versadac™

Scalable Data Recorder

... a recorder that can reduce installation costs and improve efficiency

The versadac™ scalable recorder offers a versatile solution for data recording at point of measurement. Comprehensive security and data integrity make it ideal for use in regulated industries, such as pharmaceutical or heat treatment, or for any application where loss of data during a manufacturing process would result in loss of revenue through scrap or rework. Data is recorded in tamper resistant binary check summed files (known as UHH) and stored in on board flash memory. Flexible archiving strategies ensure long term data is kept secure for later retrieval and analysis if required.

The versatility of this unit comes from a flexible range of base sizes and selection of input and output modules to best suit specific application needs. A wide range of software features are available including batch control, maths functions, totalisers, communications channels and audit trail. Electronic signatures and password control functionality which meets the requirements of FDA 21 CFR Part 11 is also available. Upgrade of both software and hardware can be easily carried out on site ensuring the versadac recorder can grow with your process needs.

The versadac recorder is easy to integrate into wider systems with Modbus Master/Slave or EtherNet/IP Client or Server communications options. The modular equipment can also be distributed throughout the plant in best position to reduce installation and cabling costs.

Set up of the recorder is via the easy to use Eurotherm iTools PC software. Configurations can be saved and re-used and pre-configured modules are available to reduce engineering costs. Once installed, the recorders can be viewed and managed securely from anywhere on the network, improving operational efficiency. Archived data can be automatically stored to designated FTP servers or to the secure Eurotherm Online Services (EOS) data cloud using EOS Director.

- **Record**
  - Secure
  - Never lose data
  - Exceptional data and access security
  - Electronic signatures
  - Self-healing, validated data archive
- **Manage**
  - View data from anywhere
  - Extensive function library to further process data
  - Record data from remote devices
  - Intelligent data archiving
  - Web server
  - Email notification
- **Optimise**
  - Optimise installation by recording where you want to
  - Scalable to fit process with modular I/O
  - Easy integration
  - Compact, easy installation
  - Simple to upgrade



Record Manage Optimise

Eurotherm®

by Schneider Electric

Data integrity and user access control

The versadac recorder offers advanced recording and archive strategies to ensure valuable process data is kept safe. This is supported by comprehensive and secure user access options to give complete peace of mind for data integrity with access when and where you need it. It gives best in class data recording at point of measurement and meets the most stringent of regulatory requirements.

User access control is managed with unique user names and passwords and supports use of Active Directory. For the applications regulated by FDA 21 CFR Part 11 or Nadcap additional peace of mind is provided by features such as recorded logins, password ageing, minimum password lengths, account retirement, timed logout, electronic signing and electronic authorisation.

Easy to integrate

The versadac recorder provides many features and options that can bring real benefit in standalone applications or it can be easily integrated into any wider process using native communications options for Modbus Master TCP/IP, RTU and EtherNet/IP.

