WIZO-LINK
USER MANUAL

Centurion Systems (Pty) Ltd
www.centsys.com
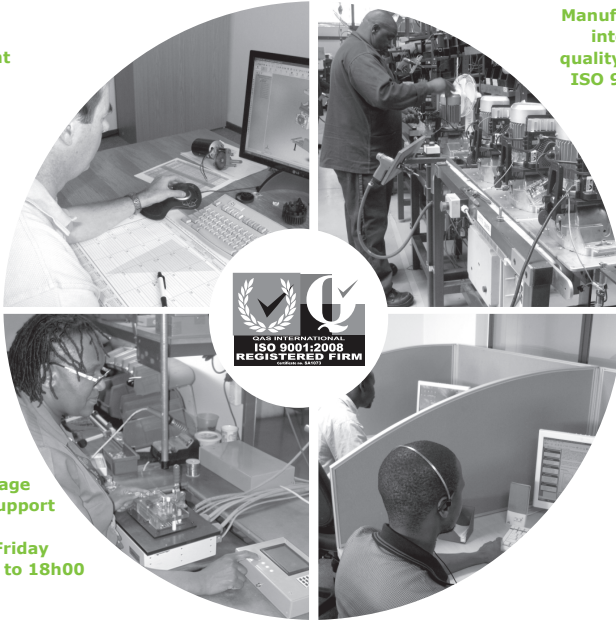
Company Profile

1986 **1990** **1995** **1999** **Today**

In-house R&D development team

Manufactures to international quality standard ISO 9001:2008

After-sales multi-language Technical Support

Monday to Friday from 07h00 to 18h00 GMT+2 Saturdays 08h00 to 16h30 GMT +2

100% testing of products

Sales and technical support to Africa, Europe, Asia, the Americas, Australia and the Pacific

Contents

Icons used in this manual

This icon indicates tips and other information that could be useful during the installation.

This icon denotes variations and other aspects that should be considered during installation.

This icon indicates warning, caution or attention! Please take special note of critical aspects that MUST be adhered to in order to prevent injury.

1. Introduction

WiZo-Link is a mesh networkable product which enables a fully redundant network of devices to be constructed. The **WiZo-Link** network topology requires a minimum of two **WiZo-Link** devices to be connected to create a network; as more devices are added network redundancy is improved until full redundancy is achieved. Integrated inputs and outputs (I/O) enhance the Network's ability to respond to events and actuate devices.

A **WiZo-Link** network is a standalone network of devices that inter-communicate, managing the distributed I/O. Each device is supervised, which ensures that, when a device is lost to the network, a notification is sent so that the network can be maintained to mitigate the loss.

1.1. Defining the WiZo-Link Product

1.1.1. Architecture

WiZo-Link is comprised of two elements:

1. The network, which enables communication between devices as both a receiver and a transmitter.
2. The distributed I/O of which each **WiZo-Link** device has one input and one output.

FIGURE 1. NETWORK ARCHITECTURE

1.1.2. Security and Management Features

When a factory fresh **WiZo-Link** device is powered up, it does not yet belong to a network of devices. The **WiZo-Link** device can either be added to an existing network or be used as an initiator to create a new network. Once configured, a **WiZo-Link** device retains its configuration even when power is lost to the device.

The network is initiated on a **WiZo**; which requires that one **WiZo** be elected as the temporary mesh network master. As soon as a second **WiZo** joins the network, there is no longer a need for the master role and it falls away, with the **WiZo** devices determining the best message transmission route. As additional **WiZo** devices are added, the network management is delegated amongst the **WiZos**, building up the mesh until it reaches full network redundancy.

When a **WiZo-Link** mesh network has been initiated and then federated, the devices belong to a secure network with 128 BIT encryption. Additional nodes can only be added to the network if one of the devices on the network is placed into "Add Node" mode. This requires physical access to at least one device.

Owing to the federated nature of the network, when one **WiZo-Link** device is placed into "Add Node" mode, this places the mesh network of **WiZo-Link** devices into "Add Node" mode.

The network protocol used by WiZo does not contain a user-defined address. This means that, if by coincidence another WiZo is being configured in proximity to the user's network while a new WiZo is being added, there is the risk that a rogue WiZo will join the network.

1.2. Defining the WiZo-Link Network

A single **WiZo** device does not form and cannot form a mesh network; a minimum of two devices is required.

Once **WiZo** devices has been purchased, the user may be evaluating the installation from one of two angles. Firstly, as an existing CENTURION customer who already has an existing CENTURION product, or products, in operation, or secondly as someone new to CENTURION's product range wanting to get the most value for money out of his or her purchases.

If you are an existing CENTURION customer, the **WiZo-Link** enables you to enhance your existing product investment. Each **WiZo-Link** device adds distributed I/O which can be used for several applications. Since the **WiZo-Link** devices form a Mesh-able Network, each new device improves the network strength. This is implemented with no need for further infrastructure investment. Provided the device has power, and is able to connect to the mesh network, it functions as an interconnected device enhancing network capabilities.

If the user is a new CENTURION product customer, please keep in mind that **WiZo-Link** is a standalone product offering that can and does integrate with CENTURION's product range. **WiZo-Link** forms a standalone network of devices, which has the option of integrating via the G-ULTRA GSM unit and the G-REMOTE mobile application to be activated and used as an interface to the **WiZo-Link** network. This is, however, not a requirement, and the **WiZo-Link** network, once configured, will self-manage and self-heal, functioning independently and reliably.

The **WiZo** network is a standalone network, which may consist of up to 50 or more individual units. The network is constructed of **WiZo-Link** devices, which are nodes on the network. Once a **WiZo-Link** device is added or allowed entry, the device is trusted and is managed as a node on the network.

As a node, the **WiZo-Link** improves the strength of the network by;

1. Adding an additional path or hop to the network.
2. network redundancy is improved.
3. additional I/O is added.

2. Network Redundancy

Full network redundancy takes full advantage of the mesh network integrity by ensuring that the message that needs to travel will reach its destination. Redundancy can be achieved with three devices or more. The **WiZo-Link** device will continue to deliver the most recent message, indefinitely, until the message is delivered. When the message is delivered, an acknowledgement is returned; all messages sent have end to end acknowledgements.

In a mesh network, each device is connected to every other device in the network. In an ideal environment, transmission is always perfect, and the message always arrives intact. However, in practice, many factors influence signal transmission and the mesh network principles and topology ensure that the message will always be delivered to its destination. This is achieved by;

1. Line-of-sight or a direct connection,
2. through routing via adjacent devices.

The network strength or health is indicated locally at each **WiZo-Link** device.

2.1. Full Network Redundancy

As shown in Figure 2, node A has a direct line-of-sight connection to node C. Node A can also route its message via node B or node D to reach node C.

The message has three routes through which it can travel, which guarantees that the message is received, unless there is total network failure.
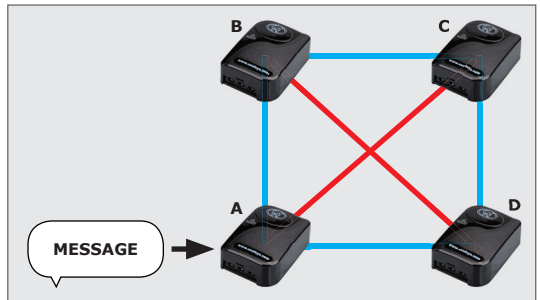

FIGURE 2. FULL NETWORK REDUNDANCY

2.2. Partial Network Redundancy

Partial redundancy is achieved when a node has at least one alternative path to deliver its message to the target device.

