Honeywell

VARIODYN® ONE

Loop Driver & Isolator

User Manual

Intended purpose

This product may only be used for the applications outlined in the catalogue and in the technical description, and only in conjunction with the recommended and approved external devices and components.

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The information contained in this documentation is provided without warranty.

Safety-related user information

This manual includes all information required for the proper use of the products described.

In order to ensure correct and safe operation of the product, all guidelines concerning its transport, storage, installation, and mounting must be observed. This includes the necessary care in operating the product.

The term 'qualified personnel' in the context of the safety information included in this manual or on the product itself designates:

- Project engineers who are familiar with the safety guidelines concerning fire alarm and extinguishing systems.
- Trained service engineers who are familiar with the components of fire alarm and extinguishing systems and the information on their operation as included in this manual.
- Trained installation or service personnel with the necessary qualification for carrying out repairs on fire alarm and extinguishing systems or who are authorised to operate, ground and label electrical circuits and/or safety equipment/systems.

Symbols

The below information is given in the interest of personal safety and to prevent damage to the product described in this manual and all equipment connected to it.

Safety information and warnings for the prevention of dangers putting at risk the life and health of user and maintenance personnel as well as causing damage to the equipment itself are marked by the below pictograms. Within the context of this manual, these pictograms have the below meanings:


Warning - Designates risks for man and/or machine. Non-compliance will create risks to man and/or machine. The level of risk is indicated by the word of warning.


Note - Important information on a topic or a procedure and other important information!


Standards and guidelines - Observe configuration and commissioning information in accordance to the national and local requirements.

Hazard warnings on the system components


Warning – risk source.


Warning – dangerous electrical voltage.

Dismantling



In accordance with Directive 2002/96/EG (WEEE), after being dismantled, electrical and electronic equipment is taken back by the manufacturer for proper disposal.

Safety requirements

During the installation of the devices and components, the applicable standards and guidelines as well as local requirements must be observed. In addition, the following safety requirements according to EN 62368-1:2014 must be observed:

- **Skills**
  Installation, Commissioning and Maintenance may only be conducted by skilled persons!
- **Fastening**
  Use 50 mm long and 5 mm diameter screws to secure the product to wall using suitable dowels.
  The installation of the floor-type cabinet must comply with the object-specific specifications!
  - For fastening on the floor (material: concrete or similar), 4 screws with a diameter of 10 mm and a length of at least 60 mm must be used.
  - The fastening on an intermediate / stilt floor depends on the material, thickness and condition of the floor. Therefore, it is imperative to observe the manufacturer documentation for the intermediate / stilt floor!
- **Circuit Breaker**
  Connect the device to the AC mains power supply via a separate mains isolator or a suitably rated circuit breaker.
- **Emergency power**
  The batteries used within this product may only be replaced by batteries that are in compliance with IEC 60896-11, IEC 60896-21 and IEC 60896-22, IEC 61056-1 and IEC 1056-2 or IEC 62485-2 and made of material with flammability rating V-1 or better.
  Important information on handling of batteries
  For handling of used batteries, the warnings notes related to storage, maintenance, charging, operation and disposal, given by the manufacturer of these batteries are to be considered.
- **External Wiring**
  To ensure product safety, only cables are to be used that are tested against either IEC 60332-1-2 and IEC 60332-1-3 or IEC/TS 60695-11-21.
- **Cable glands**
  Cable glands with flammability class V-1 or better must be used.

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1. Loop Solution

A speaker loop is a collection of speakers driven by a common amplifier channel. At maximum a speaker loop can reach 1000m, with spur included. The stability of such a speaker loop can be enhanced by applying the Loop Driver Module (Part No. 585343, hereafter referred as LDM) and the Loop Isolator Module (Part No. 585342, hereafter referred as LIM), which will work together to detect short-circuit, open-circuit and earth faults in the loop and isolate the short-circuited speaker to ensure normal functionality of other speakers in the loop.