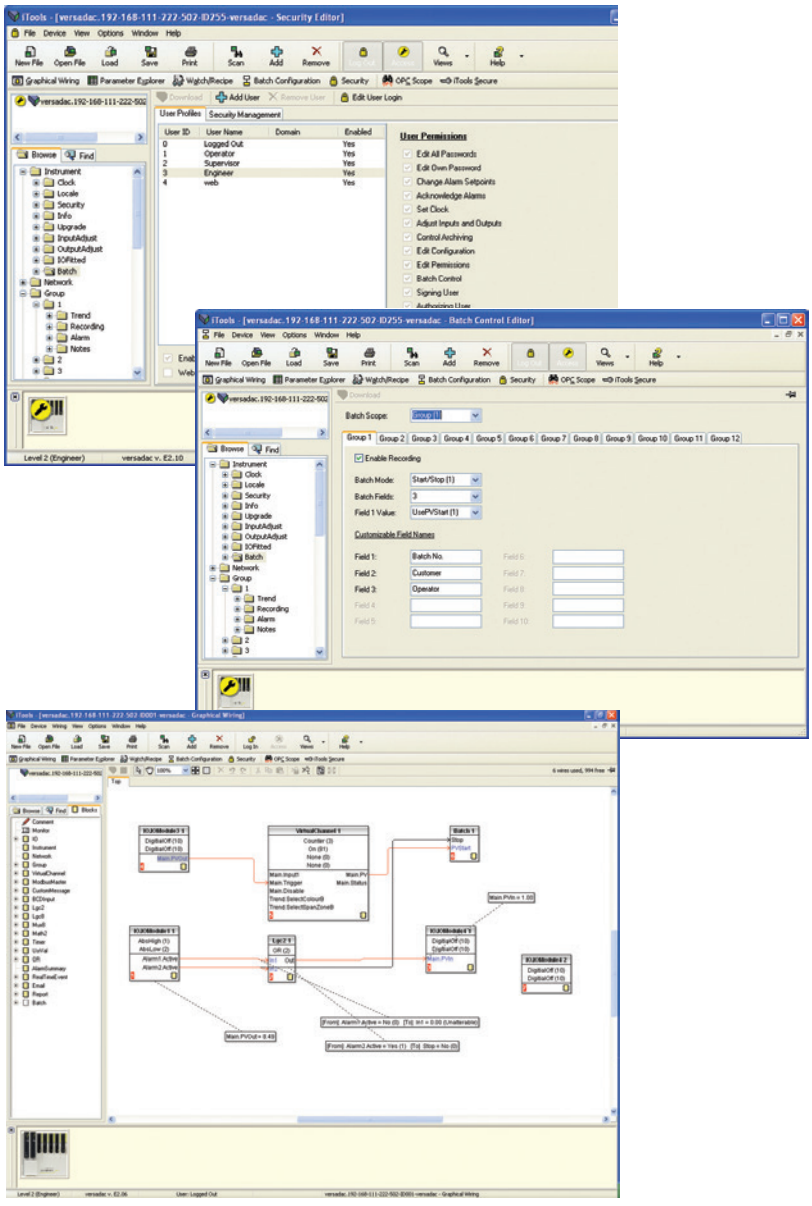
Batch Control

Powerful batch functionality is included within the recorder and, combined with the ability to group data into up to 30 groups, the instrument can run up to 30 simultaneous batches. The Batch software option enables the user to enter specific information relating to a batch and record this alongside the process data. The feature provides up to 10 operator entry fields which can be configured for manual or automatic data entry. These free format fields may be used to store Batch Number, Job Number, Customer Name, Cycle Number, etc. Operator details will be logged with the rest of the batch data on start and/or stop of the batch, providing complete process traceability.

Toolkit blocks

Toolkit blocks provide mathematical or logical expressions to meet the needs of more sophisticated applications. Using the Eurotherm iTools PC configuration software, functions may be wired together with simple drag and drop techniques to ensure easy creation of even the most complex configurations. Variables are easily parameterised using pull down lists or direct data entry.

User Variables:	12 real values per base
Analogue Function Blocks:	250 function blocks per base. (Add, Subtract, Multiply, Divide, Absolute difference, Maximum, Minimum, Hot Swap, Sample and Hold, Power, Square Root, Log, Ln, Exponential, Select)
Digital function Blocks:	12 function blocks per base. (AND, OR, XOR, Latch, Equal, Not Equal, Greater than, Less than, Greater than or equal to, Less than or equal to)
Timing Functions:	12 Timers



Application Blocks



Steriliser block

The steriliser block has been developed in collaboration with a number of steriliser manufacturers to provide a solution for the Independent Monitoring System (IMS) within the decontamination process. It provides cycle based data logging and monitoring with display of instantaneous information on the status of the sterilisation cycle.

The Steriliser Application supports up to four process variables with chamber temperature, chamber pressure and air detector being the three primary variables. It is suitable for use with porous load, dry heat, flash and LTS sterilisers or for any steriliser requiring up to four process variables.

Mean Kinetic Temperature (MKT)

Measuring and recording temperature is vital to the storage of perishable goods but there is more than one way to record an average. The International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) defines MKT as being “A single derived temperature that, if maintained over a defined period of time, affords the same thermal challenge to a drug or drug product as would be experienced over a range of both higher and lower temperatures for an equivalent defined period.” It expresses the cumulative thermal stress experienced by a product at varying temperatures during storage and distribution. It differs from other means, such as simple numerical average or arithmetic mean, in that higher temperatures are given greater weight in computing the average in recognition of the accelerated rate of thermal degradation of materials at higher temperatures.

The versadac recorder provides support for up to 30 MKT calculation blocks, one per Group within the unit.

Steam Flow

The Steam Flow Application block provides support for the following saturated steam calculations:

Saturated Steam Mass Flow

This calculates the mass flow of steam using either pressure or temperature input with a volumetric flow rate. Using data from the steam tables, the density of steam at the appropriate temperature or pressure is used to calculate the mass per unit time.

