



## INTRODUCTION

The objective of this leaflet is to provide additional product support information with regards to safety, legislation and general installation guidelines to ensure any risks are removed or kept to a minimum. United Automation Limited is committed to be pro- active in keeping up with all appropriate legislation related to our industry.

## LEGISLATION

### Health and Safety

Good health and safety practice should be followed such that the safety of the person(s) installing or maintaining the equipment is not compromised. The location and method of installation should not endanger others, either during or after installation.

Customers and/or installers should also be aware of health and safety legislation including the Health and Safety at Work Act 1974 (HSW 1974) and the EC “Provision and Use of Work Equipment Regulations 1992” (PUWER 1992). Both are available from the Health and Safety Executive (HSE) website, as well as other documentation.

### GENERAL

Other legislation not governed by health and safety, but relevant within our industry includes the following:-

- Restriction of hazardous substances (RoHS).
- Waste of Electrical and Electronic Equipment (WEEE).
- Registration, Evaluation, Authorisation and restriction of Chemicals (REACH)
- Appropriate installation standards the current edition of the IET wiring regulations (BS7671).

The RoHS and REACH directives are related to our products and their suppliers. Periodical reviews are undertaken for appropriate suppliers within the supply of goods chain.

The WEEE Directive applies to products directly or indirectly sold into the domestic market.

In addition there are specific directives and standards that addresses product ‘CE’ marking.

Since this legislation is continually being updated we have not referenced any specific directive. Current references to all appropriate directives and standards are readily available from the internet.

### WEEE DIRECTIVE

We are currently registered with an authority for the recycling of WEEE. Most of our product range is considered to be out of the scope to be WEEE registered. Currently the [INFRESCO product range](#) is the only product which [is registered under WEEE](#).

All product users have a duty of care as to the safe disposal of our products. They should NOT be disposed of as general waste.

For further information please contact our Quality Department and/or your appropriate Local Authority on this matter.

### CE DIRECTIVES

Generally, products sold on the European market to the end user are required to be ‘CE’ marked. These are European regulations which apply to our industry. The legislation mainly covers the equipment emissions and immunity to Radio Frequency Interference (RFI), chemical restrictions and use and various elements of safety for electrical equipment. United Automation Ltd. (UAL) opted for the self- certification method of assessment to address the wide range and variety of products supplied.

The European Community ‘CE’ Directives that concern UAL are the Low Voltage Directive (LVD) and the Electromagnetic Compliance Directive (EMC). To support these directives, further reference is made to appropriate European Harmonised Standards.

Some products may fall outside of the legislation guidelines and may not be ‘CE’ marked. For some specific products, when all appropriate legislation and standards have been reviewed and verified a Technical Construction File (TCF) is made to support a Declaration of Conformity (DoC) for ‘CE’ marking. Other products may only have a DoC (i.e. be ‘CE’ marked) to address specific chemical restrictions like RoHS.

When appropriate, a DoC may be supplied on request.

## INSTALLATION

### Torque Settings

Good working practices must be adhered to, ensuring appropriate electrical and mechanical installation. This would include the mechanical fixing of potentiometer bushes and electrical setscrew and/or pillar connections. These electrical connections and mechanical fastenings must not be over tightened. For most signal terminal connections, we would recommend a typical torque setting of 1 to 5Nm. For specific product information, see appropriate product datasheet, and/or specification sheet where applicable (*see also MAINTENANCE section page 2*).



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## Temperature Humidity & Cooling

### Temperature

Operating temperatures - Most products are specified a maximum working operating temperature in their Product technical data.

Storage temperatures - Some products are specified a maximum working storage temperature in their Product technical data.

### Humidity

Many electronic devices have humidity specifications, for example, 5% to 45% RH.

High humidity can cause corrosion to component parts and the PCB, which may cause failure. Furthermore, at the top end of the range, moisture may increase the conductivity of permeable insulators leading to malfunction. Too low humidity may make materials brittle. A particular danger to electronic items, regardless of the stated operating humidity range, is condensation. When an electronic item is moved from a cold place (e.g. icy weather) to a warm humid place (e.g. heated house), condensation may coat circuit boards and other insulators, leading to short circuit inside the equipment. Such short circuits may cause substantial permanent damage if the equipment is powered on before the condensation has evaporated.

In contrast, a very low humidity level favours the build-up of static electricity, which may result in spontaneous shutdown of electronic circuitry when discharges occur. Apart from spurious erratic function, electrostatic discharges (ESD) can cause dielectric breakdown in solid state devices, resulting in irreversible damage.

