Tel: +359 **64 801 597**
e-mail: office@dm-teh.com
office@dmtech-ltd.com
web:www.dmtechtd.com

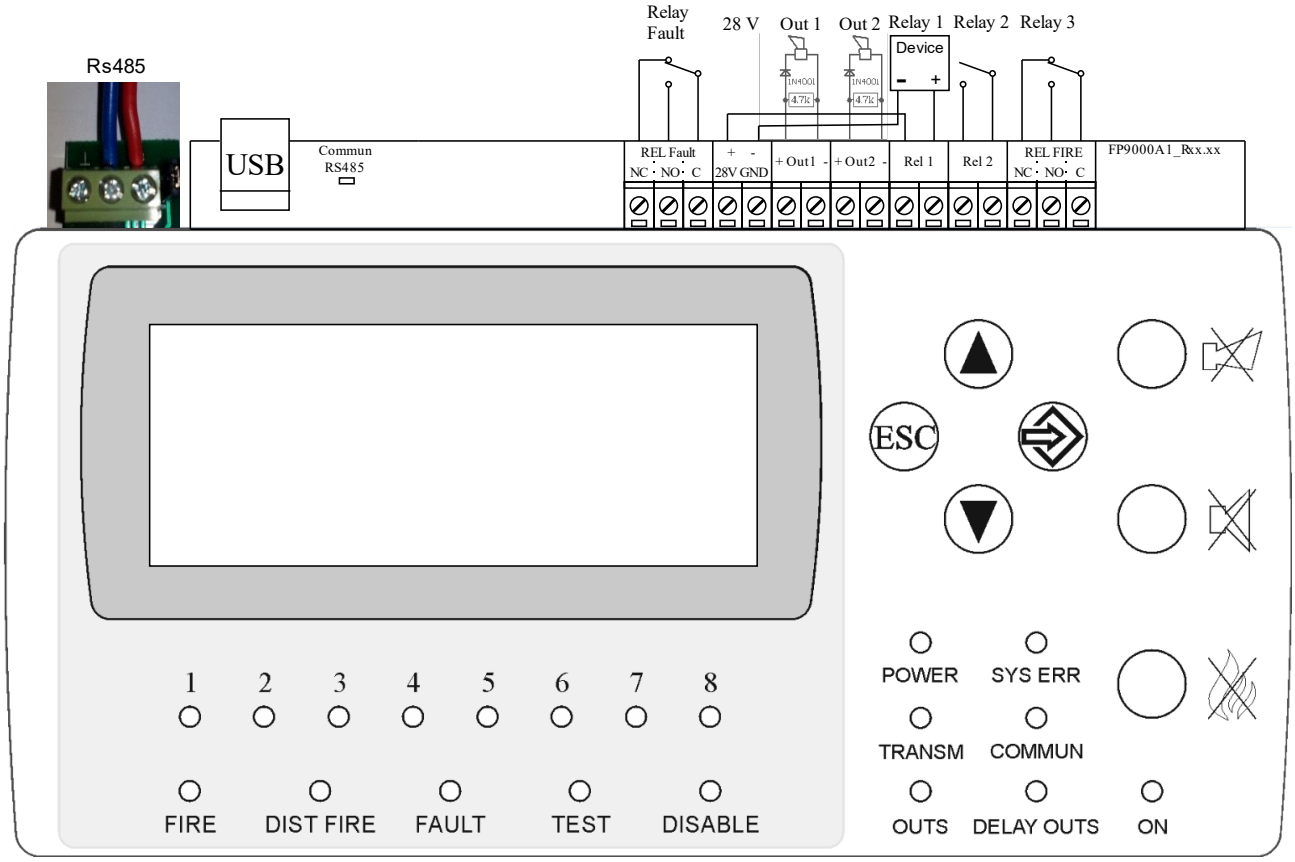
DMTech Ltd. Pleven

Addressable REPEATER

FP9000A R

Installation, setup and operation.

Rev 01:25



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1. INTRODUCTION

FP9000A R is an addressable repeater for addressable Fire alarm panel FP9000A. Through the display and keyboard can be programmed and adjusted over 20 functional parameters. Each remote panel has 7 individual programmable parameters. With its 6 outputs, including 4 programmable, giving flexibility and adaptation to new and existing installations. All the panel conditions information is displayed on LCD 4x20 display and LED indicators. Volatile memory and real time clock enable recording and review of 1024 archive events.

Quick and easy - installation, setup and starting. Simple and clear procedures for operation and maintenance of the system.

