

DFMC36 Driver Module

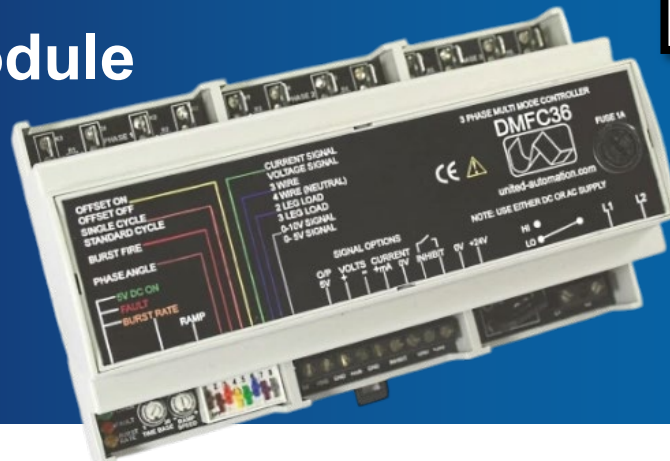
110/230v, 440v, 380/500v, 400/500v
Advanced Three-Phase Thyristor Control

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KEY FEATURES:

- ✓ **Dual Control Modes:** Select between phase angle and burst fire (Single-Cycle/Dual-Cycle & adjustable Burst Firing).
- ✓ **Soft Start:** Adjustable ramp speed (0-30 seconds) for smooth power application.
- ✓ **Wide Control Options:** Compatible with 0-5V, 0-10V, 1-5V, 2-10V, 0-20mA, 4-20mA signals, and manual potentiometer input.
- ✓ **Auto Phase-Rotation Detection:** Ensures correct phase alignment and operation.
- ✓ **On-Board Protection:** Integrated fuse and LED indicators for power, burst rates, and fault conditions.
- ✓ Standard DIN Rail Mounting.
- ✓ Isolated Pulse Transformer Outputs.

APPLICATIONS:

The **DFMC36 Driver Module** is ideal for:

- Industrial Heating
- AC Motor Control.
- Power Supplies & Rectifiers
- Electroplating
- Transformer Management
- Soft Starters

The **DFMC36 Driver Module** is a versatile, microprocessor-based power controller designed for precise control of three-phase thyristor assemblies driving resistive loads. Offering both phase angle and burst fire control, the DFMC36 provides reliable and efficient power regulation in a wide range of industrial applications. With features like auto phase rotation detection, selectable control modes, and on-board indication of power, burst rates, and fault conditions, this module ensures smooth and consistent operation even in challenging environments.

The **DFMC36 Driver Module** is the perfect solution for industries requiring precise, reliable control over three-phase power systems, providing a seamless integration of power management with easy installation and versatile functionality.

TECHNICAL SPECIFICATIONS

| | |
|------------------------------------|--|
| Standard Supply voltage | 420/460 VAC selectable via LINK J1 (other supply voltages available) |
| Supply Frequency | 50/60 Hz |
| Auxiliary Supply Voltage | 24V AC/DC (500mA minimum) |
| Power Consumption | 7VA |
| Internal Fusing | 1 Amp 32mm fuse |
| Protection Rating | IP20 |
| Operation Temperature Range | 0-65°C |
| Input Signal Options | 0-5VDC, 0-10VDC, 1-5VDC, 2-10VDC, 0-20mA, 4-20mA, Manual Potentiometer |
| Output Specification | Pulse transformer picket-fence 25kHz pulse output. Initial pulse 500mA & Sustaining pulses of 250mA |
| Output Isolation | 3.5KV |
| Soft Start (Ramp Speed) | 0-30 Seconds (adjustable) |
| STD Burst-Fire Cycle Time | Minimum 1s to Maximum 30s variable. Selectable via switch SW1 |
| Rapid Burst-Fire Cycle Time | Single-Cycle/Dual-Cycle variable time base, selectable via switch SW1 |
| Green LED Indicator | Power ON, indicating when 5 VDC is present |
| Red LED Indicator | LED ON continuously indicates phase loss between K2 phase 1 & K2 phase 2. LED slow flashing indicates no current control signal (4-20mA) LED fast flashing indicates incompatible 2-Leg control & 4-Wire load selected |
| Yellow LED Indicator | Burst-Rate indicator, mimics the output burst-rate |
| Safety Standards | Complies with European Low Voltage Directive & major international standards |
| Weight | Complete unit weight – 500g approx. |

