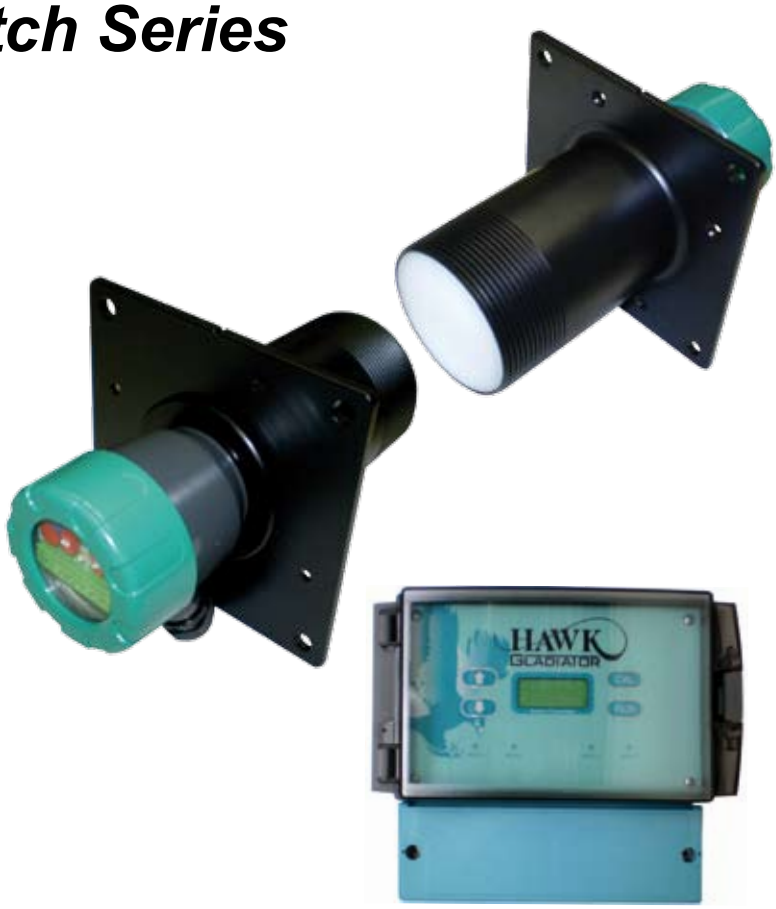
A higher level of performance

Data Sheet

GLADIATOR

Microwave Smart Switch Series

- Beam blockage detection -



Principle of Operation

A beam of microwave energy passes from a sender to a separate receiver in bursts approximately 200 times per second. If the path between the sender and receiver is blocked by any object or material which absorbs or reflects microwave energy, then the receiver will not be able to detect the signal. The presence or absence of the signal at the receiver is used to switch a relay for indication or control purposes.

Typical Uses

Blocked chute detection
Stacker/reclaimer protection
Shiploader protection
Nucleonic switch replacement
Hi level alarm / Low level alarm
Truck/machine detection

Function

Detection of objects or material between two points. Can be used for blockage detection, barrier detection, machine detection or protection and point level detection.

Primary Areas of Application

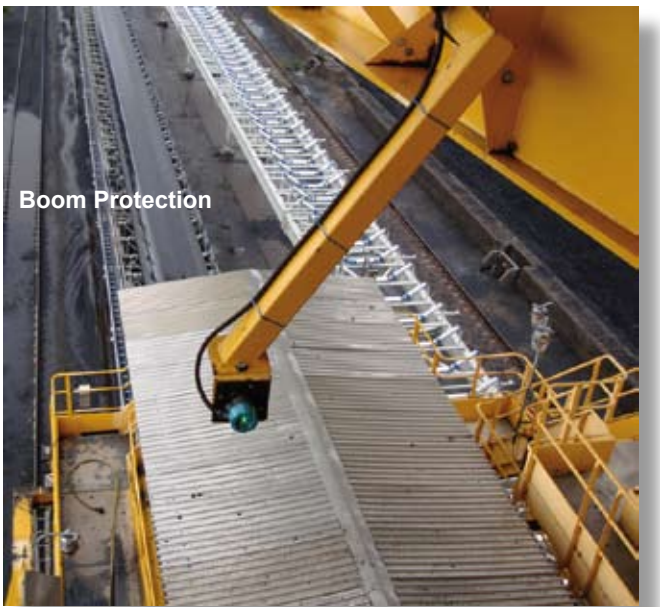
- Asphalt
- Brewing
- Cement
- Chemical
- Dairy
- Edible oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Plastics
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater

Features:

- LCD setup/diagnostics on remote amplifier
- Ranges up to 200 meters (656 ft)
- Simple ‘1-minute’ setup
- Remote sensor or Smart Integral ‘all in one’ types
- Relay outputs: Smart Integral (1) Remote (2)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Smart communication options: GosHawk, Modbus, HART, Profibus DP, DeviceNet
- Remote GSM connection option
- Remote amplifier to sensor separation up to 500 meters (1640 ft)
- Bright visual status indication on sensors
- Independent housing alignment after mounting sensor

