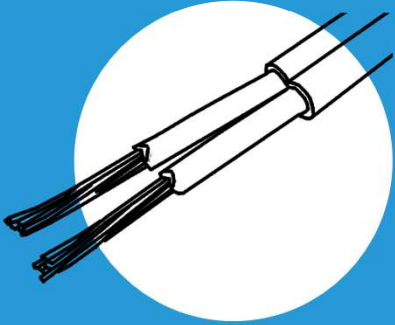


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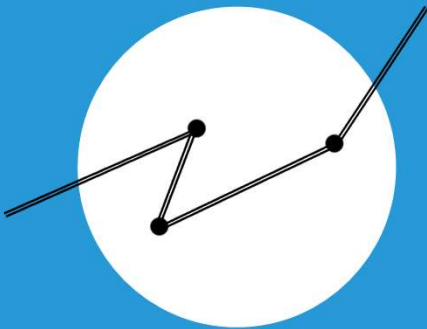
KEY FACTORS

TO ENSURE THE HIGHEST QUALITY DALI LINE



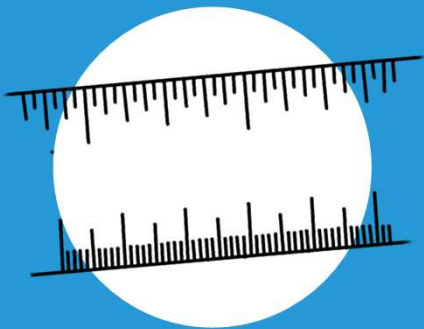
BIGGER CABLE GAUGE

2.5mm rather than 1.5mm



SERIES CABLE TOPOLOGY

Install your DALI line in series



SHORTER TOTAL LENGTH

Keep your total line length to 300m or less



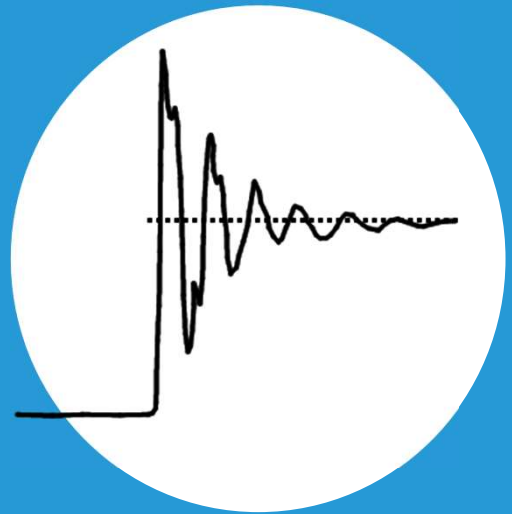
*But why does
this help?*

DALI communications can be negatively impacted by two major effects

- Ringing
- Voltage Drop

What is Ringing?

Ringing is unwanted oscillation of the DALI line voltage that hinders communications to the point where a receiving device is no longer able to interpret the incoming message



There will always be some ringing on the DALI line, but when the ringing becomes excessive, that is when communication problems start to arise

What does Ringing look like on a DALI control system?

The effects of ringing will show up to the installer in a few possible ways



- Non-communicating devices on-site that work fine on the test bench
- Devices have temperamental communication, operation and commissioning is intermittent
- Devices that frequently fail to respond to commands

What Causes Ringing?

Ringling is caused by impedance

Specifically, the impedance characteristics of the DALI line will determine whether the line is susceptible to ringing

The three key components that will cause impedance on your DALI line

- Capacitance
- Inductance
- Resistance

Large values for any of these three things is a recipe for ringing

Impedance is the electrical property of the system that causes a difference between what's happening at one end of an electrical conductor compared to the other

What causes a high capacitance?

Conductors run in parallel

If the DALI line topology is a star, with conductors fanning out from one or more point along its run, this can result in excessive DALI cable on the line. The additional conductor length will increase capacitance

Overall conductor length

The overall length of the DALI line will raise its potential capacitance

Devices on the line

The type and quantity of DALI devices on the line will also increase capacitance. Not all DALI devices are created equal, and some products add more capacitance than others. Unfortunately, how a DALI device will affect the capacitance of the DALI line is not easy information to obtain

Capacitance is the amount of stored energy on a conductor. This stored energy then pushes back into your system when you don't want it to. The more stored energy - the bigger the push back into the system. When combined with inductance it can provide a transitory energy source that can make your line oscillate and degrade communication quality

What causes a high inductance?

Low cable gauge

Or poor-quality cable

Coiled cable

Cabling that is left coiled up

Inductance

like capacitance is another unwanted energy source on your line. Where capacitance stores the energy in an electric field, inductance stores it in a magnetic field. Both will push energy back into your line when it's not wanted, resulting in voltage change. When there is both inductive energy storage and capacitive energy storage, the energy being pushed back into the line can shuffle back and forth between them and that's what we call ringing

What causes a high resistance?

