CleverEVAC

CleverEVAC
APPLICATION GUIDE

v0.5 September 2020

Clevertronics

CONTENTS

NCC STATEMENT	**3**
STATEMENT FROM PROF. ED GALEA	**3**
WHAT IS CleverEVAC	**4**
PRODUCTS	**4-5**
CleverEVAC PRODUCT SUITE	4
Dynamic GREEN	4
Dynamic RED X	4
SOUNDESCAPE™	5
ZONEWORKS® XT HIVE – EMERGENCY LIGHTING MANAGEMENT SYSTEM	5
SYSTEM OPERATION	**5-9**
PRODUCT ACTIVATION, INTERFACING AND TESTING USING THE ZONEWORKS SYSTEM	5
SPECIFIC DETAILS FOR INTERFACING AND ACTIVATION OF FUNCTIONS	6-7
TYPICAL SYSTEM SCHEMATIC (SHOWING CURRENT PRODUCTS)	7
LEVELS OF A CleverEVAC SYSTEM	8-9
DEVELOPING THE SYSTEM INTERFACE (FOR TIER 2 & 3 SYSTEMS)	9
SYSTEM TESTING	9
APPENDIX 1	**10-11**
ZONEWORKS® XT CleverEVAC INTERFACE SCHEMATIC	10
SYSTEM INTERFACE AND DYNAMIC SIGN / SOUNDER OPERATION	11
SYSTEM OPERATION	11
DYNAMIC FITTINGS	**14**
APPENDIX 2: DIP SWITCH INFORMATION	**16**
GLOSSARY	**16**

DISCLAIMER

Clevertronics Pty Ltd is a vendor of CleverEVAC products. It is not a fire engineer or designer. It does not purport to recommend its products for use in any particular application or to achieve any particular outcome. Purchasers and users of its products must take their own steps to ensure compliance with statutory requirements, safe practice and suitable application of the products.

CleverEVAC.com.au

Clevertronics.com.au

NCC STATEMENT

The CleverEVAC Dynamic Signs when in static mode meet the requirements of AS 2293.3-2005. However when activated into Dynamic, or enhanced, mode the signs no longer meet the luminance ratios as set out by the standard. Fire safety engineers and JHA are able to specify CleverEVAC products under the National Construction Code 2016, via the development of a performance solution that will comply with the NCC if it satisfies the Performance Requirements, which are the mandatory requirements of the NCC.

STATEMENT FROM PROF. ED GALEA

In an evacuation, every second counts. Whatever the situation – from a fire, such as the Kings Cross Underground disaster (1987), to a terrorist attack, such as the Nairobi Westgate shopping mall tragedy (2013) - people need to find the best route to safety as quickly as possible.

Guiding people to safety and away from danger is the reason we have emergency exit signs. But many of today's signage systems lack the ability to respond to a changing threat environment, or to attract the immediate attention of the people they are there to assist. They may be required by building standards and safety legislation, but their potential to be overlooked, or even, in some cases, to direct people into harms way, makes them inherently unreliable in many of the situations for which they are intended.

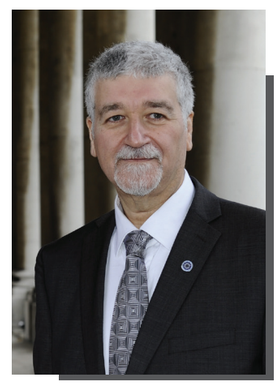
Active Dynamic Signage Systems (ADSS), is a new concept intended to address the shortcomings of emergency signage and save lives in an emergency evacuation, bringing the humble emergency exit sign into the 21st century.

ADSS, the new concept in emergency signs, uses flashing, running green LED lights, within the arrow of a standard emergency exit sign, to draw people's attention. The signs also display a large illuminated flashing 'red cross', effectively shutting down the evacuation route if people are NOT meant to go that way.

The green flashing arrows can be activated automatically when the evacuation alarm is sounded, and if the ADSS is integrated into the detection system, compromised evacuation routes can be shut down using the 'red cross', based on a pre-determined fire-engineered design strategy for the building.

