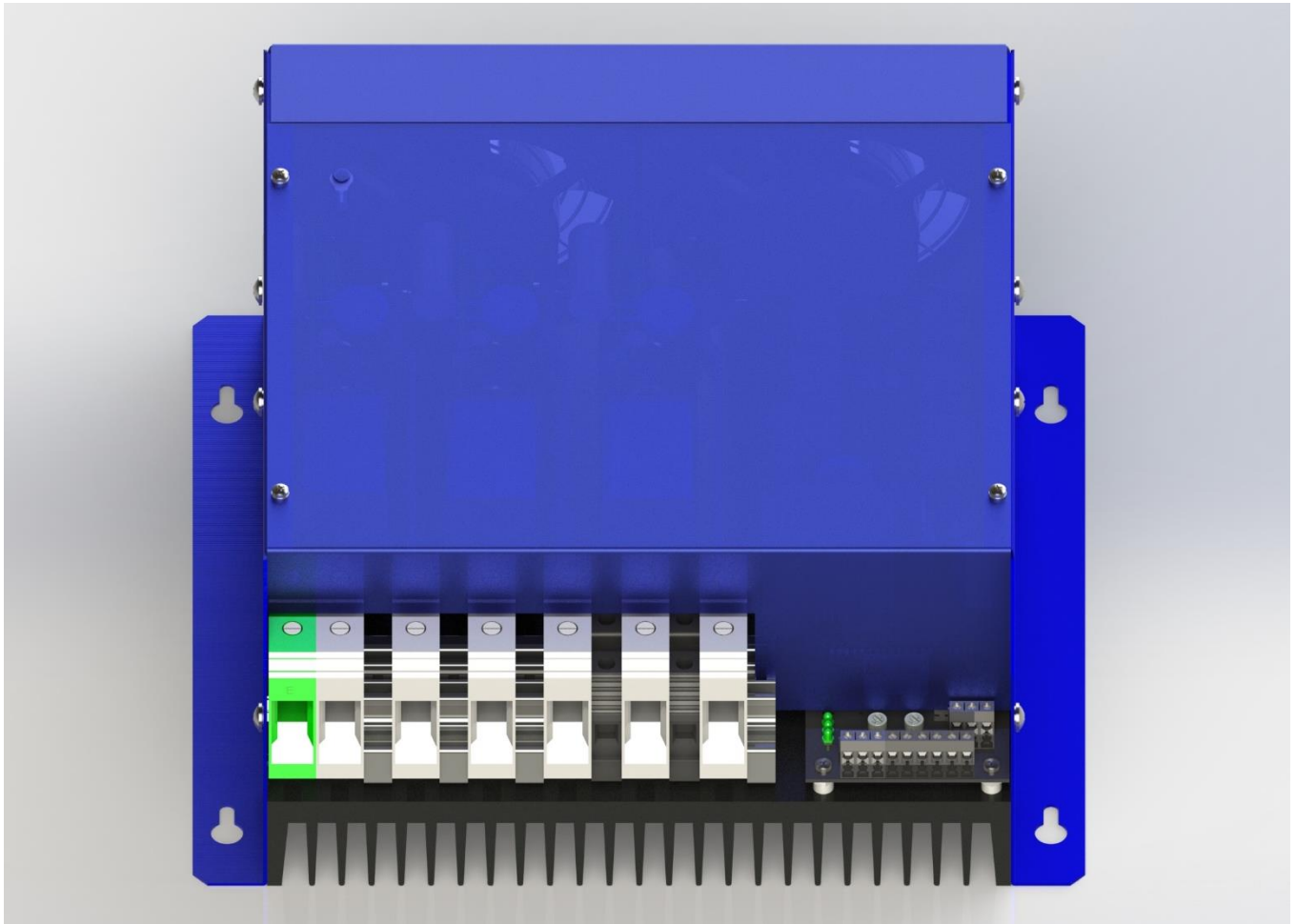


DMPR3 86kW  
3-Phase Dual Mode Power Controller  
X20121



**united  
automation**

# X20121 – DMPR3 86kW Instruction Manual

## Three Phase Dual Mode Power Controller

### Issue 4



## Contents

|     |                                |   |
|-----|--------------------------------|---|
| 1   | Introduction .....             | 3 |
| 2   | Applications .....             | 3 |
| 3   | Function/Troubleshooting ..... | 3 |
| 4   | Control Options Guide .....    | 4 |
| 5   | Installation .....             | 5 |
| 5.1 | Load Considerations .....      | 5 |
| 5.2 | Connections.....               | 5 |
| 5.3 | Power Supply.....              | 5 |
| 5.4 | Fusing .....                   | 5 |
| 5.5 | CE Marking .....               | 5 |
| 6   | Specifications .....           | 6 |
| 7   | Safety Warnings .....          | 6 |
| 8   | Recommendations .....          | 6 |
| 9   | Note .....                     | 6 |
| 10  | Order Details .....            | 6 |



## UNITED AUTOMATION LTD

Southport Business Park  
Wight Moss Way  
Southport, PR8 4HQ  
ENGLAND

Tel: 0044 (0) 1704 – 516500  
enquiries@united-automation.com  
www.united-automation.com

unitedautomationltd

UA\_Limited



# X20121 – DMPR3 86kW Instruction Manual

## Three Phase Dual Mode Power Controller

### Issue 4



#### 1 Introduction

The complete enclosed three phase Dual Mode Power Regulator (DMPR3) thyristor assembly provides control of inductive/resistive loads of up to 86 kW at 415V. The user selectable control modes, via the internal switches, are either phase- angle, burst-firing, or a combination of the two i.e., start up in phase angle and then continue in burst firing. The Single-Cycle & Dual-Cycle options offer the fastest burst rates possible, providing very accurate control and minimising Harmonic Distortion & Flicker within the system. In addition, the standard variable burst rate, adjustable from 1 to 30 seconds, is also available. There is a number of signal control options to meet most of the standard industrial requirements. All are housed in bespoke enclosures and have easy access to control signal & power terminals to aid installation. Semiconductor fuses and a heatsink with cooling fans. The controller offers a solution for many applications requiring single or dual mode control.

#### 2 Applications

Suitable for:

- Furnaces
- Ovens
- Dryers
- Air curtains
- Hot plates
- Many other heating and ventilation applications
- Also suitable for inductive loads such as transformers

