Data Sheet

Gladiator
Gen 3 Microwave Switch Series
Beam Blockage Detection
Circular Polarisation

For more information, please visit>
www.hawkmeasure.com
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 or 4-20mA output the change for automatic indication and process control requirements.

Typical Uses

• Blocked chute detection
• Collision detection
• Stacker / Reclaimer protection
• Shiploader protection
• 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, collision detection for protection, 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 transmission
• Backwards compatible with all Gladiator Microwave generations
• IECEx ta tb IIIC T* Da Db
• LCD push button setup / diagnostics on remote amplifier
• Simple sensitivity adjustment and calibration on Integral system
• Ranges up to 1200 meters (3937 ft)
• Simple ‘1-minute’ setup application pre-sets
• Remote sensor or Integral ‘all in one’ types
• Relay outputs: Integral (1 + failsafe) Remote (2)
• Remote test function
• Adjustable ON and OFF delays (0-20 sec)
• Remote 3G HAWKlink 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.

*Consult Safety Instructions
**Typical Applications**

Gladiator Gen 3 Microwave Switch Series

**Conveyor Protection**

Presence / Absence of material

**Bulk Material Handling**

High / Low blocked chute detection

"Blocked Chute"
Mount Microwave under pulley or out of main system flow
Typical Applications

Gladiator Gen 3 Microwave Switch Series

Stacker / Reclaimer / Boom collision detection

Wagon Detection

Truck Detection

Tip / Overload detection

Tip / Overload detection
Generation 1 Microwave - Linear Polarisation

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

Perfect Condition: Tx Pulse = Rx Pulse

REFLECTIONS FROM CHUTE WALLS OR BOOM
Rx Pulse = Tx Pulse – Reflected 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.
Circular polarization is either right handed or left handed. The HAWK Gen 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 Gen 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.
Remote Microwave System

Remote Amplifier

Remote Sender / Receiver

Integral Sender / Receiver

Mounting Bracket

MA15 / MA25 Focaliser Tube (extension pipe)

MA20-P1

MA12 / MA13 Adjustable Mounting Bracket
MA Series Weldments and Windows (UHMW / PTFE)

**Weldment with UHMW / PTFE Windows**

Weldment is welded to the vessel. Window threads into Weldment

### Weldment / Window Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Size</th>
<th>Window</th>
<th>Weldment</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA0</td>
<td>3&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA3</td>
<td>3&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA4</td>
<td>4&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA5</td>
<td>6&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA6</td>
<td>3&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA7</td>
<td>4&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA8</td>
<td>6&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA18</td>
<td>4&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA19</td>
<td>3&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA20</td>
<td>4&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA21</td>
<td>3&quot;</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MA22</td>
<td>4&quot;</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

### UHMW / PTFE Window

<table>
<thead>
<tr>
<th>Size</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; NPT</td>
<td>28.7 (1.13&quot;)</td>
<td></td>
</tr>
<tr>
<td>4&quot; NPT</td>
<td>35 (1.38&quot;)</td>
<td></td>
</tr>
<tr>
<td>6&quot; NPT</td>
<td>40 (1.57&quot;)</td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

**Gladiator Gen 3 Microwave Switch Series**
Weldment / Window Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Size</th>
<th>Window</th>
<th>Weldment</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA9</td>
<td>Special</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MA10</td>
<td>Special</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MA16</td>
<td>3&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MA17</td>
<td>4&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Weldments and Windows (Ceramic Tile & Firebrick Assemblies)

Weldment with Ceramic Windows
Weldment is welded to the vessel. Window is locked into Weldment with Locking Retainer

Ceramic Tile

Firebrick
**Dimensions**

**Gladiator Microwave Series**

**MD Series Weldments and Windows**

**Weldment with UHMW or PTFE Windows**

The Weldment is welded to the vessel. The Window locks into the weldment using a locking ring.

For Approval Option 2D Installations. Consult Safety Instructions for critical details.

