Eurotherm T2750 PAC

Optimizing Control, Operations and Regulatory Compliance

Benefits

Precision control, advanced data security, energy management, and flexible I/O combined with powerful programmable application capability supports the development of systems that can easily integrate with existing platforms and 3rd party equipment as required.

The Eurotherm T2750 PAC product is designed with built-in functionality that reflects our core technology and application expertise – reducing engineering effort, helping to provide systems that are delivered on time and work first time.

- High-performance control in a versatile modular system
- Proven control algorithms already packaged and implemented where you need them
- Energy management solutions
- Embedded technologies to help meet requirements such as FDA 21 CFR Part 11 and AMS2750 without additional engineering

Key features

- Flexible modular I/O
- Cost-effective high availability options that don't require expensive engineering
- Point of measurement, tamper-resistant, redundant data recording
- Integrated batch management
- Distributed control and recording environment
- Integration with HMI visualisation software
- IEC based programming tools

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Eurotherm T2750 PAC

Product Overview

The Eurotherm™ T2750 Programmable Automation Controller (PAC) combines high performance and high availability into a cost-effective solution, designed to maximize uptime, and meet the stringent regulatory requirements of advanced manufacturing industries.

T2750 PAC controller redundancy is automatically commissioned; no special cabling or engineering is required. Bumpless processor changeover and support for hot swap of hardware, together with online addition, deletion and changing type of I/O modules also contribute to the high overall system availability.

Eurotherm PAC offers a distributed control and recording environment capable of continuous analog, logic, sequential and batch control, combined with tamper-resistant data recording at point of measurement – all designed to maximize your process uptime and return on investment.

Configured using IEC61131-3 based programming techniques, the Eurotherm PAC enables simplified engineering through Eurotherm LINtools integrated programming environment. The T2750 PAC controller supports online reconfiguration and online monitoring for all continuous and logic control functions to help maximize availability and minimize production downtime.

Unique PID control functions designed by Eurotherm are built into function blocks, enabling faster commissioning and more accurate control of the overall process, as well as easing conformance to regulatory and end-customer requirements.

Data recording and management embedded within the Eurotherm PAC helps manufacturers meet strict regulatory process data requirements, including:

- Eurotherm tamper-resistant UHH file format (a superior alternative to editable csv files commonly found in PLCs)
- Eurotherm 'Store and Forward' technology, delivering unsurpassed data integrity all the way to the Historian

The Eurotherm PAC System can run standalone, or be seamlessly integrated into system platform technologies, though Eurotherm dedicated extensions include a Data Access (DA) Server and a range of Application Objects (AO) to closely integrate the controller functions (data and alarms) straight out of the box.

Ethernet communication offers connectivity to IIoT (Industrial Internet of Things) and Industry 4.0 technologies.

Typical application industries

- Heat Treatment (including Aerospace and Automotive)
- Glass
- Life Sciences (Process Control and Environmental Monitoring Systems - EMS)
- Semiconductor Manufacturing
- Scientific Research Applications
- Food & Beverage
- Oil & Gas
- Water and Wastewater Treatment
- Power Generation (Boiler Control including Combined Cycle and Co-generation)
- Chemical
- Metals Processing (Steel, Aluminum, etc.)
- Industrial Boilers (Hospitals, Schools, etc.)

Easy to use function block libraries

- Advanced control and setpoint programming
- PID auto-tune and overshoot control functions
- I/O block interaction
- Signal conditioning and communications
- Motor, pump and valve device control
- Logic & math functions
- Timing functions
- Batch processing and management
- Data recording
- OEM Customization and Lockdown

IEC 61131-3 based programming languages

- Function Block Diagram (FBD)
- Ladder Diagram (LD)
- Sequential Function Chart (SFC)
- Structured Text (ST)

Specifications

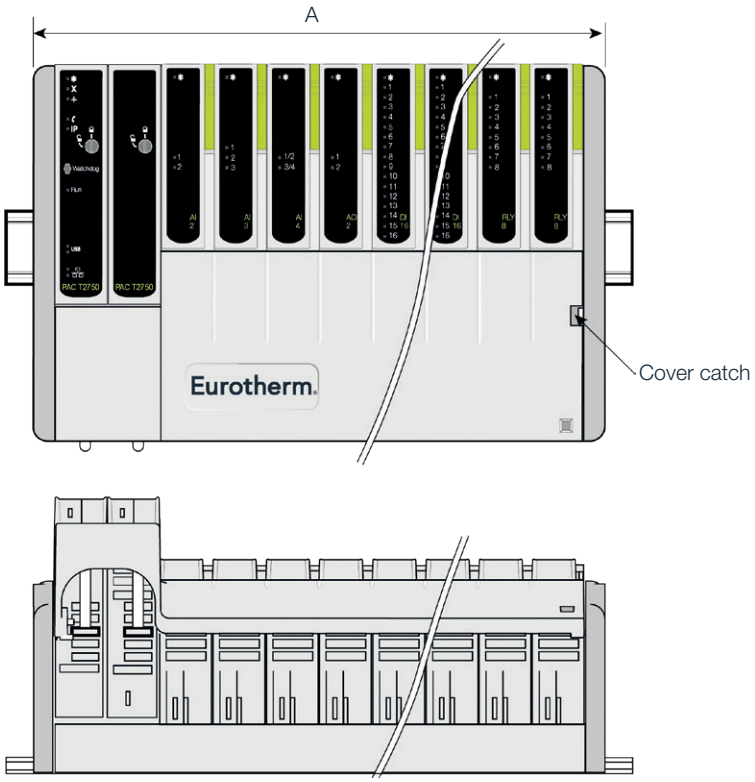
Physical Specifications

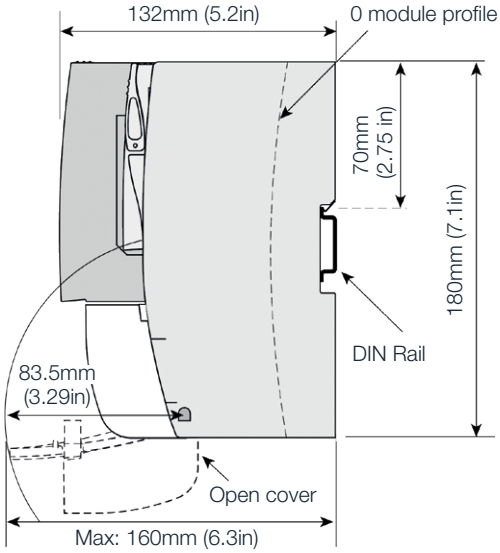
Base unit								
Modular format	T2750 single or redundant pair of processor modules with up to 16 I/O modules.							
Module connection	Modules plug onto removable terminal units which provide the wiring interface to the machine or plant.							
Base sizes	Bases are available in four widths, to fit 0, 4, 8, or 16 I/O modules.							
Backplane communication	The processor module communicates with the I/O modules via a passive internal module I/O bus running along the width of the base. Each module position is monitored separately to provide continuous I/O bus communication during live replacement of I/O modules.							
Base composition	The base consists of an aluminum extrusion, the internal I/O bus, and mounting supports.							
Mounting	Designed for horizontal DIN rail mounting (as shown in Dimensions diagram below), or direct attachment to a bulkhead or mounting plate.							
DIN rail type	Symmetrical DIN rail to EN50022 (35 x 7.5 or 35 x 15).							
Case protection rating	IP20.							
Ventilation space required	25mm (0.9in) free space above and below.							
Weight for different base widths (approx. dependent on I/O module types)	0 module base		4 module base		8 module base		16 module base	
	kg	lb.	kg	lb.	kg	lb.	kg	lb.
Base weight (no processor or I/O modules fitted)	0.35	0.77	0.7	1.54	1.0	2.16	1.6	3.53
Base weight (all processor and I/O modules fitted)	0.7	1.54	1.65	3.64	3.1	6.83	5.3	11.68