Saturated Steam Heat Flow

This calculates the heat flow of steam using either pressure or temperature input with a volumetric flow rate. Using data from the steam tables, the enthalpy of steam at the appropriate temperature or pressure is used to calculate the energy per unit time.

Saturated Steam Heat Consumed

This calculates the heat consumed in a process by monitoring the energy going into the process and the residual energy leaving the process using a similar calculation to the heat flow calculation above. Subtracting one from the other gives the heat consumed by the process. The calculation requires either pressure or temperature from the process input and temperature of the condensate at the output along with a volumetric flow rate. The output of this calculation is in kJ/time. The instantaneous values of the steam calculations can be totalised (or integrated) to give a total flow value on a configurable time period such as per hour, per day, per week or per shift. This requires the totaliser function within the versadac recorder.

Specification

Base Unit

General

The base unit is fitted with the versadac recorder 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 4 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 along 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.

Mechanical

Based on the number of modules and allowing for future expansion, the versadac recorder can be supplied in a range of standard base sizes to suit process requirements. The dimensions and weights of the different base sizes are detailed in the table below:

Module Capacity (Base Size)	0	4	8	16
Weight (no modules) kg	0.2	0.7	1.0	1.6
Weight (all modules) kg	0.7	1.65	3.1	5.3

Height:	180mm
Depth:	132 -135 mm with retaining lever raised
Mounting:	DIN rail or Bulkhead, mounted 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

General

Supply voltage range:	24V dc ±20%
Power consumption:	< 82W maximum for fully loaded rack
Fuse rating:	0.5A time lag (Not customer replaceable)
Surge current:	8A maximum
Module power consumption:	See individual module specification

Environmental

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

RFI

EMC emissions:	BS EN61326 – 1: 2006 Class A
EMC immunity:	BS EN61326 – 1: 2006 Industrial Locations

Safety

BS EN61010-1/A2; 2001
Installation cat II, Pollution degree 2
Safety earth and screen connections are made to earth terminals at the bottom of the base

Vibration

Vibration:	IEC61131-2:2007 section 4.2.1 1.75mm peak amplitude 5-8.4Hz; 1g peak amplitude, 8.4-150Hz 30 minutes dwell at resonance in all 3 planes
Shock:	15g static shock

Diagnostic LEDs

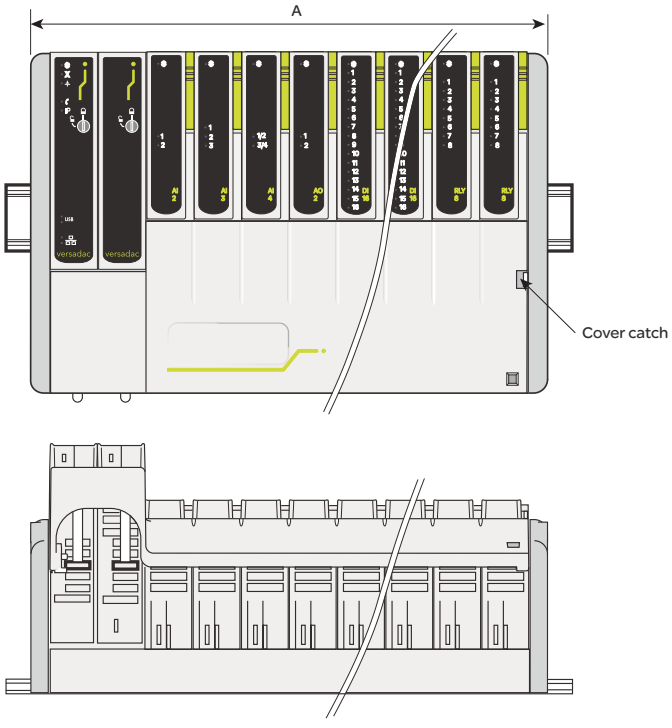
Diagnostic LEDs indicate module diagnostic status.