#### 3 Function/Troubleshooting

| Condition                                    | Description                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Trip/Inhibit Input</b>                    | This input should be driven by a volt free contact. When the contact is closed, the power to the load will be disconnected, the relay changes state and the alarm LED will be illuminated for as long as the inhibit input is closed                                                              |
| <b>Over Temperature Protection</b>           | When a heatsink temperature of over 90°C is detected by the sensor, the alarm relay changes state, and the alarm LED will flash alternatively every half second. The power to the load will be disconnected and will not be re-enabled until the heatsink temperature drops to approximately 85°C |
| <b>Phase Loss with Auxiliary Supply Only</b> | When any one of the three phase inputs are not present the relay changes state and will not be re-enabled until a current of voltage signal is detected, the alarm LED will pulse ON/OFF every two seconds and the alarm relay state changes                                                      |
| <b>Offset Failure</b>                        | If there is no current signal (4-20mA), power to the load will be disconnected and will not be re-enabled until a current or voltage signal is detected, the Alarm LED will pulse ON/OFF every two seconds and the alarm relay state changes.                                                     |
| <b>Mode Mismatch</b>                         | If an incompatible mode has been selected, the Alarm LED will pulse ON/OFF every quarter second and the alarm relay state changes.                                                                                                                                                                |
| <b>Alarm Relay Fault Indication</b>          | The alarm relay will be de-energised with no fault present and hence the NO contact will be open and dis-connected from the COM terminal, the relay state toggles when an alarm condition is detected.                                                                                            |
| <b>Remote Supply</b>                         | If there is a requirement for the alarm relay and Alarm LED to energise when a phase fault condition occurs an external 24V dc supply should be used.                                                                                                                                             |



### UNITED AUTOMATION LTD

Southport Business Park  
Wight Moss Way  
Southport, PR8 4HQ  
ENGLAND

Tel: 0044 (0) 1704 – 516500  
enquiries@united-automation.com  
www.united-automation.com  
unitedautomationltd UA\_Limited



