ANNUNCIATORS

Series 725
PEX7250
NEX7250
UC625
9000TS
PPM4-P
PPM4+1
S9000
DF301
LN1000
# Series 725 Programmable Alarm Annunciator

**Multi-redundant design for greater reliability**

- Modular construction from 1 to 256 alarm channels
- Multi-redundant design so there is no single point of failure
- Choice of window sizes
- Available in six colours with conventional filament lamps or removable LED assemblies
- Each channel programmable from the front
- Low cost RS485 bi-directional Communications option
- Panel or 19” rack mounting or fully integrated into wall mounting or floor standing enclosures

The Series 725 Alarm Annunciator provides the ideal solution to all your alarm system requirements. Whatever the size or complexity of your alarm scheme the Series 725 can be configured to provide the best solution. With a field proven multi-redundant ASIC design this Annunciator gives the best in reliability, flexibility and programmability for all applications and industries.

With a range of three window sizes, six colours and a choice of bulb or ultra-bright LED illumination, a format and size will be available to match your exact requirements. Each individual alarm way is fully programmable from the front, using the integral programming module. This allows the user to select many different features giving thousands of possible combinations.

Numerous relay outputs are included as standard to connect to external equipment and individual repeat relays or communications can be supplied as an option.
Features & Benefits

**Modular Construction**
The modular design of the 725 Series allows units to be assembled in almost any size and shape to suit the individual customer's requirements. Units can be constructed from a single alarm channel to a maximum of 256 channels with a choice of three window sizes.

**ASIC Technology**
The Series 725 Annunciator builds on the success of previous designs using ASIC technology but taking the design to new levels of reliability.

**Multi-Redundant Design**
As Annunciators are often used to monitor critical plant alarms it is essential the unit provides the highest reliability possible. With this design there is no common CPU or common services module, which can cause complete system failure. All alarm cards in the Series 725 can act as the master controller, if a card does fail then only two alarm points are affected. This design combined with the huge reduction in component count gives a far higher Mean Time Between Failures.

**Fully Field Programmable**
The user may select from a vast range of different operating functions and alarm sequences including all the standard sequences defined in the ISA publication 'Alarm Sequences and Specifications S18.1 1979(R1985)'. The modular design of the 725 Series allows units to be assembled in almost any size to suit the customer's exact requirements. Units can be constructed from a single alarm channel to a maximum of 256 channels with a choice of three window sizes. All programmed information is stored in EEPROM giving repeatability, total reliability and requiring no battery backup.

**Service From The Front**
All normal servicing and maintenance is carried out from the front of the unit without the need for special tools. This includes bulb/LED removal, legend changes and all programming. When commissioning the unit it is a simple matter to check and amend all programmed settings from the front of the unit without removing power, boards, backplates or alarm bezels. This programming module can also be used as a diagnostic tool to indicate the current state of the associated field contacts.

**Pushbutton/Programming Module**
As standard the bottom right cell is fitted with an integral pushbutton and audible module. This provides six pushbuttons and a 90dB audible together with a 'power on' LED. The rubber keypad is designed for harsh environments with an effective tactile feel to aid operators. It is this keypad that is dropped down to become the programming module when configuring the system.

**Shallow Depth**
Even with the advanced programming facilities the unit is still only 145mm deep, a fraction of the depth of traditional annunciator systems.

**Pre-configured**
If specified at the time of ordering, systems can be supplied pre-configured and complete with the associated coloured filters and film legends, ready to install and commission.

**Auto-mute and Auto-acknowledge**
It is a frequent requirement of alarm systems to have an automatic mute or even automatic acknowledge after a certain time delay. This is another programmable feature supplied as standard on all units.

**Expandability**
Each Annunciator can be expanded using a factory supplied ribbon cable to link to additional units. Systems consisting of multiple Annunciators can be daisy chained together to form larger systems with common features. All first-up information, synchronised flash rates and pushbutton functions are linked through this ribbon cable.

**Sleep Mode**
Increasingly Alarm Annunciators are used in applications where the primary supply is produced from batteries, typically substations, which are not permanently manned. To conserve power in these situations the Annunciator can be placed in "Sleep" mode. In this mode the Annunciator works as normal, latching in alarms and driving repeat relays, but the drive to the lamps, horn and pushbutton inputs are disabled.

When the unit is removed from "Sleep" mode all alarm information is available in the normal way.

**Serial Communication**
Bi-directional RS485 communication is available as a low-cost option. This can be used to receive alarm information from or transmit to third party equipment. Each alarm channel can be configured to accept alarm inputs from the standard alarm contact or via the communications. The communications can be used to create systems linking two or more Annunciators together as repeat or grouped displays.
### Inputs & Outputs

#### Inputs
All inputs are opto-coupled and comply to the stringent requirements of the European Directive on electromagnetic compatibility and the low voltage directive. This ensures there is no possibility of false alarms. The standard input voltage is 24V but units can be supplied with field contact voltages of 48, 125 or 250V. All versions are capable of accepting AC or DC voltages.

#### Common Outputs
As standard the Series 725 has five relay outputs to cover all normal alarm applications. These are as follows:
- 1 Critical Audible Relay
- 2 Non-critical Audible Relay
- 3 Critical Group Relay
- 4 Non-critical Group Relay
- 5 Special Function Relay

Each of the group relays can have a reflash facility to indicate the occurrence of a new alarm within the group. The Special Function Relay can be set to act in a number of different ways to suit the particular application. This function can be selected from one of the following:
- Total Group Relay
- Ringback Audible Relay
- First-Up Relay
- Watchdog Relay

#### Audible Outputs
The standard unit will be supplied with an integral 90dB(A) audible and two audible relays (critical and non-critical). Each alarm way can be programmed to be in one, both or neither of these two groups. The integral audible will always sound on the critical group.

#### Group Outputs With Reflash Facility
Two group relays are provided as standard (critical and non-critical). As with the audible relays, each alarm way can be programmed to be in one, both or neither group. Each group relay can also be set to have a reflash facility. This means the first alarm in the group will change the state of the relay and any subsequent alarms within the same group will cause the relay to pulse for approximately 0.5 seconds.

#### Auxiliary Relays
Each alarm way can be supplied with an individual repeat relay. Each relay can be programmed to be energised or de-energised on alarm and both normally open and normally closed contacts are available on customer terminals. The repeat relays can be set to follow the alarm logic, follow the field contact or follow the display.

#### Connections
All connections are made to the rear of the unit, using two part screw terminals capable of taking 2.5mm² cable.

### Display

#### Window Sizes
This flexible unit is designed to be fully modular using a cell based structure.

Each cell can house:
- One large window (60 x 60mm)
- Two medium windows (60 x 30mm)
- Four small windows (30 x 30mm)

Window sizes can be mixed as required.

#### Backlit Illumination
Each window is backlit by long life incandescent lamps or ‘Fit & Forget’ removable LED Assemblies. All colours are available for both lamps and LEDs. These colours are red, amber, yellow, white, green and blue.

### General

#### Complete Alarm System
Everything is contained within the standard 725 Annunciator to provide a complete alarm monitoring system. This includes all pushbuttons and a local audible.

#### First-Up
In alarm annunciation applications it is often essential to know which alarm occurred first in a particular group. To this end, four different first-up sequences and four different first-up groups are available, all user programmable from the front.

#### Power Supplies
The supply required to power the Annunciator is nominally 24VDC. This can be a simple unregulated low cost source as the annunciator itself will provide all the necessary smoothing and regulation. RTK can supply suitable Power Supplies or DC/DC Converters if converting from higher AC or DC voltages including the RT-AD Dual Redundant Supplies.

#### CE Marked
Designed within the stringent requirements of the European EMC and LVD directives ensures that the Annunciator conforms to the highest standards of both safety and function.

#### Wall, Panel and Rack Mounting
The standard unit is supplied as a panel mounting version ready for customers to drop into a single cut-out. If required RTK can supply the 725 Annunciator fully integrated into wall mounting or floor standing enclosures or mounting within standard 19” plates.
Annunciator Options

**Illumination (Option LED)**
The use of LEDs is becoming more popular and these can be supplied as an optional extra. The 10mm glass wedge bulb is replaced with a small ultra-bright LED Assembly which plugs into the same lampholder as the bulb.

**Tropicalised (Option TRO)**
In harsh environmental conditions where there may be moisture or chemicals within the atmosphere, there is an option to tropicalise the unit. This consists of covering all the pcbs with a conformal coating and using sealed relays.

**Repeat Relays (Option RLY)**
The five common relays are always fitted as standard but there is an option of having individual repeat relays for all alarm ways.

**Customer Specified Response Time (Option CRT)**
As standard the alarm will be activated by signals over 22ms in duration. If this time is either too long or too short to suit the particular application there is an option to increase or decrease this response time.

**Disable Horn (Option DHN)**
If the integral horn is not required when the audible relays are being used, this can be disabled.

**Field Contact Voltage (Option FC**)**
The standard unit uses either volt-free contacts or 24V signals to trigger alarms. It is possible to change the field contact voltage to alternatives such as 48V, 125V or 250V. All versions are capable of accepting AC or DC voltages.

**Rack Mounting**
The Annunciators can be supplied pre-mounted in standard 19" aluminium mounting plates. A maximum of 7 cells will fit across a 19" front plate.

**RS485 Serial Communications (Option COM)**
All Series 725 Annunciators can be fitted with the optional serial communications card, which is usually located in the cell directly above the pushbutton module. This card provides RS485 bi-directional communication to and from third party devices using modbus ASCII or modbus RTU protocols as standard. All pushbutton controls can be local to the annunciator or driven remotely via the communications link. Up to 64 annunciators can be multi-dropped on the same communications connection.

**Adjustable Response Time (Option AD*)**
If specified at the time of ordering each channel can be supplied with user adjustment of the response time across any range up to 2 seconds.

**Three Horn Relay Outputs (Option 3HN)**
It is possible to change the operation of the common relays to have three horn relays and a single group relay rather than two of each. With this option the method of programming of the relays remains the same but their operation is altered slightly.

**Three Group Relay Outputs (Option 3GP)**
It is possible to change the operation of the common relays to have three group relays and a single horn relay rather than two of each. With this option the method of programming of the relays remains the same but their operation is altered slightly.

**Systems and Specials**

**Systems**
RTK Instruments has extensive systems experience and can supply an alarm annunciator as part of a complete alarm system. This may include installing in wall mounting or floor standing enclosures, integrating into mimic displays or wiring together with other switchgear, power supplies or battery backup systems.

Because of the varied nature of this type of special system, they are priced on application against an agreed specification.

**Greater Ingress Protection**
The Series 725 facia is rated at IP41. Optional hinged plexiglass covers are available in all sizes for IP54 applications. For extreme environmental conditions enclosures with viewing windows are available to meet IP66 and IP67 standards.

**Lamp-only Module**

**Matching Display**
To complement our Series 725 Annunciator the 725LO lamp-only unit is available, which provides the same flexibility of display size, window colours and illumination by lamp or removable LED assemblies. The display can be supplied complete with lamp test facilities or with integral audible and pushbuttons if required. With lamp-only versions the lamps or LEDs are simply wired to customer terminals for connection to remote devices as required. See separate datasheet for full details.
Alarm Sequences

Each alarm channel can be configured to suit the operating sequence required as listed in the ISA publication *Annunciator* Sequences and Specifications S18.1 1979 (R1985). Systems can be configured with different features on different alarm ways. The diagram below shows the most commonly used sequences.