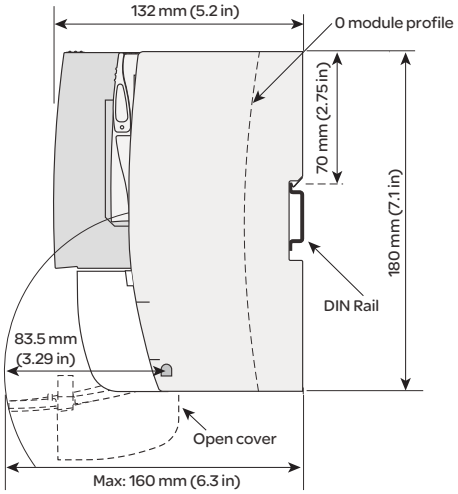
All modules:	A green LED at the top indicates the module is powered and operating correctly
Analog modules:	Red LEDs for each channel to indicate channel failure
Digital modules:	Yellow LEDs for each channel to indicate the channel state

Approvals

GOST:	CU TR pattern (AI8 pending)

Mechanical details





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

Input Output Controller (IOC)

The Input Output Controller (IOC) is the central processing unit of the versadac recorder. Each versadac recorder base has an IOC module mounted in the extreme left-hand position. This module communicates with the internal I/O bus with module interconnection via the Base unit PCB. Each I/O slot consists of a terminal unit and an I/O module. These modules can be fitted to any available slot. The versadac can be ordered in one of four base sizes (0 – no I/O, 4, 8 or 16).

Processor Module

Processor and communications diagnostics are available from the LEDs on the front of the processor module.

Control 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 or I/O module type mismatch between what is fitted and that expected or I/O module failure
Battery (if installed):	A green LED indicates battery health
Serial communications:	A green LED indicates communications activity
Ethernet:	A yellow LED indicates Ethernet link and flashes to show activity
USB:	A green LED indicates USB insertion, periodic flashing indicates USB activity
USB over-current indication:	A yellow LED indicates an over current error

Power on Self Tests

On power up the versadac recorder automatically performs Power On Self Tests. These are a series of diagnostic tests used to assess the instrument health. The above LEDs indicate module diagnostic status in case of a problem.

Physical

CPU:	Freescale Power QUICC II Pro processor MPC8313
Bus Size:	32 bit
System Clock:	330 MHz
Logging Capacity:	96MB on board, Log files transferred by FTP
USB:	USB 2.0 connected on terminal unit

Live plug-in

I/O modules can be replaced while powered without any disturbance to the field wiring or other inputs and outputs – reducing downtime and minimising disturbance to other signal conditioning strategies.

Communications

Ethernet

Supports 10/100baseT Ethernet. Simultaneously it can support Modbus-TCP Master or Slave and EtherNet/IP.

Connectors:	RJ45 connector
Network medium:	Ethernet Cat5 shielded cables
Speed:	10/100baseT auto-select
Line length (maximum):	100 metres, extendible by repeater
Allocation of IP address:	Fixed, DHCP
Modbus:	TCP configurable master or slave
Max numbers of slaves:	32 Modbus TCP slaves
Isolation:	50V dc; 30V ac (IEEE802.3)

RS422/485 Serial Communications

Connector:	1 x 9 way D-type 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
Max number of slaves:	32 serial slave devices
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

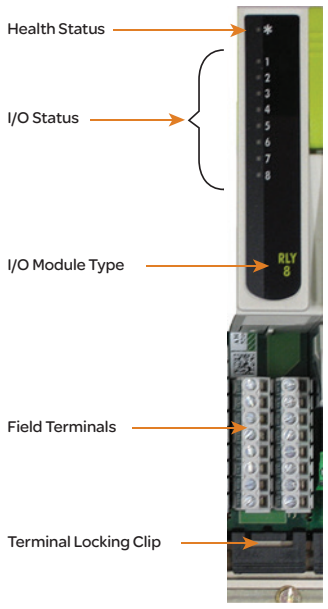
Note: Use of a communications buffer/isolator is recommended

