METRONOM TEKNİK

ELEKTRİK ELEKTRONİK SİSTEMLER SAN. VE TİC. LTD. ŞTİ.

DECU3 - STANDALONE DETECTION EXTINGUISHING CONTROL UNIT

TECHNICAL MANUAL

Document Revision Details

Issue	Modification Detail	Author	Date
1	Document Creation	MvD	19 / 01 / 2017
2	Detector change	CvT	01 / 08 / 2019

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Important Notes – PLEASE READ CAREFULLY

- **This manual should be thoroughly read and understood before installation and commissioning is undertaken.**
- **The DECU3 and its associated connections must be installed, commissioned and maintained by a suitably trained, skilled and competent person.**
- **It is assumed that the person commissioning the system is aware of K&G Groep BV equipment terminology and terms of reference.**
- **This equipment must be earthed and earth continuity must be preserved on broken segments of screened cable used anywhere in the system installation.**
- **This equipment is not guaranteed unless installed and commissioned in accordance with current national standards.**
- **This equipment is not suitable as part of an I.T. type power distribution system as defined in IEC 60364-3.**
- **A competent person trained to undertake such work MUST carry out any internal maintenance. There are no user serviceable parts inside the DECU3. Opening the moulded PCB will immediately invalidate the warranty.**

CE

The policy of the K&G Groep BV is one of continuous improvement and as such we reserve the right to make changes to product specifications at any time and without prior notice.

Errors and omissions excepted.

1.0 Introduction and Key Features

The DECU3 is designed to be a stand-alone fire-extinguisher device and is often found in e.g. bobcats, ships or other equipment/vehicles in which the user should be able to extinguish a fire rapidly. This is done by pressing two buttons or by the use of sensor inputs. The device continuously senses its inputs and in case of fire it gives the correct output to enable a product-specific fire-extinguisher (e.g. the Stat-X fire extinguisher).

The key features include.

- Able to set to manual, single stage or double stage detection, alarm and extinguishing.
- Separate outputs for Fire, Fault and VFC.
- Two loop for linear heat or spot detection with fault monitoring.
- The device works on input voltages ranging from 11 to 32 Volt DC.
- Low power mode is enabled by switching off the ignition.
- Double extinguisher release buttons to prevent unwanted releases.
- The unit is water proof IP65, reverse polarity, transient and EMC K&G Groep ted.
- Watchdog timer will for additional safety.
- Additional functionality regarding separated external hold-off functions.
- Additional functionality regarding separated external release extinguishing functions.
- Improved fault monitoring and fault identifying.
- Additional option to override the release extinguishing delay after manual release.
- Improved fault monitoring extinguishing output.

2.0 DECU3 Features

2.1 General

Dual Linear Heat Cable up to 50 meters or conventional detectors (max. cable length 20 meters) can be used. Each are continuously monitored for alarms, open and short circuit. LED flash codes indicate the location of an alarm or fault condition.

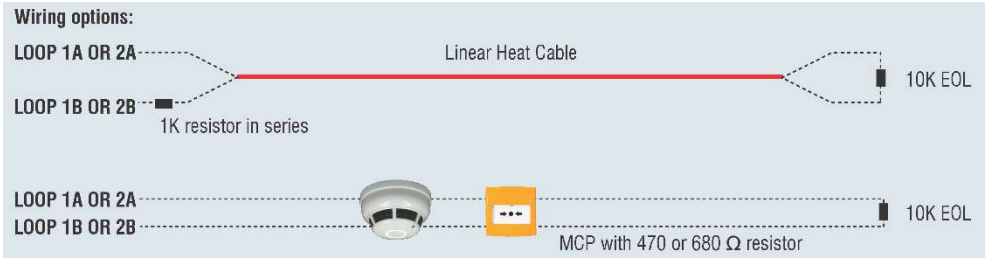
The DECU3 has an internal alarm sounder and an output to drive additional external audible alarm units up to 2Amps. Also a Voltage Free Contact (VFC) for fuel shutoff, engine/fan shutdown etc.

2.2 Loops

The DECU3 is equipped with two loop inputs. The loop inputs are continuously scanned for fire or fault detection. The loops are set to the following values:

- RESISTANCE of less than 190 Ohm: FAULT
- RESISTANCE of more than 190 Ohm and less than 1k2 Ohm: FIRE
- RESISTANCE of more than 10k Ohm and less than 12k Ohm: NORMAL
- RESISTANCE of more than 12k Ohm: FAULT

Note: When a low resistance (less than 190 Ohms) linear heat cable is used, a 1k Ohms resistor **must** be installed in series at the begin of the loop on one of the wires. Otherwise the wires of the linear heat cable which melt together will give a fault instead of a fire alarm.