### Manual Reset
- **Sequence Code M**
  - PROCESS Normal
  - SEQUENCE Normal
  - VISUAL Off
  - AUDIBLE Silent
  - return to normal

### Automatic Reset
- **Sequence Code A**
  - PROCESS Normal
  - SEQUENCE Normal
  - VISUAL Off
  - AUDIBLE Silent
  - return to normal

### No Lock In
- **Sequence Code R**
  - PROCESS Normal
  - SEQUENCE Normal
  - VISUAL Off
  - AUDIBLE Silent
  - return to normal

### Ringback
- **Sequence Code**
  - PROCESS Normal
  - SEQUENCE Normal
  - VISUAL Slow Flashing
  - ALARM Audible
  - Ringback Audible
  - return to normal

### Automatic Reset First Out
- **Sequence F3A**
  - WITH FIRST OUT FLASHING AND RESET PUSHBUTTON

### Manual Reset First Out
- **Sequence F2M-1**
  - WITH NO SUBSEQUENT ALARM FLASHING AND SILENCE PUSHBUTTON

### Automatic Reset First Out
- **Sequence F1A**
  - WITH NO SUBSEQUENT ALARM STATE
**System Configuration**

**Window Size & Layout**

The Series 725 Annunciator is modular in design allowing customers to quickly design each alarm system to suit their exact requirements for both window size and number of windows. The system is built up of multiple cells; each cell has dimensions of 60 x 60mm and can be configured as a single large window (60 x 60mm), two medium windows (60 x 30mm) or four small windows (30 x 30mm). The units are built up from pre-tested components so custom solutions can be provided with the best possible lead times.

Units can be configured into almost any shape and size as long as the overall width or height is less than 30 cells. Windows are numbered depending on window size as shown in the examples below. Please refer to these numbers when providing legend/configuration details.

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**Rear View/Removable Customer Terminals**
Dimensions

The dimensions are very simple to work out using the following formula or alternatively read from the table below.

Overall dimensions = [(No of cells) x 60] + 24mm
Cutout dimensions = [(No of cells) x 60] +14mm

<table>
<thead>
<tr>
<th>NO OF CELLS</th>
<th>OVERALL (MM)</th>
<th>CUTOUT (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>84</td>
<td>74</td>
</tr>
<tr>
<td>2</td>
<td>144</td>
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<td>14</td>
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<tr>
<td>15</td>
<td>924</td>
<td>914</td>
</tr>
<tr>
<td>16</td>
<td>984</td>
<td>974</td>
</tr>
</tbody>
</table>

Film Legends

As fully approved details of alarm text is often not available at the time of order, acetate film legends are generally used. RTK can supply the Series 725 Annunciator complete with alarm legends or they can be generated by the customer using a Microsoft Excel software template. This allows the user to create their own legends locally. Once the details have been entered they can be printed onto acetate film via a laser printer. This software template makes the production of legends in different languages, sizes and fonts very straightforward.

Bezel Assembly

The diagram below shows how the bezel assembly is constructed using different layers to diffuse the light, colour and window and show the text using a film legend insert. These assemblies are simple to move around in the Annunciator frame and to change colour or text on site.

Order Code

Model

Window size
Small
Medium
Large
Intermixed

Number of cells wide

Number of active alarm ways

Number of cells high

6-button TAR module
No pushbutton module

6T
NT

Options
(see options section)

LED
DHN
AD*
TRO
FC**
3GP
RLY
RAC
3HN
Technical Specification

**Inputs**
The inputs are all bipolar so can accept AC or DC voltages.

**Alarm Contacts**
The standard unit is suitable for volt-free contacts or 24VDC powered inputs. Each input can be easily set to operate from either a Normally Open or Normally Closed field contact.

**Isolation**
All customer inputs are optically coupled as standard and are capable of withstanding 1000V Megger test to ground.

**Field Contact Voltage**
This voltage is distributed through the annunciator to field contacts, 24VDC is supplied as standard.
Options for 48, 125 and 250V are available. The inputs are all bipolar so can accept AC or DC voltages.

**Response Time**
- Standard units 22ms
- Customer defined fixed response time from 1ms to 2s, specified at time of order
- Adjustable response time typically 5-50ms (Option AD1)

**First-up Discrimination**
Better than 5ms

**Pushbuttons**
Both integral and terminals for remote fitting
- Lamp Test
- Acknowledge
- Reset
- First-up Reset
Optional remote pushbutton/programming assembly.

**Outputs**

**Common Relays**
All systems come with the five common, programmable relays fitted behind the Pushbutton Module.

1. Critical Audible
2. Non-critical Audible
3. Critical Group
4. Non-critical Group
5. Special Function Relay

**Repeat Relays**
Each alarm way can have individual repeat relays. Changeover contact available.
Relay contacts rated at 220VDC (250VAC) max, 125VDC @ 0.5A, 24VDC @ 2A, resistive.
Two relays per channel can be provided (Option RL2).

**Audible**
3kHz piezoelectric buzzer at 90dB 30cm.

**Communications (Optional)**
RS485 2 or 4 wire, Modbus, ASCII or Modbus RTU protocol user selectable. Master and Slave configurations. Supports bi-directional communications Ethernet Modbus TCP/IP. Alarm Management software. Other protocols available on request.

**Display**

**Window Sizes**
- Small: 30 x 30mm
- Medium: 60 x 30mm (W x H)
- Large: 60 x 60mm

**Window Colours**
Red, Amber, Yellow, White, Green and Blue for both Lamp and LED illumination.

**Illumination**
Small window: Single Bulb/LED
Medium window: Dual Bulb/dual LED
Large window: Four Bulb/four LEDs

The LEDs are ultra-bright LED Assemblies that plug into the standard 10mm wedge style lampholder.

**Lamps**
28V 50mA 10mm glass wedge.
14,000 hour design life.

**LED Assemblies**
10mm base ‘Fit and Forget’ plug-in LED Assemblies, typically 20mA, minimum 11-year life expectancy.

**General**

**Supply Voltage**
24VDC Nominal (19-28VDC)

**Supply Current Per Alarm Point**
(at 24VDC supply)
- Quiescent: 9mA
- Lamps: Small window: 45mA, Medium window: 90mA, Large window: 180mA
- LEDs: Small window: 20mA, Medium window: 40mA, Large window: 80mA
- Relays: All window sizes: 10mA per relay

Additional current for pushbutton module, common relay and audible is nominally 100mA.

Standard Power Supplies and DC/DC Converters can be supplied on request.

**Compliance**
Immunity to EN61000-6-2:2001
Emissions to EN61000-6-4:2001
LVD to EN61010-1:1993

**Surge Immunity**
To AMSI/IEEE C37.90:1989

**Environment**
Operating temperature (lamp version)
-20 to 50°C
Operating temperature (LED version)
-20 to 60°C
Storage temperature
-20 to 80°C
Humidity 0-95% RH, non condensing

**Protection**
Front of panel: IP41
Rear of enclosure: IP20
Optional covers and enclosures to protect from IP54 up to IP67

**Connections**
Two-part rising clamp type terminals, for conductors up to 2.5mm²

**Weight**
Approximately 0.3kg per module.

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
PEX7250
Explosion Proof Alarm Annunciator

For total programmability in hazardous areas

Suitable for use in Zone 1 and Zone 2 Hazardous areas

Certified EEx d IIB T5 to EN50018

Ultra-bright LED illumination as standard

Multi-redundant design (ensuring no single point can cause failure)

Fully field programmable for all standard ISA sequences plus a range of options

Dual horn relays and dual group relays

RS485 serial interface and repeat per channel options

The PEX7250 Explosion Proof Alarm Annunciator offers a vast range of features and benefits normally reserved for use in safe area annunciators only. The heart of the system is our field proven Series 725 Alarm Annunciator which is available in 3 individual window sizes 30 x 30mm, 30 x 60mm or 60 x 60mm. Reliability of the system is vastly improved over conventional systems with the use of ASICs (Application Specific Integrated Circuits) for each pair of alarms, removing any reliance on common control cards. The standard enclosure is copper-free cast alloy, finished in a light grey two-part epoxy paint, making it ideal for offshore applications.

Systems are available in a range of formats and sizes and are certified for use in Zone 1 hazardous areas. All systems are automatically covered by our standard 5-Year Warranty.
Technical Specification

Certification
ATEX certified to EN50014:1997, ENS0018:2000 Group II, Category 2GD, EEx d IIB T100ºC

Location
Zones 1 or 2. Gas Group, IIB or IIA, Temp Class up to T5

Certificate No.
Baseefa 06ATEX0089

Number of alarm ways
Systems are available in a vast range of sizes depending on window size from 1 to 56 points in a single enclosure.

Materials
The EEx d enclosure: copper-free cast alloy. EEx de Control Station and EEx e Terminal Box: GRP

Connections
The annunciator is wired to a row of terminals suitable for cable sizes up to 2.5mm². On larger systems, the terminals are mounted within an EEx e terminal box below the EEx d enclosure.

Cable Entries
Five M20 cable entries are included as standard. Alternative quantity and size of metric or NPT threads can be provided on request.

Pushbuttons
Test, Accept and Reset are included as standard, additional control pushbuttons can be added as required. These are mounted in an attached, certified EEx de Control Station.

Cover
The cover is hinged as standard, to allow easy access for wiring and commissioning.

Outputs
Units are equipped with dual group relays and dual horn relays as standard. Individual repeat relays per channel and RS485 serial interface options are available on request.

Environment
Operating temperature: 0 to 55ºC
Storage temperature: -20 to 80ºC
Humidity: 0-95% RH, non-condensing

Protection
IP65 as standard, IP66 can be obtained using suitable sealant and gasket.

Detailed Specification
See the Series 725 datasheet for full details on the Alarm Annunciator specification.

Specials
The details shown here demonstrate our standard range of EEx d IIB Annunciators. RTK Instruments can quote for alternatives and IIC systems on request.

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
NEX7250
Alarm Annunciator

Designed to Type “n” standards for Zone 2 hazardous areas

Suitable for use in Zone 2 hazardous areas  
Certified to the ATEX Directive 100a in accordance with EN50021:1999
Ultra-bright LED illumination as standard in six colours
Multi-redundant design (ensuring no single point can cause failure)
Fully field programmable for all standard ISA sequences plus a range of options
Options for RS485 serial interface and repeat relay per channel

The NEX7250 Zone 2 Programmable Alarm Annunciator offers a range of features and benefits normally reserved for use in safe area annunciators only.

The heart of the system is the field proven Series 725 Alarm Annunciator which is available in 3 individual window sizes 30 x 30mm, 30 x 60mm or 60 x 60mm.

Reliability of the system is vastly improved over conventional systems with the use of ASIC (Application Specific Integrated Circuits) technology for each pair of alarms, removing any reliance on common control cards.

The standard unit is wall mounting but panel mounting versions can also be supplied. Both types have a hinged plexiglass viewing window sealed to IP54.

Systems are available in a range of formats and sizes and all carry the same approval to internationally recognised Zone 2 standards.
Technical Specification

Certification
Self certified to EN50021:1999 under the ATEX Directive 100a
Group II, Category 3G, EX nA (L) IIC T4
(Ta -20ºC to +50ºC)

Location
Zone 2. Gas Groups IIIC, IIB or IIA.
Temp Class up to T4

Number of alarm ways
Systems are available in a range of sizes from 2 to 120 channels and with a choice of three window sizes.

Material
Industry standard, steel, wall mounting enclosures or bespoke panel mounted versions both sealed to IP54. Stainless steel options can be supplied as an option.

Connections
On the wall mounted version the Annunciator is wired to a row of terminals. The panel mounted version can be connected directly to the Annunciator. Terminals are suitable for cable sizes up to 2.5mm² and would be wired via the appropriate gland plate.

Cable Entries
Units are fitted with removable un-drilled gland plates to allow access to customer connections.

Pushbuttons, Sounders and Beacons
Remote pushbuttons & certified Sounders and Beacons can all be catered for as part of the overall alarm system.

Hinged Door
The front plexi-glass cover of the enclosure is hinged to allow easy access for configuration, wiring and commissioning.

Outputs
Units are equipped with dual common alarm and dual horn relays as standard. Individual repeat relays per channel and RS485 serial interface options are available on request.

Environment
Operating Temperature: 0 to 50°C
Storage Temperature: -20 to 80°C
Humidity: 0-95% RH, non condensing

Supply
85-264VAC or 24VDC

Protection
IP54

Detailed Specification
Please refer to the Series 725 datasheet for full details on the Alarm Annunciator specification.

Specials
The details shown below are typical arrangements only, systems can be designed and manufactured to each customer’s exact requirements.

