ENG

3508 and 3504 Process Controllers

This instrument is intended for permanent installation, for indoor use only, and to be enclosed in an electrical panel.

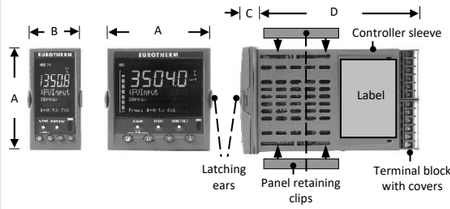
Select a location where minimum vibrations are present, and the ambient temperature is between 0 and 50°C (32 and 122°F).

The instrument can be mounted on a panel up to 15mm thick.

To assure IP65 and NEMA 12 front protection, use a panel with smooth surface texture.

Please read the safety information before proceeding and refer to the EMC Booklet part number HA025464. For details not covered in this installation sheet a 3500 User Guide HA033837 is available. These documents may be downloaded from https://www.eurotherm.com.

Parts Supplied and Dimensions



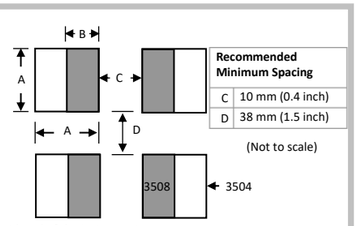
A	96 mm 3.78 inch
B	48 mm 1.89 inch
C	12.5 mm 0.5 inch
D	150 mm 5.91 inch

2.49 Ω resistors are also supplied for each mA input

Installation

1. Cut out the panel to the size shown.

Panel cut out	
3504 controller A x A	
A	92 mm (-0.0, +0.8) 3.62 inch (-0.00, +0.03)
3508 controller A x B	
B	45 mm (-0.0, +0.6) 1.77 inch (-0.00, +0.02)



Recommended Minimum Spacing	
C	10 mm (0.4 inch)
D	38 mm (1.5 inch)

(Not to scale)

2. Fit the IP65 sealing gasket behind the front bezel of the instrument.
3. Insert the instrument in its sleeve through the cut-out.
4. Spring the panel retaining clips into place. Secure the instrument in position by holding it level and pushing both retaining clips forward.
5. Peel off the protective cover from the display.

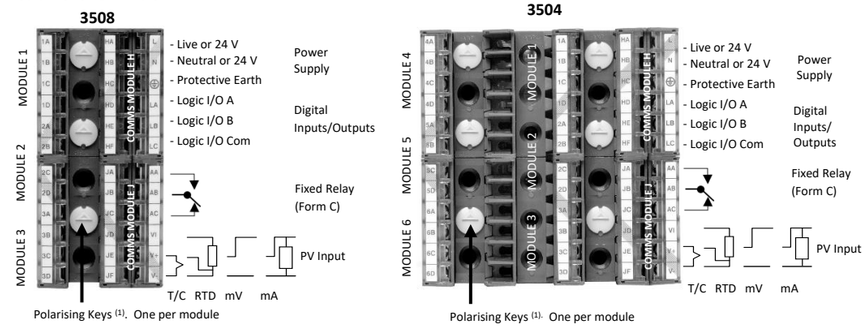
If the panel retaining clips subsequently need removing, they can be unhooked from the side with either your fingers or a screwdriver. **NOTE**: Please ensure the power is disconnected from the product prior to removing the retaining clips.

To Remove the Controller from its Sleeve

For Ethernet version ensure the Ethernet cables are disconnected from the rear of the controller (isolate the power supply first).

To remove, ensure that the latching ears are eased outwards, then pull the controller forward, to remove from the sleeve. When plugging back in ensure that the latching ears click into place to maintain the IP65 sealing.

Instrument Terminals



Modules

Caution: Ensure non-isolated modules are never installed in any 3500 Series controller. Non-isolated modules are NOT supported.

(1) Polarising keys are intended to prevent modules which are not supported in this controller from being fitted into the controller. An example might be a non-isolated module (coloured red) from a 2400 controller series. When pointing towards the top, as shown, the key prevents a controller, fitted with an unsupported module, from being plugged into a sleeve which has been previously wired for isolated modules.

Wiring

Wire Sizes: The screw terminals accept wire sizes from 0.5 to 1.5 mm (16 to 22 AWG) and should be tightened to 0.4N.m (3.5lbf/in). Hinged covers prevent hands or metal making accidental contact with live wires.

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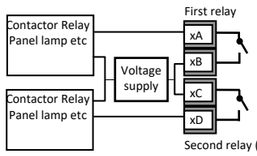
Plug in I/O Module Connections

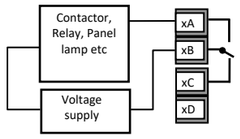
Plug in I/O modules can be fitted in three positions in the 3508 and six positions in 3504. The positions are marked Module 1, 2, 3, 4, 5, 6. With the exception of the Analogue Input or Dual DC Output modules (see below), any other module listed in this section, can be fitted in any of these positions. To find out which modules are fitted check the ordering code printed on a label on the side of the instrument. If modules have been added, removed, or changed it is recommended that this is recorded on the instrument code label.

