INSTRUCTION MANUAL

Foundation Fieldbus

Fieldbus
Foundation

A higher level of performance

HAWK

INTRODUCTION

CONTENTS

PROPRIETARY NOTICE
The information contained in this publication is derived in part from proprietary and patent data. This information has been prepared for the express purpose of assisting operating and maintenance personnel in the efficient use of the instrument described herein. Publication of this information does not convey any rights to use or reproduce it, or to use for any purpose other than in connection with the installation, operation and maintenance of the equipment described herein.

WARNING
This instrument contains electronic components that are susceptible to damage by static electricity. Proper *handling procedures must be observed during the removal, installation, or handling or internal circuit boards or devices.

* Handling Procedure:
1. Power to unit must be removed.
2. Personnel must be grounded, via wrist strap or other safe, suitable means, before any printed circuit board or other internal devices is installed, removed or adjusted.
3. Printed circuit boards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until the immediate time of installation. Removed boards must be placed immediately in a protective container for transport, storage, or return to factory.

Comments:
This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc.). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

GENERAL DESCRIPTION

DEVICE ADDRESSING

Foundation Fieldbus Network Overview

SULTAN 2 wire unit is powered from the H1 Fieldbus, and many units can be networked using multi-drop cabling. DD and CFF files are used to plan your FieldBus network. These can be downloaded from
http://www.hawk.com.au/files/it064400.zip

SULTAN 234 wire unit is powered by an external power supply.
An H1 Link will supply power to the Fieldbus communications module, and many units can be networked using multi-drop cabling. DD and CFF files are used to plan your FieldBus network. These can be downloaded from
http://www.hawk.com.au/files/it064400.zip

Orca Sonar bed level units can be powered by an external power supply.
An H1 Link will supply power to the Fieldbus communications module, and many units can be networked using multi-drop cabling. DD and CFF files are used to plan your FieldBus network. These can be downloaded from
http://www.hawk.com.au/files/it064400.zip

Hawk PA/FF units leave the factory with a default bus address of **31**. It is recommended not change the ID of the unit using the keypad prior to connecting to the network.

Connect the unit to the network so it is detected and change the device ID from 31 to an available address using your PLC.

If using multiple units only connect one unit at a time to change the address.

You can change the address of the units using the keypad after you have established which IDs the devices will be using. **Ensure these addresses are free.**
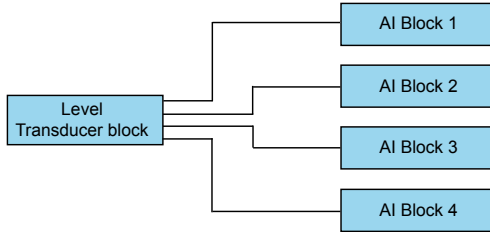
SYSTEM DIAGRAM