**UHMW / PTFE Window**

**Weldment**

**Assembled Piece**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Window Material</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>P.C.D</th>
<th>No. Holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD3-X</td>
<td>UHMW</td>
<td>122</td>
<td>4.8</td>
<td>93</td>
<td>3.7</td>
<td>77</td>
<td>3.0</td>
<td>115</td>
</tr>
<tr>
<td>MD4-X</td>
<td>UHMW</td>
<td>148</td>
<td>5.8</td>
<td>120</td>
<td>4.7</td>
<td>102</td>
<td>4.0</td>
<td>141</td>
</tr>
<tr>
<td>MD5-X</td>
<td>UHMW</td>
<td>203</td>
<td>8.0</td>
<td>175</td>
<td>6.9</td>
<td>153</td>
<td>6.0</td>
<td>196</td>
</tr>
<tr>
<td>MD6-X</td>
<td>PTFE</td>
<td>122</td>
<td>4.8</td>
<td>93</td>
<td>3.7</td>
<td>77</td>
<td>3.0</td>
<td>115</td>
</tr>
<tr>
<td>MD7-X</td>
<td>PTFE</td>
<td>148</td>
<td>5.8</td>
<td>120</td>
<td>4.7</td>
<td>102</td>
<td>4.0</td>
<td>141</td>
</tr>
<tr>
<td>MD8-X</td>
<td>PTFE</td>
<td>203</td>
<td>8.0</td>
<td>175</td>
<td>6.9</td>
<td>153</td>
<td>6.0</td>
<td>196</td>
</tr>
</tbody>
</table>

**Part No.**

<table>
<thead>
<tr>
<th>Window Material</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>P.C.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD3-X UHMW</td>
<td>89</td>
<td>3.5</td>
<td>76</td>
<td>3.0</td>
</tr>
<tr>
<td>MD4-X UHMW</td>
<td>115</td>
<td>4.5</td>
<td>102</td>
<td>4.0</td>
</tr>
<tr>
<td>MD5-X UHMW</td>
<td>170</td>
<td>6.7</td>
<td>153</td>
<td>6.0</td>
</tr>
<tr>
<td>MD6-X PTFE</td>
<td>89</td>
<td>3.5</td>
<td>76</td>
<td>3.0</td>
</tr>
<tr>
<td>MD7-X PTFE</td>
<td>115</td>
<td>4.5</td>
<td>102</td>
<td>4.0</td>
</tr>
<tr>
<td>MD8-X PTFE</td>
<td>170</td>
<td>6.7</td>
<td>153</td>
<td>6.0</td>
</tr>
</tbody>
</table>

*X = Weldment Material Selection*
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 cables.
- The GND / SHLD end must be connected to the amplifier.

Remote Sender Remote Receiver

Remote Sender

Status LED
- Green when powered
- Blinks while working correctly
- Solid while not transmitting

TEST Button
- Press and hold to test level relay action

Remote 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

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

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**Gladiator Remote Amplifier**

Inputs model dependent

Remote 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

**Ground the housing to vessel if vessel is metallic.**
**Ground the housing to plant ground if vessel is non-metallic.**
Remote System Connection - Customer Supplied Cable

Alternate Cable Colour Equivalents

<table>
<thead>
<tr>
<th>Pairs</th>
<th>HAWK</th>
<th>Belden 3120A</th>
<th>Dekoron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Red</td>
<td>Red</td>
<td>White 1</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>Black</td>
<td>Black 1</td>
</tr>
<tr>
<td>Pair 2</td>
<td>White</td>
<td>Yellow</td>
<td>White 2</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>Green</td>
<td>Black 2</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Brown</td>
<td>Brown (not used)</td>
<td>White 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black (not used)</td>
<td>Black 3 (not used)</td>
</tr>
<tr>
<td>Pair 4</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
</tr>
</tbody>
</table>

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.
**Integral System Connection**