The concept can also be made 'intelligent', in response to computer-based evacuation simulations undertaken in faster than real-time during the incident. The simulations take into account smoke and fire conditions, and the location of people in a building. The software uses this information to identify the optimal evacuation routes and activates the signage to direct the population appropriately - minimising delays, injuries and potential fatalities.

The next generation of advanced emergency exit signs are capable of attracting attention when they need to be conspicuous, redirecting people in an evolving emergency, and identifing, not just an exit route, but the optimal exit route, extending the smart building concept to emergency wayfinding.



Prof Ed Galea BSc, Dip.Ed, PhD, CMath, FIMA, CEng, FIFireE
CAA Professor of Mathematical Modelling
Director Fire Safety Engineering Group
University of Greenwich

WHAT IS CleverEVAC

CleverEVAC provides a suite of enhanced exit signage & emergency lighting products for use in the design of evacuation and way-guidance systems, including fire engineered/performance solutions. CleverEVAC can form part of an (AS2293 compliant) emergency & exit lighting system, and provide enhancements to assist Fire Safety Engineers, specifiers and certifiers to achieve outcomes in their evacuation scenarios. A CleverEVAC system is capable of various control configurations, using a combination of CleverEVAC products. The CleverEVAC dynamic signs fail-safe, meaning that if a specific enhancement does not activate, then an illuminated EXIT sign is still present.

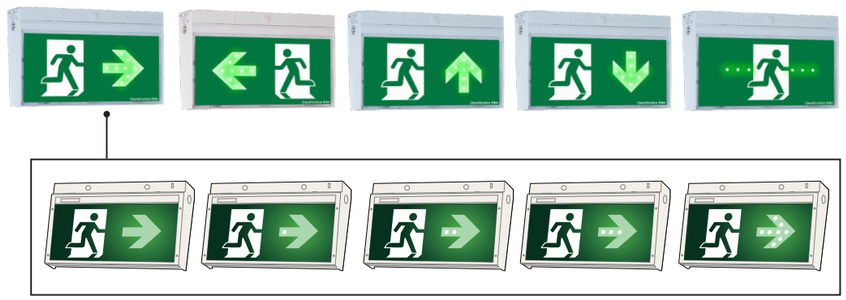
PRODUCTS

CLEVEREVAC PRODUCT SUITE

CleverEVAC EXIT signs are dynamic, which means they are capable of changing from a regular static illuminated EXIT sign, to an enhanced EXIT sign. This is achieved by way of activating sequencing LEDs within the face of the EXIT sign, or by changing the sign to a negative cue with a RED X shown as a cross through the face of the sign with red flashing LEDs at the corners. CleverEVAC locatable sound technology - SoundEscape is also able to be incorporated into the dynamic EXIT signs.

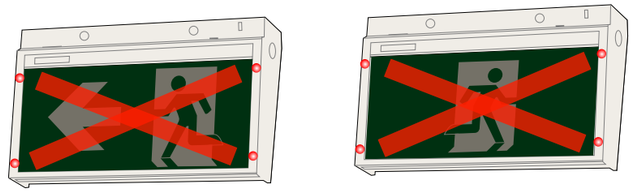
Dynamic GREEN

An EXIT sign with a switchable positive enforcement cue - sequencing LEDs within the arrow left or right, up or down. This positive enforcement product is an enhancement to standard AS2293.3 EXIT sign. This product is referred to as the Dynamic GREEN Sign.



Dynamic RED X

An EXIT sign with a switchable negative enforcement cue – a RED X shown as a cross through the face of the sign, with flashing LEDs in the corners. This sign can also provide a Dynamic Green Mode where specified. The Dynamic RED X sign can only be specified as part of a fire engineered/ performance solution. This product is referred to as the Dynamic RED X Sign



PRODUCTS (CONT.)