Supported I/O Types

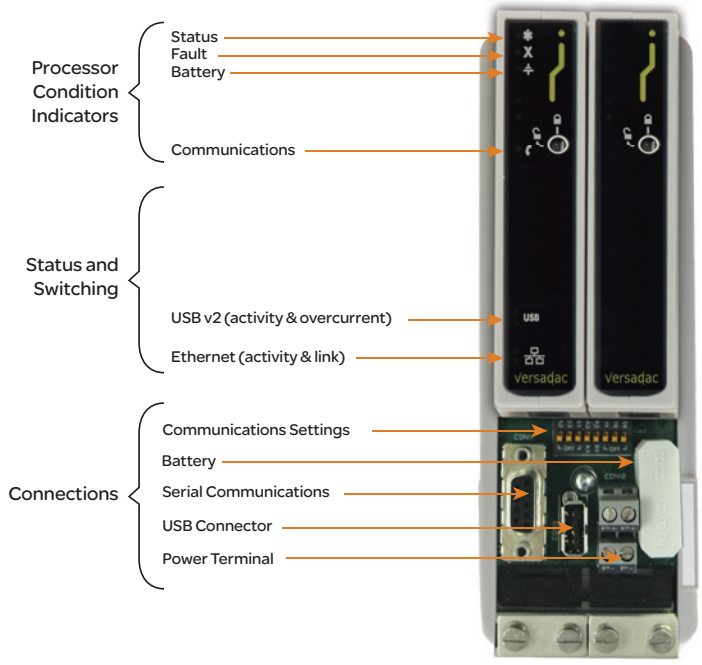
The versadac recorder shares I/O modules with the T2750PAC, T2550PAC and 2500 I/O.

Type	Description
AI2	Two Channel Analog Input
AI3	Three Channel Analog Input
AI4	Four Channel Analog Input
AI8	Eight Channel Analog Input
AO2	Two Channel Analog Output
DI16	Sixteen Channel Digital Input
RLY8	Eight Channel Relay Output

Module condition indicators



Processor condition indicators



AI2 – Two Channel Analog Input



This analog input module is used to monitor analogue 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 for oxygen measurement.

Module type:	AI2-DC, AI2-TC, AI2-MA
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:	–25mA to +25mA with 5Ω burden in the terminal unit
Volts range:	–10.3V to +10.3V at input impedance 303kΩ, 0 to 1.8V ≥10MΩ high impedence range (channel 2 only)
RTD support:	Support for 2, 3 and 4-wire resistance thermometer devices (RTD)
Resolution:	Better than 0.001% of range
Ohms range:	0 to 560Ω 2, 3 or 4-wire lead compensation
Hi Ohms range:	0 to 6kΩ 2, 3 or 4-wire lead compensation
Pot range:	0% to 100% 'rotation' of 100Ω to 6kΩ pot
Linearity:	Better than 0.01% of range
Input filtering:	OFF to 60 seconds
Input accuracy:	Electrical input factory calibrated to better than 0.1% of reading
System isolation:	300V RMS or dc (double insulation)
Channel isolation:	300V RMS or dc (basic insulation)
Series mode rejection:	>60dB (47-63Hz)
Common mode rejection:	>120dB (47-63Hz)
Power consumption:	2W maximum

Input specification

TC Linearisation types:	B, C, D, E, G2, J, K, L, N, R, S, T, U, NiMo/NiCo, Platinel, Ni/NiMo, Pt20%RHPt40%Rh, Custom, Linear, SqRoot, $XX^{3}/_{2}$, $X^{5}/_{2}$
RTD LIN Types:	Cu10, Pt100, Pt100a, JPt100, Pt1000, Ni100, Ni120, Cu53
CJC system:	Measured by RTD, located beneath the input connector
Initial CJC accuracy:	±0.5°C typical (±1°C maximum)
CJC rejection:	Better than 30:1 over operating temperature range

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

AI3 – 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 utilises a sophisticated trip system in which the module senses over current and cuts the power. After a period the circuit checks for continued circuit malfunction.

Module type:	AI3
No of channels:	3
Input range:	–28mA to +28mA
Resolution:	Better than 0.5uA with 1.6 sec filter time (equivalent: 16 bits)
Linearity:	Better than 1µA
Initial accuracy:	Factory calibrated to better than ±0.1% of reading at 25%
Input filtering:	OFF to 60 seconds
Burden resistance:	60Ω nominal, 50mA maximum current
Channel PSU:	20-25V dc, current limited 30mA nominal, self-resetting
System isolation:	300V RMS or dc (double insulation)
Channel isolation:	50V RMS or dc (basic insulation)
Series mode rejection:	>60dB (47-63Hz)
Common mode rejection:	>120dB (47-63Hz)
Power consumption:	Current input mode - 2.2W 3 powered loops - 3.7W

Notes:

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

2. Total burden can be increased to 250Ω by cutting a link track on the terminal unit.

AI4 – 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.