As shown in Figure 3, A has a line of sight to node C. If the line of sight is interrupted, the message will be redirected via the mesh network via node B.
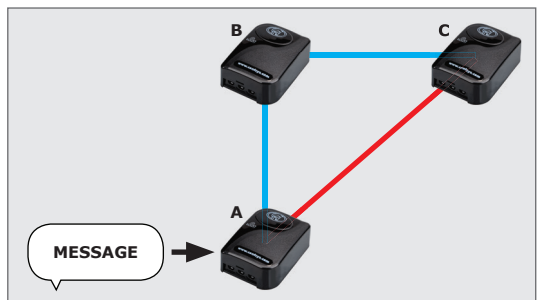

FIGURE 3. PARTIAL NETWORK REDUNDANCY

2.3. Base Network - No Redundancy

Although two **WiZo-Link** devices are required to form a basic network, this does not constitute a mesh network. Node A has direct line-of-sight to Node B and Node B the same for Node A; if there were interruption, there is no alternative path for the message to be delivered.
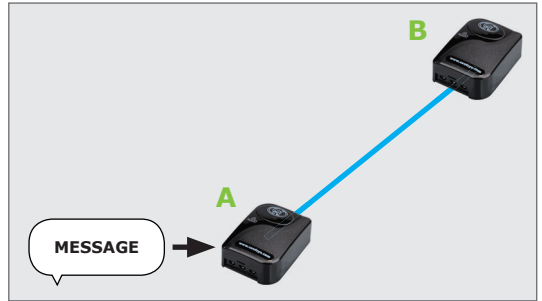

FIGURE 4. BASE NETWORK - NO REDUNDANCY

WiZo-Link devices that do not have any I/O links configured add value to the network as they function as repeaters. This helps strengthen the robustness of the mesh network.

2.4. Designing the Network

When mastering the network, mastering onsite has the advantage of the master selecting a channel that has low energy and minimal interference from other RF devices or even an adjacent **WiZo-Link** network.

More than one **WiZo** Network can coexist on the same channel, provided they are not in permit mode at the same time, which will interfere with federation.

When planning the network, a few essential elements must be considered before physically installing each **WiZo-Link** device or node. Since the **WiZo-Link** is a wireless device, physical installation is minimal, and this does allow for moving elements around. However, sensible planning to begin with will ensure that the network is set up and installed with minimal errors or issues.

2.4.1. Establishing the Network

When planning the **WiZo-Link** network, it is important to consider the paths that are available for a message to travel from one point to another. It is possible to create a network where there is a combination of full- and partial-redundancy. When travelling, the message may have line-of-sight from source to destination node, or the message may be routed via multiple nodes before it reaches its destination. The **WiZo-Link** devices determine the best route to deliver the message, and good network planning goes hand-in-hand with this process to ensure that the devices have enough available paths to ensure that the message is delivered.

Redundancy is affected by the distance between nodes as well as the availability of nodes. This can be impacted by obstructions, where although the devices are close enough, or there are enough nodes on the network, the interference prevents the signal from being transmitted or received.

Shown in Figure 5 below is an example network, which links several common devices into a mesh network. Owing to proximity, certain devices have more than one path to transmit and receive messages, whereas other devices do not. It is not always possible to install the **WiZo-Link** in an ideal location to guarantee optimal signal strength; therefore, it is important to plan carefully to ensure that, as the installer, the devices are not installed in such a way as to reduce signal strength, but so that signal strength is at its best.
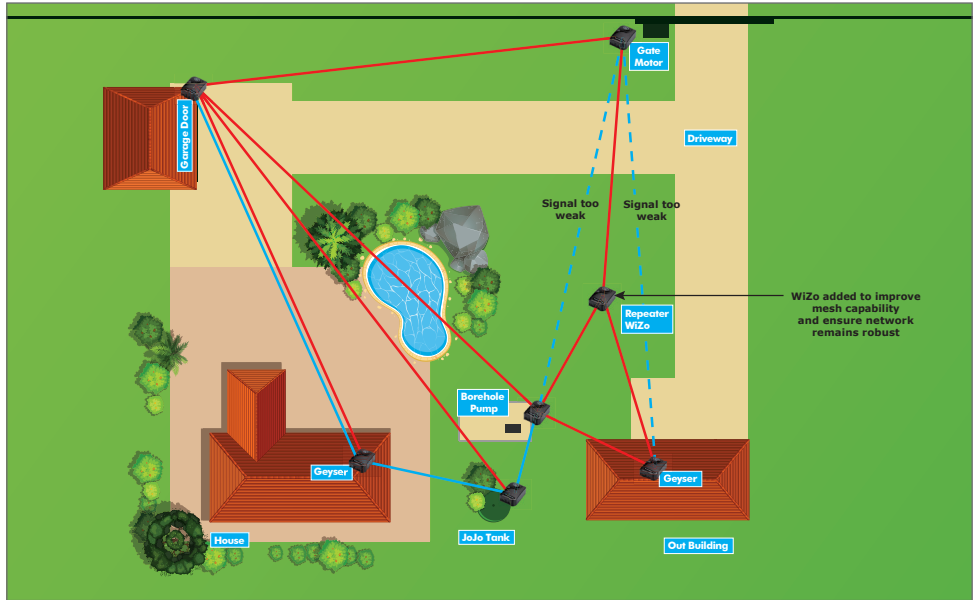
FIGURE 5. EXAMPLE NETWORK

When the **WiZo-Link** mesh network is fully redundant two green LEDs will illuminate in the NET area on the PCB. If only one is illuminated, this means that the user does not have full network redundancy.

The above example consists of the following:

A home which has the following devices near,

- Geyser
- JoJo Tank
- Borehole Pump
- Outbuilding Geyser

Devices which are further away from the home are,

- Garage Door
- Gate Motor

'Lost' refers to any number of eventualities which includes: device(s) struck by lightning, power loss, etc., and does not necessarily refer to device failure.

If, for example, the Garage Door **WiZo** was lost there would be no link between the devices installed in the actual home and the gate motor as there was only one path between the fully-redundant network and the adjacent nodes.

The devices located in the area around the home have higher redundancy, and they will continue to function as a mesh network. To create a bridge or additional path to avoid meshed failure, a **WiZo-Link** can be installed and used as a repeater. Since each **WiZo-Link** already functions as this in its usual role, once joined to the network this role is fulfilled with no additional setup required.

- If one notes in Area A, these devices all have full redundancy as there are multiple paths available to deliver the message
- However, in Area B, i.e. the distance between the Gate Motor and the Home there is only one line-of-sight link. Message delivery is guaranteed provided there is clear line-of-sight and there is sufficient signal strength

> If the red LED illuminates in the NET section, the **WiZo** has lost signal and, if the Amber LED illuminates, there is weak signal.

- In area C, we do have partial redundancy; however, the number of paths for adjacent nodes is limited
- In area D, a **WiZo** has been used as a repeater. This increases network strength by adding in the additional path ensuring that network redundancy has been achieved

2.4.2. Network Transmission Integrity

The **WiZo-Link** unit has an omnidirectional antenna on the PCB. This antenna has a small surface area and, since it operates within the RF band, this means that it is susceptible to interference. When installed, a few precautions must be observed to ensure minimal interference exists.

2.4.2.1. Network Interference Considerations

> - When referring to transmission, we refer to the ability of the device to transmit and receive signals via its antenna
> - Atmospheric conditions can affect wireless transmission. This includes air pressure, ambient temperature, lighting storms, dust storms causing static, dry static ambient air and so on

The **WiZo-Link** unit has an omnidirectional antenna on the PCB. This antenna has a small surface area and, since it operates within the RF band, this means that it is susceptible to interference. When installed, a few precautions must be observed to ensure minimal interference exists.

We recommend that the **WiZo-Link** not be installed in the following locations:

- Metal enclosures, which dampen signal
    - Metal includes ferrous and non-ferrous
    - Steel, mild steel, etc.
    - Aluminium
- The device should not be installed on a metal base or other materials that can absorb or dampen signal, and should be at least 100mm (See above)

- Near or adjacent to devices which generate strong electromagnetic fields, for e.g. transformers, electric equipment, etc
- Line-of-sight transmission can be affected by the following
  - Indoors
    - Concrete reinforcing
    - Concrete Walls
    - Rhino board Walls with internal steel structure
  - Outdoors
    - Elevation: **WiZo** devices mounted at disparate elevations (e.g. ground level versus 3-4 storeys up: Windmill VS Borehole Pump)
    - Steel structures
    - Concrete structures

2.4.2.2. Network Transmission Limitations

The following are recommendations for transmission distance and can be used as a reliable rule of thumb. These recommendations are generalised, and external factors may reduce network integrity.

Network Transmission Recommendations	
Indoors	50 metres minimum[1]
Outdoors	Up 1KM, Line of sight[2]

1. This is omnidirectional and will be affected by reinforcing and concrete.
2. This requires line-of-sight, clear weather and no ambient conditions which impact negatively on RF characteristics or obstructions that deflect or diffuse signal strength.