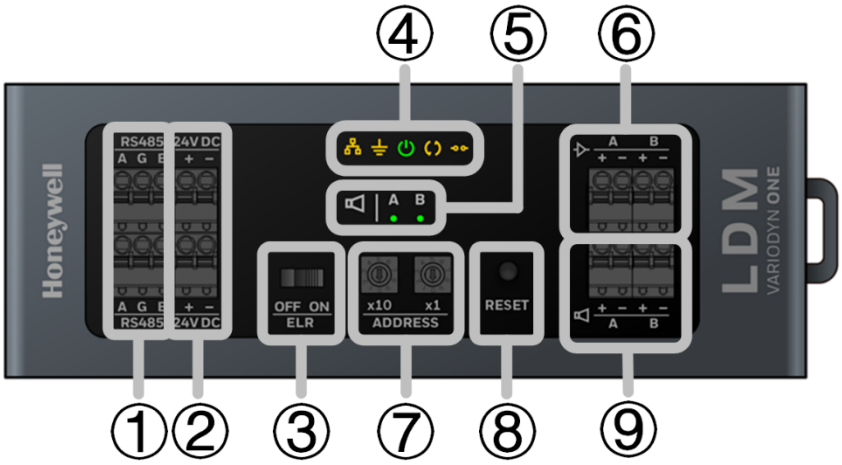
An amplifier channel can drive multiple speaker loops, but at maximum 64 LIMs can be installed in these loops.

An INC can be connected to 24 loops at maximum.

1.1 Loop Driver Module

The LDM can be applied in a speaker loop (one LDM at maximum for a loop) to provide power to LIM and to monitor short-circuit, open-circuit and earth faults of speakers in the loop. It is powered 24V DC via AUX output or 30 A output on the PSU, connecting it to 30 A outputs is recommended. The LDM communicates with and reports faults in the loop to the INC via RS 485.

The front panel of LDM is illustrated as below:



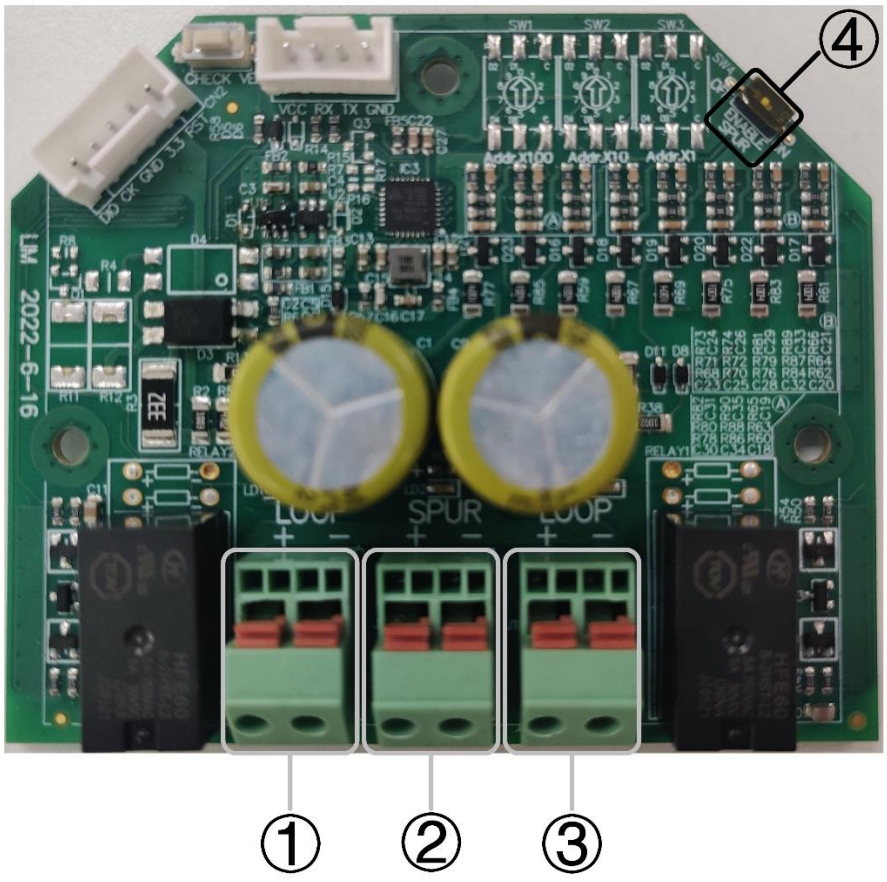
Component	Description
①	RS 485 terminals used to connect VARIDOYN ONE controller, from left to right are A, G and B. The two RS 485 terminals are connected. It is recommended to connect one RS 485 to the INC and connect the other RS 485 to the next LDM, in which way LDMs can be connected easily in a loop.
②	24 V DC terminal used to connect a PSU for power. A PSU can power the LDM through its 30 A output terminal or AUX terminal. It is recommended to connect a LDM to PSU 30 A output in case of current overload that may occur when the device is powered on.
③	End of Line Resistor (ELR). When multiple LDMs are connected with an INC via RS 485, the first one connected to the INC is the first LDM and the last one (farthest to the INC) is the last LDM. For the last LDM in the loop, the ELR MUST be **ON**. For other LDMs in the loop, the ELR MUST be **OFF**.
④	General indicators, for details, see Operation Instruction.