**Remote Sender**

**Status LED**
- Green when powered
- Blinks while working correctly
- Solid while not transmitting

**TEST Button**
- Press and hold to test level relay action

**Integral Receiver**

**Status LED**
- Green LED: Indicates received signal strength
- High illumination = strong signal
- Low illumination = weak signal
- Red LED: Indicates Relay status
- Blue LED: Flashes during calibration. Stays illuminated if calibration fails

**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

**Use long nose pliers to extract terminals**

**SENTER TERMINAL LAYOUT**

<table>
<thead>
<tr>
<th>DC-IN</th>
<th>AC-IN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
<td>+</td>
</tr>
<tr>
<td>8.</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Z</td>
</tr>
<tr>
<td>10.</td>
<td>L1</td>
</tr>
<tr>
<td>12-30VDC</td>
<td>80-260VAC</td>
</tr>
</tbody>
</table>

**RECEIVER TERMINAL LAYOUT**

<table>
<thead>
<tr>
<th>RELAY</th>
<th>COMMS</th>
<th>DC-IN</th>
<th>AC-IN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td>6.</td>
<td>7.</td>
<td>8.</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Z</td>
<td>L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS 485</td>
<td>12-30VDC</td>
<td>80-260VAC</td>
<td></td>
</tr>
</tbody>
</table>

**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.
Cross-Talk Prevention / Sequencer Wiring

- Up to four remote Microwave systems can be set up for anti-crosstalk.
- For two systems, one can be set to operating mode ‘Master’ and the other to operating mode ‘Slave’
- For up to four systems, a dedicated Sequencing control unit must be used with the four systems set to operating mode ‘Slave’

Master / Slave Wiring

Sequencer / Slave Wiring
Remote Version

Remote Amplifier

GSA  Gladiator Amplifier (compatible with all Gladiator products), Modbus

Housing
S  Polycarbonate

Power Supply
B  12-30 VDC
C  36-60VDC
U  12-30VDC and 90-260VAC

Output Options
S  2 Relays (relay 1 primary switch, relay 2 secondary switch OR Failsafe / Cleaner / Maintenance alarm)
X  Option ‘S’ plus 4-20mA output

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

Remote Sender / Receiver

GMSB  Gladiator Microwave Sender
GMRR  Gladiator Microwave Remote Receiver

Frequency
1  10.525 GHz

Facing Material Selection
0  UHMW Polyethylene
1  PTFE Teflon

Housing Material
1  Aluminium / Mild Steel
2  316L Stainless Steel

Output Option
X  Not Required - Outputs generated from GSA amplifier

Approval Standard
X  Not Required
A22  ATEX Grp II Cat 3 GD T85°C IP67 Tamb -40°C to 70°C
2D  Facing Material: 0 (UHMW) IECEx ta tb IIIC T* Da Db Tamb = -30°C to +55°C
Facing Material: 1 (PTFE) IECEx ta tb IIIC T* Da Db Tamb = -30°C to +80°C

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

Lengths above 100m available via special order
**Integral Version**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMS</td>
<td>Gladiator Microwave Sender</td>
</tr>
<tr>
<td>GMSR</td>
<td>Gladiator Microwave Smart (Integral) Receiver</td>
</tr>
<tr>
<td>GMSRQ</td>
<td>Gladiator Microwave Smart (Integral) Receiver with anti-crosstalk Sequenced software. Requires GMSEQ Sequencer</td>
</tr>
</tbody>
</table>

**Power Supply**

- B 12-30 VDC
- U 12-30VDC and 90-260VAC

**Frequency**

- 1 10.525 GHz

**Transducer Facing Material Selection**

- 0 UHMW Polyethylene
- 1 PTFE Teflon

**Transducer Housing Material**

- 1 Aluminium / Mild Steel
- 2 316L Stainless Steel

**Output Option**

- X Not Required for Sender units
- S Switch, 1 output relay with Modbus for Receiver Units only.

