MANUAL CONTROL UNIT
CUE

**QUICK EXTINGUISHING SYSTEM
CUE**

Contents

CONTROL UNIT CUE   Rev. A   MC   Date: 030224

INTRODUCTION

The control unit CUE is the heart of the preventive protection system controlling and operating all the different functions. The control unit receives and evaluates information from each detector and activates appropriate output according to the programme, such procedures as activation of relays, solenoid valves, explosive outputs and/or text messages. The control unit CU-E has an integrated power supply as well as a battery back-up. Each control unit may be installed close to the respective risk area that is being protected thus minimizing installation and maintenance costs. The control unit is equipped for connection to a network. Up to 31 units can be connected in a network controlled by one master unit MUE.

The control unit CUE consists of six main components.

☞ **Enclosure**

☞ **Front panel with LCD-window and keyboard**

☞ **Power supply card**

☞ **Transformer**

☞ **Main card**

☞ **Batteries**

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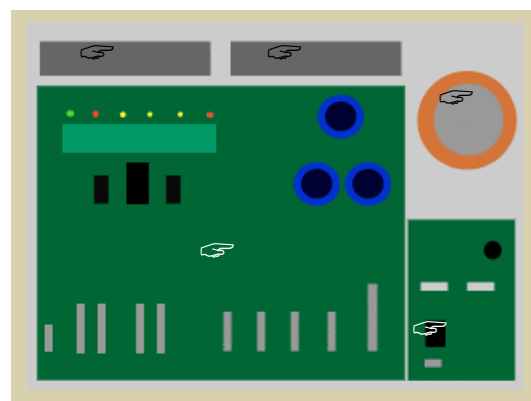
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FUNCTION

1.   **Power Supply Unit with battery backup.**

The control unit is supplied with AC-voltage from the mains which is transformed to the required voltages for operating the different systems and for charging the battery. If the main supply drops out, the control unit will automatically switch over to battery back-up, thereby maintaining the full functionality of the central unit. When the main switch is re-established, the control unit will automatically return to normal AC operation, and the battery will be recharged.

2.   **Monitoring.**

The control unit checks all the connected components with regard to electrical operation and the internal function of hardware and software. In the case when a fault alarm is activated the operator receives a message on the LCD- display clarifying the type of fault.

3.   **Control system with pre-programmed functions..**

For any detector indication or any other input signal, programmed procedures will immediately take place. These procedures can vary depending on different factors for example energy level, number of glows or sparks, indications from several detectors or other input signals.

4.   **Electronic log-book**

The control unit stores events and alarms in the electronic memory, which can be recalled by the operator on demand.

INSTALLATION

The control unit is shipped ready for immediate installation complete with lockable enclosure, mounting brackets and cable glands. This items are located under the "flap" in the box (Note: The delivered mounting brackets and screws should be used). Choice of cable entry will be determinated by the terminal connections to be used. The control unit should be located in a well protected area. If the CU-E is located out-doors it must have adequate weather protection.

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ELECTRICAL INSTALLATION

1.   **Power supply**

        The main connection to the control unit should be individually fused.

2.   **Installation of cables**

        All cables to and from the control unit should be installed in the same way as signal cables in general. The network cables should be installed at least 300 mm away from the power cables or other source of main disturbance. The network cables must not be spliced. If there is a risk for cable damage a mechanical protection shall be provided.

3.   **Process earthing**

        It shall be preformed according to standard: XXXXXXXXx

MECHANICAL INSTALLATION

Follow the given instructions in the project documentation. The location of detectors and extinguishing zones is essential for the correct function of the system.

FIREFLY AB CAN NOT HOLD RESPONSIBLE IF THE INSTALLATION IS NOT PREFORMED ACCORDING TO THE DRAWINGS ISSUED BY FIREFLY AB.

START UP

Connect the control unit according to the instructions and connecting diagrams issued by FIREFLY. When all connections have been completed,

turn on the switch **SW1:**

and **SW3:**

For switches location see the layout at the end of the manual.

Check if the system gives any malfunction alarms. Check out any reiterated alarms and make corrections accordingly. Make a function test for all equipment connected and test outgoing alarms from the control unit (process interlocking control).