YOU MUST READ THIS BEFORE INSTALLATION

|  ELECTRICAL SAFETY |  INSTALLATION REQUIREMENTS |  USER RESTRICTIONS |  USAGE ENVIRONMENT |  HOT SURFACE WARNING |
|---|---|--|---|--|
| WARNING: RISK OF ELECTRIC SHOCK Always consult the Installation & Maintenance Instructions before connecting this product to the power supply. WARNING: Disconnect Power Before Servicing Ensure the electrical supply is safely disconnected before connecting to any supply, load, or control terminals. | WARNING: Installation by Qualified Personnel Only This product must only be installed or fitted by a competent, qualified installer familiar with the relevant electrical standards and installation practices. | WARNING: Not for Use by Vulnerable Individuals This product is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or instructed by a person responsible for their safety. | WARNING: Industrial Use Only This is an industrial-grade product and is not intended for household use. | WARNING: Hot Surfaces On certain models, surfaces marked with this symbol become hot during use. Avoid direct contact and follow all thermal safety precautions. |

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TERMINALS & CONNECTIONS

| Terminal | Function | Notes |
|--|---|--|
| 9-way terminal block reading left - right | | |
| 1 | 5V DC output (50mA max) | This supply is used to feed 5VDC to the clockwise end of the manual control potentiometer or auxiliary circuit |
| 2 | +VE voltage control signal input | +VE control signal input from the temperature controller or connect to the counter-clockwise end of the manual control potentiometer |
| 3 | Ground/0V (-VE) voltage control signal input | -VE control signal input from temperature controller or connect to the counter-clockwise end of the manual control potentiometer |
| 4 | +VE current signal input | +VE current signal input (0-20mA or 4-20mA) |
| 5 | Ground/0V | -VE current signal input (0-20mA or 4-20mA) |
| 6,7 | INHIBIT | CLOSE contacts to DISABLE (shut down) the controller OPEN contacts to ENABLE the controller |
| 8 | Common 0V line | External -VE 24VDC supply (only required if supply to L1 and L2 are not being used) |
| 9 | +24V AC or DC input | External +VE 24VDC supply (only required if supply to L1 and L2 are not being used) |
| Additional Connections | | |
| HI/LO | High/Low Jumper Link | Select High or Low supply voltage range |
| L1 & L2 | AC Supply input (use any two phases or phase and neutral) | AC supply only required if 24VDC supply to terminals 8 & 9 are not being used |
| G1 & K1 G2 & K2 | Output connections to thyristors | Timing reference inputs from K1 of phase 1 and K1 of phase 2 are taken from here |