Typical Applications

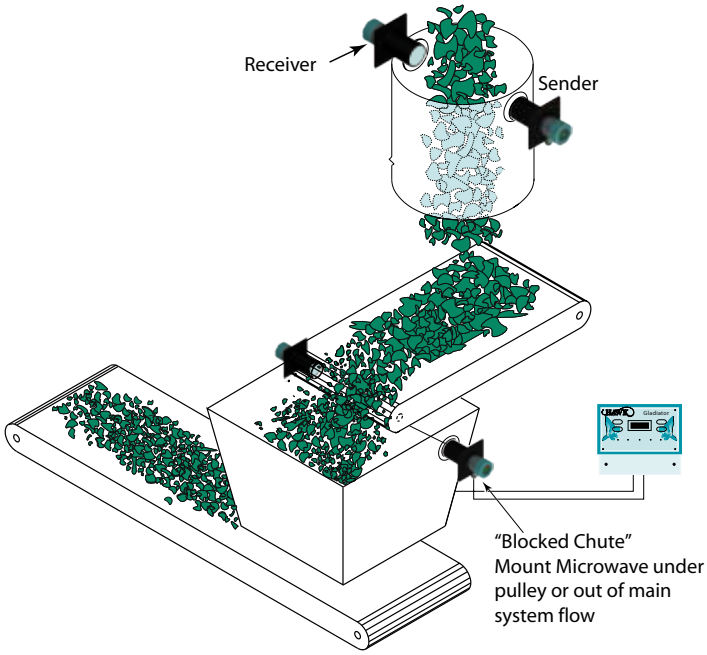
Machine Protection



Coal Fired Power Station, Bulk Material Handling

High/Low blocked chute detection

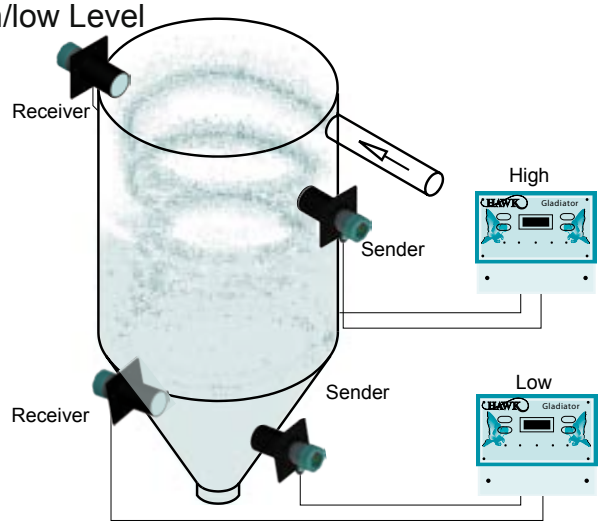
For dual receiver wiring see user manual.