TABLE 1

2.4.2.3. Communication Certifications

The **WiZo-Link** device carries the following approvals:

- ICASA (South Africa)
- CE (Europe)
- RCM (Australia)

2.5. Expanding the Network

Although **WiZo-Link**-based networks are standalone, the network can be expanded by including a Gateway Device. The gateway would link the **WiZo-Link** network to the outside world and allow for control and monitoring of the network.

A gateway device may, for example, be the Centurion Systems G-ULTRA GSM Ultra. This device links the **WiZo-Link** mesh network to the outside world and the user would be able to link to the network using Centurion Systems' G-REMOTE mobile app.
The gateway has enabled connectivity with the individual **WiZo** units, allowing for them to be monitored and controlled. The gateway is not required and, once configured, the gateway enhances features. The network and device configuration are done on the **WiZo** devices themselves and, once configured, the the app can interact with them.

2.6. Power Redundancy Options and Requirements

The following power requirements must be adhered to, in order to ensure that the **WiZo-Link** operates optimally.

Power Requirements	
WiZo-Link Nominal Supply Voltage	12 – 24 VDC
Input Max Voltage	24V
WiZo-Link nominal current drain	40mA

<div align="right">**TABLE 2**</div>

3. Distributed I/O

The **WiZo-Link** devices have built-in inputs and outputs and, once the network has been established and the additional devices added, the next step is to configure the I/O. The key strength of the **WiZo-Link** system is that inputs of one device can be configured to drive the outputs of one or many devices. These relationships will be discussed in more detail in the next section.

Each **WiZo** is equipped with one input and one output:

Input	Active Low, internally pulled High
Output	Single Pole, double throw, potential free

<div align="right">**TABLE 3**</div>

3.1. What are inputs and outputs?

Inputs and outputs are used by electronic devices to interface and interact with people and systems; in other words, the "outside world". An input allows the outside world, whether a person pushing a pushbutton or, for example, a float switch on a JoJo tank, to send a signal. That signal indicates to the system that a change has taken place and that change must translate into an action. The action takes place when the actuator or output is activated.

Examples of inputs are:
• Pushbutton
• Float switch
• Proximity device, Alarm panels, Energisers, Gate motors.

Examples of Outputs are:
• A globe
• A motor
• A siren

Keep in mind that the output on the **WiZo-Link** is a low power type output, and it is used to ACTUATE the output system and not to drive the output system. This is referred to as relay action, where a low-powered system drives or actuates a high-power system.

Using the WiZo-Link output to drive a high-power system, for example a 10A motor, WILL result in the WiZo-Link being damaged. This may void the warranty, and/or destroy the WiZo in the process.

3.2. How they work

Inputs and Outputs function in specific ways and this allows the installer to configure them in such a way that they do what the application requires. **WiZo-Link** also allows the installer to configure one device to actuate it own output, but also the outputs of other **WiZo-Link** devices.

3.2.1. Modes of Operation

The input is an active low-type. This means that the change in the signal is recognised when the level of the input goes from high to low or from 12V to 0V. As shown diagrammatically in Figure 6 below, when the button is pushed the active low signal is detected, and the **WiZo-Link** unit determines which output to activate. That output is located and activated.
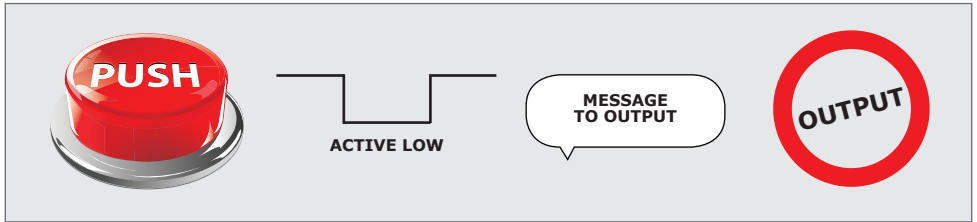
FIGURE 6

The outputs are activated in one of two ways: Normal mode or latch.

Normal: Means that, when the input is activated, the output stays active so long as the input is active. If the input is inactive, then the output is inactive.

Latch: Means that when the input is active the output goes active and stays active even if the input is inactive. The output will only go inactive if the input is activated again.

See Tables 4 and 5 below for a visual description:

Normal Mode	
In toggle mode, when the input the output is active or on. When released, the output goes off immediately.	
ACTIVE LOW - INPUT ACTIVE	**OUTPUT IS ACTIVE MOMENTARILY**
ACTIVE HIGH - INPUT INACTIVE	**OUTPUT IS INACTIVE**

TABLE 4

Latched Mode
In latch mode, when the input is active, the output stays active even if the input goes inactive, i.e. it latches. The output will only revert to the off / inactive state when the input is active again. In other words, to activate the output requires a change in state on the input and to deactivate the output requires a change in state on the input.

ACTIVE LOW - INPUT ACTIVE	
ACTIVE HIGH - INPUT INACTIVE	OUTPUT STAYS ACTIVE
ACTIVE LOW - INPUT ACTIVE	
ACTIVE HIGH - INPUT INACTIVE	OUTPUT IS INACTIVE
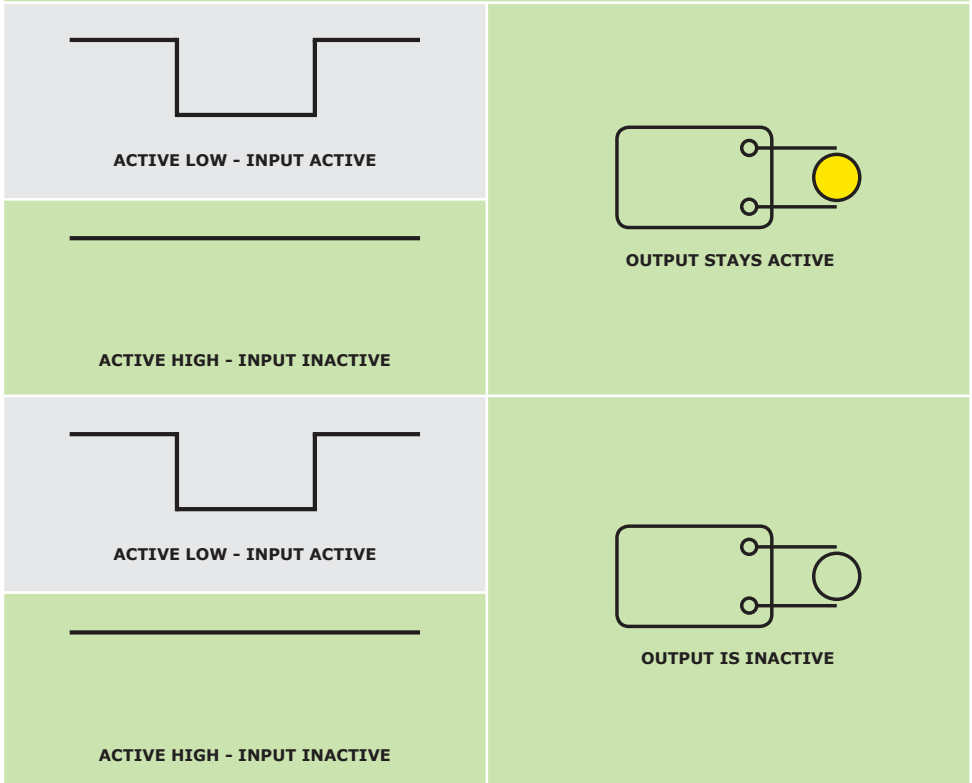
TABLE 5

3.2.2. I/O Relationships

The key feature of the **WiZo-Link** device is to actuate the outputs of adjacent devices or devices at some distance wirelessly; while still able to actuate its own output.
In other words, there is no need to run extended cabling to activate, for example, a gate motor. The **WiZo-Link** with the dependable mesh network, guarantees that the link or connection between devices stays active and can reliably be actuated at any time.

