

## 3500 Series

### Dual Loop Controller/Programmer

Improve process efficiency, product quality and minimise waste

The latest range of advanced process controllers from Eurotherm™ provide precision control of temperature and a host of other process variables together with an abundance of advanced options making it the most adaptable product in its class.

The emphasis is on flexibility yet the 3500 controllers still maintain ease of use. A simple 'Quick Start' process is used to configure all the basic functions essential to controlling your process. This includes input sensor type, measurement range, control options and alarms making 'Out the Box' operation truly achievable. More advanced features are configured using a PC based graphical configuration tool enabling users to pick function blocks from a library then connect them together using soft wiring.

The large 5-digit display provides a clear and unambiguous indication of the process value. A four-line message centre provides custom or standard views of important information to the user while vertical and horizontal bargraphs provide at a glance visual indication of the process. Configuration Lock enables a user to protect their intellectual property by preventing unauthorized cloning of the configuration.

#### Dual loop

Two independent PID loops make the 3500 ideal for interactive processes such as those found in carburizing furnaces, environmental chambers and autoclaves. The loops may also be 'soft' wired together in creative ways to create cascade, ratio or other intelligent control strategies.

#### Setpoint programmer

Heat treatment and other processes often require the ability to change setpoints with time. The dual loop 3500 has two programmers which can be configured as synchronized or independent programs. 50 programs with up to two channels can be stored with a total of 500 segments.

#### Input/output flexibility

A range of plug-in I/O modules caters for individual application requirements minimizing stock and spares holding. A total of sixteen module types, including relay, logic, triac and analogue, are available to fit into either three slots on 3508 or six slots on 3504.



- 50 Programs
- Precision PV input
- Carbon potential
- Maths/logic/timers
- Custom user interface
- Recipes
- Digital communications
  - Ethernet : DUAL RJ45 port
  - Modbus TCP Server and Client
  - Modbus RTU Server and Client
  - DeviceNet® network
  - Configuration Lock
  - Multi-language support (English, French, German, Spanish and Italian)

## Carbon potential

The 3500 calculates carbon potential from measuring both the oxygen concentration and temperature of a furnace using a zirconia probe. This enables a dual loop 3500 to be used to control both carbon potential and temperature in an atmosphere controlled furnace.

## Customized solutions

The 3500 is more than just a process controller. It also provides a selection of application blocks including maths, logic and timing functions offering the ability to develop custom solutions and create cost effective machine controllers.

The custom User Page feature allows an operator to view current information in a style most suitable to the process and terminology of the industry.

## Communications

The 3500 is designed to integrate seamlessly with programmable logic controllers and other supervisory systems. A wide range of serial communication options are catered for including EIA232 and EIA485 using the Modbus RTU protocol along with DeviceNet. Ethernet connectivity is achieved using the Modbus TCP protocol.

## Recipes

Using a PC tool recipes can be created that can be used to change the operating parameters of the 3500 simply by selecting a new recipe via the HMI. This is very useful where multiple products are processed using the same controller but require different parameters to be set.

## Infrared configuration adaptor

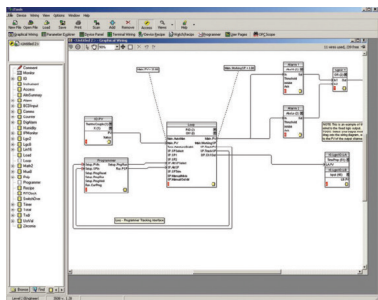
Communications to the 3500 can be achieved by using an infrared adaptor. Clipping onto the front fascia it provides Eurotherm iTools communications allowing configuration and commissioning to be performed without the need to access the rear terminals of the controller.



Infrared clip connected to the 3504

## Eurotherm iTools Graphical Wiring Editor

The GWE is an extremely easy way to create applications. It allows users to select the function blocks they wish to use in their application then connect them together using 'Soft Wiring'. The GWE gives the user a pictorial view of exactly what he has configured and can also be used to monitor runtime conditions.



## IO Expander

Extra IO can be provided by the IO Expander. Options are available for 10in 10out and 20in 20out.

## Specification

### General

#### Environmental performance

|                     |                                                                                |
|---------------------|--------------------------------------------------------------------------------|
| Temperature limits: | Operation: 0 to 50°C<br>Storage: -10 to 70°C                                   |
| Humidity limits:    | Operation: 5% to 85% RH non condensing<br>Storage: 5% to 95% RH non condensing |
| Panel sealing:      | IP65, NEMA12                                                                   |
| Vibration:          | 2g peak, 10 to 150Hz                                                           |
| Altitude:           | <2000 metres                                                                   |
| Atmospheres:        | Not suitable for use in explosive or corrosive atmosphere*                     |

#### Electromagnetic compatibility (EMC)

|                                                                                                                                                                                 |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Emissions and immunity:                                                                                                                                                         | BS EN61326 |
| Suitable for domestic, commercial and light industrial as well as heavy industrial. (Domestic/light (Class B) emissions. Industrial (Class A) environmental immunity emissions. |            |
| With Ethernet module fitted product only suitable for Class A emissions                                                                                                         |            |

#### Electrical safety

|                                                                                                                                                                 |                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| BS EN61010:                                                                                                                                                     | Installation cat. II; Pollution degree 2 |
| INSTALLATION CATEGORY II<br>The rated impulse voltage for equipment on nominal 230V ac mains is 2500V.                                                          |                                          |
| POLLUTION DEGREE 2<br>Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected. |                                          |

#### Physical

|              |                                                                                          |
|--------------|------------------------------------------------------------------------------------------|
| Dimensions:  | 3508: 48W x 96H x 159Dmm<br>3504: 96W x 96H x 159Dmm                                     |
| Weight:      | 3508: 400g<br>3504: 600g                                                                 |
| Panel:       | 3508: 1/8 DIN mounting 45W x 92Hmm cut-out<br>3504: 1/4 DIN mounting 92W x 92Hmm cut-out |
| Panel depth: | Both: 148mm                                                                              |

#### Operator interface

|                  |                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------|
| Type:            | STN LCD with backlight                                                                                          |
| Main PV display: | 3508: 4 1/2 digits, green<br>3504: 5 digits, green                                                              |
| Panel:           | 3508: 1/8 DIN mounting 45W x 92Hmm cut-out<br>3504: 1/4 DIN mounting 92W x 92Hmm cut-out                        |
| Panel depth:     | Both: 148mm                                                                                                     |
| Message display: | 3508: 8 character header and 3 lines of 10 characters<br>3504: 16 character header and 3 lines of 20 characters |
| Status beacons:  | Units, outputs, alarms, program status, program events, active setpoint, manual, remote SP                      |
| Access levels:   | 3 operator plus config. Password protected                                                                      |

