



ABB Control Technologies

ABB ScreenMaster paperless recorders

Versatile recording anywhere

ABB ScreenMaster paperless recorders

ABB's ScreenMaster paperless recorders provide the reliable, cost effective and secure solution for paperless data recording and analysis

ABB's ScreenMaster paperless recorder family provides a solution for every recording application. Whether you want a field mountable device that can be installed anywhere, a multipoint device for a comprehensive overview of your process, or slick and easy operation using the latest touchscreen technology, ABB's ScreenMaster recorders offer a versatile, secure and proven alternative to traditional paper-based devices.

Features include:

- High specification 21 CFR Part 11 compliant data security
- High visibility process displays
- Remote access and operation via Ethernet
- Hose down protection to IP66 & NEMA 4X
- Automated process data management
- Flexible recording capability including alarms, totalizers, math and batch recording
- AMS2750 compliant input accuracy



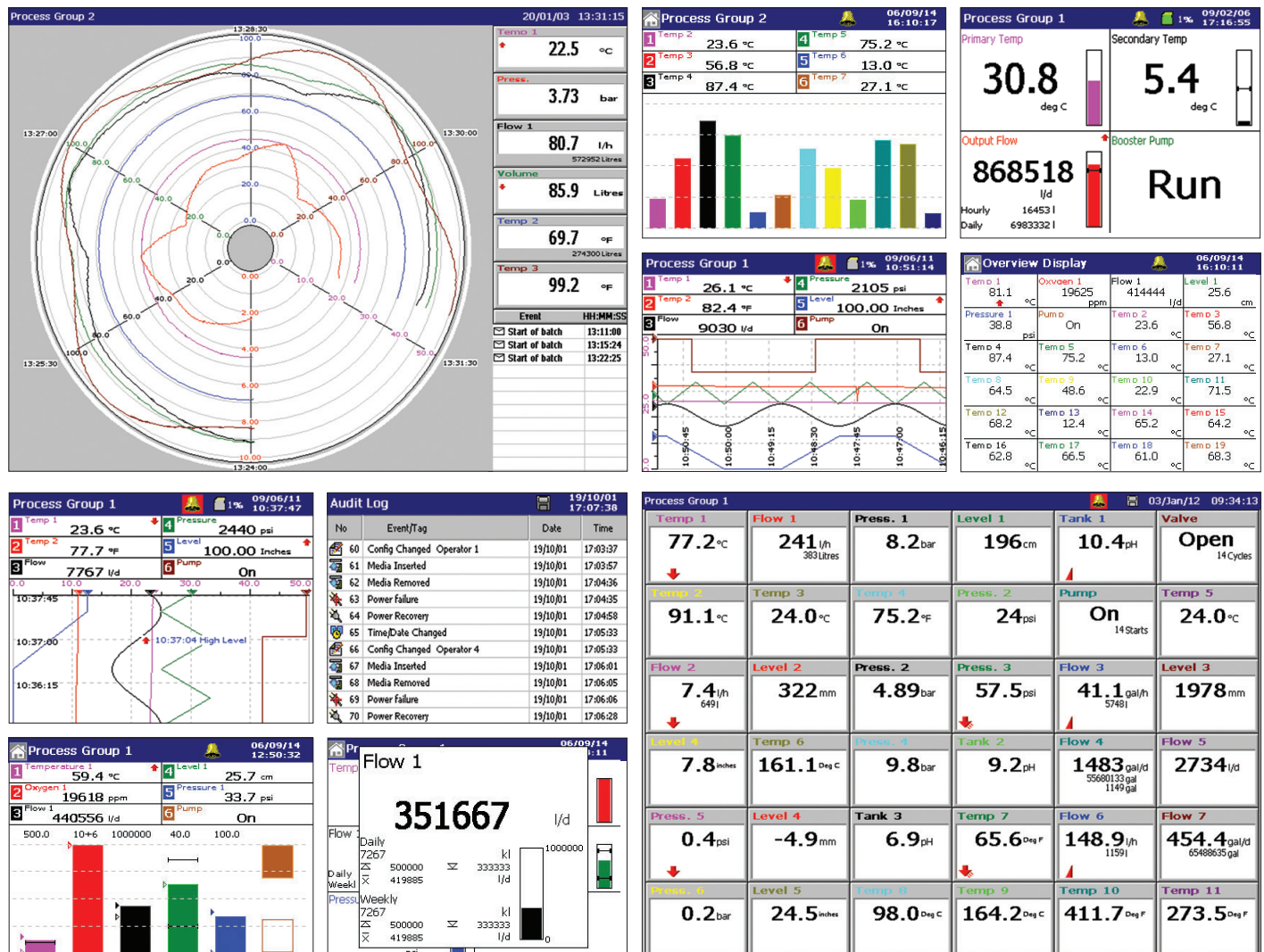
Simple, tough and versatile, the ScreenMaster range gives you a comprehensive solution for your data recording needs

Powerful yet simple

Setting up and operating a ScreenMaster recorder is easy. A simple menu-based interface takes the hard work out of configuration and makes it easy to find and view your process data, with multiple display formats offering a wide choice of viewing options.

Suitable for even the most arduous environments

Protected to NEMA 4X and IP66 as standard, ScreenMaster recorders can be installed next to the process in even the wettest or grimeiest conditions, giving you local access to your information at your fingertips.



Secure, precise, reliable recording

Flexible recording capability

A wide range of features give ScreenMaster recorders the flexibility to meet the requirements of almost any recording application.

Flow recording

Flow totalizers enable instantaneous flow rates to be totaled and recorded. An automatic reset capability enables reports of daily, weekly, monthly flow volumes to be generated and alarms to be raised if predefined flow limits for a given time period are exceeded.

Powerful maths

Mathematical functions such as averages and deviations can be calculated using ScreenMaster's math and logic option. Results of math calculations can be displayed, recorded and used to drive alarms and totalizers.

Batch recording

For batch processes, ScreenMaster's batch recording option allows data including batch numbers and product type

information to be recorded alongside process data. With ABB's DataManager Pro software, collected batch records can be rapidly displayed by searching for their batch number or batches with common attributes identified.

The highest levels of data protection

Every model in the ScreenMaster range incorporates the highest levels of protection against the accidental loss of valuable process data.

Multiple users can be configured, each with individual user name, password and access rights. A comprehensive audit log records configuration changes, calibration changes, system events and many other items key to data security. Where applicable, all entries are detailed with operator identification. Operators can securely annotate the chart with comments and signatures.

ScreenMaster's standard complement of security features mean that it is also fully compliant with the requirements of 21 CFR Part 11.



Ethernet communications

It is very simple to connect a ScreenMaster recorder to an existing plant network via Ethernet communications. Once connected, archived data and email facilities become instantly available. Using a modem router or GSM technology, the ScreenMaster's labour-saving Ethernet features can still be used even when a recorder is in a remote location.

Remote process monitoring

Remote access to a ScreenMaster is possible via the use of any standard web browser. Detailed real-time information is available for current alarm and totalizer conditions, memory card status and many other key process details. For an on-line demonstration of this feature enter <http://217.46.239.73> in to the address bar of your web browser.

Email notification

Keep up to date with the latest process alarms or critical process events with email notifications which can be automatically sent to your PC or smartphone. The same technology can also be used to provide routine performance updates, giving you even greater power over your process.

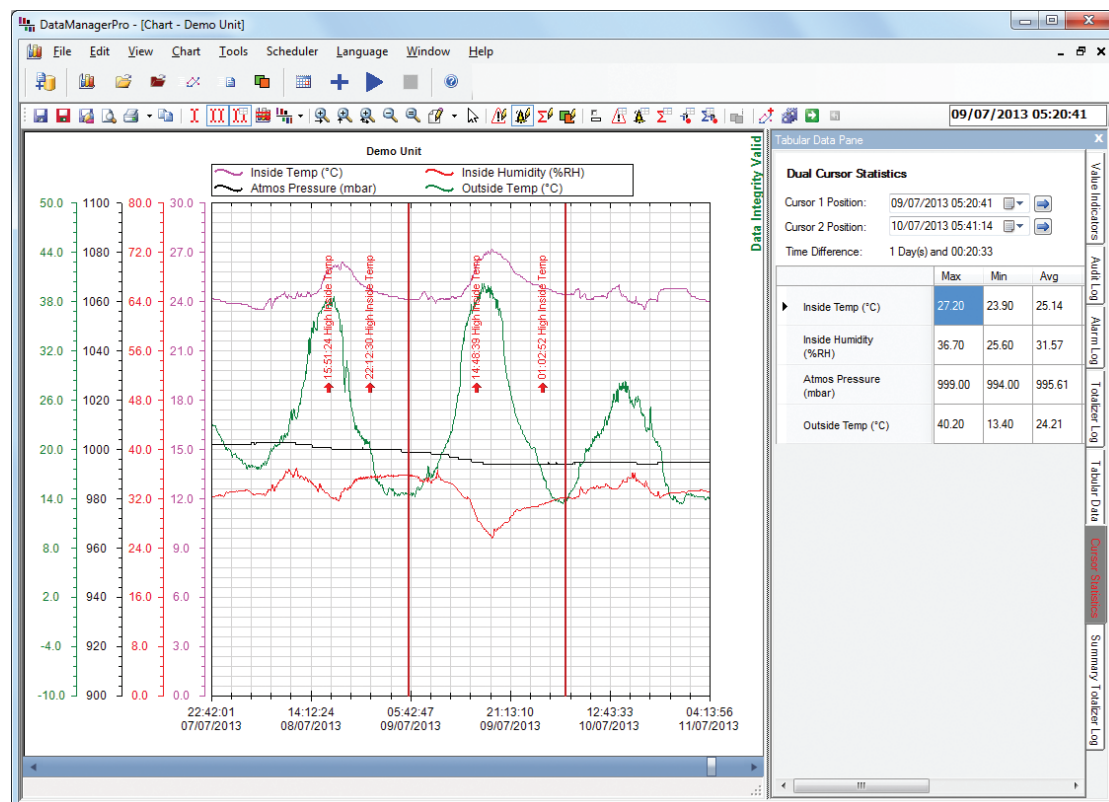
Real-time data communication

Via the use of MODBUS TCP or RTU protocol, a ScreenMaster recorder can communicate the process values being monitored to a DCS, SCADA, PLC or other similar system. Alternatively, data values can be communicated to a ScreenMaster for display to the operator and secure logging of the data.

