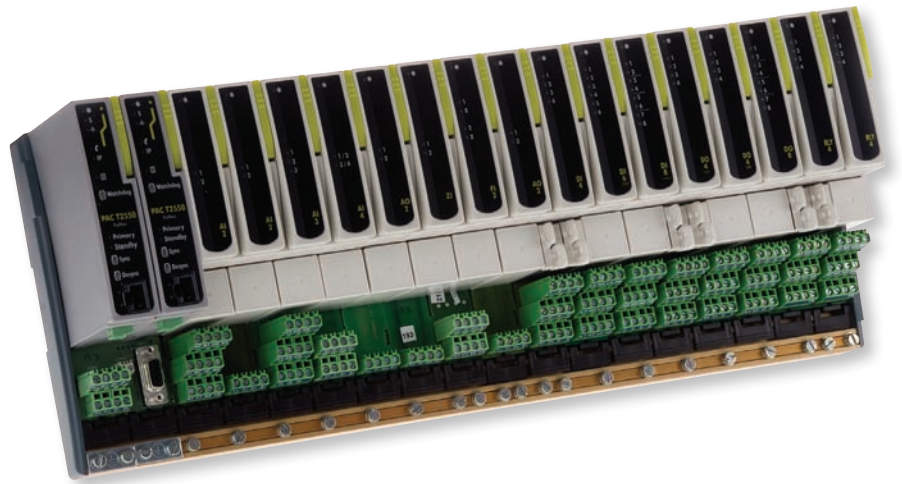




T2550 PAC

Programmable
Automation
Controller

MODEL



Foxboro T2550 PAC

HIGH PERFORMANCE CONTROL IN A VERSATILE, MODULAR SYSTEM

The T2550 Programmable Automation Controller (PAC) is a high performance solution with cost effective redundancy options. The control unit and I/O system form the basis of a complete distributed control and recording environment capable of continuous analog, logic, and sequential control, combined with secure data recording at point of measurement – all designed to maximize your return on investment.

Maximize Process Uptime

Using the T2550 PAC reduces engineering costs and its high availability maximizes process uptime. Controller redundancy is automatically commissioned – simply plug the additional processor module into the redundant base and press synchronize – no special cabling or engineering is required. Changeover to a secondary controller is automatic, with uninterrupted control and bumpless transfer of communications and process I/O. Replacement of a processor or I/O module, for any reason, can be done with the power on – and initialization is automatic. These powerful features combine with the high MTBF of the system's I/O and passive backplanes to provide extremely high system availability.

The T2550 PAC also supports online reconfiguration and online monitoring for all continuous and logic control functions. With support for adding and hot swapping I/O modules, active strategy components can be modified to support system enhancements without the need for a shutdown.

Redundant Data Recording

The T2550 PAC provides secure data recording at point of measurement. This powerful feature is offered with redundancy simply by plugging in the additional processor module. Again, no additional engineering is required as the system synchronizes itself. The data is held in non-volatile memory and is in a secure format to inhibit tampering. If your data has value to you, this simplest of offerings is the most powerful in the market place.

Summary

The Foxboro PAC System from Invensys enables secure and reliable process control and information recording with complete redundancy options for maximum availability.

The PAC System is a component of the InFusion Enterprise Control System. It is ideally suited for stand-alone applications and for integration into a wider ArchestrA-based control solution.

Business Value

Non-stop control and data acquisition is essential in today's competitive manufacturing environment. Regardless of the state of the surrounding environment, your process is able to run continuously without data loss which can mean the difference between a successful production run and an expensive scrap or rework.

Foxboro®



Autonomous and Integrated, Scalable, and Distributed

The T2550 PAC provides a comprehensive standalone solution or a powerful addition to a wider system. Communicating over 10/100baseT Ethernet (ELIN), its peer-to-peer communications system can be used for interlocking, signal conditioning, alarm monitoring, remote data acquisition, or devolved control. The T2550 PAC supports Modbus TCP, serial Modbus RTU (both as master or slave), Profibus slave, simple customer specific protocols, and OPC. The T2550 PAC can be used in conjunction with other systems such as PC based SCADA packages, Programmable Logic Controllers, and Eycon Visual Supervisor, or can provide an effective standalone solution.

A range of DIN rail mounting base sizes is available for I/O modules and serial communication interfaces. Multiple bases can be easily interconnected so processors can share interlocking, acquisition, and multi-loop control solutions in distributed and larger scale applications.

Scalable Control Units Match Process Hierarchy

The modular nature and seamless interaction of ELIN based control units allow both physical distribution and adoption of a structured control methodology.

T2550 Programmable Automation Controller

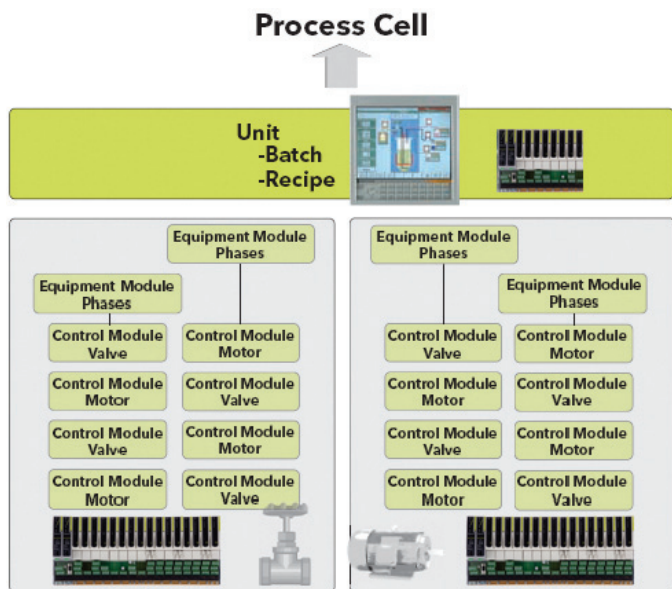
Each T2550 PAC base is capable of analog, logic, and sequence control and is self-contained up to a capacity of 128 I/O points. Larger systems can be easily implemented by interconnecting multiple T2550 PAC base units to form a distributed system utilizing the peer-to-peer communications.

Alternative Ethernet and serial communications protocols are available to facilitate simple connection to other equipment.

Devices supporting their own serial protocol can be connected to the T2550 PAC using the open communications (raw communications) option.

T2550 PAC Unit Supervisor

Large systems or complex sequence and batch applications are treated in a 'layered' fashion by decoupling the front-end, closedloop control and its associated I/O and control modules (logical devices) from the main strategy. This follows the S88.01 standard for batch control and is achieved by assigning the role of strategy coordination to the 'short' version of the T2550 PAC. This T2550 PAC, which uses the same processor as the standard controller has no I/O and provides coordination and sequence control of the lower level elements.



Redundant Processing

Using the T2550 PAC as a redundant controller pair automatically protects your process against controller or communications failure. If external or field I/O communications to the active controller, or the active controller itself fail, then the secondary controller automatically takes over, providing uninterrupted control and bumpless transfer of the communications, process I/O, and data historian. An alarm warns the operator that the changeover event has occurred.

A processor can be replaced for any reason with the power on. Commissioning a redundant capable processor is simple: Plug the second processor into a redundant base unit and press synchronize – all the rest is automatic. No special cabling is required.