It is therefore good practice in critical system installations to monitor relative humidity levels for these reasons.

A few products are specified a maximum working relative humidity (RH) in their Product technical data.

Moisture sensitivity level (MSL) - relates to the packaging and handling precautions for some semiconductors. The MSL is an electronic standard for the time period in which a moisture sensitive device can be exposed to ambient room conditions (approximately 30 C @ 60%RH).

### Cooling

In electronics, power semiconductor devices have a maximum power dissipation rating usually quoted at a case temperature of 25 C (77°F). The datasheet for the device also includes a 'derating curve' which indicates how much a device will dissipate without getting damaged at any given case temperature and this must be taken into account while designing a system.

As can be seen from the derating curve image for a hypothetical 'bipolar junction transistor' (fig.1), the device (rated for 100W at 25°C (77°F)) cannot be expected to dissipate anything more than about 40W if the ambient temperature is such that the temperature at which the device's case will stabilise (after 'heat-sinking') is 65°C (149°F). This final case temperature is a function of the 'thermal resistance' between the device's case and the heat-sink; and the heat-sink and the ambient (this includes the heat-sink's temp/watt rating [°C/W] - with lower values implying better cooling characteristics).

In some capacitors, voltage capability is reduced at higher temperatures because the softened dielectric (e.g., a polymer) is softened by the heat and its breakdown field strength is reduced. In this instance, derating curves would be included in data sheets for this type of capacitor.

Derating can also be used to provide a safety margin for transient voltages or currents (spikes) that exceed normal operation, or simply to prolong life. For example, the life of electrolytic capacitors is dramatically increased by operating them below their maximum temperature rating.

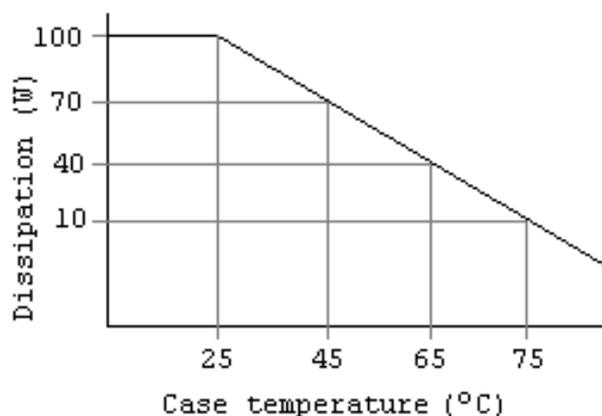


Fig.1 Typical (hypothetical) De-rating curve.



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# X10255 – Safety Regulations & Advice Guidelines (SRA)



UAL manufacture and use a wide range of discrete power semiconductors, which under load conditions may generate excessive heat.

We therefore recommend some form of cooling or additional cooling for high power rated products.

The use of an additional heatsink (this could be a conductive panel) suitably attached or mounted with the unit, will help to dissipate heat away from the device. An alternative or additional method is forced air- cooling (i.e. using a fan), to assist the natural convection of airflow over an existing heatsink within the unit. The product fins should be mounted in line with the forced and/or natural airflow.

The equipment's environment and its initial ambient temperature also need to be considered, as this could have an adverse effect on the overall operating conditions.

Some equipment may have de- rating curves (as above), which will help and support the equipment installation.

## Shock & Vibration Limits

Generally, the products manufactured by UAL, when used by themselves, do not generate vibrations as such as to cause any danger or harm and are therefore a very low risk to occupational health or injury.

However, under much available legislation guidelines, indirect shock and vibration limits should be considered when a product is being installed and/or commissioned, as a component into a complete installation design.

Some HSE health and safety guidelines include:-

- HSE - Advice - control of vibration at work regulations 2005 (indg242).
- HSE - Vibration solutions guide [Ed.1, 1997] (hsg170).
- HSE - Vibration calculations guide (Ver.1.06, Mar 2006) (wbv).

Further industry standards should be considered during product installation and commissioning:-

Statutory Instruments guide

- (SI 227: 2015) - The control of noise (Code of Practice for Construction and Open Sites) (England) Order.