DataManager Pro

ABB's DataManager Pro advanced data review software opens up a raft of new possibilities for interrogating and presenting recorded data. The software creates a database of recorded data providing secure long-term storage and enabling instant access to data regardless of when or on which ScreenMaster it was recorded.

Via Ethernet communications, DataManager Pro can be integrated with any number of ScreenMaster recorders to create a fully automatic data gathering and storage system. Data is automatically collected from the networked recorders and made available for review.



View
DataManager
Pro Videos



ABB Paperless recorders

SM500F

Field mountable paperless recorder

The SM500F is the world's first field mountable videographic data recorder. Featuring seven process inputs, twelve recording channels and available with wall, panel and pipe mounting options, it provides a truly simple recording solution that can be used anywhere, anyhow and by anyone. Its fully sealed IP66 and NEMA 4X enclosure means it is ideal for use in even the most hostile environments, including hosedown and dusty applications.

View
SM500F video



RVG200

Paperless recorder

The RVG200 recorder takes the established operating and security benefits of the ScreenMaster range one step further. Features include touchscreen 'swipe' operation, front and rear USB ports for connecting peripheral devices, including a barcode scanner and keyboard, and Ethernet and RS485 communications.

Up to 24 process signals can be connected to the RVG200's analog inputs or transferred to it via digital communications.



SM3000

Multi-point paperless recorder

Using the SM3000, up to 36 channels can be recorded, with data able to be arranged in a variety of views to provide users with a tailored view of their process. Six process groups are provided, allowing channels to be grouped together and individual displays created for different processes.

Process data can be easily viewed on the SM3000's large 31cm (12.1in) display in a wide variety of formats, including a circular chart and a combined overview format showing all six process groups.



Product Selection Guide

Standard ✓

Optional ●

Model	SM500F	RVG200	SM3000
General features			
Display	120mm (4.7 in) TFT Mono STN or 140mm (5.7 in) TFT	140mm (5.7 in) TFT	310mm (12.1 in) TFT
Operator interface	Tactile keys	Touchscreen	Tactile keys
Internal memory	64MB Flash	256MB Standard 2GB Optional	8MB Flash
Memory card	SD	SD	Compact Flash
Number of software recording channels	12	24	36
Process groups	2	6	6
USB		✓	
Process inputs			
Universal analog / Digital inputs	1 to 7	6, 12, 18 or 24	Up to 36
2 wire transmitter power supply	2 loops optional	12 optional	2 loops standard 8 optional
Additional I/O			
Relays	1 standard, 2 optional	1 standard, 24 optional	24 optional
Digital inputs		10 optional	24 optional
Digital outputs		12 optional	24 optional
Analog outputs		12 optional	8 optional
MODBUS RS485	●	●	
Ethernet	●	✓	✓
Advanced processing			
Alarms	48 (4 per channel)	96 (4 per channel)	144 (4 per channel)
Totalisers	24 optional (2 per channel)	96 optional (2 per channel)	72 (2 per channel)
Advanced math / Logic	●	●	●
21 CFR Part 11 compliant security	✓	✓	✓
Batch recording	●	●	●
Physical attributes			
IP Rating	NEMA 4X & IP66	NEMA 4X & IP66	NEMA 4X & IP66
Panel cut out	138mm x 138mm (5.43 in x 5.43 in)	138mm x 138mm (5.43 in x 5.43 in)	281mm x 281mm (11.06 in x 11.06 in)
Power supply	85-265V ac or 10-36V dc	Combined 100-to 240V ac and 24V dc	85-265V ac or 24V dc
Overall size	144mm x 144mm x 79mm (5.67 in x 5.67 in x 3.1 in)	144mm x 144mm x 175mm (5.67 in x 5.67 in x 6.9 in)	288mm x 288mm x 245mm (11.34 in x 11.34 in x 10 in)
Mounting options	Panel, Wall or Pipe	Panel	Panel

Contact us

To find your local ABB contact visit:

www.abb.com/contacts

For more product information visit:

www.abb.com/recorders



www.abb.com/recorders

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ScreenMaster RVG200

Paperless recorder

Measurement made easy

Secure process data
at your fingertips



High security data recording

- encrypted data storage compliant to 21 CFR Part 11
- up to 2 GB of internal memory

Simple, intuitive operation

- touchscreen operation and configuration
- USB ports for keyboard and barcode scanner

Easy network integration

- standard Ethernet communications provide remote data access, process supervision and easy integration to control systems
- RS485 MODBUS RTU master and slave

Complete data recording solution

- automatic data collection via Ethernet combined with powerful data analysis using DataManager Pro software

Built to survive

- IP66 and NEMA 4X environmental protection

Scalable high specification I/O

- high accuracy and stability compliant to AMS 2750 E
- recording of up to 24 channels
- optional relays, mA outputs and Tx PSU

Advanced functionality

- math and logic
- batch recording
- flow totalization

ScreenMaster RVG200

Paperless recorder

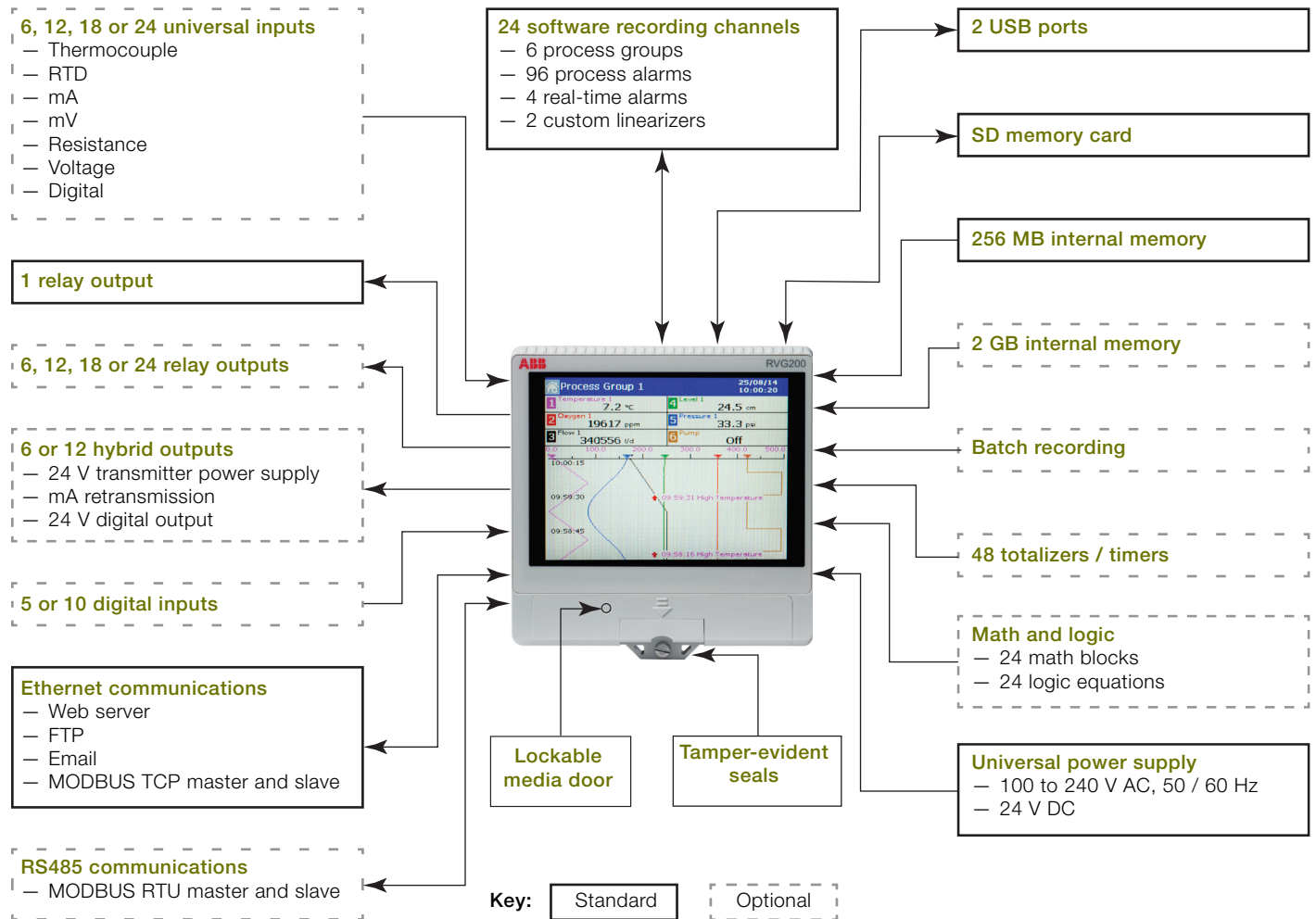
Overview

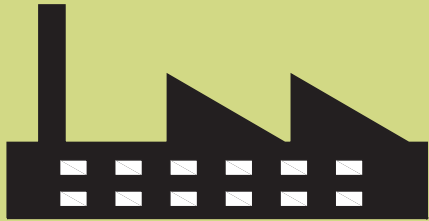
The ScreenMaster RVG200 is a secure, easy-to-use paperless recorder. Up to 24 process signals can be connected directly to the RVG200's analog inputs or transferred to it via digital communications. All process data, including alarm conditions, math calculation results and totalizer values, are displayed clearly to the operator and archived securely in an encrypted format for review using the accompanying DataManager Pro PC software.

