REACH Wireless®

Optical Smoke Detector

Product overview

Product	**REACH Wireless Optical Smoke Detector**
Part No.	**RW1000-600APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Technical data

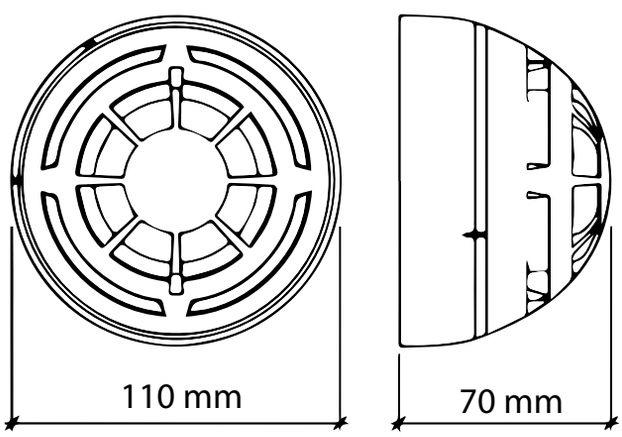
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Detection principle	*Photo-electric detection of light scattered in a forward direction by smoke particles*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Status LED	*Green and Red*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*10 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*40*
Standards and approvals	*EN54-7, EN54-25*
Dimensions	*110 mm diameter x 70 mm height*
Weight (including base and batteries)	*190 g*

Product information

The RW1000-600APO is a wireless addressable optical smoke detector that utilised dual-optical smoke detection technology for improved performance; maintaining the highest levels of false-alarm rejection.

- Twin alarm, bi-colour LEDs for 360° visibility
- Advanced dual-optical chamber design
- Advanced drift compensation
- Bi-directional wireless communication
- Dual channel redundancy
- Ten year battery life
- Five year product warranty



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Operating Principles

The REACH Wireless Optical Smoke Detector features an advanced dual-optical chamber design.

Status LED

It also includes a 360° LED indicator which illuminates red or green to indicate status conditions.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication
Power Up	Blinks green four times
Power Up (dip-switch ON)	Blinks red four times
Entering Wake-Up	Blinks alternatively green/red four times
Link Success	Blinks green four times, then repeats
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure
Normal Condition	LED off
Alarm	Red 1s, period 2s
Battery Faults	LED off
Tamper Fault	LED off
Replaced	Blinks amber two times

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

Base Compatibility

This device is supplied with a standard wireless base and is compatible with the following AV bases:

Table 2: REACH Wireless Base Compatibility

Part Number	Product Name
RW1300-110APO	REACH Wireless Sounder Base
RW1300-210APO	REACH Wireless Sounder VAD Base (White Flash) (C-3-15)
RW1300-211APO	REACH Wireless Sounder VAD Base (Red Flash) (C-3-10)

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

EMC Directive 2014/30/EU

REACH Wireless Optical Smoke Detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Conformity of the REACH Wireless Optical Smoke Detector with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Optical Smoke Detector complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

REACH Wireless®

Heat Detector

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Detection principle	*Single NTC thermistor*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Status LED	*Green and Red*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*10 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*40*
Standards and approvals	*EN54-5 Class P, EN54-25*
Dimensions	*110 mm diameter x 70 mm height*
Weight (including base and batteries)	*190 g*

Product overview

Product	**REACH Wireless Heat Detector**
Part No.	**RW1000-400APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

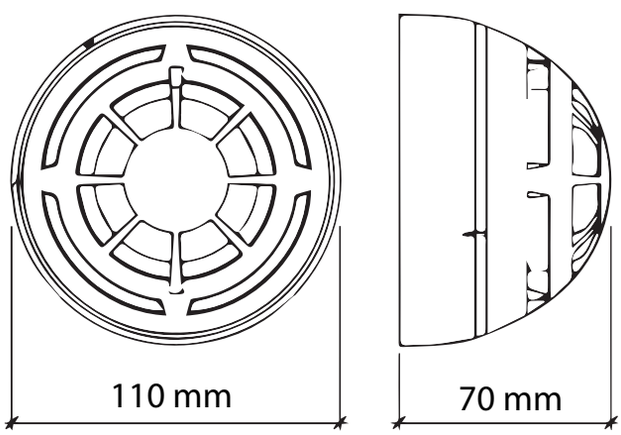
Approvals

CE UKCA

Product information

The RW1000-400APO is a wireless analogue addressable heat detector that can be configured as either rate-of-rise (A1R) or high temperature (BS) classification as specified in the EN 54-5. Multiple EN 54-5 classes (either A1R and BS) can be configured via the Loop-Interface during setup.

- Twin alarm, bi-colour LEDs for 360° visibility
- Programmable for rate-of-rise (A1R) or static temperature (BS)
- Bi-directional wireless communication
- Dual channel redundancy
- Ten year battery life
- Five year product warranty



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Operating Principles

The REACH Wireless Heat Detector is flexible – offering either static (BS) or rate-of-rise (A1R) functionality.

Status LED

It also includes a 360° LED indicator which illuminates red or green to indicate status conditions.

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Table 1: REACH Wireless Device Indication

Device Status	LED Indication
Power Up	Blinks green four times
Power Up (dip-switch ON)	Blinks red four times
Entering Wake-Up	Blinks alternatively green/red four times
Link Success	Blinks green four times, then repeats
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure
Normal Condition	LED off
Alarm	Red 1s, period 2s
Battery Faults	LED off
Tamper Fault	LED off
Replaced	Blinks amber two times

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO / RW1700-031APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface. Tampering detection is not signalled visually by the device

Base Compatibility

The device is supplied with a standard wireless base and is compatible with the following sounder bases:

Table 2: REACH Wireless Base Compatibility

Part Number	Product Name
RW1300-110APO	REACH Wireless Sounder Base
RW1300-210APO	REACH Wireless Sounder VAD Base (White Flash) (C-3-15)
RW1300-211APO	REACH Wireless Sounder VAD Base (Red Flash) (C-3-10)

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

EMC Directive 2014/30/EU

REACH Wireless Heat Detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Conformity of the REACH Wireless Heat Detector with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Heat Detector complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

REACH Wireless®

Multisensor Detector

Product overview

Product	**REACH Wireless Multisensor Detector**
Part No.	**RW1000-700APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Technical data

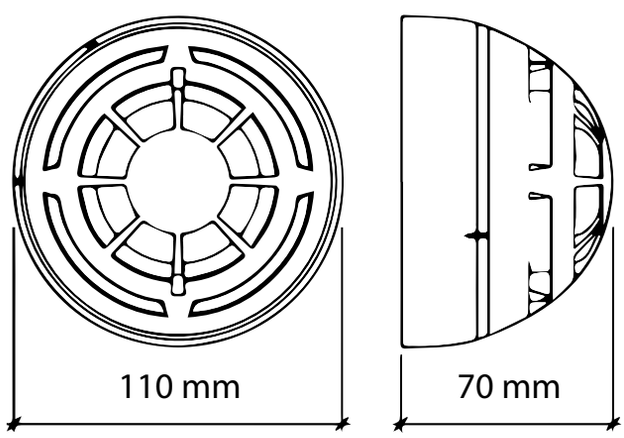
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Detection principle	*Photo-electric detection of light scattered in a forward direction by smoke particles* *Single NTC Thermistor*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Status LED	*Green and Red*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3V, 1250mAh typical*
Battery Lifespan	*10 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*40*
Standards and approvals	*EN54-7, EN54-5 Class P, EN54-25*
Dimensions	*110 mm diameter x 70 mm height*
Weight (including base and batteries)	*190 g*

Product information

The RW1000-700APO is a wireless addressable dual-optical and heat detection multisensor detector, offering both technologies for improved performance and high levels of false-alarm rejection.