Cement Plants

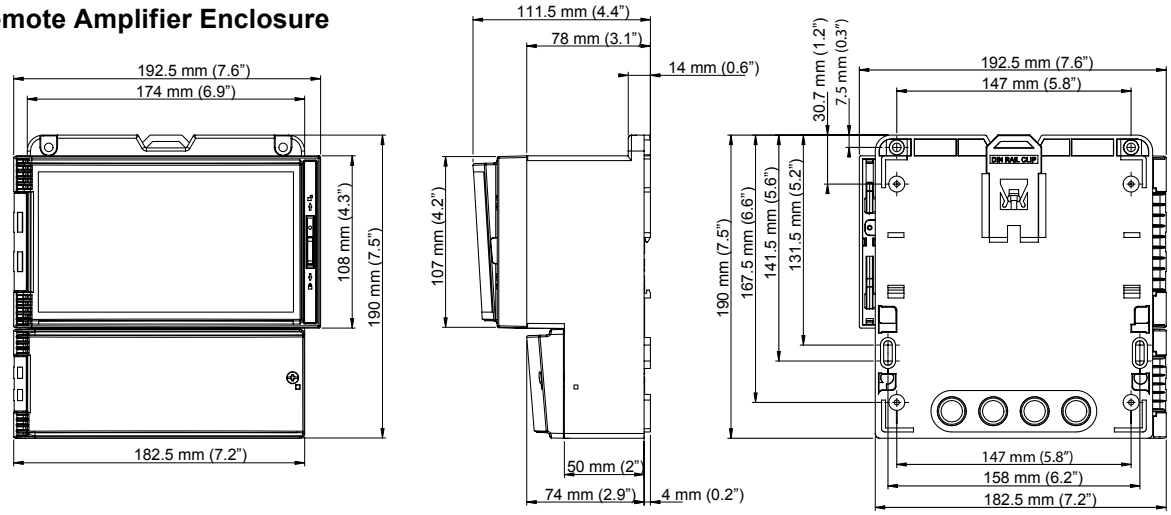
Solid Level - Cyclone Bin

High/low Level



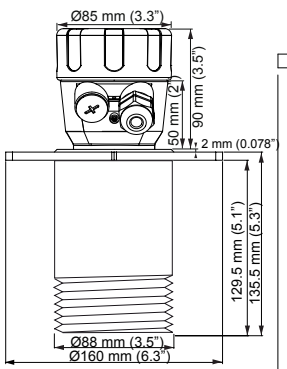
Remote Microwave System

Remote Amplifier Enclosure

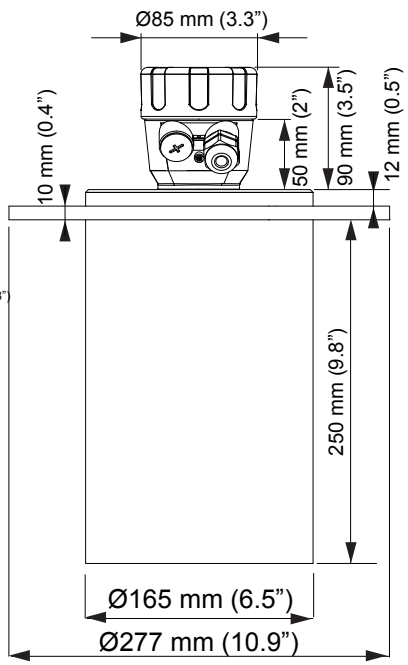


Remote Sender / Receiver

Standard Sender/Receiver

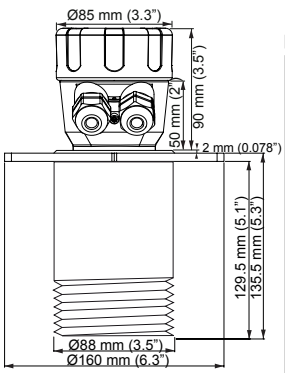


High Power Sender, Receiver or SRS Receiver

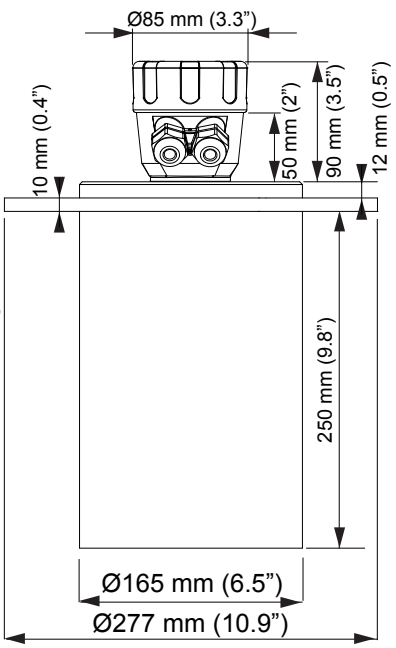


Smart Integral Microwave System

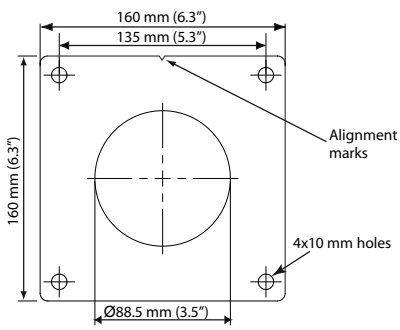
Standard Sender/Receiver

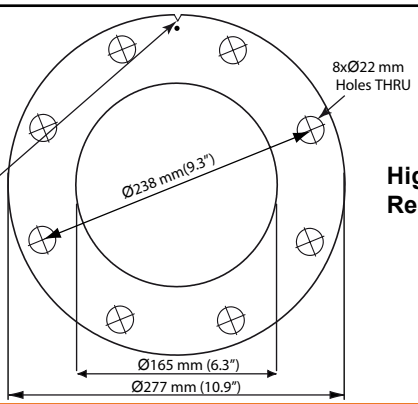


High Power Sender, Receiver or SRS Receiver



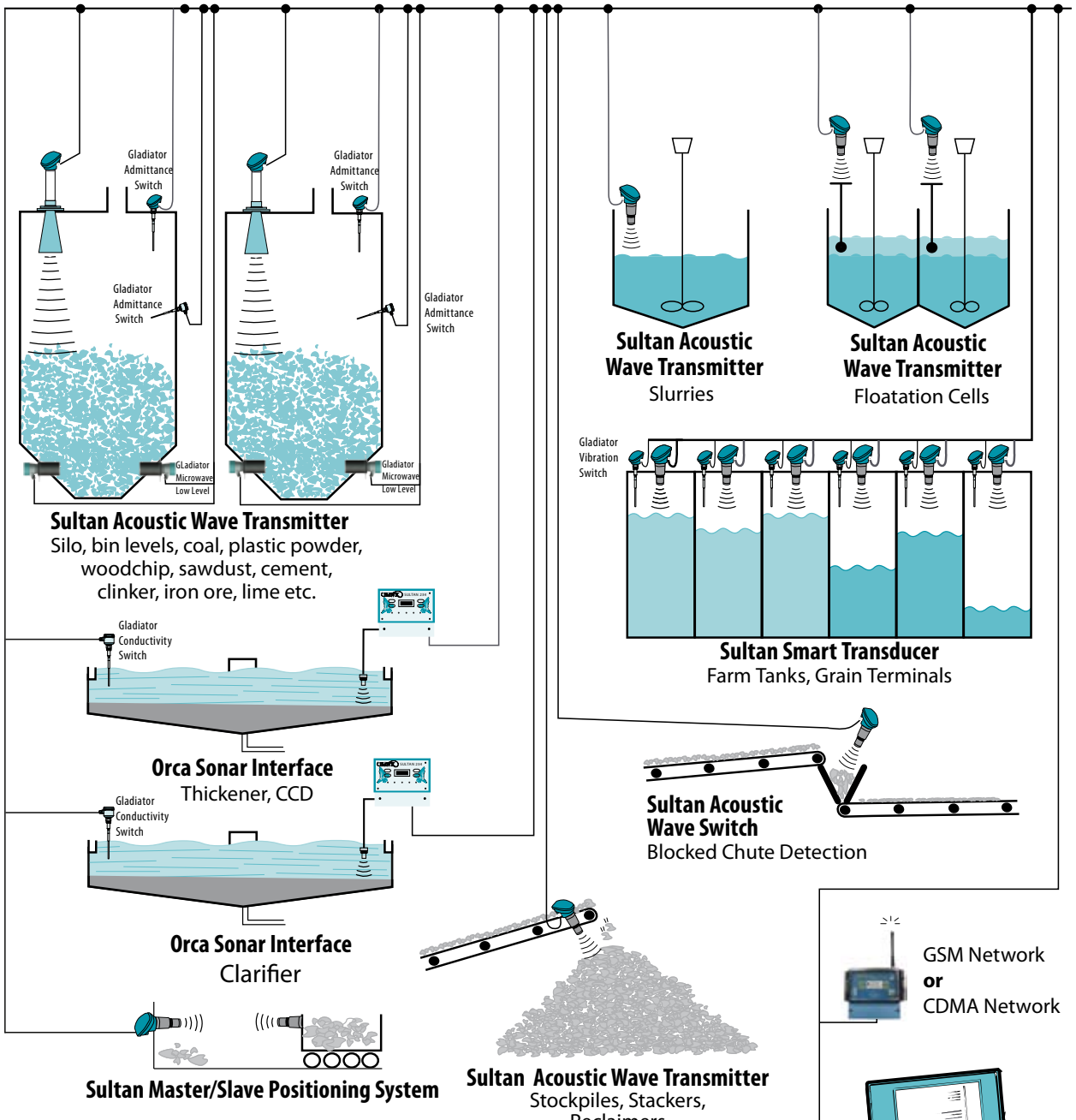
Standard Sender/ Receiver Flange





High Power Sender/ Receiver or SRS Flange

Multidrop Connections



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.

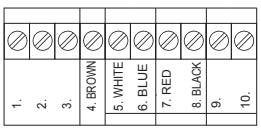
(Limited Modbus query rate for Switches only)

Remote System Connection - Hawk Supplied Cable

The black wire of Hawk supplied cable comes with one end GND and the other GND/SHLD together.
The GND/SHLD end is a larger cable which has been heat shrunk. The GND only end is the same size as the other coloured cables.
The GND/SHLD end must be connected to the amplifier and the GND end to the sender/receiver.

Remote Receiver

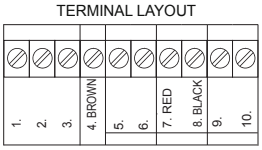
TERMINAL LAYOUT



Terminals 1, 2, 3, 9, 10 not used

