

A Higher Level of Performance



Data Sheet

G1

Microwave Switch Series

Beam Blockage Detection
Circular Polarisation



For more information, please visit >
www.hawkmeasure.com

Overview

G1 Microwave Switch Series



Principle of Operation

A high power circular polarized Microwave pulse is emitted from the Sending unit to the Receiving unit in a transmission chain of approximately 100 pulses per second. If the path between the Sender and Receiver is blocked by any object or material which absorbs or reflects microwave energy the Receiving unit will no longer detect the complete transmission chain and indicate via Relay for automatic indication and process control requirements.

Typical Uses

- Blocked chute detection
- Nucleonic switch replacement
- High level alarm / Low level alarm
- Truck / machine detection.

Function

The Gladiator Microwave Switch can be used for blockage detection, barrier detection, machine detection and point level measurement, and detection of objects or material between two points.

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

- State of the art circular polarisation
- Simple sensitivity adjustment and calibration
- Theoretical range up to 300m (984 ft)
- Simple '1-minute' setup application presets
- Relay outputs: Integral (1 + failsafe)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Remote 3G Hawklink connection option
- Bright visual status indication on sensors
- Independent housing alignment after mounting sensor.

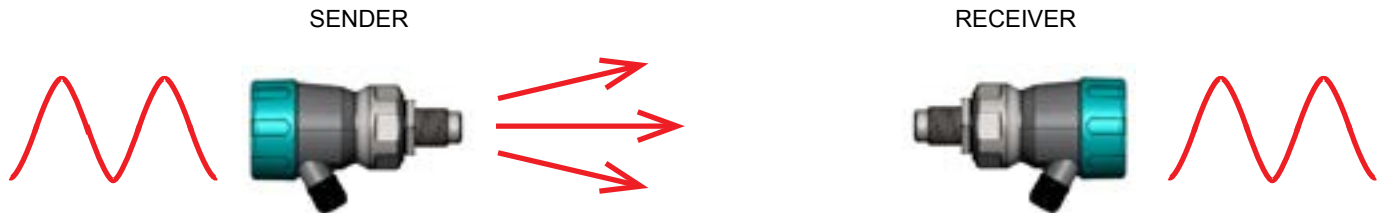
Linear vs Circular Polarisation

G1 Microwave Switch Series

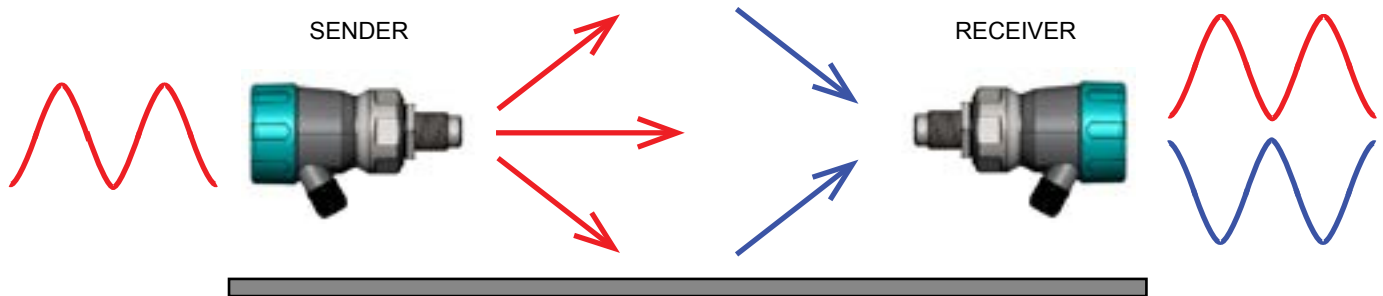


Previous Gladiator Microwave - Linear Polarisation

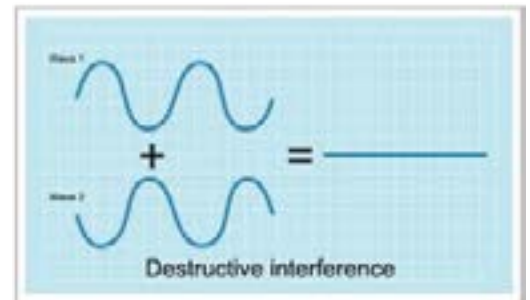
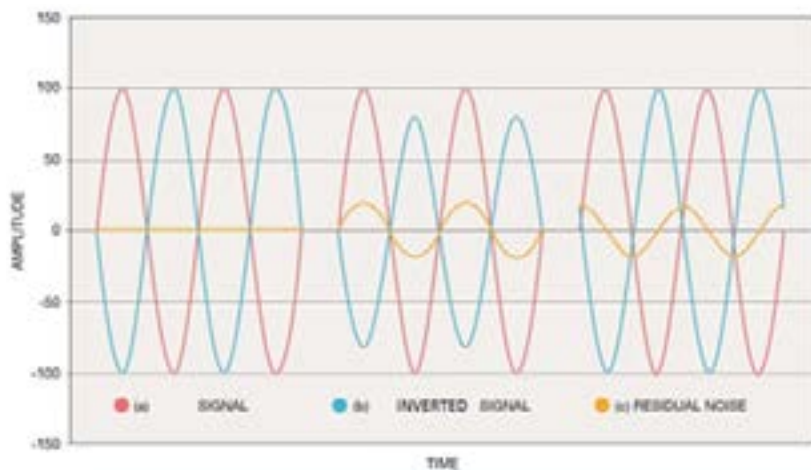
- Maximum Receiver Gain: 5000
- Maximum Distance : 100m
- Beam Angle: 40°



INTERFERENCE FROM CHUTE WALLS OR BOOM / STRUCTURE
 $Rx \text{ Pulse} = Tx \text{ Pulse} - \text{Inverted Pulse}$