- Twin alarm, bi-colour LEDs for 360° visibility
- Advanced dual-optical chamber design
- Advanced drift compensation
- Heat detection - rate-of-rise (A1R) and static temperature (BS)
- Bi-directional wireless communication
- Dual channel redundancy
- Ten year battery life
- Five year product warranty



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Operating Principles

The REACH Multisensor Detector features a dual-chamber optical smoke sensor and rate-of-rise (A1R) heat detector. Alarm is triggered based on an algorithm that considers both sensor readings.

Status LED

It also includes a 360° LED indicator which illuminates red or green to indicate status conditions.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication
Power Up	Blinks green four times
Power Up (dip-switch ON)	Blinks red four times
Entering Wake-Up	Blinks alternatively green/red four times
Link Success	Blinks green four times, then repeats
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure
Normal Condition	LED off
Alarm	Red 1s, period 2s
Battery Faults	LED off
Tamper Fault	LED off
Replaced	Blinks amber two times

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface. Tampering detection is not signalled visually by the device LED.

Base Compatibility

This device is supplied with a standard wireless base and is compatible with the following sounder bases:

Table 2: REACH Wireless Base Compatibility

Part Number	Product Name
RW1300-110APO	REACH Wireless Sounder Base
RW1300-210APO	REACH Wireless Sounder VAD Base (White Flash) (C-3-15)
RW1300-211APO	REACH Wireless Sounder VAD Base (Red Flash) (C-3-10)

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

EMC Directive 2014/30/EU

REACH Wireless Multisensor Detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Conformity of the REACH Wireless Multisensor Detector with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Multisensor Detector complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

REACH Wireless®

Sounder Base

Product overview

Product	**REACH Wireless Sounder Base**
Part No.	**RW1300-110APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Technical data

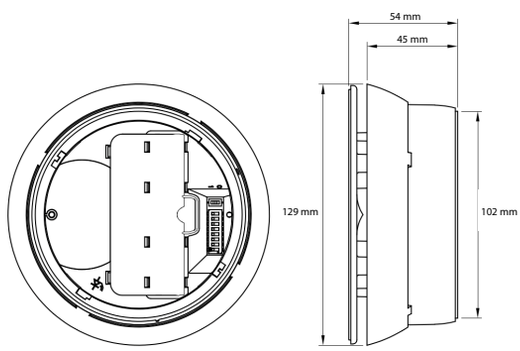
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Number of Tone Pairs	*16 (see table 4)*
Volume Levels	*Four (see table 3)*
Sound Output (Typical)	*88 - 91 dBA (tone dependant)*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*Five years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 21C (Type A Indoor Use)*
Standards and approvals	*EN54-7, EN54-5 Class P, EN54-25*
Dimensions	*129 mm diameter x 54 mm height*
Weight (including batteries)	*190 g*

Product information

The RW1300-110APO is a wireless analogue addressable sounder base that can be used as a stand-alone notification device (with a blanking cap, see next page) or as a combined solution with a REACH Wireless detector.

- Compatible only with REACH Wireless
- 16 number of tone settings (primary and secondary for alert and evacuation), selectable via on-board DIL Switches
- Four Volume Settings
- Bi-directional wireless communication
- Dual channel redundancy
- Five year battery life
- Five year product warranty



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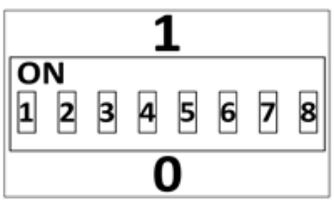
Status LED

The REACH Wireless Sounder Base includes a 360° LED indicator which to indicate status conditions. See table 1.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
Entering Wake-Up	Blinks alternatively green/red four times	
Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Tone & Volume Selection DIP Switch Settings



Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Table 2: REACH Wireless DIP Switch Functionality

DIP Switch Number	DIP Switch Group Function	Notes
1	Tone Selection	Check Tone Table (Table 6)
2		
3		
4		
5		
6	Volume Selection	Check Volume Table (Table 3)
7		
8	High/Low Power LED Output	N/A

Table 3: REACH Wireless Volume Table

Volume	DIP Configuration
High*	11
Medium High	01
Medium Low	10
Low	00

**EN54-3 certified, for Tone Table (Table 6), see appendix*

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Base Compatibility

This device is compatible with the following detector products (see table 4). It can also be used standalone with a blanking cap (see table 5).

Table 4: REACH Wireless Detector Compatibility

Part Number	Product Name
RW1000-400APO	REACH Wireless Heat Detector
RW1000-600APO	REACH Wireless Optical Smoke Detector
RW1000-700APO	REACH Wireless Multisensor Optical/Heat Detector

Table 5: REACH Wireless Blanking Cap Compatibility

Part Number	Product Name
RW1300-010	REACH Wireless AV Base Cap - White
RW1300-020	REACH Wireless AV Base Cap - Red

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trig-

ger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Sounder Base complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

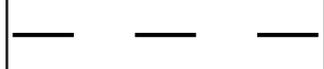
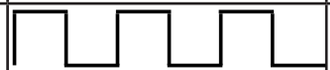
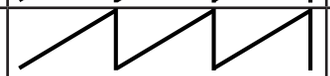
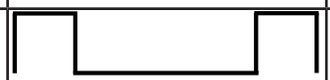
Conformity of the REACH Wireless Sounder Base with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Sounder Base complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

Table 6: Tone Table

Apollo Tone Pair Number *Apollo Approved Tone	DIP Switch Value	Primary Tone (Evacuation)			Secondary Tone (Alert)		
		Temporal Pattern Icon	Temporal Pattern Description	Frequencies	Temporal Pattern Icon	Temporal Pattern Descriptions	Frequencies
1*	0000		Apollo Fire Systems Evacuate Tone	660Hz for 0.5s, 925Hz for 0.5s		Apollo Fire Systems Alert Tone	1s off, 925Hz for 1s
2*	00001		Alternating Warble (Hochiki & Fulleon)	925Hz for 0.25s, 626Hz for 0.25s		Continuous (Hochiki & Fulleon)	925Hz
3*	00010		Sweep (med) @ 1Hz	800Hz - 970Hz @ 1Hz		Continuous	970Hz Continuous (BS5839-1:2002)
4*	00011		Sweep (fast) @ 9 Hz	2500Hz-2850Hz @ 9Hz		Continuous	2850Hz continuous
5*	00100		Netherlands -NEN 2575:2000 (Dutch Slow Whoop)	500 – 1200Hz for 3.5s, 0.5s OFF		Continuous	825Hz continuous
6*	00101		German DIN 33 404	1200Hz – 500Hz Sweep 1s (1Hz)		Continuous	825Hz continuous
7*	00110		Swedish Fire Signal	660Hz 0.15s ON, 0.15s OFF		Swedish All Clear	660Hz Continuous
8	00111		Australia Fast-rise Sweep (AS1670:4-2004 Evacuation tone)	3x (500Hz - 1200Hz for 0.5s, 0.5s off), 1s OFF		Australia AS1670:4-2004 Alert tone	420Hz 0.625s ON, 0.625s OFF
9	01000		New Zealand Slow-rise Sweep Evacuation Tone (NZS 4512)	500Hz – 1200Hz, 3.75s Sweep, 0.25s OFF		New Zealand Alert Tone (NZS 4512)	420Hz 0.625s ON, 0.625s OFF
10	01001		US Temporal LF (ISO 8201 Low Tone	3x(970Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	970Hz Continuous
11	01010		US Temporal HF (ISO 8201) High Tone	3x(2850Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	2850Hz continuous
12	01011		Simulated Bell - Continuous	827Hz for 16ms followed by 990Hz for 16ms.		Simulated Bell - Intermittent	827Hz for 16ms followed by 990Hz for 16ms for 1s then 1s off.
13	01100		Emergency Warning Siren	600Hz – 1200Hz 4s followed by 1200 – 600Hz 4s		Emergency Warning Siren All Clear	1200Hz Continuous
14	01101		France - AFNOR NF S 32 001	554Hz, 0.1s, 440Hz, 0.4s		Continuous	970Hz Continuous
15	01110		Australia Evacuation (AS7240-3)	520Hz, 0.5s ON, 0.5s OFF x 3, 1s OFF		Australia Alert (AS7240-3)	520Hz +/-5%, 0.5s ON, 3.5s OFF
16	10000		Silent Tone (REACH Wireless ONLY)	0Hz Continuous		Silent Tone (Reach Wireless ONLY)	0Hz Continuous