Continuous and Logic Control

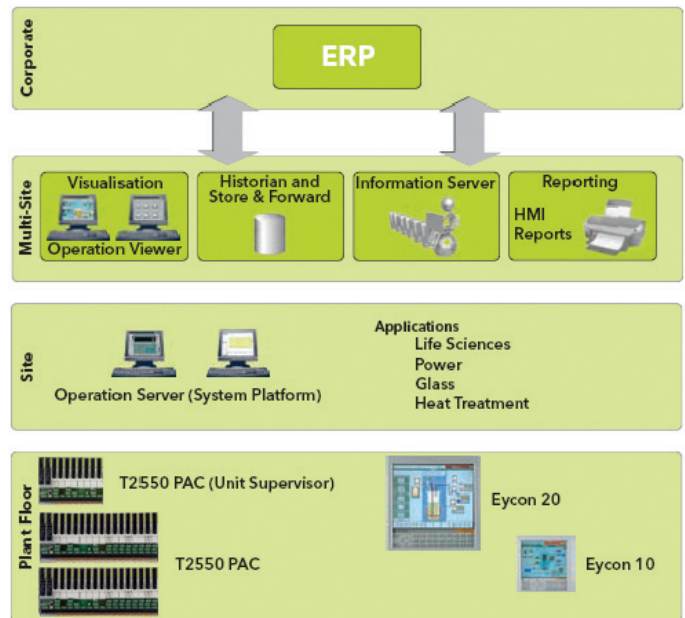
The T2550 PAC supports the level of block structuring normally only found in advanced DCS systems. The continuous strategy is built up by interconnection of function blocks from a rich library of analog and logic elements.

Sequence Control

Sequences act in a supervisory role relative to the continuous database and can be loaded and unloaded independently. This is increasingly important for batch sequences, which relate to the process rather than the physical equipment, as these must be changed to meet the requirement of flexible plants. The capacity of the local filing system allows storage of a large number of sequences. Their operation is controlled through specialized blocks in the continuous database.

ELIN System Architecture

ELIN is Ethernet based Local Instrument Network. The ELIN control network is the backbone of the control and data acquisition network that provides peer-to-peer communications between control nodes and seamless access to all data by operator and configuration workstations.



All nodes appear as part of a coherent distributed database. The database in any networked element is accessible to any other network element, allowing complete flexibility in strategy interconnection.

ELIN supports OPC with a readily available server for direct connection to operator and configuration workstations. It also supports the Eycon visual supervisor and other Eurotherm control and logging units in which standalone or panel-mounted display and control is needed. Remote monitoring, diagnostics, and application enhancement is available via secure off site communications.

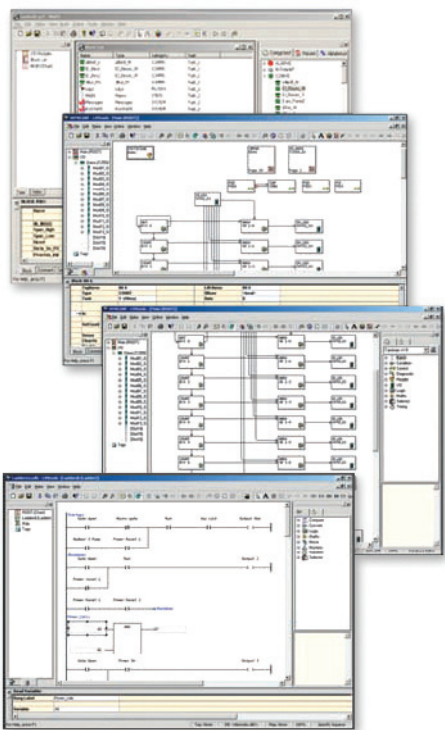
Configuration

At the heart of the system is the LINtools configuration and engineering station. LINtools is a comprehensive set of configuration, test, documentation, and commissioning tools for strategy elements distributed over the LIN control backbone.

The LINtools suite includes graphical configuration of block structured continuous control, sequence control SFCs, ladder, and graphics for any LIN based product. View and Online reconfiguration modes allow dynamic monitoring and editing of running databases and flow charts.

LINtools follows the IEC 61131-3 standard for sequence configuration, while adopting a decoupling of continuous and sequential strategy appropriate to complex process control.

LINtools is designed for simplicity and productivity. Online help, free-format text annotation, and area editing are included to make LINtools easy to use. LINtools runs on a standalone or networked PC.



IEC 61131

Languages appropriate for the I/O type and for the application are:

- Function Block Diagrams
- Structured Text
- Sequence Function Charts
- Ladder Logic Control

Online Reconfiguration

Large and complex control systems are expected to serve many needs and work well for long periods without shutdown under ever varying workloads. Online reconfiguration provides a useful foundation for enhancement of a deployed control system and allows modification of the systems application software while it is running. It allows active strategy components to be modified, wrapped with additional functionality, or replaced with a different implementation. The T2550 PAC has generic support for adding and hot swapping I/O. Online reconfiguration can use the same or new I/O interfaces and any internally available variables. You can tentatively add and delete function blocks and wires to create a new or improved control strategy for your application while the process is running. You can then try the strategy to ensure it is correct before final application. A secure file tracking system is provided for version control.

Continuous Control

Continuous strategies are configured graphically on screen using 'block structured' techniques implemented across the system. The control configurator supports a comprehensive library of functions together with powerful editing and compound definition facilities. Merging allows the re-use of similar sections of databases, avoiding duplication of effort. Free text can be placed on the screen or attached to function blocks for simple production of descriptive documentation. Context-sensitive help reduces the need of referring to manuals.

Sequence

Sequences are configured graphically using Sequential Function Charts (SFCs) following the IEC 61131-3 standard. Steps initiate Actions which may be Structured Text statements (ST) or nested SFCs. Transitions determine when control passes from one step to the next. By accessing the continuous control strategy this configurator presents the available points through a menu system thus eliminating the need to remember the names of points and reducing the likelihood of typing errors.

The sequence configurator supports text annotation and context sensitive help. A combination of mapping lists and generic Sequential Function Charts are available to easily duplicate identical SFC models on different units (tags).

Action Block

Action blocks in the continuous control strategy have their functionality defined in Ladder diagrams or Structured Text (ST) within a standard template. These are particularly useful for implementation of plant control modules.

Documentation

LINtools provides an electronic documentation facility including the graphical representation of the control strategy and a listing of the block parameters and connections. This can be transferred across the network and output can be to a printer, Postscript, or AutoCAD compatible format. Free-format user annotations can be added to complete your documentation requirements.

Multi-Setpoint Programmer

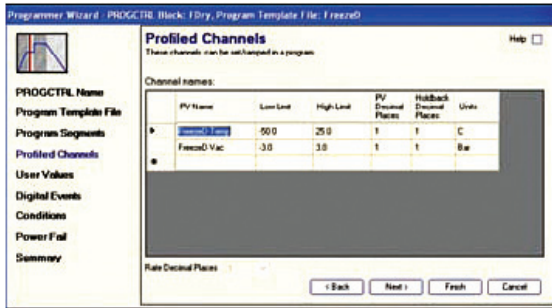
Many applications need to vary the process value over time: Temperature control is one such application in which it is very common to 'ramp' the process value from one level to another over a set time period using a setpoint program.

The PAC provides support for multiple setpoint programs that can be run simultaneously. Each program is capable of profiling up to eight channels, with up to 32 segments per profiled channel. In addition to controlling the setpoint during each segment of the profile, the controllers can also be used to activate up to 16 digital events during a segment.

The setpoint program feature enables an operator to select and run a pre-configured setpoint program. A preview facility allows the operator to view the selected program before running it. Once the program is running, the setpoint and achieved process values are both plotted on the trend screen.

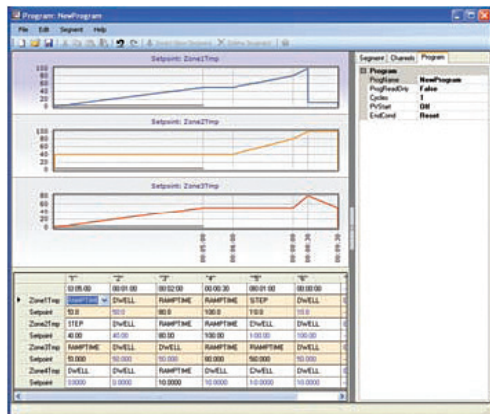
Setpoint Program Wizard

For ease of use, LINtools incorporates a wizard for creating a setpoint program. By following the on screen prompts and editing the parameters as required, a setpoint program can be simply and quickly created with all required blocks automatically created and added to the database.