The **WiZo-Link** devices create relationships in the following ways;

• One to one
• One to many
• Many to one
• Many to many

The below basic configurations allow for the output of a **WiZo-Link** device to be actuated.
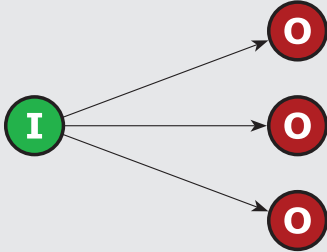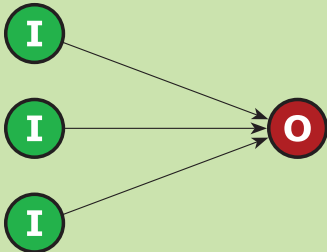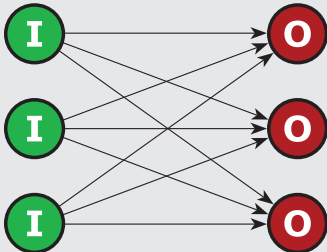
Relationship	Connections
 One-to-One	**One to One** The input of the local device can: 1. Actuate the output locally, or 2. Actuate the output of a remote **WiZo**
 One-to-Many	**One to Many** The input of the local device can: 1. The input may either actuate its local output, and the outputs of other remote devices, or 2. Activate the remote outputs of other devices.
 Many-to-One	**Many to One** The inputs of remote **WiZos** can: 1. Actuate the output of the local **WiZo**.
 Many-to-Many	**Many to Many** The inputs of remote **WiZos** can, 1. Activate their local output, and 2. The output of remote **WiZos** 3. The output of more than one remote **WiZo**. The outputs of the local **WiZo** can 1. Be actuated by a remote **WiZo** 2. Be actuated by more than one remote **WiZo**.

TABLE 6

4. Quick Start Section

4.1. Getting Started

When the **WiZos** are removed from their packaging, it is important to remember the following:

The **WiZos** are ready to be used; they have just not been configured or added to a network. Configuration is what the user / installer needs to do.

Tampering with the manufacture of the device or modifying the manufacture of the device will void the warranty.

4.2. The WiZo User Interface

The **WiZo** interacts with the user by means of a combination of LEDs, tactile switches and a buzzer.

Tactile switches come in many shapes, sizes, colours and are made from different materials. They all have one thing in common, that is to make proper contact, it needs firm force to ensure that the button is seated properly, especially when it needs to be held in one place for a period of time. Ensure that, during the setup process, when the switch needs to be held for a period, that firm, even force is applied.

Be sure to apply even, downward pressure onto the tactile switch. Avoid excessive force or horizontal force as this may cause the surface mount pads to shear, i.e. the tactile switch will break clear of the PCB and configuration will not be possible!

The combination of LEDs and tactile switches will enable the installer to configure the **WiZo**. To identify the various aspects of the **WiZo** interface, see the description in the following tables;

4.2.1. Power LEDs

LED	LED State	Description
Power	On[1]	When illuminated, the LED indicates that the required power has been applied to the PCB.
	Off	No power has been applied to the WiZo.

1. If the power LED does not illuminate, but other LEDS do, this indicates that the LED has malfunctioned. It does not indicate a system error.

TABLE 7

4.2.2. NET LEDs

The NET LEDs are software-controlled and are used to indicate the system status to the user, specifically for the communications network.

LED	LED State	Description
NET LEDs	Off	The **WiZo** has not been added to a network
	Red	The **WiZo** has been added to a network; however, no other devices have been detected or signal with its network has been lost
	Orange	The **WiZo** has been added to a network; however, the signal is weak[1]
	1 Green	Good signal
	2 Green	Good signal with the mesh network, and there are more than three devices in the vicinity to which the device can connect. This is the ideal state of the mesh network

1. Even with weak signal, message delivery is guaranteed as the system will retry until delivered and an acknowledgement of delivery is received.

TABLE 8

4.2.3. I/O

The **WiZo–Link** device has one input and one output. The LEDs used to indicate the state of the inputs and outputs will change colour, and rate of flash depending on the mode that the **WiZo-Link** has been entered.

4.2.3.1. I/O State

The I/O state means the condition that the the I/O is in. The state changes depending on the interaction with the **WiZo-Link** and how it has been configured.

LED	LED State	Description
INPUT	Off	The input is inactive (high or floating)
	On	The input is active (connected to ground or brought low when switched to ground)
HIGH	Off	The output is deactivated[1]
	On	The output has been activated[1]

1. For the output to be active, a link must be created from an input on a remote or the local **WiZo-Link** device.

TABLE 9

4.2.3.2. I/O Linking

The **WiZo-Link** device must first be placed into input-linking mode. Once this mode has been activated, the installer will use the state of the LEDs to identify which inputs are available and their status.

The Link I has two LEDs side-by-side.

LINK LED - INPUT		
COLOUR	**LED State**	**Description**
GREEN	Off	This input has not been configured to trigger an output; no link exists to either a local or remote **WiZo-Link** device. This is the factory default state.
	On	The input is linked to at least one output, either a local or remote **WiZo**.
	Fast Flash	Input to Output configuration mode for this specific Input.
RED	On	Communications with at least one of the outputs to which it has been linked has been lost or has failed.

TABLE 10

The Link O has two LEDs side-by-side.

LINK LED - OUTPUT		
COLOUR	**LED State**	**Description**
GREEN	Off	This output has not been linked to an input; no link exists to either a local or remote **WiZo**. This is the factory default state.
	On	The output is linked to at least one input, either local or a remote **WiZo**.
	Slow Flash	The output is **not** currently linked to the specific Input that is in linking configuration mode.
	Fast Flash	The output is currently linked to the specific Input that is in linking configuration mode.
RED	On	Communications with at least one of the inputs to which it has been linked has been lost or has failed.

TABLE 11

4.3. Default State

The **WiZo**'s default state is that no network has been configured. The device can be returned to this state at any time. The **WiZo** Devices do not belong to a network; therefore, the user / installer must do the following:

1. Create a Master Device to create the network.
2. Add additional **WiZos** until the mesh network is created with either full or partial redundancy.

4.4. Master reset the WiZo (Factory Reset)

Follow these steps to ensure that the **WiZo** is not part of a network, i.e. in its default network state.

Pre-step

1. Ensure that the **WiZo** is powered down, and has been without power for at least 20 seconds.
2. Locate the NET and I/O tactile switches.
   They are located at the edge of the board, next to each other.

Start

1. Apply firm, even pressure to both the NET and I/O switches.
2. Keep them depressed, and power up the **WiZo**.
   a. The power LED will illuminate.
   b. and four other LEDs will pulse and the device will emit a slow buzzer pulse.
3. Allow the device to remain in this state for at least 10 seconds. The slow pulse will change to a rapid buzzer pulse. This indicates that the device has been master reset.
4. Release the NET and I/O buttons.

4.5. Network Master

The network master step needs to take place only once, on one device, and is not needed again unless one is re-establishing the network.

To establish the network, one temporary master must be created. Once the network has been created, additional devices are added and once this happens, master control is no longer required and is delegated amongst the devices in the network.

Pre-step

1. Ensure that the **WiZo** is not already configured as part of a network.
   If so, one can master reset the device, as above.
2. Locate the NET and I/O tactile switches.
   They are located at the edge of the board, next to each other.

Start

1. Power up the device, allow for 5-10 seconds for the power supply to stabilise.
2. Locate the NET button, and depress.
   a. There will be one beep, keep holding the button,
   b. Hold until two beeps are heard,
   c. Release the NET button. A rapid succession of beeps will be heard.

3. An amber LED will illuminate indicating the channel scanning phase, followed by a red LED.

> The static illuminated red LED indicates that the device is ready but that no other devices have been found on the network.

4. The network is now ready for more devices to be added.

> If the above steps result in the **WiZo** returning a long beep, this **WiZo** has already Federated (added to a network) and cannot be used as a master unless it is master cleared or reset.

4.5.1. Network Master Process

Mastering a **WiZo** for a new network needs to happen only once. As soon as one other (and any additional) **WiZos** are added to this network, they inherit the configuration information, which may be replicated without the original master from here on.
In other words, even if the Master falls away, the network remains functional and can be expanded.

4.5.2. Adding Additional Devices or Device Federation

Mastering a **WiZo** for a new network needs to happen only once. As soon as one other (and any additional) **WiZos** are added to this network, they inherit the configuration information, which may be replicated without the original master from here on.
In other words, even if the Master falls away, the network remains functional and can be expanded.