Wall Mounted Version

Panel Mounted Version

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
# UC625 Programmable Alarm Annunciator

An expandable compact alarm system

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Sequence selectable to ISA S18.1-1979</td>
<td></td>
</tr>
<tr>
<td>Available in a range of sizes from 12 to 40 ways</td>
<td></td>
</tr>
<tr>
<td>Expansion units available to create larger systems</td>
<td></td>
</tr>
<tr>
<td>Integral redundant supplies with universal inputs</td>
<td></td>
</tr>
<tr>
<td>Two additional 'power failure' alarms with relay outputs</td>
<td></td>
</tr>
<tr>
<td>Low Power Consumption</td>
<td></td>
</tr>
<tr>
<td>Exclusive ASIC Technology for greater reliability</td>
<td></td>
</tr>
<tr>
<td>Only 130 mm Installed Depth</td>
<td></td>
</tr>
</tbody>
</table>

The UC625 Alarm System, developed from the field proven P625 range of alarm annunciators, offers the latest in ASIC technology packed into a compact design for applications where panel space is at a premium.

The field proven multi-redundant ASIC design of this annunciator provides the user with the best combination of flexibility and reliability. The UC625 is designed as a complete alarm system with integral redundant supplies, audibles, relays and pushbuttons for the most cost effective solution for monitoring critical process alarms.

Programmable alarm sequence, signal duplicating relays, dual horn relays, LED display, proven ASIC technology and dual redundant universal power inputs make the UC625 an ideal choice for all industrial sectors.
Features & Benefits

Various Sizes
Various sizes are available from 12 to 40 alarm points. Each unit is supplied with two additional alarm points for monitoring the two integral power supplies.

Dimensions are as follows:

<table>
<thead>
<tr>
<th>No. of Ways</th>
<th>Overall in mm</th>
<th>Cut-out in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height</td>
<td>Width</td>
</tr>
<tr>
<td>12</td>
<td>154</td>
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<tr>
<td>16</td>
<td>154</td>
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<td>320</td>
</tr>
<tr>
<td>40</td>
<td>154</td>
<td>348</td>
</tr>
</tbody>
</table>

Auxiliary Relays
Each channel is equipped with an integral relay facility, typically used to initiate inputs to third party devices such as RTU, SCADA or DCS systems.

On board DIL switches or jumpers allow the user to select the manner in which the relay responds; normally energised or de-energised relay state and if the contact is normally open or normally closed in the non-alarm state.

Inputs
All inputs are optically coupled and comply to the stringent requirements of the European Electromagnetic Compatibility and Low Voltage Directives.

Power Consumption
Power consumption is kept to a minimum by the use of super-bright LEDs.

Auto Accept Timer
In unmanned applications it is common to have an automatic accept facility after a pre-set time, typically one minute; this is a standard feature on the UC625.

Dual Horn Facility
Two horn relays are fitted as standard and each pair of alarm ways can be selected to operate either a critical or non-critical integrally mounted horn relay.

In substation applications it is common for one relay to be used to operate the externally mounted station bell and the second relay to be used to operate a common power failure audible alarm.

Sleep Mode
All units are equipped with ‘Sleep’ mode which is typically used in substation applications where the visual and audible outputs are disabled during unmanned periods to reduce drain on the station batteries. Whilst in ‘Sleep’ mode, the alarm logic will continue to react in the normal way including the operation of the group alarm relays and individual repeat and common alarm relays – ONLY the drive signals to the LEDs and the audibles are disabled until the unit is placed back into the ‘Run’ mode.

Input Response
As standard, the input response is set to 22ms for optimum performance, however this delay is user programmable and can be reduced or extended to suit the exact site conditions.

Fully Field Programmable
Flexible design allows selection of a range of features and a choice of operational alarm sequences, which are compliant to ISA S18.1 1979. Alarms can be set to operate from either a normally open or a normally closed volt-free signal contact.

ASIC Technology
The UC625 continues our success with field proven ASIC technology already employed in our range of alarm products, This gives the user both greater flexibility and reliability.

Integral Redundant Power Supplies
In order to maintain the highest level of reliability in safety critical applications, all models are equipped with integrated dual power supplies. The standard unit is equipped with two fully isolated universal input supplies, each capable of accepting either 85-264VAC or 88-360VDC. As an option the secondary supply can be suitable for 24VDC if specified at the time of order.
Features & Benefits

Film Legend Engraving
Because the exact text is often not known at the time of order, the UC625 has been developed to use acetate film legends which allows users to easily generate their own legends using a computer and laser printer.

Connections
All connections are made on the rear of the unit using two-part quick disconnect rising clamp terminals accepting up to 2.5mm² cable.

Common Outputs
As standard, each unit is fitted with three common relays: Critical Audible Relay, Non-Critical Audible Relay and Common Alarm Relay. The common alarm relay is equipped with a reflash feature to indicate the occurrence of a new alarm within the unit.

Power Failure Alarms
Two channels within the annunciator are reserved for power failure monitoring. One monitors the presence of the primary supply and the other monitors the presence of the auxiliary supply.

Pushbutton Controls
Integral pushbuttons are provided for Functional Test, Acknowledge, Mute, and Reset which control the operation of the standard alarms within the instrument. The two power failure alarms have their pushbutton control lines wired to Customer terminals for connection to remote Functional Test, Accept and Reset pushbuttons. As an option, all alarms ways can be controlled from the integral pushbuttons.

Illumination
The UC625 is equipped with 8mm super-bright red LEDs for increased reliability and minimal power consumption.

IP Rating
Flush panel units are IP51 rated, optional IP54 weatherproof doors or IP56 wall mounted enclosures are available.

Sequence Tables

Tropicalisation
In harsh environments where moisture or chemicals may be present in the atmosphere, there is an option to tropicalise the unit. This consists of spraying the unit with a conformal coating.

Serviceability
All normal servicing and maintenance is carried out from the front of the unit without the need for special tools.
**Technical Specification**

### Inputs

**Alarm Contacts**
All inputs are optically coupled and can be used for volt free Normally Open or Normally Closed contact inputs. Voltage inputs can also be used, these can be 24, 48, 125 or 250VAC/DC.

**Alarm Contact and Cable Resistance**
N/C contact-series resistance of contact cables 5kΩ max.
N/O contact-parallel resistance of contact cables 150kΩ min.

**Surge Immunity**
IEEE/ANSI C37.90.1
IEC 61000-4-4, 2KV

**Input Response Time**
The standard unit has a response time of 22ms. DIL switches are used to select alternative response times.

**First-up Discrimination**
Better than 5ms.

**Input Protection**
Inputs are protected against accidental connection to mains voltages (240VAC, 50Hz) or a 1000V Megger Test.

### Supply

**Supply 1**
Voltage range 85-264VAC or 88-360VDC.

**Supply 2**
Voltage range 85-264VAC or 88-360VDC (Optional 24VDC).

### General

**Connections**
Two part rising clamp terminals, for cables up to 2.5mm².

**EMC Compliance**
Immunity: EN61000-6-2:2001

### Outputs

**Visual**
Back illumination by 8mm super-bright LEDs plus green Power On LED.

**Relays**
Individual signal duplicating relays, contacts rated at 240VAC, 125VDC max, 24VDC @ 2A max.
125VDC @ 100mA
Horn and group relays, contacts rated at 240VAC, 22 VDC max, 125VDC @ 0.5A, (24VDC @ 2A).

**Audible**
Two integral audibles are included as standard, which can be inhibited as required.

### Order Code

**UC625—***—***—H—***—024D—R**

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>NO OF ALARMS</th>
<th>LED COLOUR</th>
<th>SUPPLY 1</th>
<th><strong>SUPPLY 2</strong></th>
<th>FIELD CONTACT VOLTAGE</th>
<th>REPEAT RELAYS</th>
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</thead>
<tbody>
<tr>
<td>UC625</td>
<td></td>
<td></td>
<td><strong>L</strong></td>
<td><strong>H</strong></td>
<td>Standard</td>
<td>R = Repeat Relay Option Fitted</td>
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<td>H = Universal</td>
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<td>250 = 250V</td>
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<td>32</td>
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<td>24VDC</td>
<td>88 to 264VAC or 88 to 360VDC</td>
<td>250 = 250V</td>
<td></td>
</tr>
</tbody>
</table>

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
System 9000TS
Sequence of Events Recorder

1ms Event Recorder and combined Annunciator

Modular, rack mounting design expandable to over 4000 inputs

1ms time stamping of events across the whole system

Up to 15,000 events stored per rack in distributed non-volatile memory

Flexible auto-shelving facility to avoid nuisance alarms

Fully programmable via the programming port on the Interface Card using Windows-based configuration software

Fully integrated alarm annunciator functionality

Wide range of optional displays

The System 9000TS Sequence of Events Recorder leads the way in the latest technically advanced event and alarm management systems.

Built on a rugged hardware platform suitable for the most severe of industrial environments this unit will provide true time-stamping of event occurrence to a resolution of 1ms. Using the synchronisation input this can also be related to real time.

Using the optional integrated alarm annunciator features it is possible to build a system that will capture, record, print and display events and alarms both for immediate action on the plant and for later analysis to find the prime cause of the failure.

The system is available with various different display and output options to suit individual applications.
With personnel safety, increased regulation and the high cost of plant shutdowns the need to continuously monitor, record and analyse system performance has become more important than ever before.

The traditional back-lit annunciator will provide the clearest method of alerting the operator this can now be combined with accurate time tagging of the events. In the automated control and protection used in today's modern plant a typical failure can result in alarm bursts of over 100 alarms within the first few seconds. The key issue in these situations is not only to identify the alarms and inform the operator but also to indentify the primary cause of failure within the process.

The System 9000TS has been developed with this in mind and will capture a change in state on digital events across the entire network to within a 1ms resolution.

**Total Configurability**

All the facilities are field programmable using RTK's Windows-based setup software provided with the equipment. All features are configurable for each individual input and output channel and can easily be set-up in minutes without the need to learn a special programming language.

All the alarm sequences specified in the ISA publication “Annunciator Sequences and Specifications” are available in addition to a wide range of additional features.

**Total Flexibility**

The modular construction and the advanced programming facilities mean that the System 9000TS combined SER and alarm system can be supplied to match any process alarm application. Standard 19" Racks provide almost unlimited system expansion and the user can configure each channel from a range of pre-defined features and embedded sequences as required. Configuration changes can easily be generated off-line and downloaded.

**High Density Packaging**

Standard 3U 19" Euroracks with rear access terminals are used on the System 9000TS. The first rack houses the Interface Card and up to 13 off Sixteen Channel Input/Output Cards. Extension racks are suitable for 14 off Sixteen Channel Input/Output Cards. Multiple racks are interconnected using factory supplied ribbon cables/connectors to form large systems up to 4000 channels.

**Interfacing**

The System 9000TS is ideally suited to interface to third party plant equipment. Systems are always supplied with a Modbus RS485 serial interface and options exist for Ethernet and protocol converters.

Eight system relays are provided as standard for use as watchdog, system faults, horn and group relays. Individual repeat relays for each channel can be provided as an option

Using the powerful communications features it is possible to interface to existing PLCs, SCADA systems, Emergency Shutdown Systems and plant-wide distributed control systems. The Annunciator can monitor and display critical alarms and communicate the results into the normal monitoring systems, giving another level of safety and independence from the general monitoring or control system.

**Event Storage**

The system has a unique distributed method of storing events so that even following a cascade of alarms or a power failure up to 15,000 events per rack are stored within the solid-state, non-volatile memory.

**Expandability**

Each 19" rack is supplied fully equipped allowing simple expansion with the addition of Input, Output or Relay Cards. If a larger system is required additional racks can be interconnected to the existing unit using factory supplied ribbon cables and connectors to link system features.

**Interface Card**

Each system is supplied with an Interface Card. Customer connections for remote printing and programming are provided on the front of this card. Configurable system relay outputs and the RS485 serial output are available on the rear of the associated chassis. Once configured, settings are stored on EEPROM on the individual cards.

In addition, the Interface Card filters and protects the incoming 24VDC supply and provides real time synchronisation to the system.

**Nuisance Alarms**

Each alarm can be set to automatically inhibit (shelve) if the alarm frequency exceeds configured parameters and are therefore considered invalid. Alarms are automatically re-instated once they return to normal patterns.
**Features & Benefits**

**Isolation**
All customer inputs to the system are provided with optical isolation. This enables the system to operate without deterioration or disturbance in environments of extreme electrical noise.