⑤	Speaker loop indicators
⑥	Terminals that are used to connect the speaker line module on the INC.
⑦	LDM address switch used to set RS 485 address for the LDM. For each LDM the address must be unique. The address ranges from 0 – 99. On the left switch tens can be set, on the right switch digits can be set. For example, set 1 for the left switch and 2 for the right switch, then the address of the LDM is 12.
⑧	Reset key used to reset the loop status. After isolation of an individual speaker in a loop, the speaker will be kept isolated until this key is pressed.
⑨	Loop terminals that are used to connect LIM/speakers in the loop.

1.2 Loop Isolator Module

The LIM is powered by the DC voltage from LDM. It detects short-circuit, open-circuit and earth faults in the loop and reports to the INC, this process takes at maximum 100 seconds. When a short-circuit fault occurs to a speaker, it is detected and isolated by the LIM, and an open-circuit fault is reported to the INC. Once the short-circuited speaker is isolated, other speakers in the loop avoid being short-circuited and will recover to normal in at maximum 5 seconds.

A built-in capacitor is set in a LIM to store the electric energy. Once the loop is powered on, capacitors start to charge, which takes 8s for each LIM and total charging time for the loop is ½ of all LIMs added. For example, if a loop has 20 LIMs, the initial time of the whole loop will be 80s.



Component	Description
①	Loop port, used to connect Loop A/B port on LDM.

②	Spur port, used to connect a spur.
③	Loop port, used to connect Loop A/B port on LDM.
④	Spur switch. The switch to enable spur monitoring. if the spur is connected to the LIM, it must be ON to monitor faults in the spur. When no spur is connected to the LIM, it must be OFF.



The ferrule crimp connectors connected to LIM must be between 10 to 12 mm to ensure stability of connection

1.2.1 LIM Functional Principle

The LIM is designed with 2 loop ports (2 terminals for each) for connection with the LDM. Between the 2 loop ports a spur port is placed for connection with the spur. A relay is placed between each of the two loop ports and the spur port.

The LIM can be powered from 2 loop ports. When voltage difference of the loop ports or the spur port is detected to be lower than 1 V DC, the two relays will be open and start to re-detect the voltage difference. In 3 seconds if the voltage difference is recovered to be 1 V or higher, the realys will be closed and the circuit is back to normal. However, the relays will not be closed until the reset signal is received if the voltage difference of these ports has not recovered to 1 or higher in 5 seconds. Short circuit of any one of the ports on the LIM will block the other two ports.

When the power voltage of the port is equal to the voltage of the reset signal, the disconnected port will re-detect the port voltage, and if the voltage difference is higher than 1 V, the relay is closed. The reset signal is sent by the LDM when the reset key on the LDM is pressed, by when the DC voltage of the port is lowed to 20 V.