When a microwave transmitted signal comes in contact with an object, it will reflect. The amount of reflection and phase change depends on the objects dielectric constant. A linear receiver is not able to differentiate between the direct and the reflected signals; hence it will receive both and sum of the result is likely to be a smaller signal or worst-case no signal at all.



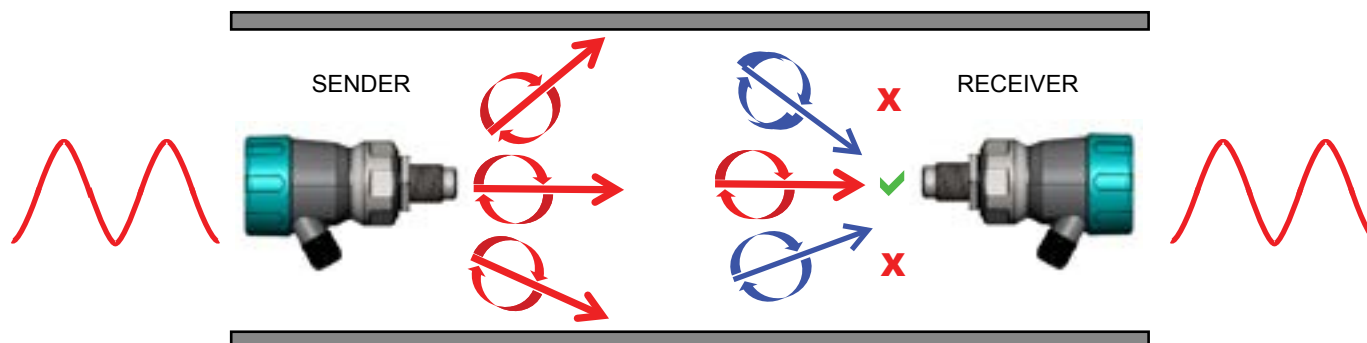
Linear vs Circular Polarisation

G1 Microwave Switch Series



G1 Microwave - Circular Polarisation

- Maximum Receiver Gain: 90,000
- Maximum Distance : 300m
- Beam Angle: 50°



Circular polarization is either right handed or left handed. The HAWK Generation 3 system is right hand circular polarized. When a Circular polarized microwave transmitted signal comes in contact with an object it will reflect a left hand circular polarized transmitted signal, will then change to right hand circular polarized signal on the next reflection and vice versa with every reflection. If it is a single or odd number of reflections it will be a left hand polarized signal and if it is a two or even number of reflection then it will be a right hand polarized signal. The amount of reflection and phase change depends on the objects dielectric constant.

A HAWK Generation 3 receiver is designed to only receive a right hand circular polarized signal which means single or odd number of reflections (left hand circular polarized signals) will be ignored by the microwave receiver.

The only time a circular polarized system can be affected is when two or even numbers of reflection occur where the time delay or phase shift will start to cancel part of the signal. Due to multiple reflections, the amount of energy is smaller compared to the direct signal. Hence a circular polarized system will receive more signal than a linear polarized system, reducing the possibility of false trips.

