T102/T103

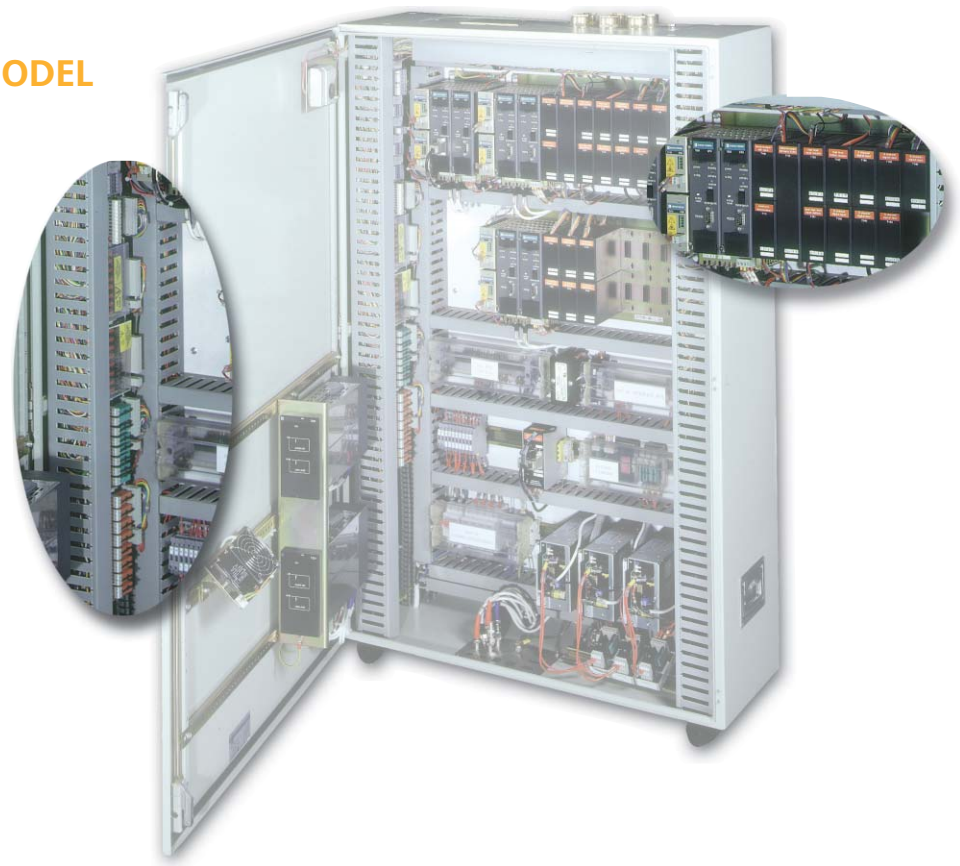
MODEL

EUROTHERM

CONTROLS
PROCESS AUTOMATION
RECORDERS

I/O Modules, Termination Units, Auxiliary

Product Data



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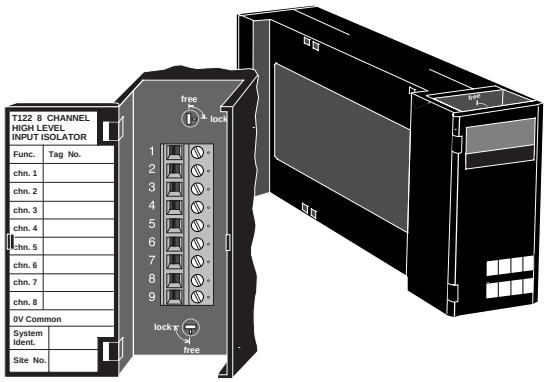
EXTENSIVE RANGE OF I/O INTERFACES AND AUXILIARIES

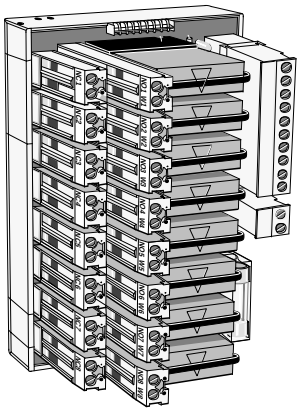
T102/T103 CONTROL UNIT I/O MODULES

- 1 to 8 channels per module
- Very high field-proven MTBF
- Live replacement
- Galvanic isolation from backplane
- Plug-in connectors



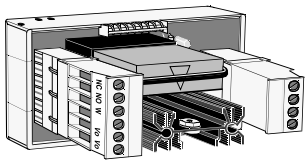
TERMINATION UNITS

- Status LEDs
- Individual plug-in relays for ease of replacement
- Individual fusing and disconnect links
- Plug-in connectors for control unit interface
- Compatible with T100/T102/T103 Control Units and T640 Loop Processors



AUXILIARY UNITS

- RAM backup battery and charger with health monitoring
- Diode OR/health status unit for redundant 24V PSU



General description

A wide range of I/O modules caters for most process signals, all modules being galvanically isolated from the base unit.

Termination units further extend the interfacing options and include features to enhance integrity and facilitate maintenance. These include status LEDs and plug-in relays for digital outputs, fusing and test disconnect breakers.

All items are designed and proven for use in the T753X and T754X range of standard enclosures, including attention to CE compliance. Standardised wiring minimises installation costs for systems integrators and end users alike.

T102/T103 CONTROL UNIT I/O MODULES

Code/Description	Single or double box	Type	Range	Channel isolation	TX PSU	Nominal update time
T111 1-channel resistance thermometer input	S	PRT (2/3/4 wire) or Resistance	PT100/Ni20, Cu10, 0-1kΩ	—	—	0.1 sec.
T112 8-channel thermocouple/mV input	D[1]	Thermocouple[2]/mV	15mV to ±100mV	Yes	—	1.2 sec.[3]
T113 6-channel resistance thermocouple input	D[1]	PRT (2/3 wire) or Resistance	PT100/Ni20, Cu10, 0-1kΩ	Yes	—	0.1 sec.
T120 1-channel analogue input	S	V or mA	±1 to ±10V, ±20 to ±50mA	—	25V (21.5mA)	0.1 sec.
T122 8-channel analogue input	S	V	0 to 10V	No	—	1.0 sec.
T123 8-channel isolated mA input	D[1]	mA	0-20mA	Yes	—	1.2 sec.
T124 6-channel isolated analogue input	D[1]	V/mA	±10V	Yes	—	0.1 sec.
T130 1-channel frequency/pulse input	S	Logic/mA or Magnetic	0.01Hz-30kHz[4], 10Hz-30kHz[4]	—	8/12/24V (21-30mA)	0.1 sec.
T140 8-channel digital input	S	Logic or Contact	1V to 10V, 1.1mA	No	24V	0.1 sec.
T150 1-channel analogue output	S	V or mA	0-10V, 0-20mA	—	—	0.1 sec.
T151 8-channel analogue output	D[1]	mA	0-20mA	Yes	—	0.1 sec.
T180 8-channel digital output	S	Logic/Open Drain	Internal pullup (10kΩ) 5/15/24V	No	—	0.1 sec.

Notes:

1 T103 has 16 I/O sites: a double height I/O module takes 2 sites

2 T112 thermocouple types J, K, T, S, R, E, B, N, W, W3, W5, MoRe

3 T112 update time 2.6 sec worst case with 8 different T/C types

4 5kHz in duplex mode

TERMINATION UNITS

Code/Description	
TA122/mA	8-way analogue input, individually fused
TA122/mAS	8-way analogue input, single fused
TA124/mA	6-way analogue input
TA124/mA/ISOL	6-way isolated analogue input
TA140/DC	8-way digital input
TA140/TDC	8-way digital input with test disconnect
TA140/120	8-way 120V mains input opto-isolator
TA140/230	8-way 230V mains input opto-isolator
TA180/1p	8-way relay output (SPCO)
TA180/2p	8-way relay 2 pole output (DPCO)
TA640DO/1p	4-way relay output (SPCO)

AUXILIARY UNITS

Code/Description	
S9537	RAM backup battery 4V
S9538/24V	Battery charger for S9537
S9539/10A	Power supply diode OR unit
S9543	T754X System power supply
S9544	Single-way PSU health status unit
S9545	6-way PSU health status unit
2500P	24V dc DIN rail power supply

GENERAL SPECIFICATIONS

I/O MODULES

All I/O modules share a common bidirectional interface with the main processor

Isolation flash test: To 4kV

Working isolation voltage: 300V dc or ac rms

Mechanical specification

Dimensions (mm), overall

- single height: 38W × 81H × 117D
- double height: 38W × 162H × 117D

Weight

- single height: 0.2kg (typical)
- double height: 0.4kg (typical)

Environmental specification

Operating temperature: 0 to +50°C

Storage temperature: –20 to +85°C

Relative humidity: 5 to 95% (non-condensing)

EMC emissions: EN50081-2

EMC immunity: EN50082-2

Electrical safety: EN61610 (1993)

Note: In the following pages all I/O module specs are worst case unless specified at 99% confidence level (T151).

TERMINATION/AUXILIARY UNITS

Mounting: TS35 DIN terminal rail

Environmental

Operating temperature: 0 to +50°C

Storage temperature: –25 to +85°C

Relative humidity: 5 to 95% non-condensing

Vibration: IEC68-2-6:1982 Fc Table CII,
10Hz ≤ f ≤ 55Hz @ 0.15mm,
55Hz ≤ f ≤ 150Hz @ 1g

Shock: IEC68-2-27:1982 Ea Table II, 15g 11ms

EMC emissions: EN50081-1: Generic emissions standard (Light industrial and domestic)

EMC immunity: EN50082-2: Generic immunity standard (Industrial)

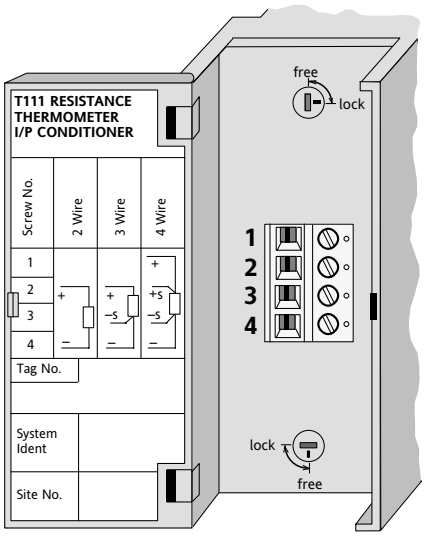
Electrical safety: EN61010 Class 2, installation category 2, pollution degree 2 where relevant

Screw terminals

Recommended torque: 0.5 to 0.7 Nm (1Nm max.)

Max. wire/ferrule size: 2.5mm²

T111 I/O MODULE — 1-channel resistance thermometer input



SPECIFICATION

Inputs:	PT100/Ni20, Cu10 or 0-1kΩ sensors
A-to-D converter:	Integrating type
A-to-D resolution:	>15 bit (with integration period = 20ms)
Internal ranges:	3
Update time, nominal:	0.1 sec
Integration period:	Selectable for 50 or 60Hz rejection
Calibration values:	In T111 EEPROM
Break detection current:	740nA (nominal)
Maximum break detect time:	Within one scan cycle
Common mode rejection:	120dB (50Hz to 5kHz)
Series mode rejection:	60dB @ 50Hz
Temperature stability:	0.003% of input per °C

Resistance thermometers supported by T111 analogue input module

Sensor	Excitation current mA	Maximum lead[1] Ω/lead	Maximum sensor Ω	Temperature °C	Accuracy
PT100/Ni20[2]	0.4	25	420	–200 to 850[3]	±0.5°C
Cu10[2]	1.67	20	60	–70 to +150	±0.7°C
0-1kΩ range	0.4	25	1k	—	0.5Ω

DESCRIPTION

The T111 RTD Input Conditioner may be used with a two-, three-, or four-wire RTD. It is able to detect a break in the circuit very rapidly, before any bad readings are used.

ORDER CODE

T111/TAG - - - - - - - -
(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

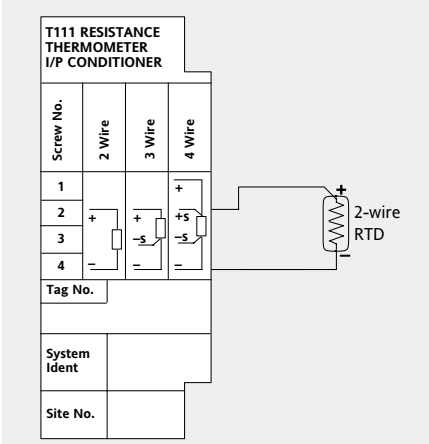
None

Notes:

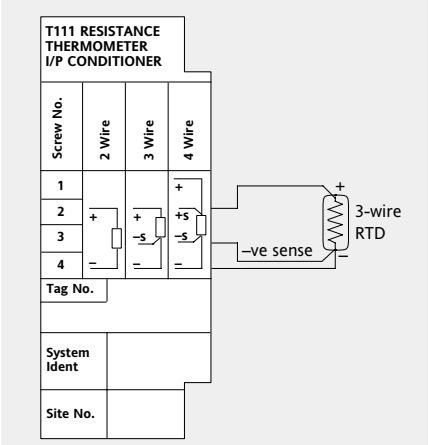
[1] For correct 3- or 4-wire rejection.

[2] Not directly supported by software; use user characterisation.

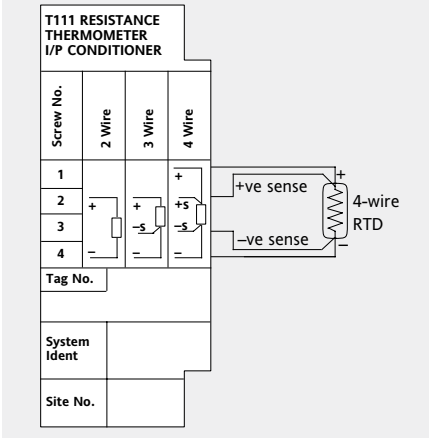
[3] This range may be increased from –220°C to +1050°C, but with reduced accuracy.