A touch screen featuring swipe gesture control provides fast and intuitive operation. USB ports further simplify operation by enabling peripherals (for example, a keyboard, mouse or barcode scanner) to be attached.

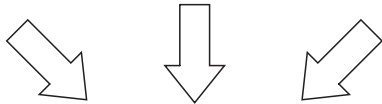
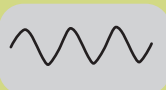
The RVG200's standard Ethernet communications and inbuilt web server enable:

- easy integration to an existing network
- automatic data collection
- remote process supervision



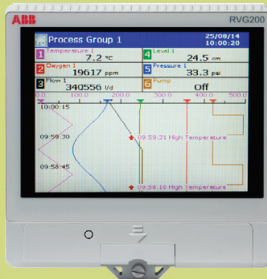


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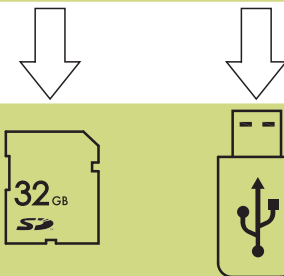
Process signals

- Up to 24 universal analog inputs provide direct connection to process signals including mA, mV, TC, RTD, voltage and digital signals
- High accuracy inputs compliant to AMS 2750 E with 500 V channel-to-channel isolation and parallel sampling rates of 125 ms
- 24 V transmitter power supply for 2-wire transmitters
- Process signals communication via MODBUS TCP / RTU



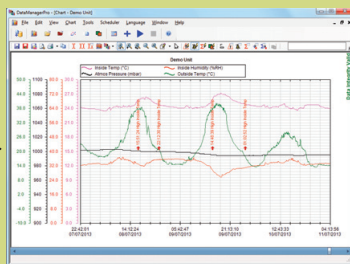
Display and recording

- Crystal clear TFT display
- Multiple easy-to-read display formats including chart, bargraph and digital indicator
- Recording to internal flash memory up to 2 GB
- On screen historical data review



Data file transfer

- Data archiving to SD card, USB flash drive or internal memory
- Automatic data file transfer direct to DataManager Pro software via Ethernet communications



Data storage and analysis

- All data stored in a secure encrypted format
- Long-term data storage in DataManager Pro's secure database
- Easy data review and analysis using DataManager Pro's powerful functionality
- Automatic verification of data file integrity when storing or reviewing data

ScreenMaster RVG200

Paperless recorder

Display examples

To display process information clearly, the RVG200 features 6 configurable process groups. This enables signals from one process to be grouped by type or enables the RVG200 to monitor up to 6 separate processes. Each process group has its own set of displays including a chart, bargraph and digital indicator. Additionally, an overview display simultaneously shows all process signals being recorded.

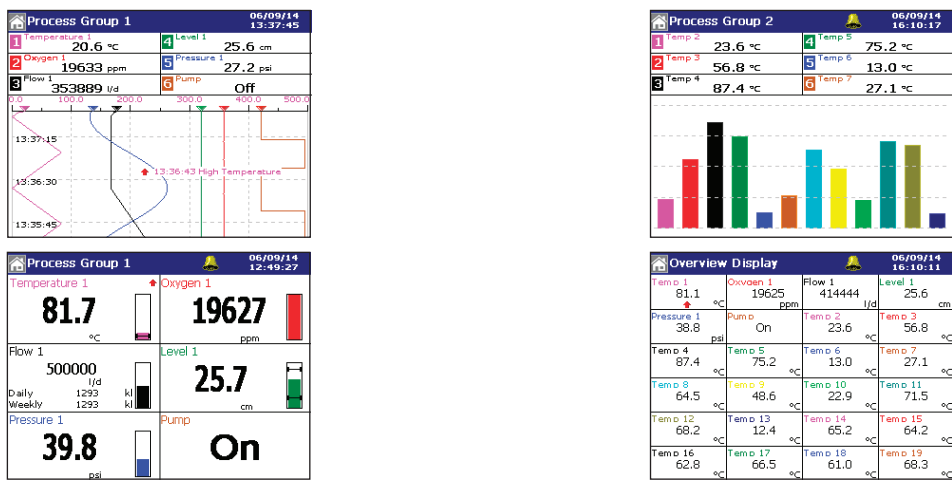


Fig. 1: Chart, indicator, bargraph, and overview displays

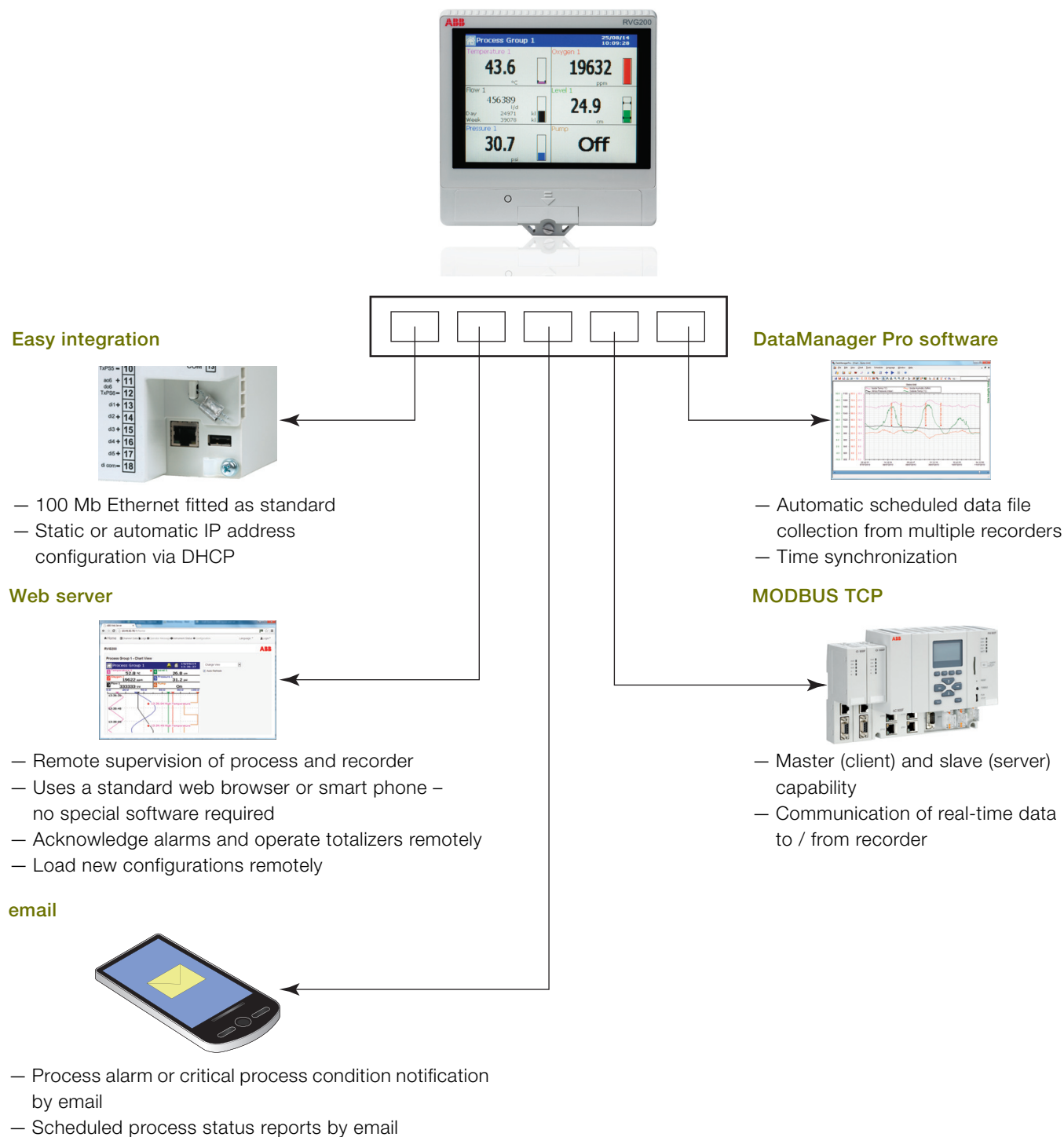
Easy operation

The RVG200's responsive touchscreen makes operation quick and simple. The intuitively structured operation and configuration menus can be navigated quickly via an icon-based system or the process groups and displays controlled via on-screen swipe gestures.



Fig. 2: Navigation using on-screen swipe gestures

Ethernet integration



ScreenMaster RVG200

Paperless recorder

Historical logs

Three historical logs are kept providing detailed alarm, totalizer and audit history.

Alarm event log

- a complete history of all alarm occurrences including state changes, acknowledgements and operator messages.

Totalizer log

- a convenient summary of totalizer readings including daily, weekly and monthly values.

Audit log

- time, date and ID stamped system data including notification of configuration changes, calibration adjustments and operator actions. The audit log provides detailed evidence of the recorder's integrity and the validity of recorded data.

Math and logic

Math and logic capabilities are available as an option, providing powerful problem solving capability. Bracket and nesting capability enable complex equations to be created, the results of which can be displayed on screen, trended and logged to the memory card. Functionality includes:

- Standard mathematical functions (for example, addition, subtraction, multiplication and division) enable signals to be compared and the comparison values recorded or averages of groups of signals to be calculated.
- Switch and high / low selection functions provide sensor redundancy capability with failure-driven automatic switching between sensors.
- Rolling and real-time average functions can be applied to noisy or erratic process signals proving clearer representation of process trends.