#### Power requirements

|                       |                                                                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supply voltage:       | 100 to 230V ac, $\pm 15\%$ ,<br>48 to 62Hz, max<br>20W (3508 15W)<br>24V ac, $-15\%$ ,<br>24V ac, $-15\%$ , $+20\%$<br>$\pm 5\%$ ripple voltage max 20W (3508 15W) |
| Interrupt protection: | Standard: Holdup >10ms at 85V RMS supply voltage<br>Low voltage: Holdup >10ms at 20.4V RMS supply voltage                                                          |
| Inrush current:       | High Voltage: (VH) : 30A duration <100 $\mu$ S<br>Low Voltage: (VL) : 15A duration <100 $\mu$ S                                                                    |

#### User page

|               |                                          |
|---------------|------------------------------------------|
| Number:       | 8                                        |
| Parameters:   | 64 total                                 |
| Functions:    | Text, conditional text, values, bargraph |
| Access level: | User selectable (level 1, 2 or 3)        |

#### Approvals

CE, cUL listed (file E57766), EAC. Suitable for use in Nadcap and AMS2750 applications under System Accuracy Test calibration conditions

## Communications

|                  |                                                                    |
|------------------|--------------------------------------------------------------------|
| No of ports      | 2 modules can be fitted                                            |
| Slot allocation: | Modbus RTU (H or J comms port) or I/O expander (J comms port only) |

### Serial communications option

|                        |                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Protocols:             | Modbus Client/Server<br>Slot H only<br>EI-Bisync (818 style mnemonics)<br>Modbus Client/Server broadcast (1 parameter)<br>Slot J only |
| Isolation:             | 264V ac, double insulated                                                                                                             |
| Transmission standard: | EIA232, EIA485, CAN (DeviceNet),                                                                                                      |

### Ethernet communications option: 10/100Base Tx (Dual port)

|                        |                                                 |
|------------------------|-------------------------------------------------|
| Protocol:              | Modbus TCP, Modbus Client/Server (H comms only) |
| Isolation:             | 264V ac, double insulated                       |
| Transmission standard: | 802.3                                           |
| Features:              | DHCP client, 4 simultaneous clients             |

## Main process variable input

|                       |                                                          |
|-----------------------|----------------------------------------------------------|
| Calibration accuracy: | <±0.1% of reading ±1LSD (Note 1)                         |
| Sample rate:          | 9Hz (110ms)                                              |
| Isolation:            | 264V ac double insulation from the PSU and communication |
| Input filter:         | Off to 59.9s. Default 1.6s                               |
| Zero offset:          | User adjustable over full ran                            |
| User calibration:     | 2-point gain & offset                                    |

### Thermocouple

|                             |                                                                               |
|-----------------------------|-------------------------------------------------------------------------------|
| Range:                      | Uses 40mV and 80mV ranges dependent on type                                   |
| Types:                      | K, J, N, R, S, B, L, T, C, PL2, custom download x 2                           |
| Resolution:                 | 16 bits                                                                       |
| Linearisation accuracy:     | <0.2% of reading                                                              |
| Cold junction compensation: | >40:1 rejection of ambient change<br>External reference of 0°C, 45°C and 50°C |
| Cold junction accuracy:     | <±1°C at 25°C ambient                                                         |

### Resistance thermometer

|                               |                                                 |
|-------------------------------|-------------------------------------------------|
| Range:                        | 0-400Ω (-200°C to +850°C)                       |
| Resistance thermometer types: | 3-wire Pt100 DIN 43760                          |
| Resolution (°C):              | <0.050°C with 1.6sec filter                     |
| Resolution:                   | 16 bits                                         |
| Linearity error:              | <±0.03% (best fit straight line)                |
| Calibration error:            | <±0.310°C/°C, ±0.023% of measurement at 25°C    |
| Drift with temperature:       | <±0.010°C/°C, ±25ppm/C of measurement from 25°C |
| Common mode rejection:        | <0.000085°C/V (maximum of 264V rms)             |
| Series mode rejection:        | <0.240°C/V (maximum of 280mV pk-pk)             |
| Lead resistance:              | 0Ω to 22Ω, matched lead resistance              |
| Input impedance:              | 100MΩ                                           |
| Bulb current:                 | 200μA                                           |

### 40mV Range

|                         |                                              |
|-------------------------|----------------------------------------------|
| Range:                  | -40mV to +40mV                               |
| Resolution (μV):        | <1.0μV with 1.6sec filter                    |
| Resolution:             | 16 bits                                      |
| Linearity error:        | <0.003% (best fit straight line)             |
| Calibration error:      | <±4.6μV, ±0.053% of measurement at 25°C      |
| Drift with temperature: | <±0.2μV/C, ±28ppm/C of measurement from 25°C |
| Common mode rejection:  | >175dB (maximum of 264V rms)                 |
| Series mode rejection:  | >101dB (maximum of 280mV pk-pk)              |
| Input leakage current:  | ±14nA                                        |
| Input impedance:        | 100MΩ                                        |

### 80mV Range

|                         |                                               |
|-------------------------|-----------------------------------------------|
| Range:                  | -80mV to +80mV                                |
| Resolution (μV):        | <3.3μV with 1.6sec filter                     |
| Resolution:             | 16 bits                                       |
| Linearity error:        | <0.003% (best fit straight line)              |
| Calibration error:      | <±7.5μV, ±0.052% of measurement at 25°C       |
| Drift with temperature: | <±0.2 V/°C, ±28ppm/C of measurement from 25°C |
| Common mode rejection:  | >175dB (maximum of 264V rms)                  |
| Series mode rejection:  | >101dB (maximum of 280mV pk-pk)               |
| Input leakage current:  | ±14nA                                         |
| Input impedance:        | 100MΩ                                         |

## 2V Range

|                         |                                              |
|-------------------------|----------------------------------------------|
| Range:                  | -1.4V to +2.0V                               |
| Resolution (mV):        | <90μV with 1.6sec filter                     |
| Resolution:             | 16 bits                                      |
| Linearity error:        | <0.015% (best fit straight line)             |
| Calibration error:      | <±420μV, ±0.044% of measurement at 25°C      |
| Drift with temperature: | <±125 V/C, ±28ppm/C of measurement from 25°C |
| Common mode rejection:  | >155dB (maximum of 264Vrms)                  |
| Series mode rejection:  | >101dB (maximum of 4.5V pk-pk)               |
| Input leakage current:  | ±14nA                                        |
| Input impedance:        | 100MΩ                                        |