Two-wire RTD connections

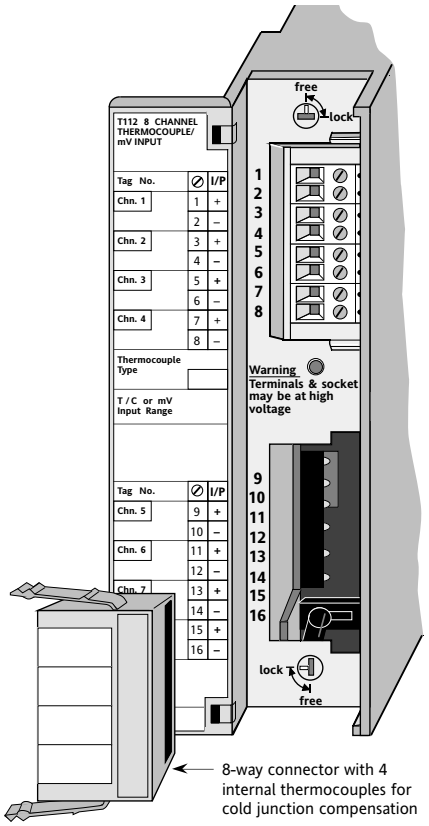


Three-wire RTD connections



Four-wire RTD connections

T112 I/O MODULE — 8-channel thermocouple/mV input



SPECIFICATION

Input type:	Multiplexed thermocouple or millivolt (any combination)
A-to-D converter:	Integrating type. (integration period = 20ms (50Hz) or 16.66ms (60Hz)
A-to-D resolution:	>15 bit
Channel-to-channel isolation:	
Isolation technique:	Multiplexed solid state switches.
Voltage rating:	110V ac rms, ±150V dc
Internal ranges:	8 different mV ranges 12 Thermocouple types
Update time:	1.2 secs per 8 channel (2.6 seconds worst case)*
Integration period:	Selectable for 50 or 60Hz rejection
Calibration values:	Stored in T112 EEROM
Break protection:	Up- or down-scale (software selectable for each channel)
Break protection current:	2.5µA pulsed for 80ms at scan rate (after measurement)
Common mode rejection:	120dB (50Hz to 5kHz)
Series mode rejection:	60dB @ 50Hz
Thermocouple input CJC rejection:	30:1 typically @ 25°C

Standard thermocouple inputs

Thermocouple type T/C	Range (°C)	Range specifications (50Hz[1]) Resolution (°C)	Accuracy[2] (±°C)	Temperature stability Gain (PPM/°C)	Offset (°C/°C)
J	–210 to 1200	0.05	0.4	45	0.043
K	–270 to 1372	0.05	0.4	50	0.075
T	–270 to 400	0.035	0.3	68	0.075
S	–50 to 1767	0.078	0.7	68	0.225
R	–50 to 1767	0.07	0.6	68	0.2
E	–270 to 1000	0.04	0.4	45	0.033
B	0 to 1820	0.055	0.5	100	0.3
N	0 to 1300	0.05	0.4	50	0.075
W	1000 to 2300	0.11	1.0	50	0.15
W3	0 to 2490	0.11	1.0	50	0.15
W5	0 to 2320	0.11	1.0	50	0.15
MoRe	0 to 1990	0.075	0.6	68	0.213

Millivolt inputs

Input range (mV)	Range specifications (50Hz[1]) Resolution (µV)	Accuracy[2] (±µV)	Temperature stability Gain (PPM/°C)	Offset (µV/°C)
–100 to 100	4.6	100	45	2.3
–65 to 65	3	65	50	2.3
–30 to 30	1.4	30	68	2.3
–15 to 15	0.7	15	100	2.3
0 to 100	2.7	50	45	2.3
0 to 65	1.76	32.5	50	2.3
0 to 30	0.8	15	68	2.3
0 to 15	0.4	7.5	100	2.3

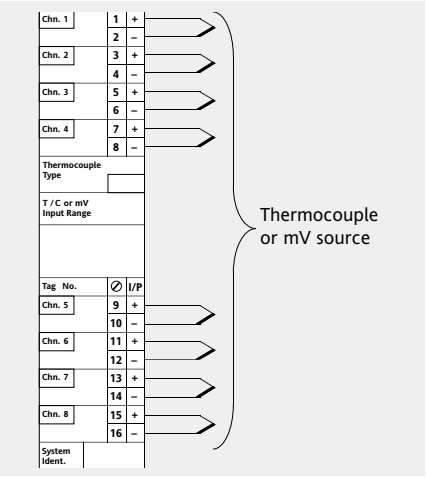
Notes

1 For operation at 60Hz, multiply figures for resolution and accuracy by a factor of 1.2.

2 These figures represent the worst case resolution averaged over full range.

Factory calibration at a nominal 25°C

* The scan rate extends for each new range selected owing to additional internal measurements required.



Input connections

DESCRIPTION

The T112 8-channel thermocouple input module provides an isolated interface to eight thermocouple or bipolar millivolt inputs. Thermocouple type, ranging and Cold Junction Compensation (CJC) is provided individually on each channel.

Serviceability is enhanced by using two special temperature sensing 8-way plug and socket connectors housed in a double height box. All T112 modules are completely interchangeable since calibration data is module-dependent and stored in EEROM. The high accuracy of the CJC is maintained by using a direct temperature measurement underneath each termination pair on the connector.

ORDER CODE

T112/TAG - - - - - - - -

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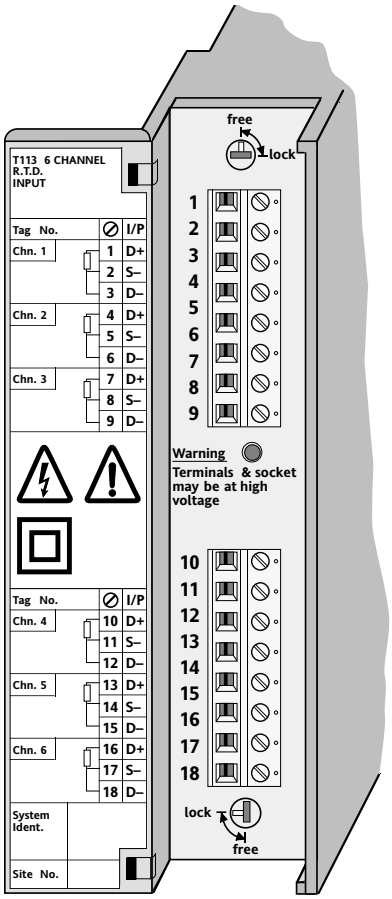
TERMINATION ASSEMBLY AUXILIARIES

None

T113 I/O MODULE — 6-channel resistance thermometer input



DESCRIPTION

The T113 RTD input conditioner may be used with six RTDs (two- or three-wire), or direct resistance inputs up to 1k ohm.

Channel-to-channel isolation eliminates wiring difficulties.

The unit is packaged in a double height box.

ORDER CODE

T113/TAG - - - - - - - -
(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

None

SPECIFICATION

Inputs:	Pt100/Cu10/Resistance (0-1KΩ)/user specified
Sampling technology:	Delta-sigma
Update time:	Six channels in 0.1 sec
Sample resolution:	15 bit (processed data)
	Note. Resolution can be improved by PV filtering. A 1 second damping filter will reduce noise and improve resolution by a factor of 2.
Excitation current:	Max 0.35mA D+ to D–
Maximum resistance per lead:	25Ω
Lead rejection (resistance mis-match):	1.0Ω/Ω
50Hz, 60Hz rejection:	Hardware and digital filtering
Common mode rejection:	120dB (above 48Hz)
Series mode rejection:	60dB (above 48Hz)
Temperature stability:	40ppm/°C max, 15ppm/°C typical
Sensor break detection time:	100mS } Action on break detect: out of range alarm
Sense wire break detection time:	5s }
Input over-range protection:	–20V to +20V
Isolation	
Channel-to-ground:	440V RMS
Channel-to-channel:	50V RMS

PT100

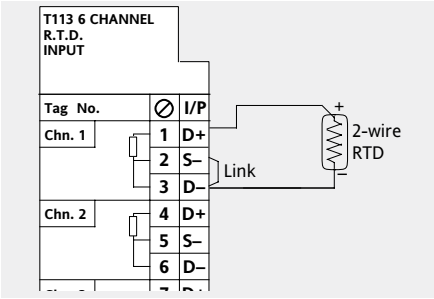
Resolution:	0.05°C
Linearity:	0.03°C
Range:	–200°C to +850°C
Accuracy	
Sensor @ 0°C to 150°C	±0.15°C @ 25°C ambient, ±0.20°C @ 25°C ±6°C
Sensor @ –220°C to 850°C	±0.25°C @ 25°C ambient, ±0.35°C @ 25°C ±6°C

CU10

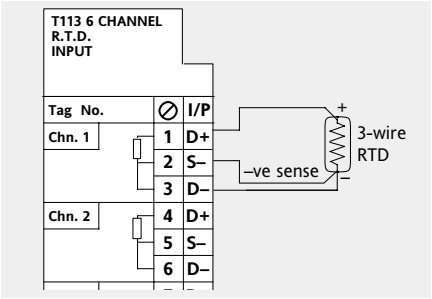
Resolution:	0.2°C
Linearity:	0.08°C
Range:	–70°C to +150°C
Accuracy	
Sensor @ 0°C to 75°C	±0.5°C @ 25°C ambient, ±0.7°C @ 25°C ±6°C
Sensor @ –70°C to 150°C	±0.7°C @ 25°C ambient, ±1.0°C @ 25°C ±6°C

Resistance

Resolution:	0.12Ω
Linearity:	0.08Ω
Range:	0Ω to 1000Ω
Accuracy:	Gain ±0.05% of reading, Offset 0.01% of range @ 25°C ambient
	Gain ±0.1% of reading, Offset ±0.03% of range @ 25°C ±6°C



2-wire connection



3-wire connection

2-wire

2-wire sensors are supported by wiring the connector with a sense wire link.

The user can then program the input block with the lead resistance for lead compensation.

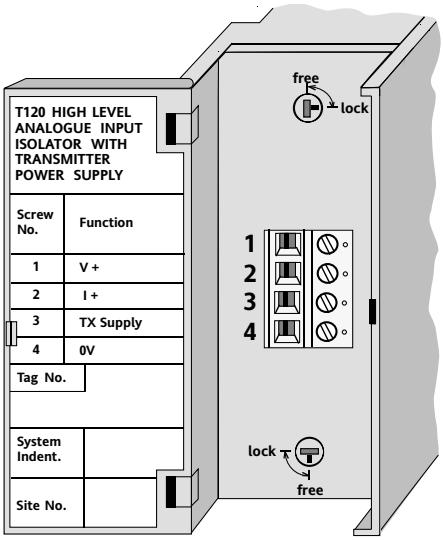
3-wire

3-wire connection provides automatic rejection of lead resistance errors.

4-wire

Not supported by T113. Use T111 Single channel resistance thermocouple input module

T120 I/O MODULE — 1-channel analogue input



SPECIFICATION

Inputs:	Voltage or current software selected
A-to-D converter:	Integrating type
A-to-D resolution:	>15 bit (with integration period = 20ms)
Internal ranges:	4
Update time, nominal:	0.1 sec
Integration period:	Selectable for 50 or 60 Hz rejection
Calibration values:	In T120 E2PROM
Common mode rejection:	120dB (50Hz to 5kHz)
Series mode rejection:	60dB @ 50Hz
Max. break protection rate:	1V/sec.

Transmitter power supply

Output voltage:	25V ±4%
Current limit:	21.5mA min to 30mA max (limiting reported to processor)

Voltage input

Break protection:	Up- or down-scale (user-selectable)			
Break protection rate:	1V/sec max			
Input levels:	+12.5V, -11.5V max. sustained			
Resolution accuracy:				
Range, ±V	1	2.2	5	10
Resolution, mV	0.06	0.13	0.3	0.6
Accuracy	(0.1% all ranges)			
Temperature stability:	<0.009% of input per °C			

Current input

Burden resistor:	50Ω		
Break protection:	Down-scale		
Input levels:	±50mA max.		
Resolution accuracy:			
Range, ±mA	20	44	50
Resolution, µA	1.2	2.6	6
Accuracy	(0.1% all ranges)		
Temperature stability:	<0.011% of input per °C		

DESCRIPTION

The T120 supports a single isolated voltage or current input with hardware ranges listed below. The user may select any software ranges within the limits; the appropriate hardware range is automatically selected and the resolution for that hardware range then applies to the input.

The internal transmitter power supply is 25V with a 21.5mA current limit.

ORDER CODE

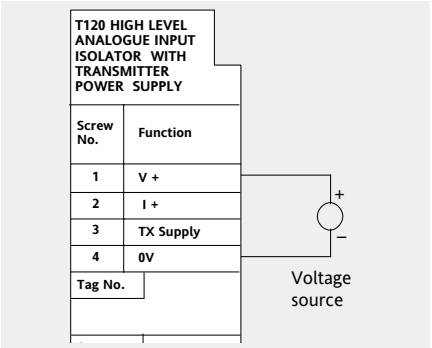
T120/TAG – – – – – – – –

(if the TAG is not specified it will be supplied blank)

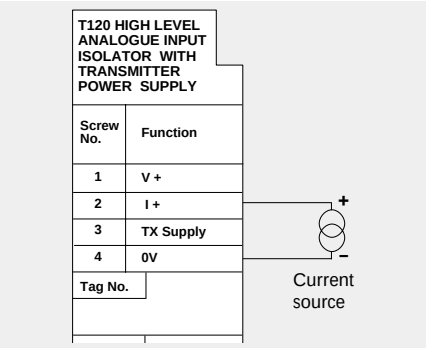
TERMINATION ASSEMBLY

AUXILIARIES

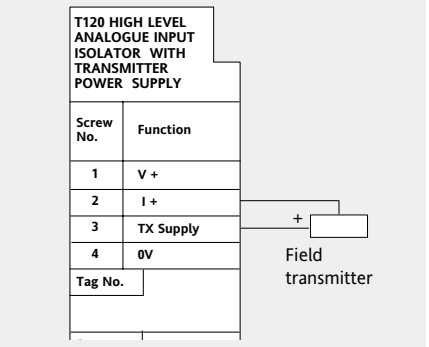
None



Voltage input connections

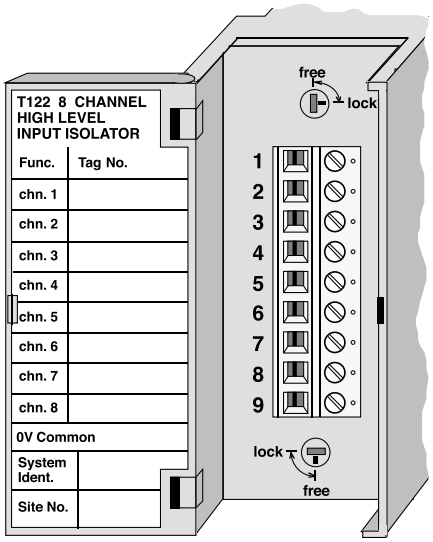


Current input connections



Current input with transmitter power supply

T122 I/O MODULE — 8-channel analogue input



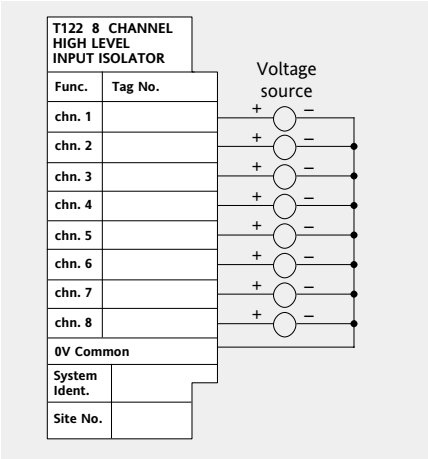
SPECIFICATION

Inputs:	Eight voltage channels
A-to-D converter:	Integrating type
A-to-D resolution:	>15 bit (with integration period = 20ms)
Internal ranges:	0 to 10V only
Update time:	1.0 sec
Integration period:	Selectable for 50 or 60Hz rejection
Calibration values:	In T122 EEPROM
Break protection:	Up- or down-scale (same for all channels)
Break protection time:	2V/sec max
Input level:	+12.5V (max sustained)
Resolution:	0.3mV
Accuracy:	0.1%
Common mode rejection:	120dB (50Hz to 5kHz)
Series mode rejection:	60dB @ 50Hz
Temperature stability:	0.009% of input per °C

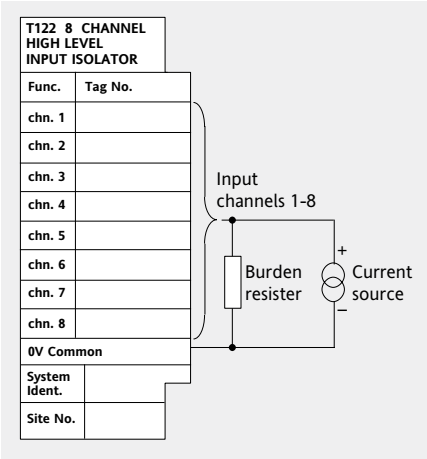
DESCRIPTION

The T122 takes up to eight voltage-only high-level analogue inputs. The hardware range is 0 to 10V. Positive ranges of 0 to 10V, 1 to 5V, and 0 to 1V are software-selectable.