Relay (2 pin) and Dual Relay Module



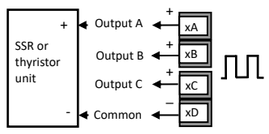
- Hardware Code: R2 and RR
- Rating of relays: 2A, 264 Vac max or 10 mA / 12 Vdc min to provide sufficient wetting current

Change Over Relay



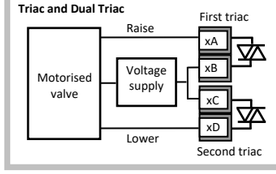
- Hardware Code: R4
- Relay Rating: 2 A, 264 Vac max
- or 10 mA / 12 Vdc min to provide sufficient wetting current.

Triple Logic and Isolated Single Logic Output



- Hardware Code: TP and LO
- Outputs Rating: Single logic 12 Vdc 24 mA
- Outputs Rating: Triple logic 12 Vdc 9 mA
- No channel isolation. 264 Vac double insulation from other modules and system
- Single Logic Output connections: D Common (-) and A Logic Output (+)

Triac and Dual Triac



- Hardware Code: T2 and TT
- Combined Output Rating: 0.7 A, 30 to 264 Vac
- Dual relay modules may be used in place of dual triac.
- **The combined current rating for the two triacs must not exceed 0.7 A**

For module functionality see 'Quick Code'.

The function of the connections varies depending on the type of module fitted in each position and this is shown below.

Note: The order code and terminal number is pre-fixed by the module number (x). For example, Module 1 is connected to terminals 1A, 1B, 1C, 1D; module 2 to 2A, 2B, 2C, 2D, etc.

- All modules are isolated 240 Vac CATII.

Snubbers

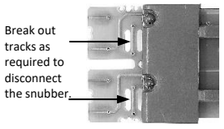
Snubbers are used to prolong the life of relay contacts and to reduce interference when switching inductive devices such as contactors or solenoid valves. The fixed relay (terminals AA/AB/AC) is not fitted internally with a snubber, and it is recommended that a snubber be fitted externally. If the relay is used to switch a device with a high impedance input, no snubber is necessary.

All relay modules are fitted internally with a snubber since these are generally required to switch inductive devices. However, snubbers pass 0.6mA at 110V and 1.2mA at 230Vac, which may be sufficient to hold on high impedance loads. If this type of device is used it will be necessary to remove the snubber from the circuit.

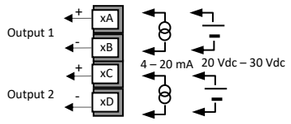
The snubber is removed from the relay module as follows: -

1. Unplug the controller from its sleeve.
2. Remove the relay module.
3. Use a screwdriver or similar tool to snap out the track.

The view shows the tracks in a Dual Relay Output module.



Dual DC Output (Slots 1, 2 and 4 only)



- Hardware Code: DO
- Output Rating: each channel can be 4 – 20 mA or 24 Vdc (nominal)

Standard Connections

These are connections which are common to all instruments in the range.

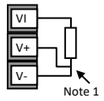
PV Input (Measuring Input)

1. Run signal cables separately from power cables.
2. When shielded cable is used, it should be grounded at one point only.
3. Any external components (such as zener barriers, etc) connected between sensor and input terminals may cause errors in measurement due to excessive and/or un-balanced line resistance or possible leakage currents.
4. This input is not isolated from logic I/O A and logic I/O B.

Thermocouple or Pyrometer Input

- Use the correct type of thermocouple compensating cable, preferably shielded, to extend wiring
- It is not recommended to connect two or more instruments to one thermocouple

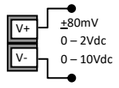
RTD Input



- The resistance of the three wires must be the same.
- The line resistance may cause errors if it is greater than 22 Ω

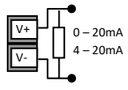
Note 1: For 2-wire this is a local link.

Linear Input V, mV and High Impedance V



- mV range ±40 mV / ±80 mV
- High level range 0 – 10 Vdc
- High Impedance mid-level range 0 – 2 Vdc. Used for zirconia probe oxygen input.
- A line resistance for voltage inputs may cause measurement errors.

Linear Input mA



- For mA input connect the 2.49 Ω resistor supplied across the input terminals
- The resistor supplied has 1% accuracy 50 ppm temperature coefficient.
- A resistor 0.1% accuracy 15 ppm resistor can be ordered as a separate item. Part No. SUB35/ACCESS/249R.1

Built in Relay (AA)

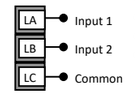
- Relay shown in de-energised state
- Isolated 240 Vac
- Relay rating: Max: 264 Vac 2 A resistive; min: 1 Vdc, 1 mAdc to provide sufficient wetting current.
- Relay shown in de-energised state

Digital I/O

These terminals may be configured as logic inputs, contact inputs or logic outputs in any combination. It is possible to have one input and one output on either channel.

The Digital IO is not isolated from the PV input. The controller is designed to operate normally if the input sensor is connected to 240Vac, but in this case these terminals will be at this potential.