SOUNDESCAPE™

A Dynamic EXIT sign can also be provided with the addition of a Modular SoundEscape Sounder unit. During evacuations the SoundEscape Sounder can provide a 'locatable sound' pulse and voice message such as 'Exit Here' to highlight the designated final exit or location of a critical direction change, as part of a performance solution. Dynamic EXIT signs with SoundEscape are capable of being a standard static sign, a Dynamic GREEN with or without SoundEscape, or a Dynamic RED X with red cross negative enforcement. (SoundEscape typically not activated when in RED X mode).

ZONEWORKS® XT HIVE – EMERGENCY LIGHTING MANAGEMENT SYSTEM

Zoneworks XT Hive is the complete automated emergency lighting management system to assist in maintaining your exit and emergency lighting and meet mandated testing and reporting requirements. This can include the testing of the CleverEVAC range of products. (Testing also in conjunction with the Fire System maintenance requirements, where CleverEVAC products are interfaced to Fire System outputs).

SYSTEM OPERATION

PRODUCT ACTIVATION, INTERFACING AND TESTING USING THE ZONEWORKS SYSTEM

The CleverEVAC products could be specified by a fire safety engineer as part of a performance solution, although an existing building could adopt various CleverEVAC components such as Dynamic Green EXIT signs as part of an existing system enhancement, upgrade, or refurbishment. Enhancements or additions that form part of a CleverEVAC Exit sign, product or system can be controlled by other Fire or building safety systems, manual operator or be configured to operate automatically when mains power is lost (Dynamic GREEN only). When interfaced to a fire or building safety system/manual operator this control will be interfaced via the following methods;

Volt free direct connection to each sign

24V direction connection to each sign

Volt Free Digital Input Unit to the Zoneworks Emergency Lighting Management System (Dynamic GREEN only)

> Note: Manual control could be initiated via a switch or break glass but would ultimately interface with the signs via the Fire System (volt free, 24V) or Zoneworks System interface methods.

SYSTEM OPERATION

SPECIFIC DETAILS FOR INTERFACING AND ACTIVATION OF FUNCTIONS

Dynamic GREEN (WITH OPTION OF SoundEscape™)

Volt Free Connection from the Fire System

24V DC Connection from the Fire System

Zoneworks System Activation, controlled from the Fire System via a VF Interface

Mains power fail operation for Dynamic GREEN activation only and not the SoundEscape function

Each Dynamic GREEN sign will be supplied with a set of dip switches that will configure the input type, either Volt Free or 24V, and enable the activation method. The DIP switches will also allow configuration of the SoundEscape unit where fitted. If the SoundEscape option is fitted, and the configured for activation, the SoundEscape Module will activate upon the Dynamic GREEN sign receiving the volt free or 24V activation signal and will operate in conjunction with the sequencing green LEDs. The SoundEscape module cannot be operated separately to the sequencing green LEDs.

The option for power fail (emergency mode) will be available, via dip switch, for the dynamic green sequencing function only. The SoundEscape module will not have the option of automatic power fail (emergency mode) operation.

All Dynamic GREEN signs, including with SoundEscape, will be enabled to receive an activation triggered via Zoneworks however any directly wired input will override the current Zoneworks activation state.

Wiring – The Dynamic GREEN signs will have a L, N, E connection (power) and an auxiliary set of terminals for the Volt Free or 24V input interface.

A more detailed explanation of the configurable DIP Switch options is available with the specific product instructions.

Dynamic RED X (WITH OPTION OF SoundEscape™)

Volt Free Connection from the Fire System

24V DC Connection from the Fire System

Zoneworks System Activation (for Dynamic GREEN activation only)

Emergency Operation (power fail) – for Dynamic GREEN activation only and not the SoundEscape nor the RED X function

Each Dynamic RED X sign will be supplied with 2 auxiliary inputs. One input for the activation of the RED X and another for activation of the Dynamic GREEN LEDs.

A set of dip switches are included that configure each input type, either Volt Free or 24V, and enable the activation method. The DIP switches will also allow configuration of the SoundEscape unit where fitted. If the SoundEscape option is fitted, and configured for activation, the SoundEscape Module will activate upon the Dynamic GREEN sign receiving the volt free or 24V activation signal and will operate in conjunction with the sequencing green LEDs. The SoundEscape module cannot be operated separately to the sequencing green LEDs.