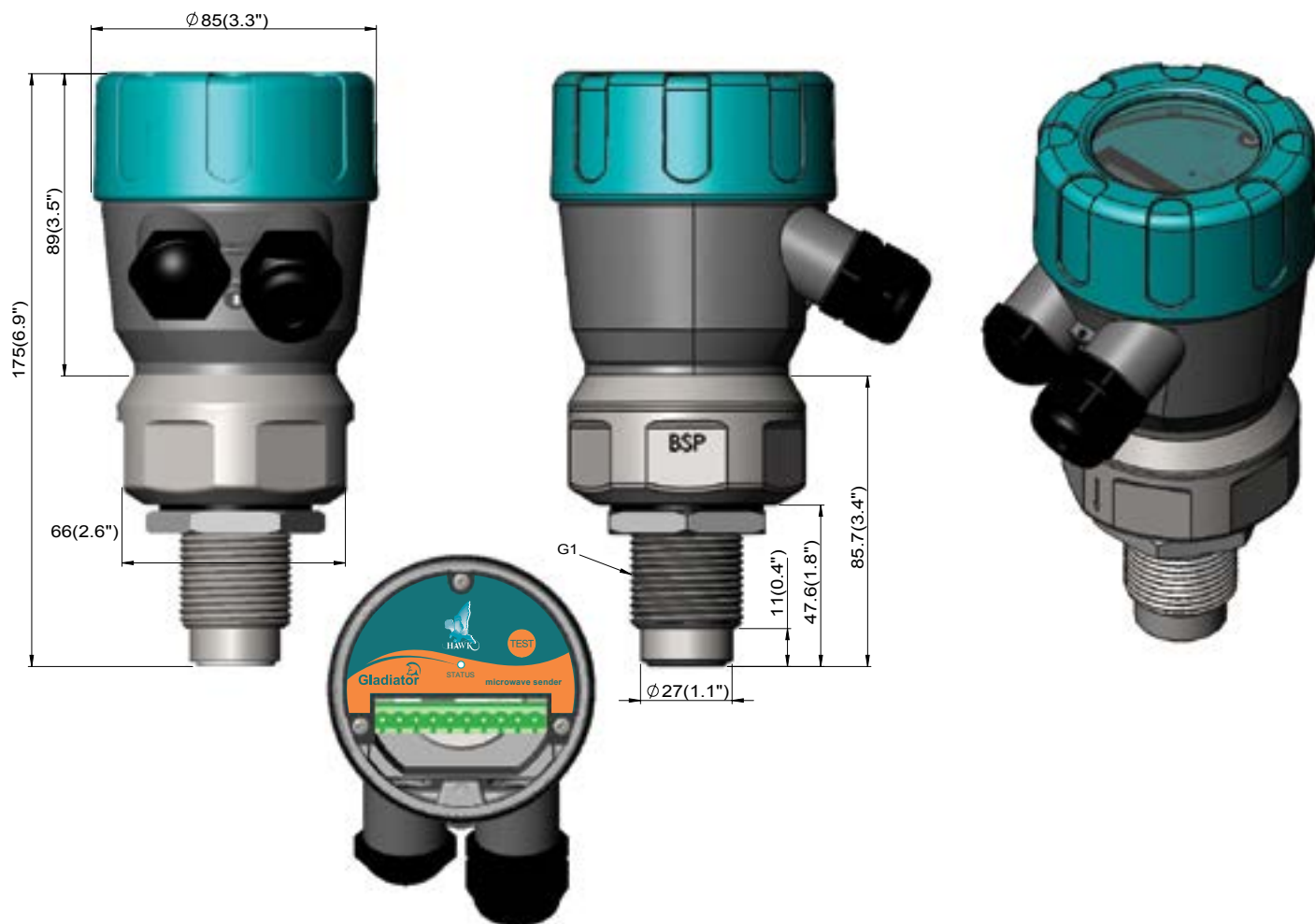
Dimensions

G1 Microwave Switch Series



Microwave System

1" BSP or 1" NPT thread types available





Weldment / Couplings with Windows

The weldment / couplings are designed to be welded into an appropriately sized hole in the vessel or application wall. A matching UHMW high wear window is then threaded into the weldment / coupling to act as a seal for the application.