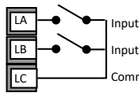
Logic Inputs



Voltage level logic inputs:

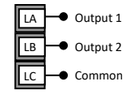
- 12 Vdc, 5-40 mA
- Logic '1' (Active): >10.8 Vdc
- Logic '0' (Inactive): <7.3 Vdc

Contact Closure Inputs



- Contact open >1200 Ω
- Contact closed <480 Ω

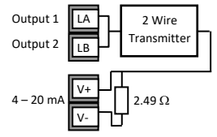
Digital (Logic) Outputs



- The logic outputs are capable of driving SSR or thyristors up to 9 mA, 18 Vdc. It is possible to parallel the two outputs to supply 18 mA, 18 Vdc.

The fixed digital logic outputs may be used to power remote 2 wire transmitters. The fixed digital I/O are, however, not isolated from the PV input circuit, so this does not allow the use of 3 or 4 wire transmitters. An isolated module must be used for the 3 and 4 wire types.

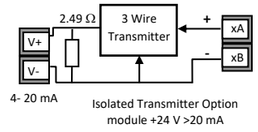
Digital (Logic) Outputs used to power a remote 2 wire transmitter.

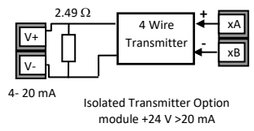


The parallel logic outputs supply >20 mA, 18 Vdc.

Connect the supplied load resistor equal to 2.49 Ω for mA input.

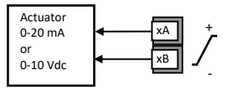
Digital (Logic) Output modules used to power remote 3 or 4 wire transmitters.





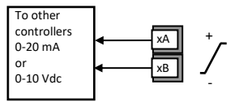
Plug in I/O Module Connections (continued)

DC Control



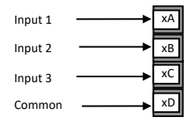
- Hardware Code: D4
- Output Rating: 10 Vdc, 20 mA max

DC Retransmission



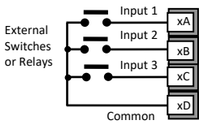
- Hardware Code: D6
- Output Rating: 10 Vdc, 20 mA max

Triple Logic Input



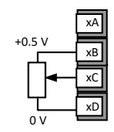
- Hardware Code: TL
- Input Ratings: Logic inputs <5Vdc OFF>10.8 Vdc ON Limits: -3 Vdc, +30 Vdc

Triple Contact Input



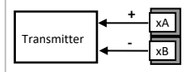
- Hardware Code: TK
- Input Ratings: Logic inputs >28 KΩ OFF <100 Ω ON

Potentiometer Input



- Hardware Code: VU
- Rating: 100 Ω to 15 KΩ

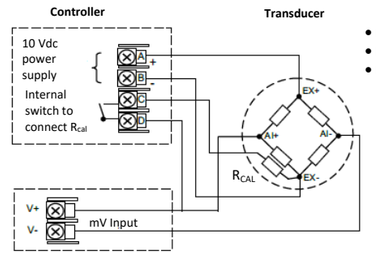
24 V Transmitter Power Supply



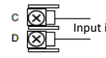
- Hardware Code: MS
- Output Rating: 24 Vdc 20 mA

Transducer Power Suppy

Transducer with Internal Calibration Resistor

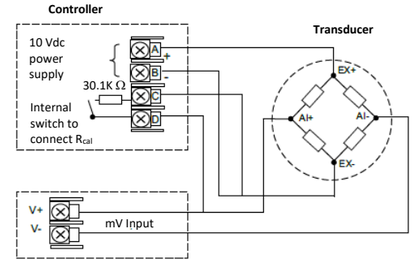


- Hardware Code: G3
- Rating: Configurable 5 Vdc or 10 Vdc
- Minimum load resistance 300 Ω



Input if an analogue input module is used in the appropriate slot.

Transducer with External Calibration Resistor



Switch On

Initial startup

The Controller will display the 'Comms Configuration' screen, follow the on-screen instruction to complete the Comms Configuration security function.

For further information refer to the 3500 User Guide (HA033837) > *Getting Started* section.

Note: No communication, including configuration with iTools is possible until the Comms Configuration requirements has been completed.

Start up (after Comms Configuration complete:)

If the Controller is new and has not previously been configured it will start up showing the 'Quick Start' codes. This is a built-in tool which enables you to configure the input type and range, the output functions and alarms.

⚠ Incorrect configuration can result in damage to the process and/or personal injury and must be carried out by a competent person authorised to do so. It is the responsibility of the person commissioning the instrument to ensure the configuration is correct.

To Configure Parameters in Quick Start Mode

With 'QckStart' selected, press ⟳ to scroll through a list of parameters.

Edit the parameters using ◀ or ▼.

When the required choice is selected a brief blink of the display indicates that it has been accepted.

The first parameter is **'Units'**.

This parameter is associated.

with Loop 1 **'LP1'** and resides

in the **'PV Input'** list as shown.

Continue setting up the parameters presented until the **'Finished'** view is displayed.

If all parameters are set up as required press ◀ or ▼ to select **'Yes'**.

The loop(s) are set to Auto on exit from Quick Start and the controller re-starts in operator level 2.

The 'HOME' display is shown.

If you wish to edit parameters again do not select 'Yes' but continue to press ♦.

All available parameters are shown in the following tables.