The DECU3 loop inputs use dedicated logics to manage the above-stated resistance levels, together with the use of ADC inputs. The loop circuits output the input voltage (-0.6 volt, power multiplex spec.), with a current fuse-limited at 50 mA.

The detector loop circuit will be reset upon initialization (ground connection will be intermittent during led-test). Resistor levels are depending on the input voltage; therefore high fluctuations on the input voltage of the DECU3 should be avoided by using screened cable.

The commissioner should ensure to be using detectors with corresponding specifications and the correct input voltage for the DECU3. The maximum amount of detectors in 1 loop is determined by the voltage/amperage usage of the detectors and the input voltage. Devices which are supported by the DECU3 are described in Appendix 2 of the manual.

Every detector loop needs a 10k Ohm resistor as End-Of-Line (EOL) resistor, even when the input(s) will not be used. This to prevent a detection fault on the input(s).

2.3 External Release Extinguishing Input

The DECU3 has a separate input for an external release extinguishing button. The external release extinguishing button has the same function as the dual release extinguishing buttons (fire buttons) on the front of the panel. By pressing the external release extinguishing button the fire extinguisher(s) will be released. Depending on the dip-switch (time) settings it is possible the release is delayed. The delayed can be set from 0 to 30 seconds in steps of 5 seconds. The loop inputs are continuously scanned for fire or fault conditions.

The input of the external release extinguishing input is set to the following values:

- RESISTANCE of less than 190 Ohm: FAULT
- RESISTANCE of more than 190 Ohm and less than 1k2 Ohm: RELEASE
- RESISTANCE of more than 10k Ohm and less than 12k Ohm: NORMAL
- RESISTANCE of more than 12k Ohm: FAULT

The external release extinguishing input loop need a 10k Ohm resistor as End-Of-Line (EOL) resistor, even when the input will not be used. This to prevent a detection fault on the input(s).

2.4 External Hold Input

The DECU3 has a separate input for an external hold-off button. The external hold-off button has the same function as the internal hold-off button. When an alarm is active and this button is pressed, the extinguisher enabling is delayed. When the button is released, the system will wait 5 seconds. After these 5 seconds, the count-down timer will reset and start from the set delay time. The loop inputs are continuously scanned for fire or fault conditions.

The input of the external release extinguishing input is set to the following values:

- RESISTANCE of less than 190 Ohm: FAULT
- RESISTANCE of more than 190 Ohm and less than 1k2 Ohm: HOLD-OFF
- RESISTANCE of more than 10k Ohm and less than 12k Ohm: NORMAL
- RESISTANCE of more than 12k Ohm: FAULT

The external hold-off input loop need a 10k Ohm resistor as End-Of-Line (EOL) resistor, even when the input will not be used. This to prevent a detection fault on the input(s).

If the external hold-off button is pressed during normal state (no fire / alarms), the DECU3 will give an fault on the front. Which can be recognized by the blinking of the yellow detection fault LED. The detection fault will lit up for 3 seconds and then flash five times, which indicates the external hold-off button is pressed.

2.5 Direct Fire

When the timer settings are set to a delay (between 5 – 30 seconds), the direct fire dip-switch gives the choose to override the delay in case of a fire event. If a fire alarm is detected by the DECU3 and the count-down timer is started you can override the timer. By pressing the dual release extinguishing buttons (fire buttons) on the front of the panel or the external release extinguishing button in the fire state you start the extinguishing releasing process immediately.

Note: This option must only be set when the DECU3 is used by persons having a specific responsibility for safety, and who are trained and authorised to release the fire-extinguisher. Make sure the fire-extinguisher is safe to release. Any delay on the extinguishing release system will be override immediately, and start the fire-extinguisher immediately!

2.6 Dual/Single Mode

A single or dual FIRE indication can trigger the VFC relay, fire-extinguisher and fire-relay. Single or dual mode is configurable with two dip-switches.

Any detection loop alarm condition will operate audible and visual alarm indications as follows:

- A single alarm condition on a detection line causes an internal pulsing alarm sound. The VFC and Fire relay and extinguisher are operated according to the dip-switch settings.
- A double alarm condition on a detection line causes a fast pulsing internal alarm sound. The VFC relay, Fire relay and extinguisher are operated according to the dip-switch settings.
- The alarm led flashes to indicate the activated alarm loop (1 flash per second indicates loop 1, 2 flashes per second indicates loop 2 and 3 flashes per second indicates both loops).