Remote Sender

TERMINAL LAYOUT



Terminals 1, 2, 3, 5, 6, 9, 10 not used

Gladiator Remote Amplifier

**Ground the housing to vessel, if vessel is metallic. Ground the housing to plant ground, if vessel is non-metallic.

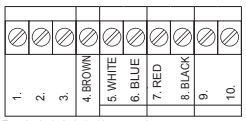
Relay 1 - Output Relay
Relay 2 - FailSafe Relay

Note: AC power terminals may only be used when universal AC power supply option has been selected - see part numbers - AC terminals have no function in products without universal AC power option.

Remote System Connection - Customer Supplied Cable

Remote Receiver

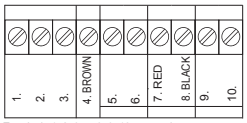
TERMINAL LAYOUT



Terminals 1, 2, 3, 9, 10 not used

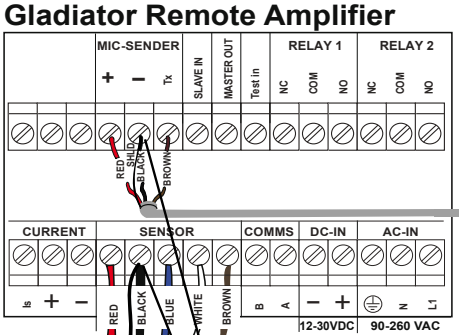
Remote Sender

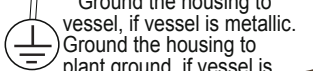
TERMINAL LAYOUT

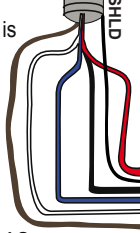


Terminals 1, 2, 3, 5, 6, 9, 10 not used

Gladiator Remote Amplifier







Relay 1 - Output Relay
Relay 2 - FailSafe Relay

Connect **BOTH GND AND SHIELD** to 'black' terminal at Amplifier end only

Alternate cable type between Amplifier and Sensors
6 or 8 conductor (5 used) shielded twisted pair instrument cable.
Conductor size dependent on cable length.
BELDEN 3120A, DEKORON or equivalent.
Max: BELDEN 3120A = 500m (1640 ft). 3 pairs, 1 conductor not used.
Max: DEKORON IED183AA004 = 350m (1150 ft). 4 pairs, 3 conductors not used.