**Inputs**
Each optically-coupled input can be set to operate from a normally open or normally closed volt free contact powered via the annunciator at 24VDC. Alternative configurations are available for direct powered inputs from 24V, 48V, 110V and 250V AC/DC if required.

**Servicing**
All alarm ways are configured by plugging into the programming port on the Interface Card and downloading the settings from the Windows Setup Software supplied with the system. In the unlikely event of a card failure a new card installed into the system will be automatically configured to the original configuration.

**Mounting**
Industry standard 3U 19" racks with rear access, rising clamp terminals mounted on the rear of the chassis for customer wiring. As an option quick disconnect terminals with locking screws are available.

**Power Supply**
The supply voltage range for the system is wide enough for unregulated and battery backed supplies. The nominal 24V DC supply can be anywhere within the range 19-36V DC without affecting system performance.

**Reprogramming**
The cost of replacement ICs and on-site visits to change cards is completely eliminated with the System 9000TS. All functions can be easily and permanently changed using the setup software provided with the system. No special programming skills are required, features are simply enabled or disabled in software.

**Pushbutton Inputs**
The standard requirement for the majority of alarm annunciators is 3 pushbuttons for Lamp Test, Accept and Reset. The System 9000TS provides these functions as standard and 5 additional control inputs are available for more complex applications if required. The additional control inputs can be enabled or disabled using the RTK supplied software utility. The additional functions are Silence, System Test, First-up Reset, Sleep and Horn Inhibit.

**Card Types**
*Interface Card (P925TS-X)*
Provides a link between the system I/O and the outside world with the following outputs
- RS485 serial port
- Power input
- Synchronisation
- Programming port
*Input Card (P925TS-I)*
Connects to the alarm and pushbutton inputs, time-stamps to 1ms and buffers the events
*Output Card (P925TS-O)*
Provides the drive to external display facia to show alarm information to standard ISA sequences
*Relay Card (P925TS-R)*
This card is driven from the Input Card and gives an individual reset relay per alarm input.

**Relay Outputs**
The standard system has outputs for all the commonly used functions, such as horn, watchdog, group and system fault relays. The watchdog relay is always provided, this will trip if any general fault occurs with the electronics. In addition to this there are eight further configurable relays which can be set as required up to a maximum of 8 group relays, 4 horn relays or various system fault relays. Each alarm way can also be supplied with individual repeat relay outputs, user configurable to follow the alarm contact or follow the alarm logic.

**Displays**
The System 9000TS is designed to work with almost any type of remote display i.e. conventional backlit lamp or LED displays individual panel lamps or mimic diagrams RTK Instruments offer a range of display products to complement the 9000TS, these are detailed in the Display Facias datasheet.

**Combined Alarm System**
The System 9000TS can be supplied as a standalone Sequence of Events Recorder or with Output Cards which will provide a fully integrated alarm and event management system. Various card combinations are available to build up systems to suit the exact application.

**Advanced Communications**
All systems are supplied with the RS485 communications feature in addition to outputs for printers, programming and synchronisation. These outputs are available to link to the wider plant equipment to log and store events and alarms as they occur for later analysis if required. Additional communications will also be available to provide ethernet, profibus, dual redundant communications etc.

**Fully Programmable**
Each input channel can be set to suit individual applications, for example: input time delay, alarm sequence, priority, grouping, and channel description. All these features can be enabled or disabled and stored using the RTK supplied configuration software. System parameters can be easily stored for retrieval at a later date if required.

**Flexible System designs**
RTK can supply the 9000TS system components as loose items for integration by others or fully integrated within industry standard wall mounting or floor standing panels configured to individual specifications.
Software and Printing Facilities

The majority of the features listed are supplied as standard as part of the normal software. This allows the system to be configured to match individual applications, RTK also offer full software integration enabling us to provide complete systems, undertake programming and commissioning. Please consult our Sales Office for further information on Alarm Management Software solutions.

Printers
All systems can be supplied with a local printer to provide and immediate record of alarm and return to normal states. As an option systems can be supplied suitable for connection via modem or Ethernet to remote printers. Configuration settings, summary and status reports can be printed on demand.

Software Options
With its advanced communications facility the System 9000TS is an ideal front-end to a screen based alarm management /recording system. RTK can provide Alarm Management Software and complete systems using industrialised computers and screens. These are developed in conjunction with the users to provide the clearest possible means of showing alarms, the priority of these alarms and exactly what to do in each alarm situation. These systems can also provide a means of displaying/storing all alarm and event history for analysis at a later date.

Event Storage
The S9000TS uses an advanced, powerful inbuilt processor system complete with non-volatile memory to store both system settings and event and alarm data. The data storage system is designed without using any components with moving parts such as Hard Disk drives to provide the greatest system reliability possible. The software is programmed for all the system settings via the front mounted programming port using a standard RS232 output from a standard PC.

System Setup
The RTK supplied configuration software allows the user to enable/disable features and assign alarm text i.e.
- 60 character of text for alarm messages
- Event prefix for both alarm and return to normal states
- Normally open or closed inputs
- Input time delays
- Alarm priorities
- Printer setting
- Auto-shelve parameters
- Assigning group and common relays

Timers
Delay timers can be incorporated into the System 9000TS on both the inputs and the outputs. This facility can avoid the possibility of nuisance alarms by setting an input time delay from 1ms to 65,000ms. Using this setting the alarm contact must be in alarm for a pre-determined minimum time before triggering the input circuitry whilst still maintaining an exact record of the time of the original event. For example, if an alarm occurs but it is dealt with and accepted, the remote telemetry system will not need to be notified.

Complete Systems
RTK can provide the System 9000TS mounted in a wall mounted or floor standing cabinet and provide all the necessary wiring to the displays, PSU’s and terminals ready for final installation on site. These panels are quoted against each specific customer requirement; please contact the Sales Office for further details.

The Best of Both Worlds
Ideally, critical plant alarms should be hard wired to a dedicated Alarm and Event Recording System like the System 9000TS and data passed onto the DCS as a secondary function. This offers the best of both worlds in that the System 9000TS, which has been specially developed to offer high speed event capture and True First Out Discrimination, also provides the clearest possible indication of critical plant conditions. The System 9000TS provides an independent, highly reliable, modular alarm system employing multiple redundant design features which should be used to complement centralised DCS platforms that have been primarily developed for control and monitoring.
Displays

To complement the System 9000TS Alarm Annunciator, RTK Instruments offers a wide range of displays from simple lamp arrays to full mosaic mimic diagrams. Most of the displays are modular in design to enable RTK to match your exact needs, rather than compromising on the nearest available shape and size. The main display types are illustrated and described here; for more detailed information, refer to the separate display datasheet.

P725LO
Lamp-Only Modules
This display has been designed to match the Series 725 Alarm Annunciator – it will look identical when viewed from the front. It is available in exactly the same format as the Annunciator with three window sizes, six colours and a choice of lamp or LED illumination. This display is the best choice when LED illumination is required, offering the most competitive ultra-bright illumination. It is fitted with a ‘Lamp Test’ facility as standard.

DF30 Display Facia
The DF30 display facia provides a flexible display panel for both LED or incandescent lamps. This display facia is totally modular allowing systems of almost any shape and size to be constructed. The basic lamp module is 30 x 30mm but these can be configured to give a range of window shapes and sizes by interconnecting multiple windows. This display can also have integral pushbuttons, keyswitches and audible devices. There is no limit to the number or position of these devices. All connections are by rear mounted screw terminals.

Hazardous Area Displays
When supplied through suitable certified interface devices, the System 9000TS can be used to drive a display facia in the hazardous area. The DF30IS is a backlit display certified as Ex IIB, EEx ia IIC T4. The display gives a bright LED illuminated backlit display that matches the safe area versions. The L20 Intrinsically Safe Multiplexer can also be used to drive a hazardous area display using only two cables into the hazardous area.

IP65 Displays
Where protection from the environment is essential a range of displays sealed to IP65 can be provided. These custom-built units have bright LED display modules wired to rear mounted terminals. The completed assembly is mounted with a gasket to the panel door to maintain the sealing.

Mimic Displays
Mosaic tiled mimic systems can be driven by the System 9000TS to provide a flexible and informative overview display. The standard mosaic mimic uses a 24 or 25mm tile mounted on a strong aluminium honeycomb grid. Tiles are the moulded type for process mimics or alternatively screen-printed or engraved to form the required display drawing. A wide range of suitable lamps, switches, pushbuttons and displays can also be integrated into the finished mimic. On smaller projects and simpler display requirements a hard wearing, single piece mimic can also be provided.

Alarm Management Software
With its multi-redundant architecture and communications facility the System 9000TS is an ideal front-end to a screen based Alarm Management System. These can be set up in thousands of different ways to suit each individual alarm handling situation. Different display screens have already been developed and these building blocks would be used to provide a custom solution for each client. These systems could also incorporate touch screen displays, dual redundant servers and a range of industrial computers.
Advanced Annunciator Features

When combined with the Output Cards the S9000TS becomes a powerful Alarm Annunciator system, some of the commonly used alarm functions available are shown below.

**Repeat Relays**
Each alarm way can have an individual repeat relay output in addition to any group relays configured. The relays can be set to be energised or de-energised and as N/O or N/C contact. The relay functions are also user configurable to follow the alarm logic or follow the input.

**Output Relay Reflash**
Each of the group relays can have a reflash facility enabled. This is where the group relay will change state for 500ms when another alarm within the group occurs. This allows a control room annunciator or monitoring system to indicate each occurrence of a new alarm.

**Multiplexer**
To cut down on the costs of installing vast numbers of cables across large sites, the System 9000TS can be used as an economical multiplexer system, where all the input contacts are gathered by a single System 9000TS-TX Module and transmitted serially on 4 wires up to 1.2 km away to the receiving module, the System 9000TS-RX Module. The alarms can then be displayed on a display facia or within alarm management software packages.

**Sleep Mode**
Useful in unmanned/not normally manned situations. Any input can be configured as a “sleep” input. When this input is switched on the drive outputs to the lamps and audibles are disabled. The annunciator will work exactly the same in all other respects; all alarms are monitored as standard and all repeat relays and communications function as normal. As soon as the system is switched out of the “sleep” mode, the display fascias will display all alarm information, complete with all first-up details.

**First Up**
In alarm annunciation applications, it is often essential to know which alarm occurred first. For this reason, the System 9000TS can be supplied with a flexible high resolution first-up facility as standard. Four different first-up sequences are provided to match the ISA standard S18-1 1979 (R 1984). Up to four separate first-up groups can be defined within the one system; each alarm way can be configured as being in one of these four groups.

Sequence Tables

Each alarm channel can be configured to suit the operating sequence required as listed in the ISA publication *Annunciator Sequences and Specifications S18.1 1979 (R1985)*. Systems can be configured with different features on different alarm ways and there is no need to switch the power off. The diagram below shows the most commonly used sequences.

**MANUAL RESET**

**AUTOMATIC RESET**

**SEQUENCE TABLES**

**MANUAL RESET**

**AUTOMATIC RESET**

**SEQUENCE CODE M**

**SEQUENCE CODE A**

**SEQUENCE F3A**
Installation and Mechanical Details

Standard System

Networked System

The System 9000TS is based on the standard eurorack, manufactured to IEC 297-3 (DIN 1494 Pt.5). The standard subrack size is 3U and 84E wide (19in). This module will fit the Interface Card and up to 13 Input Cards. Larger systems can be supplied by interconnecting multiple racks. All signals are fully buffered between racks, so no signal deterioration will occur even on extremely large systems.

Thirteen module, full 19in rack
Technical Specification

**Inputs**

**Alarm Contacts**
All inputs are opto-isolated (isolation voltage 2.5kV). By using different wiring configurations, the same system can be used for both:
- Volt-free contacts which can have the operating mode configured using the Setup Card, to operate to alarm for contact open or to alarm for contact close.
- Voltage input from 24, 48, 110 or 250VAC/DC.

**Alarm contact and cable resistance**
N/C contact – series resistance of contact cables 20kΩ maximum.
N/O contact – parallel resistance of contact cables 200kΩ minimum.

**Field contact voltage and current**
The voltage for volt-free alarm contacts is fed from the unit at 24VDC at approximately 2mA.

To maintain complete isolation it is possible to use a separate PSU to feed all the alarm contacts.