## 10V Range

|                         |                                                                                                          |
|-------------------------|----------------------------------------------------------------------------------------------------------|
| Range:                  | -3.0V to +10.0V                                                                                          |
| Resolution (mV):        | <550μV with 1.6sec filter                                                                                |
| Resolution:             | 16 bits                                                                                                  |
| Linearity error:        | <0.007% of reading for zero source resistance.<br>Add 0.003% for each 10Ω of source plus lead resistance |
| Calibration error:      | <±1.5mV, ±0.063% of measurement at 25°C                                                                  |
| Drift with temperature: | <±66μV/C, ±60ppm/C of measurement from 25°C                                                              |
| Common mode rejection:  | >145dB (maximum of 264V rms allowed)                                                                     |
| Series mode rejection:  | >92dB (maximum of 5V pk-pk allowed)                                                                      |
| Input impedance:        | 62.5kΩ to 667kΩ depending on input voltage                                                               |

### Notes

1. Calibration accuracy quoted over full ambient operating range and for all input linearisation types

## Digital IO (LA and LB)

|            |                                                                                        |
|------------|----------------------------------------------------------------------------------------|
| Isolation: | Not isolated from each other. 264V ac double insulation from the PSU and communication |
|------------|----------------------------------------------------------------------------------------|

### Input

|           |                                                                                                           |
|-----------|-----------------------------------------------------------------------------------------------------------|
| Rating:   | Voltage level: Closed 0 to 7.3V dc<br>Open 10.8 to 24V dc<br>Contact closure: Open >1200Ω<br>Closed <480Ω |
| Functions | Includes program control, alarm acknowledge, SP2 select, manual, keylock, RSP select, standby             |

### Output

|           |                                                  |
|-----------|--------------------------------------------------|
| Rating:   | 18V dc >9mA <15mA                                |
| Functions | Includes control outputs, alarms, events, status |

## AA Relay

|            |                                                                                           |
|------------|-------------------------------------------------------------------------------------------|
| Rating:    | Min 1mA @ 1V dc, Max 2A @ 264V ac resistive<br>1,000,000 operations with external snubber |
| Isolation: | 264Vac double insulation                                                                  |
| Functions: | Includes control outputs, alarms, events, status                                          |

## Input / Output modules

|              |                                                                |
|--------------|----------------------------------------------------------------|
| IO Modules   | 3508: 3 modules can be fitted<br>3504: 6 modules can be fitted |
| IO Expander: | 20 Digital inputs, 20 relay outputs                            |

## Analogue input module

|                       |                                                      |
|-----------------------|------------------------------------------------------|
| Calibration accuracy: | ±0.2% of reading ±1LSD                               |
| Sample rate:          | 9Hz (110ms)                                          |
| Isolation:            | 264V ac double insulation                            |
| Input filter:         | Off to 59.9s. Default 1.6s                           |
| Zero offset:          | User adjustable over full range                      |
| User calibration:     | 2-point gain & offset                                |
| Functions:            | Includes process input, remote setpoint, power limit |

### Thermocouple

|                             |                                                                               |
|-----------------------------|-------------------------------------------------------------------------------|
| Range:                      | -100mV to +100mV                                                              |
| Types:                      | K, J, N, R, S, B, L, T, C, PL2, custom                                        |
| Resolution (μV):            | <3.3μV @ 1.6s filter time                                                     |
| Effective resolution:       | 15.9 bits                                                                     |
| Linearisation accuracy:     | <0.2% of reading                                                              |
| Cold junction compensation: | >25:1 rejection of ambient change<br>External reference of 0°C, 45°C and 50°C |
| Cold junction accuracy:     | <±1°C at 25°C ambient                                                         |

## Resistance thermometer

|                               |                                             |
|-------------------------------|---------------------------------------------|
| Range:                        | 0-400Ω (-200°C to +850°C)                   |
| Resistance thermometer types: | 3-wire Pt100 DIN 43760                      |
| Resolution (°C):              | <±0.08°C with 1.6sec filter                 |
| Effective resolution:         | 13.7 bits                                   |
| Linearity error:              | <0.033% (best fit straight line)            |
| Calibration error:            | <±(0.4°C +0.15% of reading in °C)           |
| Drift with temperature:       | <±(0.015°C +0.005% of reading in °C) per °C |
| Common mode rejection:        | <0.000085°C/V (maximum of 264V rms)         |
| Series mode rejection:        | <0.240°C/V (maximum of 280mV pk-pk)         |
| Lead resistance:              | 0Ω to 22Ω, matched lead resistance          |
| Bulb current:                 | 300μA                                       |

## 100mV Range

|                         |                                       |
|-------------------------|---------------------------------------|
| Range:                  | -100mV to +100mV                      |
| Resolution (μV):        | <3.3μV with 1.6s filter time          |
| Effective resolution:   | 15.9 bits                             |
| Linearity error:        | <0.033% (best fit straight line)      |
| Calibration error:      | <±10μV, ± 0.2% of measurement at 25°C |
| Drift with temperature: | <±0.2 V + 0.004% of reading per °C    |
| Common mode rejection:  | >146dB (maximum of 264V rms)          |
| Series mode rejection:  | >90dB (maximum of 280mV pk-pk)        |
| Input leakage current:  | <1nA                                  |
| Input impedance:        | >100M                                 |

## 2V Range

|                         |                                    |
|-------------------------|------------------------------------|
| Range:                  | -0.2V to +2.0V                     |
| Resolution (μV):        | 30μV with 1.6s filter time         |
| Effective resolution:   | 16.2 bits                          |
| Linearity error:        | <0.033% (best fit straight line)   |
| Calibration error:      | <±2mV + 0.2% of reading            |
| Drift with temperature: | <±0.1mV + 0.004% of reading per °C |
| Common mode rejection:  | >155dB (maximum of 264Vrms)        |
| Series mode rejection:  | >101dB (maximum of 4.5V pk-pk)     |
| Input leakage current:  | <10nA                              |
| Input impedance:        | >100M                              |

## 10V Range

|                         |                                    |
|-------------------------|------------------------------------|
| Range:                  | -3.0V to +10.0V                    |
| Resolution (μV):        | <200μV with 1.6sec filter          |
| Effective resolution:   | 15.4 bits                          |
| Linearity error:        | <0.033% (best fit straight line)   |
| Calibration error:      | <±0.1mV + 0.02% of reading per °C  |
| Drift with temperature: | <± 0.1mV + 0.02% of reading per °C |
| Common mode rejection:  | >145dB (maximum of 264V rms)       |
| Series mode rejection:  | >92dB (maximum of 5V pk-pk)        |
| Input impedance:        | >69kΩ                              |