Resistance is opposition to current flow. Resistance on the DALI Line will weaken the grip the DALI power supply has on the line voltage. A good DALI power supply will attempt to damp down any unwanted line oscillation. The more resistance on the conductors, the weaker the DALI power supply's grip on the line voltage becomes, meaning that less unwanted energy is required before ringing will occur

Low cable gauge

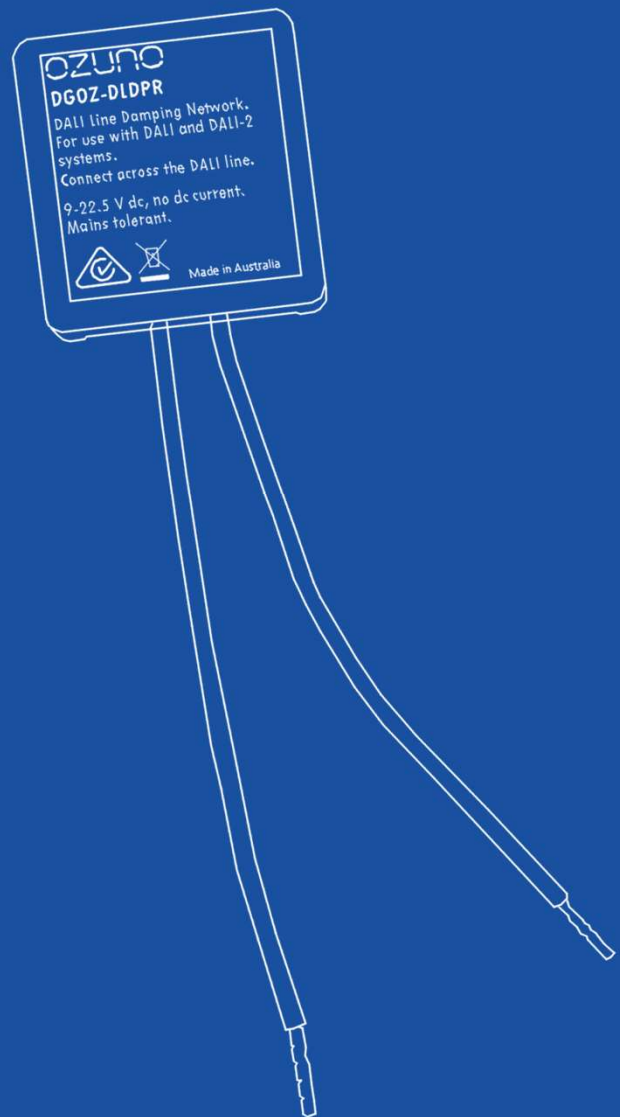
Or poor-quality cable

Long cable runs

Poor quality electrical connections

Ringling Countermeasure

In situations where a DALI line is experiencing Ringing related communications issues, but the line can't easily be altered to rectify the problem, installation of a damping device may be able to restore communication stability. Ozuno's DALI damping device (PN: DGOZ-DLDPR) is designed to be installed on the DALI line where ringing is causing problems. It will significantly reduce the amount of ringing on the line and increase the reliability of communications



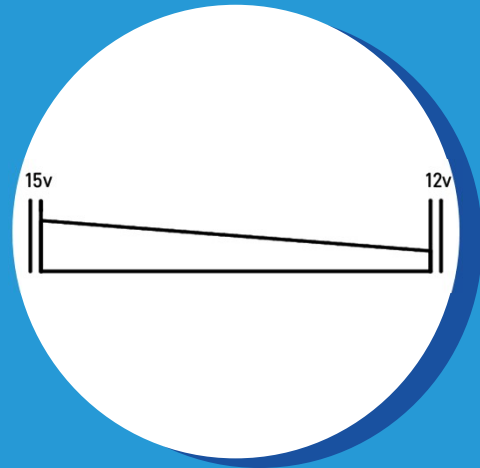
Voltage Drop

What is it and why is it important in DALI?

Voltage drop is the decrease in voltage along a resistive conductor through which current is flowing

In DALI this is the difference between the voltage measured at the DALI power supply when compared with any point along the DALI line

A drop of **2V** or more between the DALI power supply and a DALI device will likely cause a loss of communications