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LED INDICATORS
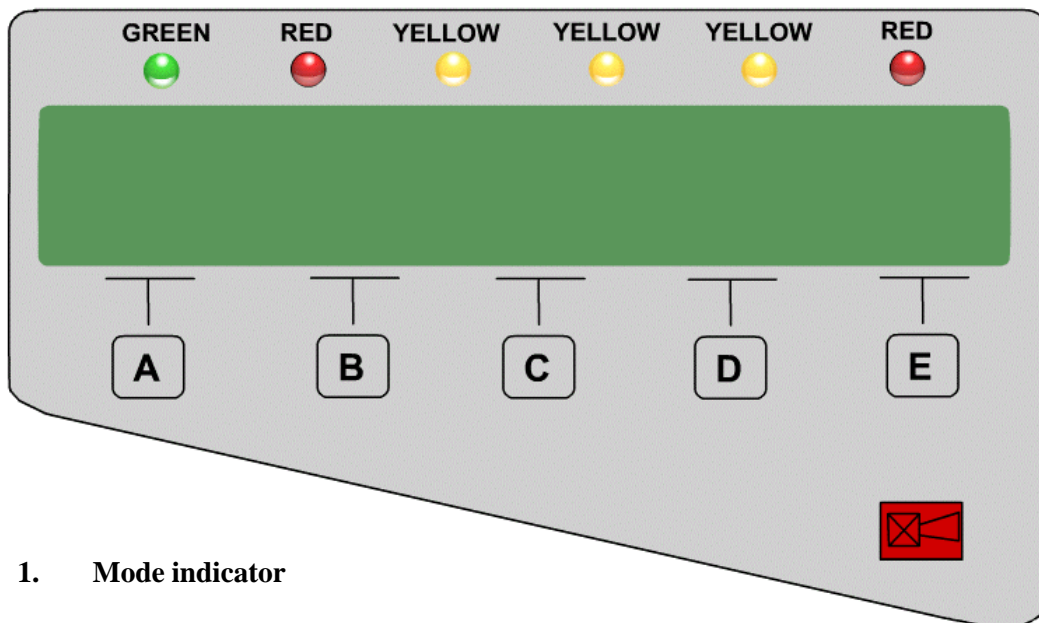
1.   **Mode indicator**

Green LED ON – normal operation.
Green LED FLASHING – Control unit in test mode.
Green LED OFF – power failure.

2.   **Malfunction indicator**

Red LED normally OFF.
Red LED FLASHING – Malfunction are registered.
Red LED goes out when malfunction have been corrected and a reset is made.

3.   **"Spare"**

4.   **Glow indicator**

Yellow LED normally OFF.
Yellow LED FLASHING momentary – glow indication.

5.   **Output indication**

Yellow LED normally OFF.
Yellow LED ON an output is active.

6.   **Process stop indication**

Red LED normally OFF.
Red LED FLASHING – system in process stop mode.
Red LED goes out when process stop has been deactivated and alarm has been reset.

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TEXT MESSAGES

OPERATION STATUS MESSAGES

> **STATE:**   **RUNNING**

Normal operating conditions – Green LED ON

> **STATE:**   **NO RELAYS**

Test mode where outputs for solenoid valves and explosive release are active.
(Note: All relays are deactivated. Malfunction alarm is given by the malfunction relay while
the system is in this mode). This test mode is used when testing extinguishing functions.

> **STATE:**   **NO REL/OUTPUT**

Test mode where all outputs are deactivated. (Note: All relays are deactivated. Malfunction alarm is given by the malfunction relay while the system is in this mode.) This test mode is used when the system should not be in operation, i.e. during maintenance work or when the process is taken out of operation. This test mode can also be used for testing the system.

MALFUNCTION MESSAGES

> **EXT. POWER ERROR**

Cause :	Incoming supply voltage is missing.
Trouble-Shooting:	Check incoming voltage. If supply voltage is correct the fuses F1 and F2 in the control unit must be checked.
Action:	Solve the problem in a suitable way. Replace the fuses.