Mechanical Details

Terminal units click into place to suit the T2750 I/O module required

Any type of I/O modules can be placed at any slot position



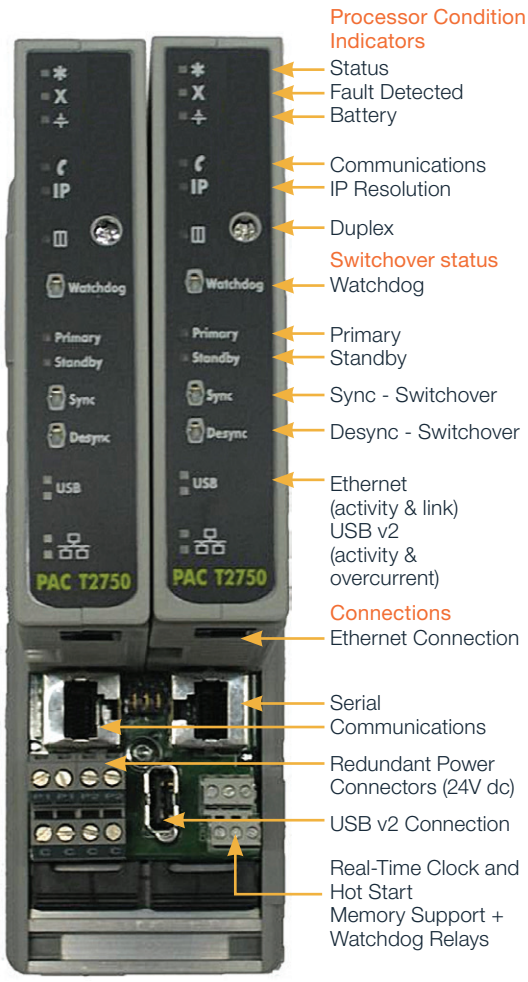


Base Size	A mm (inches)
0 module	61.25 (2.41)
4 module	162.75 (6.41)
8 module	274 (10.8)
16 module	477 (18.8)

Specifications

Functional Specifications

Processor Module	
Primary processor and communications diagnostics are available from the LEDs on the front of the processor module. More advanced diagnostics are available remotely using the LINtools monitor online over Ethernet to review the diagnostic blocks.	
Power-on Self Tests	On power up the T2750 automatically performs Power On Self Tests. These are a series of diagnostic tests used to assess the instrument health. The below LEDs indicate module diagnostic status in case of a problem.
PAC Controller module	A green LED at the top indicates the module is powered and operating correctly.
Internal diagnostics	A red LED indicates an abnormal operating state or detection of an issue by internal self diagnostics.
Battery (if installed)	A green LED indicates battery health.
Serial communications	A yellow LED indicates communications activity.
Duplex	Indicates inter processor communications.
Primary/Standby	Two LEDs indicate status information.
IP address	A yellow LED indicates if the unit has resolved its IP address for Ethernet communications.
Ethernet link	A yellow LED indicate Ethernet link and flashes to show activity.
Ethernet Link speed	A green LED indicates 100Mb/s operation.
USB link	A green LED indicate USB activity, periodic flashing shows unexpected behavior.
USB over-current indication	A yellow LED indicates an over current condition.



Processor Redundancy	
Changeover	Transfer from the primary to secondary processor is bumpless.
Changeover time	Dependent on application size, but < 0.6s (maximum) transfer for processor and I/O.
Synchronization	The non-active processor can be replaced while the system is running and upon synchronization it loads its control strategies from the active primary processor.
Synchronization time	Dependent on application size.

Processor Switchover

During a processor switchover all outputs remain at the last value. The new primary processor begins executing its application from precisely the same point as the original processor. Each processor has its own Ethernet IP address and each redundant pair uses two neighboring node addresses on the LIN network. This enables the system to communicate with the primary while still continuously testing communications to both processors. On processor switchover the LIN node address is dynamically swapped to allow SCADA applications to display and log uninterrupted data. Change over amongst LIN nodes is transparent. The following conditions can cause the processor to switch over:

Condition	Description
Hardware Failure Detected	Issue detected by primary controller internal health checks.
Hardware Removal	Removing the primary processor will cause the secondary to take immediate control. Removing the secondary will have no effect on control but will cause a system alarm on redundant configured systems.
Internal Communications	Primary and secondary controllers continually monitor the communications to the I/O on the local base. If the primary controller is not able to communicate with the I/O and the secondary can still communicate with the I/O, changeover will occur. If the secondary processor observes an issue with the primary communications, or can see more I/O modules the secondary processor will request a switchover.
External Communications	Monitors external controller communications. If the primary controller is not able to communicate with other declared nodes on the LIN network and the secondary can still communicate with the declared nodes a switchover will occur. If the secondary processor observes that it can see more declared nodes, the secondary processor will request a changeover.
Manual Request	A user can request a switchover if a secondary processor is running, synchronised and healthy.

Specifications

Control Specifications

User Tasks	
User Tasks	4
Multiple tasks are available to the user to tune the update rate of I/O.	
User Task Update Rates	
Tasks synchronous to Fast I/O Only 10ms I/O types can be assigned to this task (see I/O modules types).	10ms (or multiples thereof)*,
Tasks synchronous to Standard I/O All analog and digital I/O types can be assigned to this task.	110ms (or multiples thereof)*,
*If more tasks are configured than can be completed at the requested rates, then the task rates will be adjusted at runtime to accommodate the full set of tasks.	
Continuous Database Resources	
Maximum database size default max. values.	800k bytes
Database Resources	
Database blocks	2048
Database templates	170
Template libraries	32
External databases	32
Blocks in local database cached elsewhere	4096
Blocks in remote databases cached locally	1024
Server tasks	6
Block field-to-field connections	4096
Sequence Control Resources	
Sequence memory Program data	400k bytes
SFC Resources	
Root SFCs loadable	120
Steps loadable	1600
'Wires' permitted going into and out of step	5360
Transitions	2400
'Wires' permitted going into transitions	3200
Action associations	6400
Actions	3200

Setpoint Programmer Resources			
Programs limited by available database memory.			
Profiled channels per program	8		
Digital events per program	128		
User values per program	32		
Segments per program	32		
Programs	**Channels***	**Digital Events***	**User***
1 Program	8	128	32
2 Programs	4	64	16
4 Programs	2	32	8
8 Programs	1	16	4

* Per program (maximum)

Data Recording Speed	
Max. Recording rate (to .UHH file)	1s
Data Recording Capacity	

The following table provides an estimated memory capacity example, based on an 8-way base logging 16 parameters to a single group.

Recording Interval	Estimated Data Storage Duration	
	Min/Max Off	Min/Max On
1s	11 days	6 days
5s	57 days	29 days
10s	114 days	59 days
20s	228 days	118 days
60s	685 days	353 days

Recipes	
Recipe sets (files)	8 concurrent
Production lines	8 max. per set
Recipes	16 max. per set
Variables	1000 max. per set
Batch	
Batches (files)	8 concurrent
Max. no. of phases per batch	40

Specifications

Function Blocks

Function Blocks Categories

Definitions for licensing purposes: F = Foundation, S = Standard, C = Control, A = Advanced

License	Category				
I/O Block	**F**	**S**	**C**	**A**	
AI_UIO, AO_UIO	✓				Universal analog I/O
DI_UIO, DO_UIO	✓				Universal digital I/O
FI_UIO, MOD_UIO	✓				Frequency input, I/O module
MOD_DI_UIO, MOD_DO_UIO	✓				Multiple channel digital I/O
TPO_UIO, VP_UIO	✓				Time proportional out, valve position
CALIB_UIO	✓				Analog calibration
Communications					
GW_CON	✓				Modbus gateway configuration
GW_PROFM_CON	✓				PROFIBUS master gateway
GW_TBL	✓				Modbus gateway table
RAW_COM			✓		Raw (Open) communication
Conditioning					
CHAR, UCHAR	✓				Characterization, user defined
AN_ALARM, DIGALARM	✓				Analog and digital alarm
INVERT		✓			Analog inversion
FILTER, LEAD_LAG, LEADLAG		✓			First-order, Lead-lag
RANGE		✓			Re-ranges an analog input
FLOWCOMP		✓			Compensated flow
ZIRCONIA	✓				Compensated Zirconia function
GASCONC				✓	Natural gas concentration data
AGA8DATA				✓	American Gas Association #8 calculation
EMS_AN_ALM	✓				Acquisition, alarm, and calibration
TC_SEL		✓			Thermocouple select
TC_LIFE			✓		Thermocouple life
Control					
AN_CONN, DG_CONN, AN_DATA	✓				Analog and digital connection block
ANMS, DGMS		✓			Analog and digital manual station
SIM		✓			Simulation
SETPOINT		✓			Set-point
MAN_STAT		✓			Manual station
MODE		✓			Control mode selection
PID_LINK, TUNE_SET		✓			PID linking, Tune PID parameter
PID, 3_TERM, LOOP_PID			✓		PID control, including autotuning
Control Module					
VLV1IN, VLV2IN, VLV3WAY		✓			Valve control modules
MTR3IN		✓			Motor/Pump control module
DUTYSTBY		✓			Motor duty/standby
AN_ALM_2		✓			Time delayed alarm with disable