## Potentiometer input

|             |                                             |
|-------------|---------------------------------------------|
| Type:       | Single channel                              |
| Resistance: | 100Ω to 15kΩ                                |
| Excitation: | 0.5V dc supplied by module                  |
| Isolation:  | 264V ac double insulation                   |
| Functions:  | Includes valve position and remote setpoint |

## Analogue control output

|             |                                |
|-------------|--------------------------------|
| Type:       | Single channel                 |
| Rating:     | 0-20mA <600Ω<br>0-10V dc >500Ω |
| Accuracy:   | <±2.5%                         |
| Resolution: | 10 bits                        |
| Isolation:  | 264V ac double insulation      |

## Analogue retransmission output

|             |                                |
|-------------|--------------------------------|
| Type:       | Single channel                 |
| Rating:     | 0-20mA <600Ω<br>0-10V dc >500Ω |
| Accuracy:   | <±0.5%                         |
| Resolution: | 11 bits                        |
| Isolation:  | 264V ac double insulation      |

## Dual 4-20mA OP/24V dc TxPSU

|                |                                               |
|----------------|-----------------------------------------------|
| Type:          | Dual channel                                  |
| Rating Output: | 4-20mA dc, <1KΩ                               |
| TxPSU:         | 24V dc, 22mA                                  |
| Isolation:     | 264V ac double insulation between channels    |
| Functions:     | Either channel can be control output or TxPSU |
| Accuracy:      | <±1%                                          |
| Resolution:    | 11 bits                                       |

## Logic input modules

|                  |                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------|
| Module types:    | Triple contact closure, triple logic level                                                    |
| Isolation:       | No channel isolation. 264V ac double insulation from other modules and system                 |
| Rating:          | Voltage level: Open -3 to 5V dc @ <-0.4mA<br>Closed 10.8 to 30V dc @ 2.5mA                    |
| Contact closure: | Open >28kΩ<br>Closed <100Ω                                                                    |
| Functions:       | Includes program control, alarm acknowledge, SP2 select, manual, keylock, RSP select, standby |

## Logic output modules

|                |                                                                                  |
|----------------|----------------------------------------------------------------------------------|
| Module types:  | Single channel, triple channel                                                   |
| Isolation:     | No channel isolation.<br>264V ac double insulation from other modules and system |
| Rating Single: | 12V dc >20mA <29mA                                                               |
| Triple:        | 12V dc >9mA <12mA                                                                |
| Functions:     | Includes control outputs, alarms, events, status                                 |

## Relay modules

|               |                                                                                                           |
|---------------|-----------------------------------------------------------------------------------------------------------|
| Module types: | Single channel Form A, Single channel Form C, dual channel Form A                                         |
| Isolation:    | 264V ac double insulation                                                                                 |
| Rating:       | Min 100mA @ 12V dc, Max 2A @ 264V ac resistive<br>Min 400,000 (max load) operations with external snubber |
| Functions:    | Includes control outputs, alarms, events, status                                                          |

## Triac modules

|               |                                                  |
|---------------|--------------------------------------------------|
| Module types: | Single channel, dual channel                     |
| Isolation:    | 264V ac double insulation                        |
| Rating:       | <0.75A @ 264V ac resistive                       |
| Functions:    | Includes control outputs, alarms, events, status |

## Transmitter PSU module

|            |                           |
|------------|---------------------------|
| Type:      | Single channel            |
| Isolation: | 264V ac double insulation |
| Rating:    | 24V dc @ 20mA             |

## Transducer PSU module

|                          |                                                          |
|--------------------------|----------------------------------------------------------|
| Type:                    | Single channel                                           |
| Isolation:               | 264V ac double insulation                                |
| Bridge voltage:          | Software selectable 5V dc or 10V dc                      |
| Bridge resistance:       | 300Ω to 15kΩ                                             |
| Internal shunt resistor: | 30.1Ω @0.25%, used for calibration of 350Ω bridge at 80% |

## I/O Expander

|                 |                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Type:           | 20 I/O: 4 Form C relays, 6 Form A relays, 10 logic inputs<br>40 I/O: 4 Form C relays, 16 Form A relays, 20 logic inputs           |
| Isolation:      | 264V ac double insulation between channels                                                                                        |
| Ratings:        | Relay: Min 100mA @ 12V dc, Max 2A @ 264V ac resistive<br>Logic Input: Open -3 to 5V dc @ <-0.4mA<br>Closed 10.8 to 30V dc @ 2.5mA |
| Communications: | Using EX comms module in comms slot J                                                                                             |

## Software features

### Control

|                       |                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------|
| Number of loops:      | 2                                                                                             |
| Loop update:          | 110ms                                                                                         |
| Control types:        | PID, OnOff, VP, Dual VP                                                                       |
| Cooling types:        | Linear, fan, oil, water                                                                       |
| Modes:                | Auto, manual, forced manual, control inhibit                                                  |
| Overshoot inhibition: | High and low cutbacks                                                                         |
| Number of PID sets:   | 3, selectable on PV, SP, OP, On Demand, program segment and remote input                      |
| Control options:      | Supply voltage compensation, feedforward, output tracking, OP power limiting, SBR safe output |
| Setpoint options:     | Remote SP with trim, SP rate limit, 2nd Setpoint, tracking modes                              |

## Setpoint programmer

|                         |                                                                           |
|-------------------------|---------------------------------------------------------------------------|
| Program function:       | 50 programs, max 500 segments                                             |
| Program names:          | User defined up to 16 characters                                          |
| No of profile channels: | 2 (1 if single loop)                                                      |
| Operation:              | Full or partially synchronised                                            |
| Events:                 | 8 per channel (8 when fully synchronised)<br>1 timed event, 1 PV event    |
| Segment types:          | Rate, dwell, time, call, goback and wait                                  |
| Digital inputs:         | Run, Hold, Reset, RunHold, RunReset, Adv Seg, Skip Seg                    |
| Servo action:           | Process value, setpoint                                                   |
| Power failure modes:    | Continue, ramp, reset                                                     |
| Other functions:        | Guaranteed soak, holdback, segment user values, wait inputs, PV hot start |

## Process/Digital Alarms

|                 |                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------|
| Number:         | 16                                                                                               |
| Type:           | Abs Hi, Abs Lo, Dev Hi, Dev Lo, Dev Band, Dig Hi, Dig Lo, Pos Edge, Neg Edge, Edge and Abs Hi/Lo |
| Latching:       | None, Auto, manual, event                                                                        |
| Other features: | Delay, inhibit, blocking, display message, 3 priority levels                                     |