2. TECHNICAL PARAMETERS

LINES		
➢ **Lines:**		
• Number of addressable fire panels in networking	**1 to 8**	**Optional**
• Type of the joining line	**biconductional**	
• Maximum length of wires	**1200 m / 0.75mm²**	
OUTPUTS		
➢ **Independent relay output in case of fire alarm:**		
• Quantity	1	
• Type	switching	**NC / NO**
• Electrical characteristics	3A/125V AC, 3A/30V DC	
➢ **Controllable output in case of fire alarm:**		
• Quantity	2	**programmable**
• Type	potential relay	
• Electrical characteristics	(19-28)VDC/ 0,5A	
➢ **Relay output in case of fire alarm:**		
• Quantity	2	**programmable**
• Type	potential-free	**NO**
• Electrical characteristics	3A/125V AC, 3A/30V DC	
➢ **Independent relay output in case of failure:**		
• Quantity	1	
• Type	potential-free, switching	**NC / NO**
• Electrical characteristics	3A/125V AC, 3A/30V DC	
POWER SUPPLY		
➢ **Mains power**		
• Voltage	**(187-252)V AC**	
• Frequency	**50/60 Hz**	

• Maximum power to mains power	**65W / AC**	
➢ **Battery power**		
• Battery quantity	**2**	
• Type of the battery	**Lead, gel**	
• Battery rated voltage	**12V DC**	
• Rated power C20	**5 Ah**	
• Charger voltage	**27,6 VDC**	**temperature compensated**
Consumption of battery power in standby mode		
• battery power	**< 50 mA to 24 VDC**	
Time needed in security mode when mains power supply is down with battery 12V/ 5Ah		
•	**100h**	
Executive devices powering		
• Voltage	**(19-28)V DC**	
• Maximal current (including the controllable outputs current)	**2A**	
Fuses		
• Mains power 230V AC	**4,0 A fuse**	
• Battery power	**6,3 A fuse**	
• Powering external devices	**1,85 A automatic**	
• Controllable outputs	**1,1 A automatic**	
Functional characteristics		
• Control controllable outputs for fault conditions (short circuit and interruption) and automatic reset;		
• Control of the remote panels and automatic reset;		
• Light and textual indication for Fire, Fault, Disable and Test mode;		
• Ability to delay controllable and general outputs for fire for a period of 1 to 600 seconds after the registration of state Fire;		
• Built-in sounder in case of fire – monotonal, continuous with the possibility of exclusion;		
• Ability to Disable controllable outputs for fire;		
• Interface for communication with external devices RS485 and networking;		
• LCD display, 4×20 characters and keyboard, for control and panel indication;		
• Energy independent archive of the events, recorded by the panel, consisting of type, date and time of the event - to 1024 events;		
• Choice of language for text information display;		
• A set of test modes and options for adjustment of lines, outputs and panel.		
➢ **Over all size**	**310x240x80 mm**	
➢ **Weight without batteries**	**1,3 kg**	
➢ **Safety degree**	**IP30/ EN 60529**	
The addressable repeater meets standards:		
• EN 54-2:1997		
• EN 54-2:1997/A1:2006		
• EN 54-2:1997/AC:1999		

• EN 54-4:1997
• EN 54-4:1997/A1:2002
• EN 54-4:1997/A2:2006
• EN 54-4:1997AC:1999
• EN 50130-4:2011
• EN 55022:2006/A1:2007
• EN 60950-1:2006/A11:2009

3. CONTROLS AND INDICATION

➢ **LED indicators**

Indicators	Function
"POWER"	Constant green light
"FIRE"	Common indicator - flashing or constant red light in Fire condition
"FAULT"	A common failure indicator. Upon failure of any type a yellow light will start flashing
"SYS FAULT"	A system failure due to stoppage of the CPU. A constant yellow light will light up. Needs to be repaired at an authorized service.
"POWER FAULT"	In case of fault or loss of an AC or battery power supply a steady yellow light will light up.
"TEST"	When in line test condition a constant yellow light will light up.
"DISABLE"	When in Disabled component / line or controllable output / a steady yellow light will light up.
"OUTS"	Illuminates with steady yellow light at short or interruption of output devices power supply line
"DEL OUTS"	Continuous yellow light at preset delay of connected outputs
"BUZZER SILENCE"	Indicator to the button "BUZZER SILENCE", in suppressing local telltale, a steady red light will light up.
"SOUND SILENCE"	Indicator to the button "SOUND SILENCE", when suppressing Fire outputs, a steady red light will light up.
"COMUN"	When of the for data transmission device failure by RS485, a constant yellow light will light up.
"TRANSM"	In case of device failure, will transmit a Fire alert to a remote center.
"**1 2 3 4** 5 6 7 8"	Individual indicators for Fire and line failure in Remote fire panels- Fire is lit with red light, fault lights up with yellow light. When disabled and line test there is an indication of the respective condition.