Foundation Fieldbus System Consolidation

MASTER **CONFIGURATOR**

HSE NETWORK

Linker

H1 NETWORK

Sultan
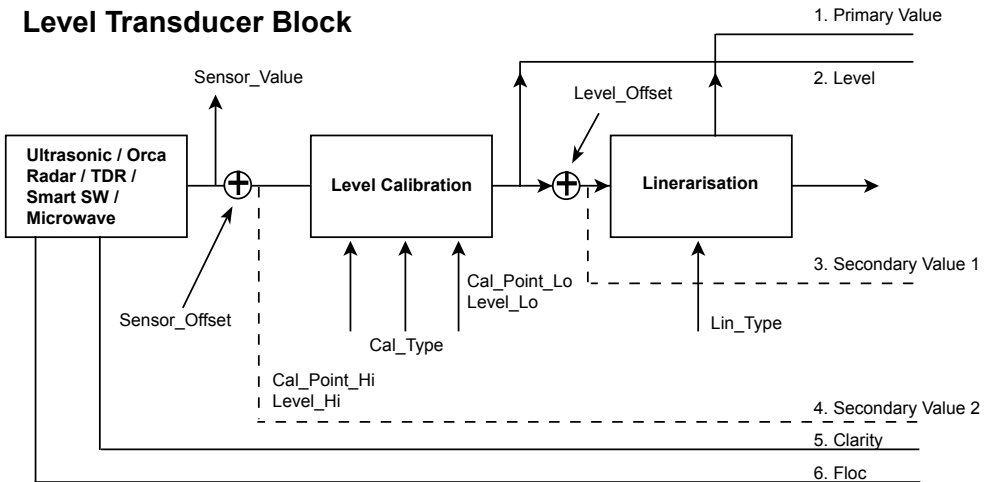Remote

Sultan
Integral
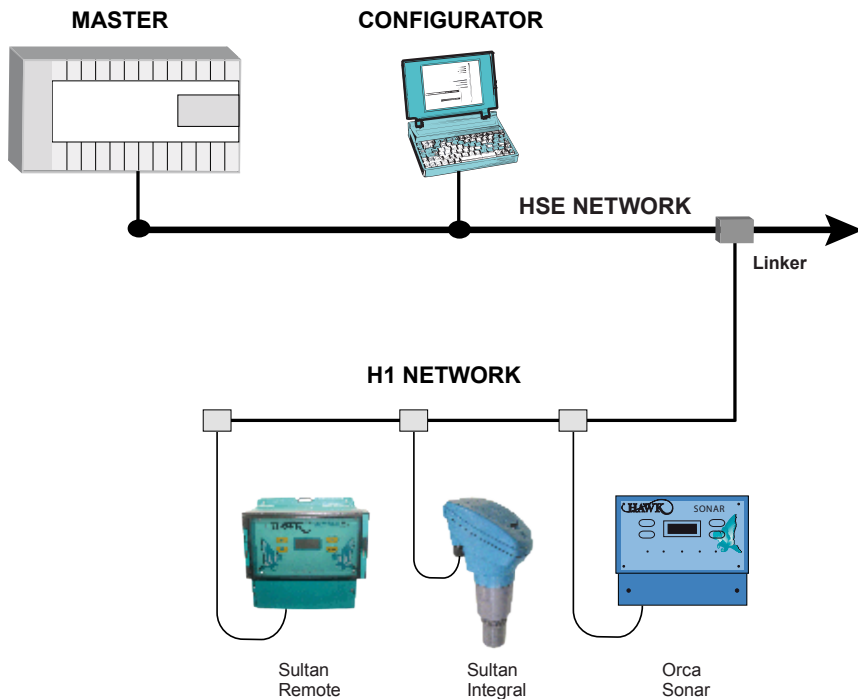
Orca
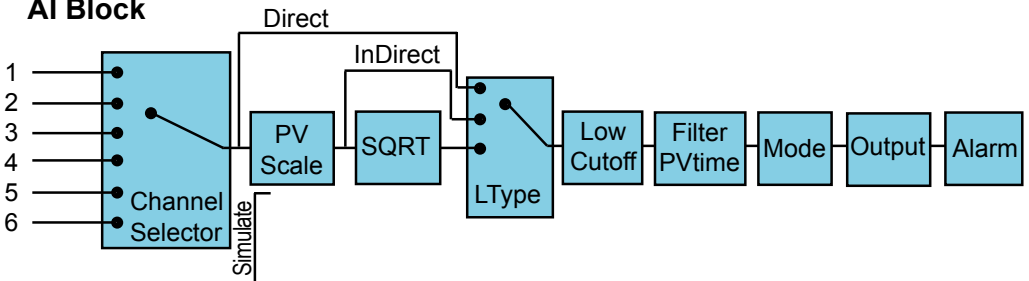Sonar