> **INT. POWER ERROR**

Cause:	Internal voltage is faulty
Trouble-Shooting:	Check that no cables are disconnected or that something may have caused a short-circuit.
Action:	Solve the problem or contact Firefly AB.

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BAT. POWER ERROR

Cause:	Broken electrical circuit or faulty battery.
Trouble-Shooting	Check that the battery cables are connected and that the batteries are functioning.
Action:	Connect the battery cables. Replace the faulty battery with a new one.

SOLENOID X ERROR

Cause:	Broken electrical circuit between control unit and solenoid valve
Trouble-Shooting:	Check that the cable connector on the solenoid valve is correctly connected and that there is no damage on the cable.
Action:	Fasten the cable connector or change the cable.

DETECTOR X NO RESP

Cause:	No contact between control unit and detector No. 1
Trouble-Shooting:	Check that the detector is connected in the control unit. Check that the plug-in cable to the detector is connected to the detector. Check that the detector cable is correctly connected to the control unit. Check that no cable is damaged.
Action:	Connect the detector. Connect the cable Correct connection. Change to new cable.

DETECTOR X UNIT TYPE

Cause:	Detector of incorrect type is connected to input D1.
Trouble-Shooting:	Check in the project documentation which type of detector should be connected.
Action:	Install correct type of detector.

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DETECTOR X SENSITIV

Cause:	Sensitivity of the detector connected to input D1 is not Corresponding to the configuration in the control unit.
Trouble-Shooting:	Check in the project documentation which sensitivity the Detector should have.
Action:	Change to correct sensitivity.

DETECTOR X OVERTEMP

Cause:	The temperature in the detector enclosure has exceeded the preset temperature limit. The overheating can be caused by to high temperature in the process or external factors, as for example heat sources.
Trouble-Shooting:	Find the cause for overheating.
Action:	If the overheating is caused by the process, contact FIREFLY for advice

DETECTOR X HUMIDITY

Cause:	Humidity in the detector enclosure.
Trouble-Shooting:	If the detector is equipped with cooling air check the instrument air quality.
Action:	Dry the unit immediately. Use a cloth or similar for drying the detector enclosure and the sensor cover. Blow the electronics dry and clean by using instrument air. Note: Do not dry the sensor with hot air. The sensor elements will be damaged if the temperature exceed 60?C.

EXPLOSIVE X ERROR

Cause:	The loop for explosive 1 faulty or not activated.
Trouble-Shooting:	Check that the explosive output 1 is activated. See menu EXPLOSIVE OUTPUTS. Check if the explosive loop is faulty. (short circuits, broken circuits, and used or faulty protractors.)
Action:	Activate explosive output X by using menu EXPLOSIVE OUTPUTS. Solve the problem in a suitable way.

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SENSOR X ERROR

Cause: The circuit supervised by input sensor 1 is not in it's normal
                    position (normally open or closed).
Trouble-Shooting: Check the documentation for normal function of the circuit.
                    Also check all items connected to the input.
Action: Rectify the error.

UNKNOWN UNKNOWN

Cause: Incorrect main program.
Trouble-Shooting: Contact FIREFLY AB.
Action: According to FIREFLY AB's instructions.

(Flashing)

SYSTEM RESTART

Cause: Incorrect master program or faulty processor.
Trouble-Shooting: Contact FIREFLY AB.
Action: According to FIREFLY AB's instructions.

CFG-GENTXT

CGF-DEDTXT

CGF-DETECT

CGF-SENSOR

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CGF-ENERGY

CGF- RISC

Cause: Incorrect program file in the configuration program.
Trouble-Shooting: Contact FIREFLY AB.
Action: According to FIREFLY AB's instructions.

ACTIVITY MESSAGES

EXPLOSIVE X ACTIVE

Cause: Explosive output 1 has been activated.
Action: Reset the alarm with key for "reset".

SYSTEM PR-STOP

Cause: The system has exceeded any of the presets criteria and
                          has therefore activated process stop.
Action: Find the cause for process stop and take necessary action.
                          Thereafter follow the routines that must be carried out after
                          process stop.