Pre-step

1. Ensure that all the devices that the user wishes to add have been master cleared and have not previously been added to another network.
2. Ensure that the temporary master has been powered up.
3. Ensure that the **WiZos** (more than one can be ready) are powered up.

Start

To add new devices, start with the Master **WiZo** or any device already added if there is more than one, and do the following;

1. Press and hold the NET button until a single beep is heard.
2. Release the button and all Federated **WiZos** will beep simultaneously; this indicates that the network is in Federated mode.
3. Using a **WiZo** that is not currently added to any network, press and hold the NET button until a single beep is heard.
4. Once released, the **WiZo** will search for the network and, once it adds the devices, LEDs will flash and the Buzzer will beep at the same rate.
5. A new **WiZo** has now been added.

> To add additional **WiZos**, repeat the steps above.

6. Press the NET button to exit Federated mode.

- When Federated mode is exited, the device LEDs stop flashing and the buzzer will be silenced
- To re-enter Federated mode, simply repeat the steps above

4.6. Configuring an I/O Link

The instructions provided assume that the installer can see each of the **WiZo** Devices visually. It is recommended that a record be kept of which devices have been linked to avoid accidentally placing a **WiZo** or **WiZos** into Supervision mode.

Although it is not always possible, thought should be given to laying out the network and programming the devices before physically distributing them; this will assist with reducing potential problems.

4.6.1. One to One

Configuring a one to one connection requires the following;

1. A maximum of two **WiZos**; however, a one to one can be configured on the same device.
2. Some knowledge of which devices have already been linked, if applicable.
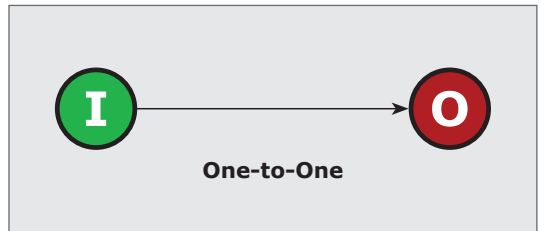

FIGURE 7. ONE TO ONE

Be careful to ensure that creating a new link does not override or impact on an existing link. For example, the user would not want his or her pool pump to switch on and off, every time that the gate motor is activated.

Pre-step

1. Ensure that the **WiZo** is on a network.
2. Ensure that the two **WiZos** have power.

Ensure that safety precautions are followed and that the device or system that the user wants to activate with the I/O link is not powered up or active.

Start

The objective is to connect (wirelessly), the input of one **WiZo**, to the output of another **WiZo**.

Start with the **WiZo**, which is the device where the input or trigger will take place.

The I/O link is always created from the input in relation to the output, since the input will always trigger the output.

1. Locate the I/O button; press and hold the button for a period exceeding 2 seconds.

2. When a single beep is heard, release the button. The network is open for configuration.

    a. The specific Input link LED will flash fast to indicate that this Input is in linking configuration mode.

    b. All Output(s) link LEDs will slow flash if they are not currently linked to this specific Input and all Output link LEDs that are will fast flash.

3. On the target **WiZo**, press and hold down the I/O button until a beep is heard.

    a. The LINK: O LED that was flashing slowly will remain on.

    b. Release the I/O button. The process will complete with rapid beeping and the devices will exit configuration.

4. To test the setup, actuate the input of the **WiZo** where the input / trigger will take place, and the output (relay) will make a clicking sound.

4.6.2. One to Many

The input of the local device can;

1. The input may either actuate its local output, and the outputs of other remote devices, or

2. Activate the remote outputs of other devices.

Pre-step

1. Ensure that the **WiZo** is on a network.
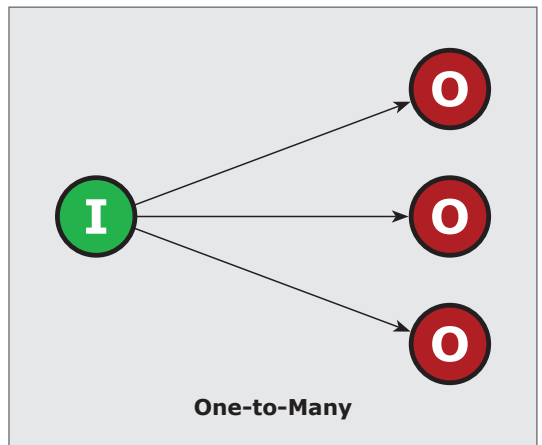
2. Ensure that the two **WiZos** have power.

One-to-Many

FIGURE 8. ONE TO MANY

Start

The objective is to connect (wirelessly), the input of one **WiZo**, to the output of another **WiZo**.

Start with the **WiZo**, which is the device where the input or trigger will take place.

> The I/O link is always created from the Input in relation to the output, since the input will always trigger the output.

1. Locate the I/O button; press and hold the button for a period exceeding 2 seconds.

2. When a single beep is heard, release the button. The network is now in I/O Linking Mode.

3. Locate the LINK LEDs, and select the output on the target **WiZo**.

    a. The specific Input link LED will flash fast to indicate that this Input is in linking configuration mode.

    b. All Output(s) link LEDs will slow flash if they are not currently linked to this specific Input and all Output link LEDs that are will fast flash.

4. On the target **WiZo**, press and hold down the I/O button until a beep is heard.
   a. The LINK: O LED that was flashing slowly will remain on.
   b. Release the I/O button; the process will complete with rapid beeping and the devices will exit configuration.
5. To test the setup, actuate the input of the **WiZo** where the input / trigger will take place, and the output (relay) will make a clicking sound.
6. The user can continue to add I/O links using the above steps as required.

> The output of a single **WiZo-Link** device or multiple **WiZo-Link** devices can be actuated by more than one input.

4.6.3. Implementing Further I/O Links

The I/O linking options shown in Figures 9 and 10 below can be implemented utilising the steps mentioned above.

Many to One

The inputs of remote **WiZos** can:

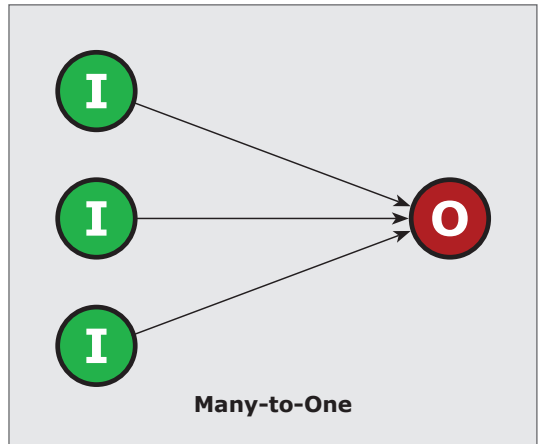1. Actuate the output of the local **WiZo**

FIGURE 9. MANY TO ONE

Many to Many

The inputs of remote **WiZos** can:

1. Activate their local output, and
2. The output of remote WiZos
3. The output of more than one remote WiZo

The outputs of the local WiZo can:

4. Be actuated by a remote WiZo
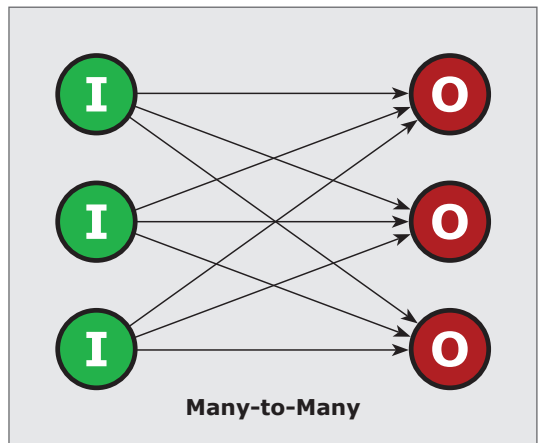5. Be actuated by more than one remote WiZo

FIGURE 10. MANY TO MANY

4.6.4. Output State

The output or relay of the **WiZo** toggles or switches on and then off when the input is triggered; this is the factory default and does not require any additional setup or configuration. Alternatively, the output can be configured to latch or stay on when the input is triggered. Changing the output mode is done at the output **WiZo**, and not at the **WiZo** where the input is triggered. The latch mode is useful for when one wants to switch a light on, for example, and the light must stay on until it is switched off.
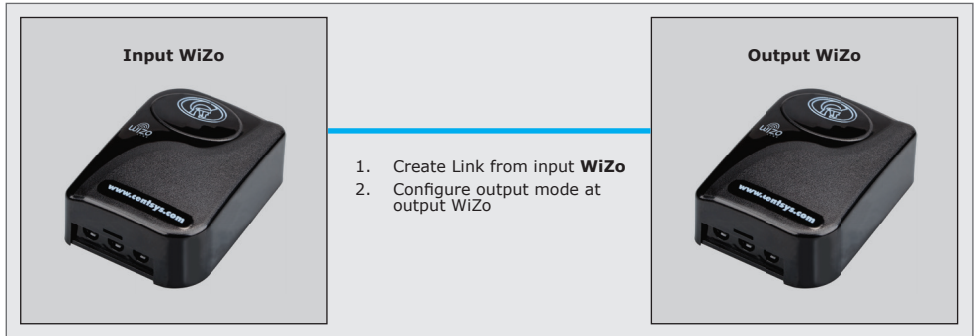