License	Category				
Timing	**F**	**S**	**C**	**A**	
TIMER, TIMEDATE	✓				Timer, Time/date event
DELAY		✓			Delay
TPO	✓				Time-proportioning output
RATE_ALM	✓				Rate alarm
RATE_LMT		✓			Rate limit
TOTAL, TOTAL2, TOT_CON		✓			Totalization
DTIME		✓			Dead-time
SEQE		✓			SEQ extender
SEQ			✓		Multi-segment slope/level/time
Selector					
ALC	✓				Alarm collection with common logic out
SELECT, SWITCH		✓			Selector, Switch
2OF3VOTE		✓			Selects 'best' input from 3, with average
Logic					
PULSE, LATCH, COUNT		✓			Pulse, Latch, Count
AND4, OR4, XOR4 NOT		✓			AND, OR, Exclusive-OR, NOT
COMPARE		✓			Greater/less than/equal of 2 inputs
Maths					
ADD2, SUB2, MUL2, DIV2		✓			Add, Subtract, Multiply, Divide.
EXPR		✓			Free-format structured text expression
ACTION, DIGACT, WORD_ACT			✓		Perform sequence type actions for use with control blocks
ACT15A3W, ACTUI818, ACT_2A2W3T			✓		Perform sequence type actions for use with control blocks
Diagnostic					
DIAG blocks (all)	✓				Diagnostic
Recorder					
RGROUP	✓				Recording group
DR_REPRT		✓			Generate reports in .UHH file format. with an associated report (UYF) file
Programmer					
PROGCHAN, SEGMENT		✓			Channel configuration, Seg. display
PROGCTRL	✓				Programmer control
SPP_RAMP		✓			Allow local ramping of setpoints
Batch					
BATCHCONTROL		✓			Manages batch execution with associated batch (UYB) file
RCP_SET		✓			Manages a recipe (UYR) file and links to the RCP_LINE block(s)
RCP_LINE		✓			Represents a single recipe line (used with RCP_SET block)
RECORD, DISCREP		✓			Record and Discrepancy block
SFC_MON, SFC_DISP_SFC_DISP_EX		✓			SFC monitor and display blocks
SFC_CON			✓		SFC control

Note – Refer to LIN Blocks documentation for a complete list.

Specifications

General Specifications

T2750M: Controller General Specifications	
Supply voltage range	24V dc ±20%
VA requirements	< 80W maximum for fully loaded rack
Fuse rating	0.5A time lag (Not customer replaceable)
IOC 'hot start' time	1 hour without external batteries
IOC power consumption	4.0W maximum
Surge current	8A maximum
Module power consumption	See individual module specification
Removable SD Memory Card	
The storage of the cold start application files, the processor firmware, and software licence code is on an SDHC card. This enables easy transfer from one processor to a replacement.	
Physical	
CPU	Freescale Power QUICC II Pro processor MPC8313
Bus size	32 bit
System clock	333 MHz
Logging capacity	32MB on board, Log files transferred by FTP or USB
SDHC card size	4GB
USB	Redundant USB 2.0 connected on terminal unit
Control switches	Processor front panel
Push button switches	Watchdog reset. Processor synchronization/changeover. Processor desynchronization
Watchdog Relays	
Each processor is fitted with a single watchdog relay.	
Watchdog relay	SPST, 1 per CPU, connected on the terminal unit
Contact rating (resistive)	24V ac/dc at 0.5A
Isolation	30V ac RMS or 60V dc
Live Plug-in	
Processors and I/O modules can be replaced while powered without any disturbance to the field wiring or other inputs and outputs – reducing downtime and minimising disturbance to other signal conditioning strategies.	

Communications	
Ethernet Communication	
The T2750 supports Ethernet LIN (ELIN) protocol that provides peer-to-peer communications between each processor over 10/100 BASE-T Ethernet. Simultaneously it can support Modbus-TCP Master and Slave to other Modbus-TCP devices.	
Ethernet Communication	
Connectors	RJ45 connector per processor
Network medium	Ethernet Cat5
Network type	LIN (ELIN)over Ethernet, Modbus-TCP master and slave
Speed	10/100 BASE-T auto-select
Network topology	Star connection to a switch
Line length (maximum)	100 meters, extendible by repeater
Allocation of IP address	Fixed, DHCP, Link-Local, BootP
Broadcast storm protection	Integrated in the processor
LIN address	8-way switch-bank – Duplex (bits SW2-8)
Maximum numbers of slaves	64 Modbus TCP slaves
Serial Communications	
Third party devices such as PLCs supporting Modbus can be readily integrated into the LIN based architecture by direct connection to controllers. The Modbus communications allows a T2750 to be used as a gateway providing access to database elements in any LIN node.	
RS422/485 Serial Communications	
Connector	2 x Shielded RJ45 connector
Comms medium	RS422 (5-wire) or RS485 (3-wire), jumper select
Line impedance	120Ω-240Ω twisted pair
Line length	1220m maximum at 9600 bits/sec
Units per line	16 maximum (electrical loading expandable by use of buffers)
Note: Use of a communications buffer/isolator is recommended	
Modbus/J-BUS	
Protocol	Modbus/J-BUS RTU and TCP as master and/or slave.
RTU serial data rate	Selectable 600-38.4k bits/sec.
RTU serial character format	8 bit, selectable parity, 1 or 2 stop bits.
Configuration memory size	51,672 bytes.
Modbus data tables	250, configurable as registers or bits.
Maximum table length	200 registers or 999 bits.
Number of communication links	1 x Modbus – RTU slave OR master. 1 x Modbus – TCP master. 1 x Modbus – TCP slave.
Maximum number of slaves	64 serial slave devices.
Redundancy	Modbus communications are supported by the controller in simplex and redundant mode.
Raw Communication	
Protocol	Device driven, Support for simple protocols written by user
Data rate	1200 to 38.4k bits/sec
Data format	7 or 8 data bits, selectable parity, 1 or 2 stop bits

Note – Refer to LIN Blocks documentation for a complete list.

Specifications

General Specifications

T2750A PBM PROFIBUS Master

Ethernet to PROFIBUS Master Gateway

The netHOST gateway allows the T2750 to access PROFIBUS Master functionality via a standard Ethernet interface.

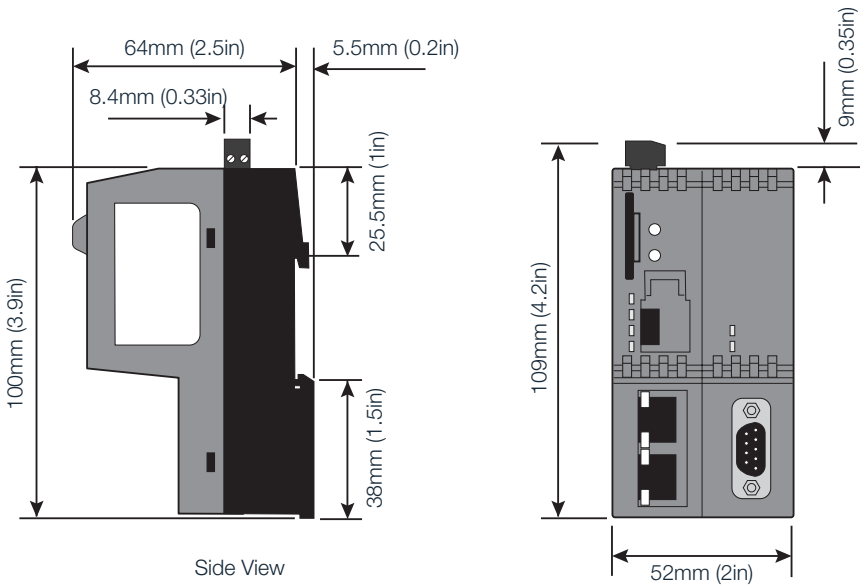
The modular gateway design combines the two network interfaces in a DIN rail mountable housing. The network ports allow the device to be inserted into a network without the need for a local switch. LED indicators are visualizing status information for rapid on-site diagnostics. The protocol conversions are pre-programmed and loaded as firmware into the device.