To convert to a current input device, use an external burden resistor across the input; auxiliary DIN rail-mounting termination assemblies are available for this purpose, and include fusing of the transmitter supply connections.



Voltage input connections



Current input connections

ORDER CODE

T122/TAG – – – – – – – –

(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

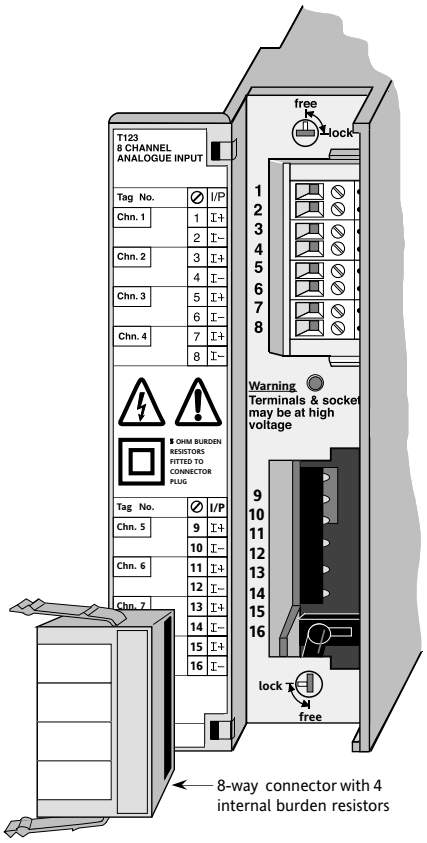
TA122/mA LA 082755

8-way analogue input, individually fused transmitter supply (See page 16)

TA122/mAS LA 083450

8-way analogue input, single fused transmitter supply (See page 17)

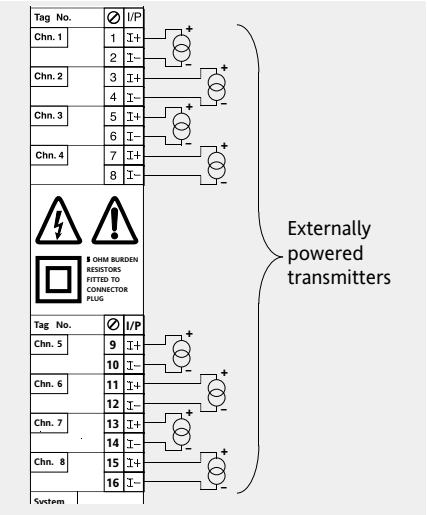
T123 I/O MODULE — 8-channel isolated mA input



SPECIFICATION

Input type:	0-20mA via 5Ω burden resistors
A-to-D converter:	Integrating type
A-to-D resolution:	>15 bit
	(with integration period = 20ms)
Channel-to-channel isolation :	
Isolation technique:	Multiplexed solid state switches
Voltage rating:	110V ac rms, ±150V dc
Internal ranges:	8 different mV ranges; 0-20mA corresponds to 0-100mV
	(5Ω burden)
Update time:	1.2 secs
Integration period:	Selectable for 50 or 60Hz rejection
Calibration values:	Stored in T112 EEROM
Break protection:	Down-scale
Common mode rejection:	120dB (50Hz to 5kHz)
Series mode rejection:	60dB @ 50Hz
Resolution accuracy:	
(0-20mA via 5Ω burden)	
Resolution:	0.5µA
Accuracy:	0.15%
Temperature stability:	
Gain stability:	1.2µA/°C
Offset stability:	0.5µA/°C

Above figures include burden resister (0.01% 10ppm/°C)



Current input connections

DESCRIPTION

The T123 8-channel isolated milliamp input module handles up to eight externally powered transmitters.

It uses the same hardware as the T112 ranged for millivolt inputs but has 5ohm burden resisters within the removable connector instead of the T112's CJC components. This allows the module to be changed without breaking the current loops.

The channel-to-channel isolation simplifies the wiring of zener barriers in IS applications.

ORDER CODE

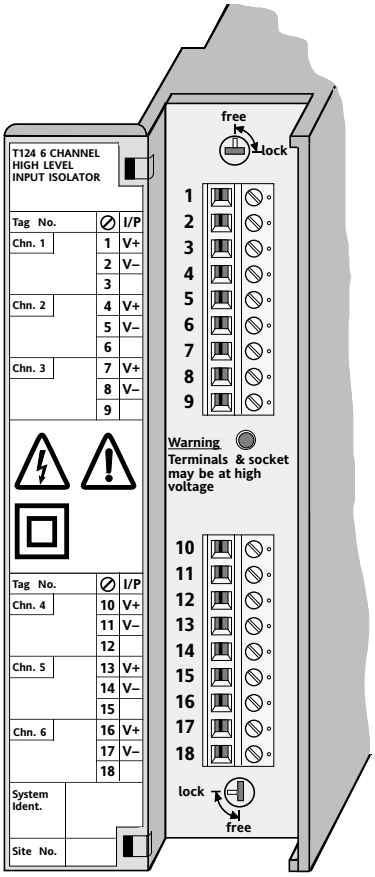
T112 (102)/TAG - - - - - - - -
(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY

AUXILIARIES

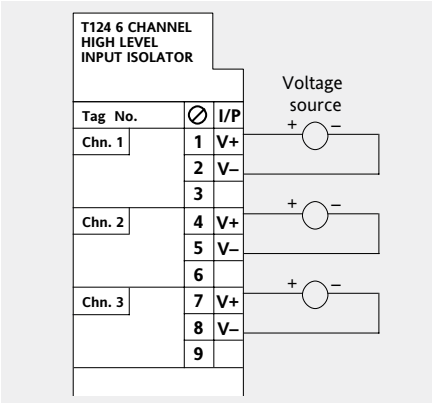
None

T124 I/O MODULE — 6-channel isolated analogue input

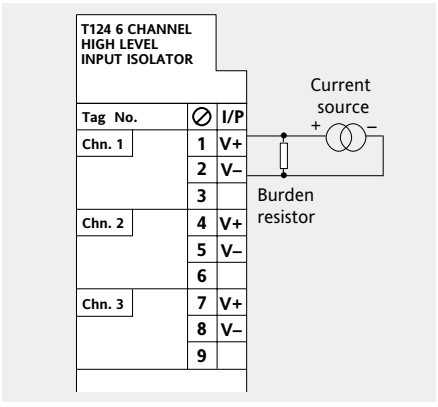


SPECIFICATION

Inputs:	Volts/mA
Range:	–10 to +10 volts
Sampling technology:	Delta-sigma
Update time:	Six channels in 0.1 sec
Sample resolution:	15 bit (processed data) Note. Resolution can be improved by PV filtering. A 1 second damping filter will reduce noise and improve resolution by a factor of 2.
Input resistance:	1MΩ ±1%
50Hz, 60Hz rejection:	Hardware and digital filtering
Common mode rejection:	120dB (above 48Hz)
Series mode rejection:	60dB (above 48Hz)
Temperature stability:	75ppm/°C max, 20ppm/°C typical
Sensor break:	Sensor break threshold value and action (NONE/UP/DOWN) software configurable
Sensor break detection time:	100mS
Input over-range protection:	–20V to +20V maximum
Isolation	
Channel-to-ground:	440V RMS
Channel-to-channel:	50V RMS
Resolution:	0.4mV
Linearity:	0.3mV
Accuracy:	Gain ±0.015% of reading, Offset ±0.01% of range @ 25°C ambient Gain ±0.1% of reading, Offset ±0.02% of range @ 25°C ±6°C



Voltage input connection



Current input connection

DESCRIPTION

The T124 high-level analogue input takes up to six isolated voltage inputs. The hardware range is –10 to +10 volts and the user may select any software span within these limits.

To convert to a current input device, use an external burden resistor across the input. Software correction for burden resistor value provides enhanced milli-amp accuracy.

The unit is packaged in a double height box.

ORDER CODE

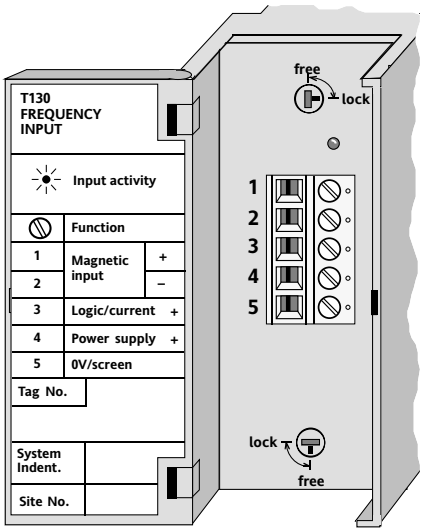
T124/TAG - - - - - - - -
(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

TA124/mA LA 083986
6-way analogue input, with transmitter supplies and burden resistors (See page 18)

TA124/mA/ISOL LA 083987
6-way isolated analogue input, with transmitter supplies and burden resistors (See page 19)

T130 I/O MODULE — 1-channel frequency/pulse input



DESCRIPTION

The T130 Frequency Input module provides an isolated interface to frequency input signals. The module has a programmable power supply and software-selectable burden resistors, and therefore can be used with a wide range of current pre-amplifiers, proximity detectors and volt free contact inputs as well as magnetic input transducers. An LED located above the connectors indicates the operating status of the input signal. The module has no build options and requires no hardware configuration or calibration.

ORDER CODE

T130/TAG – – – – – – – –

(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

None

SPECIFICATION

Frequency measurements

Frequency range:	0.01Hz to 30kHz*
Magnetic inputs:	10Hz to 30kHz*
Overrange:	60kHz
Minimum pulse length:	8µs
Hardware response time:	
Above 15Hz:	125ms max
Below 15Hz:	Waveform period + 125ms max
Update time:	0.1 sec
Resolution:	Better than 0.006%
Time Base Accuracy:	Set by base unit (0.05% over 5 years)

Transducer interface

Magnetic pick-up:	
Input type:	Bipolar
Input impedance:	>30kΩ
Signal voltage range:	10mV to 30V rising with frequency (1mV/Hz)
Threshold:	At cross-over of inputs
Open circuit input detection time:	Instant (no filter or delay)
Logic/current input:	DIN 19 234 (NAMUR)/PNP types
Maximum input voltage:	50V (absolute)
Minimum high/low pulse:	8µs (10:1 mark to space ratio)
Debounce (contact):	Selectable 25ms (max 20 pulses/sec)
Closed contact current:	5.2mA ± 1mA (24V/5kΩ burden)

Transmitter power supply

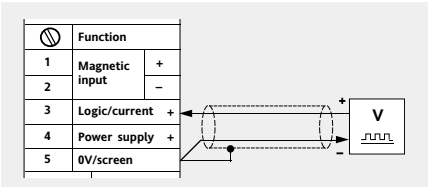
Voltage settings:	8, 12, 24V
Tolerance:	±10% (max 26 volts)
Current limit:	21 to 30mA (temperature dependent)

Logic/current input selection

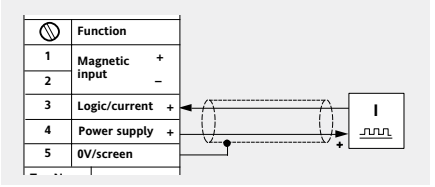
Transmitter type	Logic	Pre-amplifier	Proximity (DIN 19 234)	Contact
Burden resistor	>100kΩ	50Ω	1kΩ	5kΩ
Typical supply volts	—	24V	8V	24V
Thresholds	0.4, 1.6, 3.5, 10V	9mA	1.6, 3.5mA	0.7, 2mA
Open circuit detect	0.1V	2mA	0.1mA	0.02mA

Note

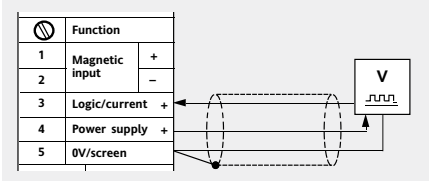
* 5kHz max for T102 in duplex (redundant) mode using T130 for totalisation



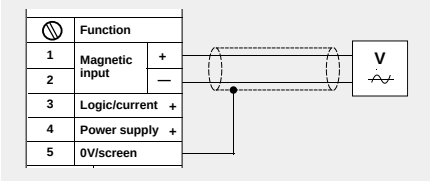
2-wire voltage input



2-wire current input

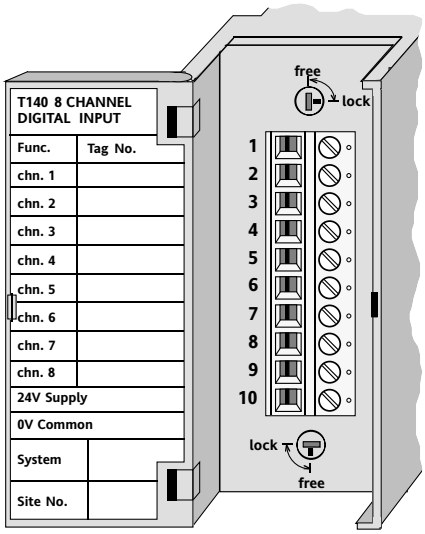


3-wire proximity input



Magnetic input

T140 I/O MODULE — 8-channel digital input

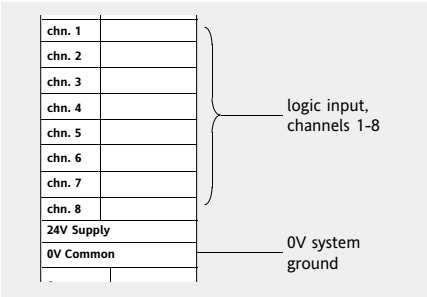


SPECIFICATION

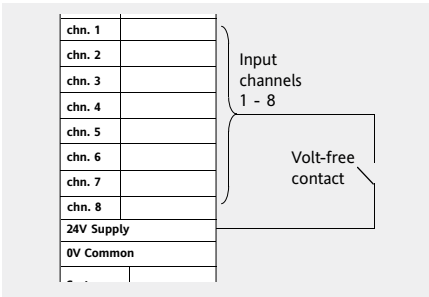
Inputs:	8 identical digital, Logic or Contact sensing configurable
Input filter:	1ms
Update time:	0.1 sec
Logic inputs	
Input logic 1 level:	50V max.
Input impedance:	>100kΩ
Hysteresis:	±0.25V
Threshold (software-selectable):	1V to 10V
Contact inputs	
Input current:	2.5mA max, per channel
Input voltage:	30V max.
Input impedance:	12kΩ
Hysteresis:	±0.1mA
Threshold:	1.1mA only
Transmitter power supply	
Output voltage:	24V ±12%
Current limit:	>18mA (limiting reported to processor)
Zero volts connection:	Shared with inputs

DESCRIPTION

The T140 can handle up to eight digital inputs. All eight inputs are either logic or contact sense, as selected by configuration. The input threshold for a logic input is software-selectable. Relays, switches and other volt-free contacts are read by the T140 when it is configured for contact sense input, using either the internal supply or an external wetting voltage; auxiliary DIN rail-mounting termination assemblies are available for this purpose, and include status LEDs and optional test-disconnect links.