6-WAY DIP SWITCH SETTINGS

| Switch | Position | Function/Action |
|--------|----------|--|
| Brown | ON – 1 | Phase Angle Enabled |
| | OFF – 0 | Phase Angle Disabled |
| Red | ON – 1 | Burst Fire Enabled |
| | OFF – 0 | Burst Fire Disabled |
| Orange | ON – 1 | VR1 clockwise → Dual Cycle VR1 Anticlockwise → Single Cycle |
| | OFF – 0 | Variable burst rate set by VR1 (time base 1 to 30 seconds) |
| Yellow | ON – 1 | Sets an offset of 20% (used for control signals which do not start from 0, e.g., 1-5V, 2-10V & 4-20mA) |
| | OFF – 0 | No offset applied (used for control signals which start from 0 e.g., 0-5V, 0-10V & 0-20mA) |
| Green | ON – 1 | Current control signal enabled |
| | OFF – 0 | Voltage control signal enabled |
| Blue | ON – 1 | Setting for a 3-wire configured load (closed-delta or floating star), where there is no neutral connection |
| | OFF – 0 | Setting for a 4-wire configured load (star to neutral), where there is a neutral connection to the star point. Note: green switch must be in the OFF position for this function |
| Purple | ON – 1 | Setting to control 2 limbs (L1 & L2) and L3 is connected directly to the load Note: neutral must not be connected in this configuration |
| | OFF – 0 | Setting to control all 3 limbs of a three-phase load. The star point may be either floating or connected to neutral |
| Grey | ON – 1 | Setting for 0-10VDC control signals |
| | OFF – 0 | Setting for 0-5VDC control signals (& manual control – using a 5K potentiometer) |



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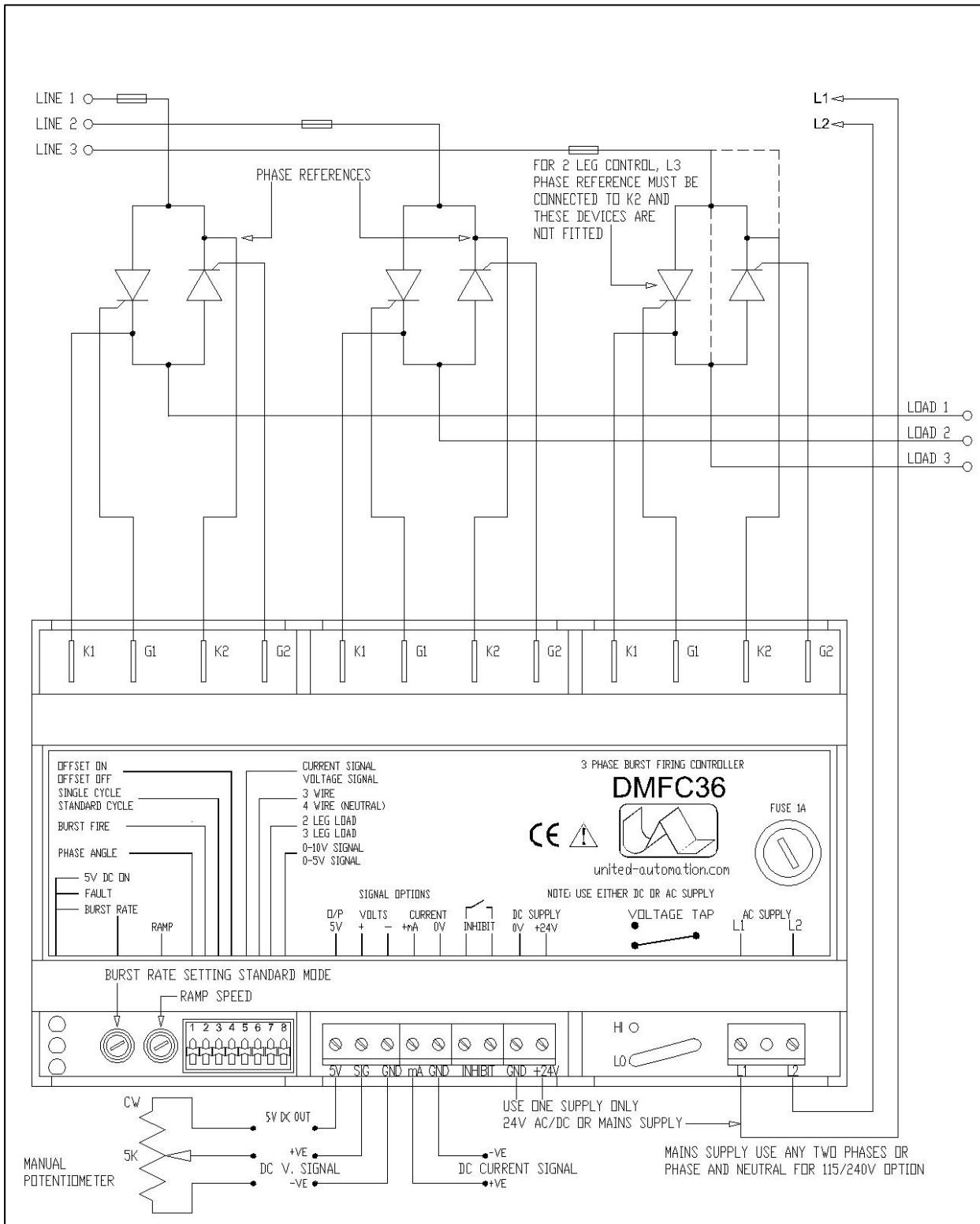