Page 3 of 7  
Issue: 4

Date: 21, September 2022

# X20121 – DMPR3 86kW Instruction Manual

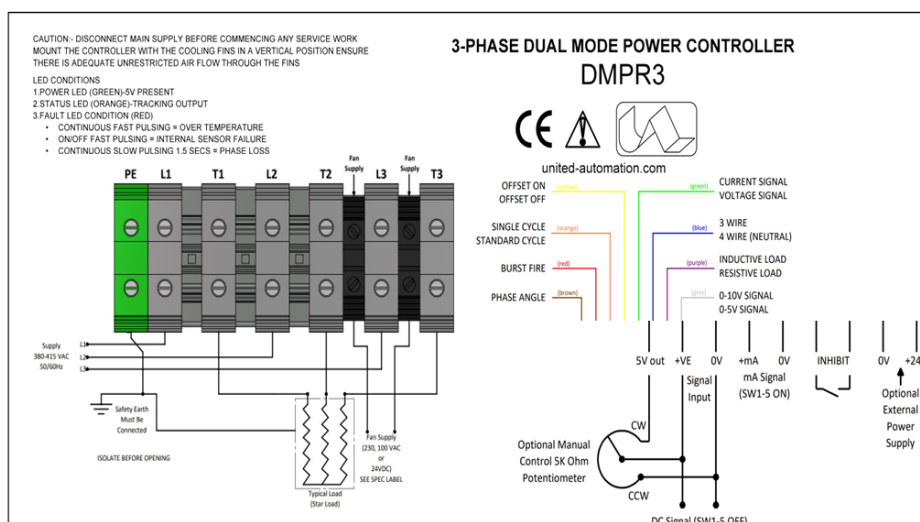
## Three Phase Dual Mode Power Controller

### Issue 4



#### 4 Control Options Guide

| Description                         | Switch                       | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase Angle Option                  | SW1-1 – Brown                | When this switch is ON, the output is enabled to phase angle mode. The ramp speed is set by VR2 (0-30 Secs). The Status LED will proportionally increase in brightness as the control input signal is increased.                                                                                                                                                                                                                                                                                                                                       |
| Burst Firing Option                 | SW1-2 – Red                  | When this switch is ON, the output is enabled in burst fire mode. The Status LED will mimic the output pulses to the load as the control input signal is increased.                                                                                                                                                                                                                                                                                                                                                                                    |
| Phase-Angle to Burst-Firing Control | SW1-1 – Brown<br>SW1-2 – Red | The switch marked SW1-1 and SW1-2 should be switched to the ON position. The firing circuit will start 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.                                                                                                                                                                                        |
| Rapid Burst Fire                    | SW1-3 – Orange               | When switch SW1-3 is in the OFF position, standard burst fire is used. When in standard burst fire mode, the TIME BASE trimmer (VR1) is used to set the time base. The time base is the ON/OFF cycle time, this is variable from 1-30 seconds. When switch SW1-3 is in the ON position, rapid burst fire mode is selected. Two types of rapid burst fire are supported, single and dual cycle. Single cycle is selected when Burst Rate trimmer (VR1) is fully anticlockwise. Dual cycle is selected when Burst Rate trimmer (VR1) is fully clockwise. |
| Offset Option                       | SW1-4 – Yellow               | When SW1-4 is in the off position no offset is selected for the voltage and current input control signals. When SW1-4 is in the ON position an offset is introduced, this option is selected for 1-5V, 2-10V and 4-20mA control signals.                                                                                                                                                                                                                                                                                                               |
| Voltage or Current Option           | SW1-5 – Green                | When switch SW1-5 is in the OFF position this selects a voltage control input signal (0-5V, 1-5V, 0-10V, 2-10V).<br>When switch SW1-5 is in the ON position this selects a current control signal (0-20mA, 4-20mA)                                                                                                                                                                                                                                                                                                                                     |
| 3-wire or 4-wire                    | SW1-6 – Blue                 | When switch SW1-6 is in the ON position the controller is set for a 3-Wire configured load (Closed-Delta or Floating-Star), where there is no Neutral connection. When switch SW1-6 is in the OFF-position controller is set for 4-Wire configured load (Star to Neutral), where there is a Neutral connection to the Star Point.                                                                                                                                                                                                                      |
| Inductive Load                      | SW1-7 – Purple               | When switch SW1-7 in the OFF position, the firing circuit is configured to control resistive and some slightly inductive loads.<br>When switch SW1-7 is in the ON position, the firing circuit should be used on inductive (transformer and coil) type loads.                                                                                                                                                                                                                                                                                          |
| 0-5V/0-10V Signal Option            | SW1-8 – Grey                 | When switch SW1-8 is in the OFF position the control voltage is selected to be 0-5V<br>When switch SW1-8 is in the ON position the control voltage range is selected to be 0-10V or 1-10V, depending on the Offset Option switch (SW1-4).                                                                                                                                                                                                                                                                                                              |