Simple or Duplex operation

For duplex operation, two units will be required; one for each T2750 processor.

Specification	
Device shall be supplied by an isolated voltage source.	
Supply voltage	24V ±6V dc with reverse voltage protection
Current at 24V	130mA (typically)
PSU connector	Mini-COMBICON, 2-pin
PROFIBUS DP slaves	125 maximum
Total cyclic input data	5712 bytes maximum
Total cyclic output data	5712 bytes maximum
Cyclic input data	244 bytes/slave maximum
Cyclic output data	244 bytes/slave maximum
Configuration data	244 bytes/slave maximum
Baud rate	9.6kBits/s, 19.2kBits/s, 31.25kBits/s, 45.45kBits/s 93.75 kBits/s, 187.5 kBits/s, 500kBits/s, 1.5MBits/s, 3MBits/s, 6MBits/s, 12MBit/s
Dimensions	(L x W x H) 100 x 52 x 70mm (3.9 x 2 x 2.7in) (without connector)

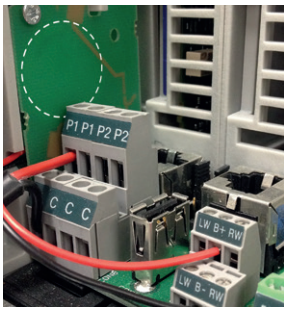
Mechanical Details

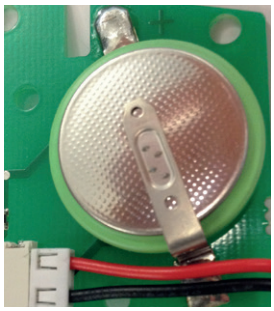


Specifications

General Specifications

T2750 Terminal Unit Power Supply Connection	
The duplex terminal unit supports dual power supply connection (See also T2750 image on p3 of this data sheet). In the event of one power supply not functioning correctly both processors are still supplied allowing redundant operation to continue uninterrupted.	
Redundant	< 0.6s bumpless transfer for processor and I/O.
Super capacitor (within processor)	Maintains memory and real time clock and enables 'hot start' for up to 1 hour in absence of battery backup input.
Simplex (0 module base)	Battery support for data in SRAM and the Real-Time Clock for a minimum of 72 hour continuous (5 year intermittent use).
Redundant	Additional terminals for an external battery connection to support SRAM and the Real-Time Clock.
Optional Battery	
An external battery (3.3V ±15%, 10µA max) can be connected in order to extend the 'hot start' period to several weeks.	





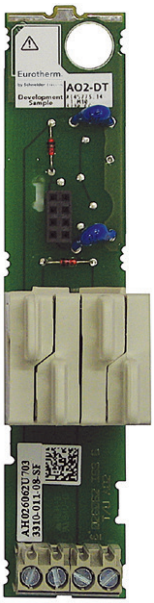
Diagnostic LEDs	
Diagnostic LED's indicate module diagnostic status.	
All modules	A green LED at the top indicates the module is powered and operating correctly.
PAC analog modules	Red LEDs for each channel to indicate channel failure detected.
PAC digital modules	Yellow LEDs for each channel to indicate the channel state.
Environmental	
Operating temperature	0 to 55°C
Storage temperature	–25°C to 85°C
Relative humidity	5 to 95% (non-condensing)
RFI	
EMC emissions	EN61326-1: 2013 Class A
EMC immunity	EN61326-1: 2013 Industrial Locations
Electrical Safety Standard	
	EN61010-1: 2010 Installation cat II, Pollution degree 2. Protective ground and screen connections are made to terminals at the bottom of the base.
Vibration	
Vibration	IEC1131-2 (2007) section 4.2.1 1.75mm peak amplitude 5-8.4Hz; 1g peak amplitude, 8.4-150Hz 30 minutes dwell at resonance in all 3 planes
Shock	15g static shock

Terminal Units

The I/O modules are mounted onto the backplane using terminal units. Terminal units provide the interface between input and output signals and their associated I/O modules. Terminal units and I/O modules are keyed to inhibit incorrect module insertion, to mitigate damage to both equipment and plant. Individual terminal units allow easy module replacement whilst leaving the field wiring connected. Modules are inserted and removed from the terminal unit using a unique, tool-less, locking lever system.

Test Disconnect Units

Terminal units for AI3, AO2 and DI8 modules have an optional disconnect link. This provides a series connection between the customer terminals and the I/O channel, providing partial isolation between the field and the system for diagnostic and fault finding purposes.



Specifications

Input / Output Module types

Supported I/O Module Types

The T2750 controller shares I/O modules with the T2550 and 2500 remote I/O.

Code	Description	Update rate
AI2-DC	Two channel isolated dc analog input module	110ms
AI2-TC	Two channel isolated thermocouple analog input module with CJC	110ms
AI2-MA	Two channel isolated mA analog input module	110ms
ZI	Two channel isolated zirconia analog input module	110ms
FI2	Two channel frequency input module	10/110ms
AI3	Three channel isolated 4-20mA analog input module with 24V transmitter PSU	110ms
AI4-MV	Four channel mV analog input module, channels isolated in pairs	110ms
AI4-TC	Four channel thermocouple analog input module with CJC, channels isolated in pairs	110ms
AI4-MA	Four channel mA analog input module, channels isolated in pairs	110ms
AI8-TC	Eight channel thermocouple analog input module with CJC, channels isolated in pairs	110ms
AI8-RT	Four channel isolated resistance/RTD analog input module	110ms
AI8-MA	Eight channel mA analog input module (110ms update rate), channels isolated in pairs	110ms
AI8-FMA	Eight channel mA analog input module (20ms update rate), channels isolated in pairs	20ms
AO2	Two channel isolated dc analog output module	110ms
DI4*	Four channel digital input	110ms
DI6-115V	Six channel isolated 115V ac digital input module	110ms
DI6-230V	Six channel isolated 230V ac digital input module	110ms
DI8-LG	Eight channel logic input	10/110ms
DI8-CO	Eight channel contact input	10/110ms
DI16	Sixteen channel digital input module	10/110ms
DO16	Sixteen channel digital output module	10/110ms
DO4*	Four channel digital output module	10/110ms
D08	Eight channel digital output module	10/110ms
RLY4*	Four channel relay output	10/110ms
RLY8	Eight channel isolated relay output module	10/110ms

*Module no longer available, but remains supported in existing installations.

Linearization tables and math equations

RTD and thermocouple linearizations are included in the T2750 PAC, see below tables for types. Custom linearization tables are available, with up to 255 break points. Mathematical equations are also available for functions such as SqRoot, powers (e.g. $x^{3/2}$, $x^{5/2}$) and polynomials etc.

