

WATER SUPPLIES DEPARTEMENT
STANDARD SPECIFICATION E-81-06
ALARM ANNUNCIATORS

1. General

Alarm annunciators are used in control panels or consoles to monitor abnormal plant conditions. In the event of an alarm which is initiated by a change in input state, the system shall give a local audible and visual indication and be able to repeat the data to other systems such as SCADA system.

The alarm annunciator shall be operated on 24V dc from battery or from a 220V ac/24V dc power supply unit. Where spare alarm way is provided, it shall be fully equipped and provided with all facilities as other alarm way in the unit.

2. Design

2.1 Circuitry

The alarm system shall design on a fail-safe principle such that a fault in any circuit component will cause an alarm to be initiated. The system shall comply with the requirements of IEC 61000-4 to protect and maintain operation under transient and voltage surge. Equipment which connects direct to 24V dc battery supply shall be protected against prolong overvoltage up to +20% and ripple factor of 5% as generated by the battery charger during boost charging conditions.

The control logic shall be solid-state throughout with large scale integrated circuits used to minimize component counts and to reduce power consumption. Power consumption shall be less than 1W on standby state and 4.5W on alarm state for each alarm way.

The alarm input shall be either normally open or closed volt-free, fleeting or maintained contact. The choice between the normally open and normally closed contact mode shall be field selectable. To prevent alarm initiation due to spurious signals, the input circuitry shall reject signal less than 30 ms and preferably the alarm response time is field selectable.

Auxiliary relay shall be provided for each alarm way to give a repeat volt-free contact output which follows the field alarm contact.

The circuit board shall have on board LEDs to monitor the operation of the

alarm annunciator. The CPU board shall incorporate software watchdog to operate a common fault alarm repeated relay in the event of a software fault.

2.2 Alarm Sequence

When an alarm condition occurs, the common audible alarm on the system shall sound and the alarm lamps behind the appropriate legend shall flash. A common 'ACCEPT' pushbutton when pressed shall silence the audible alarm and the flashing light shall be steadily lit with full illumination. When the alarm is cleared, the alarm shall flash slowly or half-dim. Manual operation of the 'RESET' pushbutton shall return the alarm annunciator to normal condition.

If a momentary alarm occurs which clears before acceptance, the alarm shall flash slowly or half-dim with the audible alarm sound. When the 'ACCEPT' pushbutton is pressed the audible alarm shall silence but the alarm lamp remains slow flash or dim. Further pressing of the 'RESET' pushbutton shall switch off the lamp and return the alarm annunciator to normal working condition.

If a second alarm occurs after the first alarm has been accepted and has cleared but the reset pushbutton has not been pressed, this second alarm shall be presented visually and audibly as if it were a new alarm.

Alarm reset shall not be effected if the alarm has not been accepted before or the alarm has not been cleared.

Where specified in the Particular Specification for unmanned or day-manned installations, automatic alarm accept feature shall be incorporated which shall silence the audible alarm after the alarm has been initiated for 60 seconds.

The flasher circuit for visual alarm indication shall flash at a rate of 110 ± 20 flashes per minute at alarm state and at a slower rate of 20 ± 5 flashes per minute for reflashing when an accepted alarm is cleared. The flash rates shall be field selectable.

2.3 Serial Communication Link

Where specified in the Particular Specification, the alarm annunciator shall be suitable for connection to a computer system or a master station via a serial link for interrogation of alarm status. Each alarm system shall have a full duplex ASCII RS232C or RS422/485 port at 9600 bauds for connection to serial communication link. The system protocol shall be arranged so that a number of alarm annunciators can be controlled by a master-station computer. Each alarm annunciator shall have its own address and shall transmit the alarm data when polled or when there is a change in alarm state. The output data shall include alarm reference and state, its occurrence in time order, accept or reset mode, etc.

The alarm annunciator shall also be capable of accepting alarm inputs from programmable logic controller/computer/intelligent/terminal/multiplexer via a serial port.

The transmission data in the system shall be checked to ensure error-free data communication. The software for data presentation on computer and drivers for peripheral devices shall be provided with the alarm system.

2.4 Ancillary Equipment

A common audible alarm shall be provided. The alarm output shall be at least 90 dB when measured at a distance of 3 m from the alarm.

Pushbuttons for 'ACCEPT', 'RESET' AND 'LAMP TEST' shall be provided. These pushbuttons shall preferably be integral with the alarm display facia unit. The 'LAMP TEST' pushbutton when pressed shall illuminate all alarm facia legends and exercise the alarm logic of each alarm way. However, the operation of the 'LAMP TEST' pushbutton shall not result in operation of output auxiliary relay and/or inhibiting the initiation of audible and visual alarm.

3. Construction

3.1 General Constructional Features

For small system up to 20 alarm points, an integral logic board shall be provided in the individual modules which can be easily added or removed for each alarm function. For large system, the common logic circuitry for all alarm functions shall preferably be housed in a separate logic box connected to the alarm display facia by pre-wired cable loops using coded multi-pin plugs and sockets. Relays and logic boards shall be sealed to IP 55 protection to IEC 60529.

Equipment shall be panel mounted and arranged for easy access for maintenance. Lamp replacement for individual annunciator shall be from the front of the display screen and any special tools required for the replacement shall be supplied. Operation of other alarm functions shall not be affected during lamp replacement of individual annunciators.

3.2 Alarm Display Facias

Alarm display facias shall be of rectangular format. The end column or the bottom row may accommodate the control pushbuttons and audible alarm unit.

To avoid reflection of incident light interfering with the observation of the annunciator, bezels and mounting plates shall be finished in matt black.

Annunciator windows shall be rectangular in shape with a minimum window area of 48 mm x 24 mm (b x h) and a maximum window size of 76 mm x 30 mm (b x h). Each alarm window shall be illuminated by at least two lamps to provide lighting security.

The level of illumination shall be such that the legend shall be clearly legible under normal daylight conditions. There shall be no light leakage to adjacent legends or around the edges of the window or facia. No halo shall be visible under poor light conditions.

3.3 Alarm Windows

The alarm window shall be made from long ageing plastic with alarm indication by back illumination. Replacement of the window screen shall easily be done without the need for major dismantling work. The alarm window shall be white in colour with black character engraved at front.

Where specified for semi-secret display when not illuminated, the film legends shall have clear characters on black film except for fire alarm where red film shall be used.

The alarm characters shall have a minimum height of 3 mm to suit the size of the window.

3.4 Accessories

The following accessories and spares shall be provided with each alarm annunciator :

- (a) Lamp extractor
- (b) Screen remover
- (c) Card extender
- (d) Spare lamps (20% of lamps on unit)