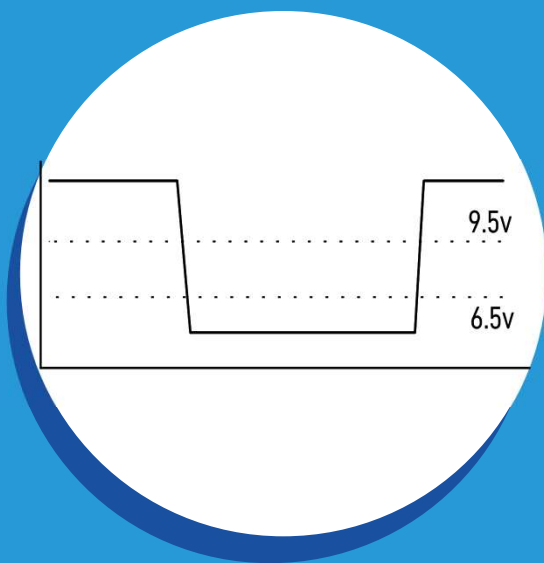


DALI devices communicate by pulling the DALI line to a low voltage level

By shifting between a “**High voltage level**” (11.5V or more)

and a “**Low voltage level**” (4.5V or less)

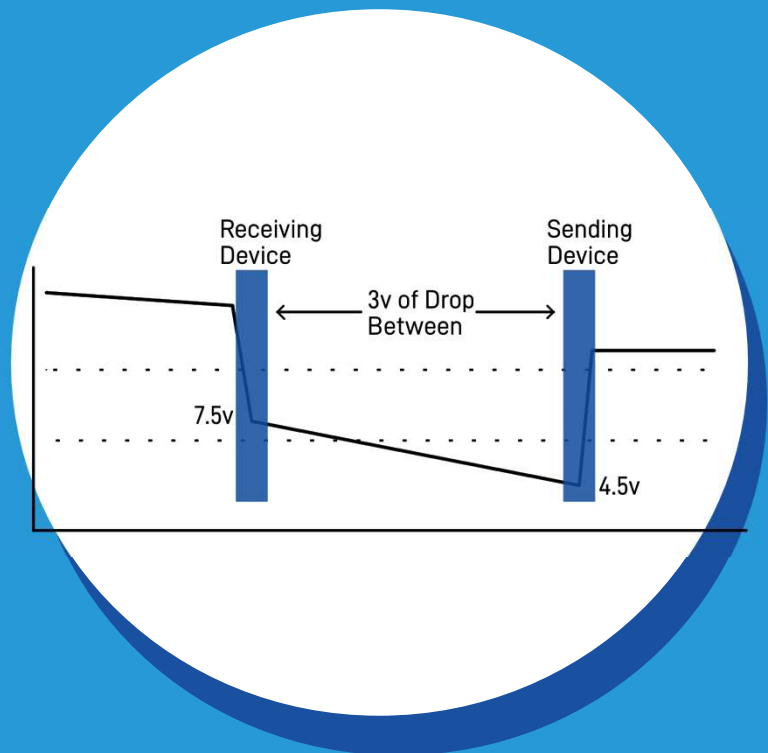
a DALI device can transmit commands or responses which can be read by all other DALI devices on the line



DALI allows for a 2V tolerance between sending device and receiving device. A receiving device will accept a “High voltage level” as **9.5V or more**, and a “Low voltage level” as **6.5V or less**

Voltage drop can cause issues in the receiving of communications

If a DALI line has a 3V volt drop across its length, and a DALI device located at the lowest voltage point attempts to communicate, it will pull the DALI line voltage down to 4.5V (or less) and believe that the Low Voltage level has been achieved. However, receiving DALI devices in areas where the 3V drop is not present will see a DALI line voltage of **7.5V**



7.5V is not low enough to be reliably detected as a “Low voltage level” by the receiving devices

This means that the message being sent by the DALI device located on the line in an area with high voltage drop will not be successfully received by DALI devices in areas with no (or less) voltage drop

What does Voltage drop look like on a DALI control system?

The effects of voltage drop will show up to the installer in a few possible ways

- Voltage drop issues may appear as non-communicating devices on-site, that work fine on the test bench
- One-way communications where a DALI device will respond to broadcast or even direct commands but will not respond with information when queried

Voltage drop can be easily identified by measuring the DALI line voltage between the DALI power supply and any other point on the line. A drop of 2V or greater is likely to cause issues

High-quality DALI devices account for voltage drop by clamping the DALI line down as low as 2-3V during communication. This makes the system more tolerant of voltage drop. As DALI lines are often made up of devices from different manufacturers, some devices on the same line will be more susceptible to Voltage drop issues than others



What causes voltage drop?

Long cable runs

Low gauge cable

Resistive cable connection

Lots of DALI devices on a line that are a long way from the DALI power supply

How to ensure the highest quality DALI line?

Keep your DALI line to 300m or less of total cable length

Use a higher gauge cable (2.5mm recommended)

Where possible install the DALI line in a series type cable topology

Install smarter for a better system

Understanding the signs and causes of ringing and voltage drop on a DALI system will help in determining the possible causes for DALI communication problems, and what can be done to resolve them.

By following some basic installation principles, your DALI system will be much less likely to experience these issues, and this will mean much less time spent fault-finding