Logic input connections

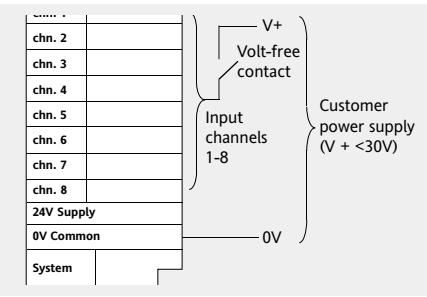


Contact sense inputs using internal power supply

ORDER CODE

T140/TAG – – – – – – – –

(if the TAG is not specified it will be supplied blank)



Contact sense inputs using external power supply

TERMINATION ASSEMBLY AUXILIARIES

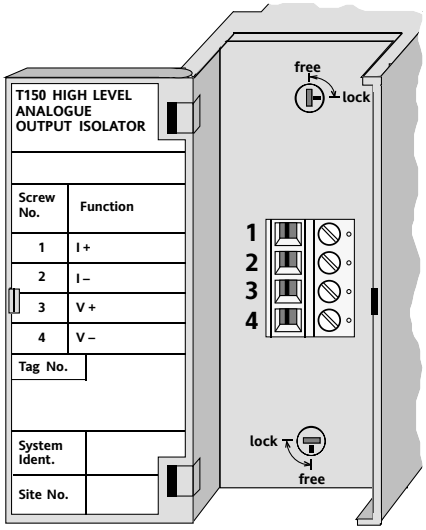
TA140/DC LA 083350
8-way digital input (See page 20)

TA140/TDC LA 083383
8-way digital input with test disconnect
(See page 21)

TA140/120 LA 083611U 120
8-way mains input opto-isolator 120V
(See page 22)

TA140/230 LA 083611U 230
8-way mains input opto-isolator 230V
(See page 22)

T150 I/O MODULE — 1-channel analogue output



DESCRIPTION

The T150 has a single analogue output channel. It can drive voltage or current signals and the hardware supports outputs anywhere within the range 0 to 10V or 0 to 20mA. The user may select any range within these hardware limits.

Load failure is detectable by a status bit in the software.

Voltage/current outputs

The T150 may be used for either a current output or a voltage output, as selected by configuration.

Redundant back-up connections

The T150 may be backed up by a T150 in a different T103 Base Unit, so that the back-up module takes over when the primary module fails. The module with the higher signal is selected as the net output, and the other module reports to its processor that it is being overdriven. Back-up connections for voltage and current outputs are shown in the figures opposite.

ORDER CODE

T150/TAG – – – – – – – –

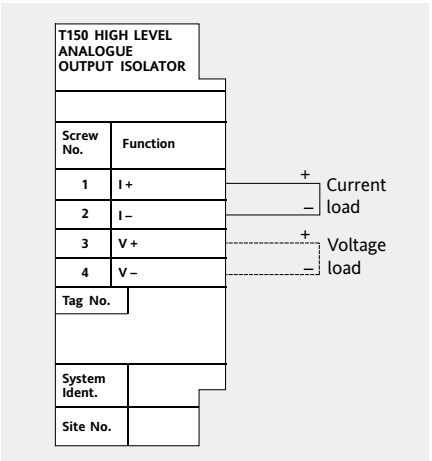
(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

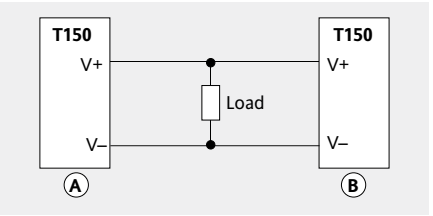
None

SPECIFICATION

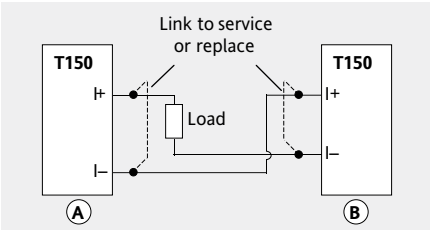
Outputs:	Voltage or current
D-to-A resolution:	>15 bit
Calibration values:	In T150 EEPROM
Update time:	0.1 sec
Voltage output	
Nominal range:	0 to 10V
Minimum output:	–1V
Maximum output:	11V
Drive capability:	–0.3 to 20mA
Resolution:	0.18mV
Accuracy, entire range:	±5mV
Temperature stability:	
Offset drift:	±160µV/°C
Gain drift:	±0.01%/°C of output
Short-circuit output:	Read by processor
Current output	
Nominal range:	0 to 20mA
Minimum output:	0mA
Maximum output:	22mA
Drive Capability:	<750Ω
Resolution:	0.37µA
Accuracy, entire range:	±10µA
Temperature stability:	
Offset drift:	±0.05µA/°C
Gain drift:	±0.01%/°C of output
Open circuit output:	Read by processor



Voltage and current output connections

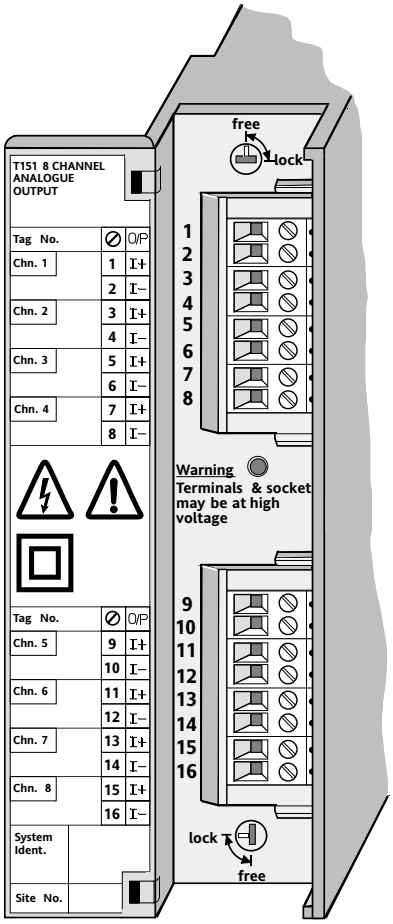


Back-up connections — voltage output



Back-up connections — current output

T151 I/O MODULE — 8-channel analogue output



SPECIFICATION

Outputs:	Current
D-to-A resolution:	>14 bit over nominal range
Calibration values:	Stored in T151 EEPROM
Isolation:	
Channel to channel:	50 dc functional isolation
Channel to base unit:	300V rms func. and safety isolation
Nominal ranges:	0 to 20mA
Minimum output:	0mA
Maximum output:	20.5mA (at max load resistance for channel enabled)
Drive capability:	
<5 channels enabled:	Up to 600Ω
5 or 6 channels enabled:	Up to 450Ω
7 or 8 channels enabled:	Up to 300Ω
Update time:	0.1 sec
Calibration accuracy:	0.07% of scale @ 25°C
Temperature stability:	
Offset drift:	0.10µA/°C
Gain drift:	0.004% of output/°C
Long term stability:	±(0.17µA + 0.013% of output/month (averaged over the first year of operation)

Accuracy and stability figures are calculated according to Appendix A of BS4889, at a confidence level of 99%.

DESCRIPTION

The 8-channel analogue output module can drive eight simultaneous current signals; the hardware supports outputs within the range 0 to 20mA.

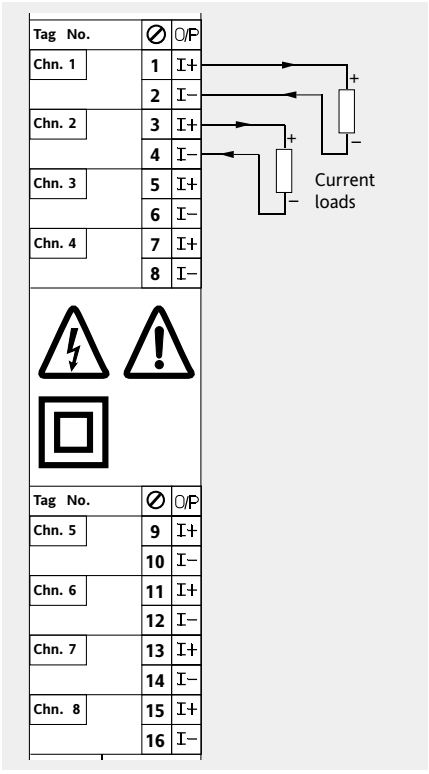
The maximum load impedance depends on the total number of current channels in use (see Specification).

ORDER CODE

T151/TAG - - - - - - - -
(if the TAG is not specified it will be supplied blank)

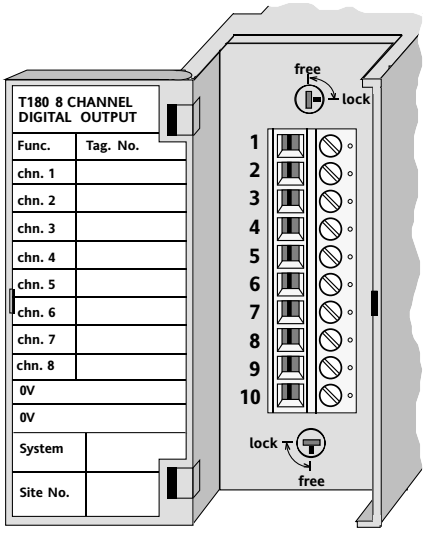
TERMINATION ASSEMBLY AUXILIARIES

None



T151 connections (example)

T180 I/O MODULE — 8-channel digital output



SPECIFICATION

Outputs:	8 identical digital, open drain with s/w selectable pull-up voltage
Processor read-back:	All outputs
Read-back threshold:	≈2.5V
Read-back input filter:	20µs
Update time:	0.1 sec

Logic 0, output low

Current sink capability:	120mA max
'ON' resistance:	4Ω max

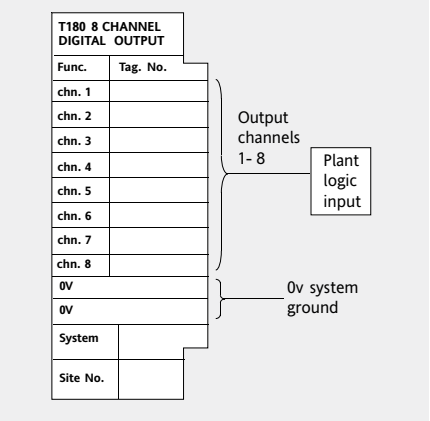
Logic 1, output high

Open Drain Voltage:	60V max
Pull-up voltages (s/ware selectable):	None (open drain), 5V, 15V, 24V
Internal pull-up resistor:	10kΩ

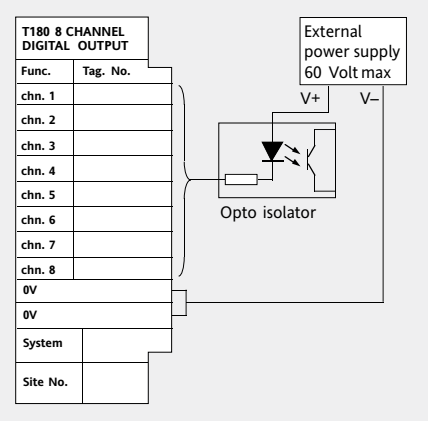
DESCRIPTION

The T180 8-channel digital output module may be configured for either open-drain or logic output signals. This is set in the software, and all eight channels are configured for the same type of output.

The logic output is sufficient to drive a small relay; auxiliary DIN rail-mounting units are available for this purpose, with plug-in relays and status LEDs.



Logic output (pull-up voltage)



Open-drain output (no pull-up voltage)

ORDER CODE

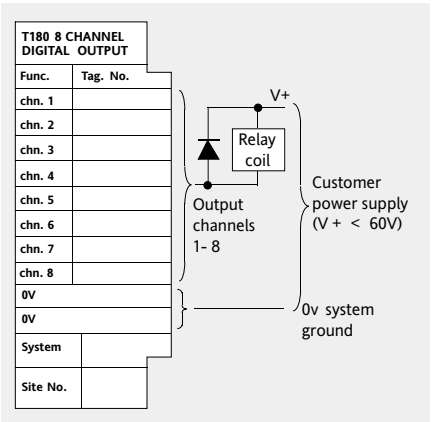
T180/TAG – – – – – – – –

(if the TAG is not specified it will be supplied blank)

TERMINATION ASSEMBLY AUXILIARIES

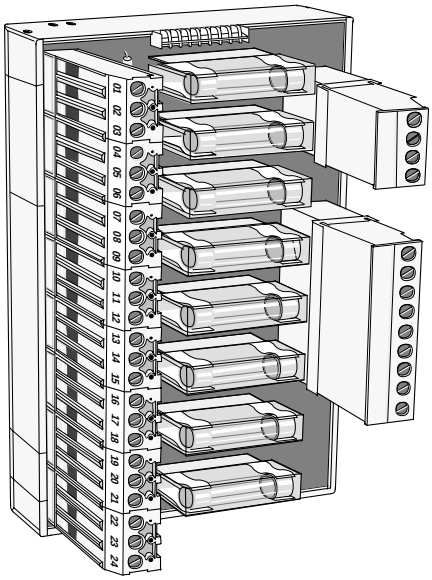
TA180/1p LA 083451U 008
8-way relay output (SPCO) (See Page 23)

TA180/2p LA 083608
8-way two pole relay output (DPCO) (See Page 24)



Open drain output (no pull-up voltage)
to inductive load

TA122/mA TERMINATION UNIT — 8-way analogue, individually fused



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **Individually fused 4-20mA transmitter supplies**
- **Plug and socket at system side for ease of installation/replacement**

SPECIFICATION

Plant inputs

Input current:	0-20mA
Burden resistor	
Resistance:	250Ω
Tolerance:	±0.1%
Stability:	±15ppm/°C
Power rating:	1/8W

System outputs

Output volts:	1-5V (compatible with T122)

Safety

Fuse:	50mA 20 × 5mm fast acting per channel

Physical

Dimensions:	128mm (W) × 80mm (D) × 65mm (H)

Connections

Supply connector:	4-way plug and socket
0V dc	
24V dc	
Plant input connector:	24-way screw terminal block max. conductor size 2.5mm²
System output connector:	9-way plug and socket
Input/output connections:	

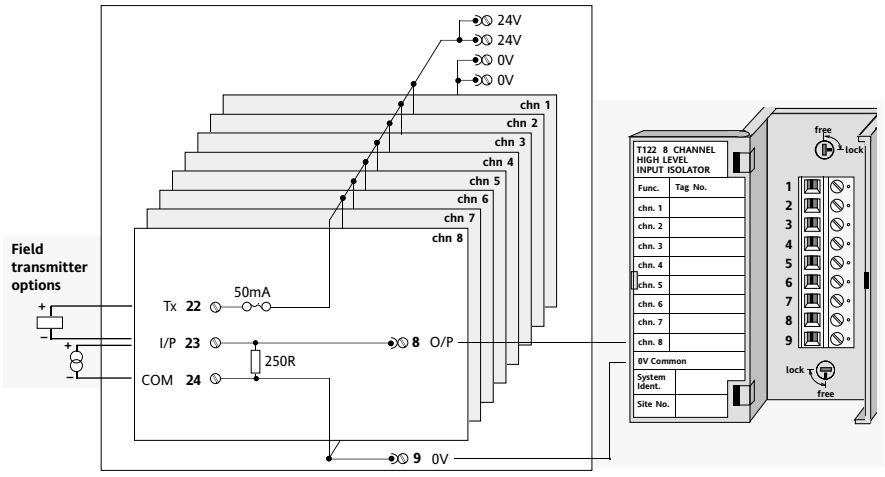
Channel	Input Tx	Input I/P	Input COM	Output O/P
1	01	02	03	1
2	04	05	06	2
3	07	08	09	3
4	10	11	12	4
5	13	14	15	5
6	16	17	18	6
7	19	20	21	7
8	22	23	24	8
0V common	—	—	—	9

DESCRIPTION

8-way analogue input termination assembly. It uses precision resistors to convert a 4-20mA current signal to 1-5V level for the T122 Analogue Input module. Each channel has an individually fused transmitter power supply for which an external 24V PSU is required.