- **BUTTONS**

Button	Panel condition	Access level	Management Authority Action
"RESET" 	Fire	Level 2 or Level 3	Exit from Fire condition.
"SOUND SILENCE" 	Fire	Level 2 or Level 3	Where activated outputs for Fire - silence of the same outputs.
"BUZZER SILENCE" 	Fire и Failure	Level 1 and Level 2	Suppression / activation of the local sounder
	Fire, Failure, Test and Disable component	Levels 1 and 2	Entry in Information and management condition.
	Information and management	Levels 1 and 2	- Displaying the next element onto the display; - Moving of the cursor; - Modification of the selected parameter.
	Fire	Levels 1 and 2	- Displaying the previous text message for Fire onto the display.
	Information and management	Level 1 and 2	- Displaying the previous element onto the display; - Modification of the selected parameter.
	Options	Level 3	
	Fire	Levels 1 and 2	Displaying the next message for Fire onto the display
	Information and management	Levels 1 and 2	- Displaying the next element from the menu onto the display; - Moving of the cursor; - Modification of the selected parameter.
	Options	Level 3	
	Information and management	Levels 1 and 2	- Exiting a function with saving changes in parameter; - Exiting from the current menu and transition to the upper menu in the hierarchy.

4. DEFAULT PARAMETERS

The repeater panel provides users with default parameters, described in the table below. These parameters are saved and recorded from menu "Default par.".

INPUT LINES		
➢ **Remote panels:**		
• Quantity	**1 Enable**	
OUTPUTS		
➢ **Independent relay output in case of fire alarm:**		
• Quantity	1	**EN 54-2, independent**
➢ **Programmable controllable output in case of fire alarm:**		
• Quantity	2	**Connected to Panels**
➢ **Programmable relay output when fire alarm**		
• Quantity	2	**Connected to Panels**
➢ **Independent realy output during failure:**		
• Quantity	1	**EN 54-2, independent**
Functional characteristics		
• Controllable and general outputs delay in case of fire. (The delay is valid only when outputs are connected to Panels)	20 seconds	

FUNCTION

Addressable Repeater FP9000A R:

- receives data for Fire condition from the remote fire addressable control panels:
- receives data for Fault condition from the remote fire addressable control panels:
- displays information for the condition of remote fire addressable control panels;
- executes control commands to remote fire addressable control panels for their forced exit of Fire condition;
- executes control commands to remote fire addressable control panels for suppressing fire alarm outputs and sirens and enabling;
- executes control commands to remote fire addressable control panels for suppressing buzzer alarm;

Addressable Repeater FP9000A R could be used:

- when the persons whom are expected to detect and react initially to the fire condition and/or fault condition signals are at a different place from the location of the fire addressable control panel/s;
- when fire addressable control panels located at different sites have to be monitored and controlled from one place;
- when the fire addressable control panel/s are monitored from several locations.

5. REPEATER INSTALLATION AND SETUP

5.1 Panel assembly.

- Unpack the repeater;
- Mount the dowels at the appointed place for fixing the repeater;
- Attach the repeater to the dowels through the three holes on the chassis
  It is recommended that the panel should not be installed near heat sources (radiators, air conditioners, etc.).
- The connecting wires are mounted, using the hole in the box.

5.2. Connecting addressable remote panels.

- The repeater may be connected to eight fire addressable panel.
- The connection between the devices along RS485 is executed by parallel connection along the two-wire line as it should be observed potential "A" and "B" not to be crossed. The maximal distance between the final point devices is 1200 meters.

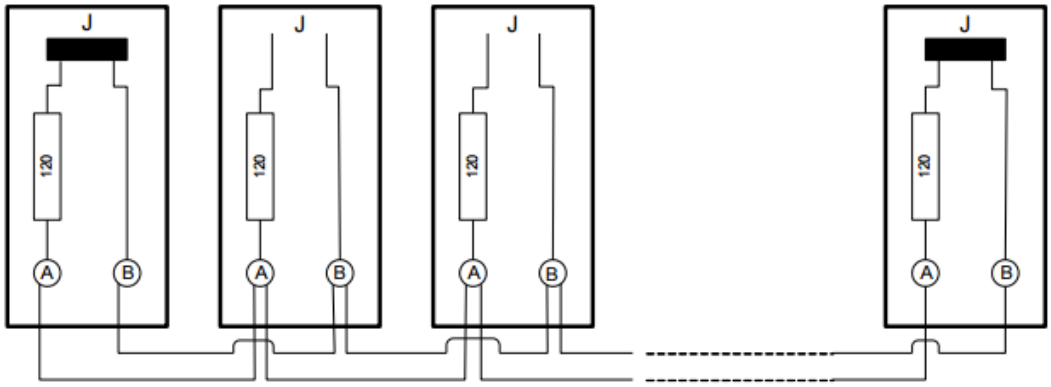
The recommended connecting wire cross section should not be less than:

- Up to 1200 m - connecting wire 2 x 1.0 mm²

In the case of long distances or environment with electromagnetic radiation it is recommended the wire to be double-core or shielded. If the wire is shielded, the shield should be connected only in one end to "earth" terminal on the respective fire control panel or repeater.

Regardless the line length a jumper should be installed to the first and the last device to terminate the line by 120 ohms. The jumper should be removed from all other devices.

The setting MASTER of the addressable repeater and the addressable fire control panels connected to it does not depend on the physical location of the devices in the network. The addressable repeater could be physically connected anywhere in the line. If it is the first or the last device (in RS485 there is only one two-wire line connected), it should be terminated with the jumper. The same rule applies for the fire control panels too.



First device in the line
(last for the network)

Last device in the line
(last for the network)

- Connection to FP9000A fire addressable control panel in order to operate in a network, FP9000A fire addressable control panel has to be completed with an extended module M9000-485 is located. Network address is set from the menu panel FP9000A.

- data exchange rate– 9600 Bits/s.

- Checking the line resistance

With switched off power supply of all connected objects, the line resistance is measured by means of an electronic measuring instrument:

- If the measured resistance is in the range 45Ω to 90 Ω - the line is within the referent values;
- If the measured resistance is < 45 Ω - there are more than two installed terminating resistors in the line;
- If the measured resistance is > 90 Ω - both ends of the line are not ϕterminated by resistance of 120 Ω.

- **Outputs**
  To each conected fire addressable panel can be joined 4 programmable outputs, that will be activated when Fire condition of the respective panel. The repeater has two controllable potential relay outputs and two potential-free relays. The factory setting is with the OUT 1 connected output without delay and with delay. Depending on the project and the type of object, programing the necessary outputs.
- **Delay Outputs**
  For each fire addressable panel has the ability to set a delay to trigger the outputs, that are connected to it. It is possible of a delay of 0 to 600 seconds. The election takes place every 1 seconds. If it is 0 we have direct actuation. The factory setting for all connected panels is 20 seconds. The delay is only active when there are connected programmable outputs. The function allows for each conected fire addressable panel to determine individual time for a physical check to the secured area for authentication alarm. The aim is for the time to be enough to check the area and return to the panel for a possible reset to Fire condition and in case of spurious actuation, to prevent inclusion of sirens and executive devices.
  Example:
  If you have an object of 4 buildings with 4 fire addressable panels located on the first floor, it can be given for example the following location and time parameters:
  1 Panel guard the 1st building - time to view 180 sec.
  2 Panel guard the 2nd building - time to view 220 sec.
  3 Panel guard the 3rd building - time to view 370 sec.
  4 Panel guard the 4th building - time to view 440 sec.

5.3. Installation of the executive devices at panel

All connections are made by means of terminals, mounted on the printed circuit board (Fig.4).

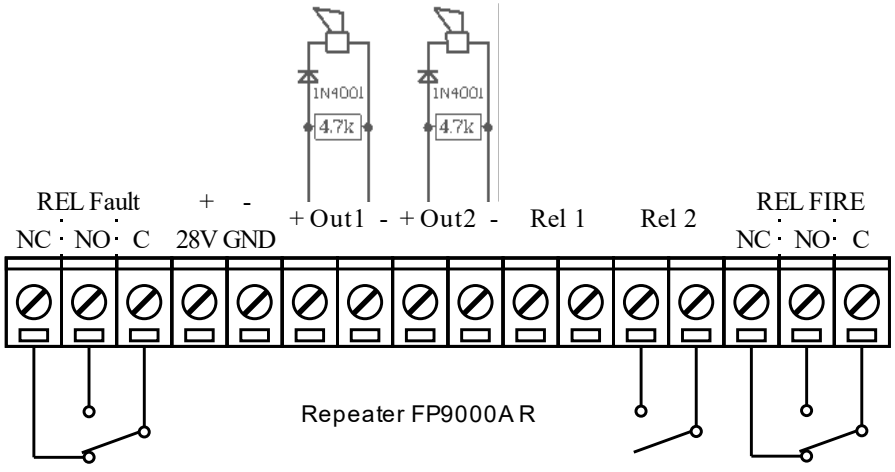


Fig. 4

Total consumption of the voltage powering the external devices (terminal "+28 VDC") and the consumption of the controllable outputs shall not exceed 2,0 A in the heaviest mode.