**Overall system resolution**
1ms

**First-up Discrimination**
1ms

**Alarm Clearance Discrimination**
1ms

**Control Inputs**
Any input can be configured to one of the following control inputs:
- Lamp test
- Acknowledge
- Reset
- System test
- Silence
- First-up reset
- Sleep
- Horn Inhibit

**Outputs**

**Lamp Drive (when Output Cards fitted)**
Each output can drive up to 160mA at 24VDC, making it suitable for multi bulb displays or multiple repeat displays.

**Standard Relays**
Eight standard relays fitted on the Interface Card, these are configurable as system alarms such as watchdog, printer fault etc or group alarms.

Contact rating at 220VDC (250VAC) max, 125VDC @ 0.5A, 24VDC @ 2A, resistive. Selection of N/O or N/C contact by jumper link.

**Repeat and Group Relays**
Group relay card and individual repeat relays for each alarm way. Contact rating at 220VDC (250VAC) max, 125VDC @ 0.5A, 24VDC @ 2A, resistive.

**Synchronisation**
By pulse, IRIG-B or GPS signal

**Printer Port**
Standard parallel port

**Serial Data**
Event/alarm data can be transmitted using the serial communications port to other System 9000TS units, DCS systems, PLCs or computers.

Transmission – RS485C. Full duplex, 1 start bit, 7 data bits, 1 parity, 1 stop bit.

Baud Rate – up to 9600

Protocol – ASCII MODBUS and RTU

**General**

**Supply Voltage**
24VDC nominal (19–36VDC) Standard

A range of power supplies is available to convert from other AC or DC voltages.

**Supply Current (mA)**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current (mA)</th>
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<tr>
<td>24V</td>
<td>150, 50, 22</td>
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<tr>
<td>Quiescent: Interface Card</td>
<td>150</td>
</tr>
<tr>
<td>Quiescent: Input Card</td>
<td>50</td>
</tr>
<tr>
<td>Relay current/per relay</td>
<td>22</td>
</tr>
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</table>

Add the current for the lamp drive to the totals of the above cards

**EMC Compliance**
Immunity to EN61000-6-2:2001
Emissions to EN61000-6-4:2001

**LVD Compliance**
The unit is designed and manufactured to safety specification BS EN61010-1:1993

**Environment**
Operating temperature –20°C to +60°C
Storage temperature –20°C to +80°C
Humidity 0–95% RH, non-condensing

**Mechanical Details**
19in Rack
Standard 3U by 19in Eurorack to IEC 297-3 (DIN 1494 Pt.5)
Larger systems can be provided using multiple racks and interconnect cable.

**Mounting**
Industry standard 19” racks with rear terminal access

**Assembly**
All cards plug in to a standard pre-tested motherboard using DIN41612 connectors. This allows simple system expansion of system size at a later date.

**Connections**
Plug and socket terminals of the rising clamp type, maximum cable size 2.5mm². Quick disconnect terminals with locking screws available as an option.

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.

Doc 9000TS-1
PPM4-P
Programmable Process Meter

User scaleable meters for all standard process inputs

The PPM4 range of Process Meters meets the needs of most process display requirements where the input is known but where it is necessary to alter the display scaling at the installation or commissioning stage.

Using surface mount and microprocessor technology the PPM4 provides a highly accurate meter with the ability to scale the display and store these settings to EEPROM.

The meter comes as standard with an isolated excitation voltage to supply transducers and power current loops.

Two status inputs are also provided as standard for TARE and HOLD functions. An optional alarm relay output is available which provides a programmable setpoint for control applications.

Other optional items include an IP65 gasket to seal to the panel door and software/interface cable to allow calibration from a computer.

User programmable display between -1999 and 9999

Operates on all normal process control signals - voltage, current

Easy to program and accessible from the front

Microprocessor design for higher accuracy and reliability

Range extension modules to cover most AC and DC input requirements

Optional IP65 gasket
Technical Specification

**Inputs**

**Standard Versions**
- 1 Selectable between ±20mA and ±100mV
- 2 0-10V
Other ranges available by using a "Range Extension Module".

**Other input ranges to special order**

**Outputs**

**Alarm Relay & Front Panel LED**
Optional single trip relay with changeover contacts, rated at 2A, 230VAC resistive. The setpoint is fully user programmable.

**Excitation Voltage**
- 5 or 10VDC stabilized or 24VDC unregulated, max current 35mA

**Supply**

**Mains Version**
- 115VAC ±10%, 50/60Hz
- 230VAC ± 10%, 50/60Hz
- Power consumption 6VA

**Universal Low Voltage**
- 11-30VDC and 10-24VAC

**Display**

4 digit red LED 14.2mm high (0.56"), user programmable in the range –1999 to 9999. High brightness red LED to indicate setpoint exceeded.

Green display available to special order.

The display is updated two times per second and is fully scaleable using jumper links and the two front pushbuttons.

**General**

**Accuracy**
Better than 0.1% of span ±1 digit

**Common Mode Rejection Ratio**
>120dB

**Series Mode Rejection Ratio**
>60dB at 50/60Hz

**Analogue to Digital Converter**
Dual slope conversion, with 5 updates per second

**Temperature Coefficient**
0.01%/°C of full scale (typical)

**Watchdog**
Both software and hardware, resets the CPU on any program error.

**Calibration**
All user configuration is stored in EEPROM. All calibration can be undertaken from the front of the unit. An optional cable and software pack is available to program from a computer. (Part Number PPM4CAL)

**Environment**

Operating temperature: 0°C to 50°C
Storage temperature: –10°C to 70°C
Humidity: 0-90% RH, non-condensing

**Protection**
IP65 with optional gasket
IP20 on the rear

**EMC Compliance**
- Immunity to EN61000-6-2:2001
- Emissions to EN61000-6-4:2001
- LVD to EN61010-1:1993

**Input Impedance**
- 20mA input <5Ω
- 100mV input >1MΩ
- 10V input >100kΩ

**Connection**
Plug in screw terminals of the rising clamp type suitable for 2.5mm² cable

**Weight**
450g

**Ordering Information**
PPM4 Meter, supply voltage, input range, excitation voltage. Relay output (optional), IP65 gasket (optional)

---

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
PPM4-T
Temperature Meter

Fully linearised, high accuracy panel meters

Display range between –1999 and 9999
Linearised to 0.1% accuracy
Available as thermocouple or RTD input
Easy to setup and accessible from the front
Microprocessor design for higher accuracy and reliability
Optional 2A alarm relay
Optional IP65 gasket

The PPM4 range of Temperature Meters uses surface mount and microprocessor technology to provide a highly accurate meter fully linearised for the majority of commonly used thermocouples and RTDs giving accurate and reliable readings across the complete sensor temperature range.

The user can program the PPM4 to display in °C or in °F. An optional alarm relay output is also available which provides a programmable setpoint for control applications.

Other optional items include an IP65 gasket to seal to the panel door and software/interface cable to allow calibration from a computer.
**Technical Specification**

### Inputs

#### Thermocouples
To BS EN 60584-1:1996
- Type K (NiCh/NiAl)  –270 to 1372°C
- Type J (Fe/NiCu)  –210 to 1200°C
- Type T (Cu/CuNi)  –270 to 400°C
- Type N (Nicrosil-Nisil)  –200 to 1300°C

#### RTDs
To BS EN 60751:1996
- 2 or 3 wire
- Pt100  –200 to 850°C
- Pt130  –200 to 500°C

*Other input ranges to special order*

### Outputs

#### Alarm Relay & Front Panel LED
Optional single trip relay with changeover contacts, rated at 2A, 230VAC resistive.
The setpoint is fully user programmable from the front of the meter.

### Supply

#### Mains Version
115VAC ±10%, 50/60Hz
230VAC ± 10%, 50/60Hz
Power consumption 6VA

#### Universal Low Voltage
11-30VDC and 10-24VAC

### Display

- 4 digit red LED 14.2mm high (0.56”). High brightness red LED to indicate setpoint exceeded.
- Green display available to special order.
- The display is updated two times per second and can be selected to display in °C or °F.

### General

#### Accuracy
Better than 0.1% of span ±1 digit with linearisation error of 0.3%

#### Reference Junction Rejection
Better than 0.1%/°C after 30 minutes

#### Common Mode Rejection Ratio
>120dB

#### Series Mode Rejection Ratio
>60dB at 50/60Hz

#### Analogue to Digital Converter
Dual slope conversion, with 5 updates per second

#### Temperature Coefficient
0.01%/°C of full scale (max) excluding RJC errors, ±50ppm/°C (typical)

#### Sensor Break
If the sensor breaks, the display will show O/C. The alarm relay will go to thetrip state.

#### Environment
- Operating temperature: 0°C to 50°C
- Storage temperature: –10°C to 70°C
- Humidity: 0-90% RH, non-condensing

### Protection
- IP65 with optional gasket
- IP20 on the rear

### Calibration
All user configuration is stored in EEPROM. All calibration can be undertaken from the front of the unit.
An optional cable and software pack is available to program from a computer.
(Part Number PPM4CAL)

### Input Impedance
All inputs >10MΩ

### Connections
Plug in screw terminals of the rising clamp type suitable for 2.5mm² cable

### Compliance
- Immunity to EN61000-6-2:2001
- Emissions to EN61000-6-4:2001
- LVD to EN61010-1:1993

### Weight
450g

### Ordering Information
PPM4 Meter, supply voltage, sensor type.
Relay output (optional), IP65 gasket (optional)

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Due to our policy of continuous product development, we reserve the right to amend specifications without notice.

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A member of the MTL Instruments Group plc
System 9000
Alarm Annunciator

Ultimate flexibility and reliability in a rack-mounted format

<table>
<thead>
<tr>
<th>Exclusive ASIC/micro-controller technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-redundant design (no single point of failure) including PSU and communications</td>
</tr>
<tr>
<td>Modular, rack-mounted design expandable to thousands of alarm points</td>
</tr>
<tr>
<td>Fully field programmable using the integral Setup Card or RTK configuration software</td>
</tr>
<tr>
<td>Alarm sequences to ISA-S18.1-1979 (R 1984)</td>
</tr>
<tr>
<td>Wide range of displays including mimic diagrams, LED light boxes</td>
</tr>
</tbody>
</table>

The System 9000 Alarm Annunciator offers the latest in combined ASIC/micro-controller technology to provide an annunciator of unparalleled reliability and programmability. The system gives flexibility and security at a cost-effective price.

A unique “multi-redundant” design is used in the System 9000 which avoids the need for a central controller and also provides “multi-redundant” PSU and communications.

The programming flexibility means that users can easily configure hundreds of options including alarm sequence, time delays, relay operation, first-up grouping, functionality, communications etc. The range of displays to complement the System 9000 is also extensive, from the ultra-bright LED illuminated P725LO, hazardous area displays and alarm management software screens.
With the continued improvements in the complexity of process plants combined with the pressures to strive for greater operating efficiency, it is even more important that alarm annunciators offer the clearest means of showing alarms combined with the best reliability and highest integrity.

RTK has designed the System 9000 rack mounted alarm system with this in mind. Based on the field proven and highly acclaimed range of panel mounted Annunciators, the system employs exclusive ASIC and microcontroller technology with additional safety, communications and configuration facilities.

Total Configurability
All the facilities are field programmable using the in-built keypad or downloaded from a PC using RTK's Setup Software. All features are configurable for each individual alarm way and can easily be set up in minutes without the need to learn a special programming language. All the alarm sequences specified in the ISA publication “Annunciator Sequences and Specifications” are available in addition to a wide range of additional features.

Displays
The System 9000 is suitable to drive almost any display, such as complex mimic diagrams, simple LEDs, or backlit lamp displays of a vast range of shapes and sizes. RTK Instruments can offer a whole range of display options for the System 9000, which are fully detailed in a separate datasheet.

Total Flexibility
The modular construction and the advanced programming facilities mean that the System 9000 Alarm Annunciator can be supplied to match any process alarm application. The 19in racking system allows almost unlimited system expansion, and the Setup Card allows configuration down to each individual alarm way for both sequence and operation.

High Density Packaging
A standard rear mounting 19in 3U Eurorack forms the basis of the System 9000. Each rack can contain up to 14 eight channel active input cards giving a total of 109 alarm ways and three pushbuttons per rack. Racks can easily be linked together to produce alarm systems of almost unlimited size.