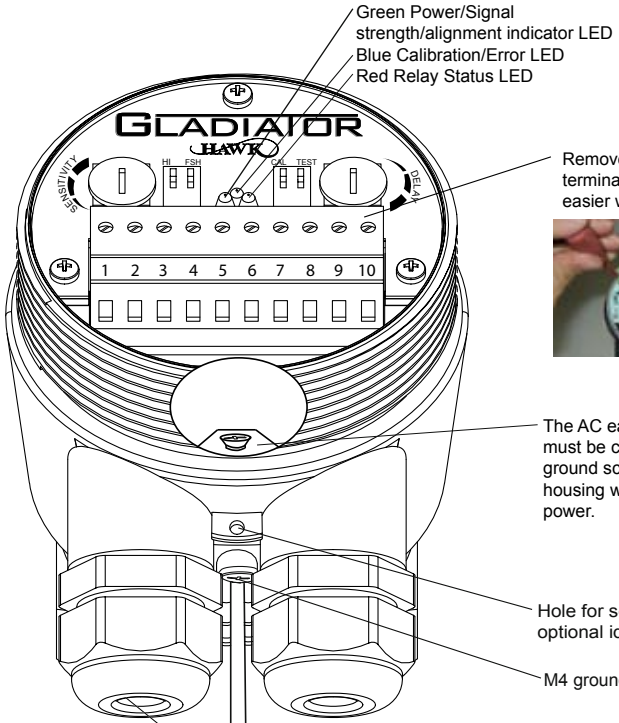
Alternate Cable Colour Equivalents

	Hawk	Belden 3120A	Dekoron
Pair 1	Red Black	Red Black	White 1 Black 1
Pair 2	White Blue	Yellow Green	White 2 Black 2
Pair 3	Brown ---	Brown White (not used)	White 3 Black 3 (not used)

Pair 4 - not used

Smart Integral System Connection

Receiver



Remove Plug-In terminal block for easier wiring.

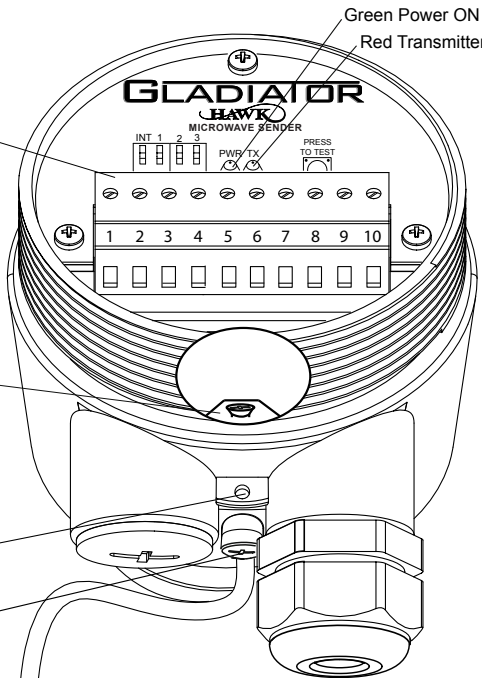
The AC earth/ground cable must be connected to the ground screw inside the housing when using AC power.

Hole for securing of optional identification tag

M4 grounding screw

If only one cable is used for both power and output signal, then the second entry port must be plugged or blinded. Every Smart receiver is supplied with two M20 glands (or 3/4"NPT adaptors) mounted on the unit and one blind plug loose.

Sender



**Ground the housing to vessel, if vessel is metallic. Ground the housing to plant ground, if vessel is non-metallic.

RECEIVER TERMINAL LAYOUT

RELAY				COMMS		DC-IN		AC-IN	
NC	COM	NO	Test	A	B	+	-	N	L1
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
				RS 485		12-30VDC		80-260VAC	

SENDER TERMINAL LAYOUT

						DC-IN		AC-IN	
						+	-	N	L1
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
						12-30VDC		80-260VAC	

Terminals 1, 2, 3, 4, 5, 6 not used

Note: AC power terminals may only be used when universal AC power supply option has been selected - see part numbers - AC terminals have no function in products without universial AC power option.

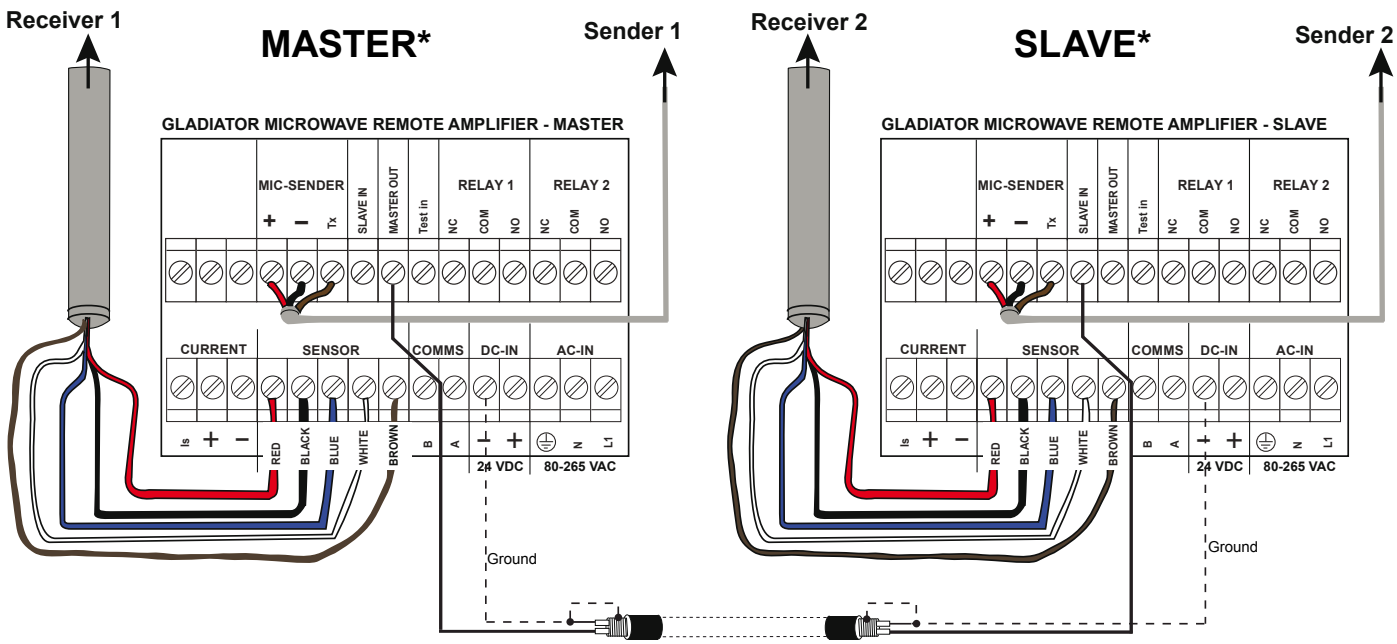
Cross-Talk Prevention - Sequencing two remote systems

To prevent possible interference between two remote beam blockage detection systems mounted in close proximity, one system must be selected as a 'Master' and the other as a 'Slave'. The Operation Mode selection can be found in the advanced menu of the remote amplifier for each system.