Example

Do This	Display	Additional Notes
1. From the Start view press ♦ 2. Press ◀ or ▼ to change the 'Units' 3. A different parameter is selected each time ⟳ is pressed		The first parameter to be configured is **'Units'**. It resides in the **'PV Input List'** because it is associated with the process variable. When the required choice is selected a brief blink of the display indicates that it has been accepted.
4. Continue setting up the parameters presented until the **'Finished'** view is displayed 5. If all parameters are set up as required press ◀ or ▼ to **'Yes'**		If you wish to scroll around the parameters again do not select Yes but continue to press ♦. When you are satisfied with the selections select **'Yes'**. The 'HOME' display section.

Quick Start Parameters - Plug in I/O Modules

The controller automatically displays parameters applicable to the module fitted - if no module is fitted in a slot, then it does not appear in the list.

Each module can have up to three inputs or outputs. These are shown as A, B or C after the module number, and this corresponds to the terminal numbers on the back of the instrument. If the I/O is single only A appears. If it is dual A and C appears if it is triple A, B and C appear.

Note: If an incorrect module is fitted the message 'Bad Ident' will be displayed.

Module type	Parameter	Value		Availability
Change over relay (R4) 2 pin relays (R2) Triac output (T2) Dual Relay (RR) Dual Triac Output (TT)	Relay (Triac) function	Not Used All parameters the same as RlyOP AA, including Min OnTime if the OP is a relay		Always (if the module is fitted)
Single Logic Output (LO) Triple Logic Output (TP)	Logic Out function	Not Used All parameters the same as RlyOP AA		Always (if the module is fitted)
DC Output (D4) DC Retransmission (D6)	DC Output function	Not Used	Module fitted but not configured	Always (if the module is fitted).
		LP1/2 Ch1/2OP	Loop 1/2 Channel 1/2 control output	Note: If a Dual DC Output module is fitted, it cannot be configured using the Quick Start Code. To configure this module, refer to the Engineering Manual part no. HA033837.
		LP1/2 SP Tx	Loop 1/2 setpoint retransmission	
		LP1/2 PV Tx	Loop 1/2 PV retransmission	
		LP1/2 ErrTx	Loop 1/2 error retransmission	
		LP1/2 PwrTx	Loop 1/2 output retransmission	
	Range Type	0–5 V, 1-5 V, 1–10 V, 2–10 V, 0-20 mA, 4-20 mA		
	Display High/low	100.0/0		
Triple Logic Input (TL) Triple Contact Input (TK)	Logic In function	Not Used	Module fitted but not configured	A function can only be allocated to one input. eg if AlarmAck is configured on X*A it is not offered for the other inputs * is the module number. LP2 does not appear if loop 2 is not configured.
		LP1/2 A-M	Loop 1/2 Auto/manual	
		LP1/2 SPsel	Loop 1/2 SP select	
		LP1/2 AltSP	Loop 1/2 Alternative SP select	
		AlarmAck	Alarm acknowledge	
		ProgRun/Reset/Hold	Programmer run/reset/hold	
Analogue Input (AM)	Analogue IP function	Not Used	Module fitted but not configured	LP1/2 V1Pos and LP1/2 V2Pos only appear if Loop 1 or 2 and the control channel 1 or 2 is set to VPB. Alt/SP does not appear if the programmer option is supplied. LP2 does not appear if loop 2 is not configured.
		LP1/2 AltSP	Loop 1/2 alternative setpoint	
		LP1/2 OPH/L	Loop 1/2 remote OP power max/min	
		LP1/2 V1/2Pos	To read valve position from the feedback potentiometer loop 1/2	
	Range Type	Thermocouple: J, K, L, R, B, N, T, S, PL2, C. RTD: Pt100 Linear: 0-50m Vdc, 0-5 Vdc, 1-5 Vdc, 0-10 Vdc, 2-10 Vdc, 0-20 mA, 4-20 mA		Not shown if analogue IP function not used
	Display High/low	100.0/0.0		These parameters only appear for Linear Range
Potentiometer Input (VU)	Pot Input function	Not Used	Module fitted but not configured	LP1/2 V1Pos and LP1/2 V2Pos only appear if Loop 1 or 2 and the control channel 1 or 2 is set to VPB. Alt/SP does not appear if the programmer option is supplied. LP2 does not appear if loop 2 is not configured.
		LP1/2 AltSP	Loop 1/2 Alternative setpoint	
		LP1/2 OPH/L	Loop 1/2 output power maximum/ minimum	
		LP1/2 V1/2Pos	To read valve position from the feedback potentiometer loop 1/2	
Transducer Power Supply (G3)	TdcrPSU function	5 Vdc or 10 Vdc		Always (if the module is fitted)
Transmitter power supply (MS)	No parameters. Used to show the ID of the module if fitted			

Quick Start Parameters - Fixed Build

Parameters shown in **bold** are defaults.