First Up
In alarm annunciation applications, it is often essential to know which alarm occurred first. For this reason, the System 9000 has a flexible high resolution first-up facility as standard. Four different first-up sequences are provided to match the ISA standard S18-1 1979 (R 1984). Up to four separate first-up groups can be defined within the one system; each alarm way can be configured as being in one of these four groups.

Relay Outputs
The standard system has relay outputs for all the commonly used functions, such as a horn relay, watchdog relay and total group relay (with optional reflash). If additional relays are required, then the optional Group Relay Card may be needed. This card will expand the relay outputs from the system by an additional eight.

Communications
The communications facility allows the System 9000 to act as a data acquisition system and transmit alarm information serially to SCADA systems, computers, PLCs, DCS systems etc. With the unique ‘multi-redundant’ design, all cards can communicate directly to the host system so there is no risk of card failure causing the communications to halt. This method of data transmission will operate over 1.2km and uses standard MODBUS protocol.

Isolated Inputs
Inputs are generally normally open or normally closed volt-free contacts. All inputs are opto-isolated as standard and can accept 24VDC signals without alterations. There are options for the higher field contact voltages of 48, 110 and 250VDC.

Bulb Fault Indication
If any alarm way is unable to light its window, because either both lamps are open circuit or missing, or one of the lamps has failed short circuit, then a green ‘status’ LED on the input card flashes to indicate this problem. The lamp test pushbutton can then be pressed to find the faulty window. None of the above malfunctions will prevent the alarm annunciator from detecting and sounding alarms.

Servicing
All alarm ways are configured from the keypad on the Setup Card mounted on the left hand side of the rack, or on systems with communications, this can be downloaded from the Setup Software. In the unlikely event of a card failure, the cable connections can be unplugged from the card and the card itself unplugged from the rack. This allows very fast card replacement without the need for any rewiring.
Features & Benefits

Setup Card
Each system is supplied with a Setup Card. This card is not a master module; it is not required for the system to run correctly. The function of the Setup Card is to allow users to configure the input cards to their required operation. Once configured, all settings are stored on the EEPROM on the Active Input Cards. The Setup Card also filters and protects the incoming power supply and provides the common relay outputs.

Alarm Management Software
With its multi-redundant architecture and communications facility the System 9000 is an ideal front-end to a screen based alarm management system. RTK can provide alarm management software and complete systems using industrialised computers and screens. These are developed in conjunction with the users to provide the clearest possible means of showing alarms, the priority of these alarms and exactly what to do in each alarm situation. These systems can also provide a means of logging all alarm and event history for analysis at a later date.

Mounting
The standard method of mounting is directly onto the backplate of a control panel. The rack can easily be supplied as a normal front mounting 19in subrack suitable for direct mounting into 19in racking systems.

Power Supply
The supply voltage range for the system is wide enough for unregulated and battery backed supplies. The nominal 24VDC supply can be anywhere within the range 19-36VDC without affecting system performance. Alternative supply systems such as 48VDC can also be provided.

Interfacing
The System 9000 is ideally suited to interface to other plant equipment. Even basic systems come complete with output relays to link to external indicating devices and displays. The relays can be expanded to cover multiple group relays and individual repeat relays for all alarm ways.

Using the powerful communications features it is possible to interface to existing PLCs, SCADA systems, Emergency Shutdown Systems and plant-wide distributed control systems. The Annunciator can monitor and display critical alarms and communicate the results into the normal monitoring systems, giving another level of safety and independence from the general monitoring or control system.

Pushbutton Inputs
The standard requirement for the majority of alarm annunciators is three pushbuttons for Lamp Test, Accept and Reset. The System 9000 not only allows these standard functions, but can also allocate a further five inputs to operate additional more advanced control features. If these are not required, they are simply not used. The additional functions are Silence, System Test, First-up Reset, Sleep and Horn Inhibit.

RTK Engineering’s Total Security Concept

‘Multi-redundant’ design
The System 9000 maintains the unique ‘multi-redundant’ design. Each alarm board contains an ASIC (Application Specific Integrated Circuit) which is capable of complete system control – if one board fails, or is removed, then another ASIC on another board will takeover system control, avoiding a single source of system failure and vastly increasing the system MTBF. An in-built watchdog relay will give an alarm if any Active Input Cards fail or are removed.

‘Multi-redundant’ Communications
This principle is now extended to the communications. All active alarm boards have full communications facilities – if a single board fails, an alarm is sounded but normal communications will continue with all the remaining boards. Again, this removes the single source of communication failure and goes far beyond a dual redundancy system.

‘Multi-redundant’ Power Supply
Each alarm card has its own in-built fully isolated dc/dc converter, again providing distributed power supplies across the whole alarm system, so the system does not rely on a single power supply card.

Line Monitoring
The integrity of the rack itself is without question, but what of the connections to the outside world?

Alarm contacts: The System 9000 can be supplied complete with an extensive line monitoring facility. If the connections to the alarm contact go either short circuit, open circuit or high resistance then an alarm is sounded to identify the problem.

Lamp Failure: The connection to the lamp display module can also be fully monitored, so that if any alarm way is unable to light its lamps the system will also sound an alarm. Both features can have volt-free relay contact outputs.
Displays

To complement the System 9000 Alarm Annunciator, RTK Instruments offers a wide range of displays from simple lamp arrays to full mosaic mimic diagrams. Most of the displays are modular in design to enable RTK to match your exact needs, rather than compromising on the nearest available shape and size. The main display types are illustrated and described here; for more detailed information, refer to the separate display datasheet.

P725LO
Lamp-Only Modules
This display has been designed to match the Series 725 Alarm Annunciator – it will look identical when viewed from the front. It is available in exactly the same format as the annunciator with three window sizes, six colours and a choice of lamp or LED illumination. This display is the best choice when LED illumination is required, offering the most competitive ultra-bright illumination. It is fitted with a ‘Lamp Test’ facility as standard.

DF30 Display Facia
The DF30 display facia provides a flexible display panel for both LED or incandescent lamps. This display facia is totally modular allowing systems of almost any shape and size to be constructed. The basic lamp module is 30 x 30mm but these can be configured to give a range of window shapes and sizes by interconnecting multiple windows. This display can also have integral pushbuttons, keyswitches and audible devices. There is no limit to the number or position of these devices. All connections are by rear mounted screw terminals.

Hazardous Area Displays
When supplied through suitable certified interface devices, the System 9000 can be used to drive a display facia in the hazardous area. The DF30IS is a backlit display certified as Ex II 1G, EEx ia IIC T4. The display gives a bright LED illuminated backlit display that matches the safe area versions. The L20 Intrinsically Safe Multiplexer can also be used to drive a hazardous area display using only two cables into the hazardous area.

IP65 Displays
Where protection from the environment is essential a range of displays sealed to IP65 can be provided. These custom-built units have bright LED display modules wired to rear mounted terminals. The completed assembly is mounted with a gasket to the panel door to maintain the sealing.

Mimic Displays
Mosaic tiled mimic systems can be driven by the System 9000 to provide a flexible and informative overview display. The standard mosaic mimic uses a 24 or 25mm tile mounted on a strong aluminium honeycomb grid. Tiles are the moulded type for process mimics or alternatively screen-printed or engraved to form the required display drawing. A wide range of suitable lamps, switches, pushbuttons and displays can also be integrated into the finished mimic. On smaller projects and simpler display requirements a hard wearing, single piece mimic can also be provided.

Alarm Management Software
With its multi-redundant architecture and communications facility the System 9000 is an ideal front-end to a screen based Alarm Management System. These can be set up in thousands of different ways to suit each individual alarm handling situation. Different display screens have already been developed and these building blocks would be used to provide a custom solution for each client. These systems could also incorporate touch screen displays, dual redundant servers and a range of industrial computers.
Advanced Features

The Best of Both Worlds
Ideally, critical plant alarms should be hard wired to a dedicated alarm system like the System 9000 and data passed onto the DCS as a secondary function. This offers the best of both worlds in that the System 9000, which has been specially developed to offer high speed event capture and True First Out Discrimination, also provides the clearest possible indication of critical plant conditions. The System 9000 provides an independent, highly reliable, modular alarm system employing multiple redundant design features. It should be used to complement centralised DCS platforms that have been primarily developed for control and monitoring.

Most of the features listed here are supplied as standard as part of the normal software; the system is simply configured exactly as required for each application. Further options exist from RTK to provide complete systems, undertake programming and commissioning, and provide alternative mounting arrangements. Please consult the Sales Office for further information on any of these options.

Timers
Delay timers can be incorporated into the System 9000 on both the inputs and the outputs. This facility can avoid the possibility of nuisance alarms by setting an input time delay, so that the alarm contact must be in alarm for a certain time before triggering the input circuitry.

Repeat Relays
Each alarm way can have an individual repeat relay output in addition to any other alarm ways. The relays can be configured into any of the 8 possible groups or 4 possible audible groups. Three of these group relays can alternatively be configured to give outputs for ‘line fault’, ‘communications fault’ and ‘bulb failure’.

Output Relay Reflash
Each of the group relays can have the reflash facility enabled. This is where the group relay will change state for approx 0.5s when another alarm in that group occurs. This allows a control room annunciator or monitoring system to indicate each occurrence of a new alarm.

Alarm Indication via PLCs
The cost of digital output cards for PLCs to drive conventional backlit displays can be avoided by simply communicating all the alarm information serially to a System 9000 annunciator. The Annunciator will then convert the serial information and drive the lampbox display.

Multiple Input Reflash
It is often necessary to connect more than one alarm contact to a single alarm display window. This can be configured from the Setup Card so that up to 24 alarm contacts can all link to a single alarm window. After an alarm has occurred and been accepted then another alarm occurring in the same group will cause the display window to flash again (reflash) to indicate the occurrence of a new alarm.

Discrepancy
Rather than simply monitoring the state of a single alarm contact, it is possible to configure the Annunciator to monitor two or more contacts to ensure they correspond. If the two contacts go out of sync, a fault has occurred and the alarm will sound.

Boolean Logic
In a similar way to the discrepancy control, multiple inputs can be linked together by standard OR and AND functions. For example, the system can be programmed so that an alarm will only occur if four particular inputs are all on at the same time.

Sleep Mode
Useful in unmanned/not normally manned situations. Any single input can be configured as a “sleep” input. When this input is switched on the drive outputs to the lamps and audibles are disabled. The annunciator will work exactly the same in all other respects; all alarms are monitored as standard and all repeat relays and communications function as normal. As soon as the system is switched out of the ‘sleep’ mode, the display facias will display all alarm information, complete with all first-up details.

Multiplexer
To cut down on the costs of installing vast numbers of cables across large sites, the System 9000 can be used as an economical multiplexer system, where all the alarm contacts are gathered by a single System 9000TX Module and transmitted serially on 4 wires up to 1.2 km away to the receiving module, the System 9000RX Module. The alarms can then be displayed on a display facia or via VDU screens.

Complete Systems
RTK can provide the System 9000 mounted in a wall mounted or floor standing cabinet and provide all the necessary wiring to the displays, PSUs and terminals ready for final installation on site. These panels are quoted against each specific customer requirement; please contact the Sales Office for further details.

Card Types

<table>
<thead>
<tr>
<th>Card Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Input Card</td>
<td>Connects to the alarm and pushbutton inputs and drives the lamp facia display.</td>
</tr>
<tr>
<td>Setup Card</td>
<td>Allows configuration of Active Input Cards, filters the incoming supply voltage and provides 3 relay outputs.</td>
</tr>
<tr>
<td>Relay Card</td>
<td>This card is connected directly to the Active Input Card and gives an individual repeat relay per alarm input.</td>
</tr>
<tr>
<td>Group Relay Card</td>
<td>Has 8 relays fitted, 7 additional group relays and 3 additional horn relays.</td>
</tr>
<tr>
<td>Interface Card</td>
<td>Provides a link to the systems communications facilities via RS485.</td>
</tr>
<tr>
<td>Power Input Card</td>
<td>Used on extension racks in place of the setup card. This simply filters the incoming power and provides a connection to the rear backplane.</td>
</tr>
<tr>
<td>Interconnect Card</td>
<td>Use on larger systems to buffer the signals between racks and link the common lines. Supplied with an interconnect cable.</td>
</tr>
</tbody>
</table>
Each alarm channel can be configured to suit the operating sequence required as listed in the ISA publication *Annunciator Sequences and Specifications S18.1 1979 (R1985)*. Systems can be configured with different features on different alarm ways and there is no need to switch the power off. The diagram below shows the most commonly used sequences.