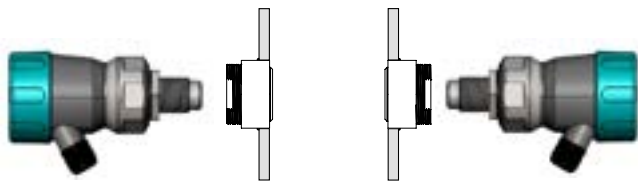
This typical installation isolates the Microwave hardware from coming into contact with any damaging materials and allows simple maintenance or replacement of units without having to unseal the process / application.

The Microwave transmission will pass directly through plastics to measure the material in the process.

MA2 - 2" Weldment / coupling with UHMW windows

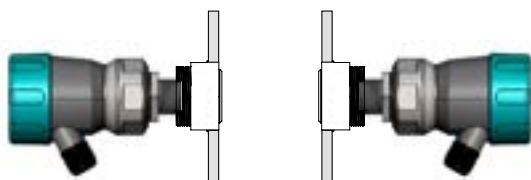
Isolated from process with Weldment / Coupling and window

Mount maximum 100mm (4") back from Window.



Isolated from process with Weldment / Coupling and window

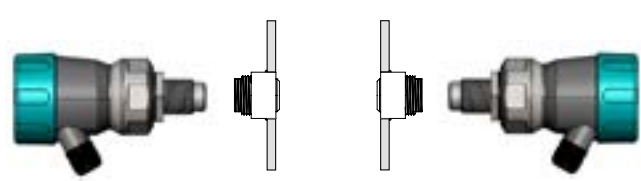
Mounted to MA2-UW threaded window



MA1 - 1" Weldment / coupling with UHMW window

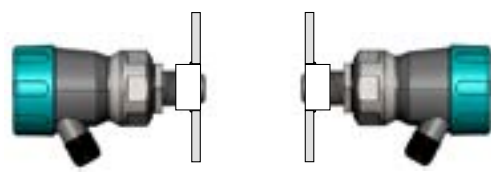
Isolated from process with Weldment / Coupling and window

Mount maximum 100mm (4") back from Window.



Sensing element within process

Mounted to MA1-WC threaded weldment / coupling



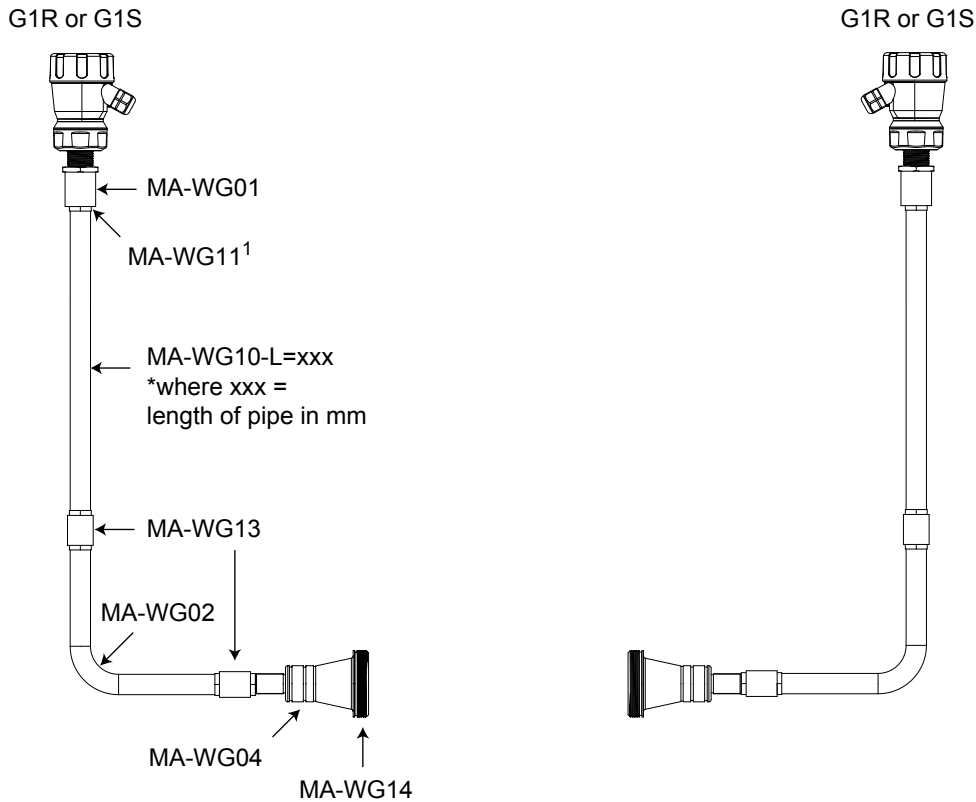


Waveguides

System with Waveguide extensions for remote mounting / signal transmission.