Input WiZo   1. Create Link from input **WiZo**   **Output WiZo**
                        2. Configure output mode at
                            output WiZo

FIGURE 11. OUTPUT STATE

4.6.5. Modes of Operation for the WiZo Output

The **WiZo**'s output works in one of two ways: either in toggle mode, which is the factory default, or in Latch mode, which must by configured by the installer.

Mode	Description
Normal	Toggle or non-latched mode; in this mode the output responds directly to the input. When the input is active, the output is active. When an input is inactive, then the output is inactive as well.
Latch mode	Latch mode allows for the output to stay on after the input is inactive. This means that releasing the input won't switch the output off; the input must be activated to switch the input on and then activated again to switch it off.

TABLE 12

The factory default output mode is non-latching or toggle mode.

Pre-step

1. Ensure that an I/O link exists between an input and an output.
2. Ensure that both **WiZos** are powered up.
3. If a device or system is connected to the **WiZo** output, ensure that it is disconnected or powered down to prevent any injury or damage.

Start

1. Locate the I/O button on the output **WiZo**.

> When working with installed **WiZos**, locating the output **WiZo** would rely on the installer keeping a record of which input WiZos activate the outputs of **WiZos** that aren't visible.

2. Press and hold the button for a period exceeding 5 seconds, or until the **WiZo** beeps twice.
3. Release the I/O button and the output **WiZo** will produce a rapid succession of beeps.
4. The **WiZo** is now configured in Latch mode.
5. Test the device link, by activating the input and
   a. One press will activate the relay and keep it on.
   b. A second press will switch the relay/output off.

To change back to toggle mode, repeat the steps above.

4.6.6. Removing an I/O Link

An I/O link would be removed if no longer needed or if the I/O Link was created in error.

> The I/O link is removed at the OUTPUT **WiZo**, not at the device where the input is triggered (unless they are the same device).

Pre-step

1. Ensure that an I/O link exists between an input and an output.
2. Ensure that both **WiZos** are powered up.

Start

1. Place the **WiZo** where the link will be removed into IO Link mode.
   This will also put the whole network into IO Link mode.
   a. Press the I/O button until a confirmation beep is heard.
   b. Since the network is in I/O Link mode, the IO LEDs will flash rapidly for 'has been linked' and slowly for 'no link'.
   c. Ensure that the O LED is flashing fast as this indicates there is a link to remove. If the LED is flashing slowly, this means there is no link to remove.
2. Press and hold the I/O button a second time and wait until there is a confirmation beep. This indicates that the link has been broken.

> - O LED will be **OFF** if there are no other output links associated with it
> - O LED will be **ON** if one or more output links remain in place

> At the same time, the [I LED] on the **WiZo** where the input was associated with this output, will stop rapidly flashing. Instead, it will:
> - Turn **ON** if the device has links to other outputs remaining in place
> - Turn **OFF** if the device has no remaining links to other outputs on other devices

Removing an IO link does not remove the **WiZo-Link** device from the network, it simply removes the I/O connection. The **WiZo** will still be a part of the network and continue to work as a signal repeater, ensuring that the network is robust and remains fully redundant.

4.6.7. Removing a Device from a Network

Removing a device from the network follows the same process as a master reset.

Pre-step
1. Identify the device to be removed.
2. Ensure that there is no dependency on this device by other devices.

Start
1. Power down the **WiZo** to be removed.
2. Press and hold the I/O button, and power up the device.

> [Net], [I] & [O] LEDs all flash while the device returns to factory default.

3. The **WiZo** emits a rapid beep succession and the three LEDs flash slowly.
4. Release the button.
5. Cycle power to the device. The device will power up in its default state.

> **Removing a device from the network may cause one or more devices to go into Supervision mode. This means that an I/O link has been lost.**

4.7. Supervision Mode

Supervision mode is when the mesh network is in an error state due to a network resource being lost. The user will notice that either the Input **WiZo** or the Output **WiZo**'s right-hand Link [I] or [O] button will flash.

The link may be lost due to:
• poor signal
• one or more **WiZos** have lost power
• A **WiZo** has been removed from the network

> • Link [I] flashes when the input **WiZo** loses connection to an output **WiZo**
> • Link [O] flashes when the output **WiZo** loses connection to an input **WiZo**

4.7.1. Supervision Mode Notification

A **WiZo** board can be used as a Network Error notification system, if its output is not configured and has no inbound link. The input on the **WiZo** can be configured to, for example, another **WiZo**, which controls a gate motor. If the **WiZo** controlling the gate motor fails or is lost, the output on the input **WiZo** will automatically switch on when the **WiZo** goes into Supervision mode. If a G-ULTRA unit is connected, this notification can be used to communicate a network failure or error.

The Supervision Mode Notification feature is **ONLY** available when the output is not linked. If linked, this feature is not available.

4.7.2. Removing I/O Links while in Supervision mode

When a **WiZo** has gone into Supervision mode, the link to the now non-existent **WiZo** can be removed.

1. Press and hold down the NET and I/O buttons together for a period exceeding two seconds.
2. The **WiZo** will buzz several times in rapid succession. This indicates that the link has been broken.
3. Release the two buttons,
    a. Either one of the supervision LEDs will now no longer flash.
    b. The I/O link has been removed.

The above process will remove the **WiZo-Link** device that can't be reached IO Links and takes the **WiZo** that has lost the link out of Supervision mode.

To illustrate:

1. **WiZo A** controls the output on **WiZo C**.
    a. The output of **WiZo A** is not used.
    b. and has no inbound link.
    c. **WiZo A**'s output is connected to a G-ULTRA.

This configuration only activates the **WiZo A** output when **WiZo C** fails.

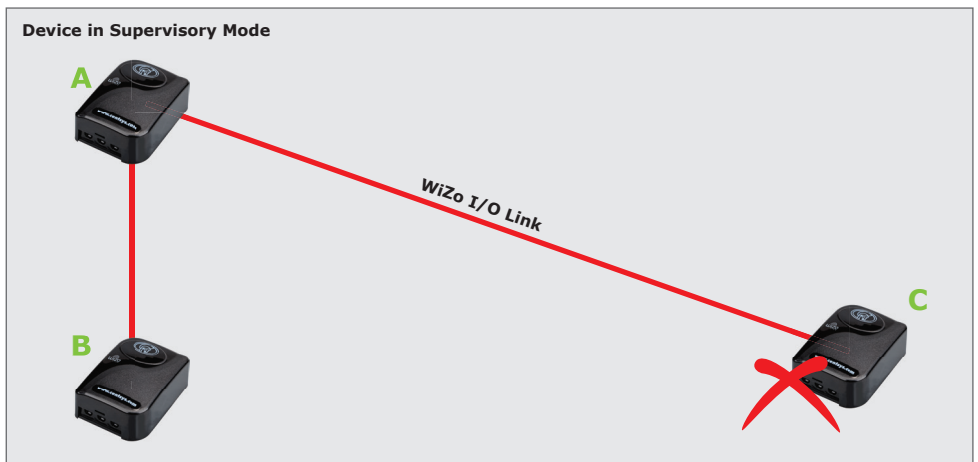2. **WiZo C** loses power.
    a. **WiZo A** goes into Supervision mode.