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WIRING DIAGRAM (THYRISTOR CONNECTIONS)



Note: For 2-leg (2/3rd) control, L3 phase reference must be connected to Phase-3, K2.

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WIRING DIAGRAM (THYRISTOR CONNECTIONS)

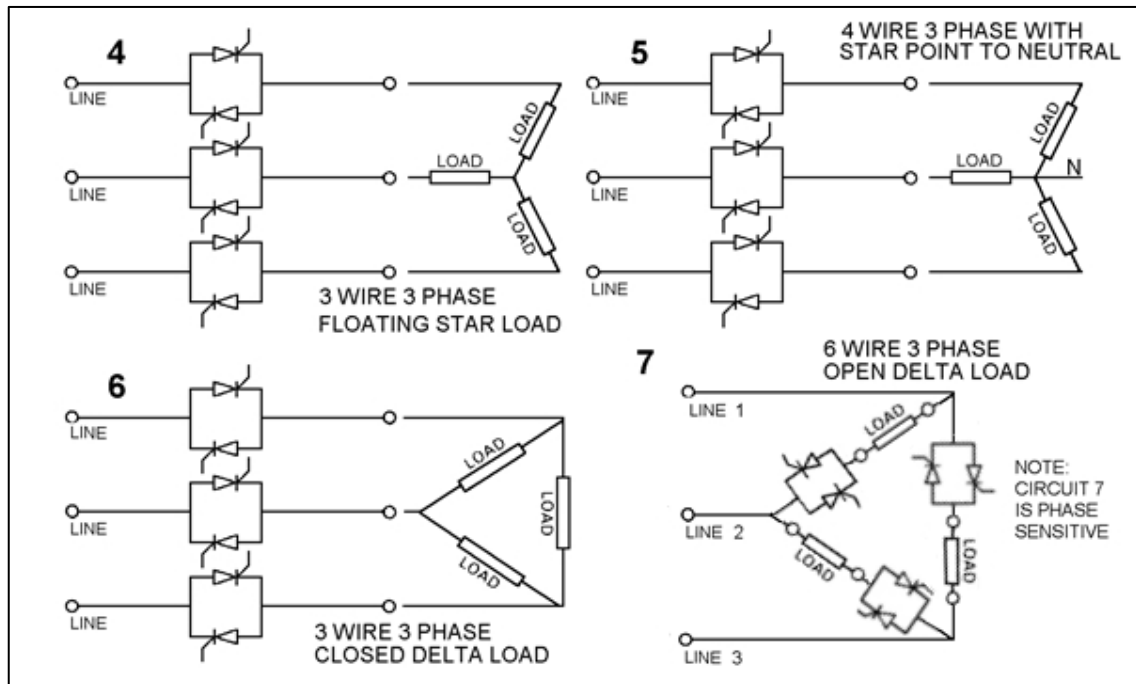


Figure 1: Typical 3-phase, 3-wire, 4-wire & 6-wire Load Configurations (All three phases switched)