SYSTEM OPERATION (CONT.)

SPECIFIC DETAILS FOR INTERFACING AND ACTIVATION OF FUNCTIONS - CONT.

The option for power fail (emergency mode) will be available, via dip switch, for the dynamic green sequencing function only. The SoundEscape module will not have the option of automatic power fail (emergency mode) operation.

All Dynamic RED X signs, including with SoundEscape, will be enabled to receive an activation triggered via Zoneworks for the Dynamic GREEN LEDs and SoundEscape only (not RED X) - however any directly wired input will override the current Zoneworks activation state.

Wiring – The Dynamic RED X signs will have a L, N, E connection (power) plus a 3 terminal arrangement for the Volt Free or 24V input interface.

These will be configured as follows:

I2 - Red Activation

I1 - Green Activation

C - Common

A more detailed explanation of the configurable DIP Switch options is available with the specific product instructions.

SYSTEM OPERATION (CONT.)

CleverEVAC SYSTEM TIERS

CleverEVAC may be specified to perform various functions. This can range from basic positive enforcement, ie. the Dynamic GREEN activation of an EXIT sign, controlled and switched either by a manual operator or via an interface from the building fire or safety system, through to a detailed performance solution, utilising both positive and negative cues, all controlled by the building's fire detection or other building safety system.

The Levels are broken down into 3 tiers as detailed below:

TIER 1

Dynamic RED X sign at final exits

A specialist application, where manually operated Dynamic Red X signs are located above the final exits, for use in security related performance solutions. An example of this is to activate the RED X sign to shut down a final exit because of a known or suspected external threat e.g. terror attack, located outside the exit. Manual control could be interfaced via the 24V/VF contact output from the specified control method.

TIER 2

Dynamic GREEN EXIT signs to enhance an emergency lighting system

Typically consists of conventional EXIT signs with the addition of the Dynamic GREEN function, triggered to activate by either emergency mode, or through a direct voltage free or 24V/VF contact output from a fire or other building safety system to the fitting/s (this could encompass manual operator control and again would allow the Dynamic GREEN mode to commence with Fire Panel Alarm AS 1670 mode). Sound Escape can be considered for use as a further option, to highlight the final exit.

TIER 3

Dynamic GREEN, RED X, with or without SoundEscape™, as a performance solution

In addition to Tier 2 where specified, the addition of negative enforcement by way of an EXIT sign that can display a RED X. This would be a multifunction CleverEVAC sign capable of displaying a traditional green running man, and then be switched to then display the negative enforcement cue. This sign could also display the Dynamic GREEN mode when required. The functions would be activated by a fire or other building safety system, either directly at each fitting via the 24V/VF interface or interfaced through the Clevertronics Zoneworks XT Hive System's Digital Input Unit (See section 'Developing the System Interface' below). Negative enforcement could be part of a Fire Engineered / Performance Solution and the resulting actions to a specific event will be defined in the Control Matrix (see the reference to the Control Matrix in the 'Developing the System Interface' below).

As a modular component of the Tier 2 approach, Locatable Sound (SoundEscape) could be added to designated EXIT signs interfaced to activate by the same methods stipulated above designed into the building as part of a Fire Engineered / Performance Solution.

The purpose of SoundEscape is to provide Positive Enforcement of the final EXIT point or critical change in direction.

SYSTEM OPERATION (CONT.)

CleverEVAC SYSTEM TIERS

TIER 3 (cont.)

Dynamic GREEN, RED X, with or without SoundEscape™, as a fire engineered system (continued)

For example SoundEscape™ could be used at:-

Exit or Refuge points e.g. announcing "exit here "or "refuge here":

Critical decision points along Escape Routes e.g. "EXIT right" or "EXIT left" or " EXIT Here".