Batch recording

The batch recording option enables simple recording and reviewing of batch processes. When a batch is started it is tagged with a unique batch number, operator identification and 3 user-definable description fields. All information can be entered using the on-screen keyboard, a USB keyboard or a barcode scanner. RVG200 can accommodate multiple batches within single- or multiple-process groups simultaneously. Using DataManager Pro, batches can be recalled for review simply and quickly using the unique batch number or descriptive information entered at the time of its recording. Additional functionality provides the ability to search and sort batch records for an entire production facility in many ways; including by product type, operator and time and date of processing.

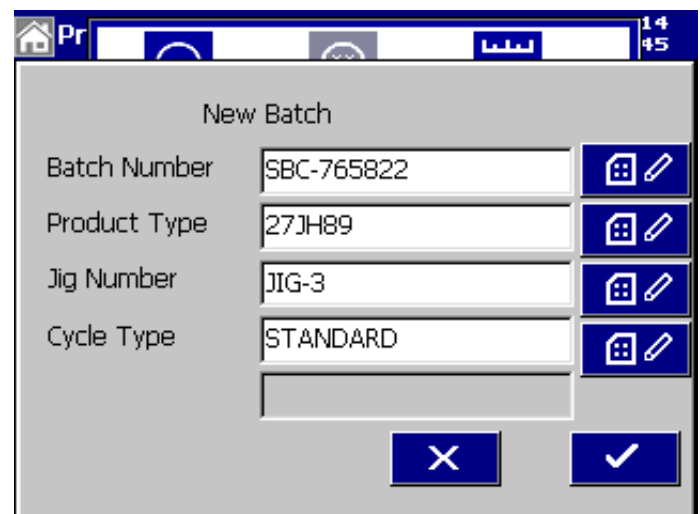


Fig. 3: Batch recording configuration dialog

DataManager Pro off-line review and analysis software

The RVG200 combined with ABB's DataManager Pro software provides a complete data recording, analysis and long-term storage solution.

All process data and historical log archive files recorded by the RVG200 are compatible with DataManager Pro.

Features include:

- Database management of data files ensures simple, secure, long-term storage and instant retrieval of historical data.
- The graphing capabilities provide powerful interrogation of process data.
- Validity checking of all data files during the storage and retrieval process ensures maximum data integrity.
- Automatic data file collection via Ethernet communications from multiple ScreenMaster recorders provides maintenance-free data file collection.

For further information on the capabilities of DataManager Pro software, refer to data sheet [DS/RDM500-EN](#).

21 CFR part 11 compliance and GAMP validation package

With its comprehensive audit trail, secure archiving format and extensive physical and configuration security features, the ScreenMaster RVG200 is ideally suited to applications where compliance with 21CFR part 11 (the FDA's regulations regarding electronic record keeping) is required. For further information refer to [INF13/147](#).

A template for validating the RVG200 paperless recorder is available. Following GAMP 5 (a risk-based approach to compliant GxP computerized systems), the template is designed to make the validation process as simple as possible and provides an IQ and OQ that is completed at the customer site, before and after installation. Once completed, the template is then packaged together with other documentation relating to the system as a whole, ready to be presented to the governing regulatory body for inspection.

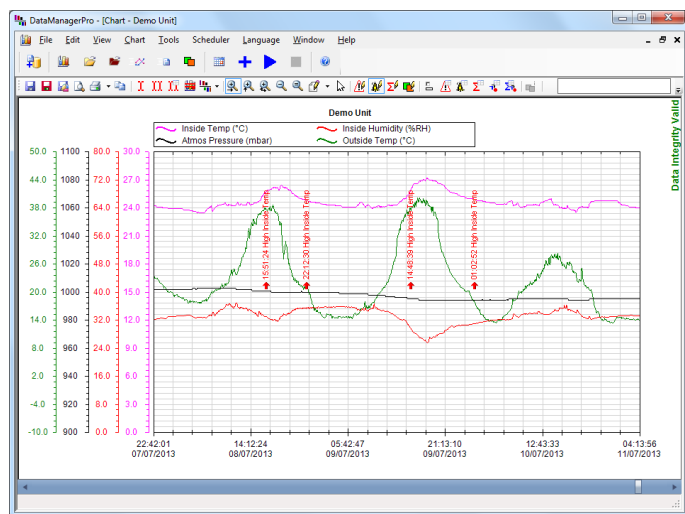
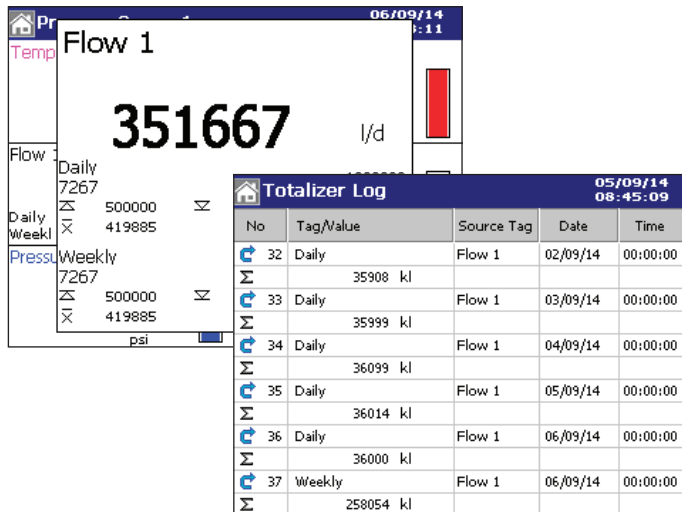


Fig. 4: DM Pro screen shot

ScreenMaster RVG200

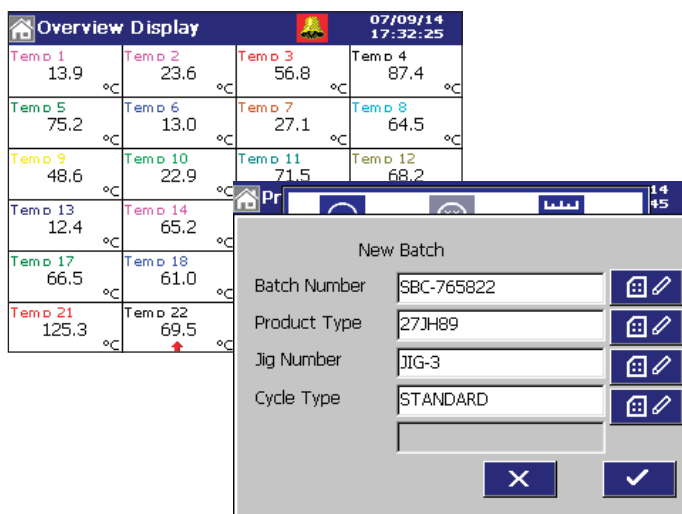
Paperless recorder

Example applications / industries



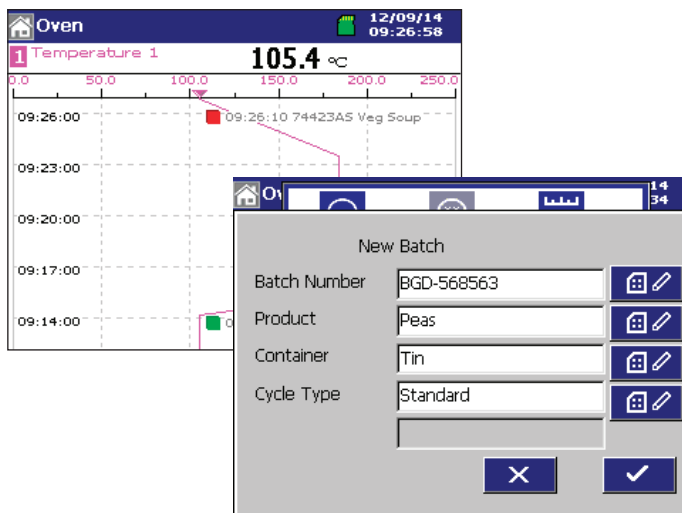
Water and waste water monitoring

- Dual flow totalizers per channel provide the flexibility to record both a continuous and resettable total for a single flow signal. Both totalizers are clearly displayed to the operator together with the instantaneous flow rate.
- A totalizer log keeps a record of all totalizer occurrences; whenever a totalizer is started, stopped or reset it is logged; together with the totalizer value at the time of the occurrence. The totalizer log is archived securely with other process data and can be reviewed using DataManager Pro software.
- Flow totalizers can be configured easily to reset automatically at specific intervals – for example, daily, weekly or monthly. When reset, the totalizer value is recorded in the totalizer log to provide a convenient history of flow totalizer values.
- When monitoring flow totals that must conform to strict limits, (for example, waste water discharge monitoring), the recorder's alarms can be configured to warn that a limit is approaching or has been reached.
- All process data can be accessed remotely using Ethernet communications. Additionally, the recorder's internal webserver, detailing the process status, can be viewed using a PC, tablet or smart phone and the flow totalizers can be remotely started, stopped and reset via the webserver.



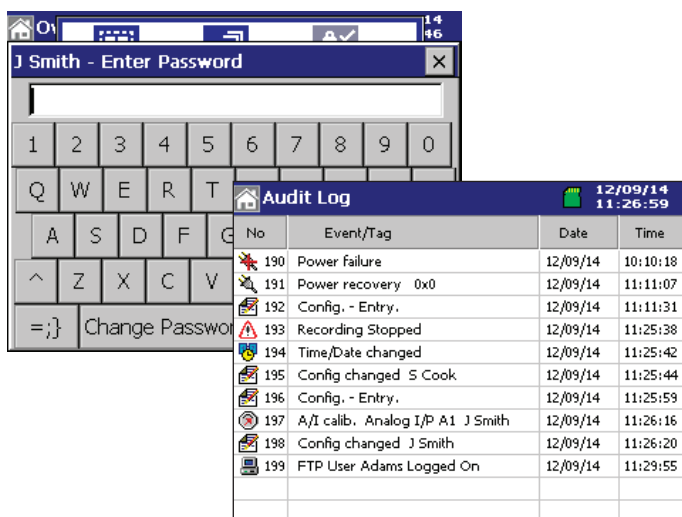
Heat treatment recording

- High specification inputs provide the accuracy and stability needed to meet the requirements of AMS 2750 E.
- Batch recording enables data such as batch number, product type and other identification to be tagged to process data. Specific batch records can be recalled rapidly and reviewed using DataManager Pro software.
- A barcode scanner can be connected to the front or rear USB port to prevent typographical errors that can occur when batch data is entered manually.
- Process signals can be recorded against a logarithmic scale enabling signals such as vacuum measurements to be represented accurately.
- Chart, digital indicator and bargraph display options enable operators to view process signals in their preferred format. Up to 24 signals can be displayed on a single screen enabling easy comparison of multiple measurements.
- Simple calibration procedure with traceable history detailed in the audit log.