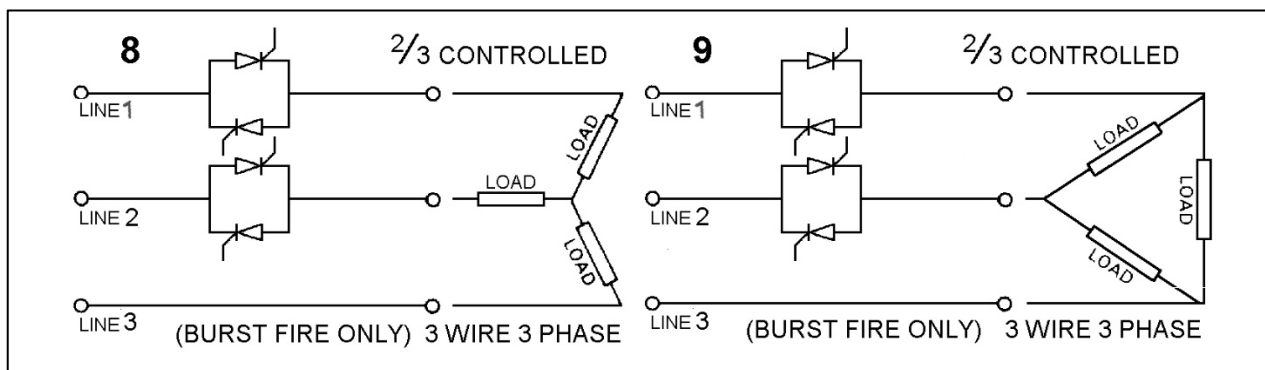


Figure 2: Typical 3-phase, 3-wire Load Configurations (only two of three phases switched) Burst-Fire mode only

MOUNTING

The unit should be installed on a TS35 DIN Rail via the DIN clip on the base of the control module

TERMINAL CONNECTIONS

Connections are made to the above terminals which will accept wires up to 1.5mm² cross section. The use of screened cable is not usually necessary for control signal wiring within a panel.

Normal precautions should be taken to keep signal wiring away from power cables, in particular avoid running signal cables parallel to power cables in the same trunking. See ITA datasheet for more information.

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PHASE REFERENCE

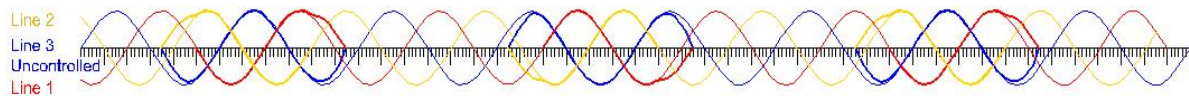
The phase references, for the zero-voltage detection circuit is taken from both of the K1 connections of PHASE 1 and PHASE 2, this phase reference is provided by the Cathode connections of the thyristor modules, so the correct orientation of the thyristor modules is required see the schematic diagram. If the line supply to either of these phases is not present the Red LED will be on continuously and the output drive will be inhibited until the supply to these phases is reinstated.

WAVEFORMS (TYPICAL FOR SINGLE-CYCLE & DUAL-CYCLE SWITCHING)

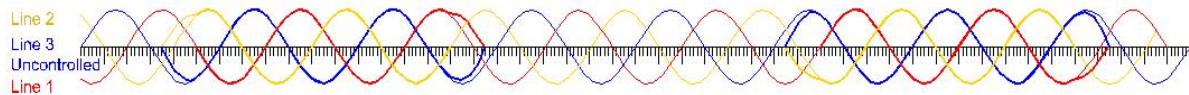
The following diagrams show representations of voltage waveforms for Burst-Fire (Single-Cycle & Dual-Cycle switching) operation. The heavily outlined portion of the sinusoidal train indicates when the thyristors are switched on, and the lighter portion indicates when they are off. The waveforms show zero voltage (and thus current) switch on, and zero current switch off.

A more comprehensive set of waveforms and Harmonics information is available in a separate appendix document Ref: X10789.