Setpoint Program Editor

In addition to the setpoint program wizard, programs can be created or edited off-line using the setpoint program editor supplied with LINtools. As an ActiveX, this tool can be inserted into any of your visualization packages.



Redundant Recording and Archiving

Programmable Automation Controllers (PACs) have internal non-volatile flash memory for secure tamper resistant data storage, and providing for redundant data logging. In addition all PAC processors support Ethernet connectivity. As such, data stored within the internal flash memory can be configured to periodically archive to primary, secondary, and tertiary FTP servers. Archiving files to FTP servers provides a secure, infinite archiving capacity.

Data Historian

Data historian is used to store PVs, message and alarm information in the internal flash memory in order to generate historical data in the form of a set of secure, tamper resistant history files. The following example provides estimated memory duration based on an 8-way base logging 16 Parameters to a single group:

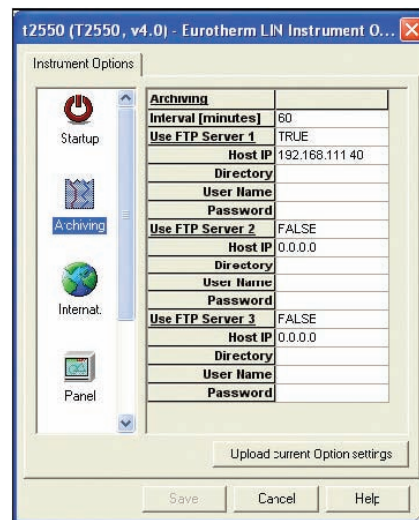
Recording Interval	Estimated Duration	
	Min/Max Off	Min/Max On
(Update A)		
1s	60 hrs	31 hrs
5s	12 days	6 days
10s	25 days	13 days
20s	50 days	26 days
60s	150 days	77 days

FTP Push

For efficiency, historical data files are automatically deleted on a first in first out (FIFO) basis from the internal flash memory of the PAC (7Mb for history). In order to ensure longevity of data the PAC is able to push historical data files (.uhh) to primary, secondary, or tertiary FTP servers at user defined intervals. Thus, depending on the archive strategy chosen, data is never lost.

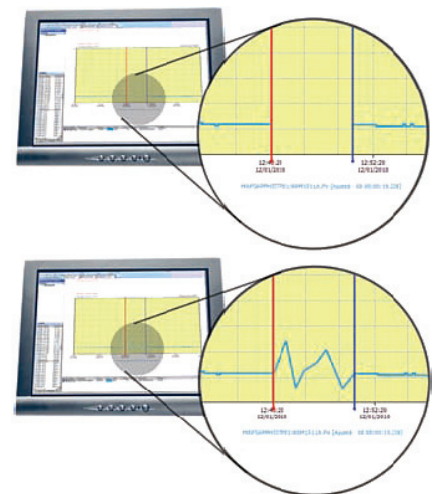
Data Archiving

Data archiving is used to copy selected parts of the history, i.e. one or more history files (.uhh) to primary, secondary, or tertiary FTP Servers.



Historian Store and Forward

'Store and Forward' is a self healing 21 CFR Part 11 data archiving system which automatically stores data during a communication failure in the T2550 PAC hardware and then forwards this data to the configured data historian server once communication is reinstated.



The T2550 PAC

provides dual redundant data acquisition using Secure (.uhh) files created at the local level, which results in a secure electronic recording system with total data integrity.

Alarm Management

Alarms are managed and collected within the T2550 PAC to provide features such as alarm status and priority, acknowledgement, date, and time stamping at the source, as well as suppression and local message historian storage.

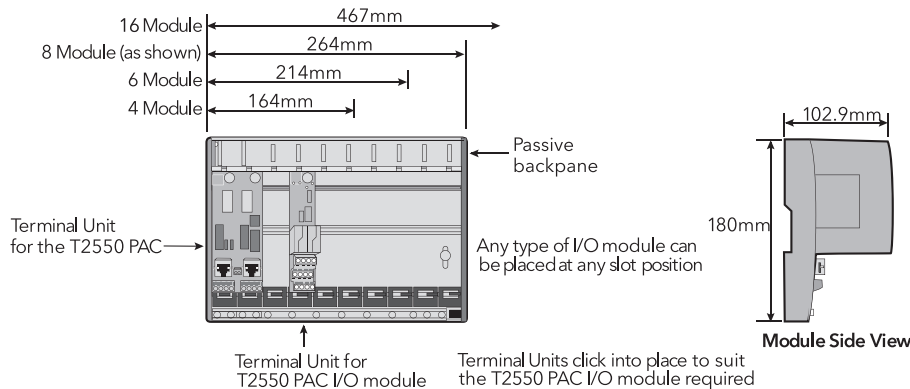
Open Communications

The PAC provides a special function block to define any simple serial communications protocol. This function block can be used to integrate many 3rd party devices which use ASCII communications, such as bar code readers and particle counters. Direct control over transmit and receive also allows multi-node connections.

HMI Reports

HMI Reports provides an intuitive reporting package to develop and print reports using the secure data from the T2550 PAC. The package includes a report studio for configuring report projects and a run-time execution module to generate and print reports in many different formats to printers, file servers, and via e-mail. HMI Reports is also optionally available as a web portal.

SPECIFICATIONS



255BF: BASE UNIT

The base unit is fitted with the T2550 PAC I/O controller modules plus additional I/O modules. These modules plug onto terminal units, which provide the wiring interface between the plant or machine and the I/O modules. Bases are available in 5 sizes to suit the number of modules required in a particular system.

Communication between the I/O modules and the processor is effected by the use of a passive internal module I/O bus running the width of the base.

Each module position is tracked separately for additional security during live replacement of I/O modules.

The base consists of an aluminium extrusion, the internal I/O bus, and mounting supports. It is designed to be DIN rail mounted or directly fixed to a bulkhead or mounting plate. Both base and modules can be installed horizontally or vertically.

Mechanical

I/O Module Capacity	0	4	6	8	16
Width (mm)	36	164	214	264	467
Weight Kg (No modules)	0.2	0.45	0.6	0.7	1.2
Weight kg (all modules)	0.5	1.3	1.7	2.1	3.7
Height:	180mm				
Depth:	102.9-132.9mm with retaining lever raised				
Mounting:	DIN rail or Bulkhead, can be mounted horizontally or vertically				
DIN rail:	Use symmetrical DIN rail to EN50022-35 x 7.5 or 35 x 15				
Casing:	Without additional protection IP20				
Ventilation space:	25mm free space above and below				

Termination Units

The I/O modules are mounted on the base using terminal assemblies. Terminal assemblies provide the interface between the input and output signals and the I/O modules. Terminal assemblies and I/O modules are keyed to inhibit insertion of the incorrect module to prevent damage to both equipment and plant.

Individual termination units provide for easy module replacement leaving the field wiring connected. Modules are inserted and removed from the termination unit using a unique, tool-less, locking lever system.

Test Disconnect Units

Terminal assemblies have an optional fuse or link (isolator or disconnect). This provides a series of connections between the customer terminals and the I/O module, permitting pluggable fuse or link units to be placed in series with the signal. Fuse and link units are not interchangeable.