FIGURE 12. REMOVING I/O LINKS WHILE IN SUPERVISION MODE

5. Specifications

5.1. Technical Specifications

The following specifications were correct at the time of publishing and may be subject to change without notice.

Device Specifications		
Supply Voltage	Minimum Supply	11.5 Vdc
	Maximum Supply	24 Vdc
Current Consumption[1]	Average Current	30 mA @ 12Vdc
	Peak Current	50 mA @ 12Vdc
Maximum Devices	Devices per network	50
I/O	Inputs / Device	1
	Outputs / Device	1
	Number of outputs linkable by single input	10
	Number of inputs linkable to single output	10
Physical Data	Unit Weight	65g
	Dimensions	78mm W X 58mm D x 31mm H
Operating Temperature	Degrees Celsius	-15°C - 80°C

1. The current values can be used to determine current consumption for battery life backup calculations.

TABLE 13

6. Installation

This portion of the product installation should be reserved for qualified personnel only. Qualification includes the ability to differentiate between AC and DC power supplies, and proficiency in working with low-powered electronics devices.

6.1. Prepare for Installation

The WiZo-Link is a DC (Direct Current) powered system. The unit is under no circumstances to be connected to an AC power supply. This action will damage the unit and void the warranty!

Shown in Figure 13 below is an example installation of the product; the product is not limited to this example.
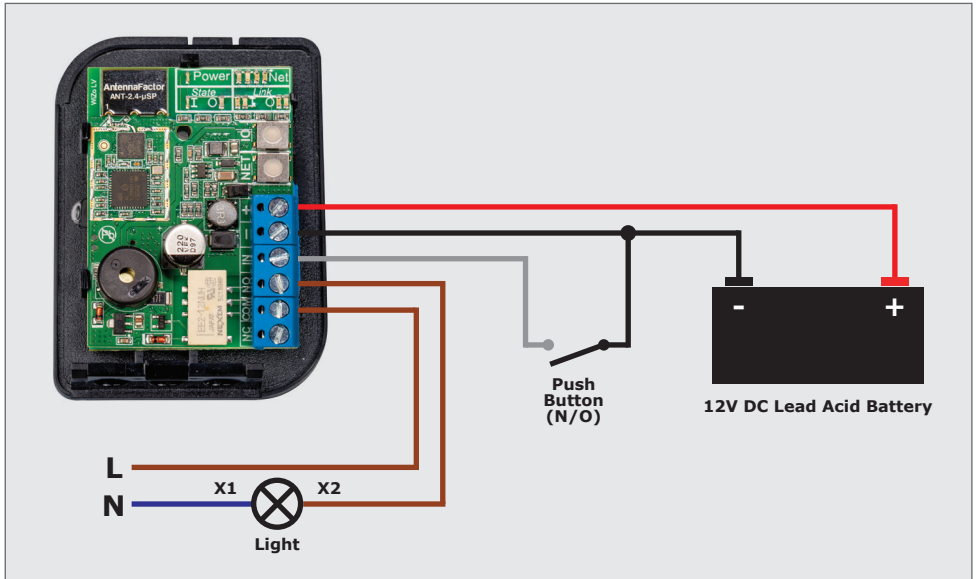

FIGURE 13. BASIC INSTALLATION EXAMPLE

6.2. Potential Applications

The list below identifies possible application, but the product is not limited to these examples and neither is the list exhaustive.

- General signalling wire replacer (On/Off applications)
- Wireless gate motor activation and status/alarm feedback
- Geyser (and other household) control
- Control of multiple lights from multiple locations
- Pool pump control
- Activation of remote sirens and alarm warning strobes
- Remote sensing of fault conditions along long-distance fencing
- Community panic alarm system

6.3. Troubleshooting

6.3.1. Weak Signal

Scenario	The Orange NET LED has illuminated.
Resolution	The orange LED indicates that the **WiZo** has a weak signal to adjacent **WiZo-Link** devices. • Ensure that no obstruction impedes the line-of-sight • An additional **WiZo-Link** device can be installed to act as a repeater to improve signal strength

6.3.2. I/O

Scenario	My input triggers intermittently, activating the output.
Resolution	Ensure that the input is tied high. The input may be floating, causing the unexpected trigger.

Scenario	I want to link an input to an output that has already been linked.
Resolution	It is possible to have more than one input linked to more than one output.

Scenario	My link output LED came on after I disconnected a WiZo that I no longer needed.
Resolution	The I/O link is still active for the **WiZo** that is still up and running. Remove the I/O link so that the **WiZo** does not go into Supervision mode.

7. Warranty Information

You can register your product(s) online at www.centsys.co.za, which will assist you in keeping a record of your date of purchase or installation, serial numbers, etc.

All of our products are manufactured with extreme care, thoroughly inspected and tested.

The goods supplied by us shall be subject to the provisions of sections 55 to 57 of the Consumer Protection Act (68/2008) except where the provisions of the warranty contained in our product documentation are more favourable to the purchaser.
Subject to the warranty contained in our product documentation, if applicable, our products are warranted for a period of twenty-four months after delivery.
However, it is expressly noted that batteries carry a six month warranty due to the nature of these products being such that they are subject to possible misuse. Please note that warranties will be honoured on a carry-in basis; in other words, the product in question must be taken in to one of our branches, or to the authorised reseller that the product was purchased from, for assessment and, if necessary, repair. For equipment not of our manufacture, the warranty as supplied by the original manufacturer will apply if such warranty is more favourable to the purchaser than the relevant provisions of the Consumer Protection Act (Act 68/2008 of South Africa), or any other applicable law as so required in different countries in which the product was sold.
Such warranty is valid only once full payment has been received for such goods.

Australian customers:

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure

Any warranty may be voidable on any equipment which:

1. Has not been installed in accordance with the installation instructions provided.

2. Has been subject to misuse or which has been used for any purpose other than that designed for by the manufacturers.

3. Has damage caused as a result of handling during transit, atmospheric conditions (including lightning), corrosion of metal parts, insect infestation, power surges or other forces outside of the control of the manufacturer.

4. Has been repaired by any workshop and / or person NOT previously authorised by the manufacturer.

5. Has been repaired with components not previously tested, passed or authorised by Centurion Systems (Pty) Ltd, South Africa or one of its subsidiary companies.

8. Appendix

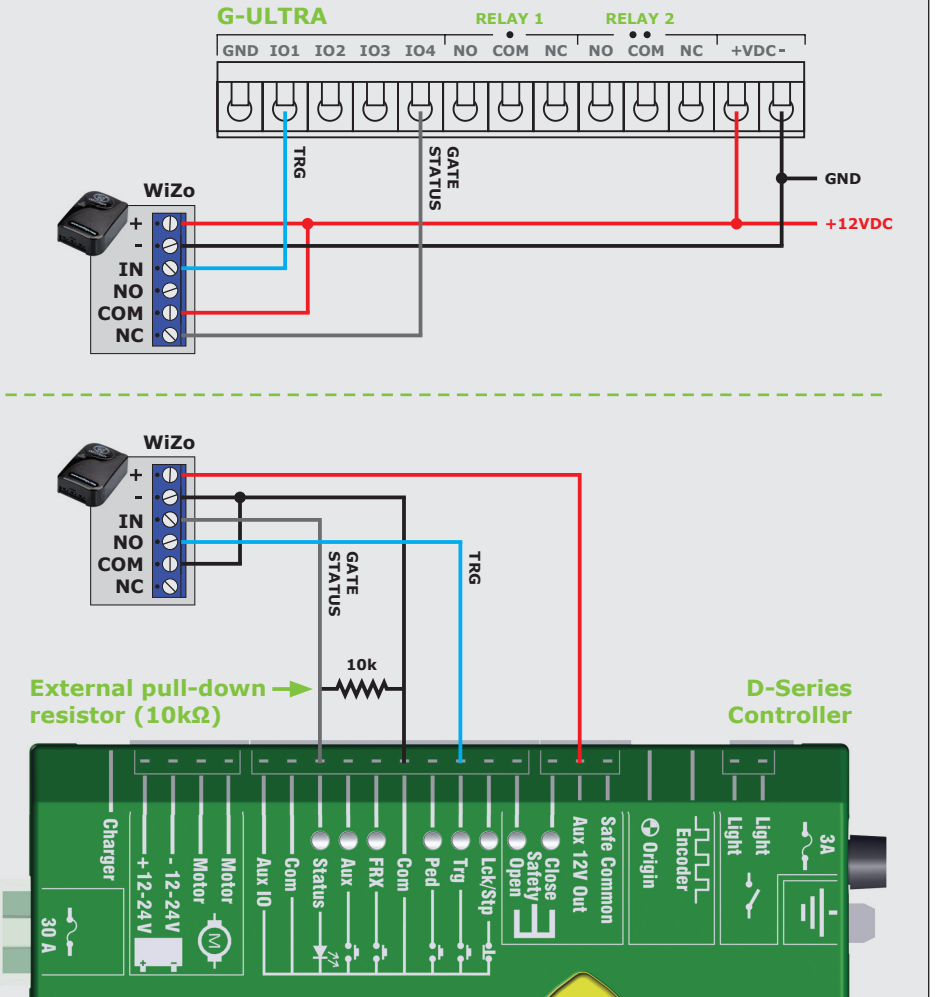## 8.1. Wiring a G-ULTRA into a D-Series Controller via a WiZo