## Zirconia

|                    |                                                                                       |
|--------------------|---------------------------------------------------------------------------------------|
| Number:            | 1                                                                                     |
| Functions:         | Carbon potential, dewpoint, %O2 LogO2, probe mV                                       |
| Supported probes:  | Barber Colman, Drayton, MMICarbon, AACC, Accucarb, SSI, MacDhui, BoschO2, BoschCarbon |
| Gas reference:     | Internal or remote analogue input                                                     |
| Probe diagnostics: | Clean recovery time, impedance measurement                                            |
| Probe burn-off:    | Automatic or manual                                                                   |
| Other features:    | Sooting alarm with tolerance setting, PV                                              |

## Humidity

|                          |                                   |
|--------------------------|-----------------------------------|
| Number:                  | 1                                 |
| Functions:               | Relative humidity, dewpoint       |
| Measurement:             | Psychrometric (wet & dry) inputs  |
| Atmosphere compensation: | Internal or remote analogue input |
| Other features:          | Psychrometric constant adjust     |

## Recipes

|                 |                      |
|-----------------|----------------------|
| Number:         | 8                    |
| Parameters:     | 40 per recipe        |
| Length of name: | 8 Characters         |
| Selection:      | HMI, comms, strategy |

## Transducer calibration

|                 |                              |
|-----------------|------------------------------|
| Number:         | 2                            |
| Type:           | Shunt, load cell, comparison |
| Other features: | Autotare                     |

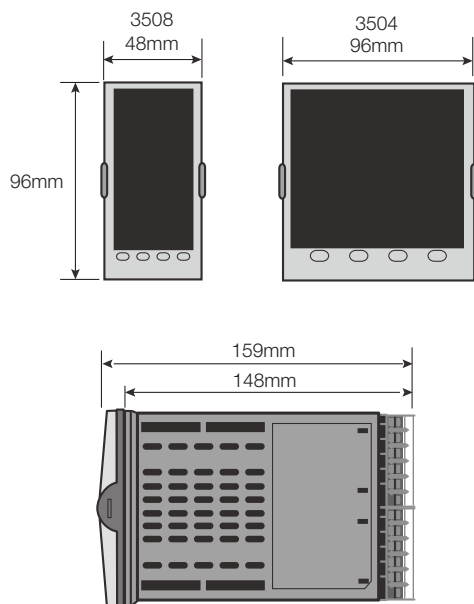
## Communication tables

|               |                                 |
|---------------|---------------------------------|
| Number:       | 250                             |
| Function:     | Modbus remapping (indirection)  |
| Data formats: | Integer, IEEE (full resolution) |

## Application blocks

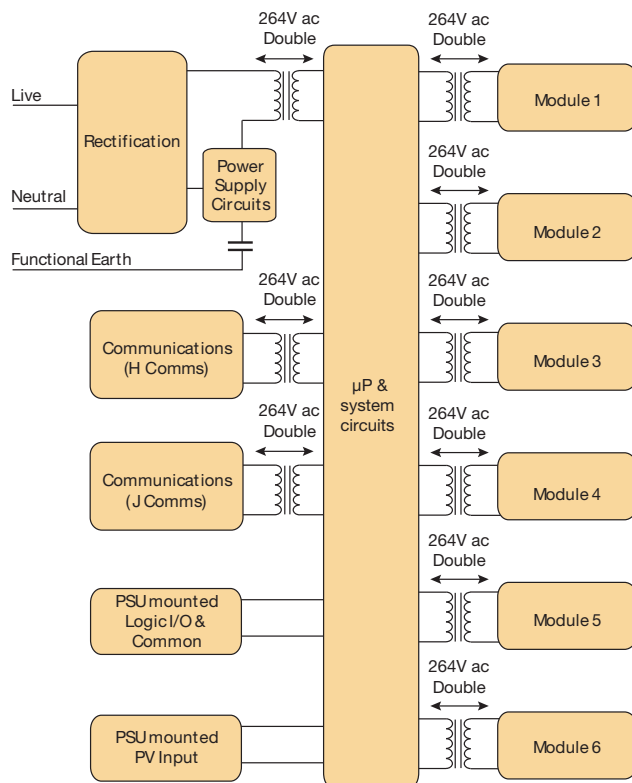
|                         |                                                                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soft wiring:            | Orderable options of 30, 60, 120, 250 or 360                                                                                                                                   |
| User values:            | 16 as standard, 40 with 360 wires, real numbers with decimal point                                                                                                             |
| 2 IP maths:             | 24 as standard, 32 with 360 wires. add, subtract, multiply, divide, absolute difference, max, min, hot swap, sample and hold, power, square root, Log, Ln, exponential, switch |
| 2 IP logic:             | 24 as standard, 40 with 360 wires AND, OR, XOR, latch, equal, not equal, greater than, less than, greater than or equal to, less                                               |
| 8 IP logic:             | 2 as standard, 4 with 360 wires AND, OR, XOR                                                                                                                                   |
| 8 IP multiplexor:       | 4 as standard, 8 with 360 wires 8 sets of 8 values selected by input parameter                                                                                                 |
| 8 IP multiple IP:       | 2 as standard, 4 with 360 wires average, min, max sum                                                                                                                          |
| BCD Input:              | 2 blocks, 2 Decades                                                                                                                                                            |
| Input monitor:          | 2 blocks, max, min, time above threshold                                                                                                                                       |
| 32 point linearisation: | 2 as standard, 8 with 360 wires, 32-point linearization fit                                                                                                                    |
| Polynomial fit:         | 2 blocks, characterisation by Poly Fit table                                                                                                                                   |
| Switchover:             | 1 block, smooth transition between 2 values                                                                                                                                    |
| Timer blocks:           | 4 blocks, OnPulse, OnDelay, OneShot, MinOn Time                                                                                                                                |
| Counter blocks:         | 2 blocks, Up or down, directional flag                                                                                                                                         |
| Totaliser blocks:       | 2 blocks, alarm at threshold value                                                                                                                                             |