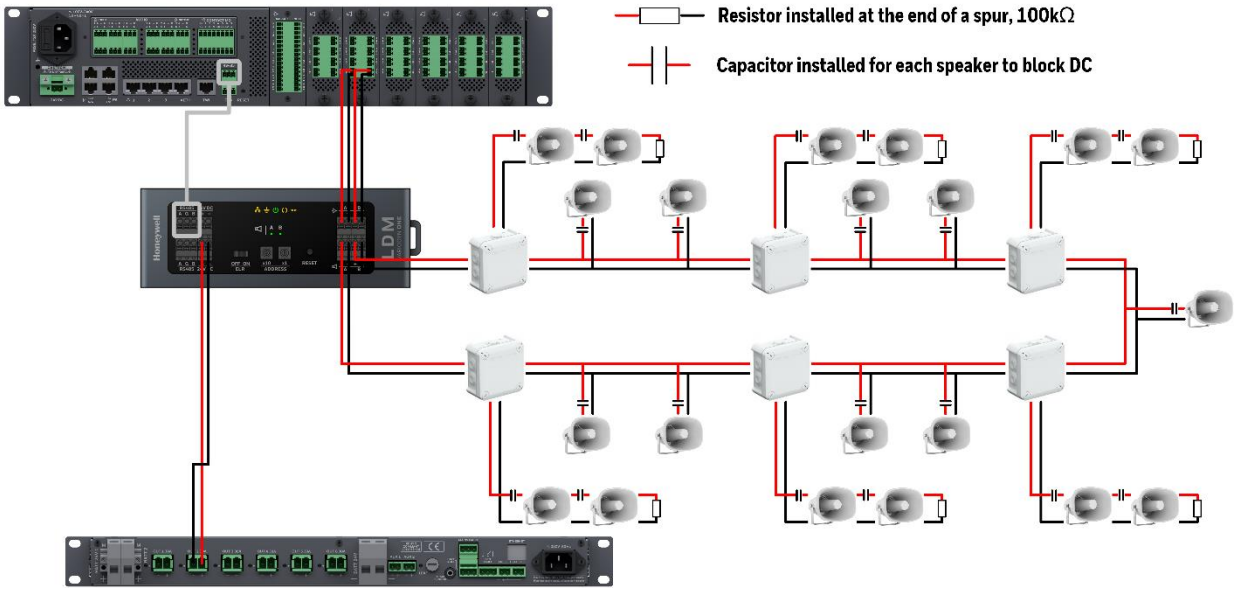
1.3 Wiring

To enable a speaker loop, the following devices are required:

- An INC
- A PSU to power the loop driver module
- A loop driver module
- Loop isolator modules as per requirement, 1 at minimum and 64 at maximum
- A capacitor for each speaker in the loop
- A 100KΩ resistor for each spur in the loop

1.3.1 Loop Wiring

LDM, LIMs and speakers are wired to the INC and PSU as follows:



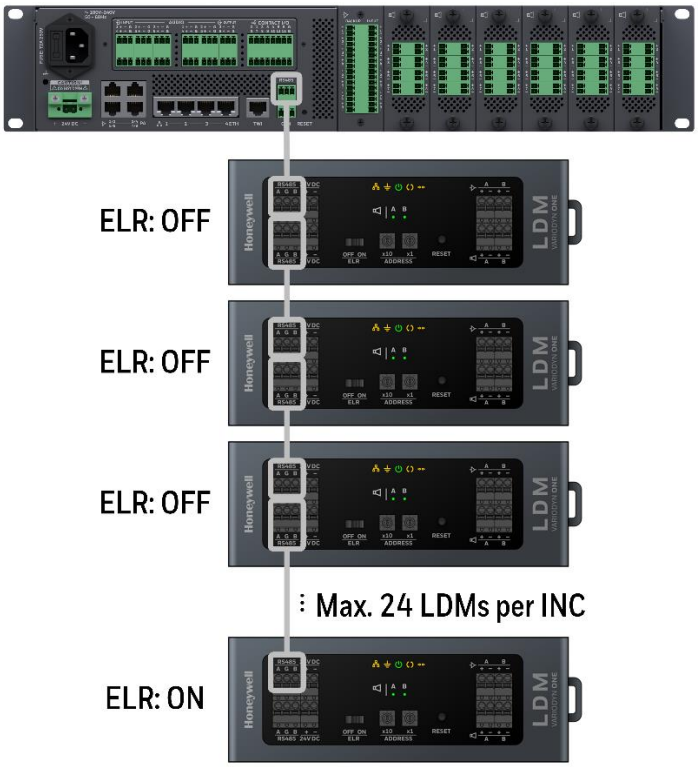
- An end-of-line resistor (100kΩ) must be connected at the end of each spur
- Each speaker in the loop must be installed with an inbuilt capacitor or connected to a capacitor to block DC voltage.
- The grounding screw on the rear side of the LDM must be connected to enable earth fault monitoring

For speakers of different powers in the loop, the capacitor they are connected should have different values. The following is the recommended values of capacitors for speakers. In addition, the withstand voltage of the capacitor must be greater than 100V.

Speaker Power	Capacitor Value
1.5W	0.22uF
3W	0.47uF
6W	1uF
10W	1.5uF
20W	3.3uF
40W	6.8uF
60W	10uF
80W	15uF
100W	22uF
200W	47uF
400W	100uF
500W	150uF

1.3.2 RS 485 Wiring

An INC can be connected to 24 LDMs at maximum via the RS 485 interface, each of these LDMs represent a loop and are serial connected as illustrated below:



1.3.3 LIM Charging Time

The LDM outputs DC power to the speaker loop and supplies power to the LIMs in the loop. A LIM needs to be charged to be fully functional. When powered up, each LIM needs to be charged for 10s.

The LDM can charge multiple LIMs at the same time if the relay of LIMs in the loop and the LDM is closed. The relay of LIMs is closed by factory default. Besides, when the Loop is on, the LDM takes an additional 60s to fully charge all LIMs.

A Loop does not function during the charging process.

1.4 Loop Installation

This section provides information on LDM and LIM installation.

1.4.1 LDM Installation

The loop driver module is installed on a DIN rail with push-in technology. The installation is easy and time-saving, no extra tools are needed.

The earth connection is done via DIN rail.

1.4.2 LIM Housing

The LIM is installed within a housing and connected to the loop.



LIM Housing

1.5 Specifications

This section provides information on LDM and LIM specifications.

1.5.1 LDM Specifications

Loop Driver Module

Power	24 V DC
Current	200 mA (short circuit peak current < 2 A)
RS 485 baud rate	19200 bps
RS 485 End of Line Resistor	120 Ω
Maximum amplifier input voltage	100 Vrms
Maximum amplifier input current	5 Arms
DC output voltage range	20 V DC … 30 V DC
Maximum DC output current	300 mA
Dimension (W x H x D)	150 x 110 x 55 mm
Weight	700 g
Relative humidity	<95%, non condensing
Operation temperature	-5 °C ··· +55 °C
Storage temperature	-40 °C ··· +70 °C

To ensure stability of 1000m connection, section of cables applied must be 1.5 mm^2 at least.

1.5.2 LIM Specifications

Loop Isolator Module

Power	24 V DC
Current	1 mA (fast charge current 10 mA max.)
Type of protection	IP 66 (housing)
Maximum line voltage	100 Vrms AC or 30 V DC
Minimum line voltage (without a short circuit or partial short circuit fault)	20 V DC
Maximum rated continuous current with the switch closed (IC max)	5 A
Maximum rated switching current (under short circuit) (IS max)	5 A

maximum series impedance with the switch closed (ZC max)	< 100 mΩ
Threshold for LIM Enablement	Line voltage difference < 1 V
Threshold for LIM Disablement	Line voltage difference > 1 V and reset signal is received
Dimension (W x H x D)	114 x 114 x 57 mm
Weight	130 g
Relative humidity	<95%, non condensing
Operation temperature	-5 °C … +55 °C
Storage temperature	-40 °C … +70 °C

1.6 Loop Mode Configuration

In the VARIODYN® One system, speakers can be connected in a loop that is monitored by Loop Driver Module (LDM, Part No. 585343) and Loop Isolator Module (LIM, Part No. 585342). In case of short-circuit, open-circuit and earth faults, INC receives error logs and the LIM can cut connection of short-circuited speakers to ensure integrity of the speaker loop.