### MANUAL RESET

**Sequence Code M**

- **Sequence Table**: Process Normal, Sequence Normal, Visual Off, Audible Silent
- **Alarm Channel**
  - Abnormal
  - Acknowledged
  - Audible Silent
- **Process**
  - Abnormal
  - Sequence
  - Acknowledged
  - Visual On
- **Alarm**
  - Abnormal
  - Flashing
  - Audible Audible

### AUTOMATIC RESET

**Sequence Code A**

- **Sequence Table**: Process Normal, Sequence Normal, Visual Off, Audible Silent
- **Alarm Channel**
  - Abnormal
  - Acknowledged
  - Audible Silent
- **Process**
  - Abnormal
  - Sequence
  - Acknowledged
  - Visual On
- **Alarm**
  - Abnormal
  - Flashing
  - Audible Audible

### NO LOCK IN

**Sequence F2M-1**

- **Process Normal**, **Sequence Normal**, **Visual Off**, **Audible Silent**
- **Alarm Channel**
  - Abnormal
  - Acknowledged
  - Audible Silent
- **Process**
  - Abnormal
  - Sequence
  - Acknowledged
  - Visual On
- **Alarm**
  - Abnormal
  - Flashing
  - Audible Audible

### RINGBACK

**Sequence Code R**

- **Sequence Table**: Process Normal, Sequence Ringback, Visual Off, Audible Silent
- **Alarm Channel**
  - Abnormal
  - Acknowledged
  - Audible Silent
- **Process**
  - Abnormal
  - Sequence
  - Acknowledged
  - Visual On
- **Alarm**
  - Abnormal
  - Fast Flashing
  - Audible Audible

### AUTOMATIC RESET FIRST OUT

**Sequence F3A**

- **Sequence Table**: Process Normal, Sequence Normal, Visual Off, Audible Silent
- **Alarm Channel**
  - Abnormal
  - Acknowledged
  - Audible Audible
- **Process**
  - Abnormal
  - Sequence
  - Acknowledged
  - Visual On
- **Alarm**
  - Abnormal
  - Fast Flashing
  - Audible Audible
Installation and Mechanical Details

Standard system with Communications

Local Annunciation

System 9000

Alarm inputs (up to 109/rack) and control inputs (T, A, R)

DCS/ESD

Printer

PLC

Alarm Management Software

Multiplexed system

System 9000TX

System 9000RX

Alarm inputs (up to 109/rack) and control inputs (T, A, R)

up to 1.2km

Five module, half 19in rack

132.5
57

253
269

10
190

10
190

132.5
57

14

Fourteen module, full 19in rack

132.5
57

465
482.6 (19in)

10
190

The System 9000 is based on the standard eurorack, manufactured to IEC 297-3 (DIN 1494 Pt.5). The standard subrack size is 3U and 84E wide (19in). This module will fit the Setup Card and up to 14 Active Input Cards. For smaller systems, a half rack version is available, this is 42E wide (10½in) and will fit the Setup Card and up to 5 Active Input Cards. The units can be supplied as rear mounting for direct fixing to backplanes or front mounting for use in 19in racks. Larger systems can be supplied by interconnecting multiple racks. All signals are fully buffered using the Interconnect Card, so no signal deterioration will occur even on extremely large systems.
Technical Specification

Inputs

Alarm Contacts
All inputs are opto-isolated (isolation voltage 500VDC). By using different wiring configurations, the same system can be used for both:

- Volt-free contacts which can have the operating mode configured using the Setup Card, to operate to alarm for contact open or to alarm for contact closed.
- Voltage input from 19VDC minimum to 36VDC maximum with a common 0V for the 24VDC system and 38 to 58VDC for the 48VDC system.

Voltage for 110V field contact voltage option

Alarm Contact and Cable Resistance
N/C contact – series resistance of contact cables 20kΩ maximum.
N/O contact – parallel resistance of contact cables 200kΩ minimum.

Field Contact Voltage and Current
The voltage for volt-free alarm contacts is fed from the unit at 24VDC at approximately 2mA.
To maintain complete isolation it is possible to use a separate PSU to feed all the alarm contacts.

Input Transient Filter (24V input)
Signals narrower than approx 40ms at 30V will not trigger the annunciator.
Tolerable transient at higher voltages:
- 100V for 2ms
- 7 data bits, 1 parity, 1 stop bit.
- Baud Rate – up to 9600
- Protocol – ASCII MODBUS and RTU

First-up Discrimination
Typical 10ms

Control Inputs
Any input can be configured to one of the following control inputs:
- Lamp test
- Mute
- Acknowledge
- First-up reset
- Reset
- Sleep
- System test
- Horn Inhibit

Outputs

Lamp Drive
Each output can drive up to 160mA at 24VDC, making it suitable for multi bulb displays or multiple repeat displays.

Standard Relays
Standard relays fitted on the Setup Card: Horn, Group and Watchdog.
Contact rating 3A at 24VDC resistive or 2A at 240VAC resistive. Selection of N/O or N/C contact by jumper link.

Repeat and Group Relays
Group relay card and individual repeat relays for each alarm way. Contact rating 3A at 24VDC resistive or 2A at 240VAC resistive. Relay outputs may be normally energised or normally de-energised and contacts can be N/O or N/C.

Field Contact Voltage and Current
The voltage for volt-free alarm contacts is fed from the unit at 24VDC at approximately 2mA.
To maintain complete isolation it is possible to use a separate PSU to feed all the alarm contacts.

Input Transient Filter (24V input)
Signals narrower than approx 40ms at 30V will not trigger the annunciator.
Tolerable transient at higher voltages:
- 100V for 2ms
- 7 data bits, 1 parity, 1 stop bit.
- Baud Rate – up to 9600
- Protocol – ASCII MODBUS and RTU

First-up Discrimination
Typical 10ms

Control Inputs
Any input can be configured to one of the following control inputs:
- Lamp test
- Mute
- Acknowledge
- First-up reset
- Reset
- Sleep
- System test
- Horn Inhibit

Communications
Alarm data can be transmitted using the serial communications port to other System 9000 units, DCS systems, PLCs or computers.
Transmission – RS485C. Full duplex, 1 start bit, 7 data bits, 1 parity, 1 stop bit.
Baud Rate – up to 9600
Protocol – ASCII MODBUS and RTU

General

Supply Voltage
24VDC nominal (19–36VDC) Standard
48VDC nominal (38–58VDC)
A range of power supplies is available to convert from other ac or dc voltages.

Supply current (mA) 24V 48V
Quiescent: Setup Card 120 60
Quiescent: Active Input Card 40 30
Relay current/per relay 22 10
Add the current for the lamp drive to the totals of the above cards

EMC Compliance
Immunity to EN61000-2-2:2001
Emissions to EN61000-6-4:2001

LVD Compliance
The unit is designed and manufactured to safety specification BS EN61010-1:1993

Environment
Operating temperature –20°C to +60°C
Storage temperature –20°C to +80°C
Humidity 0–95% RH, non-condensing
Protection IP41

Mechanical Details

19in Rack
Standard 3U by 19in Eurorack to IEC 297-3 (DIN 1494 Pt.5) for up to 109 alarm inputs and 3 control inputs.
Standard 3U by 101⁄2in Eurorack to IEC 297-3 (DIN 1494 Pt.5) for up to 37 alarm inputs and 3 control inputs.
Larger systems can be provided using multiple racks and interconnect cable.

Mounting
Either rear mounting direct to backplate or front mounting in a standard 19in racking system.

Assembly
All cards plug in to a standard pre-tested motherboard using DIN41612 connectors. This allows simple system expansion of system size at a later date.

Connections
Two part rising clamp terminals, maximum cable size 2.5mm². Side mounted and front mounted screw terminals are available.
DFR30IS Series
Intrinsically Safe Display Facias

Backlit LED illuminated displays for all hazardous areas

ATEX certified Ex II 2G
EEx ia IIC T4

3 window sizes

6 window colours, all LED illuminated

Modular construction so displays can be matched to your exact requirements

Integral pushbuttons

Used as part of a hazardous area alarm system

The simple backlit flashing display is still regarded as the clearest way of alerting operators to abnormal conditions on complex processes. The DFR30IS Display Facia provides a clear, bright display and is approved for use in zone 1 or zone 2 hazardous areas. This product is often combined with the RTK range of Alarm Annunciators and certified Interfaces to provide a complete Alarm Management System with displays both in the safe and hazardous areas.

As the unit is modular in design, displays can be created in almost any format, arrangement and size making it possible for users to have exactly the configuration needed for the application.
Window Details
The DFR30IS is available in three window sizes: small, medium and large as listed below.
Small: 30 x 30mm
Medium: 60 x 30mm (W x H)
Large: 60 x 60mm
Any combination of these window sizes can be supplied in any format, mixed as required in a single display to make up the appropriate matrix required.

Window Colours
All three different window sizes are available in the following six colours
- Red
- Amber
- Yellow
- White
- Green
- Blue

Integral Components
As these Displays are used for alarm indication it is often necessary to include pushbuttons and audibles within the display itself to acknowledge and reset alarms. These are normally fitted in the bottom right hand cell.

Window Marking
Displays can be configured with the required filter colours and film legends to suit the exact customer’s requirements or alternatively RTK can supply a template to allow users to create their own legends locally.

Certification
ATEX certified to EN50014:1997 and EN50020:2002
Group II, Category 2G, EEx ia IIC T4 (Ta –20ºC to +60ºC)

Location
Zones 1 or 2. Gas Group, IIC, IIB or IIA, Temp Class up to T4

Certificate No.
KEMA03ATEX1021X

Safety Parameters
Ui = determined by li and Pi
li = 2A
Pi = 1W
Ci = Li = 0

The device can be powered from an EEx ia IIC certified interface with output parameters lower than those shown above

Supply
14-26VDC, current 20mA per 30mm window

Recommended Interfaces
Zener Barriers: MTL7728P+
IS Isolators: MTL5021

Environment
Operating temperature: 0 to 60ºC
Storage temperature: –20 to 80ºC
Humidity: 0-95% RH, non condensing

Protection
IP41 from the front, IP20 from the rear

Connections
Raising clamp terminals suitable for 2.5mm² cable

Compliance
Immunity to EN61000-6-2:2001
Emissions to EN61000-6-4:2001

Due to our policy of continuous product development, we reserve the right to amend specifications without notice.
LN1000
Intrinsically Safe Annunciator

Modular Alarm System for all Hazardous Areas

ATEX Certified Ex II 1G, EEx ia IIC T4

Ideal for installation in any Zone

Up to 32 channels can be powered through one IS interface

Field-mounting product: flameproof or purged cabinets not required

User-programmable alarm sequences to ISA-S18.1 1979

Compatible with a range of intrinsically safe audible and visual alarms

Alarm indication by combined bright LEDs and LCDs

The LN1000 Intrinsically Safe Annunciator provides a unique solution for problems with hazardous area alarm indication. The Annunciator provides a visual display of the alarm status including ‘first-up’ information and can be mounted in the hazardous area for the benefit of operators working in any Zone.

The lightweight stainless steel construction gives a compact and simple to install modular unit which can easily be expanded by the addition of extra Alarm Cards.

Maintenance can be carried out live without the necessity of ‘gas checks’ or prior shutdown. Unlike explosionproof, purged and type ‘n’ systems, installation is simple and relatively low cost.

With the addition of a number of ancillary devices a complete intrinsically safe alarm and control package can be provided.
Features & Benefits

Lightweight
The LN1000 being constructed from stainless steel and polyurethane mouldings is extremely lightweight in comparison to conventional explosionproof and purged systems, this gives great benefits where space and payload are critical factors, especially offshore.

Fully Field Programmable
Each two way alarm card is programmable for different alarm sequences and different functionality.