REACH Wireless®

Sounder VAD Base

Product overview

Product	**REACH Wireless Sounder VAD Base**
Part No.	**RW1300-210APO (White Flash)** **RW1300-211APO (Red Flash)**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Technical data

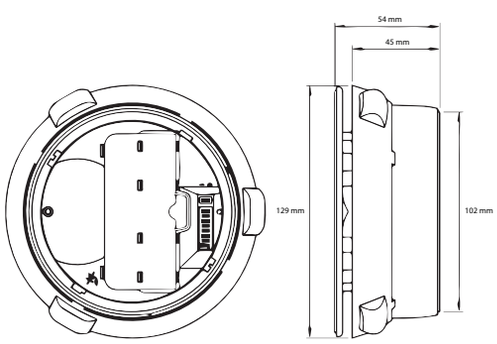
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Number of Tone Pairs	*16 (see table 7)*
Volume Levels	*Four volume settings*
Sound Output (Typical)	*88 - 91 dBA (tone dependant)*
VAD Coverage Rating (EN54-25)	*Configurable (see table 4)*
Flash Rate	*0.5 Hz*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*Five years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 21C (Type A Indoor Use)*
Standards and approvals	*EN54-3, EN54-23, EN54-25*
Dimensions	*129 mm diameter x 54 mm height*
Weight (including batteries)	*190 g*

Product information

The RW1300-210APO and RW1300-211APO are wireless analogue addressable sounder VAD bases that can be used as a stand-alone notification device (with a blanking cap, see next page) or as a combined solution with a REACH Wireless detector.

- Compatible only with REACH Wireless
- 16 number of tone settings (primary and secondary for alert and evacuation), selectable via on-board DIL Switches
- Four Volume Settings
- Bi-directional wireless communication
- Dual channel redundancy
- Five year battery life
- Five year product warranty



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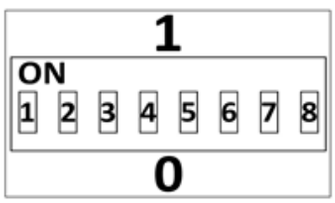
Status LED

The REACH Wireless Sounder VAD Base includes a 360° LED indicator which to indicate status conditions. See table 1.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
Entering Wake-Up	Blinks alternatively green/red four times	
Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Tone & Volume Selection DIP Switch Settings



Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Table 2: REACH Wireless DIP Switch Functionality

DIP Switch Number	DIP Switch Group Function	Notes
1	Tone Selection	Check Tone Table (Table 7)
2		
3		
4		
5		
6	Volume Selection	Check Volume Table (Table 3)
7		
8	High/Low Power LED Output	N/A

Table 3: REACH Wireless Volume Table

Volume	DIP Configuration
High*	11
Medium High	01
Medium Low	10
Low	00

**EN54-3 certified, for Tone Table (Table 7), see appendix*

Table 4: REACH Wireless VAD Output Table

Power	DIP Configuration	EN54-23 Class
High	1	White: C3-15
		Red: C3-10
Low	0	White: C3-10
		Red: 01.7-6.0

Base Compatibility

This device is compatible with the following detector products (see table 5). It can also be used standalone with a blanking cap (see table 6).

Table 5: REACH Wireless Detector Compatibility

Part Number	Product Name
RW1000-400APO	REACH Wireless Heat Detector
RW1000-600APO	REACH Wireless Optical Smoke Detector
RW1000-700APO	REACH Wireless Multisensor Optical/Heat Detector

Table 6: REACH Wireless Blanking Cap Compatibility

Part Number	Product Name
RW1300-010	REACH Wireless AV Base Cap - White
RW1300-020	REACH Wireless AV Base Cap - Red

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Sounder VAD Base complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

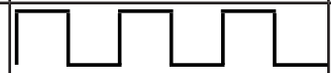
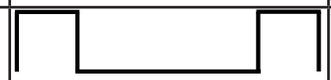
A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Sounder VAD Base complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

Table 7: Tone Table

Apollo Tone Pair Number *Apollo Approved Tone	DIP Switch Value	Primary Tone (Evacuation)			Secondary Tone (Alert)		
		Temporal Pattern Icon	Temporal Pattern Description	Frequencies	Temporal Pattern Icon	Temporal Pattern Descriptions	Frequencies
1*	0000		Apollo Fire Systems Evacuate Tone	660Hz for 0.5s, 925Hz for 0.5s		Apollo Fire Systems Alert Tone	1s off, 925Hz for 1s
2*	00001		Alternating Warble (Hochiki & Fulleon)	925Hz for 0.25s, 626Hz for 0.25s		Continuous (Hochiki & Fulleon)	925Hz
3*	00010		Sweep (med) @ 1Hz	800Hz - 970Hz @ 1Hz		Continuous	970Hz Continuous (BS5839-1:2002)
4*	00011		Sweep (fast) @ 9 Hz	2500Hz-2850Hz @ 9Hz		Continuous	2850Hz continuous
5*	00100		Netherlands -NEN 2575:2000 (Dutch Slow Whoop)	500 – 1200Hz for 3.5s, 0.5s OFF		Continuous	825Hz continuous
6*	00101		German DIN 33 404	1200Hz – 500Hz Sweep 1s (1Hz)		Continuous	825Hz continuous
7*	00110		Swedish Fire Signal	660Hz 0.15s ON, 0.15s OFF		Swedish All Clear	660Hz Continuous
8	00111		Australia Fast-rise Sweep (AS1670:4-2004 Evacuation tone)	3x (500Hz - 1200Hz for 0.5s, 0.5s off), 1s OFF		Australia AS1670:4-2004 Alert tone	420Hz 0.625s ON, 0.625s OFF
9	01000		New Zealand Slow-rise Sweep Evacuation Tone (NZS 4512)	500Hz – 1200Hz, 3.75s Sweep, 0.25s OFF		New Zealand Alert Tone (NZS 4512)	420Hz 0.625s ON, 0.625s OFF
10	01001		US Temporal LF (ISO 8201 Low Tone	3x(970Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	970Hz Continuous
11	01010		US Temporal HF (ISO 8201) High Tone	3x(2850Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	2850Hz continuous
12	01011		Simulated Bell - Continuous	827Hz for 16ms followed by 990Hz for 16ms.		Simulated Bell - Intermittent	827Hz for 16ms followed by 990Hz for 16ms for 1s then 1s off.
13	01100		Emergency Warning Siren	600Hz – 1200Hz 4s followed by 1200 – 600Hz 4s		Emergency Warning Siren All Clear	1200Hz Continuous
14	01101		France - AFNOR NF S 32 001	554Hz, 0.1s, 440Hz, 0.4s		Continuous	970Hz Continuous
15	01110		Australia Evacuation (AS7240-3)	520Hz, 0.5s ON, 0.5s OFF x 3, 1s OFF		Australia Alert (AS7240-3)	520Hz +/-5%, 0.5s ON, 3.5s OFF
16	10000		Silent Tone (REACH Wireless ONLY)	0Hz Continuous		Silent Tone (Reach Wireless ONLY)	0Hz Continuous