Group	Parameter	Value		Availability
LP1 PV Input	Units Engineering units for the PV. (C, F, K options change the displayed units)	**C**, F, K V. mV, A, mA, pH, mmHg, psi, Bar, mBar, %RH, %, mmWG, inWG, inWW, Ohms, PSIG, %O2, PPM, %CO2, %CP, %/sec, Vacuum, sec, min, hrs, None		Always
LP1 PV Input	Resolution Decimal point position for the PV	**XXXXX**, XXXX.X, XXX.XX, XX.XXX, X.XXXX		Always
LP1 PV Input	Range Type To select the linearisation algorithm required and the input sensor.	Thermocouple: J, **K,** L, R, B, N, T, S, PL2, C, CustC1(2&3) RTD: Pt100 Linear: 0-50 mV, 0-5 V, 1-5 V, 0-10 V, 2-10 V, 0-20 mA, 4-20 mA		Always
LP1 PV Input	IO Type Only shown if custom curve is selected	Thermocpl, RTD, Pyrometer, mV40, mV80, mA, Volts, HIZVolts, Log10		
LP1 PV Input	Range High/Low Max /min. display range and SP limits	Depends on Range type selected. Default **1372/-200**		Always
LP1 Loop	Loop 1 Channel 1, control type (normally Heat)	**PID**, VPU, VPB, Off, OnOff	VPU = Boundless valve position control. This does not need feedback potentiometer	Always
LP1 Loop	Loop 2 Channel 2, control type (normally Cool)	PID, VPU, VPB, **Off**, OnOff	VPB = Bounded valve position control. Requires a feedback potentiometer	Always
LP2 PV Input	Source Defines where the PV input is wired to	**None**, FixedPV, Module6 (Module6 is available only if an analogue input module is fitted).		If a dual loop controller
The LP1 parameters listed above are repeated for LP2 if the LP2 PV Input is configured.				
Init LgcIO LA	Logic function (input or output) To configure the function of Logic IO which can be an output or an input.	**Not Used,** Lp1 Ch1, Lp1 Ch2, Lp2 Ch1, Lp2 Ch2, Alarm1 to 8, AnyAlarm, NewAlarm, ProgEvnt1 to 8, LP1SBrkOP, LP2SBrkOP*, LPsSBrk*, (outputs) LP1 A-M, LP1 SPsel, LP2 A-M, LP2 SPsel, AlarmAck, ProgRun, ProgReset, ProgHold (Inputs)		[Note 1] [Note 2] * LP2 and LPs (both loops) only shown if the second loop is configured. Programmer options only available if the controller is a programmer/controller.
	Min OnTime (if configured as a control OP)	**Auto,** or 0.01 to 150.00		[Note 2] [Note 3]
The above two parameters are repeated for the LB Logic I/O (LgcIO LB)				
Init RlyOP AA	AA Relay output function This relay is always fitted.	**Not Used,** Lp1 Ch1, Lp1 Ch2, Lp2 Ch1, Lp2 Ch2, Alarm 1 to 8, Any Alarm, New Alarm, ProgEvnt1 to 8, LP1SBrkOP, LP2SBrkOP*, LPsSBrk*.		Always if the instrument Is ordered as a programmer/controller. [Note 4]
Init RlyOP AA	AA Relay Min OnTime	**Auto,** or 0.01 to 150.00		[Note 2] [Note 3]

Note 1) Parameters only appear if the function has been turned on, eg If 'Control Channel 1' = 'Off', 'Chan 1' does not appear in this list. When a control channel is configured for valve positioning, LgcIO LA and LgcIO LB act as a complementary pair. If, for example, Chan 1 is connected to LgcIO LA (valve raise) then LgcIO LB is automatically set to Chan 1 (valve lower). This ensures the valve is never raised and lowered simultaneously.

The same complementary behaviour also applies to dual output modules and channels A and C of triple output modules.

Note 2) If any input function, for example Chan 1, is connected to another input it will not appear in this list.

Note 3) Is available if the Control Channel is not On/Off and is allocated to the LA, LB or AA output as applicable.

Note 4) For valve position control Chan 1 or Chan 2 will not appear in this list. Valve position outputs can only be dual outputs such as LA and LB or dual relay/triac output modules.

Quick Start Parameters - Alarms

Parameters shown in Bold are defaults.

Group	Parameter	Value			Availability
Init Alarm 1 to 8	Type	**None**	No alarm type configured		Always
		Abs High/Low	Absolute high/low		
		Dev High/ Low/ Band	Deviation high/ low/ band		
Init Alarm 1 to 8	Source	**None**	Not connected		Always if Type ≠ None PV Input and ModX Ip do not appear if Type = Deviation
		PV Input	Connected to main process variable does not appear if Alarm Type = Deviation		
		LP1/2 PV	Connected to Loop 1/2 process variable		
		Module1 - Module6	Connected to an analogue input module and only of the Alarm Type is not a deviation alarm		
Init Alarm 1 to 8	Setpoint	To adjust the alarm threshold within the range of the source.			Always if Type ≠ None
Init Alarm 1 to 8	Latch	**None**	No latching		Always if Type ≠ None
		Auto	Automatic latching	The alarm continues to be active until both the alarm condition is removed AND the alarm is acknowledged. The acknowledgement can occur **BEFORE** the condition causing the alarm is removed.	
		Manual	Manual latching	The alarm continues to be active until both the alarm condition is removed AND the alarm is acknowledged. The acknowledgement can only occur **AFTER** the condition causing the alarm is removed.	
		Event	Alarm beacon does not light but any output associated with the event will activate and a scrolling message will appear.		
Finished	Exit	**No**	Continue back around the quick configuration list		
		Yes	Go to normal operation. The loop(s) are set to Auto on exit from quick start mode and the controller re-starts in Level 2.		