Module type:	AI3-TC, AI3-MA, AI3-MV
No of channels:	4
Input types:	TC, mV, mA, Pyrometer mV range: –150 to +150mV at input impedance >20MΩ
mA range:	–25 to +25mA with 5Ω burden in the terminal unit
Resolution:	Better than 2µV
Input filtering:	OFF to 60 seconds
Initial accuracy:	Electrical input factory calibrated to better than 0.1% of reading Burden resistor 5Ω ±1% (fitted to terminal unit)
System isolation:	300V RMS or dc (double insulation)
Channel isolation:	300V RMS or dc (basic insulation) Ch1 and Ch2 from Ch3 and Ch4
Series mode rejection:	>60dB (47-63Hz)
Common mode rejection:	>120dB (47-63Hz)
Power consumption:	2W maximum

Input specification

TC Linearisation types:	B, C, D, E, G2, J, K, L, N, R, S, T, U, NiMo/NiCo, Platinel, Ni/NiMo, Pt20%RHPt40%Rh, Custom, Linear, SqRoot, $X^{3}/_{2}$, $X^{5}/_{2}$
CJC system:	Measured by RTD, located beneath the input connector
Initial CJC accuracy:	±0.5°C typical (±1°C maximum)
CJC rejection:	Better than 30:1 over operating temperature range

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 thermocouples.

AI8 – Eight Channel Analogue Input



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

Module type:	AI8-TC, AI8-MA, AI8-RT
No of channels:	8
Input types:	TC, RTD, mA, mV
mV range:	–80mV to +80mV at input impedance >10MΩ differental 2.5MΩ common mode
mA range:	–20mA to +20mA with 3.3Ω burden in the terminal unit
RTD support:	Support for 2 and 3-wire resistance thermometer devices
Ohms range:	20Ω to 500Ω and 2 and 3-wire lead compensation
Hi Ohms range:	200Ω to 5KΩ 2 and 3-wire-wire lead compensation
Resolution:	±10mΩ and ±100mΩ (with 0.4s filter)
Input accuracy:	Electrical input factory calibrated to better than 0.1% of reading
Linearity:	20ppm of span
System isolation:	300V RMS or dc (double insulation)
Channel isolation:	300V RMS or dc (basic insulation) Galvanic Isolated in pairs
Series mode rejection:	60dB (47-63Hz)
Common mode rejection:	120dB (47-63kHz) >120dB @50/60Hz
Power consumption:	1.8W maximum

Input specification

TC Linearisation types:	B, C, D, E, G2, J, K, L, N, R, S, T, U, NiMo/NiCo, Platinel, Ni/NiMo, Pt20%RHPt40%Rh, Custom, Linear, SqRoot, $X^{3}/_{2}$, $X^{5}/_{2}$
CJC system:	Measured by 2 RTD (Pt100), located beneath the input connector
Initial CJC accuracy:	±0.8°C – sensed with two PT100 sensors on TU
CJC rejection:	Better than 30:1 over 0°C to +55°C ambient

AO2 – Two Channel Analog Output



This analog output module provides two isolated analog output channels. Each output can be independently configured for current or voltage.

Module type:	AO2
No of channels:	2
Current output:	–0.1 to 20.5mA; 10V dc max. Compliance with total burden less than 500Ω
Resolution:	Better than 1 part in 10,000 (1uA typical)
Voltage output:	–0.1V to 10.1V dc; 20mA max. compliance with total load greater than 550Ω –0.3 to 10.3 V dc; 8mA max. compliance with total load greater than 1500Ω
Resolution:	Better than 1 part in 10,000 (0.5mV typical)
System isolation:	300V RMS or dc (double isolation)
Channel isolation:	300V RMS or dc (basic isolation)
Power consumption:	2.2W maximum
Calibration accuracy:	Better than 0.1% of reading

DI16 – Sixteen Channel Analog Input



This digital input module accepts sixteen inputs and can be wired either for voltage input or for contact closure.