REACH Wireless®

Loop-Interface

Product overview

Product	**REACH Wireless Loop-Interface**
Part No.	**RW1700-030APO**
Digital Communication	**XP95 native (mimics XPander)**
	Device will present as a zone monitor to the fire panel

Approvals

CE UKCA

Technical data

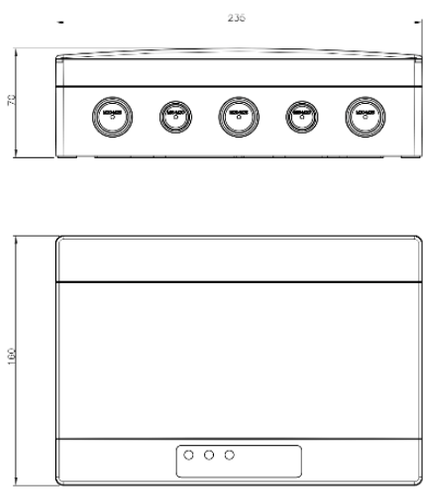
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Maximum Number of Connected Devices	*32*
Flash Rate	*0.5 Hz*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Available Protocol Addresses	*126 (XP95)*
	Loop Interface requires a loop address. Configured during setup.
Radiated Power	*14 dBm (25 mW)*
Line Voltage	*17 V - 35 V (typical 24 V)*
Current Consumption	*40 mA peak @24 V*
Operating Temperature	*-20°C to +70°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 65*
Standards and approvals	*EN54-17, EN54-18, EN54-25*
Dimensions	*236 mm diameter x 100 mm height x 70 mm depth*
Weight (including base and batteries)	*700 g*

Product information

The RW1700-030APO is a wired loop interface that bridges REACH Wireless radio-frequency products to an Apollo wired loop. Communication between the wireless products are translated to Apollo wired protocol for operation via the wired fire panel.

- Built-in LCD Display
- Physical Navigation Buttons
- 3x Status LEDs: Fault, Configuration, and Power
- Loop-powered
- Built-in Isolator
- Bi-directional wireless communication
- Dual channel redundancy
- Five year product warranty



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Status LED

When one or more faults are present in the system they are shown on the LCD and the fault LED is switched on yellow. LCD is ON only when the tamper switch is not activated (cover open) regardless of the configuration of the translator tamper fault.

For a table of fault codes & LED meanings, see table 1.

No. of Loop-interfaces

No. of Loop-interfaces per loop is determined by the following limits:

• Available RF channel Pairs. There are 22 available for 868Mhz region usage. 1 RF channel pair is required per loop-interface (for communicating to devices). 100m spacing between loop-interfaces is required before repeating RF channel usage (we recommend contacting Apollo customer support before attempting this).

• Available loop current. 40mA is required per loop-interface (@24V). Apollo recommends only loading a wired loop to 80% of theoretical max e.g. 80% of 500mA = 400mA/40mA = 10 loop-interfaces maximum per loop (assumes no other wired devices or voltage droop).

• Available Protocol Addresses. XP95 protocol supports up-to 126 addresses. Although the Loop-interface does not use an address, the REACH wireless devices do so this may limit how many loop-interfaces can be installed with the maximum number of wireless devices connected (32 devices per loop-interface). Every REACH part number takes one address, including AV bases.

Examples:

- 3 Loop-interfaces with 32 wireless devices each (XP95 protocol address limit reached)
- 10 Loop-interfaces with 12 wireless devices each (available loop-current limit REACHed)

Device Addressing

RW1700-030APO allow REACH Wireless devices to be soft-addressed via the LCD display, during commissioning.

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPert cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Loop-Interface complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Conformity of the REACH Wireless Loop-Interface with the EMC Directive does not confer compliance with the directive on any apparatus or systems connected to it.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Loop-Interface complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

Table 1: REACH Wireless Fault Table

Type of Fault	Fault Description	Note
LINK	No valid supervision is received from the device by the link fault timeout	Fault LED blinking. Link fault timeout is configured with teh keyboard/LCD interface
TAMP	Device is in tamper fault	Fault LED blinking
FAULT	Generic device fault (transceiver error, FW incoherence, etc)	Fault LED blinking
JAMMING	Noise on field communication channels	Fault LED blinking
START UP	During low current consumption start-up phase	Fault LED blinking 1s ON / 2s OFF
ISOLATORS	Isolators open	Fault LED steady on
BRIGDE FAULT	Communications error between internal micros	Fault LED steady on

REACH Wireless®

Input Module

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*10 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 65*
Standards and approvals	*EN54-18, EN54-25*
Dimensions	*136 mm diameter x 96 mm height x 57mm depth*
Weight (including batteries)	*270 g*

Product overview

Product	**REACH Wireless Input Module**
Part No.	**RW1700-051APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

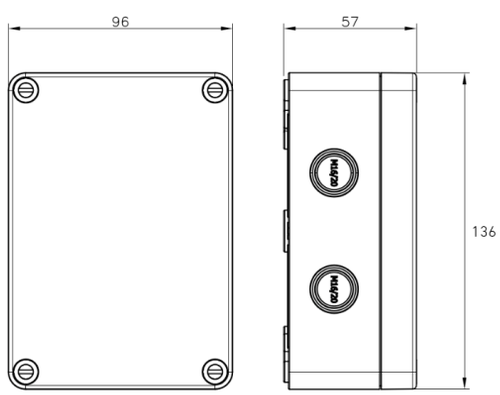
Approvals

CE UKCA

Product information

The RW1700-051APO REACH Wireless Input Module is a wireless analogue addressable interface with single fully monitored input circuit which allows simple integration of third-party equipment with the fire system.

- Input circuits are fully supervised for alarm and fault conditions (utilising *eol* resistors)
- Bi-directional wireless communication
- Dual channel redundancy
- Five year product warranty



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Operating Principles

The RW1700-051APO REACH Wireless Input module works on an ON/OFF logic and does not rely on any special and/or intelligent communication protocol for its operation (i.e conventional call-points). See table 2 for connection requirements.