To Re-enter Quick Start Mode

If you have exited from Quick Start mode (by selecting 'Yes' to the 'Finished' parameter) and you need to make further changes, the Quick start mode can be entered again at any time.

1. Ensure the instrument is fully powered off.
2. Hold ▣ down then power up the controller. Keep this button pressed until the **'Startup' - 'Goto QckStart'** screen is displayed.
3. Press ♦ to enter the quick start list. You will then be asked to enter a passcode.
4. Use ◀ or ♦ to enter the passcode – default 4. If an incorrect code is entered the display reverts to the 'Quick Start' view.

It is then possible to repeat the quick configuration as described previously.

It is then possible to repeat the quick configuration as described previously.

Note: The Quick Start view contains two additional parameters - **'Cancel'** and **'Config'**.

Select **Cancel** to revert to normal operating mode.

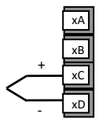
Config will allow full configuration mode to be entered (after entering the correct pass code). Configuration is described in the Engineering Manual HA033837.

Plug in I/O Module Connections (continued)

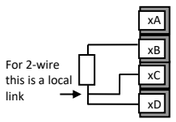
Analogue Input (T/C, RTD, V, mA, mVdc) Slots 1, 3, 4 & 6 only

- Hardware Code:AM
- Isolated output 240 Vac CATII

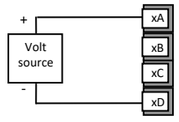
Thermocouple



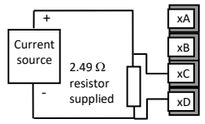
3-wire RTD



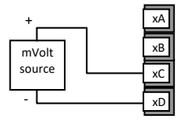
Voltage
-3 to 10 Vdc or –1.4 to 2 Vdc



Current
0 to 20 mA or 4 to 20 mA



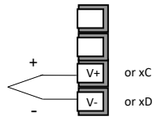
mV
±50 mV



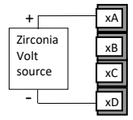
Analogue Input (Zirconia Probe)

- The temperature sensor of the zirconia probe can be connected to the Fixed PV input, terminals V+ and V-, or to an Analogue Input module, terminals C & D. The voltage source is connected to an Analogue Input module, terminals A & D.

Fixed PV (or an Analogue Input Module)

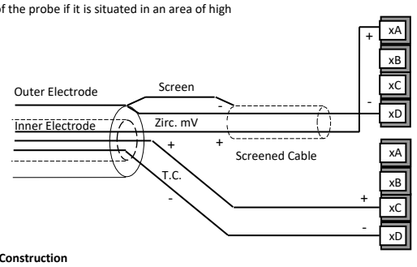


Analogue Input Module

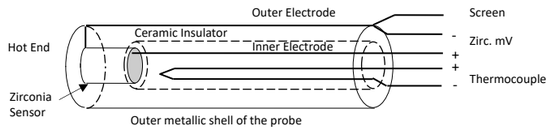


Zirconia Probe Screening Connections

The zirconia sensor wires should be screened and connected to the outer shell of the probe if it is situated in an area of high interference.

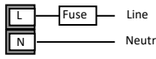


Zirconia Probe Construction

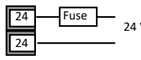


Controller Power Supply

Ensure that you have the correct supply for your controller.
Before connecting the instrument to the power line, make sure that the line voltage corresponds to the description on the identification label.



- High voltage supply:
  100 to 230 Vac, ±15%
  48 to 62 Hz



- Low voltage supply:
  24 Vac -15% +10%, 48 to 62 Hz
  24 Vdc -15% +20%

1. For supply connections use 16SWG or larger wires rated for at least 75 °C.
2. Use copper conductors only.
3. For 24Vdc the polarity is not important.
4. The power supply input is not fuse protected. This should be provided externally.

Recommended external fuse ratings are as follows:

- For 24 Vac/dc, fuse type: T rated 4 A 250 V
- For 100-230 Vac, fuse type: T rated 1 A 250 V

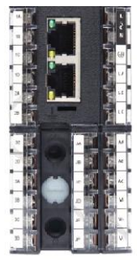
Safety requirements for permanently connected equipment state:

- A switch or circuit breaker shall be included in the building installation.
- It shall be near the equipment and within easy reach of the operator.
- It shall be marked as the disconnecting device for the equipment.

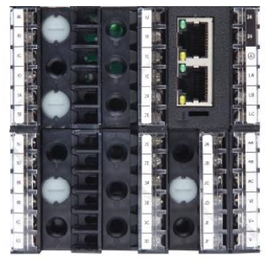
Note: a single switch or circuit breaker can drive more than one instrument.

Ethernet (MODBUS TCP)

For Ethernet communications use CAT5 Shielded Cable 10/100 Mbps.