FIGURE 14

8.2. Wiring a G-ULTRA into a Electric Fence Controller via WiZos

Possible Activations

- Arm / Disarm

Possible Notifications

- Arm Status
- Alarm Notifications

G-ULTRA

RELAY 1   RELAY 2

GND IO1 IO2 IO3 IO4 NO COM NC NO COM NC +VDC-

STATUS

WiZo

+
-
IN
NO
COM
NC

WiZo

+
-
IN
NO
COM
NC

KEYSWITCH
ALARM

GND

+12VDC

WiZo

+
-
IN
NO
COM
NC

STATUS

NC   NC

COM

NO   NO

ALARM

+   -   +   -

+12VDC   GND

KEYSWITCH

WiZo

+
-
IN
NO
COM
NC

16VAC   STROBE   SIREN   KEYPAD   GATE   IN1
         +   -   +   -   +12 GND DAT
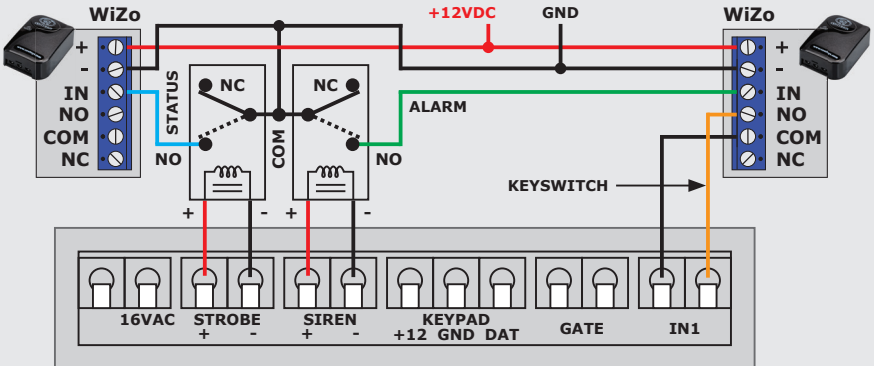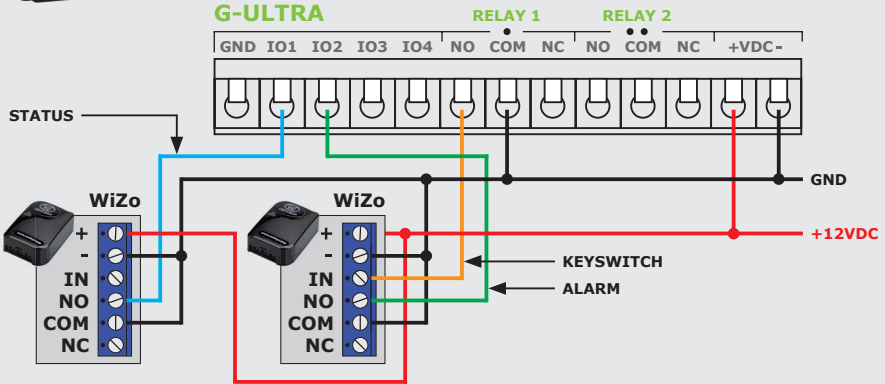
Electric Fence control board

To program the Strobe to Status:

JVA Keypad, Press:
1. "INSTALLER PIN"*0#
2. 2202#
3. *#

Nemtek Keypad, Press:
1. "INSTALLER PIN"*0#
2. 101# **OR** 0011# (Model Dependant)
3. *#

- The Status and alarm inputs must have three seconds filter time configured on the G-ULTRA
- The strobe output on the energiser needs to be programmed for the armed status notification to be sent via the G-ULTRA
- Using "IN1" via the G-ULTRA will bypass the key-switch function on the energiser

FIGURE 5

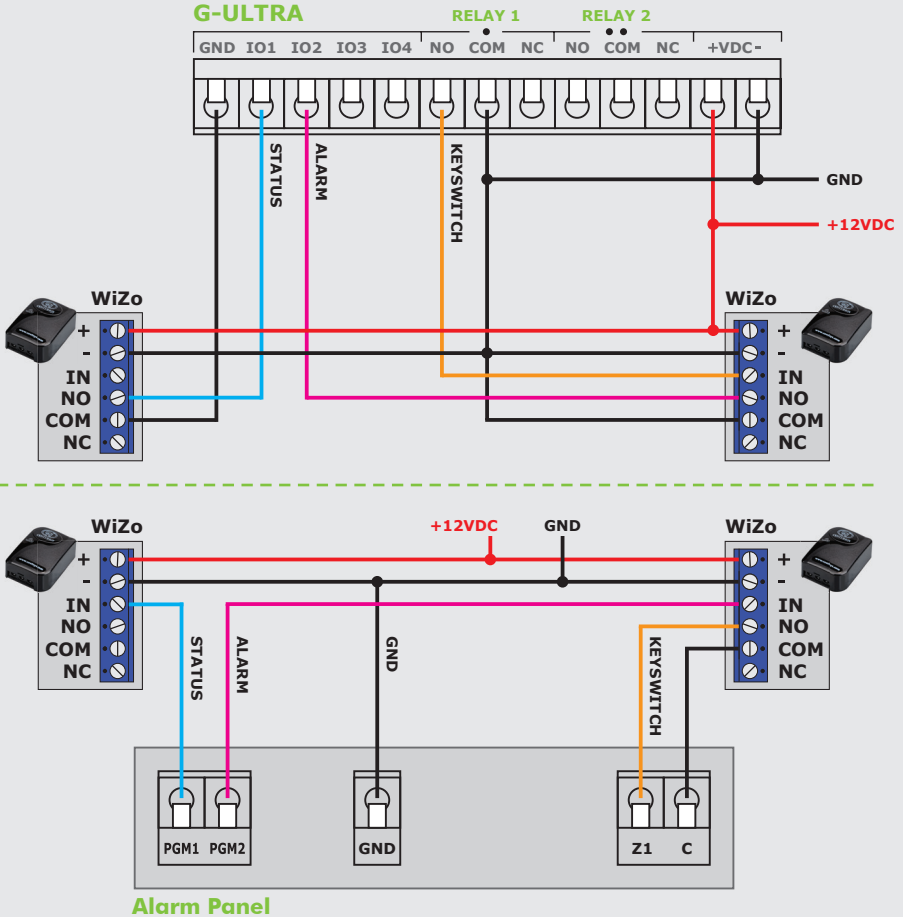## 8.3. Wiring a G-ULTRA into an Alarm System via WiZos

Possible Activations

• Arm / Disarm

Possible Notifications

• Arm Status
• Intruder / Siren

Alarm programming:

PGM1:   Armed Status
PGM2:   Siren Follow
Z1:   Keyswitch Latched Arm / Disarm

The Alarm Panel PGMs must activate to "GND". However, if the Alarm Panel only supports positive activations, then relays must be used between the Alarm Panel and the G-ULTRA to change the activation to "GND".

FIGURE 6

Notes

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