**Approval Standard**

- X Not Required
- A22 ATEX Grp II Cat 3 GD T85°C IP67 Tamb -40°C to 70°C
- 2D Facing Material: 0 (UHMW) IECEx ta tb IIIC T* Da Db Tamb = -30°C to +55°C
- Facing Material: 1 (PTFE) IECEx ta tb IIIC T* Da Db Tamb = -30°C to +80°C

*Consult Safety Instructions*

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**Accessories**

**Microwave Sequencer**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMSEQ</td>
<td>Gladiator Microwave Sequencer</td>
</tr>
</tbody>
</table>

**Power Supply**

- B 12-30VDC
- C 36-60VDC
- U 12-30VDC and 90-260VAC

**HAWKLink Modem**

**Model**

- HL HAWKLink

**Type**

- R Remote stand alone system

**Power Supply**

- B 12-30VDC
- U 12-30VDC and 90-260VAC

**Network Type**

- G3 3G

**Simcard**

- S3 Australian Simcard expires after 3 month
- S12 Australian Simcard expires after 12 month
- X Not Required

(customer supplied data enabled simcard)

**HAWKlink-USB**

HAWKlink USB PC connector for GosHawkII
Part Numbering
Gladiator Gen 3 Microwave Switch Series

MA Series Mounting Accessories

**MA Standard Mounting Accessories**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3&quot; Weldment, each</td>
</tr>
<tr>
<td>3</td>
<td>3&quot; UHMW Window &amp; Weldment each</td>
</tr>
<tr>
<td>4</td>
<td>4&quot; UHMW Window &amp; Weldment each</td>
</tr>
<tr>
<td>5</td>
<td>6&quot; UHMW Window &amp; Weldment each</td>
</tr>
<tr>
<td>6</td>
<td>3&quot; PTFE Window &amp; Weldment each</td>
</tr>
<tr>
<td>7</td>
<td>4&quot; PTFE Window &amp; Weldment each</td>
</tr>
<tr>
<td>8</td>
<td>6&quot; PTFE Window &amp; Weldment each</td>
</tr>
<tr>
<td>9</td>
<td>9&quot; x 4.5&quot; fire brick assembly each</td>
</tr>
<tr>
<td>10</td>
<td>6&quot; x 4&quot; ceramic brick assembly each</td>
</tr>
<tr>
<td>11</td>
<td>Shock/vibration insulation mounts pack of 4</td>
</tr>
<tr>
<td>12</td>
<td>Adjustable mounting bracket (UHMW window) each</td>
</tr>
<tr>
<td>13</td>
<td>Adjustable mounting bracket (PTFE window) each</td>
</tr>
<tr>
<td>15</td>
<td>Flanged Focaliser tube (extension pipe) (mild steel)</td>
</tr>
<tr>
<td>16</td>
<td>3&quot; Ceramic Window &amp; Weldment each</td>
</tr>
<tr>
<td>17</td>
<td>4&quot; Ceramic Window &amp; 4&quot; Weldment each</td>
</tr>
<tr>
<td>18</td>
<td>4&quot; Microwave Weldment only each</td>
</tr>
<tr>
<td>19</td>
<td>3&quot; Stainless steel Weldment only for UHMW each</td>
</tr>
<tr>
<td>20</td>
<td>4&quot; UHMW Window only each</td>
</tr>
<tr>
<td>21</td>
<td>3&quot; UHMW Window only each</td>
</tr>
<tr>
<td>22</td>
<td>4&quot; Stainless steel Weldment only for UHMW each</td>
</tr>
<tr>
<td>25</td>
<td>Flanged Focaliser tube (extension pipe) (316L)</td>
</tr>
<tr>
<td>20-P1</td>
<td>4&quot; UHMW Window with 40mm insertion depth (fits 4&quot; Weldment)</td>
</tr>
</tbody>
</table>

MD Series Mounting Accessories - Kit

**MD Mounting Accessories Kit**

*For Approval Option 2D Installations. Consult Safety Instructions for critical details.*

<table>
<thead>
<tr>
<th>Window Facing Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weldment Material</th>
</tr>
</thead>
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<tr>
<td>A</td>
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<td>S</td>
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<tr>
<td>M</td>
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</table>
Gladiator Gen 3 Microwave Switch Series

**MD Series Mounting Accessories - Parts**

For Approval Option 2D Installations. Consult Safety Instructions for critical details.