British Standards guides

Code of practice for noise and vibration control on construction and open sites:-

- BS 5228-1:2009 +A1:2014 – Noise.
  - Recommends basic methods to control noise on construction and open sites with significant noise levels arising from work activities/operations. Concentrating on predicting and measuring noise and impact assessments for those exposed to it.
- BS 5228-2:2009 +A1:2014 – Vibration.
  - Recommends basic methods to control vibration on construction and open sites with significant vibration levels arising from work activities/operations. Concentrating on measuring vibration and assessing environmental effects.

## Fusing

We recommend that semiconductor, fast- acting (to BS88 IEC 269) type fuses or circuit breakers (Semiconductor - MCB) should be used for unit and/or device protection. The appropriate maximum load current should be known to select the required SCR fuse or MCB, but must not exceed the equipment rating. The I<sup>2</sup>t (A<sup>2</sup>s) rating of the selected fuse, must be less than that of the equipment so as to protect the equipment's discrete device. Further appropriate fusing may be required for protection of the unit supply using standard fuse links and holders. Failure to address these requirements and the use of incorrectly selected fuses may cause the equipment to fail.

## Earth Bonding

The protective conductor terminal of the equipment must be utilised at all times and bonded to a 'good earth' (ground). The earth bonding (strapping) leads of any combined equipment should be as short as possible and be substantial, i.e. at least rated higher than the equipment's load. For further information, refer to BS7671 (see *MAINTENANCE below*). Following these simple guidelines will ensure optimum use of any appropriate filter circuits, which may be required.

## Insulation and Protection from Electric Shock

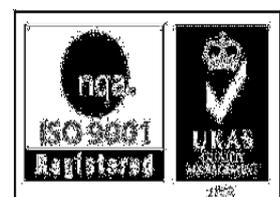
All equipment, unless otherwise stated, is rated to CLASS II insulation (over- voltage category) and CLASS I (protection category). For specific insulation test voltage ratings, see equipment datasheet.



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## Connections

Polarity sensitive equipment - care should be taken to ensure that any positive and negative connections are correctly connected prior to switching on the equipment. Failure to do so may cause damage to internal circuitry.

Phase sensitive equipment - care should be taken to ensure that the supply is correctly connected. For single phase this is LIVE/NEUTRAL, for three phase and phase-to-phase supplies, this is BROWN/BLACK/GREY by rotation. Some firing circuit equipment detects and corrects this error automatically. This function is identified in their product specifications.

## MAINTENANCE

### Overview

We recommend that installation and maintenance of all United Automation Limited equipment should be done with reference to the current edition of the IET wiring regulations (BS7671), by suitably qualified/trained personnel. The regulations contain important requirements regarding safety of electrical equipment within the UK. For International Standards refer to IEC Directive IEC 950.

Electronic equipment has few mechanical moving parts and is therefore, inherently, very reliable. Before any servicing is carried out, reference should be made to appropriate installation instructions, drawings and labelling which may come with the equipment. Personnel should switch off the unit supply before accessing or removing any safety cover and be aware of hazardous live parts.

### General Checks (weekly/monthly/annually)

Periodic checks should be built in to a maintenance programme. We would recommend that this is undertaken at least annually. Checks should include the following:

- Moving parts – ensure good working order and free movement, check product life cycle.
- Vents/louvers – clean, free of blockages.
- Signs of corrosion – inspect areas that may be susceptible.
- Electrical connections – ensure all connections are suitably tightened to any appropriate torque settings (refer to EN60 947 for verification of mechanical stability of screw connections).

## SAFETY

### Functional Safety

Built-in instrumented safety systems are widely used in industrial applications where there is threat to life or environment, should something go wrong.

When designing, manufacturing and commissioning products and systems into installations, it is good practice to consider 'failsafe conditions'. The safety related applications The IEC 61508 standard – 'Functional safety of electrical/electronic/programmable electronic safety-related systems' provides suitable and sufficient guidelines to reduce the risks.

We would recommend that this risk process is followed before during and after a complete installation is being commissioned.

#### Examples for the HEVAC product range

The environment maximum working ambient of 40°C should not be exceeded. Where necessary, control panels & enclosures should be ventilated with a fan.

The units must be earthed. A protective earth connection is provided in the main terminal connections.

Load cables must be sized such that they are rated in excess of the HS fuse rating.

The 3-phase PR3-series of (HVAC) products are designed for resistive-type (heater) loads in 'star' or 'delta' wiring configurations.

A load break switch and a contact breaker should be installed in the load supply. The supply to the contactor coil **should be interrupted** by an over-temperature thermostat located in the heater battery and also upon detection of airflow loss.



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