2.7 Timer Settings

A count-down timer is used to wait a certain amount of time before extinguisher enabling in case of a FIRE alarm. This timer can be set with the use of the TIME-SWITCH dip-switches. The timer is changeable between 0 and 30 seconds, with steps of 5 seconds.

The TIME-SWITCH dip-switches can also be used to set the device in No-AUTO release state. In this state, only pressing the fire-buttons on the device or the external extinguishing release button can (immediately) release the fire-extinguisher. In this case, FIRE alarms from the detector loops will only trigger the FIRE and VFC relays (and not the release the fire-extinguisher).

2.8 Ignition Mode

When the system is supplied with power on the normal inputs, it also monitors the ignition input (if not chosen otherwise with the dip-switch settings). In normal usage, the ignition line feeds the system with roughly the same voltage as the input lines. This means the ignition is engaged.

Upon disengaging of the ignition, the on LED will start to blink and the VFC contact is operated (spin-off). The system will wait for the delay time to pass, before entering parked mode. When parked mode is enabled, the on LED will blink as a 'heartbeat'.

In PARKED mode, a single or dual (depending on the dip-switches) FIRE alarm immediately release the extinguishers. When the ignition is re-enabled (even for a very short time), the system returns to normal mode and the count-down timer is reset.

When the ignition is disabled and within the spin-off time a FIRE alarm is raised, the complete spin-off time is waited before the extinguishers are activated. When the ignition mode is disabled and there is no external backup battery/power supply, connect the battery input to the main input of the DECU3 to suppress a battery fault.

2.9 Battery Mode

Additionally on the normal power input, the DECU3 can be used with an external backup battery/power supply. The user can choose to either use backup power, or use low-power mode when the ignition disabled.

The battery power should be in the same range as the input power. Upon initialisation, the device will check the normal power supply and note the nominal voltage. When the backup power supply gets 30% below the nominal input power, the fault state is triggered and the fault LED and relay will be activated. This means that if the system normally uses a 12VDC input, the battery should also supply 12VDC input, or if the normal voltage is 24VDC, the battery should also supply 24VDC. If the DECU3 is set to battery mode and the continuous power supply would fall off, the on LED will blink to warn the user.

2.10 Extinguishing Output Monitoring

The extinguishing output of the DECU3 is a polarised to monitor the output on short circuit and open circuit. With an end-of-line resistor (10k Ohm) and a diode (1N4004 – 1N4007) the extinguishing units will be monitored.

Note: The installation of the diode is critical and therefor the extinguishing output must been tested with an extinguishing tester unit (at least 24 Vdc / 1A, for example a light bulb).

The amount extinguishing units depends on the input voltage of the system:

- 12 Vdc = maximum 2 Extinguishing Units.
- 24 Vdc = maximum 4 Extinguishing Units.

3.0 DECU3 Controls and Indications

The DECU3 has a clear front panel display enabling the current state of the DECU3 to be rapidly determined. Figure 3.0 shows the controls and indications.

Figure 3.0 DECU3 front panel controls and indications.

3.1 Controls

The top view of the DECU3 consists a special foil which includes buttons and LEDs and is water-proof.

Mute / Reset Button

The mute / reset button has a dual function:

- A single press by a fault event: disables internal buzzer.
- A single press by an alarm event: disables external alarm.

Or

Mute / **Reset** Button

- Hold the mute / reset button for 3 seconds: Reset device.

Upon reset, a LED/buzzer test is completed. All LEDs will be lit for 3 seconds and the buzzer will 'beep' two times.

Hold Extinguishing Release

- Hold the 'hold extinguishing release' button when an alarm is active: hold off fire-extinguishing while this button is pressed. Upon button release, the device will revert to countdown and release after a 5 second delay.

Fire Buttons

- When a fire emerges, press both extinguishing release buttons, this will trigger an alarm. The fire extinguishers will be released, depending on the dip-switch (time) settings.
- If the DECU3 is set up in the direct fire mode, pressing both extinguishing release buttons will override the extinguishing delay at start the extinguishing release immediately.

3.2 Indications

The layout of the DECU3 has five LEDs divided in three sections to indicate power, detection and extinguishing status with separate LED flash pattern indications.

The On LED

This green LED indicates the power status of the DECU3, which can have different states:

- In normal state the LED will continues lit up.
- If the ignition mode is chosen and the system is set to the PARKED mode the LED will blink as a 'heartbeat'.
- If the battery mode is chosen and the continuous power supply would fall off, the On LED will blink to warn the user.