Operation Mode has 3 selections:
1. Remote - normal unsequenced (single system) operation
2. Master - controlling system in a sequenced group of two units
3. Slave - controlled system in a sequenced group of two units

Additional wiring must be installed between the two amplifiers as shown below. A connection must be made between the 'Master Out' terminal of the amplifier selected to operate as the Master and 'Slave In' terminal of the unit selected to operate as the Slave. The cable shield and/or a second connection must link the DC-IN '-' terminals of the two units.

- Smart integral systems are not intended to be sequenced.
- If systems are to be installed in close proximity to one another, remote types should be used to allow sequencing.
- Sequencing of more than 2 systems near one another must be done using a GMSEQ sequencing unit connected to all systems as described in the manual.



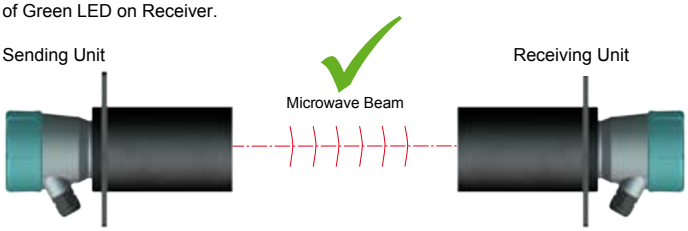
* Software selected

Mounting Examples

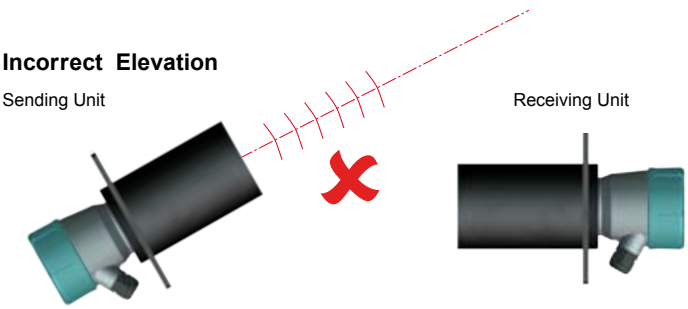
Correct Mounting Angle

Correct Elevation

Maximum Signal Strength to Receiver is indicated by maximum brightness of Green LED on Receiver.