Waveguides can be used for difficult to access areas or to isolate the electronics from high temperature or non-compatible processes.

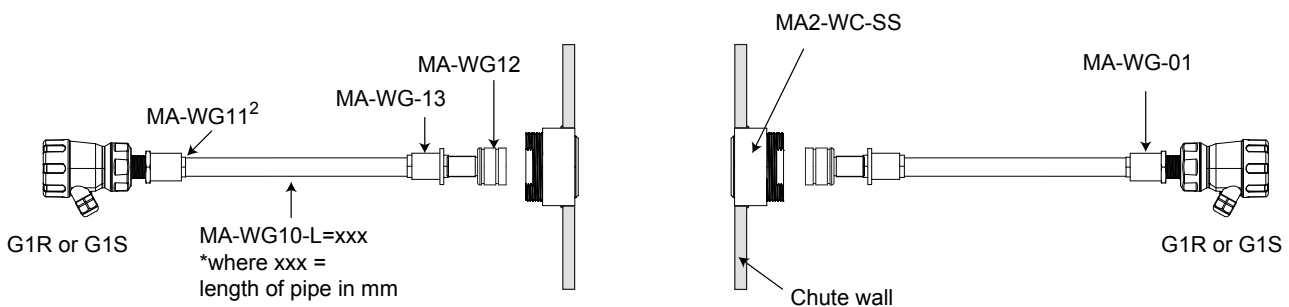
For further information on Waveguides see G1 Waveguide parts and assembly guide document available at <http://www.hawkmeasure.com>.



¹Displayed drawing includes qty 5 of MA-WG11 locking nut per side

Mounting Example

System with Waveguide extensions with MA2-WC-SS window and weldment/coupling application seal.



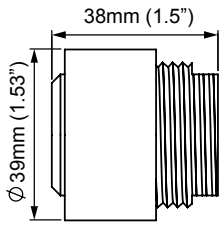
²Displayed drawing includes qty 3 of MA-WG11 locking nut per side



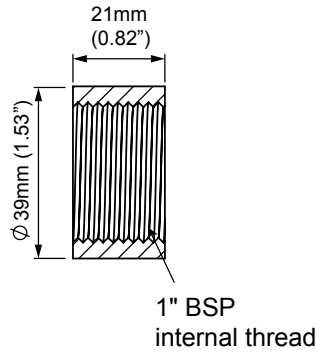
Mounting Accessories

Weldment / Couplings with Window for application seal

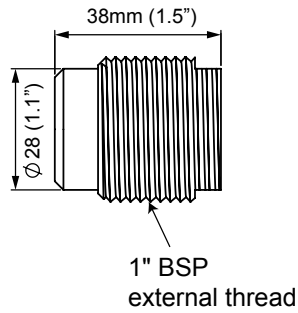
MA1
(consists of MA1-WC
and MA1-UW)



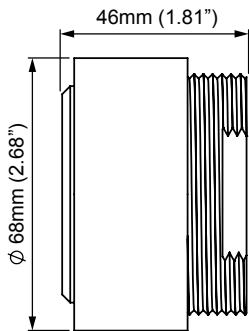
MA1-WC
Weldment / Coupling



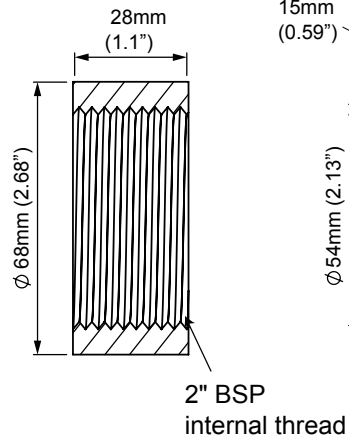
MA1-UW
UHMW Window



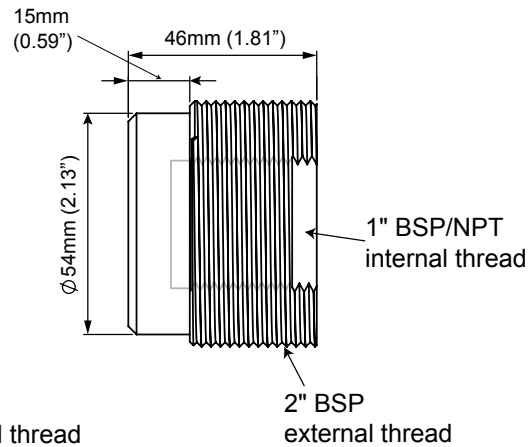
MA2
(consists of MA2-WC
and MA2-UW)