5.3.1. Installation of the executive devices to the repeater's controllable outputs.

Terminals "+ Out x", "-Out x" - controllable, potential outputs, responding at Fire condition, are used. At the end of the line a resistor 4,7k/0.25W (from the design of the panel) is mounted. It is recommended that in series with the power supply of the corresponding device to place a diode (Fig.5). We recommend 1N4001 diode or equivalent. The panel constantly monitors for failure (interruption or short circuit) power line devices.

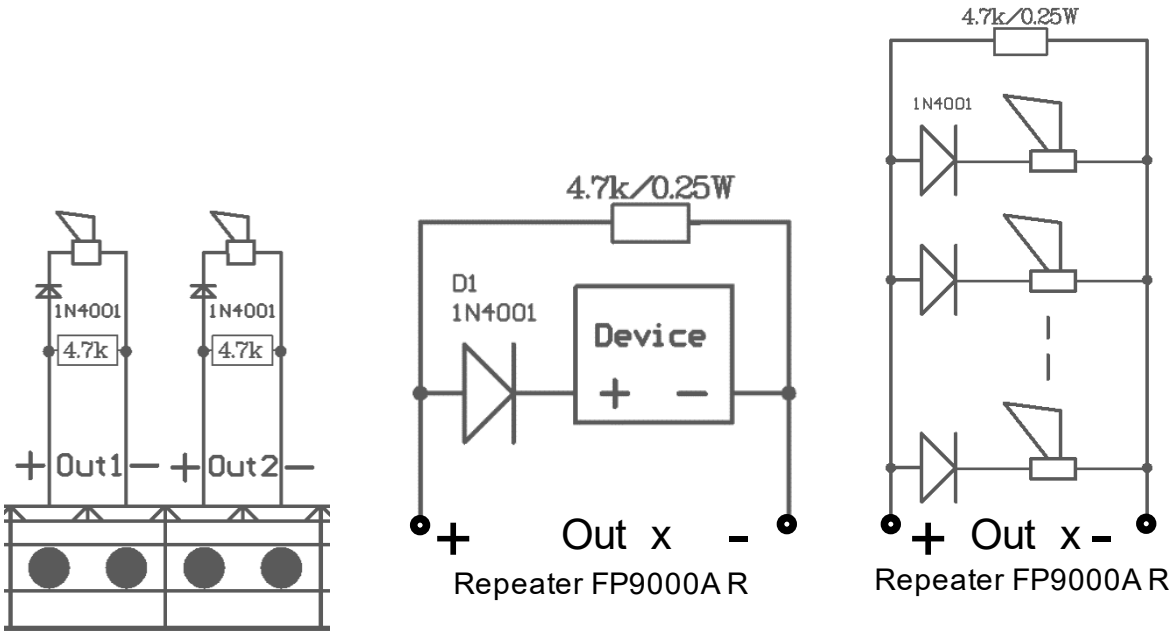


Fig. 5

If controllable outputs are not used, directly to terminals "+Outx", "-Outx" a resistor 4,7k/0,25W is connected, otherwise the outputs will be in Fault condition.

5.3.2. Installation of the executive devices to RELAY OUTPUTS.

Used:

- Terminal "+28VDC" - positive lead of the stabilized direct voltage for external devices (light and sound signaling devices, executive devices, etc.);
- Terminal "GND" – (negative lead for supplying the external devices);
- Terminal of the corresponding relay outputs.

➢ Relay outputs with changeover contacts for **Fault (REL Fault)** and **Fire (REL Fire)** conditions.

- When in Fault condition of the panel, output - **REL Fault**, is activated immediately, regardless of the type of fault. The output may not be disabled or delayed.

- Upon entering the panel's condition **Fire**, no matter what line, output - **REL FIRE** be activated immediately. The output may not be disabled or delayed.