ORDER CODE – Redundant Base

255BF-16R/C16/CDM/-/-	16 module base with earth clamps
255BF-08R/C08/CDM/-/-	8 module base with earth clamps
255BF-06R/C06/CDM/-/-	6 module base with earth clamps
255BF-04R/C04/CDM/-/-	4 module base with earth clamps
255BF-16R/NON/CDM/-/-	16 module base without earth clamps
255BF-08R/NON/CDM/-/-	8 module base without earth clamps
255BF-06R/NON/CDM/-/-	6 module base without earth clamps
255BF-04R/NON/CDM/-/-	4 module base without earth clamps
255BF-00S/NON/CDM/-/-	0 module base for additional processors and comms

T2550 PAC: GENERAL SPECIFICATIONS

Supply voltage range:	19.2 to 28.8V dc
VA requirements:	< 80W maximum for fully loaded rack
Fuse rating:	4A time lag (Not customer replaceable)
IOC warm start time:	1 hours without external batteries
IOC power consumption:	1.5W maximum
Surge current:	8A maximum
Module power consumption:	See individual module specification

Environmental

Operating temperature:	0 to 55°C
Storage temperature:	-25 to 85°C
Relative humidity:	5 to 95% (non-condensing)

RFI

EMC emissions:	BS EN61326 2002-02
EMC immunity:	BS EN61326 2002-02

Safety

BS EN61010-1/A2;19931995 Installation cat II, Pollution degree 2
Safety earth and screen connections are made to clearly marked earth terminals at the bottom of the base

Vibration

Vibration:	EN60068-2 test FC IEC1131-2 section 2.1.3 0.075mm peak amplitude 10-57Hz; 1g, 57-150Hz 20g static shock
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Diagnostic LEDs

Diagnostic LEDs indicate module diagnostic status.

All modules:	A green LED at the top indicates the module is powered and operating correctly
PAC analog modules:	Have red LEDs for each channel to indicate channel failure
PAC digital modules:	Have Yellow LEDs for each channel to indicate the channel state

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 LINtools monitor online over Ethernet to review the diagnostic blocks.

PAC Controller module:	A green LED at the top indicates the module is powered and operating correctly
Internal diagnostics:	A red LED indicates failure of the internal self diagnostic routines
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:	Two LEDs indicate link activity
Link speed:	10/100baseT
Power On self tests:	On power up the T2550 PAC automatically performs Power On Self Tests. These are a series of diagnostic tests used to assess the instrument. The above LEDs indicate module



CPU Redundancy

Processor redundancy is available for continuous, logic, and sequence control. A pair of processors operate in primary / secondary configuration with a high speed data link between them providing exact tracking of the control, logic, and sequence databases. Transfer from the primary to secondary processor is bumpless. The non-active processor can be replaced while the system is running and on synchronization it loads its strategy from the active primary processor.

Redundant:	< 0.6s bumpless transfer for processor and I/O
Changeover time:	dependant on application size
Synchronisation time:	dependant on application size

Processor Switchover

During a processor switchover all outputs remain at the last value. The new primary processor begins executing is 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 ELIN network. This enables the system to communicate with the primary while still continuously testing communications to both processors. On processor switchover the ELIN node address is dynamically swapped to allow SCADA applications to display and log uninterrupted data. Switchover amongst LIN nodes is transparent.

The following conditions can cause the processor to switchover:

Hardware Failure: Failure of 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. Should the primary controller not be able to communicate with the I/O and the secondary can still communicate with the I/O switchover will occur. If the secondary processor observes a fault in the primary communications or can see more I/O modules the secondary processor will request a switchover.

External Communications: Monitors external controller communications. Should the primary controller not be 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 switchover.

Manual Request: A user can request a switchover if a secondary processor is running, synchronized and healthy.

Removable SD Memory Card: The storage of the cold start application files, the processor firmware and software licence code is on a secure SD flash card to enable easy transfer from one processor to a replacement.

Physical

CPU:	Motorola MPC852T
Bus size:	32 bit
System clock:	66 MHz
Removable Flash card size:	32 Mbytes

Control Switches

Processor front panel Watchdog reset. Processor synchronization/push button switches: Switchover. Processor resynchronization.

Power Supply Connection

The duplex terminal unit supports dual power supply connection. In the event of a single power supply failure both processors are still supplied allowing redundant operation to continue uninterrupted.

To facilitate hot start of the processors. A super capacitor maintains memory for up to 1 hour in the event of complete power failure. An external battery can be fitted to extend this backup time on the redundant system.

Super cap (Processor):	Maintains memory/real time clock and enables hot start for up to 1 hour in absence of battery backup input
Simplex (O 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

External rechargeable battery: Retains memory and real-time clock chip in absence of main supply to extend Warm start capacity > 1 hour.

Code	Description
T2750-BBA	Backup Battery Assembly - includes Charger and Battery
T2750-BBB	Backup Battery Spare / Replacement Battery
T2750-BBC	Backup Battery Spare Charger

Watchdog Relays

Each processor is fitted with a single watchdog relay.
 Watchdog relay: SPST, 1 per CPU, connectable in parallel or series
 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 minimizing disturbance to other signal conditioning strategies.

T2550 PAC—Order Code

Basic product

255F Programmable Automation Controller

1 - IOC and software L = Standard License D = Data Logging

	Foundation	Standard	Control	Advanced
L10/D10	Unbounded	0	0	off
L20/D20	Unbounded	50	4	off
L30/D30	Unbounded	100	8	off
L40/D40	Unbounded	Unbounded	12	off
L50/D50	Unbounded	Unbounded	16	off
L60/D60	Unbounded	Unbounded	24	off
L70/D70	Unbounded	Unbounded	32	off
L80/D80	Unbounded	Unbounded	Unbounded	off
L90/D90	Unbounded	Unbounded	Unbounded	on

2 - Flash Card Size

F32	32M Flash card (standard)
NONE	None fitted

3 - Ethernet Communications Protocol

ELIN	Ethernet Local Instrument Network (LIN) peer-to-peer
MBTM	Modbus-TCP Master communications (includes LIN peer-to-peer)

4 - Serial Communications Protocol

SER0	HMI communications (non isolated)
MOD0	Modbus master communications (non isolated) and Raw communications
PBUS	Profibus DP slave communications (9 pin D connector)

Control Specifications

Continuous Database Resources

Maximum database size default max values 210k bytes

Database Resources

Number of database blocks 630
 Number of database templates 50
 Number of template libraries 32
 Number of external databases 32
 Number blocks in local Dbase cached elsewhere 1260
 Number blocks in remote Dbases cached locally 315
 Number of server tasks 6
 Number of field-to-field connections 1260

Sequence Control Resources

Sequence memory Programme data 105k bytes

SFC Resources

Number of root SFCs loadable 31
 Number of steps loadable 420
 Number of 'wires' permitted going into and out of step 1407
 Number of transitions 630
 Number of 'wires' permitted going into transitions 840
 Number of action associations 1680
 Number of actions 840

User Tasks

Multiple tasks are available to the user to tune the update rate of I/O response and the control function.

User Tasks 4

User Task Update Rates

Task 1 – Synchronous to Fast I/O 10ms or N*10ms
 Only version 2 10ms I/O types can be assigned to this task (see table)
 Task 2 – Auxiliary task to task1 10ms or N*10ms
 Runs at task 1 rate or integer multiple of task 1 rate
 Task 3 – Synchronous to Standard I/O 110ms or N*110ms
 All analog and digital I/O types can be assigned to this task
 Task 4 – Auxiliary task to task3 110ms or N*110ms
 Runs at task 3 rate or integer multiple of task 3 rate

Supported I/O Module Types

The T2550 PAC shares I/O modules with the T2750PAC and 2500 I/O.

Type	Description	Maximum Update Speed	Original Version Modules 2
AI2	Analog Input 2 channels (all I/O types)	110ms	-
AI3	Analog Input 3 channels (mA + Tx PSU)	110ms	-
AI4	Analog Input 4 channels (TC, mV, mA) 1	10ms	-
AO2	Analog Output 2 channels (mA or V)	110ms	110ms/10ms*
DI4	Digital Input 4 channels (logic)	110ms	-
DI6_MV	Digital Input 6 channels (115V ac rms)	110ms	-
DI6_HV	Digital Input 6 channels (230V ac rms)	110ms	-
DI8_LG	Digital Input 8 channels (logic)	110ms	10ms
DI8_CO	Digital Input 8 channels (contact)	110ms	10ms
DO4_LG	Digital Output 4 channels (10mA)	110ms†	10ms
DO4_24	Digital Output 4 channels (100mA)	110ms†	10ms
RLY4	Relay Output 4 channels (3 n/o, 1 c/o)	110ms†	10ms
DO8	Digital Output 8 channels (1A per ch)	10ms	-
FI2	Frequency Input 2 channels	10ms	-
ZI	Zirconia Input Module	110ms	-

Notes:

† The T2550 only supports the original (Version 1) modules in simplex operation.