MA2-WC
Weldment / Coupling



MA2-UW
UHMW Window



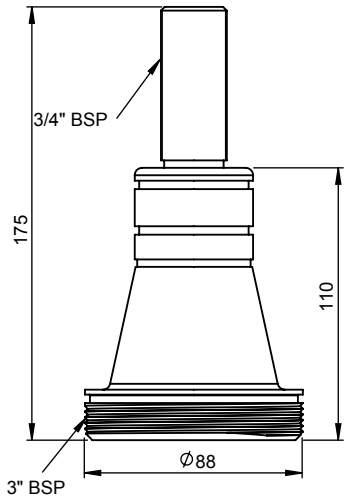
Dimensions

G1 Microwave Switch Series

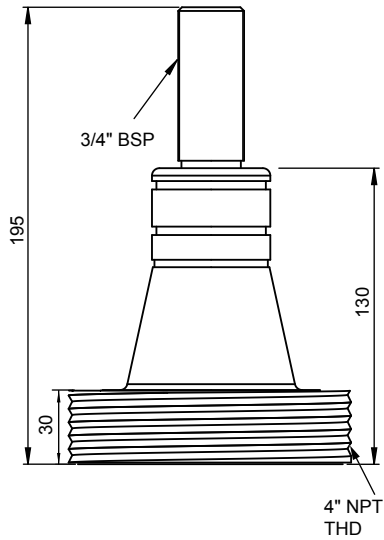


Waveguides and Waveguide Accessories

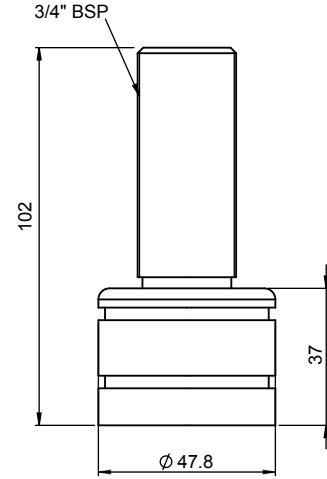
MA-WG04



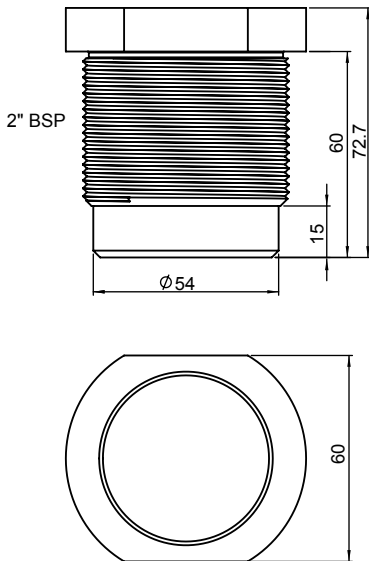
MA-WG04 with MA-WG14 window



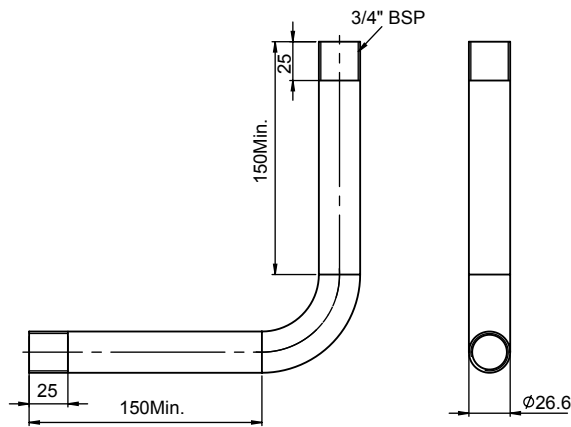
MA-WG03



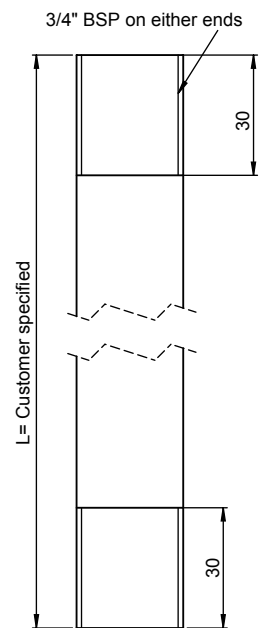
MA-WG12



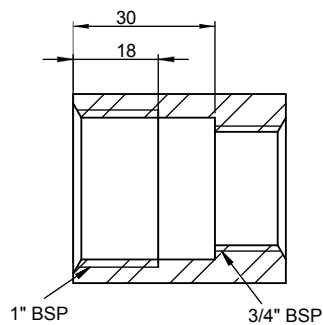
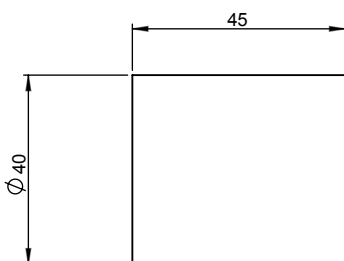
MA-WG02