TIER 4

Comprises of a CleverEVAC Tier 3 system, as part of a building evacuation modelling/simulation system and control matrix

Using the CleverEVAC products as demonstrated in Tier 3, the control of fittings and the sequence of events can be determined by the development of a control matrix. The control matrix can specify the system outcomes and activate each function within each CleverEVAC fitting/s making a "scene of events". In the specific case of Tier three, an evacuation modelling system such as buildingEXODUS® evacuation simulation software, can determine which event and subsequent action will be executed based on inputs from the detection system and modelling of human movements and reactions in the resulting circumstances.

DEVELOPING THE SYSTEM INTERFACE (FOR TIER 2 & 3 SYSTEMS)

The control of fittings, and the sequence of events will be determined by the development of a control matrix, which will specifically activate each function within a CleverEVAC fitting or fittings (i.e. a scene of events).

The outputs from the Fire or other system are connected directly to the CleverEVAC Dynamic and SoundEscape Signs and in some cases via volt free inputs to the Zoneworks system. (See appendix 1 – Zoneworks XT Hive CleverEvac Interface Schematic - V1.2)

SYSTEM TESTING

Zoneworks XT Hive is a real-time, automatic monitoring & testing system for Exit & Emergency luminaires to assist in meeting mandated testing and reporting requirements. The Emergency Lighting Functions, including the Dynamic RED X and Dynamic GREEN signs in activated mode, are tested by the Clevertronics Zoneworks XT Hive System. This is a power-fail-simulation test for the 90min or 120min duration. Zoneworks will then generate a detailed fault report with recommended repair actions.

The fire system input triggers and subsequent activation of the Dynamic Green and Dynamic RED X signs must be tested, and visually inspected for correct operation, in accordance with the maintenance schedule (this may be part of a Fire Engineered / Performance Solution). Each input trigger, from the fire system, should be operated and the resulting actions inspected to confirm correct operation in accordance with the maintenance schedule.

Typically, the fire contractor should verify that the dynamic functions are operating via the interface to the CleverEVAC Dynamic signs as detailed in the fire engineering report.

ZONEWORKS® XT HIVE

Typical schematic for Central Emergency Monitoring System (Clevertronics Zoneworks XT Hive – wireless system

Legend

- Emergency Light – Hive
- Emergency Batten – Hive
- Exit Light – Hive
- CleverEVAC Dynamic Green Exit Light – Hive
- CleverEVAC Dynamic Red Exit Light – Hive
- Network Cat 6
- Potential RF communication links
- Bluetooth communication links
- Fire Rated 2 Core Cable

CleverEVAC Dynamic RED X Exit Signs have two modes of operation:

Mode 1: is Dynamic Red X and is triggered by a FIP input

Mode 2 is Dynamic GREEN enhancement is triggered by a FIP input or Zoneworks HIVE

Up to 1000 x Emergency Light Fittings per HIVE controller linked via the Dynamic Self-Managed Meshing