**BASE**  Weldment Only

- **Weldment Size**
  - MD3  Matches MD3 & MD6
  - MD4  Matches MD4 & MD7
  - MD5  Matches MD5 & MD8

- **Material**
  - A  SS304
  - S  SS316
  - M  Mild Steel

**WIN**  Window only

- **Window Facing Material**
  - MD3  UHMW for MD3 (-30°C to +75°C)
  - MD4  UHMW for MD4 (-30°C to +75°C)
  - MD5  UHMW for MD5 (-30°C to +75°C)
  - MD6  PTFE for MD6 (-30°C to +200°C)
  - MD7  PTFE for MD7 (-30°C to +200°C)
  - MD8  PTFE for MD8 (-30°C to +200°C)

**BASE - MD3 - A**

**LRING**  Locking Ring Only

- **Ring Size**
  - MD3  Matches MD3 & MD6
  - MD4  Matches MD4 & MD7
  - MD5  Matches MD5 & MD8

- **Material**
  - A  SS304
  - S  SS316
  - M  Mild Steel

**LRING - MD3 - A**

### MD Series Part Combinations

<table>
<thead>
<tr>
<th>Full Kit</th>
<th>Size</th>
<th>Window</th>
<th>Weldment</th>
<th>Locking Ring</th>
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<tbody>
<tr>
<td>MD3-X</td>
<td>3&quot;</td>
<td>WIN-MD3</td>
<td>BASE-MD3-X</td>
<td>LRING-MD3-X</td>
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<td>BASE-MD7-X</td>
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<tr>
<td>MD8-X</td>
<td>6&quot;</td>
<td>WIN-MD8</td>
<td>BASE-MD8-X</td>
<td>LRING-MD8-X</td>
</tr>
</tbody>
</table>

1^X = Material Selection
Specifications
Gladiator Gen 3 Microwave Switch Series

**Operating Voltage**
- Integral 12-30VDC / Remote 12-30VDC (residual ripple no greater than 100mV)
- Integral 80-260VAC / Remote 90-260VAC 50 / 60Hz
- Remote 36-60VDC

**Power Consumption**
- <0.8W @ 24VDC
- <6W @ 48VDC
- <5VA @ 240VAC
- <3VA @ 115VAC

**Communications**
- GosHawk, Modbus
- Multidrop mode can address 1-250 units over 4 wires.
- 4-20mA

**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)
- Integral 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**
- Circular transmission polarity
- Frequency: 10.525GHz
- Power: +20dBm / 100mW
- Sensitivity -95dBm
- Beam width 25º.

**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: 1200m (3937 ft)
- 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**
- Integral Sensors IP66/67
- Remote Electronics IP65 (NEMA 4x)
- Remote Sensors IP66/67

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

**Mounting**
- 3.5” male NPT thread or four 10mm (0.4”) holes in flange
- MA12 / MA13 adjustable mounting bracket

**Environment Seal**
- 3”, 4” and 6” weldments for standard mounting on vessel wall with PTFE and UHMW windows
- Flange for mounting separate from vessel wall - isolation shock mounts are available
- Ceramic window assemblies
- Firebrick window assemblies available on custom basis

**Weight**
- GSA 1kg
- GMS 5kg
- GMR 5kg

**Approval**
- IECEx Zone 20/21, Zone 21
- Ex ta tb IIIIC T* Da Db Tamb -30°C to +80°C / Tamb = -30°C to +55°C (model dependent)
- IP66
*Consult Safety Instructions
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 feel comfortable with our technology, and are provided with long term and reliable solutions. 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 years of level measurement experience, and ensure that your day to day processes are efficient, understood, and always working.