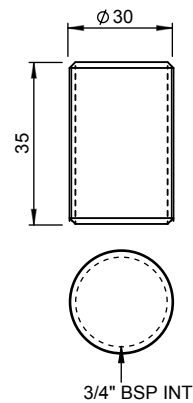
MA-WG12L=xxx



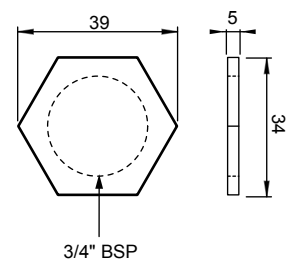
MA-WG01



MA-WG-13

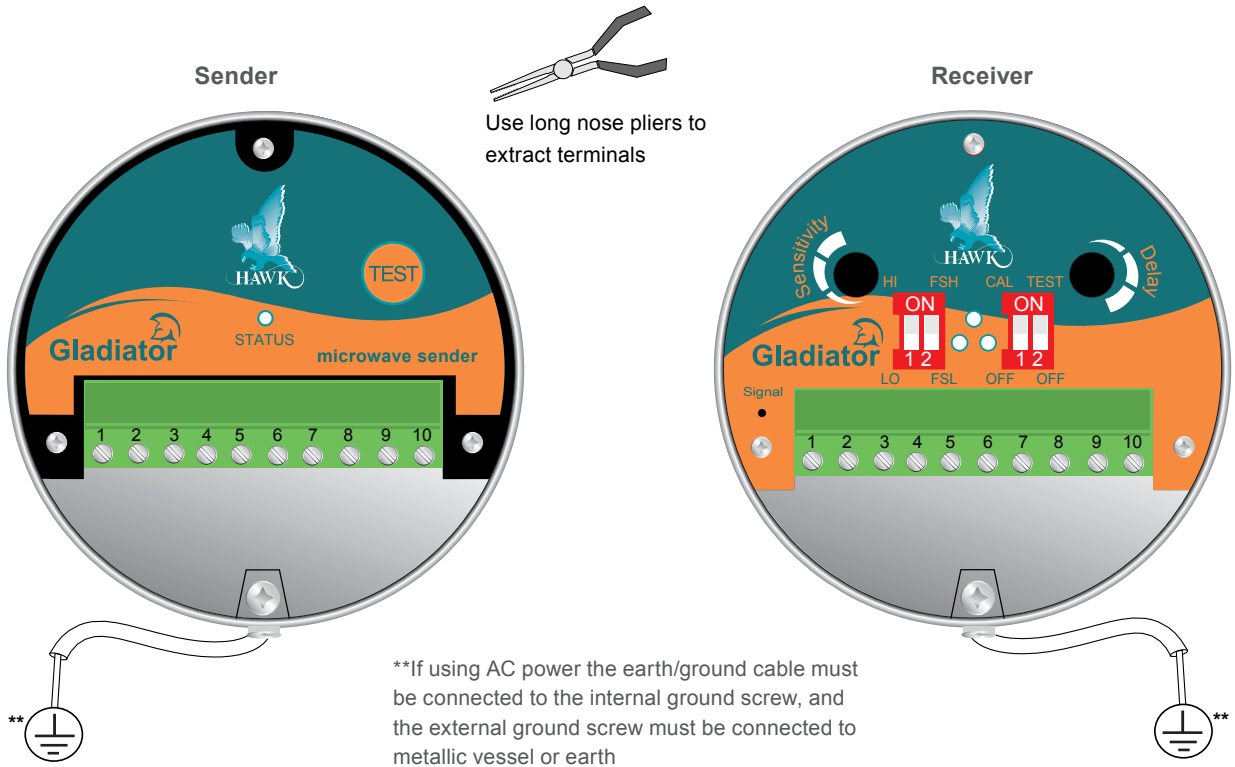


MA-WG11



Wiring

G1 Microwave Switch Series



SENDER TERMINAL LAYOUT

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

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

RECEIVER TERMINAL LAYOUT

RELAY				COMMS		DC-IN		AC-IN	
1. NC	2. COM	3. NO	4. Test	5. A	6. B	+	-	N	L1
				RS 485 Modbus D0 D1		12-30VDC		80-260VAC	

Sender

Status LED

Green when powered
Blinks while working correctly
Solid while not transmitting

TEST button

Press and hold to test level relay action

Receiver

Status LED

Green when powered
High illumination = strong signal
Low illumination = weak signal

Signal Contact

Signal can be read with voltmeter across Signal contact point and earth screw (or other ground reference)

2.4-2.5V is full signal. 0V is no signal



G1 Series

Model

G1S Gladiator 1" Microwave Integral Sender

G1R Gladiator 1" Microwave Integral Receiver, 1 Relay with Failsafe

Electronics Housing (Sensor element is 316L with Teflon face)

S Powder Coated Aluminium

C 316L Stainless Steel

Power Supply

B 12-30VDC

U 12-30VDC and 80-260VAC

Mounting Thread

TB 1" BSP

TN 1" NPT

Approvals

X Not Required

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

G1S C B TB X

Mounting Accessories

MA

1	1" UHMW Window & mild steel weldment/coupling each
1-SS	1" UHMW Window & 316L stainless steel weldment/coupling each
1-UW	1" UHMW Window each
1-WC	1" mild steel weldment/coupling each
1-WC-SS	1" 316L stainless steel weldment/coupling each
2	2" UHMW Window & mild steel weldment/coupling each
2-SS	2" UHMW Window & 316L stainless steel weldment/coupling each
2-UW	2" UHMW Window each
2-WC	2" mild steel weldment/coupling each
2-WC-SS	2" 316L stainless steel weldment/coupling each

MA 2

Additional mounting accessory variants and materials including high temperature ceramics are available.

See Gladiator Gen 3 Microwave datasheet available at www.hawkmeasure.com

Waveguides & Waveguide accessories