Module type:		DI16
No of channels:		16
System isolation:		300V RMS or dc (double insulation)
Channel isolation:		Channels share a common connection ('C')
Power consumption:	Logic:	0.75W maximum
	Contact:	2.0W maximum
Max. voltage across any channel:		30V dc

'Contact' Mode

Module Internal Isolated

Power supply (P):		16 to18V dc
Contact closure:	ON state:	Input resistance threshold <1KΩ typical
	OFF state:	Input resistance threshold >7KΩ typical
Wetting current:		>4mA
Wetting voltage:		>12V dc

'Logic' Mode

Logic inputs:	ON state:	Input voltage threshold >10.8V dc, 30V maximum
	OFF state:	Input voltage threshold <5.0V dc, –30V minimum
Input current:		3.8mA @ 12V dc; 2.8mA @ 24V dc

RLY8 – Eigth Channel Relay Output



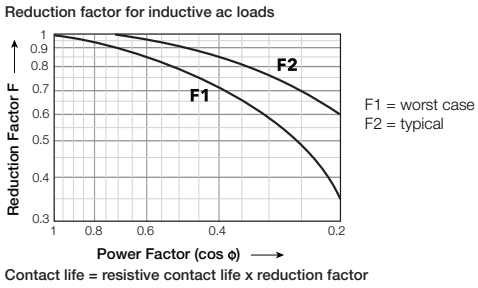
This module provides eight relay outputs. These outputs may require external snubber circuits (application dependent).

Module type:	RLY8
No of channels:	8 normally open, AgCdO contacts for best operating life
Max current rating:	2A at up to 240V ac; 0.5A at 200V dc, increasing to 2A at 50V dc (resistive)
Min rating:	100mA at 12V
System isolation:	300V RMS or dc (double insulation)
Channel isolation:	300V RMS or dc (basic insulation)
Contact life:	>10 million operations @ 240V ac, 1A rms >600,000 operations @ 240V ac, 2A rms
Mechanical life:	>30 million operations
De-rating:	The above ratings summarise the performance with resistive loads. With complex loads further de-rating may be required
Power consumption:	2.5W

Relay De-rating

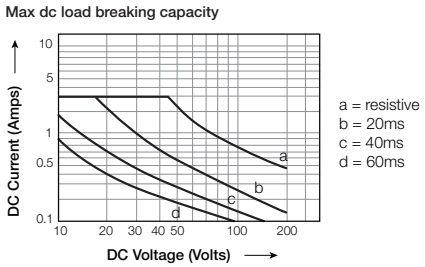
AC Voltage

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



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.



Order codes



Basic Product

VERSADAC	Scalable Data Recorder

1 Type

RXX	Recording

2 Base Size

00	0 Way base (0 I/O slots)
04	4 Way base (4 I/O slots)
08	8 Way base (8 I/O slots)
16	16 Way base (16 I/O slots)

3-18 Slot 1-16

XX	Not Fitted
AI2-DC	2 channel – isolated mV, V, RTD input module
AI2-TC	2 channel – isolated thermocouple, mV, input module with CJC
AI2-MA	2 channel – isolated mA input module – (5Ω shunt fitted)
AI3	3 channel – isolated 4-20mA analogue input module with 24V Tx PSU
AI4-TC	4 channel – TC modules – isolated in pairs, with CJC
AI4-MA	4 channel – mA module – isolated in pairs
AI4-MV	4 channel – mV module – isolated in pairs
AI8-RT	4 channel – isolated RTD input module
AI8-TC	8 channel TC with CJC (isolated in pairs)
AI8-MA	8 channel mA input module (isolated in pairs)
AO2	2 channel – isolated DC (V or mA) output module
DI16	16 channel – digital input module
RLY8	8 channel – relay output module

19 Future

XXXXXX	

20 Number of Groups

06	6 Groups (default)
12	12 Groups
18	18 Groups
24	24 Groups
30	30 Groups

21 Virtual Channels

NOVC	None
128VC	128 Virtual Channels (Maths/Totalisers/Counters)
250VC	250 Virtual Channels

22 Batch

NOBTCH	None
BATCH	Batch enabled

23 Auditor

NOADT	None
ALITE	Auditor LITE (Audit Trail)
AFULL	Auditor Full

24 Security Manager

NOSM	None Fitted
SECMAN	Security manager incl. Active directory

25 Application Blocks

XX	None
ST	Steriliser (2 instances)
RH	Relative Humidity (2 instances)
MK	MKT (Mean Kinetic Temperature), one instance per Group
SF	Steam Flow (2 instances)

26 Communications Protocols

TS	Modbus TCP/RTU Slave (Default)
TM	Modbus TCP/RTU Master
ES	EtherNet/IP Client/Server
TE	Modbus TCP Master & EtherNet/IP

27 Toolkit Blocks

NONE	None (Default)
BASIC	Basic Toolkit blocks

28 Future

XXXXXX	

29 Operating Language

ENG	English (Default)

30 OEM Security

XXX	None

31 WebServer

LITE	Default

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