Food & Beverage process monitoring

- Full IP66 and NEMA 4X front face protection provide suitability for installation in hose-down environments and those subject to high levels of moisture. This enables installation next to the process, providing local operators with the information they need at their fingertips.
- Batch recording enables data such as batch number, product type and other identification to be tagged to process data. Specific batch records can be recalled rapidly and reviewed using DataManager Pro software.
- A barcode scanner can be connected to the front or rear USB port to prevent typographical errors that can occur when batch data is entered manually.
- F0 value calculation accounts for the time a cooking or sterilization process spends at, below and above its specified temperature. F0 value calculation not only ensures accurate processing of a product, it can also help to increase efficiency by reducing overall processing time.
- Chart, digital indicator and bargraph display options enable operators to view process signals in their preferred format. 6 process groups enable multiple processes to be monitored by a single recorder; each process has its own group to minimize confusion.



Pharmaceutical process monitoring

- Extensive security features including encrypted data files, multi-user password protection and automatic audit trail generation ensures compliance with 21 CFR part 11 requirements.
- Batch recording enables data such as batch number, product type and other identification to be tagged to process data. Specific batch records can be rapidly recalled and reviewed using DataManager Pro software.
- A barcode scanner can be connected to the front or rear USB ports to prevent typographical errors that can occur when batch data is entered manually.
- F0 value calculation accounts for the time a sterilization process spends at, below and above its specified temperature. F0 value calculation not only ensures accurate sterilization, it can also help to increase efficiency by reducing overall processing time.
- Any event relevant to data security is captured by the Audit Log. This includes configuration and calibration changes complete with time, date and where relevant operator identification. The audit log provides comprehensive evidence of the integrity of the recorder creating secure data files.

ScreenMaster RVG200

Paperless recorder

Technical specification

Operation and configuration

Configuration

- Via resistive touch screen or PC Configuration
- Multiple configuration files can be stored in internal memory (up to 16 files) or external memory (SD card, USB flash drive)

Display

- Color, TFT, liquid crystal display (LCD) with LED backlight and brightness adjustment
- 144 mm (5.7 in.) diagonal display area, 76800 pixel (1/4 VGA) display *

Language

English, German, French, Italian, Spanish, Chinese

Chart screen intervals

Selectable from 18 seconds to 7 days

Chart divisions

Programmable for up to 10 major and 10 minor divisions

Chart annotation

Alarm, batch, electronic signatures and operator messages may be annotated on the chart

Real time clock

Accuracy:

- ± 5 ppm (± 0.43 seconds per day)

Back-up battery:

- Battery low warning
- Provides 3 years support for unpowered condition
- 10 year shelf-life

* A small percentage of the display pixels may be either constantly active or inactive. Maximum percentage of inoperative pixels < 0.01 %

Security

Physical

- Lockable media door
- Front and rear tamper-evident seals

Configuration security

Password protection:

- Access to configuration is enabled only after the user has entered a password

Internal switch protection:

- Access to configuration is enabled only after a hardware switch has been set. This switch is situated behind a tamper-evident seal

Logging security

Configuration:

- Can be configured for password protection or free access to logging level

Basic type security

4 individual users with unique user name and passwords

Advanced type security

Number of users:

- Up to 40

User names*:

- Up to 20 characters

Access privileges:

- Logging access – Yes / No
- Configuration access – none / load file only / limited / full

Passwords:

- Up to 20 characters
- A minimum required password length of 4 to 20 characters can be configured and a password expiry time can be applied to eliminate password ageing

Password failure limit:

- Configurable for 1 to 10 consecutive occasions or 'infinite'
- A user is deactivated if a wrong password is entered repeatedly

Deactivation of inactive users:

- Can be disabled or configured for 7, 14, 30, 60, 90, 180 or 360 days of inactivity
- Users are deactivated (by removal of access privileges) after a period of inactivity

* User names are unique (names cannot be repeated)

Operator views

Contents	Views available		
	Chart	Bargraph	Digital indicator
Instantaneous values / states	✓	✓	✓
Units of measure	✓	✓	✓
Channel tags	✓	✓	✓
Alarm status	✓	✓	✓
Alarm trip markers	—	✓	✓
Max. / Min. markers	—	✓	✓
Analog bargraphs	—	✓	✓
Totalizer values & units of measure	—	—	✓*
Totalizer tags	—	—	✓*
Maximum, minimum and average batch values	—	—	✓*
Graphical view of historical data	✓	—	—

* If Totalizer option is fitted and selected

Standard functionality

Operator messages

Number

24

Trigger

Via front panel or digital signals

Recording in alarm / event log

Can be enabled or disabled on configuration

Secure chart signatures

Recorded in the alarm / event log, complete with operator identification

Process alarms

Number

96 (4 per recording channel)

Types

High / low:

- Process
- Latch
- Annunciator

Rate:

- Fast / slow

Tag

20-character tag for each alarm

Hysteresis

Programmable value and time hysteresis (1 to 9999 seconds)

Alarm enable

Allows alarm to be enabled / disabled via a digital input

Alarm log enable

Recording of alarm state changes in the alarm / event log can be enabled / disabled for each alarm

Acknowledgement

Via front panel or digital signals

Real-time alarms

Number

4

Programmable

Day of the week, 1st of month, start and duration times

Custom linearization

Number

2

Number of breakpoints

20 per linearizer

ScreenMaster RVG200

Paperless recorder

Recording to internal memory

Internal flash memory

256 MB flash memory upgradeable to 2 GB

Oldest data is automatically overwritten by new data when memory is full

Data integrity checks

Checksum for each block of data samples

Independent process groups

6 (maximum of 24 channels per group)

Number of recording channels

24 (each channel can be assigned to 1 group only) *

Sources

Any analog or digital signal (for example, process input, communications, math block and totalizer)

Filters

Programmable for each channel to allow recording of:

- Instantaneous values
- Average
- Maximum, minimum
- Maximum and minimum value over sample time

Primary / Secondary sample rates

Programmable from 0.125 seconds to 60 minutes for each process group

Primary / Secondary sample rate selection

Via any digital signal or from password protected menu

Recording start / stop control

Via any digital signal

* If required, a single process input can be assigned to multiple recording channels enabling it to be visible in more than one process group.

Recording duration to 256 MB internal flash memory

Approximate duration calculated for continuous recording of 6 channels of analog data (for example, for 12 channels divide by 2, for 24 channels divide by 4).

Sample rate	Duration
0.125 seconds	10 days
1 second	80 days
10 seconds	2.2 years
60 seconds	13 years
10 minutes	130 years
60 minutes	960 years

Recording duration to 2 GB internal flash memory

Approximate duration calculated for continuous recording of 24 channels of analog data (for example, for 12 channels multiply by 2, for 6 channels multiply by 4).

Sample rate	Duration
0.125 seconds	20 days
1 second	160 days
10 seconds	4.4 years
60 seconds	26 years
10 minutes	260 years
60 minutes	1920 years

Historical logs

Types

Alarm / event, totalizer and audit logs

Number of records in each historical log

- Up to 500 in internal memory
- Oldest data is automatically overwritten by new data when log is full

	Alarm / event log		Totalizer log		Audit log	
Log entry events	<ul style="list-style-type: none"> • Alarm state changes • Operator messages 		<ul style="list-style-type: none"> • User defined logging intervals • Totalizer stop/start, reset, wrap • Power up / down 		<ul style="list-style-type: none"> • Configuration / calibration changes • System events • Errors, operator actions 	
Information recorded in log / on screen	In log	On screen	In log	On screen	In log	On screen
Date & time of event	✓	✓	✓	✓	✓	✓
Type of event	✓	✓	✓	✓	✓	✓
Tag	✓	✓	✓	✓	—	—
Source tag	✓	—	✓	—	—	—
Alarm trip value & units of measure	✓	—	—	—	—	—
Alarm state	✓	✓	—	—	—	—
Alarm acknowledgement state	✓	✓	—	—	—	—
Operator ID	✓	—	—	—	✓	✓
Description	—	—	—	—	✓	✓
Batch total and units of measurement*	—	—	✓	✓	—	—
Maximum, minimum and average values plus units*	—	—	✓	✓	—	—
Secure total	—	—	✓	—	—	—

* If Totalizer option fitted and selected

ScreenMaster RVG200

Paperless recorder

Archiving to removable media

Data that can be saved to removable media

- Recorded data per channel (1 to 24)
- Alarm event log data
- Totalizer log data
- Audit log data
- Configuration

File structure

Binary encoded

File protection

Secure binary format with data integrity checks

New file generation interval

Automatic

Archive sample rates

Data is archived at the same sample rate at which it is stored internally

Filename

20-character tag, prefixed with date / time

Data verification

Carried out automatically on all writes to removable-media files

SD card size

Cards up to 32 GB capacity may be used

USB flash drive size

Drives up to 32 GB capacity may be used

Archive media compatibility

ABB recorders comply with approved industry standards for SD cards and USB flash drives. ABB fully tests the brands of SD cards and USB flash drives that it supplies. Other brands may not be fully compatible with this device and therefore may not function correctly.