## Installation



3508 Panel cut-out 92mm (-0.0 +0.8) x 45mm (-0.0 +0.6)  
3504 Panel cut-out 92mm (-0.0 +0.8) x 92mm (-0.0 +0.8)

## Isolation





## Order Code Hardware/options coding

|  |   |   |   |   |   |   |   |   |   |    |    |        |        |
|--|---|---|---|---|---|---|---|---|---|----|----|--------|--------|
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12     | 13     |
|  |   |   |   |   |   |   |   |   |   |    |    | Note 2 | Note 2 |

|        |    |    |    |    |    |    |    |
|--------|----|----|----|----|----|----|----|
| 14     | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Note 2 |    |    |    |    |    |    |    |

| Basic Product |                |
|---------------|----------------|
| 3508          | 48 x 96mm unit |
| 3504          | 96 x 96mm unit |

| 1 Function |          |
|------------|----------|
| CCE        | Standard |

| 2 Supply Voltage |              |
|------------------|--------------|
| VH               | 85-264V ac   |
| VL               | VL 24V ac/dc |

| 3 Loops |           |
|---------|-----------|
| 1       | One loop  |
| 2       | Two loops |

| 4 Application |                                    |
|---------------|------------------------------------|
| XX            | Standard                           |
| ZC            | Zirconia                           |
| VP            | VP Dual Valve Positioning (Note 3) |

| 5 Program |                         |
|-----------|-------------------------|
| XX        | No programs             |
| 1         | 1 Progs - 20 Segments   |
| 10        | 10 Progs - 500 Segments |
| 25        | 25 Progs - 500 Segments |
| 50        | 50 Progs - 500 Segments |

| 6 Recipes |            |
|-----------|------------|
| X         | No recipes |
| 8         | 8 Recipes  |

| 7 Toolkit Wires |                   |
|-----------------|-------------------|
| XXX             | Standard 30 Wires |
| 60              | 60 Wires          |
| 120             | 120 Wires         |
| 250             | 250 Wires         |
| 360             | 360 Wires         |

| 8 Fascia |                 |
|----------|-----------------|
| G        | Eurotherm green |
| S        | Silver          |

| 9-14 IO Slots 1-6 (Note 2) |                                                  |
|----------------------------|--------------------------------------------------|
| XX                         | No module fitted                                 |
| R4                         | Change over relay                                |
| R2                         | 2 pin relay                                      |
| RR                         | Dual relay                                       |
| T2                         | Triac                                            |
| TT                         | Dual triac                                       |
| D4                         | DC control                                       |
| AM                         | Analogue input (not slot 2 or 5)                 |
| D6                         | DC retransmission                                |
| TL                         | Triple logic input                               |
| TK                         | Triple contact input                             |
| TP                         | Triple logic output                              |
| VU                         | Potentiometer input                              |
| MS                         | 24V dc transmitter PSU                           |
| G3                         | Transducer PSU 5 or 10V dc                       |
| DO                         | Dual 4-20mA OP/24V dc PSU (Slots 1, 2 or 4 only) |
| LO                         | Isolated single logic OP                         |

| 15 H Comms Slot |                                                      |
|-----------------|------------------------------------------------------|
| XX              | Not fitted                                           |
| A2              | EIA232 Modbus                                        |
| Y2              | 2-wire EIA485 Modbus                                 |
| F2              | 4-wire EIA485 Modbus                                 |
| AE              | EIA232 El-Bisynch <sup>Note 1</sup>                  |
| YE              | 2-wire EIA485 El-Bisynch <sup>Note 1</sup>           |
| M1              | RS232 Modbus Client                                  |
| M2              | 2-wire EIA485 Modbus Client                          |
| M3              | 4-wire EIA485 Modbus Client                          |
| FE              | 4-wire EIA485 El-Bisynch <sup>Note 1</sup>           |
| E2              | Ethernet 10/100 BASE-TX dual port                    |
| E3              | Ethernet 10/100 BASE-TX dual port with Modbus Client |
| DN              | DeviceNet                                            |

| 16 J Comms Slot |                                            |
|-----------------|--------------------------------------------|
| XX              | Not fitted                                 |
| A2              | EIA232 Modbus                              |
| Y2              | 2-wire EIA485 Modbus                       |
| F2              | 4-wire EIA485 Modbus                       |
| AE              | EIA232 El-Bisynch <sup>Note 1</sup>        |
| YE              | 2-wire EIA485 El-Bisynch <sup>Note 1</sup> |
| FE              | 4-wire EIA485 El-Bisynch <sup>Note 1</sup> |
| M1              | RS232 Modbus Client                        |
| M2              | 2-wire EIA485 Modbus Client                |
| M3              | 4-wire EIA485 Modbus Client                |
| EX              | IO Expander module                         |

| 17 Configuration Lock Function |                    |
|--------------------------------|--------------------|
| XX                             | None               |
| LK                             | Configuration Lock |

| 18 Product Language |         |
|---------------------|---------|
| ENG                 | English |
| FRA                 | French  |
| GER                 | German  |
| SPA                 | Spanish |
| ITA                 | Italian |

| 19 Manual Language |         |
|--------------------|---------|
| ENG                | English |
| FRA                | French  |
| GER                | German  |
| SPA                | Spanish |
| ITA                | Italian |

| 20 Warranty |                   |
|-------------|-------------------|
| XXXXX       | Standard          |
| WL005       | Extended Warranty |

| 21 Calibration Certificate |                           |
|----------------------------|---------------------------|
| XXXXX                      | None                      |
| CERT1                      | Certificate of Conformity |
| CERT2                      | Factory Cal certificate   |



### Notes

- Consult Factory for availability
- I/O slots 4, 5 and 6 are only available on the 3504
- Provides Valve Position option in Heat/Cool applications. Single channel VP included as standard
- If standard config is selected an instrument without configuration will be supplied.
- If C or F units are selected they must be the same for both loops. If C or F are not selected for Loop 1 they cannot be selected for Loop 2.

## 3500 Accessories

|                     |                          |
|---------------------|--------------------------|
| SUB35/ACCESS/249R.1 | 2.49R Precision resistor |
| iTools/None/3000IR  | Configuration IR clip    |
| iTools/None/3000CK  | Configuration clip       |
| 2000IO/VL/10LR/XXXX | 10IN, 10OUT Expander     |
| 2000IO/VL/20LR/20LR | 20IN, 20OUT Expander     |

| Table 1 |                 |
|---------|-----------------|
| A       | 4-20mA Linear   |
| Y       | 0-20mA Linear   |
| W       | 0-5V dc Linear  |
| G       | 1-5V dc Linear  |
| V       | 0-10V dc Linear |