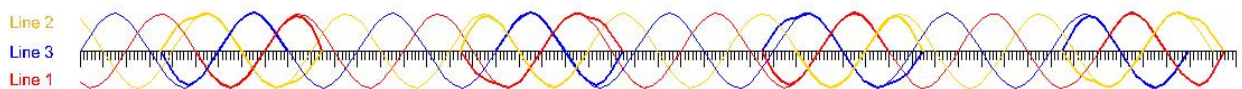
Single cycle fast burst 50% setting 2 leg control



Dual cycle fast burst 50% setting 2 leg control



Single cycle fast burst 50% setting 3 leg control 3 wire load



Single cycle fast burst 50% setting 3 leg control 4 wire load

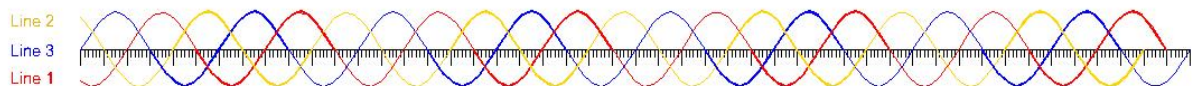


Figure 3: Voltage Waveforms

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EMC STANDARDS

Complies with the European EMC Directive for operation in an industrial environment. The following standards have been applied in whole or in part in the design of this controller:

- EN61010-1
- EN61000-6-2
- EN 50 081 part 2

PHYSICAL DIMENSIONS

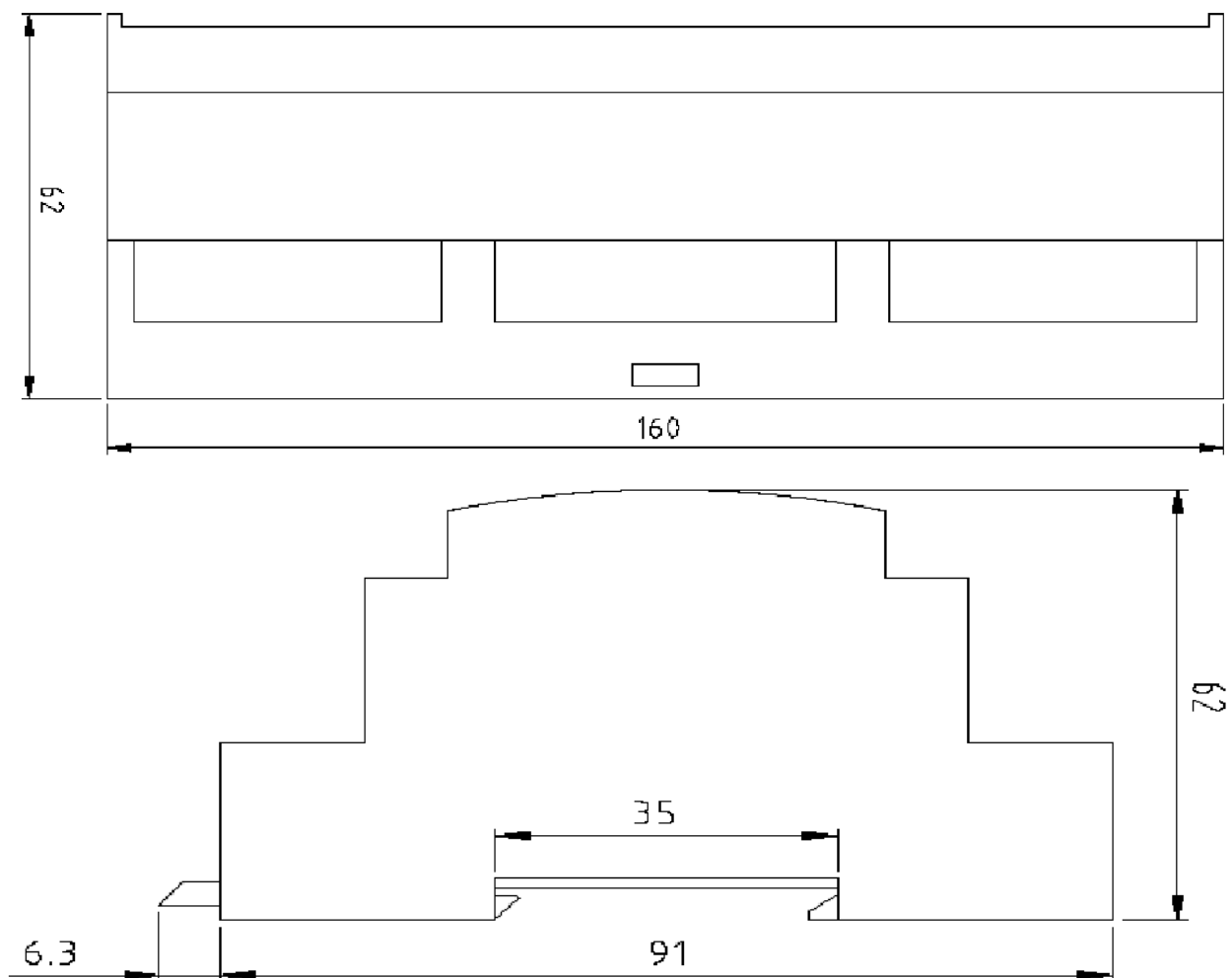


Figure 4: Overall Dimensions

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PRODUCT FUNCTION & APPLICATION

The DMFC36 offers Phase Angle, Burst-Fire or Single-Cycle/Dual-Cycle (Rapid Burst Firing) control where minimum fluctuation in heater element temperature is required. This type of Rapid Burst Fire is useful if a system has a high impedance supply as a result of long power leads or if the system is powered by a generator set. Normally this can result in the supply being subject to mains dips, but this option minimises the 'Flicker' effect on the mains supply. Another benefit of using this type of control is that you avoid high 'Harmonic Distortion' normally associated with phase angle control, typically down to levels of below 4%.

The DMFC36 can be started in phase angle mode and switch to burst mode when the control signal ramps up to the set point. It will stay in the burst mode even if the signal drops below the set point. It will restart in phase angle mode when the unit is switched off or reset.

A typical application for this module would be for a three-phase thyristor controller for connection to a heater load to regulate its power.

RECOMMENDATIONS

DOCUMENTS

Other documents available on request, which may be appropriate for your application:

| Code | Identity | Description |
|---------------|----------|---|
| X10772 | 3-RFI | Filter recommendation – Addressing the EMC directive |
| X10213 | ITA | Interaction – uses for phase angle and for burst-fire control |
| X10255 | SRA | Safety requirements – addressing the Low Voltage Directive (LVD) including thermal data/cooling, live parts warning, earthing requirements & fusing recommendations |
| X10322 | APC | Applications Circuits |
| X10789 | WAV | Single or Dual cycle waveforms & harmonics data |

It is recommended that installation and maintenance of this equipment should be carried out by suitably qualified personnel with reference to the current edition of the I.E.E. wiring regulations (BS7671). The regulations contain important requirements regarding the safety of electrical equipment. For International Standards, refer to I.E.C./ Directive IEC 950.

OPTIONAL EXTRAS

| Product Code | Product Description |
|----------------|--|
| A403001 | Manual (5K) Potentiometer Knob and Leads |

PRODUCT CODE AND RELATED PRODUCT CODE

| Product Code | Product Description |
|---------------|--|
| A35471 | DMFC36 Driver Module Supply 440V, Mains 360-500V |
| A34573 | DMFC36 (380/500V) 24V AC/DC Driver Mod c/w DIN Housing |
| A34583 | DMFC36 Driver Module Supply 110-230V, Mains 230V |
| A34585 | DMFC36 Driver Module Supply 400-500V, Mains 360-500V |



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