Status LED

When one or more faults are present in the system they are shown on the LCD and the fault LED is switched on yellow. LCD is ON only when the tamper switch is not activated (cover open) regardless of the configuration of the translator tamper fault.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
Entering Wake-Up	Blinks alternatively green/red four times	
Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Input Module complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Input Module complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

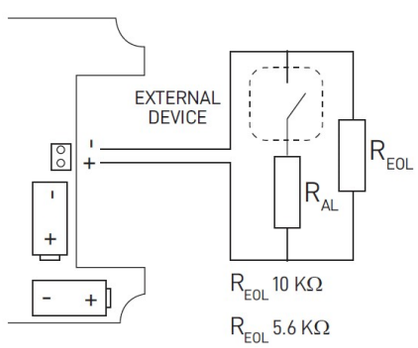
Table 2: REACH Wireless Connection Requirements

Port B	End of Line Impedance Limits				Module Status	Notes
	Min	Typ	Max	Units		
Input	6.5	10	14	kΩ	Normal	-
	0	-	2.4	kΩ	Fault	Short Circuit
	2.5	5	6.4	kΩ	Alarm	Triggered by Wired Device
	14.2	-	+∞	kΩ	Fault	Open Circuit
R_{EOL}	8	10	12	kΩ	-	
R_{AL}	5	5,6	6	kΩ	-	

The 10KΩ R resistor monitors whether the cable has been damaged or the connection is no longer available.

- The 5.6KΩ R resistor comes in and out of circuit depending on the state of the 3rd party device (alarm resistor).
- If you fail to install these resistors correctly the device will not operate as intended.
- Ensure the 3rd party device offers a voltage free relay switch.

Note: install a properly fire rated cable (according to national code of practice) between the third-party device and the input module.



REACH Wireless®

Output Module

Product overview

Product	**REACH Wireless Output Module**
Part No.	**RW1700-052APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Technical data

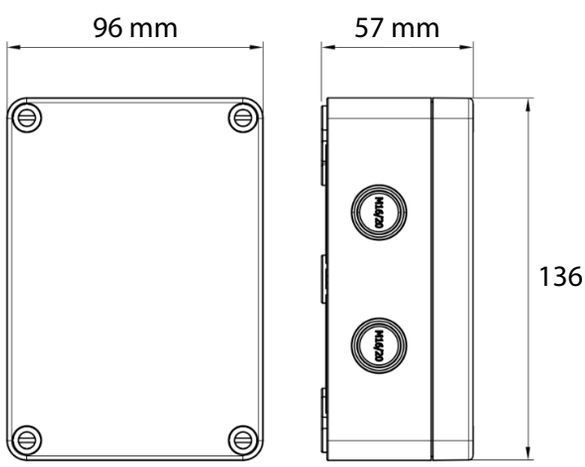
All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3V, 1250mAh typical*
Battery Lifespan	*4 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 65*
Standards and approvals	*EN54-18, EN54-25*
Dimensions	*136 mm diameter x 96 mm height x 57mm depth*
Weight (including batteries)	*270 g*

Product information

The RW1700-052APO REACH Wireless Output Module is a wireless analogue addressable interface which allows simple integration of third-party equipment with the fire system. The unit is powered entirely from its internal battery supply and is fitted as standard with both a set of change over relay contacts and a 12/24V dc output. The output is capable of supplying power for operating low current third party equipment directly from the internal batteries.

- Output circuits are fully supervised for fault conditions (utilising *eol* resistors)
- Bi-directional wireless communication
- Dual channel redundancy
- Five year product warranty



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Operating Principles

The RW1700-052APO REACH Wireless Output module works on an ON/OFF logic and does not rely on any special and/or intelligent communication protocol for its operation (i.e conventional call-points). See table 2 for connection requirements.

Status LED

When one or more faults are present in the system they are shown on the LCD and the fault LED is switched on yellow. LCD is ON only when the tamper switch is not activated (cover open) regardless of the configuration of the translator tamper fault.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
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Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on 1s
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Output Module complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

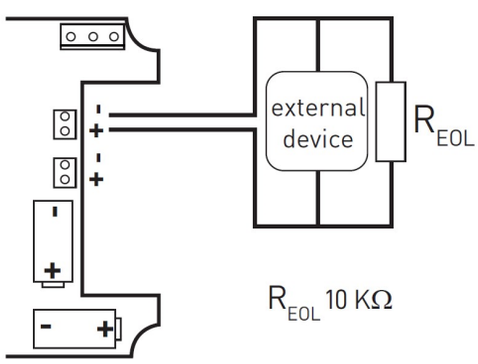
The REACH Wireless Output Module complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

Table 2: REACH Wireless Connection Requirements

Port A	Voltage Setting				Max Load Current	
Output	12V				100 mA	
	24V				50 mA	
Output Supervision	End of Line Impedance Limits				Module Status	Notes
	Min	Typ	Max	Units		
	6.5	10	14	kΩ	Normal	-
	0	-	2.4	kΩ	Fault	Short Circuit
	14.2	-	+∞	kΩ	Fault	Open Circuit
R_{EOL}	8	10	12	kΩ	-	-
Port B	End of Line Impedance Limits				Module Status	Notes
	Min	Typ	Max	Units		
Relay Supervision	6.5	10	14	kΩ	Normal	-
	0	-	2.4	kΩ	Fault	Short Circuit
	14.2	-	+∞	kΩ	Fault	Open Circuit
R_{EOL}	8	10	12	kΩ	-	-
Port A	Voltage Setting				Max Load Current	
Output	30 V				2 A	

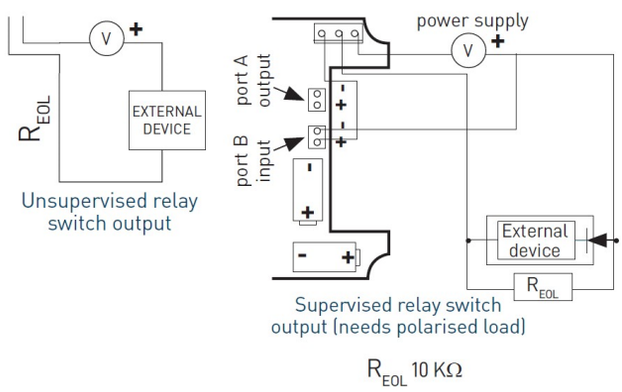
Wiring Example 1: 100 mA / 12 Vdc or 50 mA / 24 Vdc External Device Driving Capability



The 10KΩ R EOL resistor monitors whether the cable has been damaged or the connection is no longer available.

If you fail to install these resistors correctly the device will not operate as intended.

Wiring Example 2: Relay Switch Output



Ensure the device connected to the unit is not drawing more than 2 A at 30V (no 220 VAC). Drawing too much current through the output relay or connecting mains voltage could possibly damage the unit and void warranty.

Note: install a properly fire rated cable (according to national code of practice) between the third-party device and the output module.

REACH Wireless®

Remote Indicator

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

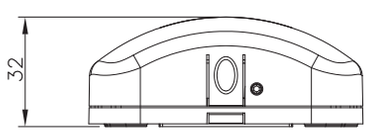
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3V, 1250mAh typical*
Battery Lifespan	*Five years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 42*
Standards and approvals	*EN54-25*
Dimensions	*80 mm diameter x 80 mm height x 32 mm depth*
Weight (including batteries)	*60 g*

Product overview

Product	**REACH Wireless Remote Indicator**
Part No.	**RW1500-800APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

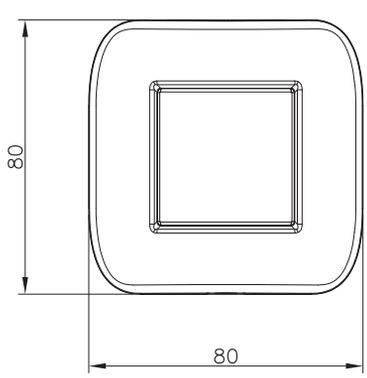
CE UKCA



Product information

The RW1500-800APO is a wireless addressable remote indicator that can be used to indicate the activation of an individual device or zone.