* Version 2 Analog Output modules can be run at the 10ms task on 4 or 6-way bases.

Setpoint programmer (V5.0 or higher) Resources (max no.)

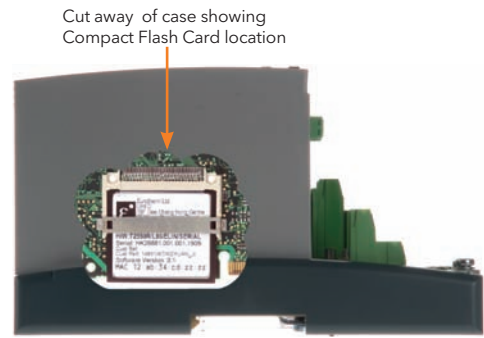
Programs	Limited by available database memory
Profiled Channels per Program	8
Digital Events per Program	128
User Values per Program	32
Segments per Program	32

No. of Programs /per prog (max)	No. of Channels /per prog (max)	No. of Digital Events /per prog (max)	No. of Users /per prog (max)
1 Program	8	128	32
2 Programs	4	64	16
4 Programs	2	32	8
8 Programs	1	16	4

Continuous Strategy Function Blocks Categories

F = Foundation, S = Standard, C = Control, A = Advanced

SOFTWARE LICENSE	CATEGORY				
I/O Block	F	S	C	A	Description
AI_UIO, AO_UIO	✓				Universal I/O & Time-proportioning O/P
DI_UIO, DO_UIO	✓				
FI_UIO, MOD_UIO	✓				
MOD_DI_UIO, MOD_DO_UIO	✓				
TPO_UIO, VP_UIO	✓				
CALIB_UIO	✓				Analog calibration
Communications					
GW_CON, GWPROFS_CON	✓				Gateway configuration block
GW_TBL	✓				Gateway table block
RAW_COM	✓				Open communication
Conditioning					
CHAR, UCHAR, FILECHAR	✓				Characterisation
AN_ALARM, DIGALARM	✓				Analog alarm
INVERT		✓			Analog Inversion
FILTER, LEAD_LAG		✓			Filter
RANGE		✓			Range
FLOWCOMP		✓			Compensated flow
ZIRCONIA	✓				Zirconia Function Block
GASCONC				✓	Natural gas concentration data block
AGA8DATA				✓	AGA8 calculation
Control					
AN_CONN, DG_CONN	✓				Analog & Digital connection block
ANMS, DGMS		✓			Analog & Digital manual stations
SIM		✓			Simulation
SETPOINT		✓			Setpoint
TC_SEL		✓			Thermocouple Select
TC_LIFE			✓		Thermocouple Life
MAN_STAT		✓			Manual station
MODE		✓			Mode block
PID_LINK, TUNE_SET		✓			PID linking block, Tune set block
PID, 3_TERM, LOOP_PID			✓		Control block
Timing					
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		✓			Sequence
SEQ			✓		Sequence
Selector					
ALC	✓				Alarm collection
SELECT, SWITCH		✓			Selector, Switch
2OF3VOTE		✓			Best-average
Logic					
PULSE, LATCH, COUNT		✓			Pulse & Latch & Count block
AND4, OR4, XOR4 NOT,		✓			AND, OR, Exclusive-OR, NOT
COMPARE		✓			Compare
Maths					
ADD2, SUB2, MUL2, DIV2		✓			Add, Subtract, Multiply, Divide
EXPR, ACT_2A2W3T		✓			Expression
ACTION, DIGACT,			✓		Action blocks
ACT15A3W, ACTUI818			✓		
Control Module					
VLV1IN, VLV2IN, VLV3WAY		✓			Valve control modules
MTR3IN		✓			Control module
DUTYSTBY, AN_ALM_2		✓			Control module
Diagnostic					
ALL Diag Blocks	✓				Diagnostic block
Recorder					
RGROUP	✓				Recording group
Programmer					
PROGCHAN, SEGMENT		✓			
PROGCTRL		✓			
SPP_RAMP		✓			
Batch					
RECORD, DISCREP		✓			Record & Discrepancy block
SFC_MON, SFC_DISP		✓			SFC monitor & display blocks
SFC_CON			✓		SFC control



Communications

Ethernet Communications

The PAC supports Ethernet LIN (ELIN) protocol that provides secure peer-to-peer communications between bases and to other Ethernet devices over 10/100baseT Ethernet from each processor. Simultaneously it can support Modbus-TCP Master or Slave to other Modbus-TCP devices.

ELIN port

Connectors:	Shielded RJ45 connector per processor
Network medium:	Ethernet Cat5
Network type:	LIN over Ethernet
Speed:	10/100baseT
Network topology:	Star connection to a switch
Line length (maximum):	100 metres, extendible by repeater
Allocation of IP address:	Fixed, DHCP, Link-Local, BootP
Broadcast storm protection:	Integrated in the processor
ELIN address:	8-way switch-bank – Duplex (bits SW2-8) 10-way switch-bank – Simplex
Max numbers of slaves:	16 Modbus TCP slaves

Serial communications

Third-party devices such as PLCs supporting Modbus can be readily integrated into the ELIN based architecture by direct connection to T2550 PAC control units. The Modbus communications allows a T2550 PAC to be used as a gateway providing access to database elements in any ELIN node.

RS422/485 serial communications

Connector:	2x 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
Max number of slaves:	64 serial slave devices

Note: Use of a communications buffer/isolator is recommended.

Modbus/J-BUS

Protocol:	Modbus/J-BUS RTU configurable master or slave
Data rate:	Selectable 600-38.4k bits/sec
Data format:	8 bit, selectable parity 1/2 stop bits
Modbus data tables:	64, configurable as registers or bits
Maximum table length:	200 registers or 999 bits
Redundancy:	Modbus communications are supported by the PAC in simplex and redundant mode 3 GWF may be run simultaneously 1x Modbus TCP master 1x TCP slave 1x Modbus RTU slave or master Max (GWF) file size: 20k bytes

Profibus

Physical medium:	2-wire RS485
Connectors:	Single 9-way D-type
Data rate:	Determined by Profibus master, 12MB max.
Isolation:	50V dc; 30V ac

Open communication

Protocol:	Device driven
Data rate:	1200 to 38.4k bits/sec
Data format:	7 or 8 data bits, none/even/odd parity

Processor Condition Indicators

Status	→
Fault	→
Battery	→
Communications	→
IP resolution	→
Duplex	→

Status and Switching

Watchdog - Switch	→
Primary	→
Standby	→
Sync - Switch	→
De-Sync - Switch	→
Ethernet (activity)	→

Connections

Ethernet connection	→
Watchdog	→
Serial /Profibus Communications	→
Redundant power connectors (24Vdc)	→
Real-time clock and Hot start	→

Module Condition Indicators

Health status	→
I/O status	→
I/O module type	→
Field terminals	→
Terminal loading clip	→
Earthing screw	→



2500MF-A: Two Channel Analog Input

This analog input module is used to monitor analog signals from a wide range of plant sensors. The mA and TC inputs each require the appropriate terminal unit. The second channel of the AI2 has a special high impedance range for use with zirconia probe inputs.