Mode 2

Mode 1

FIP outputs

Fire Indicator Panel

MAD

MAD
Mobile Access Device is used for commissioning and ongoing site maintenance

Wide area network

Ethernet network switch

Zoneworks Hive Emergency Lighting Controller

Mobile tablet

Mobile phone

Remote PC with Admin Access permission to local area network

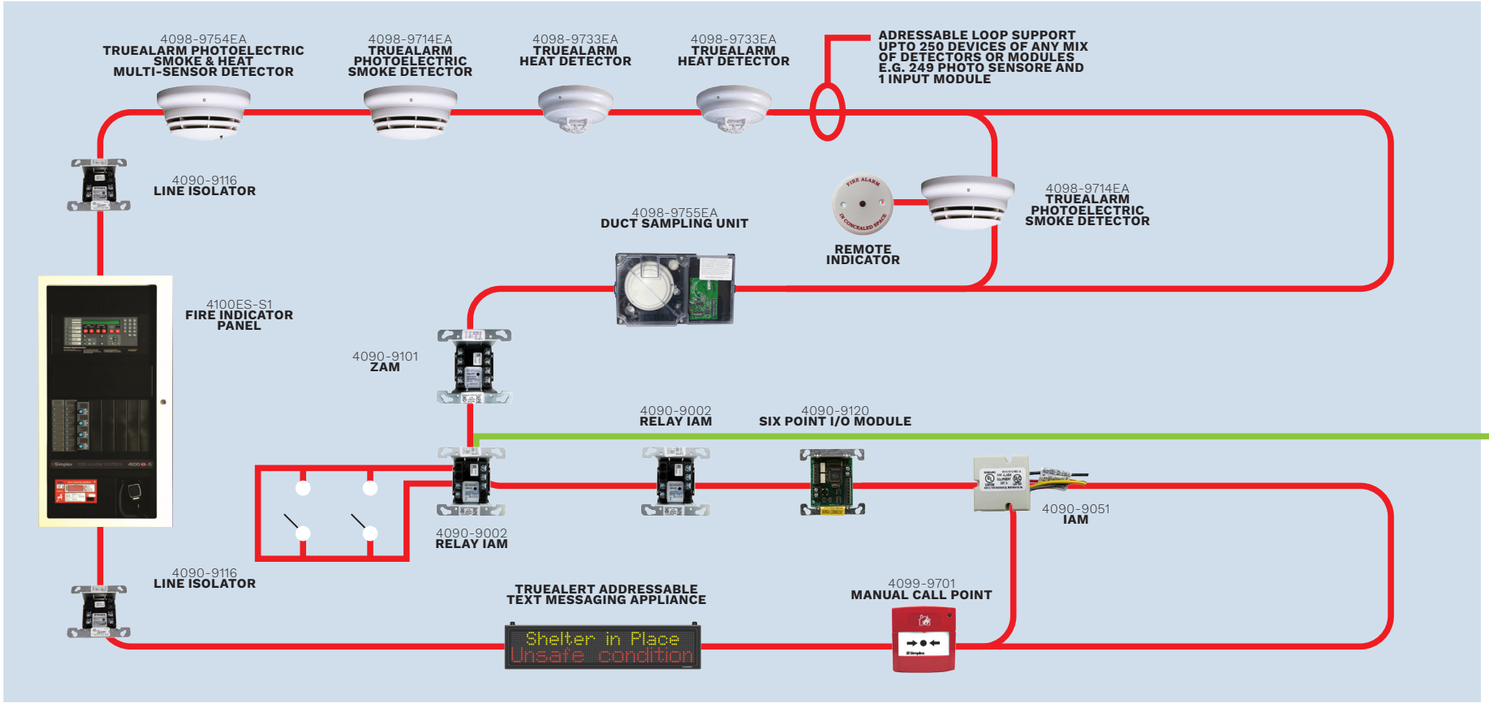
SQL database

IT network shown as a dedicate network, an alternative is connection to the client supplied network if acceptable

Zoneworks XT Server is either a stand alone unit or included in a Virtual Server provided by others