- Compatible only with REACH Wireless
- Red LED with large diffuser for greater visibility
- Bi-directional wireless communication
- Dual channel redundancy
- Five year product warranty



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Status LED

The REACH Wireless Remote Indicator is equipped with a visual LED Indicator; LED signals indicate functional status of the device as per Table 1.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication
Power Up	Blinks green four times
Power Up (dip-switch ON)	Blinks red four times
Entering Wake-Up	Blinks alternatively green/red four times
Link Success	Blinks green four times, then repeats
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure
Normal Condition	LED off
Activation	LED on
Battery Faults	LED off
Tamper Fault	LED off
Replaced	Blinks green two times

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Remote Indicator complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Remote Indicator complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

REACH Wireless®

Manual Call Point

Product overview

Product	**REACH Wireless Manual Call Point**
Part No.	**RW1900-901APO**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Product information

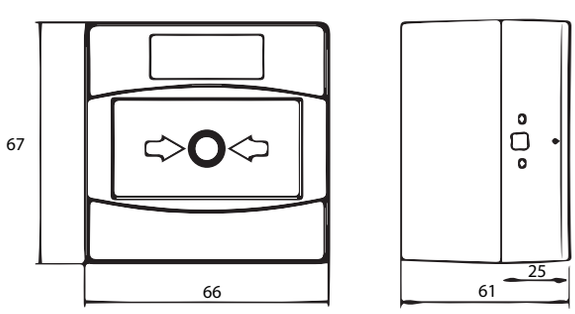
The RW1900-901APO is a wireless analogue addressable manual call point. The unit has a resettable plastic element, which displays a drop-down warning indicator when operated. A key is supplied with the MCP for reset and case opening. A transparent cover protects against accidental operation is available as an accessory *(not included)*.

- Resettable Element
- Bi-directional wireless communication
- Dual channel redundancy
- Ten year battery life
- Five year product warranty

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*10 years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 30*
Standards and approvals	*EN54-11, EN54-25*
Dimensions	*88 mm diameter x 87 mm height x 61 mm depth*
Weight (including batteries)	*160 g*



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Operating Principles

The RW1900-901APO REACH Wireless Manual Call Point is a wall-mounted device that, when activated, initiates an alarm on the fire security system. After its use the call point unit can be simply reset with its proper key, making it immediately ready for reactivation.

Status LED

When one or more faults are present in the system they are shown on the LCD and the fault LED is switched on yellow. LCD is ON only when the tamper switch is not activated (cover open) regardless of the configuration of the translator tamper fault. See table 1 for LED status meanings.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication
Power Up	Blinks green four times
Power Up (dip-switch ON)	Blinks red four times
Entering Wake-Up	Blinks alternatively green/red four times
Link Success	Blinks green four times, then repeats
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure
Normal Condition	LED off
Activation	Red on 1s, period 2s
Battery Faults	LED off
Tamper Fault	LED off
Replaced	Blinks amber two times

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO.

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Manual Call Point complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

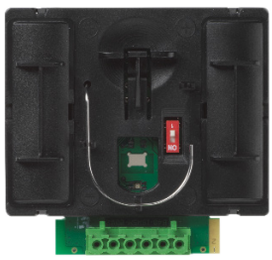
Construction Products Regulation (EU) 305/2011

The REACH Wireless Manual Call Point complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

REACH Wireless®

Open-Area Wall Sounder



Product overview

Product	**REACH Wireless Open-Area Wall Sounder**
Part No.	**RW1500-110APO (White Body)** **RW1500-120APO (Red Body)**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Product information

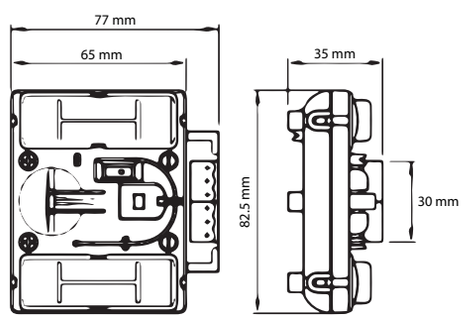
The RW1500-110APO and RW1500-120APO comprise of a wireless addressable interface and conventional open-area wall sounder that can be used as a stand-alone notification device.

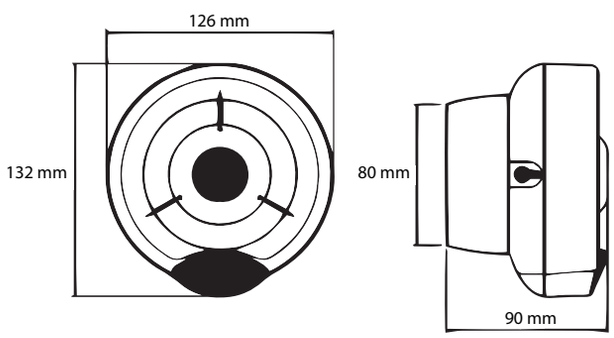
- Compatible only with REACH Wireless
- 16 tone pair settings (primary and secondary for alert and evacuation), selectable via on-board DIL Switches
- Four Volume Settings
- Bi-directional wireless communication
- Dual channel redundancy
- Five year battery life
- Five year product warranty

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Number of Tone Pairs	*16 (see table 2)*
Volume Levels	*Four (see table 3)*
Sound Output (Typical)	*88 - 91 dBA (tone dependant)*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*Five years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 35 (Type B Indoor Use)*
Standards and approvals	*EN54-3, EN54-25*
Dimensions	*126 mm diameter x 132 mm height x 125 mm depth*
Weight (including base and batteries)	*350 g*





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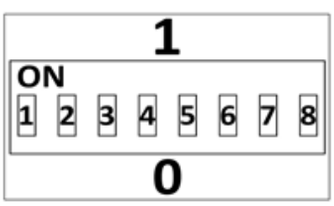
Status LED

The REACH Wireless Open-Area Wall Sounder VAD Base includes a 360° LED indicator which to indicate status conditions. See table 1.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
Entering Wake-Up	Blinks alternatively green/red four times	
Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Tone & Volume Selection DIP Switch Settings



Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Table 2: REACH Wireless DIP Switch Functionality

DIP Switch Number	DIP Switch Group Function	Notes
1	Tone Selection	Check Tone Table (Table 4)
2		
3		
4		
5		
6	Volume Selection	Check Volume Table (Table 3)
7		
8	High/Low Power LED Output	N/A

Table 3: REACH Wireless Volume Table

Volume	DIP Configuration
High*	11
Medium High	01
Medium Low	10
Low	00

**EN54-3 certified, for Tone Table (Table 4), see appendix*

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Open-Area Wall Sounder complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

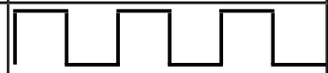
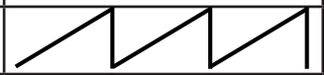
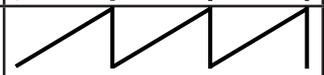
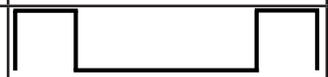
A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Open-Area Wall Sounder complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

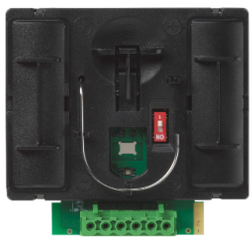
A copy of the Declaration of Performance is available from Apollo on request.