No of channels:	2
Input types:	TC, RTD, Volts, mA, mV, Potentiometer, Pyrometer, Zirconia probe,
mV range:	-150mV to +150mV at input impedance >100MΩ
mA range:	-22mA to +22mA with 5Ω burden in the terminal unit
Volts range:	-10.2V to +10.2V at input impedance 303kΩ
RTD support:	Support for 2, 3 and 4 wire resistance thermometer devices
Ohms range:	0 to 640Ω 2, 3 or 4-wire lead compensation
Hi Ohms range:	0 to 5kΩ 2, 3 or 4-wire lead compensation
Pot range:	5% to 95% 'rotation' of 100Ω to 5kΩ pot
Resolution:	Better than 0.001% of range
Linearity:	Better than 0.003% of range
Input filtering:	OFF to 999.9 seconds
Input accuracy:	Electrical input factory calibrated to better than 0.1% of reading
System isolation:	Reinforced, 264V ac maximum
Channel isolation:	Reinforced, 264V ac maximum between thermocouple channels
Functional:	264V ac maximum between RTD, volts and mA
Series mode rejection:	60dB (50-60Hz)
Common mode rejection:	120dB (50-5kHz)
Power consumption:	2W maximum

TC Input specification

Linearization types:	J, K, L, R, B, N, T, S, C, PL2, PT100, Linear, SqRoot, plus custom
CJC system:	Measured by RTD fitted on terminal unit
Initial CJC accuracy:	±0.5°C typical (±1°C maximum)
CJC rejection:	Better than 30:1 over -10°C to +70°C

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



2500MF-C: Three Channel Analog Input

Provides three isolated current input channels specifically designed to meet the requirements of modern two wire transmitters. Each channel has its own isolated 24V supply for transmitter excitation. Each channel's 24V dc supply is protected against short circuit and utilizes a sophisticated trip and try system in which the module senses over current and cuts the power. After a period the circuit checks for continued circuit malfunction. The module can be optionally fitted with disconnects to allow isolation of an individual input and allow work on the loop to continue safely.

No of channels:	3
Input range:	-28mA to +28mA
Resolution:	Better than 1uA (16 bits with 1.6 sec filter time)
Linearity:	Better than 10uA
Initial accuracy:	Factory calibrated to better than ±0.1% of reading
Input filtering:	OFF to 999.9 seconds
Burden resistance:	60Ω nominal, 50mA max current
Channel PSU:	22-25V dc, current limited 30mA nominal, self-resetting
System isolation:	Reinforced, 264V ac maximum
Channel isolation:	Functional, 50V ac maximum
Power consumption:	4W maximum

Notes:

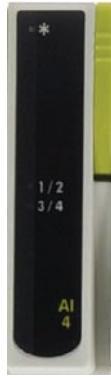
1. User calibration options can improve performance, limited only by noise and non-linearity.
2. Total burden can be increased to 250Ω or HART by removing a link track on the terminal unit.

AI3 – ORDER CODE

Module	
2500MF-C000	Three channel - isolated 4-20mA analog input with Isolated 24V Tx PSU
Terminal Unit	
2500TF-DU00	Terminal unit with dummy cover fitted
2500TF-DU30	Terminal unit with disconnect

AI2 – ORDER CODE

Module	
2500MF-A000	Two Channel - isolated universal input
Terminal Unit	
2500TF-AT00	Terminal unit for TC with CJC
2500TF-AT00	Terminal unit for Mv, V, PT100, Hiz inputs
2500TF-AT20	Terminal unit for 5 ohm shunt fitted for mA



2500MF-D: Four Channel Analog Input

This analog input module is used to monitor analog signals from a wide range of plant sensors. The mA and TC inputs each require the appropriate Terminal Unit.

No of channels:	4
Input types:	TC, mV, mA, Pyrometer mV range: -150 - +150mV at input impedance >100M Ω mA range: -22 - +22mA with 5 Ω burden in the terminal unit
Resolution:	Better than 0.001% of range
Input filtering:	OFF to 999.9 seconds
Initial input accuracy:	Electrical Input Factory Calibrated to better than 0.1% of reading. mA range with 5 Ω burden in the terminal unit, better than 0.2% of reading.
System Isolation:	Reinforced, 264V ac maximum
Channel isolation:	Functional, 264V ac maximum separating Ch1 and Ch2 from Ch3 and Ch4
Series mode rejection:	60dB (50-60Hz, 1mA rms)
Common mode rejection:	120dB (50-5kHz, 50V rms)
Power consumption:	2W maximum

TC Input specification

Linearization types:	J, K, L, R, B, N, T, S, C, PL2, linear, SqRoot, plus custom
CJC system:	Measured by RTD fitted on terminal unit
Initial CJC accuracy:	$\pm 0.5^{\circ}\text{C}$ typical ($\pm 1^{\circ}\text{C}$ maximum)
CJC rejection:	Better than 30:1 over -10°C to $+70^{\circ}\text{C}$

Notes:

1. User calibration options can improve performance, limited only by noise and non-linearity.
2. Wiring care and sensor choice should be used to prevent ground loops when using non-isolated TCs.



2500MF-E: Two Channel Analog Output

This analog output module provides two isolated analog output channels. Each output can be independently configured for current or voltage mode. The module can be optionally fitted with disconnects to allow isolation of an individual output and allow work on the individual loop to continue safely.

No of channels:	2
Current output:	-0.1 to 20.5mA; 10V dc max. Compliance with total burden less than 500 Ω
Voltage output:	-0.1V to 10.1V dc; 20mA max. compliance with total load greater than 500 Ω -0.3 to 10.3 V dc; 8mA max. compliance with total load greater than 1500 Ω
Resolution:	Better than 1 part in 10,000 (15 bit typical)
System isolation:	Reinforced, 264V ac
Channel isolation:	Functional, 264V ac maximum
Power consumption:	2.2W maximum

AO2 – ORDER CODE

Module	
2500MF-E000	Two channel isolated mA, volts
Terminal Unit	
2500TF-NU00	Terminal unit
2500TF-NU30	Terminal unit with disconnect

AI4 – ORDER CODE

Module	
2500MF-D000	Four channel - T/C, mV, mA input
Terminal Unit	
2500TF-FT00	Terminal unit for 4 channel TC with CJC
2500TF-FM00	Terminal unit for 4 channel mV
2500TF-FV00	Terminal unit for 4 channel mA



2500MF-G: Four Channel Digital Input

This digital input module accepts four logic inputs, and can be wired either for voltage input (either polarity) or for contact closure.

No of channels: 4
 Input functions: On/Off, pulse and de-bounce
 System isolation: Reinforced, 264V ac
 Channel isolation: Channels share a common connection
 Power consumption: 0.45W maximum

'Contact' Variant

External supply: 18-30V dc wetting power required
 Contact closure:
 ON state: Input resistance threshold 100Ω (<1KΩ typical)
 OFF state: Input resistance threshold 10KΩ (>7KΩ typical)
 Wetting current: >8mA
 Wetting voltage: >9V, 12V typical measured open-circuit

'Logic' Variant

Logic inputs:
 ON state: Input voltage threshold >10.8V dc, 30V max
 OFF state: Input voltage threshold <5.0V dc non-overlapping
 Input impedance: 4KΩ approx. (> 3mA drive required for 'ON')

DI4 – ORDER CODE

Module
 2500MF-GE00 Four channel - input

Terminal Unit
 2500TF-JU00 Terminal unit with dummy cover fitted
 2500TF-JU30 Terminal unit with disconnects



2500MF-L/-M: 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.

No of channels: 8
 Input functions: On/Off pulse and de-bounce inputs with input invert
 System isolation: Reinforced, 264V ac maximum
 Channel isolation: 50V ac functional isolation, 4 pairs of channels
 Power consumption Logic: 1W maximum
 Contact: 2.5W maximum

'Contact' Variant

Contact closure:
 ON state: Input resistance threshold 100Ω (<1KΩ typical)
 OFF state: Input resistance threshold 10KΩ (>7KΩ typical)
 Wetting current: 4mA typical

'Logic' Variant

Logic inputs:
 ON state: Input voltage threshold >10.8V dc, 30V max.
 OFF state: Input voltage threshold <5.0V dc non-overlapping
 Input impedance: 5KΩ approx. (>2mA drive required for 'ON')

DI8 – ORDER CODE

Module
 2500MF-L000 Eight channel - Logic input
 2500MF-M000 Eight channel - Logic input

Terminal Unit
 2500TF-MU00 Terminal unit with dummy cover fitted
 2500TF-MU30 Terminal unit with disconnects



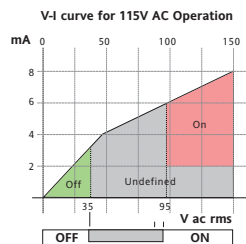
2500MF-K: Six Channel AC voltage Input

The six channel digital input module accepts AC voltage inputs and is available in two factory options optimized for 115V ac or 230V ac ranges.