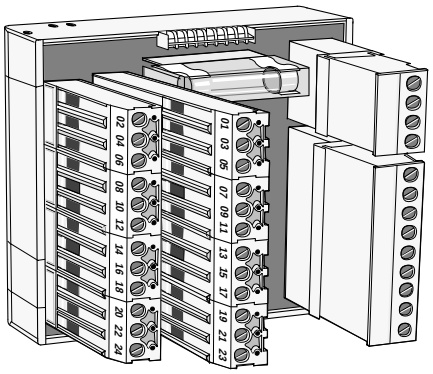
ORDER CODE

TA122/mA	Ordered within cubicle
LA082755	Ordered as separate unit



8-way relay output hardware schematic

TA122/mAS TERMINATION UNIT — 8-way analogue input, single fused



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **Fused 4-20mA transmitter supplies**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way analogue input termination assembly. It uses precision resistors to convert a 4-20mA current signal to 1-5V level for the T122 Analogue Input module. Each assembly has a fused transmitter power supply for which an external 24V PSU is required.

ORDER CODE

TA122/mAS	Ordered within cubicle
LA 083450	Ordered as separate unit

SPECIFICATION

Plant inputs

Input current:	0-20mA
Burden resistor	
Resistance:	250Ω
Tolerance:	±0.1%
Stability:	±15ppm/°C
Power rating:	1/8W

System outputs

Output volts:	1-5V (compatible with T122)

Safety

Fuse:	250mA 20 × 5mm fast acting

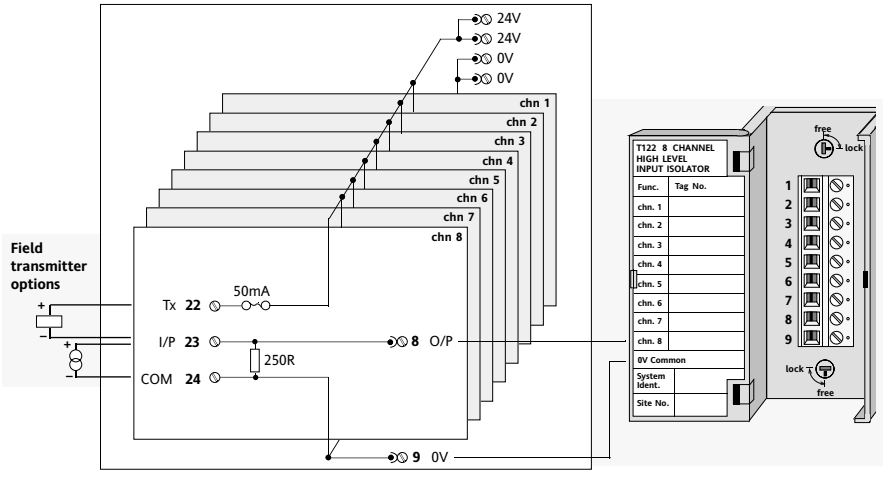
Physical

Dimensions:	85mm (W) × 80mm (D) × 65mm (H)

Connections

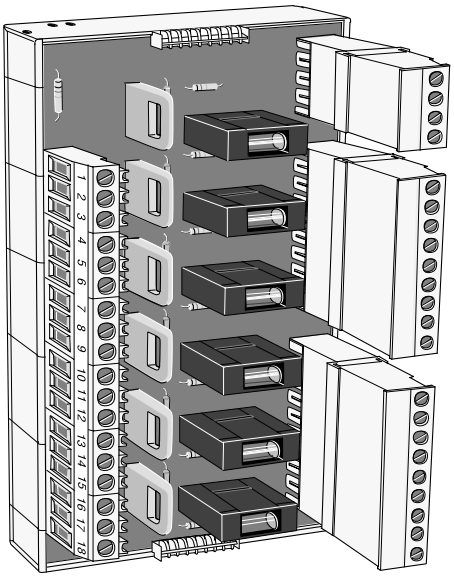
Supply connector:	4-way plug and socket
0V dc	
24V dc	
Plant input connector:	24-way double height screw terminal block max. conductor size 2.5mm²
System output connector:	9-way plug and socket
Input/output connections:	

Channel	Input Tx	Input I/P	Input COM	Output O/P
1	01	02	03	1
2	04	05	06	2
3	07	08	09	3
4	10	11	12	4
5	13	14	15	5
6	16	17	18	6
7	19	20	21	7
8	22	23	24	8
0V common	—	—	—	9



8-way analogue input hardware schematic

TA124/mA TERMINATION UNIT — 6-way analogue input



- **DIN rail mounting plant interface for T102/T103 Control Units**
- **Individually fused 4-20mA transmitter supplies**
- **Plug and socket at system side for ease of installation/replacement**

SPECIFICATION

Plant inputs

Input current:	0-20mA
Burden resistor	
Resistance:	250Ω
Tolerance:	±0.1%
Stability:	±15ppm/°C
Power rating:	1/8W

System outputs

Output volts:	1-5V (compatible with T124)

Safety

Fuse:	100mA 20 × 5mm fast acting per channel

Physical

Dimensions:	140mm (W) × 80mm (D) × 65mm (H)

Connections

Supply connector:	4-way plug and socket
0V dc	
24V dc	
Plant input connector:	18-way screw terminal block max. conductor size 2.5mm²
System output connector:	2 off 9-way plug and socket
Input/output connections:	

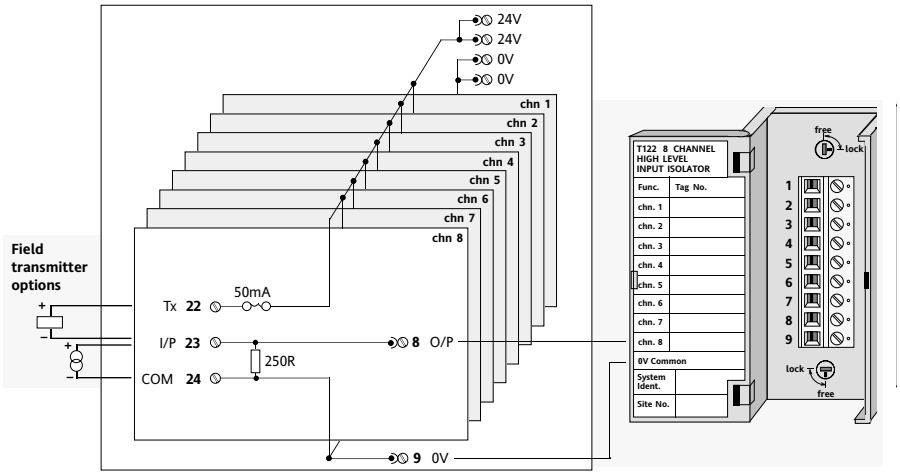
Channel	Input			Output	
	Tx	I/P	0V	V+	V–
1	1	2	3	1	2
2	4	5	6	4	5
3	7	8	9	7	8
4	10	11	12	10	11
5	13	14	15	13	14
6	16	17	18	16	17

DESCRIPTION

6-way analogue input termination assembly with individually fused transmitter power supplies. It uses precision resistors to convert a 4-20mA current signal to 1-5V level for the T124 Isolated Analogue Input module. Each channel has an individually fused transmitter power supply for which an external 24V PSU is required.

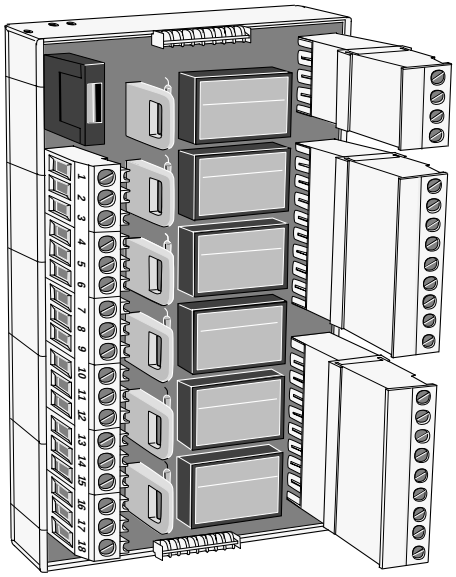
ORDER CODE

TA124/mA	Ordered within cubicle
LA 083986	Ordered as separate unit



6-way isolated analogue input hardware schematic

TA124/mA/ISOL TERMINATION UNIT — 6-way isolated analogue input



- **DIN rail mounting plant interface for T102/T103 Control Units**
- **Individually isolated 4-20mA transmitter supplies**
- **Plug and socket at system side for ease of installation/replacement**

SPECIFICATION

Plant inputs

Input current:	0-20mA
Burden resistor	
Resistance:	250Ω
Tolerance:	±0.1%
Stability:	±15ppm/°C
Power rating:	1/8W
Transmitter supply:	Isolated 24V dc ± 5% @ 65mA

System outputs

Output volts:	1-5V (compatible with T124)

Safety

Fuse:	250mA 20 × 5mm fast acting
Transmitter supply:	Short circuit and overload protection @ > 105%

Physical

Dimensions:	140mm (W) × 80mm (D) × 65mm (H)

Connections

Supply connector:	4-way plug and socket
0V dc	
24V dc	
Plant input connector:	18-way screw terminal block max. conductor size 2.5mm²
System output connector:	2 off 9-way plug and socket
Input/output connections:	

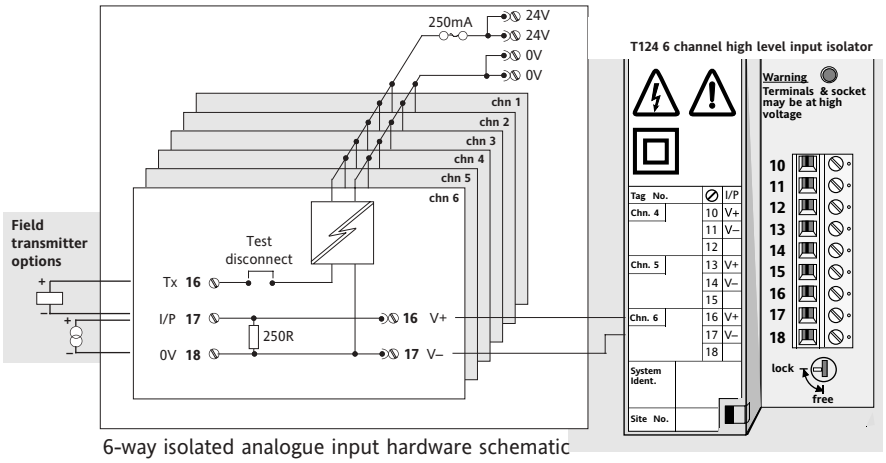
Channel	Input			Output	
	Tx	I/P	0V	V+	V–
1	01	02	03	01	02
2	04	05	06	04	05
3	07	08	09	07	08
4	10	11	12	10	11
5	13	14	15	13	14
6	16	17	18	16	17

DESCRIPTION

6-way analogue input termination assembly with individually isolated transmitter power supplies. It uses precision resistors to convert a 4-20mA current signal to 1-5V level for the T124 Isolated Analogue Input module. Each channel has an isolated 24V transmitter PSU with a common 250mA fuse. Jumpers are provided to disconnect the field devices.

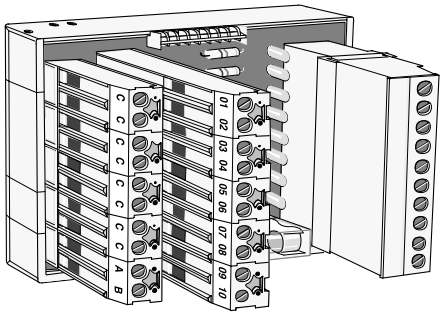
ORDER CODE

TA124/mA/ISOL	Ordered within cubicle
LA 083987	Ordered as separate unit



6-way isolated analogue input hardware schematic

TA140/DC TERMINATION UNIT — 8-way digital input



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way digital input termination assembly. The module is used to interface between the T140 digital input module and field connections. When a logic 1 (e.g. contact closed) is applied to an input the corresponding LED illuminates and the signal is passed to the T140 via the output terminals. The contact wetting voltage is supplied by the T140, or an optional external power supply. The external power supply is protected by a fuse.

ORDER CODE

TA140/DC	Ordered within cubicle
LA 083350	Ordered as separate unit

SPECIFICATION

Inputs

Maximum voltage:	50V
Impedance:	15kΩ

Outputs

Compatible with T140 with logic I/P configured

Indicators

LED (low current):	Yellow, illuminated at logic 1

Safety

Fuse:	50mA 20 × 5mm fast acting

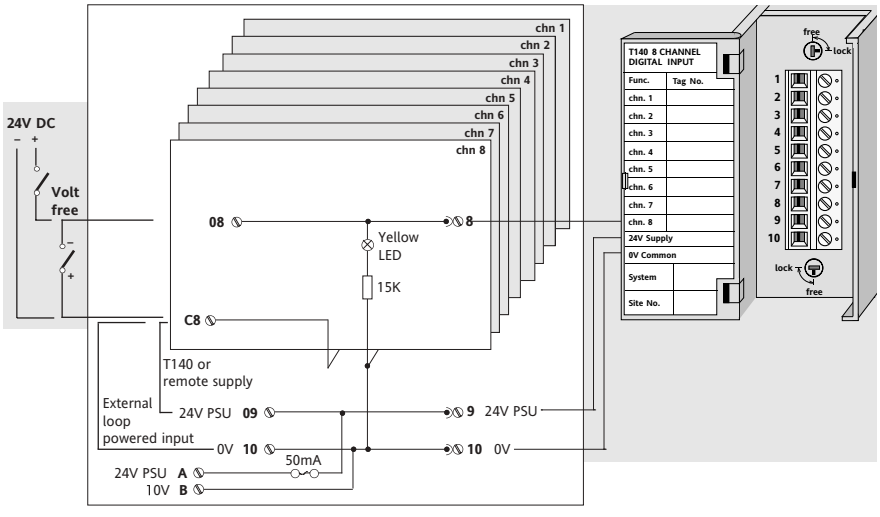
Physical

Dimensions:	61mm (W) × 80mm (D) × 64mm (H)

Connections

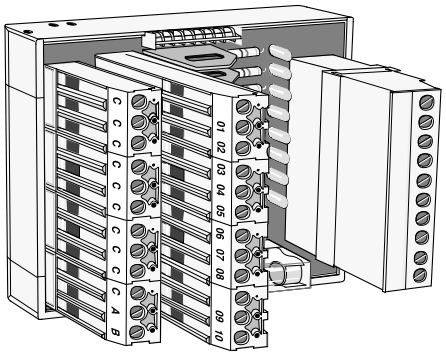
Supply connections:	See Plant connector
24V fused	A
0V	B
Plant connector:	20-way double height screw terminal max conductor size 2.5mm²
System connector:	10-way plug and socket
Input/output connections:	

Channel	I/P	Common (bussed)	Output
1	01	C1	1
2	02	C2	2
3	03	C3	3
4	04	C4	4
5	05	C5	5
6	06	C6	6
7	07	C7	7
8	08	C8	8
24V	09	—	9
0V	10	—	10



8-way digital input hardware schematic

TA140/TDC TERMINATION UNIT — 8-way digital input with test disconnect



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **Test disconnect jumpers to isolate plant inputs**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way digital termination assembly with test disconnect facility. The module is used to interface between the T140 digital input module and field connections. When a logic 1 (e.g. contact closed) is applied to an input the corresponding LED illuminates and the signal is passed to the T140 via the output terminals. The contact wetting voltage is supplied by the T140, or an optional external power supply. The external power supply is protected by a fuse.