3508

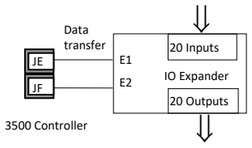


3504

I/O Expander

An I/O expander (Model No 2000IO) can be used with 3500 series controllers to allow the number of I/O points to be increased by up to a further 10 or 20 digital inputs and 10 or 20 digital outputs. Data transfer is performed serially via a two-wire interface module (order code EX) which is fitted in digital communications slot J.

A description of the IO Expander is given in handbook HA026893 which can be downloaded from https://www.eurotherm.com.



- The inputs and outputs to and from the IO Expander are isolated 240 Vac

Digital Communications Connections (Serial)

Digital Communications modules can be fitted in both H and J positions. The connections being available on HA to HF and JA to JF depending on the position in which the module is fitted. The two positions could be used, for example, to communicate with 'iTools' configuration package on one position, and to a PC running a supervisory package on the second position.

Communications protocols may be MODBUS (A2, Y2, F2), DeviceNet® (DN), MODBUS TCP (E2) or EI-Bisynch (AE, YE, FE). The Client (Master) protocol is also available for MODBUS (M1, M2, M3) and MODBUS TCP (E3). Please refer to the 3500 User Guide HA033837 for further details.

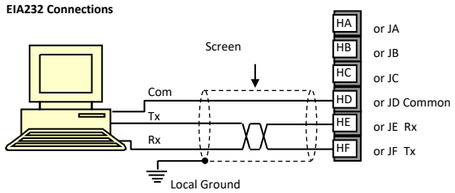
Note: In order to reduce the effects of RF interference the transmission line should be grounded at both ends of the screened cable. However, care must be taken to ensure that differences in the earth potentials do not allow circulating currents to flow. These circulating currents can induce common mode noise in the data lines. Where doubt exists, it is recommended that the Screen (shield) be grounded at only one section of the network as shown in all the following diagrams.

A further description of MODBUS communications is given in 2000 series Communications Handbook HA026230, which can be downloaded from https://www.eurotherm.com.

- The Digital communications modules are 264 Vac, double insulated from other modules and system.

Modbus (H or J Module)

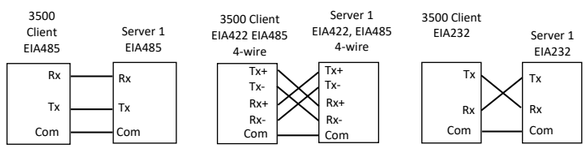
EIA232 Connections



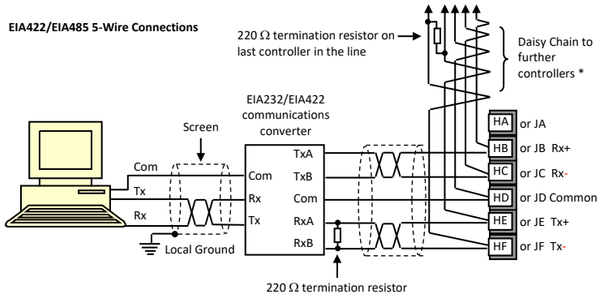
Broadcast and Modbus Communications Connections

Note: EIA422, EIA485 4-wire or EIA232

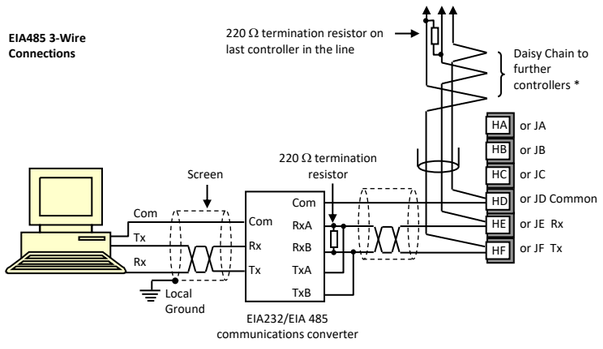
Rx and Tx connections in the Client are wired to Tx and Rx connections of the Server respectively.



EIA422/EIA485 5-Wire Connections



EIA485 3-Wire Connections



= Twisted pairs

* The use of bootlace ferrules may be an aid to wiring where two wires are to be connected to the same terminal

DeviceNet Wiring

Further information is available in the DeviceNet Communications Handbook Part No HA027506 which can be downloaded from https://www.eurotherm.com.

This table shows standard cable connections.

Controller Terminal	CAN Label	Wire Colour	Description
HA	V+	Red	DeviceNet network power positive terminal. Connect the red wire of the DeviceNet cable here. If the DeviceNet network does not supply the power, connect to the positive terminal of an external 24 Vdc power supply.
HB	CAN_H	White	DeviceNet CAN_H data bus terminal. Connect the white wire of the DeviceNet cable here.
HC	SHIELD	None	Shield/Drain wire connection. Connect the DeviceNet cable shield here. To prevent ground loops, the DeviceNet network should be grounded in only one location.
HD	CAN_L	Blue	DeviceNet CAN_L data bus terminal. Connect the blue wire of the DeviceNet cable here.
HE	V-	Black	DeviceNet network power negative terminal. Connect the black wire of the DeviceNet cable here. If the DeviceNet network does not supply the power, connect to the negative terminal of an external 24 Vdc power supply.
HF			Connect to instrument earth.