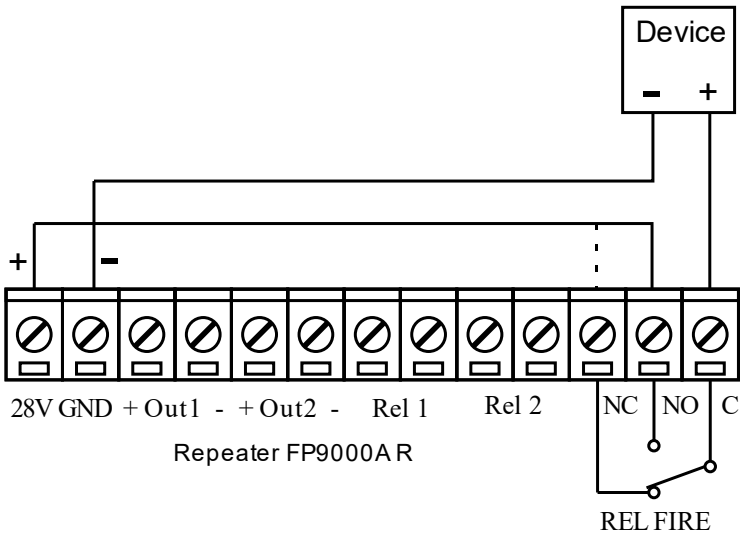


Fig. 6

- **REL Fault** - terminals "REL Fault/**C**", "REL Fault/**NO**" and "REL Fault/**NC**" - potential free relay contacts of the relay. In the absence of failure, there is a link between terminals "REL Fault/**C**" and "REL Fault/**NO**", and in case of failure - between terminals "REL Fault/**C**" and "REL Fault/**NC**".
- **REL FIRE** - terminals "REL FIRE/**C**", "REL FIRE/**NO**" and "REL FIRE/**NC**" - potential free relay contacts of the relay. In standby mode there is a connection between terminals "REL FIRE/**C**" and "REL FIRE/**NC** " and in case of Fire - between terminals "REL FIRE/**C**" and "REL FIRE/**NO** ".

➢ Programmable relay outputs in **Fire (REL 1)** and **(REL 2)**.

The terminals of the relay outputs are - potential free relay contacts of the relay. In standby mode there is no connection between terminals, but when joining the output to line and Fire condition in the same line, a connection is made by the relay contacts, which are displayed on terminals.

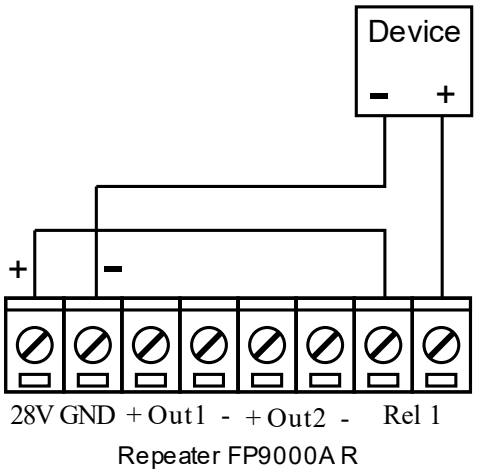


Fig. 7

If relay outputs are not used, then its terminals remain free (nothing is connected to them).

- **Outputs - Programming and parameter setting outputs for executive devices.**

Relay outputs: REL Fault and REL FIRE are automatic and not subject to programming, prohibition and delay.

- **Programmable relay outputs** Fire (REL 1) and (REL 2), programmed from menu "Setup/Output SET". They can join any fire addressable panel as well as can be set a delay for each panel individual activation. Outputs (REL 1) and (REL 2) **cannot** be prohibited.
- **Controllable programmable outputs** Fire (Out 1) and (Out 2) are programmed from menu "Setup/Output SET". They can join each fire addressable panel and it can be set a delay for a delay for each panel individual. Outputs (Out 1) and (Out 2) **can** be prohibited. When prohibited the controllable line for damages is not monitored and the output is not activated.

5.4. Power supply connection

To the terminal with mains fuse connect feeding cable observing the following positions.

- P - power wire " Phase";
- N - power wire " None ";
- "Earth" - safety ground wire.

The cable should be double insulated and section not less than 0,5 mm^2 for power cables and 1,5 mm^2 for the safety ground wire.

The other end of the feeding cable is connected to the mains using a junction box.

The mains power supply of the panel should be on a separate circuit.

6. PUTTING THE ADDRESSABLE REPEATER IN WORKING CONDITION

- Check the connection to mains power supply.
- Check the correct connection of peripheral devices.
- Place the fuse in the terminal.
- Join the feeding cables to the batteries, where as the batteries are connected in series. To the positive terminal of the battery join the red wire and the negative – to the blue wire. The overall voltage of both batteries must be greater than 21V, otherwise the repeater does not recognize them.
- If everything is done correctly and the lines parameters are within the factory settings, the panel enters Duty Mode.
- Mounted wires to build a network of addressable panels and addressable repeaters.
- Place jumpers shunting the first and last panel in the network. Jumpers on the other panels are removed.
- Menus repeater "Setup/LAN Param/Panel X" programmed parameters of all remote panels.
  - On / Off
  - Interface number of the remote fire panels.
- Set the triggering of outputs and the respective delays, if they are necessary.
- If necessary, program and adjustment to other parameters of the repeater and the fire addressable panels from the respective menus. If necessary, adjusts the clock for real-time of the repeater.
- Reset archive events.