The Fire LED

The red Fire LED is lit when a Fire alarm is tripped. The extinguisher release buttons are pressed or one of the detector loops have a resistance of <1k2 Ohm and >190 Ohm for more than 1 second.

The fire led flashes to indicate the activated alarm loop:

- 1 flash per second indicates loop 1.
- 2 flashes per second indicates loop 2.
- 3 flashes per second indicates both loops.

The Detection Fault LED

The yellow detection Fault detector loop LED indicates a fault in the detector loops, the External Release Extinguishing button or the External Hold input. If the resistor value of one or more of the monitored loops is >12k Ohm or <190 Ohm, a fault event is generated. If the detector loops, external release extinguishing input or external hold input will not be needed, still a 10k Ohm resistor must be installed to prevent a detection fault.

The Detection Fault LED can indicate different kinds of faults, by flashing the LED. After a start pulse of 3 seconds, the amount of flashes will indicate the kind of fault:

- 1 flash : Open circuit or short circuit in loop 1.
- 2 flashes : Open circuit or short circuit in loop 2.
- 3 flashes : Open circuit or short circuit at the external release extinguishing input.
- 4 flashes : Open circuit or short circuit at the external hold-off input.
- 5 flashes : External hold-off is connected (> 3 sec.) in normal state.
- 6 flashes : Battery fault/disabled.

In case of a Fault, the FAULT relay is triggered. The VFC and FIRE relays remain untouched.

The Extinguish Release LED

The red extinguishing release LED will lit up when the extinguishers are activated.

The Extinguish Fault LED

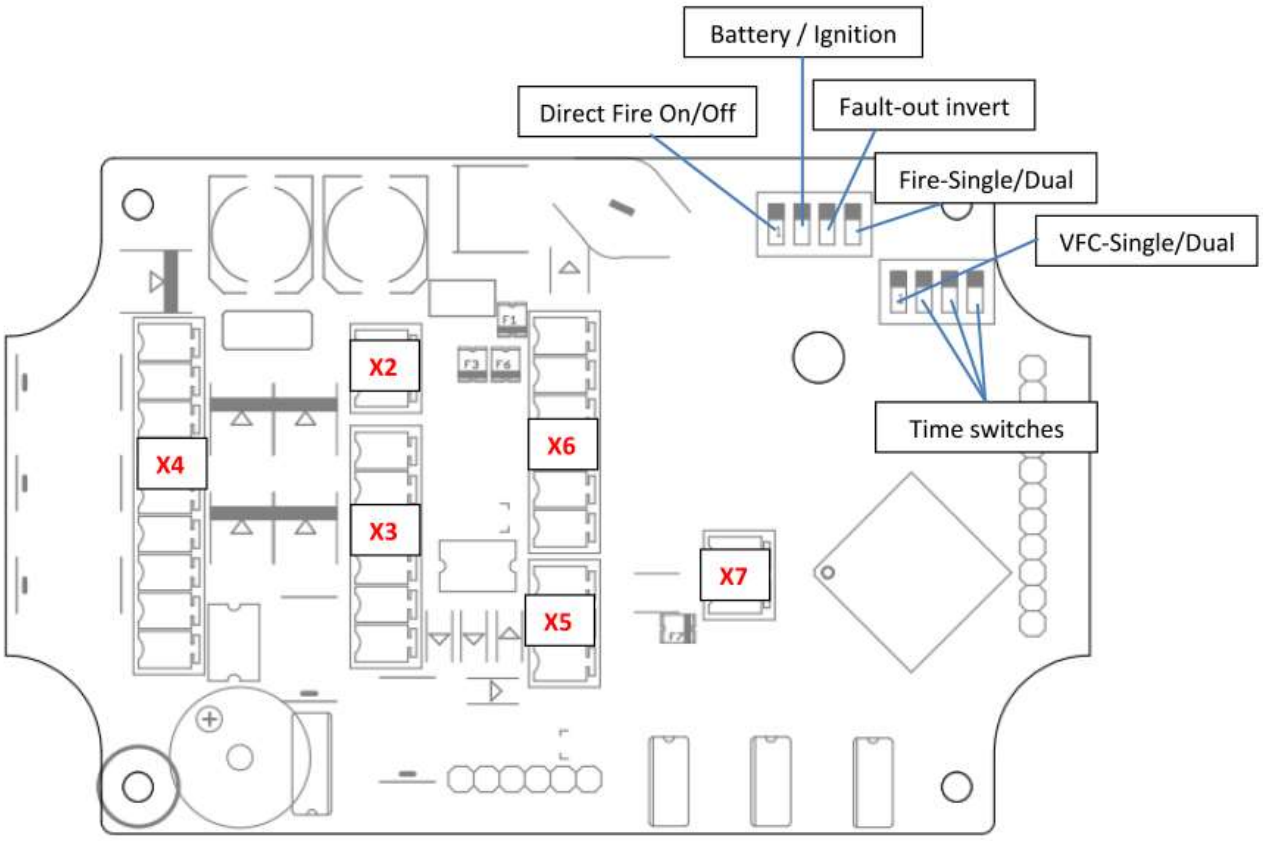
The yellow Fault (Fire suppression) LED is lit when a fault is detected in the fire-extinguisher line. In normal state (no fire) a monitoring current of <4 mA is supplied to the extinguishers. If R>300 Ohm, the Extinguish Fault is triggered.