MA-WG

01	316L Threaded connector for Sender / Receiver
02	316L 90deg bend pipe (150mm + 150mm). Includes qty 2 of MA-WG11
03	316L 1-1/2" Wave guide horn. Includes qty 1 of MA-WG13
04	316L 3" Wave guide horn assembly. Includes qty 1 of MA-WG13
10-L=1	316L Straight pipe extension ¹ L= length in mm. Includes qty 2 of MA-WG11
11	316L Locking nut
12	2" BSP teflon plug with socket to match MA-WG03 horn
13	316L Pipe to pipe connector coupling
14	4" Teflon window to match MA-WG04 Horn. Fits into MA18 weldment.

MA-WG 01

Specifications

G1 Microwave Switch Series



Operating Voltage

- 12-30VDC (residual ripple no greater than 100mV)
- 80-260VAC.

Power Consumption

- <0.8W @ 24VDC
- <5VA @ 240VAC
- <3VA @ 115VAC.

Communications

- GosHawk, Modbus
- Multidrop mode can address 1-250 units over 4 wires.

Relay Output

- Form 'C' (SPDT) contacts, rated 5A at 240VAC resistive
- Remote fail-safe test facility for one relay.

Operating Temperature

- Integral Units -30°C (-20°F) to 65°C (150°F)*.
- *For higher temperature applications, remote waveguide mounting with appropriate 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

- Circular polarisation polarity
- Frequency: 10.525GHz
- Power: +14dBm / 25mW
- Sensitivity -88dBm
- Beam width 50°

Specifications model dependant

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

- Theoretical Maximum range: 300m (984 ft)
- Recommended Range (Chutes) 15m
- Recommended Range (Object detection) 50m
- Minimum range under ideal conditions: 10cm (4 inches).

Note: Minimum ranges are dependent on application conductivity.

Maximum Operating Pressure

- 2 BAR.

Enclosure Sealing

- Integral Sensors IP67.

Wetted Materials

- Sensing element housing: 316L stainless steel
- Sensing element face: Teflon.

Cable Entries

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

Mounting

- 1" NTP
- 1" BSP.

Remote Test Input

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

Weight

- G1R 1kg
- G1S 1kg.

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

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