Clevertronics

Typical Addressable Fire System



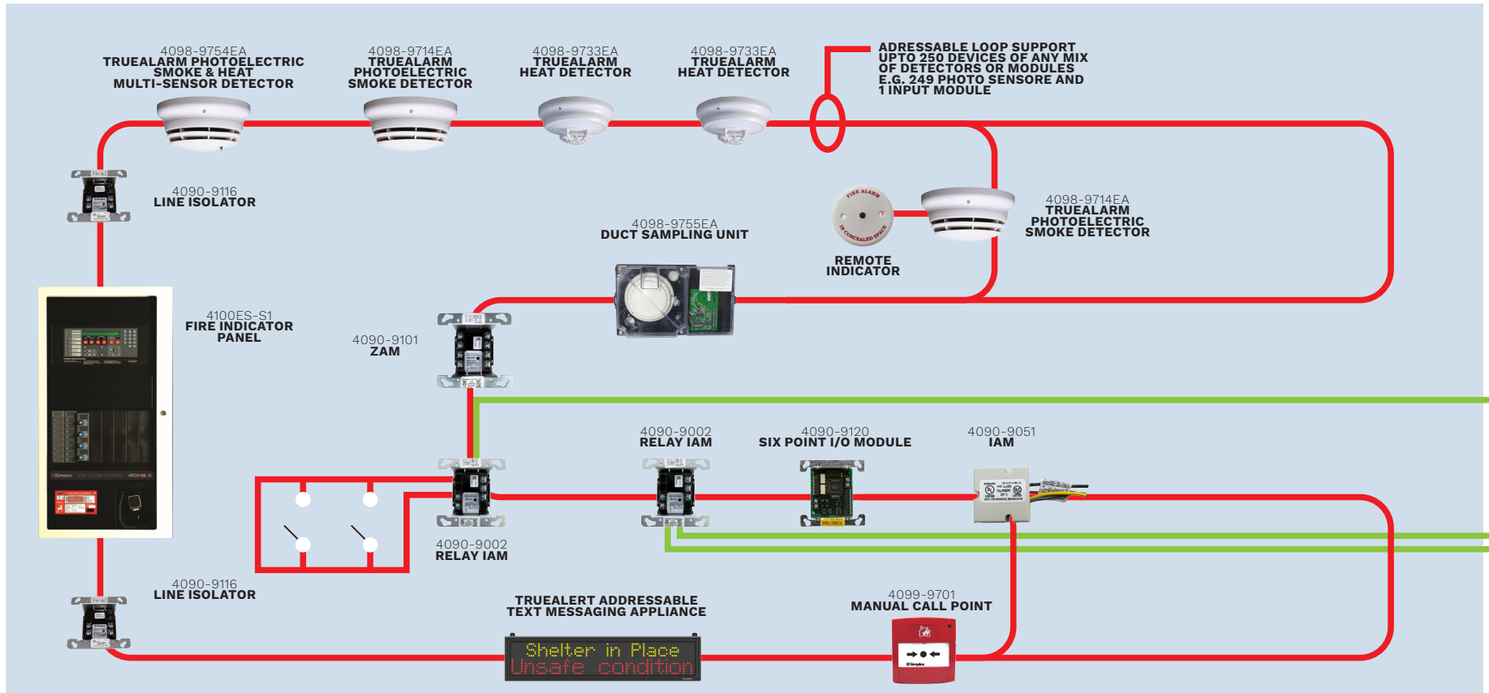
CleverEVAC

Typical addressable fire system with volt-free outputs located in the field, twin cables to the CleverEVAC fitting/s

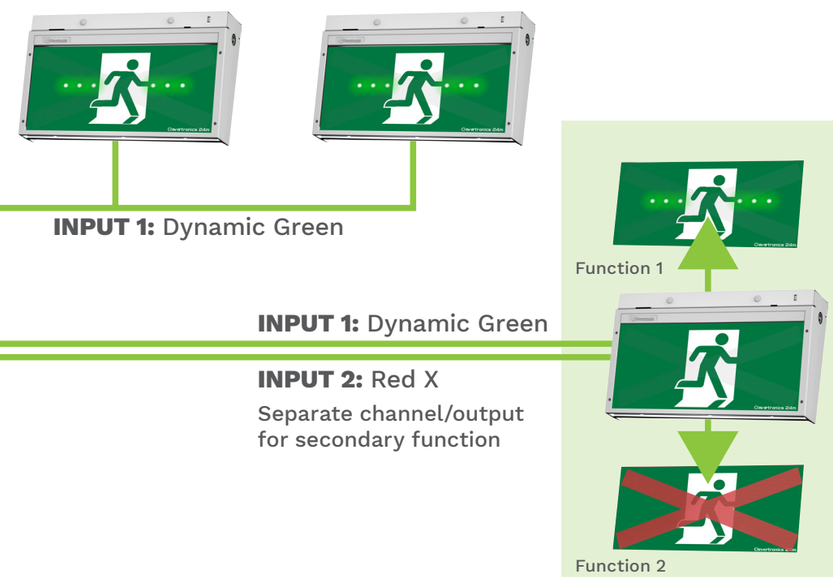
RED X, Dynamic GREEN, Sound Escape

Daisy-chain to multiple fittings, Single Scenario

Typical Addressable Fire System



Typical addressable fire system with volt-free outputs located in the field, twin cables to the CleverEVAC fitting/s