In case of a Fault, the FAULT relay is triggered. The VFC and FIRE relays remain untouched.

4.0 Connections of the DECU3

The DECU3 has the connections on the back of the control panel. It's components, except the connections and the dip-switches are moulded in plastic for a IP K&G Groep tion.
Figure 4.0 shows the controls and indications.

Figure 4.0 The back of the DECU3 front panel connections and dip-switches.



The rear of the DECU3 will have the following connections:

CONNECTOR X4:

1. FAULT Normally-closed connection
2. FAULT Normally-open connection
3. FAULT Common (engaged on any fault condition)
4. FIRE Normally-closed connection
5. FIRE Normally-open connection
6. FIRE Common (indicates upcoming extinguisher activation)
7. VFC Normally-closed connection
8. VFC Normally-open connection
9. VFC Common (engaged on single/dual* alarm)

(* = dipswitch setting)

CONNECTOR X3:

11. ALARM - : system ground
12. ALARM + : switched alarm output, same voltage as input +
13. IGNITION : 11-32 VDC switched ignition voltage +
14. INPUT - : input ground
15. INPUT + : 11-32 VDC input voltage
16. GND : system ground

CONNECTOR X2:

17. BATTERY - : battery ground
18. BATTERY + : same target voltage as input +

CONNECTOR X7:

19. EXT HOLD - : external hold off input -
20. EXT HOLD + : external hold off input +

CONNECTOR X5:

21. GND : system ground
22. FIRE-EXTINGUISHER - : output -
23. FIRE-EXTINGUISHER + : regulated output + for monitoring and activation of the extinguisher

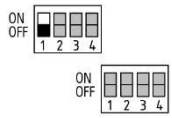
CONNECTOR X6:

24. EXT RELEASE - : external release extinguishing input
25. EXT RELEASE + : external release extinguishing input
26. LOOP2B : detector loop2 sense and GND
27. LOOP2A : detector loop2 +, input power output, 50mA max.
28. LOOP1B : detector loop1 sense and GND
29. LOOP1A : detector loop1 +, input power output, 50mA max.

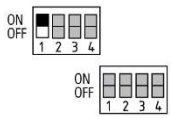
5.0 Dip-Switches Settings

The DECU3 can be commissioned in a basic manner by using the settings of the dip-switches.
Figure 4.0 shows the location of the dip-switches.

5.1 Direct fire Dip-switch



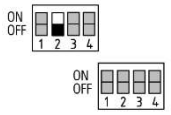
Position up:
In the direct fire mode the dual release extinguishing buttons (fire buttons) on the front of the panel or the external release extinguishing button (when commissioned) will override the any extinguishing release delay and start the extinguishing releasing process immediately.



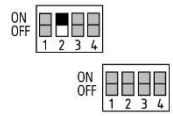
Position down (advised):
The direct fire mode will not be used.

More information about this setting see paragraph 2.5.

5.2 Battery or Ignition Dip-switch



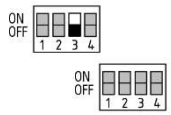
Position up:
In ignition mode the extinguishers will immediately be released when a single or dual (depending on the dip-switches) FIRE alarm occurs during shutdown of the engine.



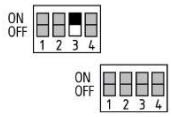
Position down:
In battery mode the DECU3 can be used with an external backup battery/power supply, which allows the DECU3 keep running when main supply is shut down.

More information about this setting see paragraph 2.8 and 2.9.

5.3 Fault-Out Invert Dip-switch

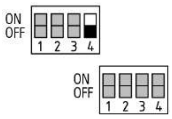


Position up:
The fault relay will be energized during normal state. During total power loss or a fault condition the fault relay will always fall off, in case a fail-safe condition is wanted.