RTD Types

RTD Type	Overall range		Standard	Linearization accuracy	
	(°C)	(°F)		(°C)	(°F)
Cu10	-20 to 400	-4 to 752	General Electric Co.	0.02	0.04
Cu53	-70 to 200	-94 to 392	RC21-4-1966	0.01	0.02
JPT100	-220 to 630	-364 to 1166	JIS C1604:1989	0.01	0.02
Ni100	-60 to 250	-76 to 482	DIN43760:1987	0.01	0.02
Ni120	-50 to 170	-58 to 338	DIN43760:1987	0.01	0.02
Pt100	-200 to 850	-328 to 1562	IEC751	0.01	0.02
Pt100A	-200 to 600	-328 to 1112	Eurotherm Recorders SA	0.09	0.16
Pt1000	-200 to 850	-328 to 1562	IEC751	0.01	0.02

Thermocouple types

T/C type	Overall range		Standard	Linearization accuracy	
	(°C)	(°F)		(°C)	(°F)
B	0 to 1820	32 to 3308	IEC584.1	0 to 400: 1.7 400 to 1820: 0.03	0 to 752: 3.1 752 to 3308: 0.05
C	0 to 2300	32 to 4172	Hoskins	0.12	0.22
D	0 to 2495	32 to 4523	Hoskins	0.08	0.14
E	–270 to 1000	-454 to 1832	IEC584.1	0.03	0.05
G2	0 to 2315	32 to 4199	Hoskins	0.07	0.13
J	–210 to 1200	-346 to 2192	IEC584.1	0.02	0.04
K	–270 to 1372	-454 to 2501	IEC584.1	0.04	0.07
L	–200 to 900	-328 to 1652	DIN43710:1985 (to IPTS68)	0.02	0.04
N	–270 to 1300	-454 to 2372	IEC584.1	0.04	0.07
R	–50 to 1768	-58 to 3214	IEC584.1	0.04	0.07
S	–50 to 1768	-58 to 3214	IEC584.1	0.04	0.07
T	–270 to 400	-454 to 752	IEC584.1	0.02	0.04
U	–200 to 600	-328 to 1112	DIN43710:1985	0.08	0.14
Ni/NiMo	–50 to 1410	-58 to 2570	ASTM E1751-95	0.06	0.11
Platinel	0 to 1370	32 to 2498	Engelhard	0.02	0.04
Mi/NiMo	0 to 1406	32 to 2563	Ipsen	0.14	0.25
	0 to 1888	32 to 3430	ASTM E1751-95	0.07	0.13
MoRe	0 to 2000	32 to 3632	Eurotherm	1.2	2.2

Specifications

AI2 modules

AI2 Two channel analog input module

The AI2 analog input module is available with three different terminal unit options for either DC, TC or mA input.

AI2-DC Two channel isolated dc input module

This option provides an AI2 module and DC terminal unit, for mV, V, resistance, RTD, and pot. position sensing applications. Channel 2 has an additional high impedance input range for use with zirconia probe oxygen sensors. However, if probe impedance checking is also required, a Zirconia input (ZI) module is a more suitable option.

General	
Number of channels	2
Power consumption	2W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Millivolt input (mV)	
Range	–150mV to +150mV
Initial accuracy	±0.1% of reading, ±10µV max
Resolution	Better than 0.001% of range
Voltage input (V)	
Range	–10.3V to +10.3V
Initial accuracy	Better than ±0.1% of reading, ±2mV
Resolution	Better than 0.001% of range
Resistance input (Ω)	
Range	0Ω to 560Ω, supporting 2, 3 or 4 wire sensor connection
Initial accuracy	Better than 0.1% of reading, ±0.1Ω
Resolution	Better than 0.04Ω with t=1.6 second filter
High resistance input for RTDs (Ω)	
Range	0Ω to 6kΩ, supporting 2, 3 or 4 wire sensor connection
Initial accuracy	Better than 0.1% of reading, ±0.6Ω
Resolution	Better than 0.25Ω with t=1.6 second filter
RTD types	Refer to RTD Type table page 9
Potentiometer input	
Range	0% to 100% rotation positioning of 100Ω to 6kΩ linear pot
Resolution	Better than 0.01% of range, with t= 1.6 second filter and 6kΩ pot.
High impedance input (channel 2 only) for zirconia probes	
Range	0.0V to +1.8V
Initial accuracy	Better than 0.1% of reading ±20µV
Resolution	Better than 0.001% of range

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

AI2 modules

AI2-TC Two channel isolated thermocouple input module

This option provides an AI2 module and TC terminal unit fitted with CJC sensor, for thermocouple inputs. It can also be used to measure inputs from other low range mV sensors such as pyrometers. Channel 2 has an additional high impedance input range for use with Zirconia probe oxygen sensors. However, if probe impedance checking is also required, a zirconia input (ZI) module is a more suitable option.

Thermocouple and millivolt input (mV)	
Number of channels	2
Power consumption	2W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Input range	–150mV to +150mV
Initial accuracy	±0.1% of reading, ±10µV max
Resolution	Better than 0.001% of range
CJC system	Pt100 RTD, located beneath terminal unit input connector
Initial CJC accuracy	±0.5°C typical (±1.0°C max.)
CJC rejection	>30:1 over operating temperature range
Thermocouple linerization types	Refer to Thermocouple Type table page 9

AI2-MA Two channel isolated mA input module

This option provides an AI2 module and MA terminal unit fitted with high precision 5Ω shunt, for current loop applications.

Current input	
Number of channels	2
Power consumption	2W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Input range	–30mA to +30mA with 5Ω shunt resistor in the terminal unit
Initial accuracy	Better than 0.25% of reading ±2uA
Resolution	Better than 0.001% of range
Shunt resister	5Ω resistor fitted to terminal unit

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

ZI modules

ZI Two channel isolated zirconia input module

The ZI module provides two analog input channels, optimized for Zirconia probe oxygen sensor measurements. Channel 1 with CJC sensor fitted provides a mV measurement for a thermocouple input, while Channel 2 provides a high impedance input range suitable for a Zirconia probe signal. The Zirconia function block includes an impedance test to indicate the health of the probe.

General	
Number of channels	2
Power consumption	1.8W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Mains rejection	>80db, (48 to 62Hz) common mode >60db, (48 to 62Hz) series mode
Millivolt input (mV) for thermocouple (Channel 1 only)	
Input range	–150mV to +150mV
Initial accuracy	±0.1% of electrical input, ±10µV max.
Measurement noise	5µV p-p with t=1.6s filter
Resolution	Better than 2µV with t=1.6s filter
Sensor break detect	250nA break high, low or off
Input impedance	10MΩ
CJC system	Pt100 RTD, located beneath terminal unit input connector
Initial CJC accuracy	±0.5°C typical (±1.3°C max.)
CJC rejection	>30:1 over operating temperature range
CJC sensor temperature range	–10°C to +70°C
Thermocouple linearization types	Refer to Thermocouple Type table page 9
High impedance millivolt input (mV) for Zirconia probe (Ch2 ONLY)	
Input range	0mV to +1800mV
Initial accuracy	±0.2% of electrical input
Measurement noise	0.1mV p-p with t=1.6s filter
Resolution	50µV with t=1.6s filter
Sensor impedance measurement	0.1kΩ to 100kΩ ±2%
Input impedance	500MΩ
Input leakage current	±4.0nA max, ±1nA typical

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

FI2 modules

FI2 Two Channel Frequency Input module

Provides two isolated frequency input channels and selectable voltage output for loop, wetting current, or sensor supply. Each input channel may be independently configured for magnetic, voltage, current, or contact sensor types.

General		
System isolation	300V RMS or dc (double insulation)	
Channel isolation	100V RMS or dc (basic insulation)	
Power consumption	3.7W maximum	
Frequency Measurements		
Range	Logic: 0.01Hz-40KHz, debounce off	
Magnetic	10Hz-40KHz	
Resolution	60ppm	
Accuracy	±100ppm, reference. ±160ppm overall ±0.05% drift over 5 years	
Pulse Counting		
Range	Logic: dc – 40KHz, debounce off	
Magnetic	10Hz-40KHz	
Magnetic Sensor Input Specification		
Input range	10mV-80V p-p	
Absolute maximum input	±100V	
Input impedance	>30KΩ	
Max frequency derating due to depounce	**Setting**	**Max Frequency**
	5mS	100Hz
	10mS	50Hz
	20ms	25Hz
	50ms	10Hz
Logic Input Specification		
Minimum pulse width (debounce off)	1.2uS	
Voltage		
Input range:	0-20V	
Absolute maximum input:	50V	
Input impedance:	>30KΩ	
Threshold:	0-20V (0.5V steps), ±0.2V hysteresis	
Accuracy:	±0.4V or ±7% of range, whichever is the greater	
Sensor break level:	50-310mV ±10%	
Current		
Input range:	0-20mA	
Absolute maximum input:	30mA	
Input impedance:	1KΩ	
Threshold:	0-20mA (0.5mA steps), ±0.2mA hysteresis	
Accuracy:	±0.4mA or ±7% of range, whichever is the greater	
Sensor break level:	0.05-0.31mA ±10%	
Sensor short circuit detect:	When <100Ω; restored when >350Ω	
Contact		
Input impedance:	5KΩ	
Threshold:	0-20V (0.5V steps), ±0.2V hysteresis	
Accuracy:	±0.4V or ±7% of range, whichever is the greater	
Debounce:	5, 10, 20, 50mS (Note: with debounce on, max frequency is limit and resolution is 600ppm)	
Output Specification		
Voltage	Selectable as 8, 12, or 24V dc at 10mA	
Maximum current	25mA	
Voltage drop at full load	1V @ 25mA	
Accuracy	±20%	

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

AI3 and AI4 modules

AI3 Three channel isolated 4-20mA analog input module with 24V transmitter power supply

The AI3 module and terminal unit is ideal for current loop transmitter applications. Each isolated channel includes a loop power supply for the transmitter if needed.