DETECTOR X SPARK Y

Cause: Detector X has indicated a glowing particle. The energy
                          level was measured by the detector to be Y. The energy
                          level from a glowing particle is measured on a scale from
                          1-8, where 1 is the lowest and 8 is the highest energy.
Action: The message is for information only. The system has
                          carried out the pre-programmed procedures automatically.

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MENUS

The control units has 6 keys to operate the unit.
Five are located under the display. This are as follows:
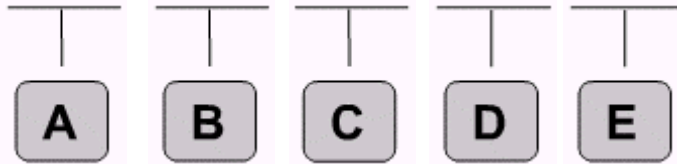
All functions keys are menu controlled.

The function for each key is displayed above respective key. The sixth key is used to reset
audible and visual alarms.

STANDARD MENUS

-   - DISPLAY EVENT LOG
                                                       - SET DATE AND TIME
                                                       - SELECT LANGUAGE
                                                       - CHANGE SYSTEM STATE

MENU SELECTION: DISPLAY EVENT LOG

Purpose: **The log-book registers events reported by the control units.**
                  It will log events sequentially as they happen i.e the last event will
                  be the first to be displayed.
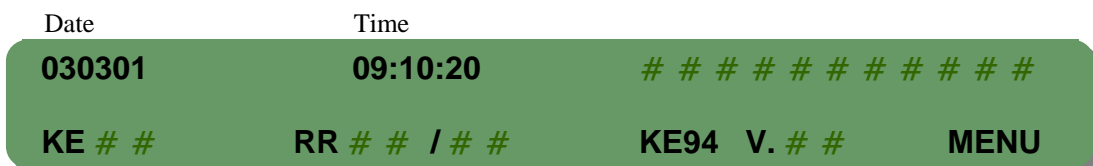
1.   The display will show the current status of the system.

Date	Time	
030301	**09:10:20**	# # # # # # # # # #
KE # #	**RR # # / # #**	**KE94 V. # #** **MENU**

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display
        shows:

MENU SELECTION	**DISPLAY EVENT LOG**	
PREV	**NEXT** # # # #	**ABORT** **ENTER**

4.   Press "**ENTER**". The display shows now the latest message in the log-book.

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5.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**".

6.   To finish press "**ABORT**" and the display will return to show the current information. If none of the keys has been pressed within 60 seconds, the display will automatically return to show the current status of the system.

MENU SELECTION: SET DATE AND TIME

Purpose: **To set date and time for the central unit which also updates all time**
settings   **for the connected control units.**

1.   The display will show the current status of the system.

Date   Time

030301	09:10:20	# # # # # # # # # # #
KE # #	RR # # **/** # #	KE94 V. # # MENU

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display shows:

MENU SELECTION	**SET DATE AND TIME**	
PREV	**NEXT**	# # # # **ABORT** **ENTER**

4.   Press "**ENTER**". The display will show:

Current date and time   Date and time to be set   Cursor

030301	09:10:20	030301	09:10: 20
-1	+1	>	**ABORT** **ENTER**

5.   The cursor will flash to show the digit to adjust. The cursor can be moved with the key marked (**>**).

6.   Set date and time with the keys "**-1**" and "**+1**" and press "**ENTER**". The display will return to show the current status of the system.

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MENU SELECTION: CHANGE SYSTEM STATE

Purpose: **To change system state for the control unit.**

1.   The display will show the current status of the system.
     Date   Time

030301	09:10:20	# # # # # # # # # #
KE # #	RR # # / # #	KE94 V. # # MENU

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display
     shows:

MENU SELECTION	CHANGE SYSTEM STATE
PREV NEXT	# # # # ABORT ENTER

4.   Press "**ENTER**". The display will show:

     Current system state   System state to be selected

STATE: # # # # # # #	# # # # # # # # #
PREV NEXT	# # # # ABORT ENTER

5.   Step backwards or forwards among available systems states by pressing "**PREV.**" or
     "**NEXT**

RUNNING   - Normal operating condition – Green LED ON.