# Configuration coding

|    |    |    |    |    |    |    |    |    |    |    |        |        |        |
|----|----|----|----|----|----|----|----|----|----|----|--------|--------|--------|
|    | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11     | 12     | 13     |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Note 2 | Note 2 | Note 2 |

| 1 Configuration |                           |
|-----------------|---------------------------|
| STD             | Standard config. (Note 4) |
| CFG             | Factory configured        |

| 2 Loop 1 Units |            |
|----------------|------------|
| C              | Centigrade |
| F              | Fahrenheit |
| %              | Percent    |
| H              | %RH        |
| P              | PSI        |
| B              | Bar        |
| M              | mBar       |
| X              | None       |

| 3 Loop 1 Function |                                 |
|-------------------|---------------------------------|
| PX                | Single Channel PID              |
| FX                | Single Ch Valve with feedback   |
| VX                | Single Ch Valve w/out feedback  |
| NX                | Single Ch On/Off                |
| PP                | Dual Channel PID                |
| PN                | Dual Ch PID/OnOff               |
| FF                | Dual Ch Valve with feedback     |
| VV                | Dual Ch Valve w/out feedback    |
| PF                | Dual Ch PID/Valve with feedback |
| PV                | Dual Ch PID/Valve w/o feedback  |

| 4 Loop 1 PV (from Main PV) |                          |
|----------------------------|--------------------------|
| X                          | Unconfigured             |
| J                          | J Thermocouple           |
| K                          | K Thermocouple           |
| T                          | T Thermocouple           |
| L                          | L Thermocouple           |
| N                          | N Thermocouple           |
| R                          | R Thermocouple           |
| S                          | S Thermocouple           |
| B                          | B Thermocouple           |
| P                          | Platinell II             |
| C                          | C Thermocouple           |
| Z                          | Pt 100                   |
| A                          | 4-20mA Linear            |
| Y                          | 0-20mA Linear            |
| W                          | 0-5V dc Linear           |
| G                          | 1-5V dc Linear           |
| V                          | 0-10V dc Linear          |
| D                          | D Thermocouple           |
| E                          | E Thermocouple           |
| 1                          | Ni/Ni 18% MO             |
| 2                          | Pt20%Rh/Pt40%Rh          |
| 3                          | W/W26%Re (Englehard)     |
| 4                          | W/W26%Re (Hoskins)       |
| 5                          | W5%Re/W26%Re (Englehard) |
| 6                          | W5%Re/W26%Re (Bucuse)    |
| 7                          | Pt10%Rh/Pt40%Rh          |
| Q                          | Custom Curve             |

| 5 Loop 1 Range Low |                                |
|--------------------|--------------------------------|
| XXXX               | Enter value with decimal point |

| 6 Loop 1 Range High |                                |
|---------------------|--------------------------------|
| XXXX                | Enter value with decimal point |

| 7 Loop 2 Units |                     |
|----------------|---------------------|
| C              | Centigrade (Note 5) |
| F              | Fahrenheit (Note 5) |
| %              | Percent             |
| H              | %RH                 |
| P              | PSI                 |
| B              | Bar                 |
| M              | mBar                |
| X              | None                |

| 8 Loop 2 Function |                                 |
|-------------------|---------------------------------|
| XX                | Single Loop Only                |
| PX                | Single Channel PID              |
| FX                | Single Ch Valve with feedback   |
| VX                | Single Ch Valve w/out feedback  |
| NX                | Single Ch On/Off                |
| PP                | Dual Channel PID                |
| PN                | Dual Ch PID/OnOff               |
| FF                | Dual Ch Valve with feedback     |
| VV                | Dual Ch Valve w/out feedback    |
| PF                | Dual Ch PID/Valve with feedback |
| PV                | Dual Ch PID/Valve w/o feedback  |

| 9 Loop 2 PV |                          |
|-------------|--------------------------|
| X           | Unconfigured             |
| J           | J Thermocouple           |
| K           | K Thermocouple           |
| T           | T Thermocouple           |
| L           | L Thermocouple           |
| N           | N Thermocouple           |
| R           | R Thermocouple           |
| S           | S Thermocouple           |
| B           | B Thermocouple           |
| P           | Platinell II             |
| C           | C Thermocouple           |
| Z           | Pt 100                   |
| A           | 4-20mA Linear            |
| Y           | 0-20mA Linear            |
| W           | 0-5V dc Linear           |
| G           | 1-5V dc Linear           |
| V           | 0-10V dc Linear          |
| D           | D Thermocouple           |
| E           | E Thermocouple           |
| 1           | Ni/Ni 18% MO             |
| 2           | Pt20%Rh/Pt40%Rh          |
| 3           | W/W26%Re (Englehard)     |
| 4           | W/W26%Re (Hoskins)       |
| 5           | W5%Re/W26%Re (Englehard) |
| 6           | W5%Re/W26%Re (Bucuse)    |
| 7           | Pt10%Rh/Pt40%Rh          |
| Q           | Custom Curve             |

| 10 Loop 2 Range Low |                                |
|---------------------|--------------------------------|
| XXXX                | Enter value with decimal point |

| 11 Loop 2 Range High |                                |
|----------------------|--------------------------------|
| XXXX                 | Enter value with decimal point |

| 12-15 Alarms 1-4 |                 |
|------------------|-----------------|
| XXX              | Unconfigured    |
| 1_               | Loop 1          |
| 2_               | Loop 2          |
| _FH              | Full scale high |
| _FL              | Full scale low  |
| _DH              | Deviation high  |
| _DL              | Deviation low   |
| _DB              | Deviation band  |

| 16-17 Logic LA and Logic LB |                        |
|-----------------------------|------------------------|
| XX                          | Unconfigured           |
| 1_                          | Loop 1                 |
| 2_                          | Loop 2                 |
| _B                          | Sensor Break           |
| _BM                         | Manual Select          |
| _H                          | Control Ch1 O/P        |
| _C                          | Control Ch2 O/P        |
| _R                          | Remote SP              |
| _S                          | Setpoint 2 Enable      |
| A                           | Alarm                  |
| _A                          | Acknowledge all Alarms |
| _1                          | Alarm 1 O/P            |
| _2                          | Alarm 2 O/P            |
| P                           | Programmer             |
| _R                          | Run                    |
| _H                          | Hold                   |
| _A                          | Reset                  |
| _1                          | Prog Ch1 Event 1       |
| _2                          | Prog Ch1 Event 2       |

| 18 Relay AA |                         |
|-------------|-------------------------|
| XX          | Unconfigured            |
| 1_          | Loop 1                  |
| 2_          | Loop 2                  |
| _H          | Control Ch1 O/P         |
| _C          | Control Ch2 O/P         |
| _B          | Sensor Break            |
| SB          | Sensor Break (any loop) |
| A           | Alarm                   |
| _A          | Any Alarm Active        |
| _N          | _N New Alarm Active     |
| _1          | _1 Alarm 1 O/P          |
| _2          | _2 Alarm 2 O/P          |
| P           | Programmer              |
| _1          | Prog Ch1 Event 1        |
| _2          | Prog Ch1 Event 2        |