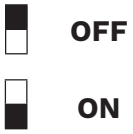
Cleverfit PRO Series

		LP	L10
Dynamic GREEN		DYGC-CP-R	DYGL-CP-R
		DYGC-CP-RR	DYGL-CP-RR
		DYGC-CP-RL	DYGL-CP-RL
		DYGC-CP-RU	DYGL-CP-RU
		DYGC-CP-RD	DYGL-CP-RD
Dynamic RED X		DYRC-CP-R	DYRL-CP-R
		DYRC-CP-RR	DYRL-CP-RR
		DYRC-CP-RL	DYRL-CP-RL
		DYRC-CP-RU	DYRL-CP-RU
		DYRC-CP-RD	DYRL-CP-RD
Dynamic Sign with SoundEscape		DYGC-CP-SND-R	DYGL-CP-SND-R
		DYGC-CP-SND-RR	DYGL-CP-SND-RR
		DYGC-CP-SND-RL	DYGL-CP-SND-RL
		DYGC-CP-SND-RU	DYGL-CP-SND-RU
		DYGC-CP-SND-RD	DYGL-CP-SND-RD

Ultrablade PRO Series

		LP	L10
Dynamic GREEN		DYGC-UP-R	DYGL-UP-R
		DYGC-UP-RR	DYGL-UP-RR
		DYGC-UP-RL	DYGL-UP-RL
		DYGC-UP-RU	DYGL-UP-RU
		DYGC-UP-RD	DYGL-UP-RD
Dynamic RED X		DYRC-UP-R	DYRL-UP-R
		DYRC-UP-RR	DYRL-UP-RR
		DYRC-UP-RL	DYRL-UP-RL
		DYRC-UP-RU	DYRL-UP-RU
		DYRC-UP-RD	DYRL-UP-RD
Other Configurations		Dynamic Signage also available in other variants such as Theatre style, Weatherproof enclosure (Cleverfit PRO only). Contact Clevertronics to discuss your specific project requirements.	

APPENDIX 2: CLEVEREVAC DIP SWITCH INFORMATION



OFF

ON

SW1	SW2	SW3	ARROW
			DISABLED
			UP
			DOWN
SW1	**SW2**	**SW3**	**ARROW**
			LEFT
			RIGHT
			RUNNING MAN
SW4			**RED X**
			DISABLED
			ENABLED
SW5			**DUAL SIDE**
			YES
			NO
SW6			**FIRE PANEL FOR ARROW**
			ACTIVE LOW
			ACTIVE HIGH
SW7			**FIRE PANEL FOR X**
			ACTIVE LOW
			ACTIVE HIGH
SW8			**POWER LOSS TRIGGER**
			NO
			YES
JUMPER			**DEFAULT TEST**
			DEACTIVATED
			ACTIVATED

GLOSSARY

24V 24VDC on/off signal output provided by the fire detection or other building safety system.

AS 2293 Australian Standards for Emergency & Exit Lighting for buildings covering design, installation, maintenance and fittings.

L,N,E Mains Power cables

LED Light Emitting Diode

UPS Uninterruptable Power Supply

VF Volt Free open/close signal output provided by the fire detection or other building safety system

ZONEWORKS® XT HIVE Automatic testing & monitoring system for Emergency Lighting system provided by Clevertronics

CleverEVAC

Clevertronics

CleverEVAC.com.au

Clevertronics Pty Ltd is a vendor of CleverEVAC products. It is not a fire engineer or designer. It does not purport to recommend its products for use in any particular application or to achieve any particular outcome. Purchasers and users of its products must take their own steps to ensure compliance with statutory requirements, safe practice and suitable application of the products.