NO RELAYS   - Test mode where outputs for solenoid valves and explosive
               release are active. (Note: All relays are deactivated. Malfunction
               alarm is given by the malfunction relay while the system is in this
               mode.) This test mode is used when testing extinguishing
               functions.

NO REL/OUTP   - Test mode where all outputs are deactivated. (Note: All relays are
               deactivated. Malfunction alarm is given by the malfunction relay
               while the system is in this mode.) This test mode is used when the
               system should not be in operation, i.e. during maintenance work
               or when the process is taken out of operation. This test mode can
               also be used for testing the system.

6.   When the display shows the required system state press **"ENTER"** to select it.
     The display will return to show the current status of the system.

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MENU SELECTION: SELECT LANGUAGE

Purpose: **To select operating language for the central unit.**

1.   The display shows the current status of the system.

Date	Time	

030301	09:10:20	# # # # # # # # # #
KE # #	RR # # / # #	KE94 V. # # MENU

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display shows:

MENU SELECTION	SELECT LANGUAGE	
PREV NEXT	# # # # ABORT	ENTER

4.   Press "**ENTER**". The display will show:

Present language	Language to be selected

LANGUAGE: # # # # #	# # # # # # # # # # # #
PREV NEXT	ABORT ENTER

5.   Step backwards and forwards among available languages by pressing "**PREV.**" or "**NEXT**". When preferred language is shown on the display, press "**ENTER**" to select it   The display will return to show the current status of the system. All information will be shown in the selected language.

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AVAILABLE MENUS DRIVEN BY EVENTS - DISPLAY ERROR LIST

The hidden menus will be available to
the operator when necessary due to system
configuration. The central unit will automatically
activate the menus when needed.

- **- DISPLAY ERROR LIST**
- **- RESET PROCESS STOP**
- **- EXPLOSIVE OUTPUTS**
- **- RESET OUTPUTS**
- **- FLOW SENSOR CALIBR.**

MENU SELECTION: **DISPLAY ERROR LIST**

Purpose: **To list existing errors. (Errors that have been remediated will
automatically**   **be erased from the error list.)**

1. The display shows the current status of the system.

  Date   Time

030301	**09:10:20**	# # # # # # # # # #
KE # #	**RR # # / # #**	**KE94 V. # #** **MENU**

Control unit identity   Rows for keys function

2. Press "**MENU**" to enter "MENU SELECTION".

3. Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display
   shows:

MENU SELECTION	**DISPLAY ERROR LIST**	
PREV **NEXT**	# # # # **ABORT**	**ENTER**

4. Press "**ENTER**". The display will show:

ERROR ALARM IN:	***)** # # # # # # # # # # # # # # #	
PREV **NEXT**	# # # # **ABORT**	**ENTER**

*) For ex. SOLENOID 1

5. Step backwards and forwards among available system states by pressing "**PREV.**"
   or "**NEXT**".

6. Press "**ABORT**" and the display will return to show the current status of the system.

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<u>**MENU SELECTION:**</u>   **<u>RESET PROCESS STOP</u>**

Purpose: **To reset the system after a process stop.**

1.   The display shows the current status of the system.

Date   Time

| 030301   09:10:20   # # # # # # # # # # # |
| KE # #   RR # # **/** # #   KE94   V. # #   MENU |

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display shows.

| MENU SELECTION   RESET PROCESS STOP |
| PREV   NEXT   # # # #   # # # #   ENTER |

4.   Press "**ENTER**". The display will show:

Blocking time in seconds

| PROCESS STOPED   COUNTDOWN   0000 |
| # # # #   # # # #   # # # #   ABORT   ENTER |

The system can not be restarted before the countdown timer as reached **0000**.

5.   Press **"ENTER"** to deactivate the process stop.

   Note: All necessary arrangements after a process stop must be finalised before the process stop is deactivated.

The display shows:

| KE # #   # # # #   # # # #   SYSTEM PR-START |
| # # # #   # # # #   ACK.   # # # #   # # # # |

6.   Acknowledge the message by pressing **"ACK."** X2. The display will automatically return   show the current status of the system..