The power supply includes a current overload protection feature which automatically resets when the overload is cleared.

Milliamp input (mA)	
Number of channels	3
Power consumption	<1.2W for current input mode with no load. Up to 0.5W dissipated per load, (2.7W with 3 powered loops).
System isolation	300V RMS or dc (double insulation).
Channel isolation	50V RMS or dc (basic insulation).
Mains rejection	>120dB (47 to 63Hz) common mode. >60dB (47 to 63Hz) series mode.
Input range	–28mA to +28mA .
Initial accuracy	Better than 0.1% of reading ±2uA.
Resolution	Better than 0.002% of range with t=1.6 second filter (1.1µA).
Loop shunt resistor	60Ω nominal, 50mA maximum current. Shunt resistance can be increased to 250Ω for HART communication by cutting a track link on the terminal unit.
Channel PSU	22V min. (at 21mA) to 30Vmax. (at 4 mA). Current limit 33mA nominal. Self-resetting after overload.

AI4 Four channel analog input module

The AI4 analog input module is available with three different terminal unit options for either mV, TC or mA applications.

AI4-MV Four channel mV input module (isolated in pairs)

This option provides an AI4 module with a MV terminal unit for mV inputs from a variety of sensors, including pyrometers. Channels are isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).

Millivolt input (mV)	
Number of channels	4
Power consumption	2W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation). Isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Input range	–150 to +150mV at input impedance >20MΩ
Initial accuracy	Better than 0.1% of reading ±10µV
Resolution	Better than 0.002% of range with t=1.6 second filter (6µV)

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors.

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

AI4 modules

AI4-TC Four channel thermocouple input module (isolated in pairs)

This option provides an AI4 module and a TC terminal unit fitted with CJC sensor, for thermocouple inputs. It can also be used to measure inputs from other low range mV sensors, such as pyrometers. Channels are isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).

Thermocouple and millivolt input (mV)	
Number of channels	4
Power consumption	2W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation). Isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 wto 63Hz) series mode
Input range	–150mV to +150mV
Initial accuracy	Better than 0.1% of reading ±10uV
Resolution	Better than 2uV
CJC system	Pt100 RTD, located beneath input connector
Initial CJC accuracy	±0.5°C typical (±1°C maximum)
CJC rejection	30:1 over operating temperature range
Thermocouple linearization types	Refer to Thermocouple Type table page 9

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors.

AI4-MA Four channel mA input module (isolated in pairs)

This option provides an AI4 module and a MA terminal unit fitted with 5Ω shunt resistor, for current loop applications. Channels are isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).

Milliamp input (mA)	
Number of channels	4
Power consumption	2W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation). Isolated in pairs (Channels 1 and 2 isolated from Channels 3 and 4).
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Input range	–30mA to +30mA with 5Ω shunt resister in the terminal unit
Initial accuracy	0.25% of reading ±2µA
Resolution	Better than 0.002% of range with t=1.6 second filter (1.2µA)

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors.

Note: User calibration options can improve performance, limited by measurement noise and non-linearity

Specifications

AI8 modules

AI8 Eight channel analog input module (4 channel for RTD option)

The AI8 analog input module is available with four different terminal unit options for thermocouple, resistance/RTD, mA (110ms update rate) or mA (10ms update rate) applications.

AI8-TC Eight channel thermocouple input module (isolated in pairs)

This option provides an AI8 module and TC terminal unit fitted with CJC sensor, for higher density thermocouple applications. It can also be used to measure inputs from other low range mV sources with output impedance >1kΩ (floating or grounded). Channels are isolated in pairs (Channels 1 & 5, 2 & 6, 3 & 7, 4 & 8).

Thermocouple and millivolt input (mV)	
Number of channels	8
Power consumption	1.8W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation) galvanically isolated in pairs
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
Input range	–80mV to +80mV at input impedance >100kΩ
Initial accuracy	±8µV for readings inside ±8mV; ±0.1% of mV reading for values outside ±8mV
Resolution	>17 bit with t=1.6s filter (±1.5µV); 16 bit of span with no filter (±3µV)
CJC system	2 x Pt100 RTDs, located beneath terminal unit input connector
Initial CJC accuracy	±0.8°C
CJC rejection	30:1 over operating temperature range
Thermocouple linearization types	Refer to Thermocouple Type table page 9

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors.

AI8-RT Four channel isolated resistance/RTD input module

This option provides an AI8 module and RT terminal unit for resistance inputs. Supports four inputs from two/ three wire RTD sensors.

General	
Number of channels	4
Power consumption	1.8W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
RTD type linearization tables	Refer to RTD Type table page 9
Low resistance input	
Range	20Ω to 500Ω with 2 or 3 wire lead compensation
Initial accuracy	500Ω range: ±50mΩ for readings <50Ω; ±0.1% of reading for resistance readings >50Ω
Resolution	>17bit (±8mΩ) with t=1.6s filter, 16bit (±16mΩ) with no filter
High resistance input	
High ohms range	200Ω to 5kΩ with 2 or 3-wire lead compensation
Initial accuracy	5kΩ range: ±500mΩ for readings <500Ω; ±0.1% of reading for resistance readings >500Ω
Resolution	>17bit (±8mΩ) with t=1.6s filter, 16bit (±16mΩ) with no filter

Specifications

A18 modules

AI8-MA Eight channel mA input module (isolated in pairs)

This option provides an AI8 module and MA terminal unit with 3.3Ω shunt resistor fitted, for higher density mA input applications. Channels are isolated in pairs (Channels 1 & 5, 2 & 6, 3 & 7, 4 & 8). The update rate of the channels is 110ms. For applications requiring a faster update rate, the AI8-FMA module may be a more suitable option.

Milliamp input (mA)	
Number of channels	8
Power consumption	1.8W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation) galvanically isolated in pairs
Mains rejection	>120dB (47 to 63Hz) common mode >60dB (47 to 63Hz) series mode
mA range	–20mA to +20mA
Initial accuracy	±3.6µA for values inside ±2.4mA. ± 0.15% of reading outside ±2.4mA
Resolution	17bit with t=1.6s filter (±0.5µA); 16 bit of span with no filter (±1.0µA)
Update rate	110ms
Shunt resister	3.33Ω resistor fitted to terminal unit

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors

AI8-FMA Eight channel mA input module with 20ms update rate (isolated in pairs)

This option provides an AI8 module and MA terminal unit with 3.3Ω shunt resistor fitted, for higher density mA input applications that require faster update rates than the AI8-MA module. Channels are isolated in pairs (Channels 1 & 5, 2 & 6, 3 & 7, 4 & 8).

Milliamp input (mA)	
Number of channels	8
Power consumption	1.8W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation) galvanically isolated in pairs
mA range	–20mA to +20mA
Initial accuracy	±3.6µA for values inside ±2.4mA (full ambient temperature range) ± 0.15% of reading outside ±2.4mA (full ambient temperature range)
Resolution	>17bit with t=1.6s filter (±0.5µA); 16 bit of span with no filter (±1.0µA)
Update rate	20ms
Shunt resister	3.33Ω resistor fitted to terminal unit

Note: Wiring and sensor choice should be carefully considered to minimize ground loops when using non-isolated sensors.

Specifications

AO2 modules

AO2 Two channel isolated dc output module

The AO2 module and terminal unit provides two isolated analog output channels, independently configurable for current (mA) or Voltage (V) output.