Table 4: Tone Table

Apollo Tone Pair Number *Apollo Approved Tone	DIP Switch Value	Primary Tone (Evacuation)			Secondary Tone (Alert)		
		Temporal Pattern Icon	Temporal Pattern Description	Frequencies	Temporal Pattern Icon	Temporal Pattern Descriptions	Frequencies
1*	0000		Apollo Fire Systems Evacuate Tone	660Hz for 0.5s, 925Hz for 0.5s		Apollo Fire Systems Alert Tone	1s off, 925Hz for 1s
2*	00001		Alternating Warble (Hochiki & Fulleon)	925Hz for 0.25s, 626Hz for 0.25s		Continuous (Hochiki & Fulleon)	925Hz
3*	00010		Sweep (med) @ 1Hz	800Hz - 970Hz @ 1Hz		Continuous	970Hz Continuous (BS5839-1:2002)
4*	00011		Sweep (fast) @ 9 Hz	2500Hz-2850Hz @ 9Hz		Continuous	2850Hz continuous
5*	00100		Netherlands -NEN 2575:2000 (Dutch Slow Whoop)	500 – 1200Hz for 3.5s, 0.5s OFF		Continuous	825Hz continuous
6*	00101		German DIN 33 404	1200Hz – 500Hz Sweep 1s (1Hz)		Continuous	825Hz continuous
7*	00110		Swedish Fire Signal	660Hz 0.15s ON, 0.15s OFF		Swedish All Clear	660Hz Continuous
8	00111		Australia Fast-rise Sweep (AS1670:4-2004 Evacuation tone)	3x (500Hz - 1200Hz for 0.5s, 0.5s off), 1s OFF		Australia AS1670:4-2004 Alert tone	420Hz 0.625s ON, 0.625s OFF
9	01000		New Zealand Slow-rise Sweep Evacuation Tone (NZS 4512)	500Hz – 1200Hz, 3.75s Sweep, 0.25s OFF		New Zealand Alert Tone (NZS 4512)	420Hz 0.625s ON, 0.625s OFF
10	01001		US Temporal LF (ISO 8201 Low Tone	3x(970Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	970Hz Continuous
11	01010		US Temporal HF (ISO 8201) High Tone	3x(2850Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	2850Hz continuous
12	01011		Simulated Bell - Continuous	827Hz for 16ms followed by 990Hz for 16ms.		Simulated Bell - Intermittent	827Hz for 16ms followed by 990Hz for 16ms for 1s then 1s off.
13	01100		Emergency Warning Siren	600Hz – 1200Hz 4s followed by 1200 – 600Hz 4s		Emergency Warning Siren All Clear	1200Hz Continuous
14	01101		France - AFNOR NF S 32 001	554Hz, 0.1s, 440Hz, 0.4s		Continuous	970Hz Continuous
15	01110		Australia Evacuation (AS7240-3)	520Hz, 0.5s ON, 0.5s OFF x 3, 1s OFF		Australia Alert (AS7240-3)	520Hz +/-5%, 0.5s ON, 3.5s OFF
16	10000		Silent Tone (REACH Wireless ONLY)	0Hz Continuous		Silent Tone (Reach Wireless ONLY)	0Hz Continuous

REACH Wireless®

Open-Area Wall Sounder VAD



Product overview

Product	**REACH Wireless Open-Area Wall Sounder VAD**
Part No.	**RW1500-210APO (White Body, White Flash)** **RW1500-220APO (Red Body, White Flash)**
Digital Communication	**Apollo protocol compatibility is handled via the Loop-Interface device, RW1700-030APO.** *See product for more detail.*

Approvals

CE UKCA

Product information

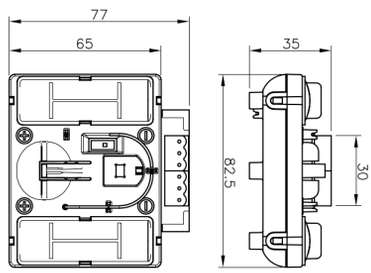
The RW1500-210APO / RW1500-220APO is a wireless analogue addressable interface and a conventional open-area wall sounder VAD that can be used as a stand-alone notification device.

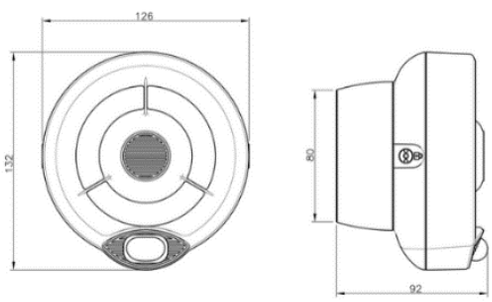
- Compatible only with REACH Wireless
- 16 tone pair settings (primary and secondary for alert and evacuation), selectable via on-board DIL Switches
- Four Volume Settings
- Bi-directional wireless communication
- Dual channel redundancy
- Four year battery life
- Five year product warranty

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Number of Tone Pairs	*16 (see table 2)*
Volume Levels	*Four volume settings*
Sound Output (Typical)	*88 - 91 dBA (tone dependant)*
Communication Range between Loop-Interface and Devices	*100 m (in open space)*
VAD Coverage Rating (EN54-25)	*Configurable - See Table 4*
Flash Rate	*0.5 Hz*
Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Lifespan	*Five years in normal operation with good signal strength (no dropped messages)*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
IP Rating	*IP 35 (Type B Indoor Use)*
Standards and approvals	*EN54-3, EN54-23, EN54-25*
Dimensions	*126 mm diameter x 132 mm height x 125 mm depth*
Weight (including base and batteries)	*350 g*





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Status LED

The REACH Wireless Open-Area Wall Sounder VAD includes a 360° LED indicator which to indicate status conditions. See table 1.

Table 1: REACH Wireless Device Status & LED Indication

Device Status	LED Indication	
	Tamper Not Activated	Tamper Activated
Power Up	Blinks green four times	
Power Up (dip-switch ON)	Blinks red four times	
Entering Wake-Up	Blinks alternatively green/red four times	
Link Success	Blinks green four times, then repeats	
Link Failure	Enters wake-up mode and signals 'Entering wake-up mode' following this failure	
Normal Condition	LED off	LED off
Activation	LED off	Red on
Battery Faults	LED off	Amber blinking every 5s
Tamper Fault	LED off	
Replaced	Blinks amber two times	

Tone & Volume Selection DIP Switch Settings

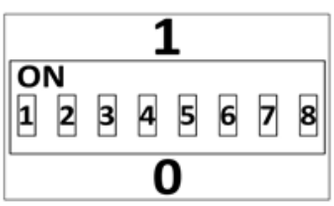


Table 2: REACH Wireless DIP Switch Functionality

DIP Switch Number	DIP Switch Group Function	Notes
1	Tone Selection	Check Tone Table (Table 4)
2		
3		
4		
5		
6	Volume Selection	Check Volume Table (Table 3)
7		
8	High/Low Power LED Output	N/A

Table 3: REACH Wireless Volume Table

Volume	DIP Configuration
High*	11
Medium High	01
Medium Low	10
Low	00

**EN54-3 certified, for Tone Table (Table 4), see appendix*

Device Addressing

Device addressing is handled by the REACH Wireless Loop-Interface device (RW1700-030APO).

Devices are soft-addressed automatically when pairing with the Loop Interface and can be changed manually. Hard-addressing using Apollo XPERT cards are not supported.