BLOCK DIAGRAM

Hawk device function block application

Level Transducer Block

AI Block

Channel 1 = Primary Value
Channel 2 = Level
Channel 3 = Secondary Value 1
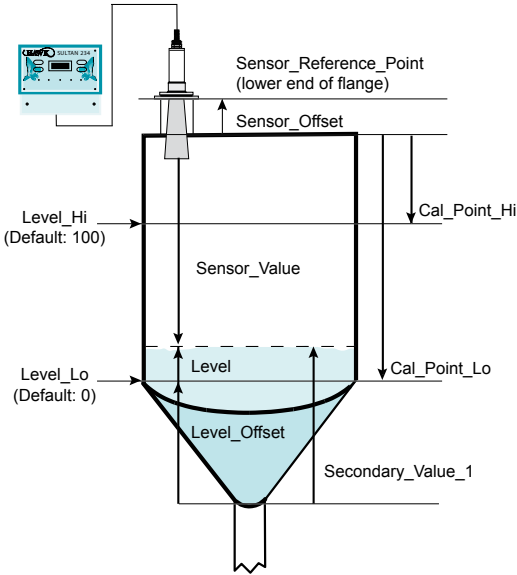
Channel 4 = Secondary Value 2
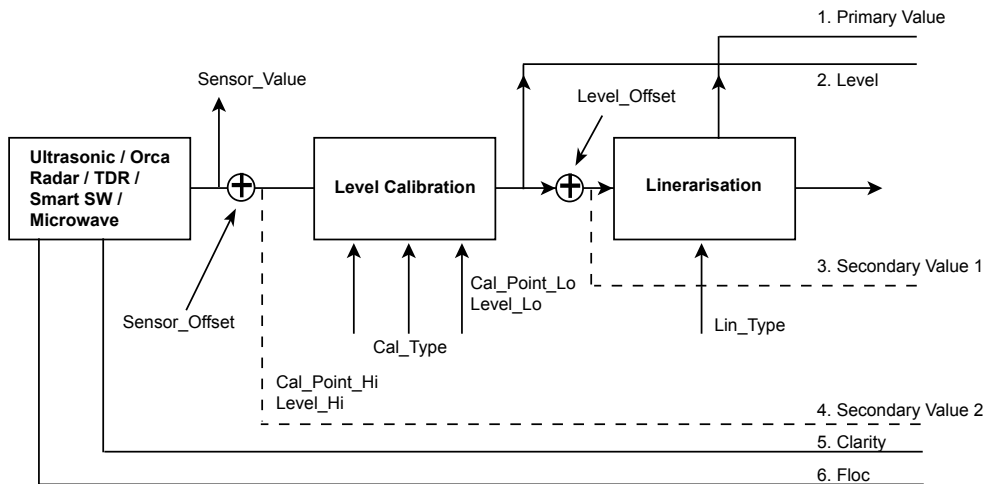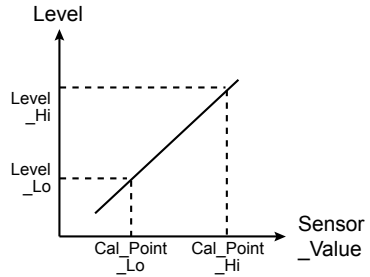Channel 5 = Clarity*
Channel 6 = Flow*

*Orca device output

PARAMETER LIST

Application Examples

Level

Thickener / Clarifier

Sensor_Reference_Point
(lower end of flange)

Sensor_Offset

Cal_Point_Hi

Level_Hi
(Default: 100)

Sensor_Value

Level_Lo
(Default: 0)

