# Fire & Security Alarm Systems

-By Vedard Security

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## Part 1 Laying Pipeline

#### I. Common pipeline material

Electric tube pipe contains galvanized steel pipe, welded steel pipe, JDG steel pipe, KBG steel pipe and so on



connection way is different. pipe thickness is different.



JDG steel pipe







KBG steel pipe

#### 2. Wiring types

the meaning of the various symbols labeld on common wire and cables

NH——Refractory, pass GB12666.6 refractory test; ZR——Flame retardant, pass GB12666.5 bundle burning test ZA/ZB/ZC——Flame retardant Class A / Class B / Class C WD——Low smoke and halogen free YJ——Cross - linked polyethylene insulation V——PVC sheathed S——Twisted pair B——Single stranded hard line R——Single stranded soft line K——Control Cable P——With shield

For example: WDZA-KYJY-7\*1.5—Low smoke halogen free flame retardant A grade XLPE double jacket 7 core 1.5mm2 control cable.

#### Common used wiring types:

At least flame retardant wire and cable should be used for weak-current line and fire-resistant cable should be used for the power supply line of the fire alarm system.

alarm circuit — ZR-RVS-2\*1.5, NH-RVS-2\*1.5, NH-RYJS-2\*1.5 etc. alarm circuit trunk — ZR-RVS-2\*2.5, NH-RVS-2\*2.5, NH-RYJS-2\*2.5 24VDC power line — ZR-BV-2\*2.5, NH-BV-2\*2.5, NH-BYJ-2\*2.5 etc. 24VDC power line trunk — ZR-BV-2\*4.0, NH-BV-2\*4.0, NH-BYJ-2\*4.0 multi-line control circuit — ZR-KVV-N\*1.5, NH-KVV-N\*1.5 etc. broadcast line — ZR-RV-2\*1.5, ZR-BV-2\*1.5, ZR-RVVP-4\*1.5 telephone line — ZR-RVS-2\*1.5, ZR-RVVP-2\*1.5, NH-RVVP-2\*1.5 open pump line — ZR-BV-2\*1.5, ZR-RVVP-2\*1.5, NH-BYJ-2\*1.5 etc. fire hydrant open pump feedback line — ZR-RV-4\*1.5, NH-BYJ-4\*1.5, ZR-KVV-2\*1.5 network line — ZR-RVS-2\*1.5, ZR-RVV-4\*1.5, cat5 etc. 3. Sharing tube principle

principle: Different systems, different voltage levels, different current types of lines, should not be laid in the same tube or in the same slot.

For example: strong-current line and weak-current line should not share tube broadcast line and other line should not share tube telephone line and other line should not share tube network communication line and other line should not share tube alarm circuit line and 24V power line should not share tube alarm circuit line and open pump line should not share tube multi-line control line and alarm circuit line, 24V power line should not share tube

# **Part 2 Equipment Installation**

## 1. Circuit types

There are ring circuit, T circuit, and mixed circuit

2-wire is generally used for the circuit, some equipment requires ring circuit

Every circuit (loop) can have 100 point, 200 point, or 324 point etc. 10~20% margin should be left for each circuit



### 2. Detectors



detector types: point type (Photoelectric smoke, ion smoke, temperature, complex, UV flame, combustible gas, dual band, etc.)

line type (Infrared beam, recoverable / unrecoverable temperature sensing cable, air sampling, distributed fiber, light section, etc.)

conventional detector (non-coded) intelligent detector (coded)

installation location: point type (distance between ceiling, roof, wall and height from the ground)

line type (laying way, distance between the roof, installation spacing)

distance between other equipment and beam plate

#### 3. Modules

surveillance module (input module, surveillance relay) control module (output module, smoke exhaust relay) combination module (input/output module, dual input module, dual output module, other combination module) manual alarm button and fire hydrant button (coded/non-coded, telephone jack) detector module (alarm relay, bus access module) short circuit isolation module relay module (switch module)

Installation location: in module box





#### 4. Fire display panel

types of fire display panels:1) LED display2) analog display panel3) LCD display

installation location of fire display panel on each floor of the building

fire display panel wiring: It is connected to fire alarm control panel via RS485 line.





#### 5. junction box, module box

calculate the size of junction box and module box

determine the installation location of the junction box and module box

The modules should be set up centrally.