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel. See datasheets for the Loop-Interface for more information.

Maintenance and Service

Maintenance must be performed in accordance with all applicable standards. Clean the detector externally using a soft damp cloth. For full cleaning and recalibration detectors should be returned to Apollo Fire Detectors.

Batteries

REACH Wireless devices are supplied with two CR123 batteries, battery A and B. The device switches periodically between the two batteries on a controlled sequence. For correct operation of the device, both batteries are required with adequate capacity reserves.

When battery A reaches a low power threshold, it will trigger a fault. This fault requires both batteries to be replaced in every instance as both batteries should be discharging equally.

When one (or both) batteries lack power, the Loop-Interface receives a low battery message and will signal this event on its in-built display, as well as relay the low battery message to the fire control panel. The battery fault will also be signalled by the device itself through its LED indicators if programmed (see table 1).

Tamper detection

REACH Wireless devices contain an anti-tamper mechanism. In the event of removal from its base, it sends a tamper detection message to the Loop-Interface.

Tampering detection is not signalled visually by the device LED.

EMC Directive 2014/30/EU

REACH Wireless Open-Area Wall Sounder VAD complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

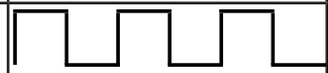
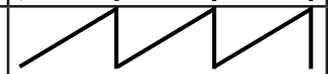
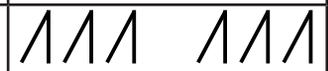
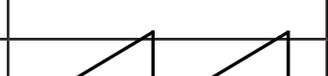
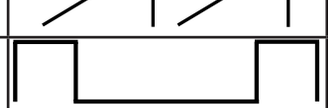
A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Open-Area Wall Sounder VAD complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

Table 4: Tone Table

Apollo Tone Pair Number *Apollo Approved Tone	DIP Switch Value	Primary Tone (Evacuation)			Secondary Tone (Alert)		
		Temporal Pattern Icon	Temporal Pattern Description	Frequencies	Temporal Pattern Icon	Temporal Pattern Descriptions	Frequencies
1*	0000		Apollo Fire Systems Evacuate Tone	660Hz for 0.5s, 925Hz for 0.5s		Apollo Fire Systems Alert Tone	1s off, 925Hz for 1s
2*	00001		Alternating Warble (Hochiki & Fulleon)	925Hz for 0.25s, 626Hz for 0.25s		Continuous (Hochiki & Fulleon)	925Hz
3*	00010		Sweep (med) @ 1Hz	800Hz - 970Hz @ 1Hz		Continuous	970Hz Continuous (BS5839-1:2002)
4*	00011		Sweep (fast) @ 9 Hz	2500Hz-2850Hz @ 9Hz		Continuous	2850Hz continuous
5*	00100		Netherlands -NEN 2575:2000 (Dutch Slow Whoop)	500 – 1200Hz for 3.5s, 0.5s OFF		Continuous	825Hz continuous
6*	00101		German DIN 33 404	1200Hz – 500Hz Sweep 1s (1Hz)		Continuous	825Hz continuous
7*	00110		Swedish Fire Signal	660Hz 0.15s ON, 0.15s OFF		Swedish All Clear	660Hz Continuous
8	00111		Australia Fast-rise Sweep (AS1670:4-2004 Evacuation tone)	3x (500Hz - 1200Hz for 0.5s, 0.5s off), 1s OFF		Australia AS1670:4-2004 Alert tone	420Hz 0.625s ON, 0.625s OFF
9	01000		New Zealand Slow-rise Sweep Evacuation Tone (NZS 4512)	500Hz – 1200Hz, 3.75s Sweep, 0.25s OFF		New Zealand Alert Tone (NZS 4512)	420Hz 0.625s ON, 0.625s OFF
10	01001		US Temporal LF (ISO 8201 Low Tone	3x(970Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	970Hz Continuous
11	01010		US Temporal HF (ISO 8201) High Tone	3x(2850Hz 0.5s ON, 0.5s OFF), 1s OFF		Continuous	2850Hz continuous
12	01011		Simulated Bell - Continuous	827Hz for 16ms followed by 990Hz for 16ms.		Simulated Bell - Intermittent	827Hz for 16ms followed by 990Hz for 16ms for 1s then 1s off.
13	01100		Emergency Warning Siren	600Hz – 1200Hz 4s followed by 1200 – 600Hz 4s		Emergency Warning Siren All Clear	1200Hz Continuous
14	01101		France - AFNOR NF S 32 001	554Hz, 0.1s, 440Hz, 0.4s		Continuous	970Hz Continuous
15	01110		Australia Evacuation (AS7240-3)	520Hz, 0.5s ON, 0.5s OFF x 3, 1s OFF		Australia Alert (AS7240-3)	520Hz +/-5%, 0.5s ON, 3.5s OFF
16	10000		Silent Tone (REACH Wireless ONLY)	0Hz Continuous		Silent Tone (Reach Wireless ONLY)	0Hz Continuous

REACH Wireless®

Survey Kit Lite

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 25°C and 50% RH unless otherwise stated.

Field Device Radio Frequency Channel Pairs	*22 pairs*
Radiated Power	*14 dBm (25 mW)*
Battery Type (Field-Device)	*2x VARTA CR123A Lithium 3 V, 1250mAh typical*
Battery Type (Network Host Device)	*4x VARTA CR123A Lithium 3 V, 1250mAh typical*
Operating Temperature	*-10°C to +55°C*
Maximum Relative Humidity (non-condensing)	*95%*
Standards and approvals	*EN54-25*
Dimensions	*136 mm diameter x 96 mm height x 57mm depth*
Weight (including base and batteries)	*270 g*

Product overview

Product	**REACH Wireless Survey Kit Lite**
Part No.	**RW1800-060APO**
Digital Communication	**N/A**

Approvals

CE UKCA

Product information

The RW1800-060APO is a portable, battery-powered toolkit for surveying signal strength of the REACH Wireless system, ahead of installation into a building.

The field-device can be held in position to test the signal strength of a potential installation location between it and the network host device. The field-device will indicate signal strength by flashing its on-board LED.

- Includes 1x network host device, 1x field-device, 1x extendable detector mounting pole
- Field-device includes an RGB LED for signal strength indication
- Bi-directional wireless communication
- Dual channel redundancy

Communication

REACH Wireless Devices use 'radio-frequency' wireless communication to connect to the Loop-Interface.

The Loop-Interface (RW1700-030APO) translates the wireless communication into wired Apollo protocol communication, with each device addressable individually by the fire panel.

See datasheets for the Loop-Interface for more information.

EMC Directive 2014/30/EU

REACH Wireless Survey Kit Lite complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from Apollo on request.

Construction Products Regulation (EU) 305/2011

The REACH Wireless Survey Kit Lite complies with the essential requirements of the Construction Products Regulation (EU) 305/2011

A copy of the Declaration of Performance is available from Apollo on request.

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Signal Quality LED Table				
Rssi (dBm)		LED Activity + Colour	Signal Quality	Ok to Install
Min	Max			
0	-65	● ● ●	Excellent	Yes
-66	-75	● ● ●	Good	
-76	-80	● ● ●	Sufficient	
-81	-85	– –	Marginal	No
-86	-90	– – – –	Bad	
-91	-95	– – – – – –	Very Bad	
-96	-100	– – – – – – – –	Extremely Bad	
101	-105		Range Limit	