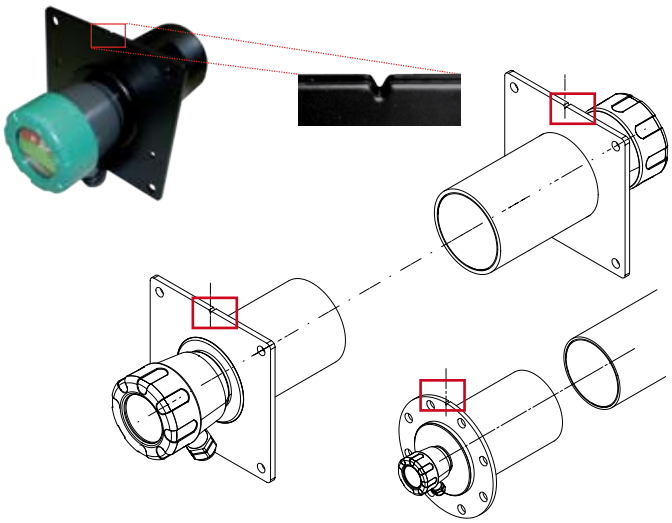


Incorrect Elevation

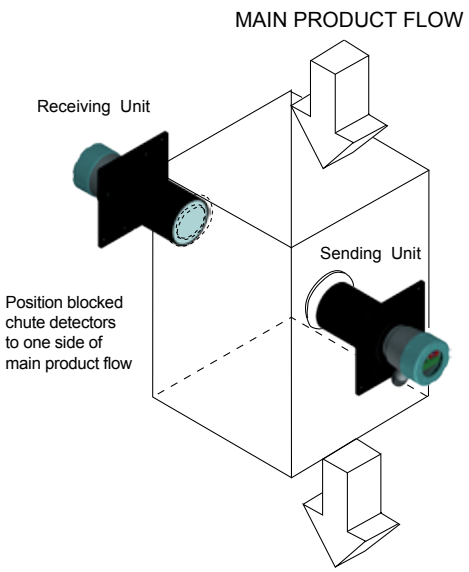


Align Sender and Receiver

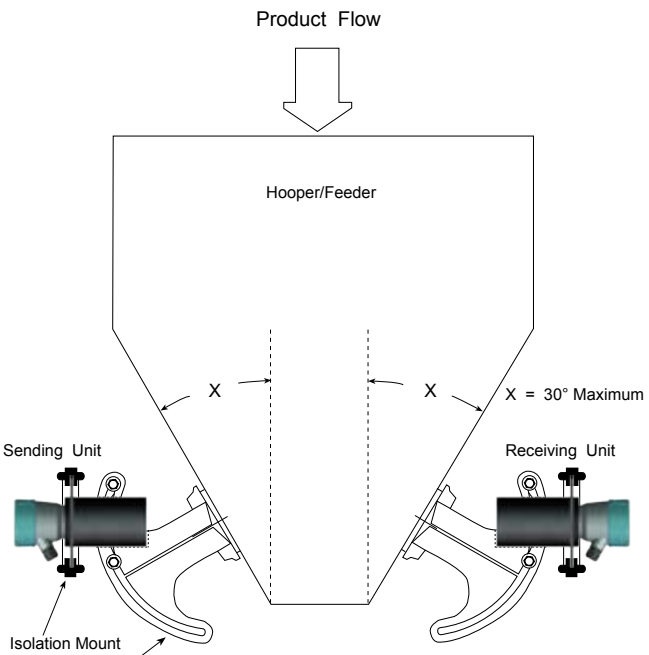
Rotate so that Visual Alignment Guide is in the same position on both sender and receiver.



Blocked Chute Mounting

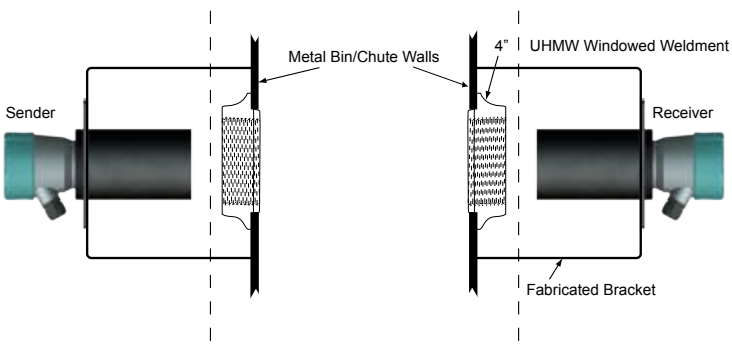


Installation with Adjustable Mounting



Adjustable microwave mounting bracket
MA-12 or MA-13 welded to vessel wall.
UHMW (MA-12) or Teflon (MA-13) Window.

Mounting with Windowed Weldments



Housing can be rotated within 200° after the mounting thread is tightened, to allow cable entries to face downwards or allow optimal cable clearance.

Remote Version

Remote Amplifier

GSA Remote Gladiator System Amplifier

Housing
S Standard polycarbonate electronics housing

Power Supply
B 24 Vdc standard (12-30Vdc)
C 48 VDC
U Universal AC power supply (90-260 VAC input) and 12-30Vdc

Output Options
S Switch. 1 level relay, 1 failsafe relay, with Modbus
I HART Isolated. 1 level relay, 1 failsafe relay
D Devicenet. 1 level relay, 1 failsafe relay
P Profibus DP. 1 level relay, 1 failsafe relay
Z Special Request

GSA	S	U	S

Remote Sender/Receiver

GMSB Gladiator Microwave Sender
GMSHB Gladiator Microwave Sender High Power
GMRR Gladiator Microwave Remote Receiver
GMRRH Gladiator Microwave Remote Receiver High Power
GMRRS Gladiator Microwave Remote Receiver with Signal Recognition Stability

Frequency
1 10 GHz

Transducer Facing Material Selection
0 UHMW Polyethylene
1 PTFE Teflon
W Wave guide connector

Transducer Housing Material
1 Aluminium / Mild Steel (Standard)
2 Full stainless steel GMSB or GMRR
3 Full stainless steel GMSHB/GMRRH or GMRRS

Output Option
X Not required - Outputs generated from GSA amplifier

Approval Standard
X Standard CE approved
A22 ATEX Dust (Grp II Cat 3 D T6 IP67)

GMSB	1	0	1	X	X

* Connection cable is not included. Please see cabling Accessories section

Smart Integral Version

GMS Gladiator Microwave Sender
GMSH Gladiator Microwave Sender High Power
GMSR Gladiator Microwave Smart (Integral) Receiver
GMSRH Gladiator Microwave Smart (Integral) Receiver High Power
GMSRS Gladiator Microwave Smart (Integral) Receiver with Signal Recognition Stability

Power Supply
B 24Vdc standard (12-30 Vdc)
C 48Vdc
U Universal power supply (80-260 VAC input) and 12-30Vdc

Frequency
1 10 GHz

Transducer Facing Material Selection
0 UHMW Polyethylene
1 PTFE Teflon
W Wave guide connector

Transducer Housing Material
1 Aluminium / Mild Steel (Standard)
2 Full stainless steel GMS or GMSR
3 Full stainless steel GMSH/GMSRH or GMSRS

Output Option
X Not required (Sender units)
S Switch, 1 output relay with Modbus (Receiver units)
Z Special request

Approval Standard
X Standard CE approved
A22 ATEX Dust (Grp II Cat 3 D T6 IP67)

GMSR	B	1	0	1	S	X

Accessories

CA-GMR Pre-cut cable for remote sender or receiver
10 10m cable each
20 20m cable each
30 30m cable each
50 50m cable each
100 100m cable each