| 19-24 Logic LA and Logic LB |              |
|-----------------------------|--------------|
| XXX                         | Unconfigured |
| 1_                          | Loop 1       |
| 2_                          | Loop2        |

| Changeover Relay (R4) |                 |
|-----------------------|-----------------|
| _HX                   | Control Ch1 O/P |
| _CX                   | Control Ch2 O/P |
| _BX                   | Sensor Break    |

| 2-Pin Relay (R2) |                 |
|------------------|-----------------|
| _HX              | Control Ch1 O/P |
| _CX              | Control Ch2 O/P |
| _BX              | Sensor Break    |

| Single Logic (LO) |                 |
|-------------------|-----------------|
| _HX               | Control Ch1 O/P |
| _CX               | Control Ch2 O/P |

| Single Triac (T2) |                 |
|-------------------|-----------------|
| _HX               | Control Ch1 O/P |
| _CX               | Control Ch2 O/P |

| Dual Relay (RR) |                           |
|-----------------|---------------------------|
| _HC             | Ch1 O/P and Ch2           |
| _VT             | VP Ch1                    |
| _VR             | VP Ch2                    |
| P12             | Prog Event 1 and 2        |
| P34             | Prog Event 3 and 4        |
| P56             | Prog Event 5 and 6        |
| P78             | Prog Event 7 and 8        |
| A12             | Alarm 1 and 2 O/P         |
| A34             | Alarm 3 and 4 O/P         |
| HHX             | Ch1 O/P for loops 1 and 2 |
| CCX             | Ch2 O/P for loops 1 and 2 |
| SBR             | Sensor Break both loops   |

| 19-24 ... continued |                           |
|---------------------|---------------------------|
| Dual Triac (TT)     |                           |
| _HC                 | Ch1 O/P and Ch2           |
| _VH                 | VP Ch1                    |
| _VC                 | VP Ch2                    |
| P12                 | Prog Ch1 Event 1 and 2    |
| P34                 | Prog Ch1 Event 3 and 4    |
| P56                 | Prog Ch1 Event 5 and 6    |
| P78                 | Prog Ch1 Event 7 and 8    |
| A12                 | Alarm 1 and 2 O/P         |
| A34                 | Alarm 3 and 4 O/P         |
| HHX                 | Ch1 O/P for loops 1 and 2 |
| CCX                 | Ch2 O/P for loops 1 and 2 |

| DC Control (D4)                           |         |
|-------------------------------------------|---------|
| For range select third digit from Table 1 |         |
| _H                                        | Ch1 O/P |
| _C                                        | Ch2 O/P |

| DC Retransmission (D6)                    |                   |
|-------------------------------------------|-------------------|
| For range select third digit from Table 1 |                   |
| _T                                        | PV Retransmission |
| _S                                        | SP Retransmission |

| Analogue Input (AM)                       |           |
|-------------------------------------------|-----------|
| For range select third digit from Table 1 |           |
| 2PV                                       | Loop 2 PV |
| _R                                        | Remote SP |

| Analogue Input (AM)                       |           |
|-------------------------------------------|-----------|
| For range select third digit from Table 1 |           |
| 2PV                                       | Loop 2 PV |
| _R                                        | Remote SP |

| Potentiometer Input (VU) |                    |
|--------------------------|--------------------|
| _RS                      | Remote SP          |
| _VF                      | Valve Feedback Ch1 |
| _VG                      | Valve Feedback Ch2 |

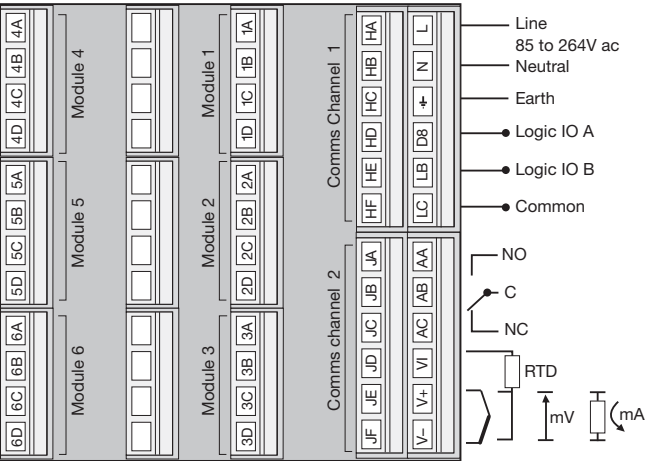
| Dual 4-20mA O/P/TxPSU |                          |
|-----------------------|--------------------------|
| _HC                   | Ch1 O/P and Ch2 O/P      |
| _HT                   | Ch1 O/P loops1, TxPSU    |
| HHX                   | Ch O/P for loops 1 and 2 |
| TTX                   | Both channels TxPSU      |

| Triple Logic IP (TL) or (TK) |                                   |
|------------------------------|-----------------------------------|
| ---                          | Select function below for each ch |
| X                            | Unconfigured                      |
| M                            | Loop 1 Manual                     |
| N                            | Loop 2 Manual                     |
| Q                            | Loop 1 Remote SP                  |
| V                            | Loop 2 Remote SP                  |
| S                            | Loop 1 Setpoint 2 enable          |
| T                            | Loop 2 Setpoint 2 enable          |
| E                            | Acknowledge all Alarms            |
| P                            | Program Run                       |
| R                            | Program Reset                     |
| H                            | Program Hold                      |

| Triple Logic OP (TP) |                                   |
|----------------------|-----------------------------------|
| ---                  | Select function below for each ch |
| X                    | Unconfigured                      |
| F                    | Loop 1 Control Ch1 O/P            |
| G                    | Loop 1 Control Ch2 O/P            |
| K                    | Loop 2 Control Ch1 O/P            |
| L                    | Loop 2 Control Ch2 O/P            |
| A                    | Alarm 1 O/P                       |
| B                    | Alarm 2 O/P                       |
| C                    | Alarm 3 O/P                       |
| D                    | Alarm 4 O/P                       |
| 1                    | Program Event 1                   |
| 2                    | Program Event 2                   |
| 3                    | Program Event 3                   |
| 4                    | Program Event 4                   |
| 5                    | Program Event 5                   |
| 6                    | Program Event 6                   |
| 7                    | Program Event 7                   |
| 8                    | Program Event 8                   |

Rear Terminals

3504



3508