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<u>MENU SELECTION:</u>   <u>EXPLOSIVE OUTPUTS</u>

Purpose: **To switch the explosive outputs ON or OFF.**

Note: When a explosive output has been activated it will automatically be switched off. This means that the system can be left in a running position after an explosive output has been activated. The protractor can be replaced without any influence on the other system functions. The explosive outputs will be blocked for a preset time and can not be activated before the countdown time is 0000.

1.   The display shows the current status of the system.

Date   Time

030301	09:10:20	# # # # # # # # # #
KE # #	RR # # / # #	KE94 V. # # MENU

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display shows:

MENU SELECTION:	EXPLOSIVE OUTPUTS	
PREV NEXT	# # # # # # # #	ENTER

4.   Press "**ENTER**". The display will show:

Blocking time in seconds   Blocking time in seconds

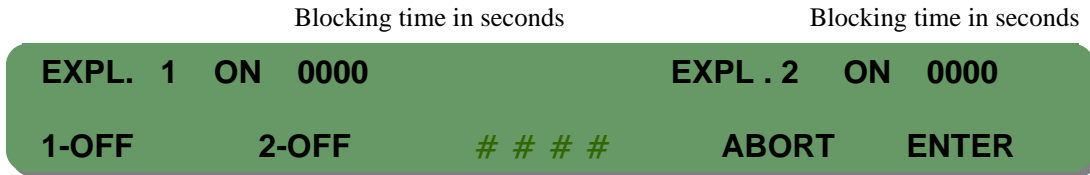| EXPL. 1 OFF 0000	EXPL . 2 OFF 0000
1-ON 2-ON # # # #	ABORT ENTER

The explosive outputs can not be activated before the blocking time is **0000**.

5.   To activate explosive output 1 press **"1-ON"**. (To activate explosive output 2 press **"2-ON"**).
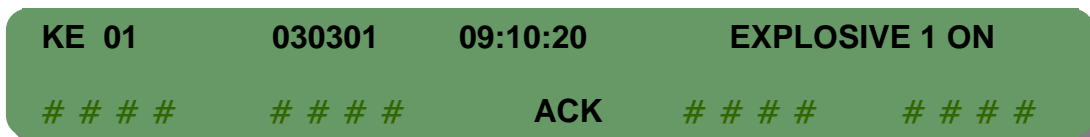
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6. The display shows:

Blocking time in seconds	Blocking time in seconds

EXPL. 1 ON 0000	EXPL . 2 ON 0000
1-OFF 2-OFF # # # #	ABORT ENTER

7.   Press "**ENTER**". The display will show.

KE 01 030301 09:10:20	EXPLOSIVE 1 ON
# # # # # # # # ACK	# # # # # # # #

The explosive 1 (2) is now activated.
Acknowledge the message by pressing **"ACK."**. The display will automatically return to show the current status of the system.

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MENU SELECTION: RESET OUTPUTS

Purpose: **To manually reset outputs that have been programmed for manually reset.**

This menu can in some cases be delayed by the countdown time from the process stop.

1.   The display shows the following:

RESET OUTPUTS

 # # # #   # # # #   # # # #   # # # #   **YES**

NOTE: **Check that the extinguishing process has been completed before pressing YES.**

2.   Press **"YES"** and the outputs for manually reset will be reseted. The display will automatically return to show the current status of the system..

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MENU SELECTION: FLOW SENSOR CALIB.