Safety and EMC Information

This instrument is intended for industrial temperature and process control applications within the requirements of the European Directives on Safety and EMC.

The information contained in this manual is subject to change without notice. While every effort has been made to ensure the accuracy of the information, your supplier shall not be held liable for errors contained herein.

⚠ The safety and EMC protection can be seriously impaired if the unit is not used in the manner specified. The installer must ensure the safety and EMC of the installation.

Safety. This instrument complies with the European Low Voltage Directive 2014/35/EU, by the application of the safety standard EN 61010.

Unpacking and storage. If on receipt, the packaging or unit is damaged, do not install but contact your supplier. If being stored before use, protect from humidity and dust in an ambient temperature range of -30ºC to +75ºC.

Electrostatic discharge precautions. Always observe all electrostatic precautions before handling the unit.

Service and repair. This instrument has no user serviceable parts. Contact your supplier for repair.

Cleaning. Isopropyl alcohol may be used to clean labels. Do not use water or water-based products. A mild soap solution may be used to clean other exterior surfaces.

Electromagnetic compatibility. This instrument conforms with the essential protection requirements of the EMC Directive 2014/30/EU, by the application of a Technical Construction File. It satisfies the general requirements of the industrial environment defined in EN 61326.

Caution: **Charged capacitors.** Before removing an instrument from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. Avoid touching the exposed electronics of an instrument when withdrawing it from the sleeve.

DANGER: **Ethernet Communication Module.** Do not remove a fitted Ethernet communications module from a 3500 series controller if no longer required as the IP rating of the rear terminals will be compromised, with an associated increased risk of electric shock.

Safety Symbols.

Symbols used on the instrument have the following meaning:

⚠ Caution, refer to accompanying documents ⏚ Protective Conductor Terminal ⏚ Functional earth Terminal.

Installation Category and Pollution Degree. This unit has been designed to conform to BS EN 61010 installation category II and pollution degree 2, defined as follows:

- **Installation Category II (CAT II).** The rated impulse voltage for equipment on nominal 230V supply is 2500V.
- **Pollution Degree 2.** Normally only nonconductive pollution occurs. However, a temporary conductivity caused by condensation must be expected.

Personnel. Installation must only be carried out by suitably qualified personnel.

Enclosure of Live Parts. To prevent hands or metal tools touching parts that may be electrically live, the controller must be installed in an enclosure.

Caution: Live sensors. The controller is designed to operate if the temperature sensor is connected directly to an electrical heating element. However, you must ensure that service personnel do not touch connections to these inputs while they are live. With a live sensor, all cables, connectors and switches for connecting the sensor must be mains rated for use in 230Vac ±15% CATII.

Wiring. It is important to connect the unit in accordance with the data in this sheet ensuring that the protective earth connection is ALWAYS fitted first and disconnected last. Wiring must comply with all local wiring regulations, i.e., UK, the latest IEE wiring regulations, (BS 7661), and USA, NEC Class 1 wiring methods.

⚠ Do not connect AC supply to low voltage sensor input or low level inputs and outputs.

Voltage rating. The maximum continuous voltage applied between any of the following terminals must not exceed 230Vac ±15%:

- relay output to logic, dc or sensor connections
- any connection to ground.

The controller must not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 240Vac with respect to ground and the product would not be safe.

Conductive pollution. Electrically conductive pollution i.e., carbon dust, MUST be excluded from the enclosure in which the controller is installed. To secure a suitable atmosphere in conditions of conductive pollution, fit an air filter to the air intake of the enclosure. Where condensation is likely, include a thermostatically controlled heater in the enclosure.

Grounding of the temperature sensor shield. In some installations it is common practice to replace the temperature sensor while the controller is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

Over Temperature Protection.

To prevent overheating of the process under fault conditions, a separate over-temperature protection unit should be fitted which will isolate the heating circuit.

This must have an independent temperature sensor.

Note: Alarm relays within the unit will not give protection under all failure conditions.

Installation Requirements for EMC. To comply with European EMC directive certain installation precautions are necessary: -

- General guidance. Refer to *EMC Installation Guide*, Part no. HA025464.
- Relay outputs. It may be necessary to fit a suitable filter to suppress conducted emissions. Filter requirements depend on the type of load.
- Tabletop installation. If using a standard power socket, compliance with commercial and light industrial emissions standard is usually required. To comply with conducted emissions standard, a suitable mains filter must be installed.

⚠ WARNING: This product can expose you to chemicals including lead and lead compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: https://www.P65Warnings.ca.gov

China RoHS 2.0

China RoHS Compliance - 3500 Series

部件名称 Part Name	有害物质 - Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 Metal parts	O	O	O	O	O	O
塑料部件 Plastic parts	O	O	O	O	O	O
电子件 Electronic	X	O	O	O	O	O
触点 Contacts	O	O	O	O	O	O
线缆和线缆附件 Cables & cabling accessories	O	O	O	O	O	O

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本表格依据SJ/T11364的规定编制。
O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

This table is made according to SJ/T 11364.
O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.

X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572.

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