1.6.1 Create a Speaker Loop

Step 1: Click the INC to be configured.

Step 2: Click **Speaker Circuit Module > ADD SPEAKER CIRCUIT MODULE**.

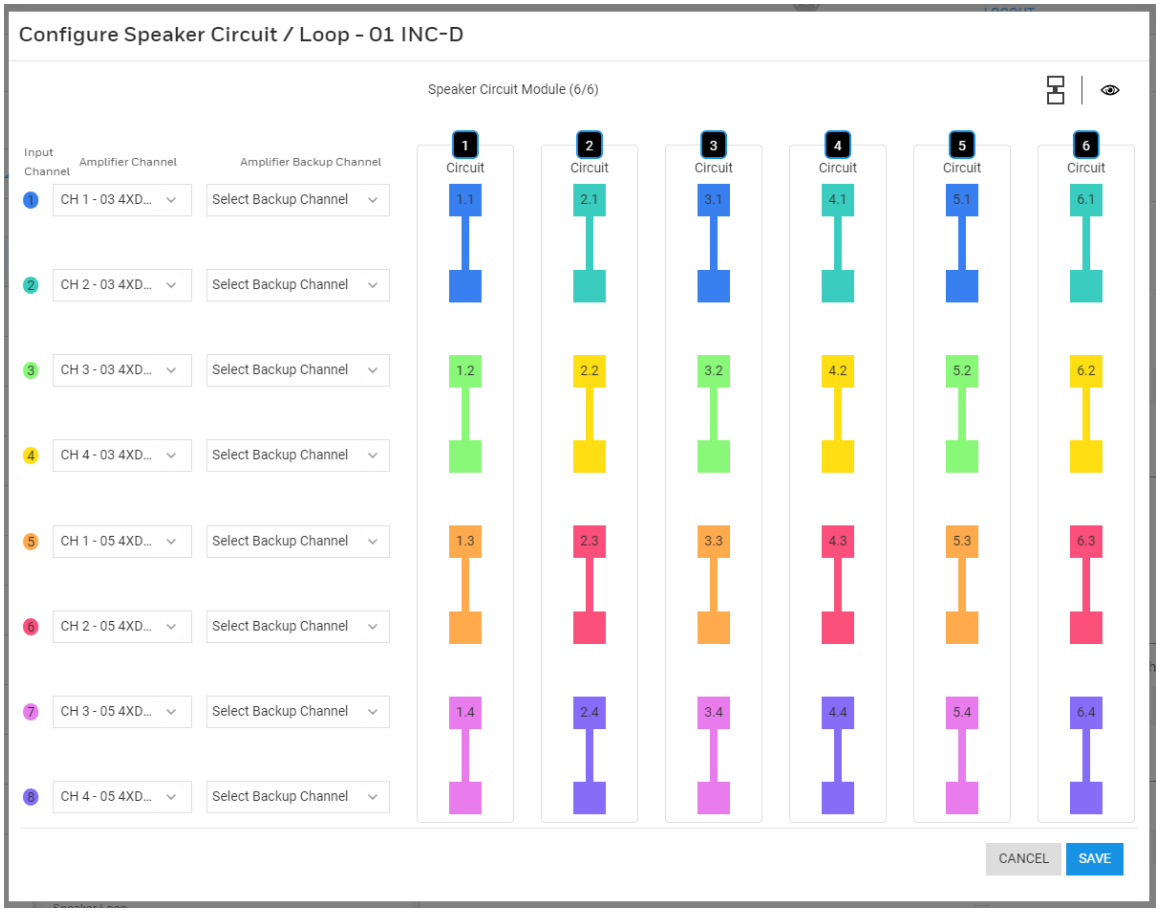
Step 3: Click the drop-down list under **Connection Mode** and select the number of amplifiers channels to be connected.