CA-GMR	10

MA Mounting Accessory

Type

0	3” Weldment, each
1	2” Glass window each
3	3” UHMW Windows & Weldment each
4	4” UHMW Windows & Weldment each
5	6” UHMW Windows & Weldment each
6	3” PTFE Windows & Weldment each
7	4” PTFE Windows & Weldment each
8	6” PTFE Windows & Weldment each
9	9’ x 4,5” Fire brick each
10	6” x 4” ceramic brick each
11	Shock insulation mounts pack of 4
12	Adjustable mounting UHMW windows each
13	Adjustable mounting PTFE windows each
14	Remote wave guide Assembly
15	Mounting Flange pipe
16	3” Ceramic window & weldment each
17	4” Ceramic window & 4” weldment each
18	4” Microwave Weldment only each
19	3” Stainless steel Weldment only for UHMW each
20	4” UHMW Windows only each
21	3” UHMW Windows only each
22	4” Stainless steel Weldment only for UHMW each

MA	4

GMSEQ Gladiator Microwave Sequencer

Power Supply
B 24Vdc standard (12-30 Vdc)
C 48Vdc
U Universal power supply (90-260 VAC input) and 12-30Vdc

GMSEQ	U

HawkLink GSM/CDMA

Model
HL HawkLink

Type
R Remote stand alone system c/w antenna

Power Supply
B 12-30VDC
U Universal 90-260VAC / 12-30VDC

Network Type
G6 3G/GPRS/TCP and CSD compatible, Quadband capability

Simcard
S3 Australian Simcard expires after 3 month
S12 Australian Simcard expires after 12 month
X Not required (customer supplied data enabled simcard)

HL	R	U	G6	S3

Specifications

Operating Voltage
- Smart 7-30Vdc/Remote 12-30Vdc (residual ripple no greater than 100mV)
- Smart 80-260Vac/Remote 90-260Vac 50/60Hz

Power Consumption
- <0.8W @ 24Vdc
- <5VA @ 240Vac
- <3VA @ 115Vac

Communications
- GosHawk, Modbus
- Remote version also with HART, Profibus DP and DeviceNet (options)
- Multidrop mode can address 1-250 units over 4 wires

Relay Output: (1) SMART (2) Remote
- Form 'C' (SPDT) contacts, rated 5A at 240Vac resistive
- Remote fail-safe test facility for one relay.

Operating Temperature
- Remote electronics -40°C (-40°F) to 80°C (176°F)
- Smart Units -30°C (-20°F) to 65°C (150°F)*
- Remote Sensors -30°C (-20°F) to 65°C (150°F)*

*For higher temperature applications, remote mounting with refractory windows is necessary

Power Density
- Rated from emitter to receiver at approximately 20μW/cm²
- Complies with FCC Title Rules Part 15 (Beam Blockage)
- Caution sign posting not required

Transmitted Signal
- Frequency: 10.525GHz
- Average Power Density: 20μW/cm² typical
- Linearly Polarised Field
- Beam angle (3db) approximately 30º (10GHz)

Fail-Safe
- Selectable - presence or absence of material
- High level fail-safe: relay is activated when material is present.
- Low level fail-safe: relay is activated when no material is present.

Range
- Maximum range under ideal conditions: 200m (656ft)
- Minimum range under ideal conditions: 10cm (4 inches)

Note: Minimum ranges are dependent on application conductivity

Sender/Receiver to Amplifier Separation
- Up to 500m (1640ft) using specified extension cable

Alternate cable type between Amplifier and Sensors
- 6 or 8 conductor (5 used) shielded twisted pair instrument cable. Conductor size dependent on cable length.

BELDEN 3120A, DEKORON or equivalent.
Max: BELDEN 3120A = 500m (1640 ft). 3 pairs, 1 conductor not used.
Max: DEKORON IED183AA004 = 350m (1150 ft). 4 pairs, 3 conductors not used.

Maximum Operating Pressure
- 2 BAR

Display (Remote version only)
- 2 line x 12 character alphanumeric LCD
- Backlight standard

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

Enclosure Sealing
- Smart Sensors IP67
- Remote Electronics IP65 (Nema 4x)
- Remote Sensors IP67

Cable Entries

Remote Sensors
- 1 x M20 Gland/3/4" NPTF threaded adaptor

Remote Amplifier
- 4 x 20mm (0.8"), 1 x 16mm (0.6") knock outs.

Smart Integral Units
- 2 x M20 Glands/ 3/4" NPTF threaded adaptors

Mounting
- 3" male NPT thread or four 10mm (0.4") holes in flange on standard units or 6" ANSI flange on high power/SRS units
- 3" weldments for standard mounting on vessel wall
- Flange for mounting separate from vessel wall - isolation shock mounts are available
- 4" or 6" Weldments with PTFE (teflon) or UHMW windows
- Ceramic window assemblies
- Firebrick window assemblies available on custom basis
- 2" NPT sight glass window
- Waveguides - custom assemblies available for high temperature and limited access applications

Remote Test Input

Press to test (used to check for malfunction of unit from remote position, PLC, SCADA etc)

Additional product warranty and application guarantees upon request.

Technical data subject to change without notice.

Contact

Hawk Measurement Systems (Head Office)
15-17 Maurice Court
Nunawading VIC 3131
Australia
Phone: +61 3 9873 4750
Fax: +61 3 9873 4538
info@hawk.com.au

Hawk Measurement
7 River Street
Middleton, MA 01949
USA
Phone: +1 888 HAWKLEVEL (1-888-429-5538)
Phone: +1 978 304 3000
Fax: +1 978 304 1462
info@hawkmeasure.com

Represented by:

For more information and global representatives: www.hawkmeasure.com

Rev 1.4 Sept 2011