No of channels: 6
 Input functions: On/Off or de-bounce
 Frequency: 47Hz-63Hz
 Transient immunity: EN50082
 System isolation: Reinforced, 264V ac maximum
 Channel isolation: Functional, 264V ac maximum
 Power consumption: 0.45W maximum

'115V ac' Variant

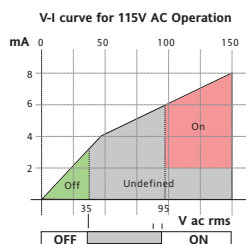
Active On state: >95V ac rms, 132V ac rms maximum
 Inactive OFF state: <30V ac rms
 Main input current: More than 2mA required for 'ON'
 Maximum input current: 8mA



V-I curve for 115V ac operation

'230V ac' Variant

Active ON state: >180V ac rms, 264V ac rms maximum
 Inactive OFF state: <60V ac rms
 Min input current: More than 2mA required for 'ON'
 Maximum input current: 9mA



V-I curve for 230V ac operation

INADVERTENT USE OF THE WRONG RANGE

115V type on 230V ac No damage will result. Power dissipation will be higher than desirable for continued use on all 6 channels simultaneously.

THIS IS NOT A RECOMMENDED MODE OF OPERATION

DI6 – ORDER CODE

Module

2500MF-KA00 Six channel high voltage 230 volt ac logic
 2500MF-KB00 Six channel high voltage 115 volt ac logic

Terminal Unit

2500TF-LU00 Terminal unit

2500MF-JE & HE: Four Channel Logic Output

This digital output module provides four logic outputs and is available in two factory option formats for standard or high output.

No. of channels: 4
 System isolation: Reinforced, 264V ac max
 Channel isolation: Channels share a common connection
 Current assumption: 100mA max
 Output functions: TPO and VP in module

'Logic' Variant

Voltage supply: 18<Vs <30V dc
 Output current: >8mA high drive per channel (Current limited)
 Output voltage: At least Voltage supply (Vs) -3V switch drop

'24' Variant

External supply: 12 <Vs <30V dc
 Output current: 100mA maximum high drive per channel (Current & Temperature limited)
 Output voltage: At least Voltage supply (Vs) -3V switch drop

D04 – ORDER CODE

Module

2500MF-JE00 Four channel digital logic output 10mA max
 2500MF-HE00 Four channel digital 24d switched output

Terminal Unit

2500TF-RU00 Terminal unit with dummy cover fitted
 2500TF-RU30 Terminal unit with disconnects



2500MF-N: Eight Channel Digital Output Module

The DO8 provides higher packing density and lower cost per channel. The eight digital output module provides eight logic outputs which are typically used for control, alarms, or events 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.

Voltage supply (external): 18-30V dc

Leakage current off state: <0.1mA

Current output:

Channel maximum: 0.75A/channel

Module maximum: 4A total (500mA/channel, all channels ON)

Output voltage:

>Voltage supply (Vs.) less 3V

System isolation:

Reinforced, 264V ac maximum

Channel isolation:

Channels share a common connection

Power consumption:

0.6W maximum



2500MF-F: Four Channel Relay Output

This digital output module provides four relay outputs. The relay contacts are all fitted with removable snubber circuits to reduce contact arcing and prolong contact life.

No of channels:

4 (3 normally open + 1 changeover)

Max current rating:

2A at up to 240V ac; 0.5A at 200V dc, increasing to 2A at 50V dc (resistive)

Min ratings:

AgCdO contacts offer best operating life switching more than 100mA 12V

Fuse (option):

3.15A, 20mm ceramic, time lag (T), in terminal unit

System isolation:

Reinforced, 264V ac maximum

Channel isolation:

Functional, 264V ac maximum

Contact life:

>10million operations @ 250V ac, 1A rms

>600,000 operations @ 250V ac, 2A rms

De-rating:

The above ratings summarize the performance with resistive loads. With complex loads further derating may be required

Power consumption:

1.1W maximum

Relay De-rating

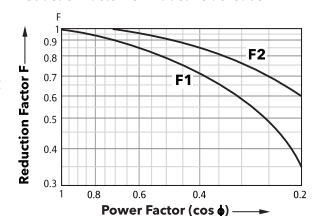
AC Voltage

As the AC load becomes more "difficult" a more significant de-rating factor is required. The graph opposite shows the derating to be applied in terms of contact life, assuming the load requirement is predefined.

F1: Worst case

F2: Typical

Reduction factor for inductive ac loads

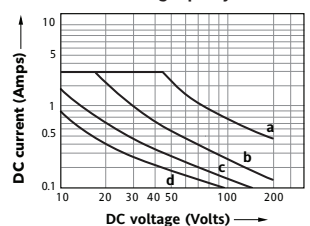


Contact life = resistive contact life x reduction factor

DC voltage

DC operation is also limited for difficult loads, particularly where there is significant inductance. Here the working current must be limited as shown where the load time constant (L/R, in ms) is the significant factor.

Max dc load breaking capacity



a = resistive b = 20ms c = 40ms d = 60ms

DO8 – ORDER CODE

Module

2500MF-NE00

Eight channel digital output 1A/channel;
Max 4A/module

Terminal Unit

2500TF-S000

Terminal unit with dummy cover fitted

RLY4 – ORDER CODE

Module

2500MF-F000

Four channel isolated relay output

Terminal Unit

2500TF-T000

Terminal unit

2500TF-T040

Terminal unit with four 3.15a fuses



2500MF-P: Two Channel Frequency Input

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.

No of channels: 2
 Channel isolation: Functional, 100V ac maximum
 System isolation: Reinforced, 264V ac maximum
 Power consumption: 3.6W maximum

Frequency measurements

Range: Logic: 0.01Hz-40KHz, debounce off
 Magnetic: 10Hz-40KHz
 Resolution: 60ppm
 Accuracy: ± 100 ppm, reference. ± 160 ppm overall
 $\pm 0.05\%$ 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: ± 100 V
 Input impedance: >30 K Ω

Logic input specification

VOLTAGE Input range: 0-20V
 Absolute maximum input: 50V
 Input impedance: >30 K Ω
 Threshold: 0-20V (0.5V steps), ± 0.2 V hysteresis
 <5 V = ± 0.4 V accuracy, >5 V = $\pm 0.7\%$ accuracy
 Sensor break level: 50-350mV
 Sensor short circuit: N/A

CURRENT Input range: 0-20mA
 Absolute maximum input: 30mA
 Input impedance: 1K Ω
 Threshold: 0-20mA (0.5mA steps), ± 0.2 mA hysteresis
 <5 mA = ± 0.4 V accuracy, >5 mA = $\pm 0.7\%$ accuracy
 Sensor break level: 0.05-0.350mA
 Sensor short circuit detect: when $<100\Omega$; restored when $>350\Omega$

CONTACT Input range: N/A
 Absolute maximum input: N/A
 Input impedance: 5K Ω
 Threshold: 0-20V (0.5V steps), ± 0.2 V hysteresis
 <5 V = ± 0.4 V accuracy, >5 V = $\pm 0.7\%$ accuracy
 Debounce: 5, 10, 20, 50mS