Recording duration

Approximate duration calculated for continuous recording of 6 channels of analog data (for example, for 12 channels divide by 2, for 3 channels multiply by 2).

Sample rate	Duration	
	512 MB SD card	1 GB SD card
1 seconds	8 months	16 months
10 seconds	6 years	13 years
40 seconds	26 years	51 years
60 seconds	40 years	75 years
120 seconds	80 years	255 years
480 seconds	315 years	620 years

Analog input modules

General

Number of process inputs

6 per module, maximum of 24 inputs

Input types

mA, mV, voltage, resistance, thermocouple, RTD, digital volt-free, digital 24 V

Thermocouple types

B, C, D, E, J, K, L, N, R, S, T

Resistance thermometer

PT100, PT1000, Ni120, Ni1000

Other linearizations

\sqrt{x} , $x^{3/2}$, $x^{5/2}$, custom linearization

Digital filter

Programmable 0 to 60 seconds

Display range

–999999 to 9999999

Common mode noise rejection

>120 dB at 50 / 60 Hz with 300 Ω imbalance resistance

Normal (series) mode noise rejection

>60 dB at 50 / 60 Hz

CJC rejection ratio

± 0.05 °C / °C

CJC error 0.5 °C maximum with recorder @ 25 °C

Sensor break protection

Programmable as upscale or downscale

Temperature stability

0.02 % / °C or 2 μ V / °C (non-thermocouple ranges only)

AMS 2750 E

Subject to suitable field calibration, meets the requirements of 'Control, Monitoring and Recording Instruments' and 'Field Test Instruments'

Analog to digital converter resolution

24 bit

Long term drift

<0.1 % of reading or 10 μ V annually

Input impedance

>10 M Ω (mV inputs)

>900 k Ω (voltage inputs)

10 Ω (mA inputs)

Inputs

Linear inputs	Standard analog input	Accuracy (% of reading)
Millivolts	–150 to 150 mV	0.1 % or ± 20 μ V
Milliamps	–50 to 50 mA	0.1 % or ± 10 μ A
Volts	–10 to 24 V	0.1 % or ± 10 mV
Resistance Ω (low)	0 to 550 Ω	0.1 % or ± 0.5 Ω
Resistance Ω (high)	0 to 10000 Ω	0.1 % or ± 5 Ω
Sample interval	125 ms per sample (all inputs are processed in parallel)	
Channel-to-channel input isolation	Galvanically isolated to 500 V DC	
Isolation from rest of recorder	Galvanically isolated to 500 V DC	

The figures in the following table include linearizer and electrical errors

Thermocouple	Maximum range		Measurement accuracy (% of reading)
	°C	°F	
B	250 to 1800	482 to 3272	0.1 % or ± 1 °C (1.8 °F)
C	0 to 2300	32 to 4172	0.1 % or ± 0.5 °C (0.9 °F)
D	0 to 2310	32 to 4190	0.1 % or ± 1.5 °C (2.7 °F)
E	–100 to 900	–148 to 1652	0.1 % or ± 0.3 °C (0.54 °F)
J	–100 to 900	–148 to 1652	0.1 % or ± 0.3 °C (0.54 °F)
K	–100 to 1300	–148 to 2372	0.1 % or ± 0.3 °C (0.54 °F)
L	–100 to 900	–148 to 1652	0.1 % or ± 0.3 °C (0.54 °F)
N	–200 to 1300	–328 to 2372	0.1 % or ± 0.3 °C (0.54 °F)
R	–50 to 1700	–58 to 3092	0.1 % or ± 0.3 °C (0.54 °F) (above 300 °C [572 °F])
S	–50 to 1700	–58 to 3092	0.1 % or ± 0.3 °C (0.54 °F) (above 200 °C [392 °F])
T	–200 to 300	–328 to 572	0.1 % or ± 0.3 °C (0.54 °F)

RTD

PT100	–200 to 600	–328 to 1112	0.1 % or ± 0.5 °C (0.9 °F)
PT1000 (IEC 60 751)	–200 to 850	–328 to 1562	0.1 % or ± 0.5 °C (0.9 °F)
Ni120	–80 to 260	–112 to 500	0.1 % or ± 0.5 °C (0.9 °F)
Ni1000	–30 to 130	–22 to 266	0.1 % or ± 0.5 °C (0.9 °F)

ScreenMaster RVG200

Paperless recorder

Advanced math (optional)

Type

24 equations provide ability to perform general arithmetic calculations including mass flow (of ideal gases), relative humidity and emissions calculations

Size

40-character equation

Functions

+, −, /, log, Ln, Exp, Xn, $\sqrt{}$, Sin, Cos, Tan, mean, rolling average, standard deviation, high / median / low select, multiplexer, absolute, relative humidity

Tags

8- and 20-character tags for each block

Update rate

1 enabled Math block is updated every 125 ms

Logic equations (optional)

Number

24

Size

11 elements each

Functions

AND, OR, NAND, NOR, XOR, NOT

Tags

20-character tag for each equation

Update rate

300 ms

Totalizer (optional)

Number

48 (2 per recording channel) 10-digit totals

Type

Analog, digital or F₀, batch, secure totals

Statistical calculations

Average, maximum, minimum (for analog signals)

6-Relay module

Number of relays

6 per module

Type and maximum rating

Relay type single-pole changeover

Voltage:

— 250 V AC, 30 V DC

Current:

— 2.5 A AC, 2.5 A DC

Note. The total load for all relays within the recorder must not exceed 17.5 A.

Hybrid module

6 Analog blocks + 5 digital inputs

Analog block

Number:

- 6, galvanically isolated

Configuration options:

- Analog output, digital output or transmitter PSU

Analog output

Configurable current range:

- 0 to 20 mA

Maximum load:

- 750 Ω

Isolation:

- 500 V DC from any other I/O

Accuracy:

- 0.25 %

Digital output

Voltage:

- 24 V (nominal)

Drive:

- 22.5 mA

Isolation:

- 500 V DC from any other I/O

Transmitter PSU

22.5 mA at 24 V DC (nominal)

Isolation:

- 500 V DC from any other I/O

Digital input

Number:

- 5

Type:

- Volt-free switching inputs

Polarity:

- Negative (closed switch contact or 0 V = active signal)

Digital input minimum pulse:

- 125 ms

Isolation:

- 500 V DC from any other I/O *

* No isolation between digital I/O on the same module

Ethernet module

Physical medium

10 / 100BaseT

Protocols

TCP/IP, ARP, ICMP, FTP (server), HTTP,

MODBUS TCP (master / slave)

FTP server functions

- Directory selection & listing
- File upload / download
- 4, independently configurable users with full or read-only access

Web server functions

- Operator screen monitoring / selection
- Remote monitoring of recording channels, analog / digital signals, alarms, totalizers and archiving

RS485 serial communications module

Number of ports

1 as option

Connections

RS485, 2- or 4-wire

Protocol

MODBUS RTU slave + master

Isolation:

- 500 V DC from rest of recorder

EMC

Emissions & Immunity

Meets requirements of:

- EN50081-2
- EN50082-2
- EN61326 for an industrial environment

Electrical

Power supply

100 to 240 V AC ± 10 % (90 min. to 264 V max.) 50 / 60 Hz

24 V DC (23.0 to 24.5 V DC)

Power consumption

25 W max.

Power interruption protection

No effect for interruptions of up to 20 ms

ScreenMaster RVG200

Paperless recorder

Safety

General safety

EN61010-1

cULus

Overvoltage Class III on mains, Class II on inputs and outputs

Pollution category 2

Isolation

500 V DC to earth (ground)

Environmental

Operating temperature range

0 to 50 °C (32 to 122 °F)

Operating humidity range

5 to 95 % RH (non-condensing)

Storage temperature range

–10 to 60 °C (14 to 140 °F)

Front panel sealing

IP66 and NEMA4X

Rear panel sealing

IP40 (with rear cover)

IP20 (without rear cover)

Vibration

Conforms to EM60068-2

Physical

Size

Height and width

— 144 x 144 mm (5.7 x 5.7 in.)

Depth behind panel (including terminal cover)

— 147 mm (5.8 in.)

Weight

2.0 kg (4.4 lb) approx. (unpacked)

Panel cutout

138 mm (5.43 in.) x 138 mm (5.43 in.)