7. LEVELS OF ACCESS

In the addressable repeater FP9000A R There are **4 LEVELS** of access to the various indications and control functions.

- **Access Level 1**

This level of access is for all persons, whom can be expected to identify and react to Fire alarm or fault. Visible are all light indicators.

Available are the following features:

- suppression of built sounder;
- displaying suppressed messages for Fire, Fault and Disabled components;
- displaying the status of the panels;

- **Access Level 2**

This is a level of access to persons, who are responsible for the safety and are trained and authorized to operate the repeater in the conditions:

- Security;
- Fire;
- Fault;
- Disabled component;

In access level 2 are available are following features:

- Exit from Fire condition;
- suppression of the outputs, activated when Fire;
- involuntary activation of the controllable outputs;
- suppression of built- in sounder.

Switching from **Level 2 to Level 1 and vice versa** happens after "ESC" button and the relevant information on the display.

- **Access level 3**

In Level 3 is reached by entering a password and opening the front cover of the panel.

Available are the following panel's features:

- Repeater Parameters;
- LAN Parameters;
- Output SET;
- Output CHECK;
- Password change;
- Default parameters set;
- Clear ARCHIVE;

- **Access Level 4**

This is the level of access for persons who are trained and authorized by the manufacturer to repair the panel and modify the software.

Special means are required to enter this level.

8. CONDITIONS OF REPEATER

FP9000A R operates in four conditions: Duty, Fire, Fault and Disabled component.

8.1. DUTY CONDITION

In Security condition, the panel is ready for indication and treatment of Fire and Fault conditions in case of relevant events.

- **LED indication** – light up the indicator: "POWER" and "DEL OUTS at preset delay of connected output.
- **Beeper indication** - off.
- **Text message indication** - displayed labeled " Security " and information about the current time.
- **Active buttons** - button  . When you press it, the panel enters Information and Control condition.

8.2. FIRE CONDITION

- The addressable repeater may be in Fire condition in one or several remote addressable fire panels.
  - **LED indication** - light indicators:
  - "**FIRE**"
  - "**1 2 3 4 5 6 7 8**" Local indicator(s) for Fire addresable panel.
- **Beeper indication** - Sounder is constantly on.
- **Text messages** - Text information about the remote panels, and devices in Fire are displayed on the display:
- **Active buttons**
  - button **"BUZZER SILENCE"**. Pressing it leads to:
  - **Disabling** the embedded sounder, if it has responded to Fire or Fault;
  - **Activating** the built-in sounder, if the panel is in Fire or Fault condition and the tale is disabled by previous pressing of the same button.
  - button **"SOUND SILENCE"**. Press it to:
  - When suppressed outputs for Fire - forced activation of the outputs;
  - When activated outputs for Fire - suppression of these outputs.
  - button **"RESET"**. Press it to:
  - the panel is forced to exit Fire condition and reset fire panels.
  - buttons  and  . Pressing them leads to:
  - Displaying suppressed messages display lines in Fire.
  - buttons  . Press it to:
  - Entering in Information and Management condition.

8.3. Fault Condition

FP9000A R Repeater enters Fault condition when registering any of the following events:

- Fatal system fault;
- Low power - diluted battery during dropping in the mains supply;
- Fault in a remote fire panel;
- Fault in a controllable output - short circuit or break;
- Damage to the mains;
- Fault in backup batteries;
- Short circuit or leakage to ground wire;

- Fault in power lines;
- Fault in power supply for external devices;
- Fault in network or transmission device.

When systemic failure processor can not continue.

Exit for this kind of fault can only be accomplished by turning off the power and subsequent repair.

All damage, except for the system kind, lead to switching off some periphery.

Exiting this condition happens automatically to 100 seconds after dropping out (removal) of the fault.

When in fault "Low power" the built-in sounder is activated with discontinuous signal.