ORDER CODE

TA140/TDC	Ordered within cubicle
LA 083383	Ordered as separate unit

SPECIFICATION

Inputs — Active high
Maximum voltage: 50V
Impedance: 15kΩ

Outputs
Compatible with T140 with logic I/P configured

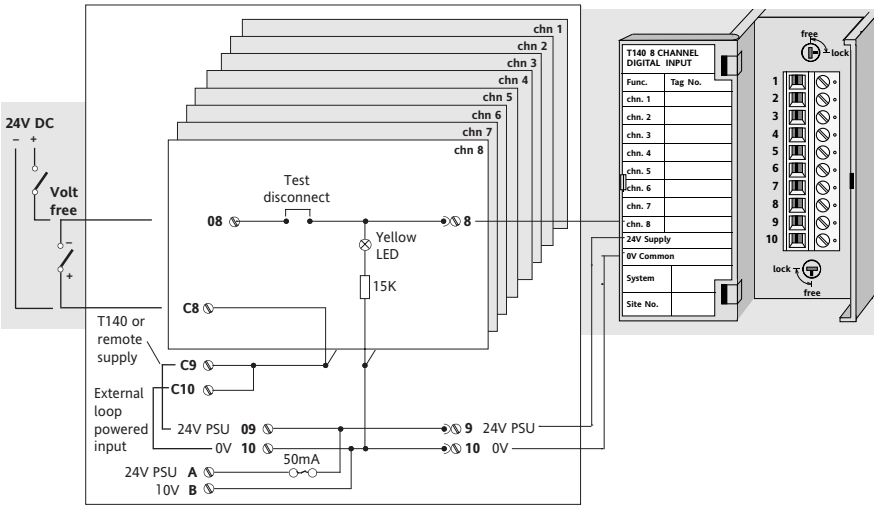
Indicators
LED (low current): Yellow, illuminated at logic 1

Safety
Fuse: 50mA 20 × 5mm fast acting

Physical
Dimensions: 71mm (W) × 80mm (D) × 64mm (H)

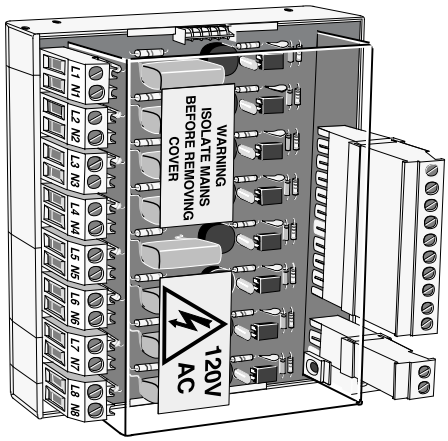
Connections
Supply connections: See Plant connector
24V dc A
0V dc B
Plant connector: 24-way double height screw terminal max conductor size 2.5mm²
System connector: 10-way plug and socket
Input/output connections:

Channel	I/P	Common (bussed)	Output
1	01	C1	1
2	02	C2	2
3	03	C3	3
4	04	C4	4
5	05	C5	5
6	06	C6	6
7	07	C7	7
8	08	C8	8
24V	09	—	9
0V	10	C9, C10	10



8-way digital input with test disconnect hardware schematic

TA140/120v & TA140/230v TERMINATION UNITS — 8-way mains input opto-isolator



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **120V and 230V versions**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way mains input opto-isolator. Two versions of the module are available to convert 120V or 230V mains voltages to 24V digital signals which are compatible with the T140 inputs. When mains is applied to an input the corresponding LED will illuminate and the output will be set to logic 1.

ORDER CODE

TA140/120	Ordered within cubicle
LA 083611U 120	Ordered as separate unit
TA140/230	Ordered within cubicle
LA 083611U 230	Ordered as separate unit

SPECIFICATION

Inputs	**120V version**	**230V version**
Voltage:	92 to 132V ac	184 to 264V ac
Impedance:	10.3kΩ @ 50Hz	21.9kΩ @ 50Hz

Outputs
Compatible with T140 with logic I/P configured

Indicators

LED (low current):	Yellow, illuminated at logic 1

Response time

Low to high:	1ms
High to low:	50ms

Safety

Isolation mains inputs to digital outputs:	240V
Isolation mains inputs to mains inputs:	240V

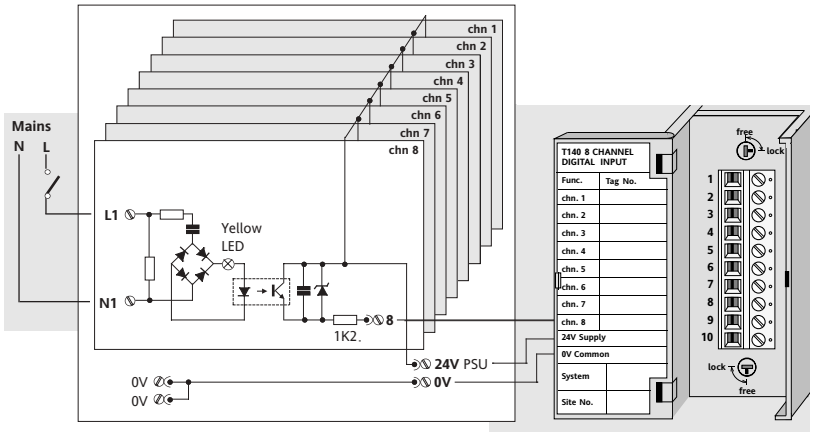
A cover and appropriate safety labels must be provided to protect user from hazardous voltages on the board

Physical

Dimensions:	106mm (W) × 96mm (D) × 65mm (H)

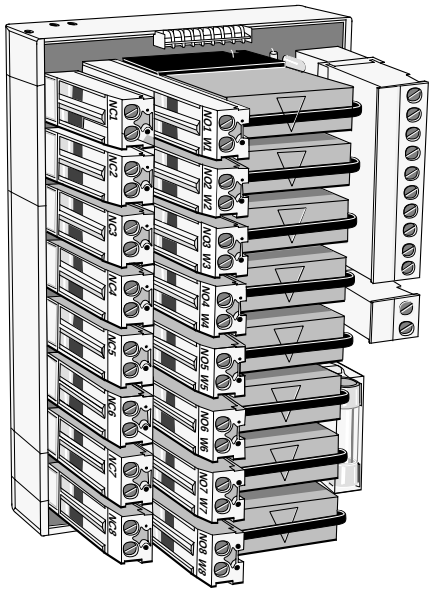
Connections

Supply connector:	2-way terminal block × 8
Terminals L1 & N1 to L8 & N8	Channels 1 to 8 Live and Neutral
Output type:	10-way plug and socket
Terminal 1 to 8	Channels 1 to 8
	24V
	0V
Output type:	2-way plug and socket
	0V



8-way mains input opto-isolator hardware schematic

TA180/1p TERMINATION UNIT — 8-way relay output (SPCO)



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **Plug in relays for ease of replacement**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way relay output termination assembly. It produces relay outputs with single pole changeover contacts from the T180 digital output module. When a logic 0 is applied from the T180 the corresponding relay is energised causing the contacts to change over and the LED to illuminate. The external 24V supply required to power the relays is protected by a fuse.

ORDER CODE

TA180/1p	Ordered within cubicle
LA 083451U 008	Ordered as separate unit

SPARE RELAYS

LA 083993	24V dc low power relay single pole

SPECIFICATION

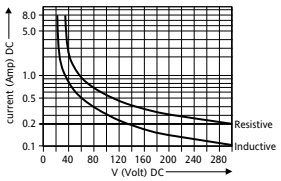
Inputs

Relay coil voltage (nominal):	Active low
Relay coil capacity (typ):	24V
24V PSU range:	220mW
Power consumption (max.):	19V to 39V dc
	2.3W

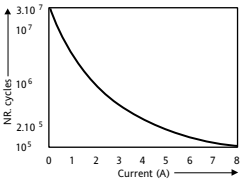
Outputs

Relay type:	SPCO
Relay contact voltage (max.):	240V ac
Relay contact current (max.):	5A (resistive load)
Relay contact min. switching level:	>12V, >100mA

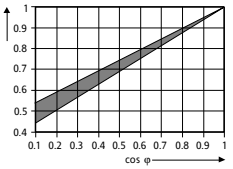
Max. switching power dc



Expected switching cycles/switching current at 250 VAC. For resistive loads and repetition rates of 360 cycles/h.



Expected life against load power factor cos φ



Indicators

LED (low current):	Yellow, illuminated at logic 0

Safety

Isolation inputs to relay contacts:	240V
Isolation relay to relay contacts:	240V
Fuse:	250mA 20 × 5mm fast acting

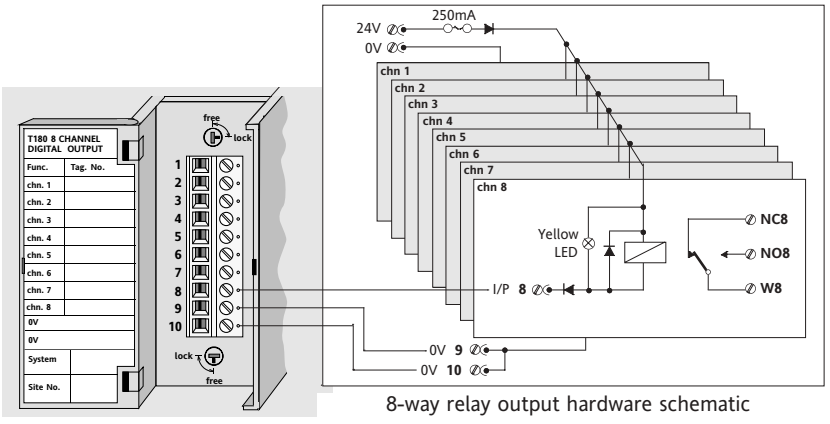
Physical

Dimensions:	128mm (W) × 80mm (D) × 65mm (H)

Connections

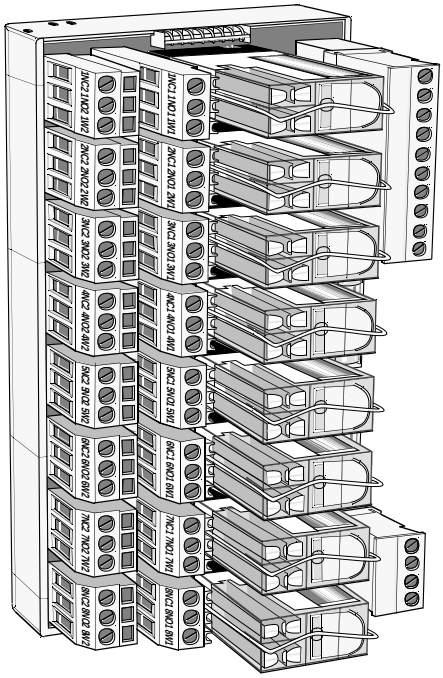
Supply connector:	2-way plug and socket
0V dc	
24V dc	
Plant connector:	32-way double height screw terminal block max. conductor size 2.5mm²
System connector:	10-way plug and socket
Input/output connections:	

Channel	Input	Output		
1	1	NO1	NC1	W1
2	2	NO2	NC2	W2
3	3	NO3	NC3	W3
4	4	NO4	NC4	W4
5	5	NO5	NC5	W5
6	6	NO6	NC6	W6
7	7	NO7	NC7	W7
8	8	NO8	NC8	W8
0V	9, 10	—	—	—



8-way relay output hardware schematic

TA180/2p TERMINATION UNIT — 8-way two-pole relay output (DPCO)



- **DIN rail mounting plant interface for T102/T103 Control Units; also suitable for T640 Loop processor**
- **Plug in relays for ease of replacement**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

8-way two-pole relay output termination assembly. It produces relay outputs with double-pole changeover contacts from the T180 digital output module. When a logic 0 is applied from the T180 the corresponding relay is energised causing the contacts to change over and the LED to illuminate. The external 24V supply required to power the relays is protected by a fuse.

ORDER CODE

TA180/2p	Ordered within cubicle
LA 083608	Ordered as separate unit

SPARE RELAYS

LA 083997	24V dc low power relay double pole

SPECIFICATION

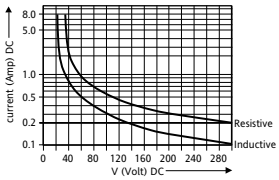
Inputs

Relay coil voltage (nominal):	Active low
Relay coil capacity (typ):	24V
24V PSU range:	408mW
Power consumption (max.):	19V to 39V dc
	3.3W

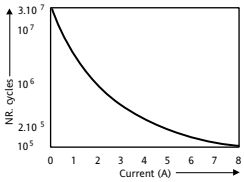
Outputs

Relay type:	DPCO
Relay contact voltage (max.):	240V ac
Relay contact current (max.):	5A (resistive load)
Relay contact min. switching level:	>12V, >100mA

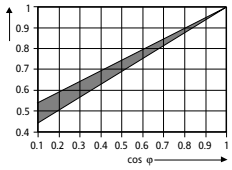
Max. switching power dc



Expected switching cycles/switching current at 250 VAC. For resistive loads and repetition rates of 360 cycles/h.