## UNITED AUTOMATION LTD

Southport Business Park  
Wight Moss Way  
Southport, PR8 4HQ  
ENGLAND

Tel: 0044 (0) 1704 – 516500  
enquiries@united-automation.com  
www.united-automation.com  
unitedautomationltd UA\_Limited



Page 4 of 7  
Issue: 4  
Date: 21, September 2022

# X20121 – DMPR3 86kW Instruction Manual

## Three Phase Dual Mode Power Controller

### Issue 4



#### 5 Installation

This robust stack assembly will operate in an ambient temperature of up to 40°C when naturally cooled and has a built-in 90°C, over temperature trip on the heatsink as a safety feature. The unit should be mounted vertically, with heatsink fins top to bottom and with sufficient surrounding air space to maximise natural convection cooling. If the unit is mounted in an enclosure or cabinet, adequate ventilation and/or forced air-cooling should be fitted.

##### 5.1 Load Considerations

It is always advisable to indicate the type of load when ordering. For industrial reliability, based on long experience, the DMPR range has considerable current overload capacity on the power devices used. The rated currents are maximum continuous rms values for use within the temperature guidelines as shown in the table below.

Unusual heating loads such as molybdenum, platinum or tungsten have a typical 10 to 1, hot to cold, resistance ratio and therefore, when cold, draw larger currents than normal. Transformers and other inductive loads have surge-starting currents and require the correct type of phase angle firing circuit. These and similar types of surge loads should be indicated, so that appropriate slow start or larger rated units can be correctly supplied for the specific needs.

##### 5.2 Connections

This unit has simple clamp type connectors for all auxiliary-wiring requirements.

##### 5.3 Power Supply

Three-way internal jumper J1 selects the internal power supply input voltage to either 420v or 460v ac rms, phase to phase. If the jumper link is fitted across HI-COM, 460v is selected with the jumper link fitted across COM-LO, 420v is selected. The jumper header is labelled as shown below:



For operation with an external power supply the jumper link should be removed from J1.

##### 5.4 Fusing

It is recommended that high speed semiconductor type fuses (as supplied) be used for protection. See SRA Data sheet X10255 for further information. Other external supplies should be fused accordingly.

##### 5.5 CE Marking

This family carries a “CE” marking, in burst fire mode the controllers do not normally require a remote filter. For more information contact our sales desk. A Declaration of Conformity is available on request.



## UNITED AUTOMATION LTD

Southport Business Park  
Wight Moss Way  
Southport, PR8 4HQ  
ENGLAND

Tel: 0044 (0) 1704 – 516500  
enquiries@united-automation.com  
www.united-automation.com  
unitedautomationltd UA\_Limited



