>J JIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F Special Request</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Flange Sizes

- 2N  2” NPT flange
- 2B  2” BSP flange
- 3  3” acoustically isolated flange
- 4  4” acoustically isolated flange
- 6  6” acoustically isolated flange
- 8  8” acoustically isolated flange
- 10  10” acoustically isolated flange
- Z  Special Request

#### Flange Mounting Position

- A Cone Mounted
- B Transducer Body Mounted for polyurethane cone
- C Angle flange

#### Flange Material

- 4 Polypropylene
- 6 Teflon
- Z Special Request

#### Cone Selection

**Cone**

<table>
<thead>
<tr>
<th>Cone Size</th>
<th>02N  Adaptor for 2” NPT sensor to fit into 4” cone (included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02B</td>
<td>Adaptor for 2” BSP sensor to fit into 4” cone (included)</td>
</tr>
<tr>
<td>03</td>
<td>3” cone for 30,20 and 15kHz transducers with TB30 or TN30 threads</td>
</tr>
<tr>
<td>04</td>
<td>4” cone, 30 and 20kHz 3” transducer</td>
</tr>
<tr>
<td>06</td>
<td>6” cone, 30 and 20kHz 3” transducer</td>
</tr>
<tr>
<td>08-15</td>
<td>8” cone, 15kHz</td>
</tr>
<tr>
<td>08-10</td>
<td>8” cone, 10kHz</td>
</tr>
<tr>
<td>10-15</td>
<td>10” cone, 15kHz</td>
</tr>
<tr>
<td>10-09</td>
<td>10” cone, 9kHz</td>
</tr>
<tr>
<td>10-10</td>
<td>10” cone, 10kHz</td>
</tr>
<tr>
<td>10-04</td>
<td>10” cone, 4kHz</td>
</tr>
<tr>
<td>10-05</td>
<td>10” cone, 5kHz</td>
</tr>
</tbody>
</table>

#### Cone Material

- 4 Polypropylene
- 6 Teflon
- 7A Carbon Fibre. Comes attached to ANSI Carbon Fibre Flange
- 7D Carbon Fibre. Comes attached to DIN Carbon Fibre Flange
- 7J Carbon Fibre. Comes attached to JIS Carbon Fibre Flange
- 8 Polyurethane. Flange needs to be transducer Body Mounted
- Z Special Request

**Part Numbering**

F A 4 A - 4
Specifications

Frequency

- 5kHz, 10kHz, 15kHz, 20kHz, 30kHz, 40kHz, 50kHz
(4/9 are long range versions of 5/10)

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, Profieldus DP, DeviceNet
(Foundation Fieldbus & Profieldus PA pending)

Relay Output: (2) Integral (5) Remote

- 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")
- 15kHz = 0.60 m (24")
- 10/9kHz = 1.0 m (39")
- 5/4kHz = 1.5 m (59")

Maximum Range

- 5 m (16ft) 50kHz liquids
- 7 m (22ft) 40kHz liquids
- 10 m (33ft) 30kHz liquids, 5m (16ft) solids
- 20 m (65ft) 20kHz liquids/slurries, 10m (33ft) solids
- 30 m (98ft) 15kHz liquids/slurries, 20m (65ft) solids
- 50 m (165ft) 10kHz liquids/slurries/powders/solids
- 60 m (196ft) 5kHz liquids/slurries/powders/solids
- 180 m (588ft) 4/9 kHz for extended range

Resolution

- 1 mm (0.04") 50, 40, 30, 20, 15, 10, 5kHz
- 4 mm (0.2") 9, 4kHz

Electronic Accuracy

- +/- 0.25% of maximum range

Operating Temperature

- Integral System -40°C (-40°F) to 80°C (176°F)
- Remote electronics -40°C (-40°F) to 80°C (176°F)
- Remote transducer -40°C (-40°F) to 175°C (Hi-Temp. 10kHz version)

Transducer/Amplifier Separation

- up to 1000m using specified extension 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 1ED183AA002 = 350m (980 ft)

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/15kHz/10kHz/5kHz
- 10° with focaliser 9kHz/4kHz

Display

- 2 line x 8 digit alphanumeric LCD

Memory

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

Enclosure Sealing

- Integral System IP67
- Remote Electronics IP65 (Nema 4x)
- Remote Transducer IP68

Cable Entries

- Integral: 3 x M16 Glands
- Remote: 3 x 20mm, 1 x 16mm knock outs.

Mounting

- ANSI, JIS or DIN Flange
- 4 in/100mm to 10 in/250mm
- 2in BSP Thread / NPT Thread

Typical Weight

Sultan AW System with appropriate flange and cone

<table>
<thead>
<tr>
<th>Frequency (in kHz)</th>
<th>kg</th>
<th>lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/5</td>
<td>13</td>
<td>28.6</td>
</tr>
<tr>
<td>9/10</td>
<td>10</td>
<td>22.0</td>
</tr>
<tr>
<td>15/15</td>
<td>8</td>
<td>17.6</td>
</tr>
<tr>
<td>20/30</td>
<td>3</td>
<td>6.6</td>
</tr>
<tr>
<td>30/40/50</td>
<td>1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Configuration

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

Additional product warranty and application guarantees upon request.

Technical data subject to change without notice.

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