Level

Cal_Point_Lo

Level_Offset

Secondary_Value_1

Clarity
Temperature

Level_Hi

Floc / Hindered

Bed_Level

Level_Lo

Level

Level
_Hi

Level
_Lo

Cal_Point
_Lo

Cal_Point
_Hi

Sensor
_Value

1. Primary Value

2. Level

Level_Offset

Sensor_Value

Ultrasonic / Orca
Radar / TDR /
Smart SW /
Microwave

Level Calibration

Linerarisation

3. Secondary Value 1

Sensor_Offset

Cal_Type

Cal_Point_Lo
Level_Lo

Lin_Type

Cal_Point_Hi
Level_Hi

4. Secondary Value 2

5. Clarity

6. Floc

PARAMETER LIST

Parameter Information

- **Primary value:** This is the Process value(Transducer Output) after linearization and offsets, with status of transducer block
- **Primary value Unit:** Unit used for Primary value output
- **Level:** Sensor Value after level calibration and sensor offset
- **Level unit:** Unit used for Level Value
- **Sensor value:** This is actual Sensor value
- **Sensor unit:** Unit used for sensor value
- **Secondary value 1:** This is Level value after level offset
- **Secondary value unit**
- **Secondary value 2:** This is Sensor value after Sensor Offset
- **Secondary value unit**
- **Lin type:** This is the switch to select the type of linearization,
  Lin type = 0 , No Linearization
  Lin type = 1 , 40 point Table method for Linearization
- **Level Hi:** Level Hi is highest value level can take
- **Level Lo:** Level Lo is lowest value level can take
- **Temperature:** It is the process temperature value

Channel Mapping Information:

Hawk devices support 4 AI blocks and each block can have different inputs selectable by channels. There are 6 channels available in hawk devices ,described as below

1. Channel 1 : Primary Value
2. Channel 2 : Level
3. Channel 3 : Secondary value 1
4. Channel 4 : Secondary Value 2
5. Channel 5 : Clarity*
6. Channel 6 : Floc*

- Output value only valid for Orca sonar

TROUBLESHOOTING

FAULT FINDING

Test Steps

1. What is the voltage at device Bus terminals? 9-32V. Try 24-26VDC setting for the comms voltage.

2. What is the current in device Bus loop? 22mA for Orca or Sultan234, 20 mA for Sultan2.

3) What comms are selected in Output Adj Menu? FF/PA.

4) What is amplifier software version? 5.68 onwards (displayed during unit power up).

5) Make sure correct and latest DD is installed in Ni folder. Consult your Fieldbus supplier for instructions on how to load the latest DD files.

Unit Detected But Not Transmitting Data or Data Read Failed

Check if the Modbus device ID is set to 1 - using the keypad hit CAL, 'unlock 0' will be displayed, hit CAL again. 'Quickset' will not be displayed. Press the arrow keys to scroll till you see 'Output Adj'. Press CAL to select. Use the arrow keys to scroll until you see 'comms type'. Press CAL to edit, use the arrows to locate 'Modbus'. Press CAL again to select. The next screen will display the Modbus ID. If this is not 1 press CAL to edit and use the arrows to change it to 1 - press CAL to save.

Repeat this procedure except now set the 'comms type' back to FF/PA.

FF/PA reads the unit parameters (such as level values) via Modbus - Modbus must be set to ID1.comms type back to PA/FF.

Repair Service / Field Service / Pre-maintenance

Hawk provides customers with excellent after-sales service to guarantee the ongoing functioning and support of our products.

Should you need to access our Repairs facilities, please submit a Return Material Authorisation form and follow the procedure as described within the form. This Form can also be downloaded from our website within the 'downloads' section.

www.hawkmeasure.com

SPECIFICATIONS

Operating Voltage
• 9 - 32Vdc

Output Signal:
• Signal: Foundation Fieldbus
• Transmition speed : 31.25KB
• Current : 20mA default and can be switched to from 15mA,20mA,25mA,30mA

Registered Features
• Alarms and Events
• Function Block
• Linking
• Trending

Function Blocks:
• 1-RB(e)
• 4-AI(e)
• 1-TB(c)

H1 Profile Class:
• 31PS
• 32L

H1 Device Class:
• Link Master

Physical layer is according to IEC 61158-2

Cable
• According to Foundation Fieldbus standard – IEC61158-2.