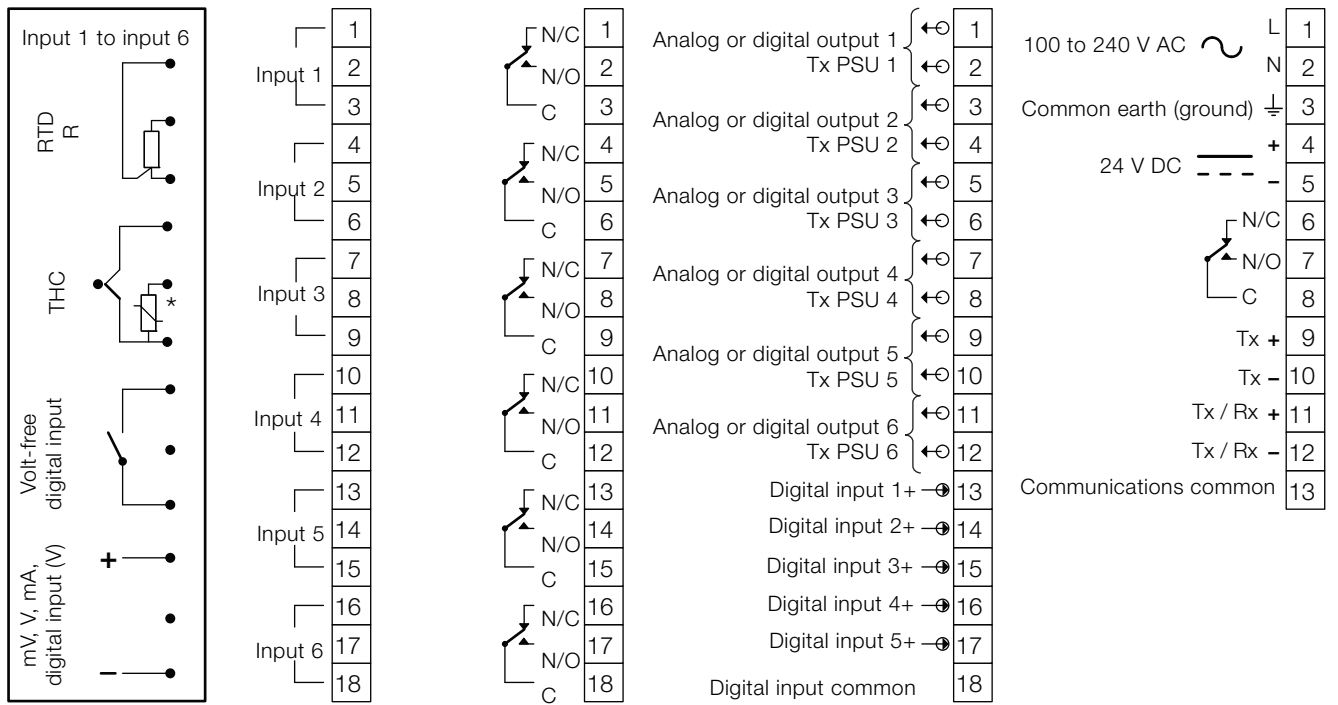
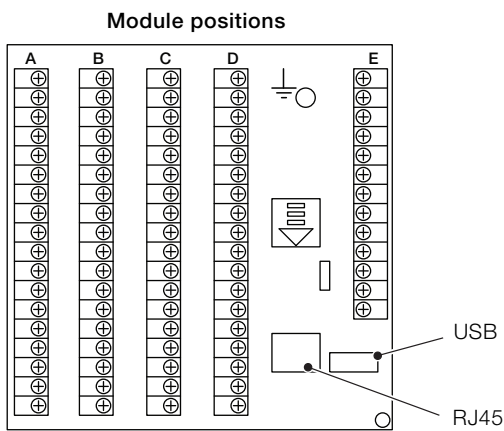
Case / Bezel material

10 % glass-filled polycarbonate

Touch screen material

Polyester (EBA 250)

Electrical connections



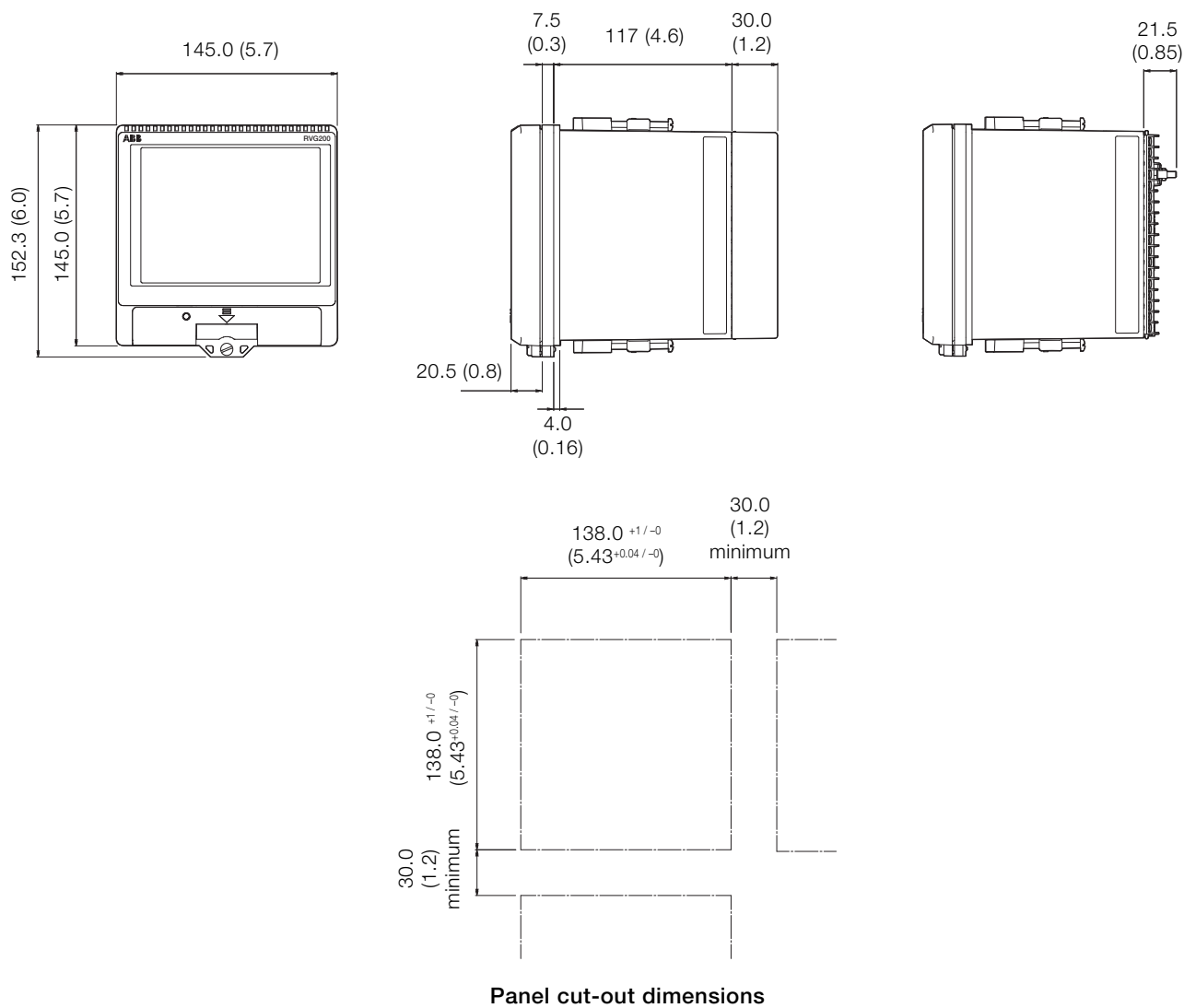
* Each thermocouple input must have either a cold junction assembly (part number CM30/0052) or shorting link (part number RVG200/0118) fitted. Each analog input card with a thermocouple input must have a minimum of 1 cold junction assembly fitted. For applications requiring maximum thermocouple accuracy, it is recommended that each thermocouple input is fitted with a cold junction assembly.

ScreenMaster RVG200

Paperless recorder

Overall dimensions

Dimensions in mm (in.)



Ordering information

ScreenMaster RVG200 paperless recorder	RVG200	AN	AN	AN	AN	A	N	A	N	A	N	A	N	A	N	Options
Option module A																
Not fitted		Y0														
6 analog inputs		A6														
6 relay outputs		R6														
Option module B																
Not fitted		Y0														
6 analog inputs		A6														
6 relay outputs		R6														
Option module C																
Not fitted		Y0														
6 analog inputs		A6														
Hybrid – 6 outputs (transmitter power supply, digital or analog) and 5 digital inputs		H6														
6 relay outputs		R6														
Option module D																
Not fitted		Y0														
6 analog inputs		A6														
Hybrid – 6 outputs (transmitter power supply, digital or analog) and 5 digital inputs		H6														
6 relay outputs		R6														
Internal memory size																
256 MB						A										
2 GB						D										
Expansion 1																
None							0									
Communications																
Ethernet								A								
Ethernet and RS485								B								
Approvals																
Standard										1						
cULus										2						
Configuration																
Standard (company default)												A				
Custom configuration (customer to complete and supply RVG200 custom configuration sheet (INF13/146))												B				
Engineered configuration (customer to supply configuration details required)												E				
Branding																
ABB standard														1		
Unbranded front panel and start-up screen														2		

Continued on page 22

ScreenMaster RVG200

Paperless recorder

ScreenMaster RVG200 paperless recorder										RVG200	AN	AN	AN	AN	A	N	A	N	A	N	A	A	N	Options
										See page 21														
Archive media																								
Standard grade SD card																								A
Industrial grade 512 MB SD card																								C
Industrial grade 2 GB SD card																								E
Standard grade USB flash drive																								J
Industrial grade 512 MB USB flash drive																								L
Industrial grade 2 GB USB flash drive																								N
HMI language																								
English																								5
German																								1
Spanish																								3
French																								4
Italian																								2
Chinese																								6
Portuguese																								A
Dutch																								D
Expansion 2																								
None																								Y
Calibration certificate																								
Certificate of calibration																								C1
Special features																								
GAMP validation compatible recorder																								KR
Printed instruction manual																								
English																								M5
German																								M1
Spanish																								M3
French																								M4
Italian																								M2
Chinese																								M6
Software Options																								
Math and Logic																								N1
Totalizers / timers																								N2
Batch																								N3

Example product ordering code:

RVG200A6H6Y0Y0A0A1A1C5Y-C1-N1-N3

Standard accessories

Included with each recorder:

- Panel-mounting clamps
- Media-door lock keys
- DataManager Pro software
- 1 CJ sensor per input card
- 5 CJ shorting links
- PC configuration software

Optional accessories

RDM500L	DataManager Pro single user license
RDM500ML	DataManager Pro multi-user license
ENG/REC	After-sales engineered configuration service
CM30/0052	Additional CJ sensor
B13328	512 MB industrial grade SD card
B13329	2 GB industrial grade SD card
B13331	512 MB industrial grade USB flash drive
B13332	2 GB industrial grade USB flash drive
RVG200/0700	6-channel analog input upgrade kit
RVG200/0701	Hybrid module upgrade kit
RVG200/0702	Relay module upgrade kit
RVG200/0703	RS485 module upgrade kit
RVG200/0706	2 GB internal memory upgrade kit
RVG200/0715	Batch upgrade
RVG200/0716	Math and logic upgrade
RVG200/0717	Totalizer upgrade
CD/VALRVG200	Validation package

Acknowledgments

MODBUS is a registered trademark of the Modbus-IDA organization

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3KXR110200R1001



Sales



Service



Software

SM3000

Multipoint videographic recorder

Raising the standards of data storage



Large clear display

- 31 cm (12.1 in.) thin film transistor (TFT) color screen

Unsurpassed environmental protection

- hosedown to IP66 and NEMA4X standards

Multiple point recording

- up to 36 universal analog inputs

Robust and convenient archive storage

- solid-state high-reliability
- Compact Flash Memory Card option

Intuitive user interface

- clear and simple Microsoft® Windows-style operation and configuration menus

10BaseT Ethernet communications as standard

- easy integration into PC networks
- remote monitoring/access
- email notification of alarms and status reports.