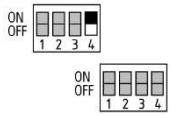


Position down:
The fault relay will be energized on a fault, so the current during normal state will lower.

5.4 Single or Dual Fire Alarm Dip-switch



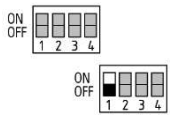
Position up:
In single mode the extinguisher(s) will be released when one of the loops will have a fire alarm condition.



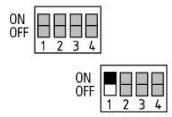
Position down:
In dual mode the extinguisher(s) will be released after both loops will have a fire alarm condition.

More information about this setting see paragraph 2.6.

5.5 Single or Dual VFC Dip-switch



Position up:
In the single mode the Voltage Free Contact (VFC) will be activated when one of the loops will have a fire alarm condition.

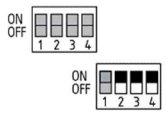


Position down:
In the dual mode the Voltage Free Contact (VFC) will be activated after both loops will have a fire alarm condition.

More information about this setting see paragraph 2.6.

5.6 Timer Dip-switches

For the timer settings we have 3 dip-switches, which can be set between 0 and 30 seconds, with steps of 5 seconds.



Appendix 2 shows the dip-switch settings for each step of 5 seconds is.

Dip-switch			Time
2	3	4	
On	On	On	Immediate Release
On	On	Off	5 sec.
On	Off	On	10 sec.
On	Off	Off	15 sec.
Off	On	On	20 sec.
Off	On	Off	25 sec.
Off	Off	On	30 sec.
Off	Off	Off	No auto-release

More information about this setting see paragraph 2.7.