Channel Mapping
• Channel 1: Primary Value
• Channel 2: Level
• Channel 3: Secondary value 1
• Channel 4: Secondary Value 2
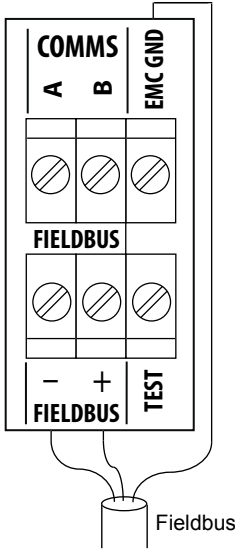• Channel 5: Clarity*
• Channel 6: Floc*

  *Output value only valid for Orca sonar
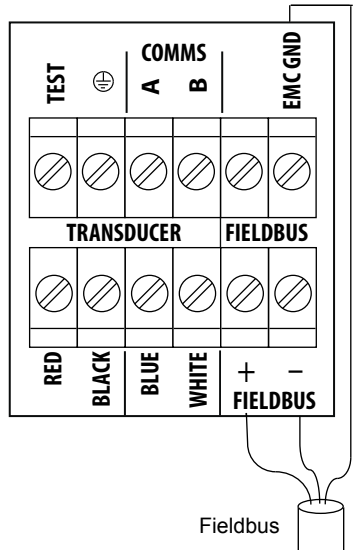
IMPORTANT
"USE SPECIFIED CABLE ONLY"

WIRING TERMINALS

H1 Bus Powered

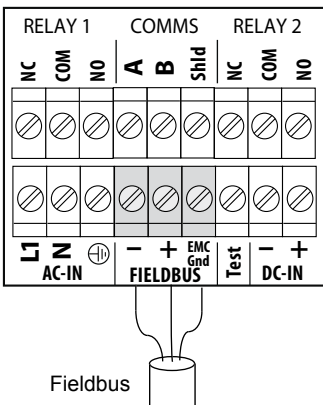Sultan 2 wire FF Transmitter
Integral Version
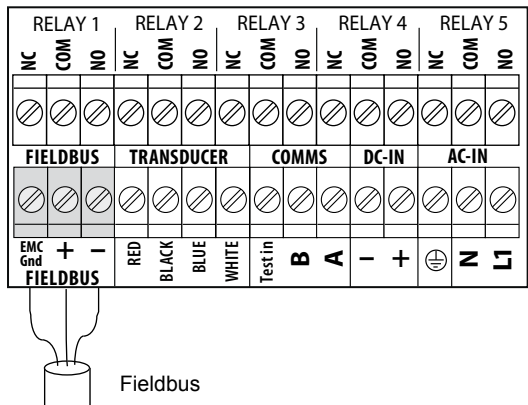
Sultan 2 wire FF Transmitter
Remote Version

COMMS
A B EMC GND

FIELDBUS

− + TEST
FIELDBUS

Fieldbus

TEST ⊕ COMMS A B EMC GND

TRANSDUCER FIELDBUS

RED BLACK BLUE WHITE + −
FIELDBUS

Fieldbus

EXTERNALLY POWERED

Sultan 234 wire FF Transmitter
Integral Version

Sultan 234 wire FF Transmitter
Remote Version

RELAY 1			COMMS			RELAY 2		
NC	COM	NO	A	B	Shld	NC	COM	NO
L1	N	⊕	−	+	EMC Gnd	Test	−	+
AC-IN			FIELDBUS				DC-IN	

Fieldbus

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
FIELDBUS			TRANSDUCER			COMMS			DC-IN			AC-IN		
EMC Gnd	+	−	RED	BLACK	BLUE	WHITE	Test in	B	A	−	+	⊕	N	L1
FIELDBUS														

Fieldbus

WIRING TERMINALS

Externally Powered

Orca FF Transmitter

SONAR 234 REMOTE TRANSMITTER																
	RELAY 1			RELAY 2			RELAY 3			ACTUATOR						
	NC	COM	NO	NC	COM	NO	NC	COM	NO	BLK	BLU	BRN	GRN	YEL	SHLD	TOP
	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	
	FIELDBUS			**TRANSDUCER**				**COMMS**		**DC-IN**		**AC-IN**				BOTTOM
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	
	ENC GND	+	–	RED	BLK	BLU	WHT	Test	B	A	–	+	⏚	N	L1	
	FIELDBUS										12-30VDC		90-265 VAC			