General	
Number of channels	2
Power consumption	2.2W
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Voltage (V)	
Voltage output	–0.1 to +10.1V range: 20mA max, 550Ω min load –0.3V to +10.3V range: 8mA max,1500Ω min load
Initial accuracy	Better than ±0.1% of reading, max. offset ±10mV
Resolution	Better than 1 part in 10,000 (0.5mV typical)
Current (mA)	
Current output	–0.1 to 20.5mA; 10V dc max. with total load <500Ω
Initial accuracy	Better than ±0.1% of reading, max. offset ±20µA
Resolution	Better than 1 part in 10,000

Specifications

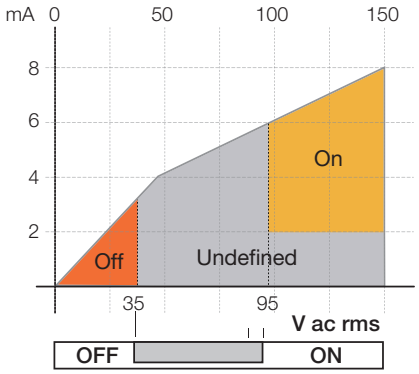
DI6 modules

DI6-115V Six channel isolated 115V digital input module

This option provides a DI6-115V module and terminal unit, for 115V AC logic inputs. The voltage is factory set and cannot be changed by the user.

115V ac logic input	
Number of channels	6
Power consumption	0.5W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Input functions	On/Off or de-bounce
Frequency	47Hz-63Hz
Active ON state (logic 1 voltage)	95V ac RMS to 150V ac RMS
Inactive OFF state (logic 0 voltage)	<35V ac RMS
Input current required for 'ON' state	>2mA
Maximum input current	8mA at 150V ac RMS
Transient immunity	EN61326

V-I curve for 115V ac Operation

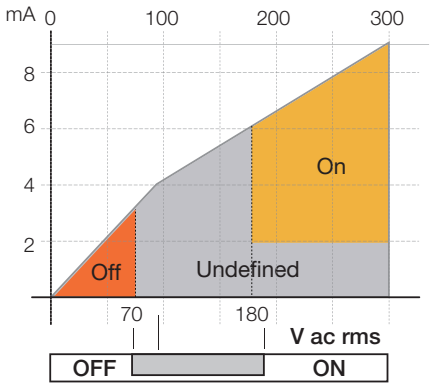


DI6-230V Six channel isolated 230V digital input module

This option provides a DI6-230V module and terminal unit, for 230V AC logic inputs. The voltage is factory set and cannot be changed by the user.

230V ac logic input	
Number of channels	6
Power consumption	0.5W max.
System isolation	300V RMS or dc (double insulation)
Channel isolation	300V RMS or dc (basic insulation)
Input functions	On/Off or de-bounce
Frequency	47Hz-63Hz
Active ON state (logic 1 voltage)	180V ac RMS to 300V ac RMS
Inactive OFF state (logic 0 voltage)	<70V ac RMS
Input current required for 'ON' state	>2mA
Maximum input current	9mA at 300V ac RMS
Transient immunity	EN61326

V-I curve for 230V ac Operation



Specifications

DI8 modules

DI8 – Eight Channel Logic/Contact Input

This eight channel digital input module accepts eight logic inputs and is available in two factory option formats for voltage or contact-closure input.

General (DI8-LG)	
Number of channels	8
Input functions	On/Off pulse and de-bounce inputs with input invert option
System isolation	300V RMS or dc (double insulation)
Channel isolation	50V RMS or dc (basic insulation) between pairs (1 and 2) to (3 and 4) to (5 and 6) to (7 and 8)
Power consumption	0.6W maximum
'Logic' Mode	
Logic inputs ON state: OFF state:	 Input voltage threshold >10.8V dc, 30V maximum Input voltage threshold <5.0V dc, non-overlapping
Input current	2.5mA approx. at 10.5V; 8mA maximum at 30V

General (DI8-CO)	
Number of channels	8
Input functions	On/Off pulse and de-bounce inputs with input invert option
System isolation	300V RMS or dc (double insulation)
Channel isolation	50V RMS or dc (basic insulation) between pairs (1 and 2) to (3 and 4) to (5 and 6) to (7 and 8)
Power consumption	1.9W maximum
'Contact' Mode	
Contact closure ON state: OFF state::	 Input resistance threshold 1000Ω (<1KΩ typical) Input resistance threshold 10kΩ (>7KΩ typical)
Wetting current	>4mA typical
Wetting voltage (effective)	>9V, 12V typical measured open circuit

Specifications

DI16 and DO16 modules

DI16 Sixteen channel digital input module

The DI16 module and terminal unit provide sixteen digital inputs for voltage input or contact closure applications.

General	
Number of channels	16
System isolation	300V RMS or dc (double insulation)
Channel isolation	Channels share a common connection ('C')
Max. voltage across any channel	30V dc
Contact input mode	
Power consumption	Module: 2.0W maximum
Power supply	16 to18V dc
Contact closure ON state	Input resistance threshold <1KΩ typical
Contact closure OFF state	Input resistance threshold >7KΩ typical
Wetting current	4mA
Wetting voltage	12V dc
Logic input mode	
Power consumption	Module: 0.75W maximum
Logic input ON state	Input voltage threshold >10.8V dc, +30V max.
Logic input OFF state	Input voltage threshold <5.0V dc, –30V min.
Input current	3.8mA at 12V dc; 2.8mA at 24V dc

DO16 Sixteen channel digital output module

The DO16 module and terminal unit provide sixteen logic outputs, typically used for control, alarm and event applications. Each channel can drive up to 0.7A and can be used for driving devices such as solenoids, relays, lamps, fans, thyristor units and single/three phase solid state relays (SSRs).

General	
Number of channels	16
Power consumption	Module: 0.6W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	Channels share a common 'C' connection
Voltage supply (external)	24Vdc ±20%
Maximum current ON State (Logic1)	0.7A per channel
Leakage current OFF state (Logic 0)	<10uA
Module thermal cut-off temperature	90±3°C; restart 88±3°C
Short circuit protection	0.7A to 1.7A per channel
Output voltage	Voltage supply (Vs) -1V switch drop

Specifications

DO8 modules

DO8 Eight Channel Digital Output Module

The DO8 digital output module provides eight logic outputs, which are typically used for control, alarms or event outputs.

Each channel has a 24V output with 0.75A capability (subject to a maximum of 4A total per module) and can be used for driving solenoids, relays, lamps, fans, thyristor units, single phase Solid State Relays (SSRs), or some three phase SSRs.

General	
Number of channels	8
Power consumption	0.6W maximum
System isolation	300V RMS or dc (double insulation)
Channel isolation	Channels share a common connection
Leakage current off state	<100uA
Output Specification	
Voltage supply (external)	18<Vs <30V dc
Supply protection	Internally limited at 4A (reaction time 4ms max.) Automatically resets 150ms after the cause of the fault has been rectified
Output voltage	>Voltage supply (Vs) -3V switch drop
Output voltage (logic 0)	<0.1V
Current output: Channel maximum: Channel maximum:	 0.75A/channel 4A total (500mA/channel, all channels ON)

Specifications

RLY8 modules

RLY8 Eight channel isolated relay output module

The RLY8 module and terminal unit provide eight relay outputs. These outputs may require external snubber circuits to be fitted for suppression of transient voltages (depending on application).

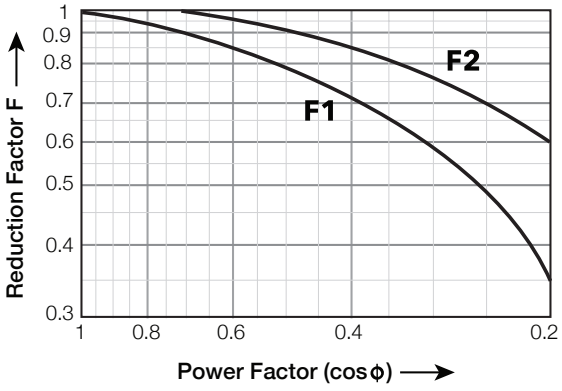
Relay output	
Number of channels	8 normally open, AgCdO contacts.
Power consumption	2.5W.
System isolation	300V RMS or dc (double insulation).
Channel isolation	300V RMS or dc (basic insulation).
Max. current rating	2A at up to 240V ac; 0.5A at 200V dc, increasing to 2A at 50V dc resistive.
Min. current rating	100mA at 12V.
Contact life (resistive load)	>10 million operations at 240V ac, 1A RMS (approx.). >600,000 operations at 240V ac, 2A RMS (approx.).
Mechanical life	>30 million operations (approx.).
De-rating	The above estimated ratings summarize typical performance with resistive loads. With complex loads further de-rating may be required.