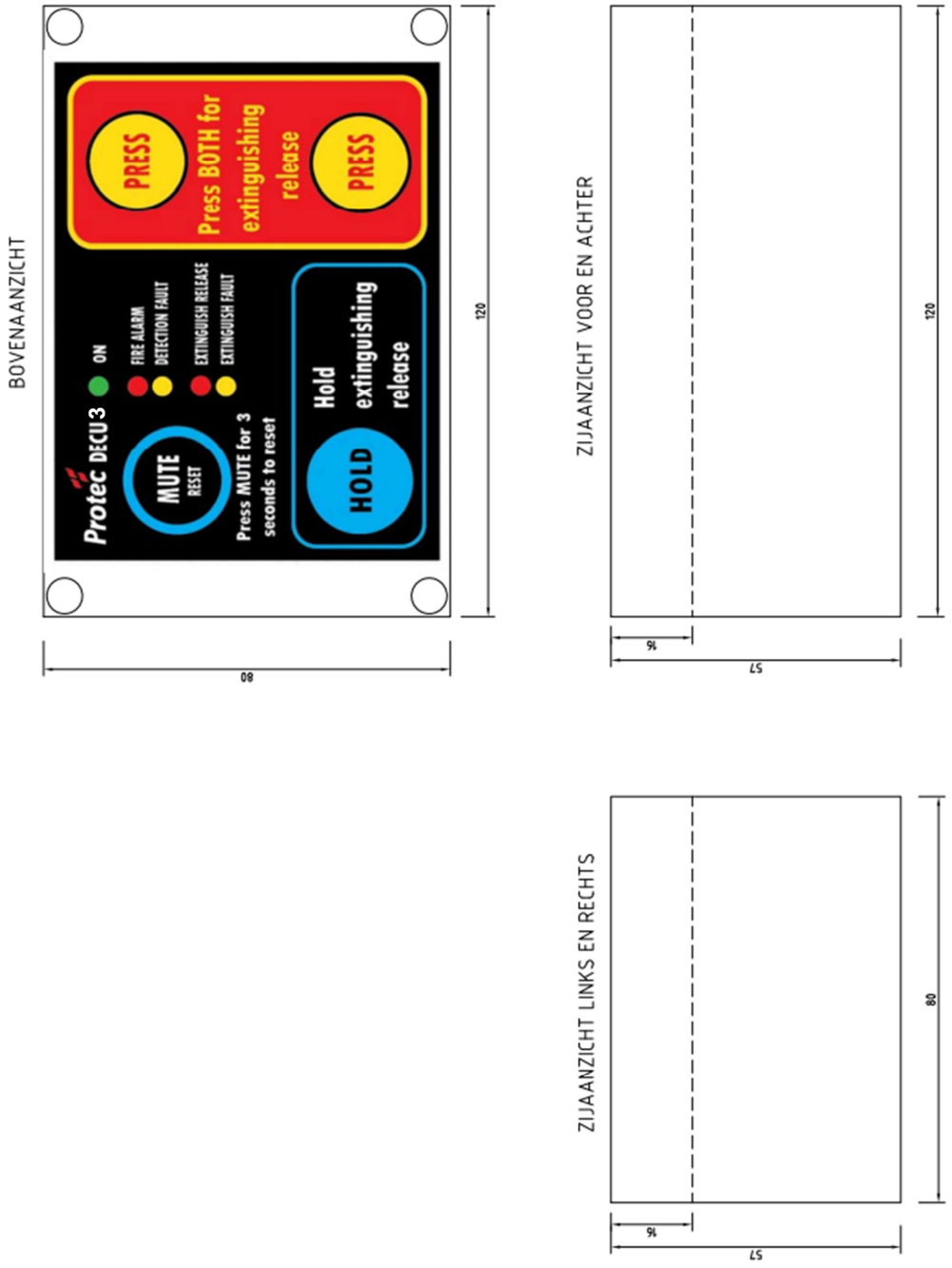
6.0 DECU3 Technical Specification

Power Supply Specification

Rated Voltage	11 to 32 Volt DC
Battery Voltage	This means that if the system normally uses a 12VDC input, the battery should also supply 12VDC input, or if the normal voltage is 24VDC, the battery should also supply 24VDC.
Maximum Quiescent Current Ign. Off	26 mA (set up with 4 detectors on the loops, without external load)
Maximum Quiescent Current Ign. On	41 mA (set up with 4 detectors on the loops, without external load)
Maximum Quiescent Current Battery mode	25 mA (set up with 4 detectors on the loops, without external load)
Maximum Alarm Current	75mA (set up with 4 detectors on the loops, without external load)
Extinguish Current	The fire-output signal to the extinguisher(s) will be 1A to 4A depending on voltage and number of suppressors (Stat-X = 1.8 Ohms nominal each unit), up to 2 units on 12V, 4 units max on 24V. Upon extinguisher activation, the input power is latched to the fire-output. Connect in series with bi-directional catch diodes across each element (see Stat-X manual).
Extinguish Monitoring End Of Line Resistor and Diode	10k Ohms and 1N4004 up to 1N4007.
Extinguish Monitoring Current	In normal state (no fire) a monitoring current of <4 mA is supplied to the extinguishers. If R>300 Ohm, the Fault (fire suppression) is triggered.
Max. Loop Output Voltage	The loop circuits output is the input voltage (-0.6 volt, power multiplex spec.).
Max. Loop Output Current	A current fuse-limited at 50 mA.
Loop Alarm Condition Threshold	>190 Ohm and <1k2 Ohm for more than 1 second. When a low resistance (less than 50 Ohms) linear heat cable is used, a 1k Ohms resistor need to be installed in series at the begin of the loop on one of the wires.
Loop Fault Condition Threshold	<190 Ohm or >12k Ohm.
Loop End Of Line Resistor	10k Ohms
External Hold-off / External Release Extinguishing Alarm Condition Threshold	>190 Ohm and <1k2 Ohm for more than 1 second.
External Hold-off / External Release Extinguishing Fault Condition Threshold	<190 Ohm or >12k Ohm.
External Hold-off / External Release Extinguishing End Of Line Resistor	10k Ohms
Alarm Output Voltage	Same as input voltage (11 to 32 Volt DC)
Alarm Output Current	Max. 2A
VFC Output Relay Maximum Load	1A @ 24 Volt DC
Fire Output Relay Maximum Load	1A @ 24 Volt DC
Fault Output Relay Maximum Load	1A @ 24 Volt DC