Note: with debounce on, max frequency is limit and resolution is 600ppm

Output specification Voltage: Selectable, 8, 12, or 24V dc
 Maximum current: 25mA
 Voltage drop at full load: 1V @ 25mA
 Accuracy: $\pm 20\%$

FI2 – ORDER CODE

Module
 2500MF-P000 Two channel digital Frequency input
Terminal Unit
 2500TF-U000 Terminal unit with dummy cover fitted



2500M-R: Zirconia Input

Input Types: Analog voltage, Channel 1 - mV (TC), and Channel 2 - 2V (Zirconia probe)

Thermocouple Input Specification (Ch1 ONLY)

Input Range: -77mV to +100mV
 Calibration Accuracy: $\pm 0.1\%$ of electrical input, $\pm 10\mu$ V
 Noise: 5 μ V p-p with 1.6s Filter
 Resolution: $<2\mu$ V with 1.6s Filter
 Sensor Break Detect: 250nA break high, low or off
 Input Impedance: 10M Ω

Cold Junction Sensor Specification (Ch1 ONLY)

Temperature Range: -10°C to +70°C
 CJ Rejection: $<30:1$
 CJ Accuracy: $\pm 1.3^\circ$ C, $\pm 0.5^\circ$ C typ. ('Automatic' cold junction compensation)

Zirconia Input Specification (Ch2 ONLY)

Input Range: -10mV to +1800mV
 Calibration Accuracy: $\pm 0.2\%$ of electrical input
 Noise: 0.1mV p-p with 1.6s Filter
 Resolution: $<50\mu$ V with 1.6s Filter
 Sensor Impedance Measurement: 0.1k Ω to 100k Ω $\pm 2\%$
 Input Impedance: >500 M Ω
 Input Leakage Current: ± 4.0 nA, max ± 1 nA typical

General Specifications

Power consumption: 1.8W maximum
 Common mode rejection: >80 db, 48 - 62Hz
 Series mode rejection: >60 db, 48 - 62Hz
 Isolation channel - channel: Functional (basic insulation), 264V ac max
 Isolation to system: Reinforced (double insulation), 264V ac max

ZI – ORDER CODE

Module
 2500MF-R000 Zirconia Input
Terminal Unit
 2500TF-Z000 Terminal unit

ORDERING CODES

PAC Series Composite Coding



Basic Product				
255RF	Dual processor - redundant capable base and I/O			
255SF	Single processor - redundant ready base and I/O			
1 Basic Size				
-A	2 IOC position for redundant operation 16 I/O module position			
-C	2 IOC position for redundant operation 8 I/O module position			
-F	2 IOC position for redundant operation 6 I/O module position			
-G	2 IOC position for redundant operation 4 I/O module position			
-E	2 IOC position for redundant operation 0 I/O module position			
2 Earthing System				
0	Two earth clamps fitted			
2	Earthing clamp for a 16 I/O module base			
1	Earthing clamp for an 8 I/O module base			
3	Earthing clamp for a 6 I/O module base			
4	Earthing clamp for a 4 I/O module base			
3 IOC and software (standard license)/(data logging)				
	Foundation	Standard	Control	Advanced
A/U	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 Ethernet communications protocol				
1	LIN peer-to-peer			
2	Modbus-TCP master comms (includes LIN peer-to-peer)			
5 Serial communications protocol				
A	HMI comms (non isolated)			
B	Modbus master comms (non isolated) and raw comms			
E	Profibus DP slave comms (9 pin D connector)			
C*	HMI comms (isolated)			
D*	Modbus master comms (isolated) and raw comms			
* Consult factory				
6 Terminal unit connector				
1	RJ45 connector for Modbus			
2	9 pin D type connector for Profibus only			

7-22 Module and Terminations	
B	2 ch – isol universal analog I/P with CJC for T/C
C	2 ch – isol universal analog I/P for PT100, H _{iz} inputs
D	2 ch – isol universal analog I/P - 5 shunt fitted for mA inputs
E	3 ch – isol 4-20mA analog I/P with 24V Tx PSU
F	3 ch – isol 4-20mA analog I/P with 24V Tx PSU with disconnects
G	4 ch – non isol T/C, with CJC
H	4 ch – non isol mV I/P
J	4 ch – non isol mA I/P
K	2 ch – isol analog O/P mA, volts
L	2 ch – isol analog O/P mA, volts with disconnects
M	4 ch – digital I/P
N	4 ch – digital I/P with disconnects
P	6 ch – 230 volt ac logic I/P
Q	6 ch – 115 volt ac logic I/P
R	8 ch – non isol digital I/P (logic I/P only)
1	8 ch – non isol digital I/P (logic I/P only) with disconnects
S	8 ch – non isol digital I/P (contact I/P only)
2	8 ch – non isol digital I/P (contact I/P only) with disconnects
T	4 ch. digital O/P logic O/P 10mA max
U	4 ch. digital O/P logic O/P 10mA max with disconnects
V	4 ch. digital O/P 24V dc switched O/P
W	4 ch. digital O/P 24V dc switched O/P with disconnects
Z	8 ch – digital O/P rated 1A per channel, max 4A per module
X	4 ch – isol relay O/P rated 2A ac
Y	4 ch – isol relay O/P rated 2A ac, with 4 off 3.15A fuses
3	2 ch – frequency I/P
4	2 ch – frequency I/P with disconnects
5	Zirconia I/P
A	Blank terminal unit
0	No terminal unit or blank fitted
23 Application	
0	No application loaded
1	Pre-configured application loaded
24 Manuals	
0	CD with manuals
1	Manuals on processor flash card
2	Paper copy of manuals
25 Language	
N/A	N/A

ORDERING CODES, continued

PAC series license upgrade coding

255UF1	1	2	3	4
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Basic Product				
255UF1	Programmable Automation Controller (PAC)			
1	IOC existing license			
	Foundation	Standard	Control	Advanced
L10/D10	Unbounded	0	0	off
L20/D20	Unbounded	50	4	off
L30/D30	Unbounded	100	8	off
L40/D40	Unbounded	Unbounded	12	off
L50/D50	Unbounded	Unbounded	16	off
L60/D60	Unbounded	Unbounded	24	off
L70/D70	Unbounded	Unbounded	32	off
L80/D80	Unbounded	Unbounded	Unbounded	off
L90/D90	Unbounded	Unbounded	Unbounded	on
2	Existing communications license			
L	Modbus master communications not enabled			
U	Modbus master communications			
3	IOC required new license			
	Foundation	Standard	Control	Advanced
L10/D10	Unbounded	0	0	off
L20/D20	Unbounded	50	4	off
L30/D30	Unbounded	100	8	off
L40/D40	Unbounded	Unbounded	12	off
L50/D50	Unbounded	Unbounded	16	off
L60/D60	Unbounded	Unbounded	24	off
L70/D70	Unbounded	Unbounded	32	off
L80/D80	Unbounded	Unbounded	Unbounded	off
L90/D90	Unbounded	Unbounded	Unbounded	on
4	Required new communications license			
NON	Modbus master communications not enabled			
MBM	Modbus master communications			

PAC series base unit coding

255BF	1	2	3	4
	DEFAULT			

Basic Product	
255BF	Programmable Automation Controller (PAC) base unit
1	IOC existing license
DEFAULT	Default
2	Base Size
16R	2 IOC position for redundant operation 16 I/O module position
08R	2 IOC position for redundant operation 8 I/O module position
06R	2 IOC position for redundant operation 6 I/O module position
04R	2 IOC position for redundant operation 4 I/O module position
00S	1 IOC position for redundant operation 0 I/O module position
3	Earthing System
NON	Two earth clamps fitted
C16	Earthing clamp for a 16 I/O module base
C08*	Earthing clamp for a 8 I/O module base
C06*	Earthing clamp for a 6 I/O module base
C04*	Earthing clamp for a 4 I/O module base
* Consult factory	
4	Manuals
CDM	CD with manuals
NON	Manuals on processor flash card
MAN	Paper copy of manuals



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