#### Junction box / module box arrangement

#### 6. telephone

multi-line telephone system
 N+1 line system
 2N line system
 host capacity
 extension and jack



2) bus-line telephone system

independent bus-line telephone system
shared bus-line telephone system (can connect with fire alarm system)
line type
host capacity

module, extension and jack

## Bus telephone switchboard



#### Multi - line telephone switchboard



## 7. broadcast

1) System components:

recording plate, regional control panel, power amplifier, module, speaker

Power amplifier power capacity selection:

Capacity can not be less than 1.5 times the maximum capacity of broadcasts in the range of simultaneous broadcasts.

2) system mode: bus system, multi-line system



#### Bus-line broadcast system



多线制广播系统



# **Part 3 Equipment wiring**

### 1. Detector



wiring non-coded detectors



#### 2. manual alarm button

non-coded manual alarm button
 coded manual alarm button

3) with jack and without jack



#### 3. fire hydrant button

Fire hydrant button function requirements: Open pump, alarm, lighting

- 1) non-coded fire hydrant button
- 2) coded fire hydrant button



Wiring of the pressure switch is similar to that of the non-coded fire hydrant button, just without feedback lighting.

## 4. Surveillance module

equipment connect to surveillance module:

- 1) Water flow indicator
- 2) signal valve
- 3) non-coded fire hydrant button
- 4) fire damper
- 5) pressure switch
- 6) Water level monitoring
- 7) other feedback signals



### 5. Control module

equipment connect to control module

- 1) elevator, floor lights
- 2) fan, air outlet, air valve
- 3) fire doors, shutter doors, file smoke hanging wall
- 4) alarm, sound and light alarm, broadcast circuit
- 5) rain valve solenoid valve
- 6) non-fire power cut, emergency lighting
- 7) other control equipment



### 6. Combination module

Types of combination modules

1) single input / single output module (each with an address point or share an address point)

2) Dual input module (one or two address points)

3) Dual output module (one or two address points)

4) Dual input / dual output module

5) Three input modules

6) four input / two output modules

7) other combinations of modules

The location for the combination module:

- 1) Single input / single output module air valve, fire doors, shutter doors, elevators and so on
- 2) Dual input module flow indicator + signal valve, monitoring signal concentration
- 3) Dual output module non-fire power cut, emergency lighting and so on
- 4) Dual input / dual output module shutter doors and so on
- 5) Three input modules monitor the signal concentration
- 6) Four input / two output modules centralized monitoring and control (eg tower standard layer)
- 7) Other combinations of modules

#### 7. multi-line control equipment

#### 1) fire pump wiring



For the standard multi-line linkage disk (each linkage point panel with a start / stop button, 3 status lights), each pump requires a linkage point panel

1 used 1 prepared fire pump wiring

#### 2) smoke exhaust fan wiring



For the standard multi-line linkage disk (each linkage point panel with a start / stop button, 3 status lights), each fan requires a linkage point panel.

#### Fire exhaust fan wiring diagram

Under normal circumstances, the rain valve group of electromagnetic valve, stage fire screen and other important fire facilities should also be set up multi-line linkage. Note: "Fire Regulations" only require fire pumps and fire engines in addition to automatic control, the need for manual direct control.

## Part 4 Fire control center equipment

#### 1. Fire control center equipment introduction

1) fire alarm controller (wall-mounted, cubic up, piano-style)

2) fire alarm controller components (host panel, multi-line disk, bus, circuit cards, communication cards, etc.)

- 3) DC power supply plate
- 4) fire broadcast and background music host
- 5) fire telephone host
- 6) CRT graphics display system
- 7) UPS uninterruptible power supply
- 8) Large space fire gun controller
- 9) electricity leakage fire alarm host
- 10) Level display
- 11) other equipment



2. the fire alarm controller capacity calculation

Loop capacity (whether the detector / module is coded differently)

Reserve capacity (consider fire partition)

Number of loops

Combined with multi-line disc,  $\longrightarrow \checkmark$ the number of bus lines

Controller capacity



Note: fire regulation does not require the setting of a bus disk, but in order to facilitate the operation of some more important equipment (has been set to multi-line linkage point without repeating the bus point), many projects will design the bus, combined with the control module. Commonly need to set the bus linkage point of the equipment are: non-fire power cut, emergency lighting, rolling doors forced landing, elevator landing, bell, fire valve reset.