Fieldbus

CERTIFICATES

HAWK MEASUREMENT SYSTEMS
HAWK FF LEVEL SERIES – AW-XXXX

FOUNDATION

Category:	Level
Revision:	1.0
Type:	Sultan Acoustic Wave Series
Registered Features:	Alarms and Events Function Block Linking Trending
Registered Function Blocks:	1-RB(e), 4-AI(e)
Other Blocks:	1-TB(c)
H1 Profile Class:	31PS, 32L
H1 Device Class:	Link Master
Test Campaign Number:	IT064400
MANUFAC_ID (HEX):	001988
DEV_TYPE (HEX):	0001
DEV_REV (HEX):	01
Tester Version:	5.2.0
Test Status:	Registered

STACK

Manufacturer (H1):	Fieldbus Inc.
Revision (H1):	3.0
Test Campaign Number (H1):	CT0086FF

PHYSICAL LAYER

Physical Layer types:	113 - Standard-power signaling, bus-powered, non I.S.
Test Campaign Number:	PT-314

DEVICE DESCRIPTION AND CAPABILITIES FILE

DD Version:	0x01, 0x01(EDD)
DD/CFF Files:	Download DD/CFF File
DD/CFF Tester Version:	5.2.0

CERTIFICATES

PREVIOUS REGISTRATIONS

Previous Revisions:
Click to view Previous Versions

MORE INFORMATION

More Information:

Sultan Acoustic Wave Series

Principle of Operation
The non contact **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 Application

Level Measurement - Waste water/water:
River level, wet wells, inlet screens, tanks, sumps, pump stations, water towers, dams, basin levels, chemical storage, etc.

Level Measurement - Mining:
Crushers, surge bins, ore passes, conveyor profile, blocked chute, stockpile, stackers, reclaimers, storage silos etc.

Level Measurement - Power Stations:
Boiler bunkers, raw coal bunkers, ash pits, fly ash silos, etc.

Others:
Food, cement, plastics, grain, chemicals, paper, irrigation, quarries

Features:

- Non contact measurement
- High Power even with two wire loop supply
- Low cost per point

CERTIFICATES

FOUNDATION™
DEVICE REGISTRATION

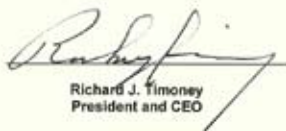|	
Manufacturer:	Hawk Measurement Systems
Model:	Hawk FF Level Series – AW-XXXX
Type:	Sultan Acoustic Wave Series
Device ITK Version:	5.2.0
Device Test Campaign:	IT064400
Test Report:	FF-527-(84400)
Stack Test Campaign:	CT0086FF
Physical Layer Test Report:	PT-314
Physical Layer Profiles:	113
Manufacturer ID:	0x001988
Device Type:	0x0001
Device Revision:	0x01

	Filename	CRC	ITK Version
Device Description:	0101.ffo	2583132A	5.2.0
	0101.sym	FA7DB1A	5.2.0
	0101.ff5	1DFCEE0A	5.2.0
	0101.sy5	FA7DB1A	5.2.0
Capability File:	0101D1.cff	50AC5019	5.2.0

Tested Features:
Resource Block
Alarms and Events
Function Block Linking
Trending
Analog Input Function Blocks

06 November 2009

Registration Date

Richard J. Timoney
President and CEO

CERTIFICATES

HAWK MEASUREMENT SYSTEMS
HAWK FF LEVEL SERIES – OSIR-XXXX

FOUNDATION

Category:	Level
Revision:	1.0
Type:	ORCA Sonar Level Series
Registered Features:	Alarms and Events Function Block Linking Trending
Registered Function Blocks:	1-RB(e), 4-AI(e)
Other Blocks:	1-TB(c)
H1 Profile Class:	31PS, 32L
H1 Device Class:	Link Master
Test Campaign Number:	IT064401
MANUFAC_ID (HEX):	001988
DEV_TYPE (HEX):	0001
DEV_REV (HEX):	01
Tester Version:	5.2.0
Test Status:	Registered