Expected life against load power factor cos φ



Indicators

LED (low current):	Yellow, illuminated at logic 0

Safety

Isolation inputs to relay contacts:	240V
Isolation relay to relay contacts:	240V
Fuse:	2 × 500mA 20 × 5mm fast acting

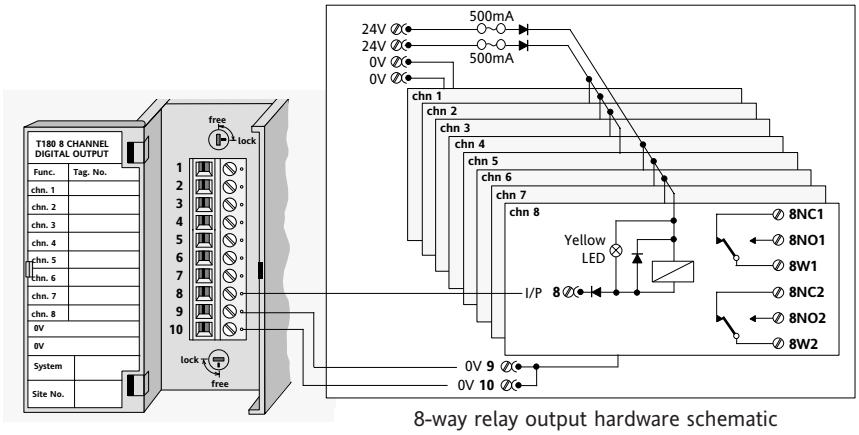
Physical

Dimensions:	150mm (W) × 80mm (D) × 65mm (H)

Connections

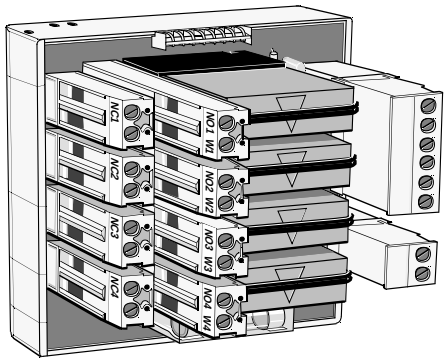
Supply connector:	4-way plug and socket
0V dc	
24V dc	
Plant connector:	48-way double height screw terminal block max. conductor size 2.5mm²
System connector:	10-way plug and socket
Input/output connections:	

Channel	Input	Output					
1	1	1NO1	1NO2	1NC1	1NC2	1W1	1W2
2	2	2NO1	2NO2	2NC1	2NC2	2W1	2W2
3	3	3NO1	3NO2	3NC1	3NC2	3W1	3W2
4	4	4NO1	4NO2	4NC1	4NC2	4W1	4W2
5	5	5NO1	5NO2	5NC1	5NC2	5W1	5W2
6	6	6NO1	6NO2	6NC1	6NC2	6W1	6W2
7	7	7NO1	7NO2	7NC1	7NC2	7W1	7W2
8	8	8NO1	8NO2	8NC1	8NC2	8W1	8W2
0V	9, 10	—	—	—	—	—	—



8-way relay output hardware schematic

TA640DO/1p TERMINATION UNIT — 4-way relay output (SPCO)



- **DIN rail mounting plant interface for the T640 Loop processor; also suitable for T102/T103 Control Units**
- **Plug in relays for ease of replacement**
- **LED status indication**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

4-way relay output termination assembly. Provides relay outputs with single-pole changeover contacts from the T640 Loop processor. When a logic 0 is applied from the T640 the corresponding relay is energised causing the contacts to change over and the LED to illuminate. The external 24V supply required to power the relays is protected by a fuse.

ORDER CODE

TA640/DO/1p	Ordered within cubicle
LA 083451U 004	Ordered as separate unit

SPARE RELAYS

LA 083993 24V dc low power relay single pole

SPECIFICATION

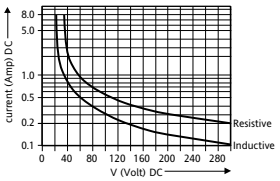
Inputs

Relay coil voltage (nominal):	Active low
Relay coil capacity (typ):	24V
24V PSU range:	220mW
Power consumption (max.):	19V to 39V dc
	1.15W

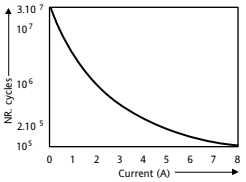
Outputs

Relay type	SPCO
Relay contact voltage (max.):	240V ac
Relay contact current (max.):	5A (resistive load)
Relay contact min. switching level:	>12V, >100mA

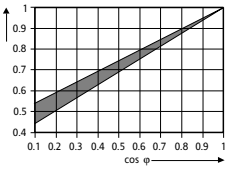
Max. switching power dc



Expected switching cycles/switching current at 250 VAC. For resistive loads and repetition rates of 360 cycles/h.



Expected life against load power factor cos φ



Indicators

LED (low current):	Yellow, illuminated at logic 0

Safety

Isolation inputs to relay contacts:	240V
Isolation relay to relay contacts:	240V
Fuse:	T250mA 20 × 5mm

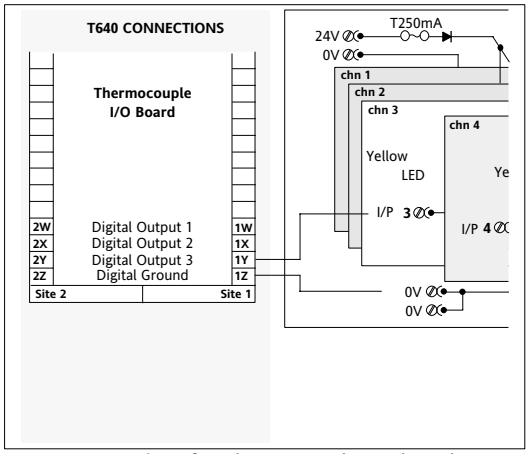
Physical

Dimensions:	72mm (W) × 80mm (D) × 65mm (H)

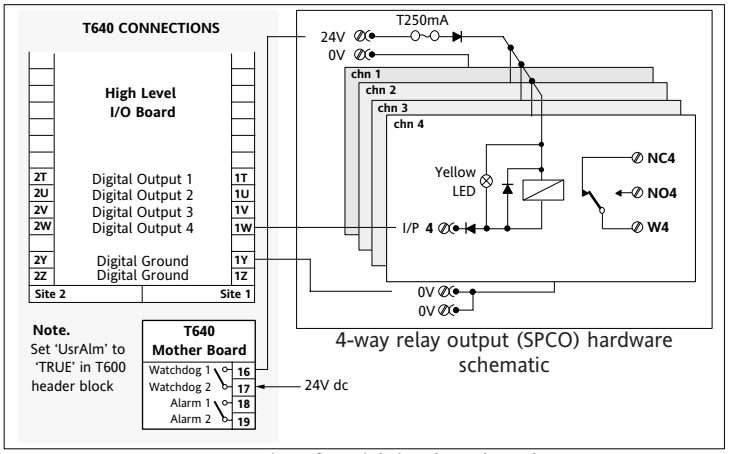
Connections

Supply connector:	2-way plug and socket
0V dc	
24V dc	
Plant connector:	16-way double height screw terminal block max. conductor size 2.5mm²
System connector:	6-way plug and socket
Input/output connections:	

Channel	Input	Output		
1	1	NO1	NC1	W1
2	2	NO2	NC2	W2
3	3	NO3	NC3	W3
4	4	NO4	NC4	W4
0V	5, 6	—	—	—



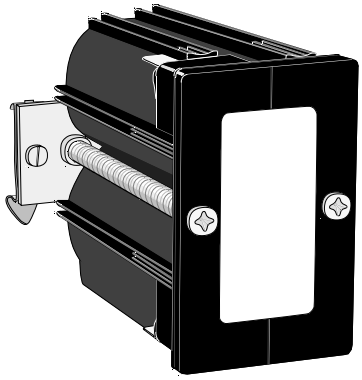
Connections for Thermocouple I/O board

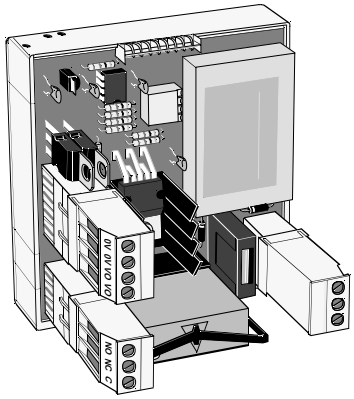


4-way relay output (SPCO) hardware schematic

Connections for High level I/O board

S9537 & S9538/24V AUXILIARY UNITS — RAM backup battery & charger unit





- **RAM backup for T103/T303 control units**
- **Pulsed charging to aid diagnostics**
- **LED and relay health monitoring**
- **DIN rail mounting**

DESCRIPTION

4V battery and charger unit. The charger provides a float voltage to the sealed lead acid battery and also monitors the charge voltage by means of a relay and LED. A failure of the charging voltage causes the relay to de-energise, the relay contacts to change over and the LED to turn off. The output voltage is cycled off for one minute and back on every 11 minutes to allow checking of battery voltage by the load device. The battery charger supports dual inputs for integrity and is protected against overvoltage and short circuit conditions.

ORDER CODE

S9537 RAM backup battery
S9538/24V Battery charger unit

SPARE RELAYS

LA 083996 5V dc low power relay single pole

SPECIFICATION

Battery

Electrical

Type:	Sealed lead rechargeable
Nominal voltage:	4.0V
Nominal capacity:	5.0Ah

Physical

Dimensions:	96mm (W) × 54mm (D) ×70mm (H); 80mm (D) with TS35 adapter
Weight:	0.74kg
Operating temperature:	–40°C to +65°C

Battery charger

Inputs

Voltage range:	18 to 36V dc
Current:	200mA
Relay coil voltage:	5V
Relay coil capacity:	220mW

Outputs

Voltage:	4.6 to 4.7V
Current limit:	800mA
Voltage on time:	10 min. (nominal)
Voltage off time:	1 min. (nominal)
Relay type;	SPCO
Relay contact voltage (max.):	240V
Relay contact current (max.):	5A (resistive load)
Relay contact min. switching level:	>12V, >100mA

Indicators

LED (low current):	Green, illuminated when output healthy

Safety

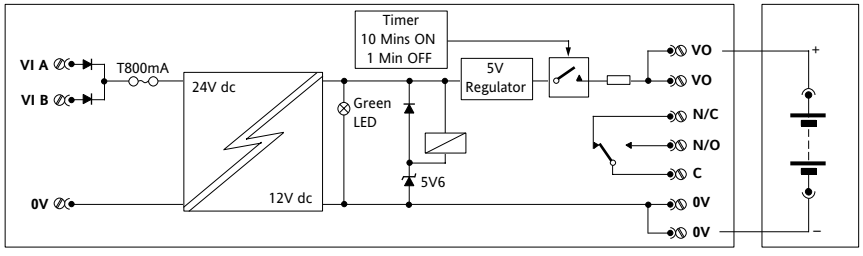
Isolation inputs to relay contacts:	240V
Isolation outputs to relay contacts:	240V
Fuse:	T800mA

Physical

Dimensions:	93mm (W) × 80mm (D) × 64mm (H)

Connections

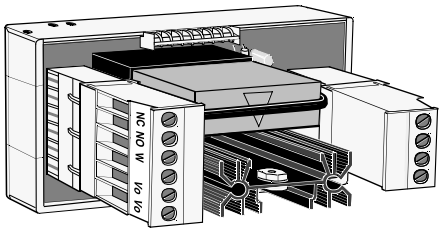
Supply output connector:	4-way plug and socket 0V VO
Relay output connector:	3-way plug and socket Relay N/O Relay N/C Relay C
Supply input connector:	3-way plug and socket VI 0V



Battery charger unit hardware schematic

Battery

S9539/10A AUXILIARY UNIT — PSU health status/diode unit



- **Allows load sharing and redundant backup for 24V power supplies**
- **Designed for online replacement**
- **LED and relay health indication**
- **DIN rail mounting**
- **Plug and socket at system side for ease of replacement**

DESCRIPTION

The outputs from a pair of PSU health status/diode units may be connected together via the unit to provide a diode OR'ed redundant supply. It also provides health monitoring of the input voltage by means of a relay and LED. A supply failure causes the relay to de-energise, the relay contacts to change over, and the LED to turn off.

ORDER CODE

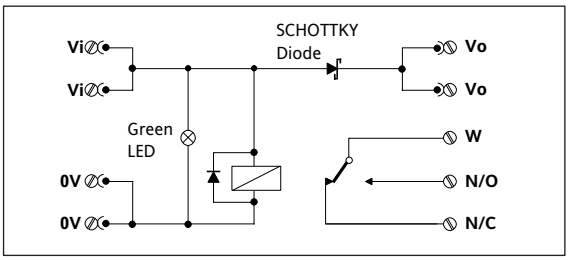
S9539/10A

SPARE RELAYS

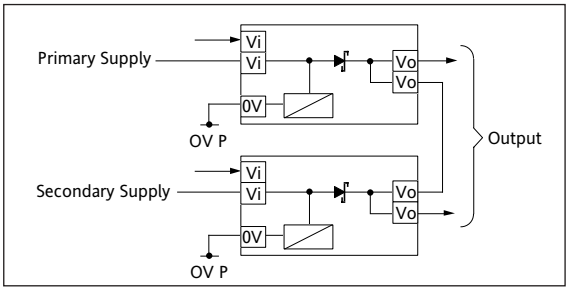
LA 083996 5V dc low power relay single pole

SPECIFICATION

Inputs	Active high
Voltage (nominal):	24V
Voltage range:	18V to 36V
Relay coil voltage:	5V
Relay coil capacity:	220mW
Outputs	
Voltage:	Vin - 0.55V @ max. load
Current (max.):	10A
Relay type:	SPCO
Relay contact voltage (max.):	240V
Relay contact current (max.):	5A (resistive load)
Relay contact min. switching level:	>12V, >100mA
Indicators	
LED (low current):	Green, illuminated when PSU healthy
Safety	
Isolation input to relay output:	240V
Isolation output to relay output:	240V
Physical	
Dimensions:	49mm (W) × 80mm (D) × 56mm (H)
Connections	
Output connector:	6-way plug and socket
2 × Terminals	Vo
1 × Terminal	No connection
1 × Terminal	Relay W
1 × Terminal	Relay N/O
1 × Terminal	Relay N/C
Input connector:	4-way plug and socket
2 × Terminals	Vi
2 × Terminals	0V

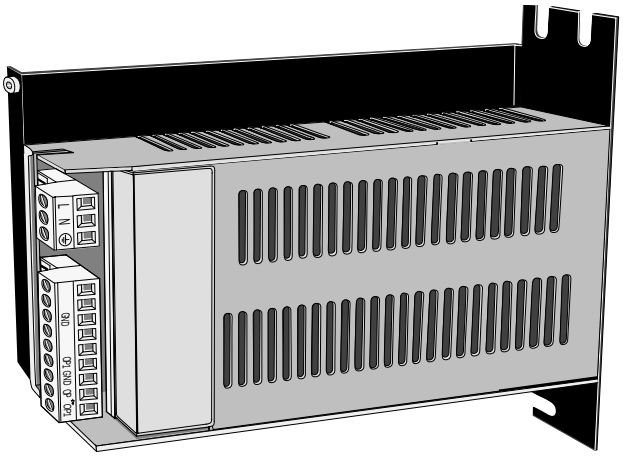


Power supply health status/diode unit hardware schematic



System schematic

S9543 AUXILIARY UNIT — T754X System power supply



- **Quick release bulkhead mounting**
- **90-264V rms universal input**
- **180W 24V dc current limited output**
- **Parallel connection for dual redundancy**
- **82% efficiency**
- **Fault detection output**
- **Plug and socket for ease of installation/replacement**

DESCRIPTION

These modular power supplies may have their outputs paralleled to generate an N+1 redundant arrangement. The quick release mounting plus plug and socket arrangements allow hot replacement when isolated via a circuit breaker.