Purpose: **To calibrate the flow measurement.**

1.   The display shows the current status of the system.

Date   Time

030301	**09:10:20**	# # # # # # # # # #
KE # #	**RR** # # **/** # #	**KE94 V.** # # **MENU**

Control unit identity   Rows for keys function

2.   Press "**MENU**" to enter "MENU SELECTION".

3.   Step backwards or forwards by pressing "**PREV.**" or "**NEXT**" until the display
      shows:

MENU SELECTION:	**FLOW SENSOR CALIBR.**
PREV **NEXT**	# # # # **ABORT** **ENTER**

4.   Press "**ENTER**". The display will show:

FLOW SENSOR	**0.0L/P**	**0.0L/P**	**0000P/10L**
PREV **NEXT**	**CLEAR**	**ABORT**	**ENTER**

      **Note: To calibrate the flow sensor see documentation for the used type of flow
      sensor.**

5.   Press **"ENTER"** and the display will automatically return to show the current status
      of the system.

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LAYOUT

MAIN CARD
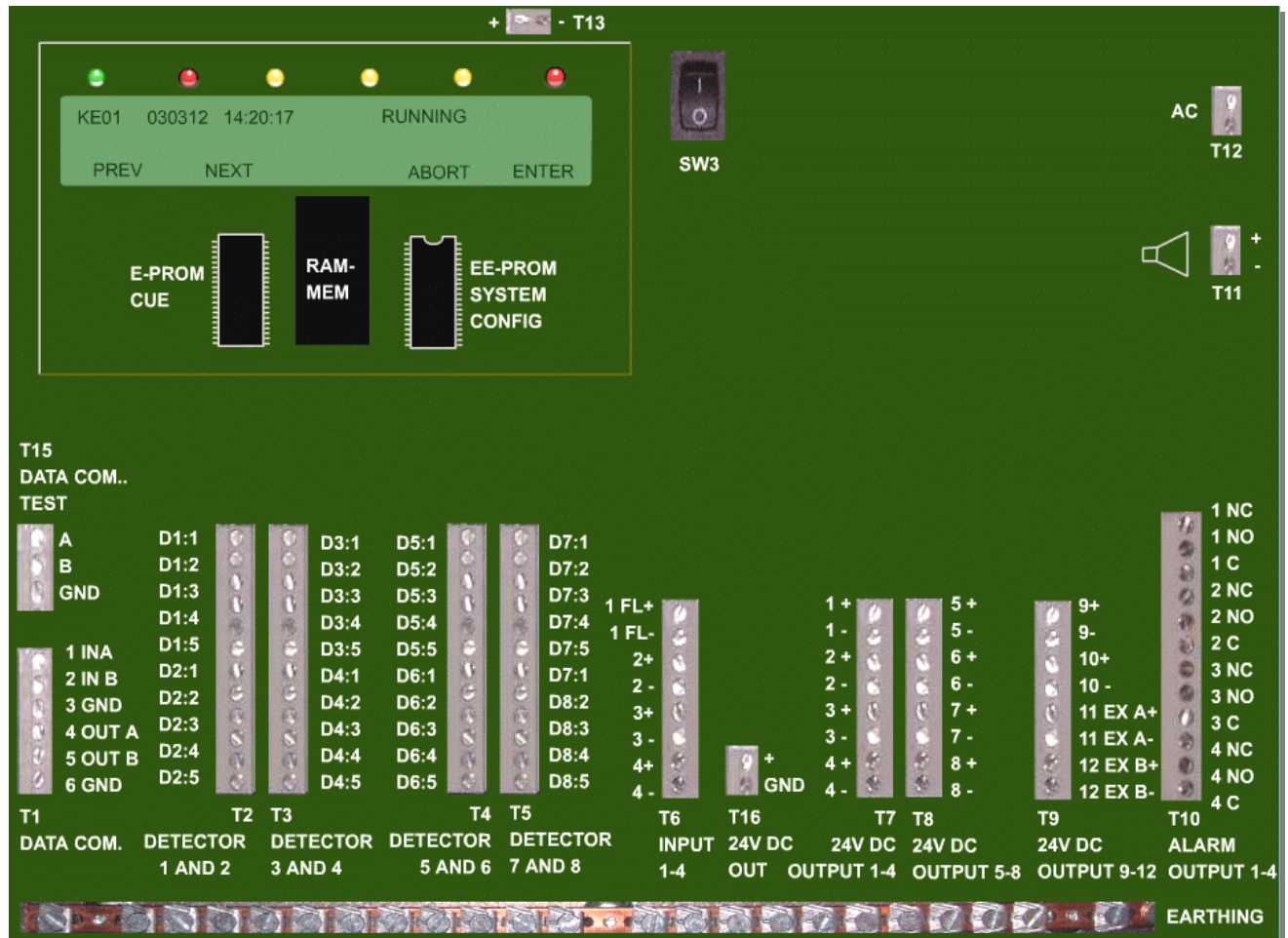
### TERMINALS / COMPONENTS

Terminal block T1:	Data communication IN/OUT.
Terminal block T2-T5:	Inputs for max. 8 detectors.
Terminal block T6:	Inputs for 4 external sensors.
Terminal block T7-T8:	Outputs for max. 8 solenoid valves.
Terminal block T9:9+, T9:9-:	Output for siren.
Terminal block T9:10+, T9:10-	Output for flash.
Terminal block T9:11+, T9:11-	Output for explosive circuit A.
Terminal block T9:12+, T9:12-	Output for explosive circuit B.
Terminal block T10:	Output for 4 outgoing alarms - T10:1 High Risk
	- make/break contacts - T10:2 System Fault.
	- T10:3 Extinguishing.
	- T10:4 Programmable

E-PROM CUE	Contains PC94 software
RAM MEM	RAM-memory