Step 4: Enter the number of speaker line modules in **QTY. of Speaker Circuit Module**, 6 at maximum.

Step 5: Enter the number of speaker lines in **QTY. of Speaker Circuit**, one installed module adds 8 speaker lines, 48 at maximum.

Step 6: Select **Convert to Loop** on the right of **QTY. of Speaker Circuit**

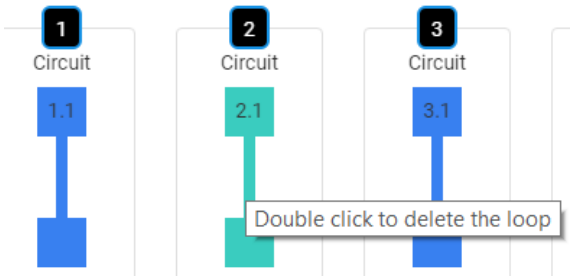
Step 7: Click **NEXT**.



Step result: As is displayed in above figure, each two speakers from different channels and same speaker line module are connected in a loop.

- Speakers connected in a loop must come from same speaker line module
- Speakers of an odd-numbered channel can only form a loop with speakers connected to an adjacent bigger even-numbered channel:
    - Channel 1 can only be connected to channel 2
    - Channel 3 can only be connected to channel 4
    - Channel 5 can only be connected to channel 6
    - Channel 7 can only be connected to channel 8

Step 8 (optional): Double click the connecting line between two speakers to delete a loop.

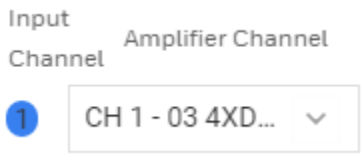


Step 9 (optional): Click the icon on the upper right corner. Your cursor will turn into a hand icon. Hold and drag it to a speaker to reconnect a loop (the speaker and the speaker it connects to will turn black).

Step 10 (optional): Click a speaker (square) in a loop to transform its connection to another available channel.

Step 11 (optional): Click the icon on the upper right corner to display names of all existing loops. Name of a loop can be configured in loop **Edit Properties**.

Step 12 (optional): Click the colored circle under **Input Channel**. Loops connected to this channel will be highlighted whereas other loops will turn grey. You can easily identify which loops belong to which channel.



Step 13: Click **SAVE** to apply changes.

1.6.2 Edit Loop Properties

Step 1: Select an INC and a loop under the INC.

Step 2: Click **Edit Properties**. The below loop properties can be configured:

Property	Description
Name	Name of the loop
Power (Watt)	Power of the loop
Loop Driver	The switch to enable loop function.
Number of Loop Isolators	Number of loop isolator modules in the loop, 1 at minimum and 64 at maximum
Loop Fault Monitoring	Check to enable fault monitoring in the loop
Earth Fault Detection	The switch to enable earth fault detection
Accurate Earth Fault checking (Slow)	Check to enable accurate earth fault monitoring
Threshold for Earth (Ohm)	The threshold for earth fault monitoring in Ohm, ranging from 10000 to 70000
Circuit Monitoring	The switch to enable circuit monitoring
Threshold for Short Circuit (Ohm)	Threshold for short circuit, 200 at maximum

	Note: If the short circuit fault cannot be reported during a paging, check if the impedance value is higher than the **Threshold for Short Circuit**. If affirmative, raise the Threshold. Make sure the threshold is not raised too high, otherwise it could hinder report of short circuit fault
Threshold for Open Circuit (Ohm)	Threshold for Open Circuit (Ohm), ranging from 1000 to 20000 Ohm

Step 3: Click **SAVE** to apply changes.