Relay de-rating

AC Voltage

As the AC load becomes more “difficult” a more significant de-rating factor is required. The graph below shows worst case and typical reduction factor curves for inductive loads. Assuming the power factor of the load is pre-defined, an approximate reduction factor can be selected and applied to contact life.

Reduction factor for ac inductive loads

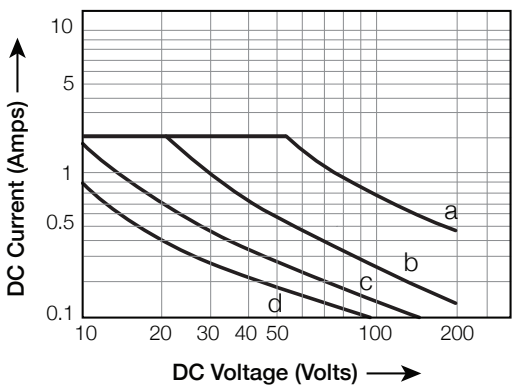


F1 = Worst case
F2 = Typical
Contact life (number of operations) =
Contact life (resistive) x reduction factor

DC Voltage

DC operation is limited for difficult loads, particularly where there is significant inductance. The curves below show the current limitation required against dc voltages, for resistive and inductive loads, where time constants (L/R) examples in ms are the significant factor.

Maximum dc inductive load breaking capacity

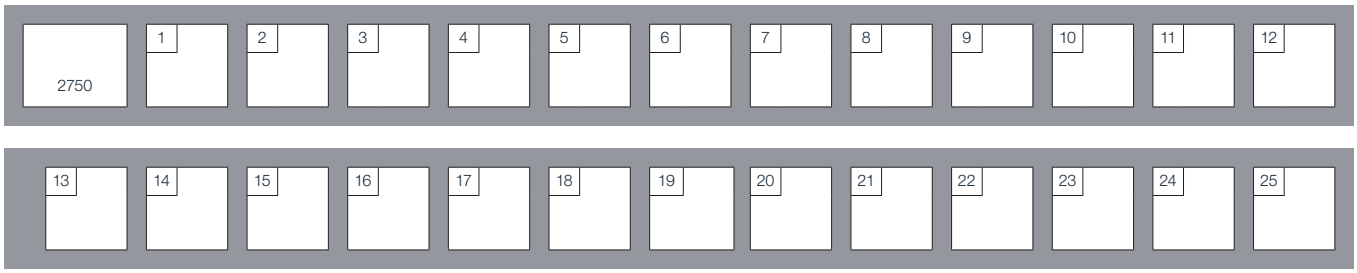


a - resistive
b - L/R = 20ms
c - L/R = 40ms
d - L/R = 60ms

Specifications

Order code specifications

Eurotherm PAC Order Codes



Basic product	
2750	CPU(s) Base & I/O Module

1	Redundant
R	2 CPUs for Redundant operation
S	1 CPU for Simplex operation

2	Base Size
A	16 I/O module positions
C	8 I/O module positions
D	4 I/O module positions
F	CPU(s) only (no I/O module)
1	16 I/O module positions + battery
3	8 I/O module positions + battery
4	4 I/O module positions + battery
6	CPU(s) only (no I/O module) + battery

3	Grounding System
0	Two ground clamps fitted
3	Earthing for 4 Module Base
1	Earthing for 8 Module Base
2	Earthing for 16 Module Base

4	License				
L	D	Foundation	Standard	Control	Advanced
A	K	Unbounded	0	0	Off
B	L	Unbounded	50	4	Off
C	M	Unbounded	100	8	Off
D	N	Unbounded	Unbounded	12	Off
E	P	Unbounded	Unbounded	16	Off
F	Q	Unbounded	Unbounded	24	Off
G	R	Unbounded	Unbounded	32	Off
H	S	Unbounded	Unbounded	Unbounded	Off
J	T	Unbounded	Unbounded	Unbounded	On

Note: L = Standard Control License; D = Data logging enabled license

5	Communications Protocol
1	ELIN, FTP, SNTP, Modbus RTU/TCP slave
2	Option 1 + Modbus RTU/TCP master and Raw Comms
3	Option 2 + PROFIBUS Master

6	Terminal Unit Connectors
A	RJ45 Modbus and USB

7	Disconnects (AI3, AO2 and DI8 modules only)
0	Standard terminals
1	Disconnects

8-23	Module and Terminations
B	AI2-TC 2 channel – T/C mV Input with CJC
C	AI2-DC 2 channel – PT100. HiZ Input
D	AI2-MA 2 channel – mA Input
E	AI3 3 channel – 4-20mA with Tx PSU
G	AI4-TC 4 channel – non isol T/C, with CJC
H	AI4-MV 4 channel – Non isolated mV Input
J	AI4-MA 4 channel – Non isolated mA Input
4	AI8 8 channel – Thermocouple, with CJC (isolated in pairs)
F	AI8 8 channel – mA Input (isolated in pairs)
L	AI8 4 channel – Isolated RTD Input
N	AI8 Fast 8 channel – Isolated mA Input (20ms)
K	AO2 2 channel – mA, V Output
P	DI6-HV 6 channel – 230 volt ac Input
Q	DI6-MV 6 channel – 115 volt ac Input
R	DI8-LG 8 channel – Logic Inputs
S	DI8-CO 8 channel – Contact Inputs
6	DI16 16 channel – Contact or Logic Input
Z	DO8 channel – Digital Output
7	DO16 16 channel – Digital Output
8	RLY8 8 channel – Relay Output
3	FI2 2 channel – Frequency Input
5	ZI 1 channel – Zirconia Input
0	No Terminal Unit or I/O Module (empty space)
A	Blank Terminal Unit only
Y	Terminal Unit with Dummy I/O Module (blank label)

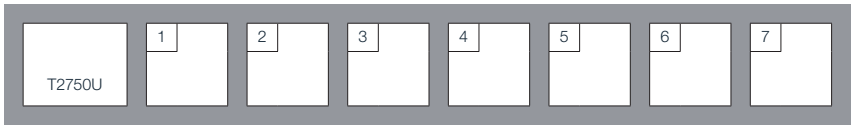
24	Batch
0	Batch not required
B	Batch Enabled

25	Recipe
0	Recipe not required
R	Recipe Enabled

Specifications

Order code specifications

Eurotherm PAC Order code (Licence upgrade)



Basic product	
T2750U	Licence Upgrade Only

1	Existing License				
L	D	Foundation	Standard	Control	Advanced
A	K	Unbounded	0	0	Off
B	L	Unbounded	50	4	Off
C	M	Unbounded	100	8	Off
D	N	Unbounded	Unbounded	12	Off
E	P	Unbounded	Unbounded	16	Off
F	Q	Unbounded	Unbounded	24	Off
G	R	Unbounded	Unbounded	32	Off
H	S	Unbounded	Unbounded	Unbounded	Off
J	T	Unbounded	Unbounded	Unbounded	On

Note: L = Standard Control License; D = Data logging enabled license

2	Existing Communications Protocol
1	ELIN, FTP, SNTP, Modbus RTU/TCP slave
2	Option 1 + Modbus RTU/TCP master and Raw Comms
3	Option 2 + PROFIBUS Master

3	Required License				
L	D	Foundation	Standard	Control	Advanced
A	K	Unbounded	0	0	Off
B	L	Unbounded	50	4	Off
C	M	Unbounded	100	8	Off
D	N	Unbounded	Unbounded	12	Off
E	P	Unbounded	Unbounded	16	Off
F	Q	Unbounded	Unbounded	24	Off
G	R	Unbounded	Unbounded	32	Off
H	S	Unbounded	Unbounded	Unbounded	Off
J	T	Unbounded	Unbounded	Unbounded	On

4	Required Communications Protocol
1	ELIN, FTP, SNTP, Modbus RTU/TCP slave
2	Option 1 + Modbus RTU/TCP master and Raw Comms
3	Option 2 + PROFIBUS Master

5	Specials
XX	No special specified
nn	Specials code

6	Batch
0	Batch not required
B	Batch Enabled

7	Recipe
0	Recipe not required
R	Recipe Enabled

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