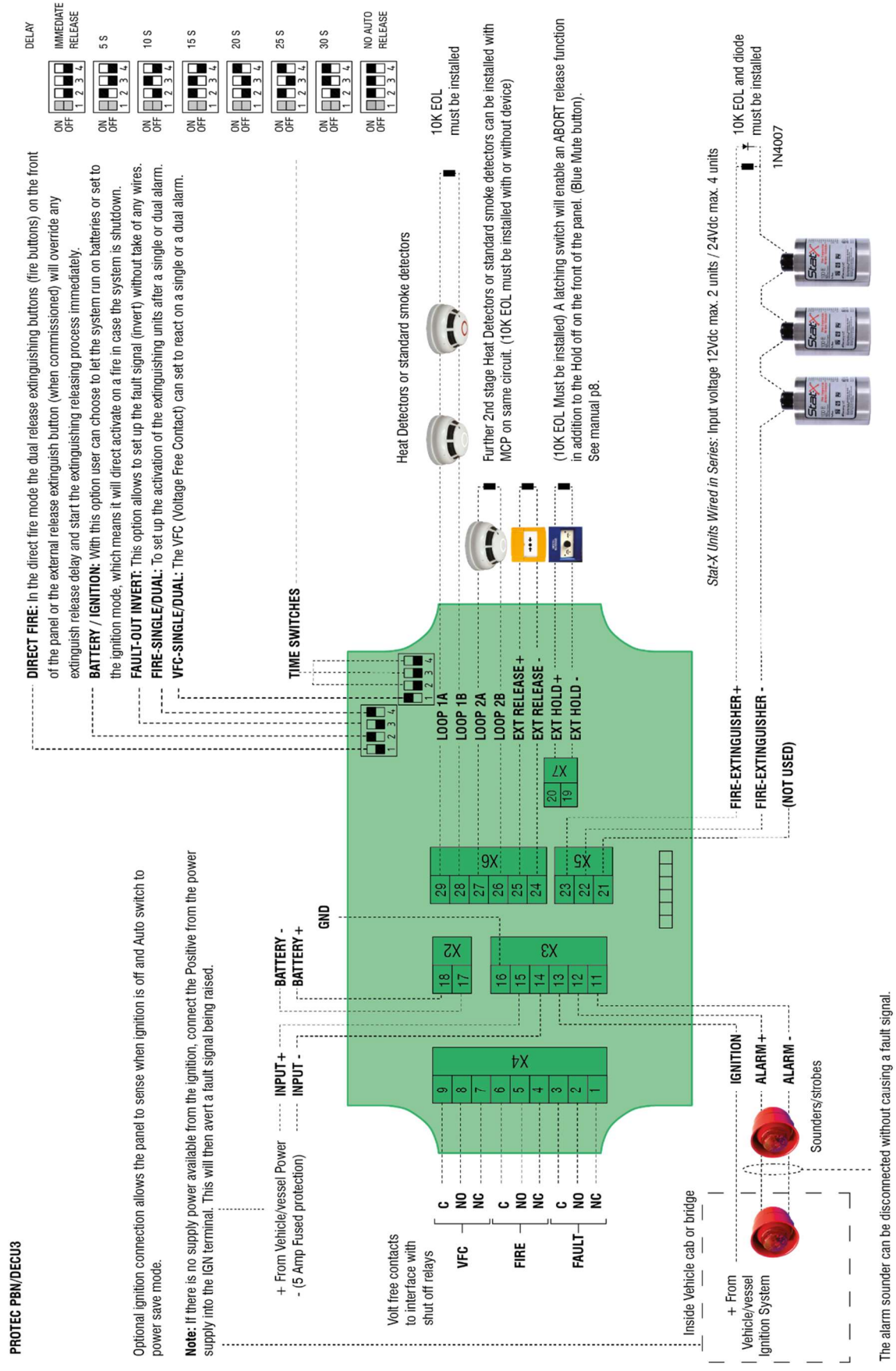
General System Specification

Ambient Temperature Range	-10 to 40 degrees Celsius
Environment	Waterproof IP65
Dimensions	See figure below.



Appendix 1 DECU3 Wiring Diagram

The diagram below shows the DECU3 connections and dip-switches.



Appendix 2 Devices Supported by the DECU3

Detection Device Support

Type	Brand
ORB-OP-42001-MAR[1]	Apollo
ORB-OH-43001-MAR[1]	Apollo
ORB-HT-41002-MAR[1]	Apollo
ORB-HT-41004-MAR[1]	Apollo
ORB-HT-41006-MAR[1]	Apollo
ORB-MB-00001-MAR	Apollo
ORB-MB-40004-MAR	Apollo
KG/BU – Hold button (Blue)	K&G
KG/BA – Extinguishing Release (Yellow, English)	K&G
KG/MC/MAR manual call point (red)	K&G

Sounder / Beacon Device Support

Type	Brand
VTB-32EM-DB-RB/RL VTB sounder/beacon[2]	Cranford
ROLP/R1/LX-W/WF sounder/beacon[3]	Fulleon

Note:
[1] Device input voltage 8,5 - 33Vdc
[2] Device input voltage 18 - 35Vdc
[3] Device input voltage 18 - 28Vdc

Always check the specification of the devices before installing them on the DECU3.