Time Delays
Each alarm input has a DIL switch selectable adjustable time delay of between 3 and 30 seconds to eliminate false alarms caused, for example, by surging liquids.

System Size
Two chassis sizes are available 12way and 32way with the number of Two Channel Alarm Cards added to suit the application. Further Alarm Cards can be slotted in at a later date if necessary. Larger systems can be created by linking chassis together.

Extremely Lower Power
Even the 32 channel Annunciator complete with repeat relays on all channels can be powered from a single isolating interface. The MTL5021 is recommended.

First-Up
In alarm annunciation applications it is often essential to know which alarm occurred first in a particular group. To this end, three different first-up sequences and seven different first-up groups are available, all programmable by DIL switches.

Servicing
Because the unit is intrinsically safe, live inspection and maintenance procedures can be carried out at any time. All configuration and maintenance is carried out from the front by simply removing the front facia and withdrawing the cards.

Installation
Installation is relatively simple using intrinsically safe equipment, there is no complicated purged panels to control and no need for explosionproof conduit etc. The front of the unit is sealed to IP65 so is suitable for mounting out in the field in harsh environments.

Mounting
The standard certified product is normally supplied for panel mounting into the customers control system. As an extra service RTK can supply the Annunciator pre-mounted into a IP65 stainless steel wall mounting cabinet.

For ease of site wiring the LN1000 is then supplied pre-wired to a row of terminals ready for external connection via the bottom gland plate. Two types of wall mounting wiring are available, one with all connections taken to terminals and a lower cost version which just has the basic alarm contact and common outputs wired to terminals.

Group Outputs
The Sequence Card has outputs to drive external sounders and also two group outputs which are DIL switch selectable to follow the alarm logic or the alarm contacts. In conjunction with these group outputs each alarm channel also has two outputs configurable to follow the alarm contact, the audible or the alarm logic. These outputs can be linked to provide group relay outputs for different alarm priorities and give a control output to third party equipment in the safe or hazardous area.

Complete Alarm Package
As specialists in the supply of all types of alarm products RTK can provide all the components necessary to produce a complete alarm package or can even provide the whole package fully wired and ready to install.
The LN1000 intrinsically safe alarm annunciator functions in the same manner and with the same operational logic as conventional flashing-light alarm panels.

The system is extremely flexible. In its simplest form it consists of a 24VDC power supply, an isolating interface, and a 12 or 32 channel annunciator – shown in the diagram above.

For both large and small systems, the DA-149 Intrinsically Safe Relays are ideal for transferring signals from safe to hazardous areas or in the opposite direction or even within a hazardous area.

Additional audible and visual warning devices can be connected to provide the clearest possible method of attracting the operator’s attention.

**Optional IS Warning Devices**
For large and small systems, the 100dBA DB-5 Sounder and/or a DA135 LED Beacon can be added to attract the operator’s attention in noisy environments. Each can be driven in either of two ways:

- By controlling the 24VDC supply with a DAA149 IS Relay in the safe area (top).

**IS Interface**
The Annunciator and the optional warning devices each operate from any suitable 24VDC supply through an IS isolating interface unit. The recommended interfaces are the MTL5000 Series which, owing to their input/output isolation, do not need a high integrity earth and are therefore easy to install.

**IS Relays**
The DA-149 Series of IS Relays are used for transferring status signals to and from hazardous and safe areas. These unique solid state devices act like the coil and contacts of an electromechanical relay.

**Power Supply Units**
The RT Series Power Supplies will conveniently provide a 24VDC supply from the AC mains to power circuits protected by the MTL5000 Series units. A separate battery backup unit, the DA-161, is available for use with the RT PSU.
System Operation

Displays
The Annunciator functions in a similar manner to a conventional, safe area annunciator, but because of the limited power available the standard backlit display window is changed to a combined high brightness LED and an LCD. When an alarm occurs a sounder and/or a beacon will be activated to attract the operator’s attention. A high brightness LED on the LN1000 facia will pinpoint the affected channel(s). A customised legend gives details of the plant parameter that needs attention.
The LCD display gives further details of the alarm situation such as which alarm occurred first and whether the alarm condition has returned to normal.
The LED will always follow the ISA alarm sequence selected. The LCD display can take any of the seven forms shown, where ‘F’ indicates the first alarm to occur in that first-up group and ‘I’ shows that channel is currently inhibited. ‘N’ always indicates that the alarm contacts are in the normal (non-alarm) state.

Controls
The operator will respond to the alarm situation by pressing the appropriate pushbuttons as follows:

Silence
Silences both the local horn and any sounder connected to the EXT SOUND output. Has no effect on the visual display. This is always overridden by a new alarm.

Acknowledge
Indicates recognition of a new alarm. The exact operation of the unit will depend on the alarm sequence selected

Reset
Returns the system to normal so the next alarm that occurs will be a first-up.

Programming
Each channel of the annunciator can be programmed independently to respond in a pre-determined manner to the inputs from the alarm contacts on the plant and the operator’s pushbuttons. A range of ISA alarm sequences are supported and selected by DIL switches. The following are details of the main programmable features:

- Alarm contacts may be normally open or normally closed.
- After an alarm has been acknowledged the LN1000 may return to normal automatically as soon as the contact does so, or it may require to be reset manually.
- A 3-30 second time delay may be added to eliminate false triggering of alarms.
- Each alarm can be selected into one of seven first-up groups or no group.
- The unit can be programmed for three different first-up sequences or ringback sequence. Ringback indicates to the operator when an alarm contact has returned to the normal (non-alarm) state.
- The audible can be set to resound after a programmable time delay.
- Group Outputs and Alarm Outputs can be configured to follow the alarm logic, follow the audible or follow the alarm contacts. All these outputs can be set to drive high or low.

Test
The test pushbutton simply illuminates all LED and all LCD segments to ensure all displays are functioning correctly.

System Test
By pressing Silence and Test simultaneously the System Test function is initiated. This will simulate an alarm on all inputs to test the full operation of the complete system.

Terminals are also available for additional external pushbuttons to be connected to the Annunciator.
As a leading supplier of Alarm Annunciators and Alarm Systems, RTK Instruments is able to specify, design, manufacture and commission a complete alarm system for the client’s exact application and industry requirements.

The parts shown below detail some key components that are used in these hazardous area alarms systems but many other options are available from the range of safe and hazardous area Alarm and Display Products.

**MTL Series Intrinsically Safe Isolators**

The MTL5000 Series of Alarm/Solenoid Drivers are suitable to drive the Annunciators, Sounder, Beacons and other display devices and as they are all manufactured by RTK Instruments have the benefit of been proven together as a system with the appropriate field mounted device.

**Field or Panel Mount Intrinsically Safe Displays**

These displays can be directly connected to the field mounted transmitter or sensor and can be used to display the desired parameter but also provide an alarm input into the LN1000 to make up a complete display and alarm package.

**DA-149 Intrinsically Safe Relays**

An essential interface between safe and hazardous area equipment and different units within the hazardous area, this unique design simulates an electromechanical relay but uses only a fraction of the normal current required. The inputs and outputs are certified as equivalent to “simple apparatus” so simplifying overall system design.

**DA135 Intrinsically Safe Beacons**

Driven from the group outputs of the LN1000 these high brightness warning Beacons will attract an operator’s attention even in areas of extremely high ambient noise levels. IP65 and fully encapsulated, this rugged design is suitable for all harsh environmental conditions.

**DB5 and DB7 Intrinsically Safe Sounders**

Triggered from the LN1000 these IP65 certified Sounders with outputs greater than 100dBA. The user can select from 26 different tones.

**RT Series PSU**

A range of industrial Power Supplies to convert from various AC or DC supply voltages.

**DA-161 Battery Backup**

Can be used in conjunction with the RT Series Power Supplies.
Sequence Tables

Each alarm channel can be configured to suit the operating sequence required as listed in the ISA publication *Annunciator* Sequences and Specifications S18.1 1979 (R1985). Systems can be configured with different features on different alarm ways and there is no need to switch the power off. The diagram below shows the most commonly used sequences.

**MANUAL RESET** Sequence Code M

**AUTOMATIC RESET** Sequence Code A

**MANUAL RESET FIRST OUT WITH NO SUBSEQUENT ALARM FLASHING AND SILENCE PUSHBUTTON** Sequence F2M-1

**AUTOMATIC RESET FIRST OUT WITH FIRST OUT FLASHING AND RESET PUSHBUTTON** Sequence F3A

**AUTOMATIC RESET FIRST OUT WITH NO SUBSEQUENT ALARM STATE** Sequence F1A

**RINGBACK** Sequence Code R

(A) = A flashing

N = On when contacts in normal state

F = First-up alarm
Installation and Mechanical Details

Engraving

The legends identifying each channel are engraved on 1.6mm Traffolyte to customers requirements. They are located behind the front panel membrane and can be changed on site if necessary. The standard colour is black text on a white background but can optionally be in the following colour combinations:

- **Black** text on **orange** or **yellow** backgrounds
- **White** text on **black**, **red**, **green**, **blue** or **brown** backgrounds.

Character sizes:
- 2.8mm characters
- 4mm characters
- 6mm characters

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12-way panel mount

- Panel Cutout: 121 x 270±0.5mm
- Recommended Panel Thickness:
  - Steel: 1.6–4.0mm
  - Aluminium: 2.0–4.0mm

32-way panel mount

- Panel Cutout: 249 x 335±0.5mm
- Recommended Panel Thickness:
  - Steel: 1.6–4.0mm
  - Aluminium: 2.0–4.0mm

12-way wall mount

- Depth: 240mm

32-way wall mount

- Depth: 240mm

Cable entry at bottom
Technical Specification

Safety Description

Certification
Group II, Category 1G, EEx ia IIC T4 (Ta –20ºC to +60ºC)

Location
Equipment and related alarm contacts can be located in Zones 0, 1 or 2, Gas Group IIC, IIB or IIA, Temp Class up to T4

Certificate No.
Baseefa02ATEX0184

Safety Parameters
Ui = 30V
Ii = 165mW
Pi = 1.2W

The device can be powered from an EEx ia IIC certified interface with output parameters lower than those shown above. Please see the EC Type Certificate for all the safety parameters of the inputs and outputs

Recommended Interfaces
IS Isolators: MTL5021

Inhibits
Inputs
Each alarm channel can be individually inhibited to prevent alarms being activated.

Pushbutton Inputs
As standard four membrane pushbuttons are fitted to the front facia, however terminals are provided so remote pushbuttons can be wired into the LN1000. Pushbuttons are: Test, Acknowledge, Reset, Silence.

Outputs
Sequence Card Outputs
Ext Sound: Used to switch a DA-149 IS Relay to control external sounders

Groups: Two group outputs to drive DA-149 IS Relays. One is configurable to follow the alarm logic or alarm contacts and the second works as a reflash output which gives a 1 second pulse on the occurrence of each new alarm.

Alarm Card Outputs
Each 2 channel alarm card has two group outputs per alarm channel. These can be configured to follow the alarm logic, follow the input or follow the horn.

These outputs are ideal to drive the DA-149 IS Relays which in turn can be used to control external safe or hazardous area mounting equipment.

General

Supply
Via suitably certified isolated interface sited in the safe area; the MTL5021 is recommended.

Power requirements
18-35VDC at 75mA max into the MTL5021 interface.

EMC Compliance
Immunity to EN61000-6-2:2001
Emissions to EN61000-6-4:2001

Protection (Panel Mount)
Door to case and case to panel: IP65
Rear of enclosure: IP20

Protection (Wall Mount)
IP65

Connection
Rising clamp type terminals, for conductors up to 2.5mm²

Recommended cable
0.5 to 2.5mm² two core with earthed screen and insulated sheath

Construction
Case: Stainless steel
Front facia: High impact resistant polyurethane
Membrane: Polyester

Weight
12 way panel mount: 3.8kg
32 way panel mount: 8.0kg
12 way wall mount: 20.0kg
32 way wall mount: 44.0kg

Above is for the chassis c/w Sequence Card – add 120g for each Alarm Card required.

Order Code

LN1000 — — — —

Chassis size
12 or 32 way

Alarm channels
Number of alarm channels

Mounting
P = panel
W1 = wall mount (supply and inputs wired to terminals)
W2 = wall mount (all inputs and outputs wired to terminals)

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