STACK

Manufacturer (H1):	Fieldbus Inc.
Revision (H1):	3.0
Test Campaign Number (H1):	CT0086FF

PHYSICAL LAYER

Physical Layer types:	113 - Standard-power signaling, bus-powered, non I.S.
Test Campaign Number:	PT-314

DEVICE DESCRIPTION AND CAPABILITIES FILE

DD Version:	0x01, 0x01(EDD)
DD/CFF Files:	Download DD/CFF File
DD/CFF Tester Version:	5.2.0

CERTIFICATES

More Information:

ORCA - Sonar Bed Level System

Principle of Operation

The ORCA Sonar Bed Level transducer emits a high powered acoustic pulse, which is reflected from the interface density selected. The reflected signal is processed using specially developed software algorithms, that eliminate lighter floating densities and stratified layers, allowing measurement of "RAS" or "BED" levels. It can be calibrated to measure lighter densities like "FLOC" or one of the outputs could be used for a "CLARITY" output, similar to a basic turbidity transmitter measuring solids in suspension.

By choosing the correct sonar transducer frequency, the ORCA sonar guarantees the optimized performance when measuring both light and heavy density interfaces.

Primary Areas of Application

- **Sewage & Wastewater**
  Primary Sedimentation - Blanket level
  Secondary and final Clarifiers - RAS Blanket and fluff/pin floc layer
  Thickeners and DAF - Bed level and clarity of water
  Sequential Batch Reactors - Blanket monitoring (floating sonar)
  Lagoons - Bed sludge level
  Lamella Clarifier - Bed level and floc level
- **Mining / Process**
  Clarifiers, thickeners, CCD's, settling ponds/lagoons, water treatment, carbon columns

Features:

- Dual independent analogue outputs to track two different interfaces, or clarity simultaneously, with the one sonar sensor.
- Full range of sonar transducers to optimize detection of heavy and light density interfaces.
- Widest range of sonar frequencies to optimize performance.
- Easy calibration to track specific density interfaces. eg: RAS blanket - 4g/l, floc/fluff layer - 1g/l.
- Industrial scum cleaning mechanisms, that do not require maintenance.
- No wiper blade assemblies.

CERTIFICATES

FOUNDATION™
DEVICE REGISTRATION

Manufacturer:	Hawk Measurement Systems
Model:	Hawk FF Level Series – OSIR-XXXX
Type:	ORCA Sonar Level Series

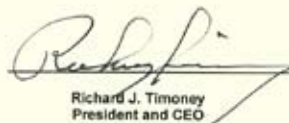|	
Device ITK Version:	5.2.0
Device Test Campaign:	IT064401
Test Report:	FF-527-(64400)
Stack Test Campaign:	CT0086FF
Physical Layer Test Report:	PT-314
Physical Layer Profiles:	113
Manufacturer ID:	0x001988
Device Type:	0x0001
Device Revision:	0x01

Device Description:	Filename	CRC	ITK Version
	0101.ffo	2583132A	5.2.0
	0101.sym	FA7DB1A	5.2.0
	0101.ff5	1DFCEE0A	5.2.0
	0101.sy5	FA7DB1A	5.2.0
Capability File:	010101.cff	50AC5019	5.2.0

Tested Features:	Resource Block
	Alarms and Events
	Function Block Linking
	Trending
	Analog Input Function Blocks

05 November 2009

Registration Date

Richard J. Timoney
President and CEO

Contacts

Hawk Measurement Systems (Head Office)
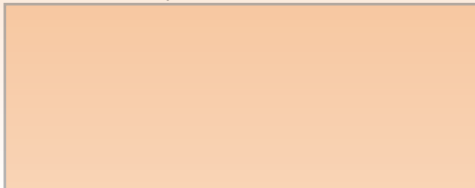15-17 Maurice Court
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