- **LED indication** – lights up the indicator: **"FAULT"** and depending on the fault:
  - Upon System error - indicator "SYS FAULT" lights up in continuous yellow light;
  - Upon fault in Fire alarm line - individual fault indicator flashes yellow light respectively when:
    - short circuit - with a frequency of 1 Hz (slow flashing);
    - interruption - a frequency of 2 Hz (fast flashing);
  - Upon fault in a controllable output - indicator "OUTS" lights up with flashing yellow light;
  - Upon fault in mains supply - indicator "POWER FAULT" lights up in continuous yellow light;
  - Fault in the local network or the transmission device - indicator "COMUN" lights up with a steady yellow light.
  - If the sound signal is suppressed by button "BUZZER SILENCE", LED indicator lights up a constant red light.
- **Beeper indication** – The built-in sounder is activated with a discontinuous signal.
- **Text messages indication** - Text messages for fault condition are displayed by priority on the main display screen.

  If we have more than one failure, by button  and regulating buttons enter the menu "FAULT". In this menu you can see all registered damage.
- **Active buttons**
  - button **"BUZZER SILENCE"**. Pressing it leads to:
    - **disabling** the embedded sounder, if it is activated by Fire or Fault;
    - **activating** the built- in sounder, if the panel is in Fire or Fault condition and the annunciator is disabled by previous pressing the same button.
  - button  . When you press it, the panel enters Information and Control condition.

8.4. DISABLED COMPONENT CONDITION

After selecting the relenant line and/or controllable output with buttons, switch the conditions **"on"** and **"off"**, respectively for disabled function on and off.

The disabled controllable output is switched off (the executive device can not be activated) and is not monitored for failure.

- **LED indication** - light indicators:
  - **"DISABLE"** lights up with a constant yellow light
  - **"OUTS"** lights up with a constant yellow light.

- **Beeper indication** - not affected by the disabled component condition.
- **Text messages indication** - Information about the lines and controllable outputs in Disabled, are displayed on the display. When **"on"** we have a disabled component in **"off"** active.
- **Active buttons**
  - buttons  . Press it to:
    - Enter Information and Management condition.

8.5.1. TEST LED

Testing of LED indication, the panel done by menu «Test indication».

With button  activate the illumination of all LEDs. The exception is the indicator for systemic failure that should not be on. With button  start the test and with button "ESC" stop test.

8.6. INFORMATION AND CONTROL CONDITION

The FP9000AR repeater has a display and keyboard to check the parameters, settings, monitoring and changing conditions, displaying archives of events and etc.

By menus you can perform the following actions:

Main menu: /access level 1/

- View all the remote addressable fire panels in Fire;
- View all the failures;
- Change the access level from 1 to 2 and vice versa;
- Review and launch (at access level 2) of the Disable condition;
- Review and launch (at access level 2) of the Test in line condition;
- View the archive of events; /up to 1024 events/

System features: /Access Level 2/

- Test indication;
- Setup the real-time clock, year, month, day, hour, minute, second, correction;
- Disable;

Setup: /Access level 3/

- Setup the parameters of the repeater: Language, Network address and on / off function to check for ground wire failure;
- Remote addressable fire panels Setting.
- Setup outputs repeater
- Check outputs repeater
- Change the password to access level 2 and 3;
- Delete archive.

! When working with menus to have the following characteristics.

- When working with menus, use the four active buttons for information and management. (see Controlsfor management and indication).
- If you enter into the menu's structure and has no activity for more than 30 seconds, it automatically returns to Duty mode.
- If you can not enter into a menu, check whether the access level is set properly.

- Please note that Setting Mode stops processing the status the fire addressable panels.
- After exiting from the Setup menu, the panel goes through reset and record the new set parameters.

9. CONDITIONS FOR USE, STORAGE AND TRANSPORT

- **Operation and storage**
  The panel is used and stored in closed rooms under the following conditions:
- **Temperature**
  - storage from 5°C to 35°C
  - transport from -10°C to 50°C
  - working from -5°C to 40°C

- **Relative humidity**
  - storage to 80%
  - working to 93%
- **Transport**
  The addressable repeater is transported in covered vehicles, in factory packing and in the above atmospheric conditions.

10. DELIVERY COMPOSITION AND COMPLEXITY/SET

• Addressable repeater FP9000A R	**1 qty.**
• Fuse 6,3A;	**1 qty.**
• Fuse 4,0A;	**1 qty.**
• Connective bridge for batteries;	**1 qty.**
• Packaging.	**1 qty.**

11. WARRANTY

The manufacturer guarantees the product's conformity with EN 54-2: 1997, A1: 2006, EN54-4: 1997, A1: 2002, A2: 2006. The warranty period is 36 months from the date of sale, provided that:

- the conditions of storage and transport were met;
- the startup has been done by authorized persons;
- The requirements for operation conditioned in this instruction were met;
- Defects are not caused by natural phenomena and accidents of the plug socket.

DMTeh wishes you splendid work!

For any questions may contact the company's technical staff DMTech, by email.

e-mail: ***office@dm-teh.com***