ORDER CODE

S9543 Power supply
BA 083234U 002 Power supply tray

SPECIFICATION

Inputs

Voltage:	90-264V rms Universal I/P
Frequency:	47-63Hz
Power factor:	0.67 @230V rms typ.
Input current:	1.6A max @240V rms
Input VA:	300VA max @ 240V rms
Inrush I:	30A max @ 240V rms
Hold-up:	28mSec @ full load and nominal input
Earth leakage	2.5mA max 264V rms
Efficiency:	>82% @ 240V rms, full load

Outputs

Output voltage (nominal):	24V
Output current:	7.5A
Voltage adjustment:	±5%
Initial setting:	0.5%
Load regulation:	1%
Temp. coeff:	0.02%/°C
Ripple rms:	0.2%
pk-pk	2%
Transient deviation:	5% for a 50% load change
Transient time	2mSec
Overcurrent protection:	Constant current
Output power:	180W (airflow >0.5m/s) and/or affixed to cold face
Operating temperature:	0-50°C (derate @ 2.5%/°C to 70°C)
MTBF:	100,000 Hrs

Safety

In accordance with EN60950, UL1950, CSA22.2 No950

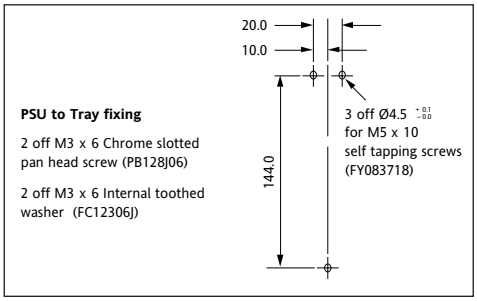
Input to earth:	2.5kV dc creepage and clearance > 2.5mm
Input to output:	4.24kV dc creepage and clearance >6.4mm
Output to earth:	5000V dc

Physical

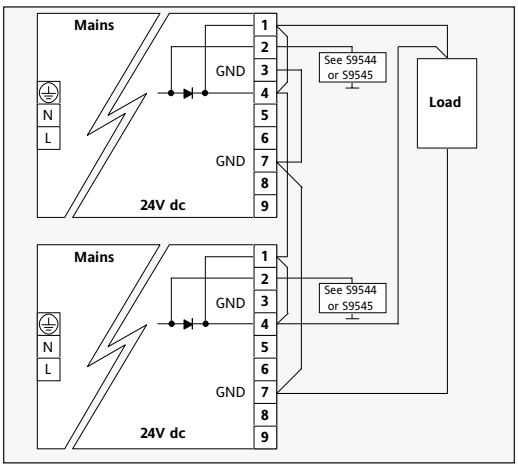
Dimensions:	
Power supply	40mm (W) × 207mm (D) × 100mm (H)
Tray	42mm (W) × 205mm (D) × 157mm (H)

Connections

Output connector:	9-way plug and socket
Terminal 1	24V dc output
Terminal 2	24V dc alarm output
Terminal 3	Ground
Terminal 4	24V dc output
Terminal 5	No connection
Terminal 6	No connection
Terminal 7	Ground
Terminal 8	No connection
Terminal 9	No connection

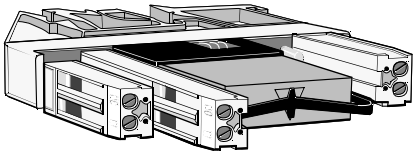


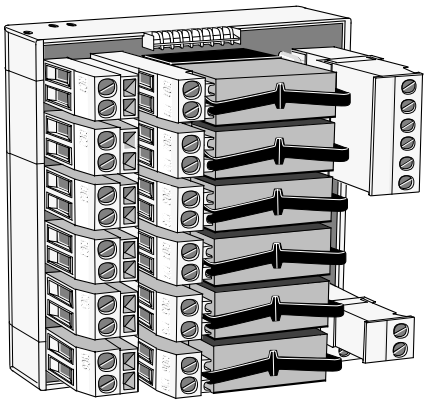
Fixing details



Redundant system power supply hardware schematic

S9544/S9545 AUXILIARY UNIT — Single-way/6-way PSU health status unit





- **DIN rail mounting plant interface**
- **LED health status indication**
- **Power supply fail contacts**
- **Plug and socket at system side for ease of installation/replacement**

DESCRIPTION

The power supply health status units are available as single- or 6-way modules. When a 24V power supply is monitored a green LED is illuminated and a 5V relay is energised. If the power supply output fails the relay changes over to its failsafe condition and the LED turns off.

ORDER CODES

6-way PSU health status unit

S9545	Ordered within cubicle
LA 083737U 006	Ordered as separate unit

Single-way PSU health status unit

S9544	Ordered within cubicle
LA 083744	Ordered as separate unit

SPARE RELAYS

LA 083996	5V dc low power relay single pole

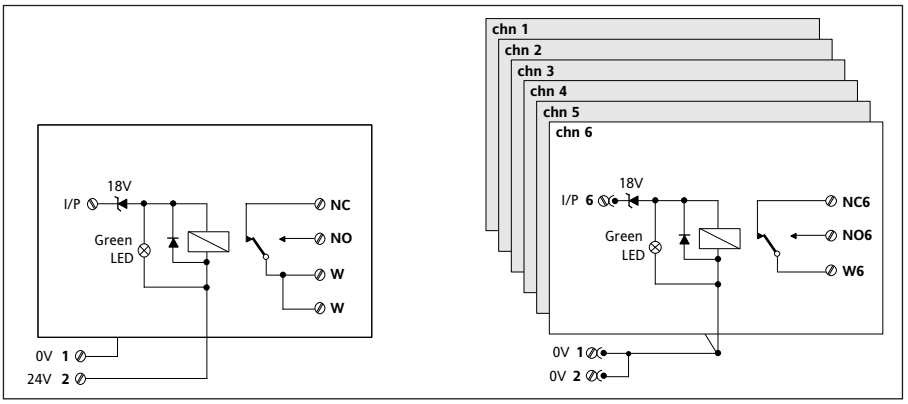
SPECIFICATION

Inputs	Active low
Voltage (nominal):	24V dc
Voltage range:	22-28V dc
Current/channel @ 13V:	50mA
Relay coil voltage:	5V
Relay coil capacity (typ):	220mW
Outputs	
Relay type:	SPCO
Relay contact voltage (max.):	240V ac
Relay contact current (max.):	5A (resistive load)
Screw terminals:	5A, 240V ac
Relay contact min. switching level:	>12V, >100mA
Indicators	
LED (low current):	Green, illuminated when PSU healthy
Safety	
Isolation inputs to relay contacts:	240V
Isolation relay to relay contacts:	240V
Physical	
S9544 dimensions:	12mm (W) × 80mm (D) × 65mm (H)
S9545 dimensions:	94mm (W) × 80mm (D) × 65mm (H)
S9544 connections	
Supply connector:	2-way screw terminal block max. conductor size 2.5mm²
Terminal 1	0V dc
Terminal 2	24V dc
Plant connector:	4-way double height screw terminal block max. conductor size 2.5mm²
Input/output connections:	

Channel	Input	Output		
1	1	NO	NC	W
0V	1	—	—	—
24V	2	—	—	—

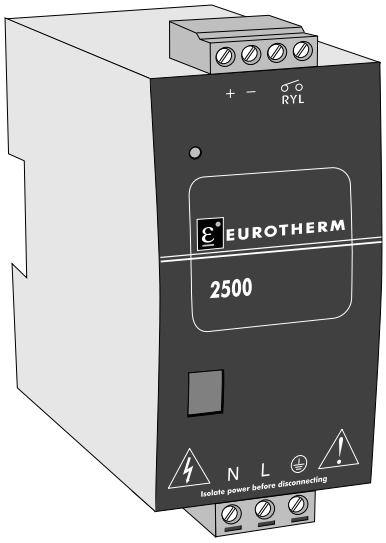
S9545 connections	
Supply connector:	2-way plug and socket
Terminals 1, 2	0V dc
Plant connector:	24-way double height screw terminal block max. conductor size 2.5mm²
System connector:	6-way plug and socket
Input/output connections:	

Channel	Input	Output		
1	1	NO1	NC1	W1
2	2	NO2	NC2	W2
3	3	NO3	NC3	W3
4	4	NO4	NC4	W4
5	5	NO5	NC5	W5
6	6	NO6	NC6	W6
0V	1, 2	—	—	—



Single-way/6-way PSU health status unit hardware schematic

2500P AUXILIARY UNIT — 24V dc DIN rail power supply



- **DIN rail mounting**
- **Diode de-coupled output**
- **Relay and LED indication**
- **Reserve capacity**
- **20m sec hold-up time**
- **Reliability**

DESCRIPTION

This is a series of three high quality DIN rail mounting power supply units, each providing 24V dc output at supply voltages of either 115 or 230V ac (switchable). The Model 2500P/2A5 is a 2.5 Amps supply; the Model 2500P/5A0 supplies 5 Amps, and the Model 2500P/10A can supply up to 10 Amps. The power supplies incorporate de-coupling diodes and can thus be connected in parallel to supply higher currents. Under overload conditions, (>1.5 Inom.) the output voltage falls smoothly, with increasing overload current. Each model is fitted with an LED indicator and a pair of relay contacts to indicate the health of the dc output. All connections are made using push-fit connector blocks.

The mains supply must be isolated before the mains connector is plugged/unplugged

ORDER CODES

2500P/2A5 Din Rail mounting 24V PSU for 2500, 60 watt. 2.5 amp
2500P/5A0 Din Rail mounting 24V PSU for 2500, 120 watt. 5 amp
2500P/10A Din Rail mounting 24V PSU for 2500, 240 watt. 10 amp

SPECIFICATION

General

Supply voltage range:	85 to 132V ac/176 to 264V ac (switchable)
Supply frequency range:	47 to 63Hz
Supply current:	
2.5A model	230V <0.7A; 115V <1.3A
5A model	230V <1.4A; 115V <2.6A
10A model	230V <2.6A; 115V <5A
Inrush current:	
2.5A model	<15 Amps
5A model	<25 Amp
10A model	<30 Amp
Recommended input protection:	6A (Type D MCB)
O/P voltage at nominal power:	24V dc ± 0.5%
Ripple (inc. spikes):	<30mV peak to peak
Output current:	
2500P/2A5	2.5 Amps
2500P/5A0	5 Amps
2500P/10A	10 Amps
Hold-up time:	
2500P/2A5	>20 msec (196V ac full load)
2500P/5A0	>37 msec (196V ac full load)
2500P/10A	>25 msec (196V ac full load)
Start-up delay:	0.1 sec (typ.)
Rise time:	5-20m sec depending on load
Efficiency:	(230V ac supply; 24V dc output)
2500P/2A5	87.5% at 2.5V amps
2500P/5A0	90% at 5 Amps
2500P/10A	90% at 10 Amps
Temperature:	
Operation	–10 to +60°C
Storage	–25 to +85°C

Safety

Safety EN61010	Installation category II, pollution degree 2

Mechanical

Casing:	Robust metal case to IP20
Mounting:	Clip-on, DIN rail Type TS35
Height:	125mm
Depth:	103mm + DIN rail
Width:	
2500P/2A5	<50mm
2500P/5A0	<65mm
2500P/10A	<122mm
Weight:	
2500P/2A5	460 grammes
2500P/5A0	620 grammes
2500P/10A	1100 grammes

Relay

Contacts close:	When output voltage >22.1V ±4%
Contacts open:	When output falls below19.8V ±4%
Isolation:	Relay contact to output: 500V dc
Switchable power:	1A at 28V dc
Max switching voltage:	50V

EMC

Emissions:	EN50081-1 (includes EN50081-2) Class B (EN55011, EN55022) conducted and radiated noise, and EN 50081, Ann.1 (DC output).
Immunity:	EN50082-2 (includes EN50082-1)
Static discharge:	EN61000-4-2 (IEC801-2), Level 4 (withstands 8kV direct discharge, 15kV air discharge)
Electromagnetic radiated fields:	ENV50140 (IEC801-3), Level 3 (10V/m)
Burst assym/unassym:	EN61000-4-4 (IEC801-4)
coupled to ac input lines	Level 4 (4kV)
coupled to dc output lines	Level 3 (2kV)
Surge transients:	EN61000-4-5
Differential (Line to Protective Earth):	Isolation class 4 (4kV)
Common mode (Line to Neutral):	Isolation class 4 (2kV)
Conducted noise immunity:	ENV50141 (draft version of IEC801-6) Level 3 (10V, 150Hz to 80mHz)
Mains breaks:	EN6100-4-11
Transient immunity:	To VDE0160/w2 over entire load range

ORDERING INFORMATION

T1XX I/O modules

I/O modules	Code
1-channel PRT input	T111
8-channel low level thermocouple input (D)	T112
6-channel resistance thermometer input (D)	T113
1-channel high level analogue input	T120
8-channel high level analogue input	T122
8-channel mA analogue input (D)	T123
6-channel isolated analogue input (D)	T124
1-channel frequency input	T130
8-channel digital input	T140
1-channel analogue output	T150
8-channel 0-20mA analogue output (D)	T151
8-channel digital output	T180
Blank module	T1BB

D = Double height module

Termination units

Temperature and low level analogue inputs	Code (within cubicle)	Code (separate unit)
Single-way PRT	TA111/PRT	
8-way T/C or mV – via term/comp cable (T/C compensation cable type must be stated)	TA112/TC	
6-way 2-wire RTD	TA113/2W	
6-way 3-wire RTD	TA113/3W	
High level analogue inputs		
Single-way analogue input V or mA (self-powered)	TA120/–	
8-way analogue input V	TA122/V	
8-way analogue input, individually fused transmitter supply	TA122/mA	LA 082755
8-way analogue input, single fused transmitter supply	TA122/mAS	LA 083450
8-way analogue input, mA isolated external powered	TA123/mA	
8-way analogue input, mA external powered or loop powered	TA123mAT	
8-way analogue input, mA external powered or loop powered with earthed transmitter	TA123mATE	
6-way analogue input, transmitter supplies and burden resistors	TA124/mA	LA 083986
6-way isolated analogue input, transmitter supplies and burden resistors	TA124/mA/ISOL	LA 083987
6-way isolated analogue input, voltage input	TA124/V	
Frequency inputs		
Single-way pulse/freq (self powered)	TA130/–	
Digital inputs		
8-way digital input – logic	TA140/log	
8-way digital input	TA140/DC	LA 083350
8-way digital input with test disconnect	TA140/TDC	LA 083383
8-way mains input opto-isolator 120V	TA140/120	LA 083611U120
8-way mains input opto-isolator 230V	TA140/230	LA 083611U 230
8-way dc input opto-isolator 15V	TA140/15V	LA 083979U 001
8-way dc input opto-isolator 24V	TA140/24V	LA 083979U 002
8-way dc input opto-isolator 48V	TA140/48V	LA 083979U 003
Analogue outputs		
Single-way analogue output	TA150/–	
8-way analogue output	TA151/–	
Digital outputs		
8-way digital output – logic	TA180/log	
8-way relay output (SPCO)	TA180/1p	LA 083451U 008
8-way two-pole relay output (DPCO)	TA180/2p	LA 083608
4-way relay output (SPCO)	TA640DO/1p	LA 083451U 004

Termination units are available as stand-alone items of hardware or mounted within a T754x enclosure by Eurotherm. Please order using the relevant part number as shown.

Spare relays for Termination units

	Code
24V dc low power relay single pole	LA 083993
5V dc low power relay single pole	LA 083996
24V dc low power relay double pole	LA 083997

ORDERING INFORMATION (continued)

Auxiliary units

	Code (within cubicle)	Code (separate unit)
RAM backup battery	S9537	PB 083188
Battery charger unit	S9538/24V	LA 083677
PSU health status/diode unit	S9539/10A	LA 083306
T754X system power supply	S9543	LA 083738
Single-way PSU health status unit	S9544	LA 083744
6-way PSU health status unit	S9545	LA 083737U 006

Auxiliary units are available as stand-alone items of hardware or mounted within a T754x enclosure by Eurotherm.
Please order using the relevant part number as shown.

Cables

	Code
Flat cable for I/O wiring 16/0.02	
10-way 50m reel	CM 083413

2500P power supply unit

Model	Description	Option 1	Option 2	Option 3	Option 4	Language
2500P	2A5	—	—	—	—	ENG

Example

Model	Code
DIN rail mounting 24V PSU for 2500, fully protected	2500P

Description	
60watt. 2.5 amp	2A5
120 watt. 5 amp	5A0
240watt. 10 amp	10A

Option 1	—

Option 2	—

Option 3	—

Option 4	—

Language	
English manual	ENG

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