EE-PROM CONFIG	Contains system configuration and programming parameters.
SW3	On/Off Switch

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POWER SUPPLY CARD

VOLTAGE SELECTOR

FUSE
F1

FUSE
F2

SW 1

T0

L N
MAINS IN
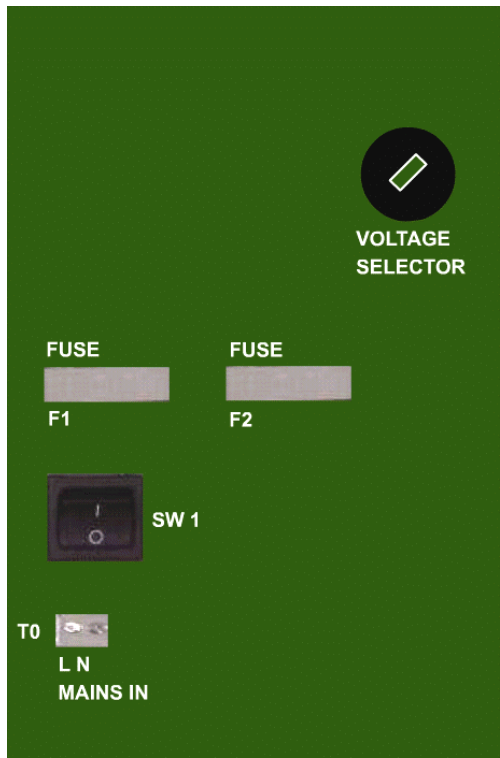
TERMINALS

*Terminal block **T0:*** Incoming supply 230/115
AC ±20%.

VOLTAGE SELECTOR :   110/220 V AC
    FUSES :   … A fuses
    SW1:   Main supply switch.

TECHNICAL DATA

Voltage supply:	115/230 VAC ±20%.
Power consumption:	Normally 0,2A at 220 VAC (Max. 1A).
	Normally 0,4A at 110 VAC (Max. 2A).
Storage temperature range:	-20? to +60?C.
Operating temperature range:	-20? to +60?C.
Environmental protection:	Equivalent IP65.
Measures:	
Wide:	480mm (1,89')
Deep:	130mm (0,51')
Height:	350mm (1,38')
Approximate weight:	17kg.

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Complies with EMC standards (emission):   EN 50 081-1 (1992).

Complies with EMC standards (immunity): EN 50 081-2 (1995).

ENV 50 142 (1994).

Solenoid valves outputs: 8 pcs. 24 VDC. Max 0,5 A.

Explosive release outputs: 2 pcs. Max. 10 pcs. protractors on each output. Circuit resistance 20 OHM on each output.

Horn output: 1 pc. 24 VDC. Max 0,5 A.

Alarm lamp output: 1 pc. 24 VDC. Max 0,5 A.

Relays outputs: 4 pcs. make/break contacts 250 VAC 2A or30 VDC 2 A.

Detector inputs: 8 pcs. with individual supply and data communication.

Sensor inputs: 3 pcs. for closed or broken circuits.

Flow sensor input: 1 pc.

Network communication input: 1 pc.

Network communication output: 1 pc.

Maximal cable length: 1000m.

Battery back-up: 4 hours.

Distributor:

Anaparts
FLAME MONITORING,
FIRE & GAS DETECTION