Page 5 of 7

Issue: 4

Date: 21, September 2022

# X20121 – DMPR3 86kW Instruction Manual

## Three Phase Dual Mode Power Controller

### Issue 4



#### 6 Specifications

|                              |                                                                                                                                           |                                                |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Specifications               |                                                                                                                                           |                                                |
| Power (Current) Rating       | 86kW (120A)                                                                                                                               |                                                |
| Input Voltage                | 415V RMS +/- 10%                                                                                                                          |                                                |
| Frequency                    | 50/60Hz                                                                                                                                   |                                                |
| Control Signal Input Options | 0-5VDC, 0-10VDC, 1-5VDC, 2-10VDC, 0-20mA, 4-20mA, Manual Potentiometer Using 5K Pot.                                                      |                                                |
| Soft Start (Ramp Speed)      | 0-30 seconds (adjustable)                                                                                                                 |                                                |
| Alarms Relay Contact Rating  | 2A @ 125VAC Max.                                                                                                                          |                                                |
| Power Indicator              | Green Power LED                                                                                                                           |                                                |
| Status indicator             | Status LED indicator changes intensity during phase angle and soft start or flashes in synchronisation with bursts                        |                                                |
| Over Temperature             | Temperature trip activates @ 90°C, Alarm LED, and Status LED slow alternate flashes<br>Temperature trip de-activates @ approximately 85°C |                                                |
| Alarm Relay Default State    | Relay is de-energised in no fault state, NO contact is open (disconnected from COM)                                                       |                                                |
| Phase Lose Detection         | Alarm LED and Status LED ‘flashes’ fast alternately                                                                                       |                                                |
| Sensor Loss Detection        | Alarm LED indicator ‘flashes’ at quarter second intervals (approx. 4Hz)                                                                   |                                                |
| Fuse Failure                 | Alarm LED indicator on solid                                                                                                              |                                                |
| Offset Failure               | Alarm LED indicator ‘flashes’ slow pulsing (approx. 0.5Hz)                                                                                |                                                |
| Mode Mismatch                | Alarm LED indicator ‘flashes’ fast pulsing (approx. 1Hz)                                                                                  |                                                |
| Power Cable Size             | 86kW 35mm <sup>2</sup>                                                                                                                    |                                                |
| Cable Terminations           | Phase Power                                                                                                                               | 35mm <sup>2</sup> rising clamp terminal block  |
|                              | Earth                                                                                                                                     | 35mm <sup>2</sup> rising clamp terminal block  |
|                              | Remote Supply, Alarm Relay, Inhibit, Control Signal                                                                                       | 2.5mm <sup>2</sup> rising clamp terminal block |
| Terminal Torque Settings     | 3.2Nm minimum, 3.7Nm Maximum (35mm <sup>2</sup> ) Power terminals only                                                                    |                                                |
| Fusing                       | High-Speed semiconductor type fuses 86kW: 160EET (160A)                                                                                   |                                                |
| Ambient Temperature          | 40°C without de-rating                                                                                                                    |                                                |
| Dimensions (D x W x H)(mm)   | 277 x 300 x 130                                                                                                                           |                                                |
| Fixing Centres               | 4 x 5.5mm ø holes on centres 277mm (W) x 200mm (D)                                                                                        |                                                |
| Weight                       | 6.5kg                                                                                                                                     |                                                |

#### 7 Safety Warnings

Isolate supply before removing cover; Metal parts, the heatsink, may get very hot when the unit is fully operational; DO NOT COVER enclosure ventilation slots. **It is essential that a load break switch and contact breaker is installed in the supply.** The supply to the contactor coil should be interrupted by an over-temperature thermostat located in the heater battery and by detection of airflow loss.

#### 8 Recommendations

Additional supporting documents, which may be appropriate for your application, are available on request (see X10593).

#### 9 Note

It is recommended that installation and maintenance of this equipment should be done with reference to the current edition of the I.E.T. (formally I.E.E.) regulations (BS7671) by suitably qualified/trained personnel. The regulations contain important requirements regarding installation and safety of electrical equipment. Specific installers should refer to local and national regulations.

© These products are protected by unregistered design with United Automation Limited, Southport, UK

#### 10 Order Details

When ordering directly, please use the following stock code:

| Manufacturer Stock Code | Product Description | Rating                                   |
|-------------------------|---------------------|------------------------------------------|
| A481851                 | DMPR3 86kW          | 3-Phase, 86kW, 120A@415VAC, Full Control |



## UNITED AUTOMATION LTD

Southport Business Park  
Wight Moss Way  
Southport, PR8 4HQ  
ENGLAND

Tel: 0044 (0) 1704 – 516500  
enquiries@united-automation.com  
www.united-automation.com  
unitedautomationltd UA\_Limited



Page 6 of 7  
Issue: 4

Date: 21, September 2022