21 CFR Part 11 compliant data security

- extensive physical and electronics security features

GAMP validation package

- 21 CFR part 11 compliant

SM3000

The SM3000 Multipoint Videographic Recorder features state-of-the-art data storage and security technologies. Up to 36 universal analog inputs, communicated inputs or math results can be recorded and displayed in a variety of operator views.

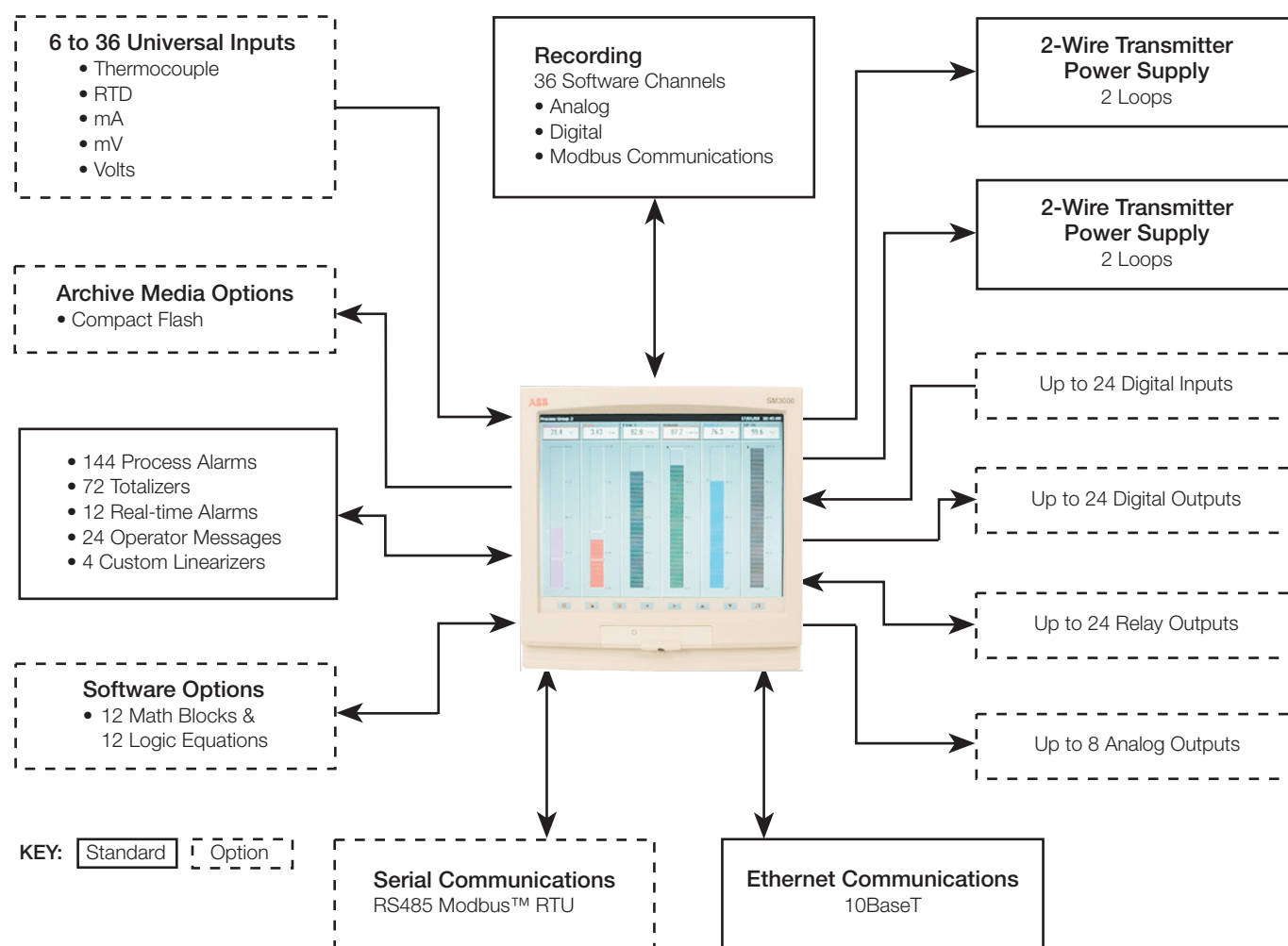
Standard 10KBaseT Ethernet communications ensure full integration into PC networks for remote process monitoring and secure access to archived process data.

8 Mb of onboard flash memory, capable of storing 2.8 million samples of data and the option of Compact Flash removable memory cards, provide extensive data storage capability.

A bright, clear high-contrast 31 cm (12.1 in.) TFT display, Windows-style operation and configuration menus ensure clear and simple operator interface.

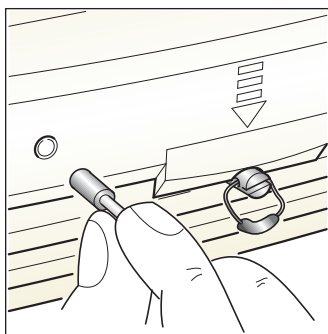
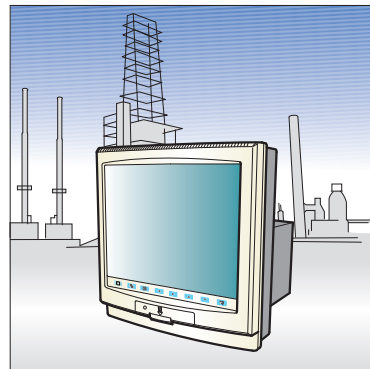
Application areas include:

- Environmental monitoring
- Water treatment plants
- Heat treatment
- Autoclaves
- Food, Dairy and Beverage processing
- Power stations
- Cold storage
- Emission monitoring
- Life sciences



Advanced Process Recording

- 36 recording channels are provided as standard which can be used to record any analog, digital or communications (via Modbus) signal.
- Each group can be stored at its own primary or secondary sample rate. This allows detailed information to be stored under specific process conditions, e.g. critical process states or alarm conditions. Alternatively, for simple applications one sample rate can be applied to all channels.
- Through the use of pre-storage filters it is possible to record the average, max./min. or instantaneous values of any recording channel.
- 8 Mb of internal memory is provided for buffering of process data. Once this memory is full it wraps-around automatically and overwrites the oldest data, ensuring that the latest process data is always captured.
- All data recorded by the SM3000 is available to archive to the removable storage media. During periods when a card is not present or is full, data is still recorded into the SM3000's internal memory. When a card is inserted or space becomes available on the card unarchived data can be transferred to the card.

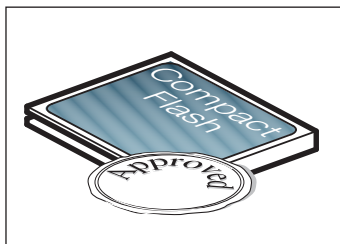
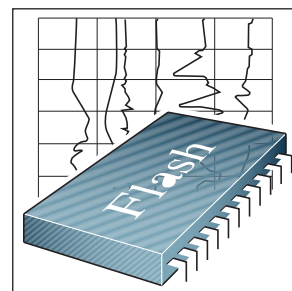


Security

- High specification data security compliant with 21 CFR Part II.
 - A media door lock is fitted as standard to prevent unauthorized access to the memory card.
 - Multiple users can be configured, each with an individual user name and password. Comprehensive security options, including password expiry and configurable access levels, ensure the exceptional security of the SM3000.
 - Operator actions, data archiving events, configuration changes and other system occurrences are all saved to the audit log of the SM3000. Each entry is time, date and, where appropriate, stamped with a user ID, providing a comprehensive audit trail to accompany any data recorded by the SM3000.
- All data files contained within the SM3000's 8 Mb of internal buffer memory, or created on memory cards, are encoded in a secure binary format ensuring that recorded data cannot be altered.
 - Two security modes are available for protection of the instrument's configuration. Multiple users can be configured, each with individual passwords and access levels or, as an alternative, a tamper-evident seal can be fitted to the front of the recorder. In this mode the configuration of the recorder can only be altered by first changing the position of an internal switch. To accomplish this the recorder must be removed from its case, breaking the seal.

Guaranteed Data Integrity

- The use of Flash memory technology ensures that the SM3000 is not reliant on batteries to preserve stored data during a power failure.
- Data stored in the internal memory and on removable media is stored in small blocks with each block containing a checksum to ensure the integrity of that data.
- An advanced error detection/correction code is built into the internal Flash memory, ensuring safe storage of your process data.



Industrial Standard, Robust, Archive Storage

- A Compact Flash memory card option can be fitted to the SM3000 for archive purposes. The solid-state nature of these cards ensures that the SM3000 can truly operate in ambient temperatures up to 50 °C (122 °F), whereas traditional electromagnetic floppy disk drives can operate only in temperatures up to 40 °C (104 °F).
- Every write to the archive storage media is verified to ensure the integrity of the data.

21 CFR part 11 Compliance and GAMP Validation Package

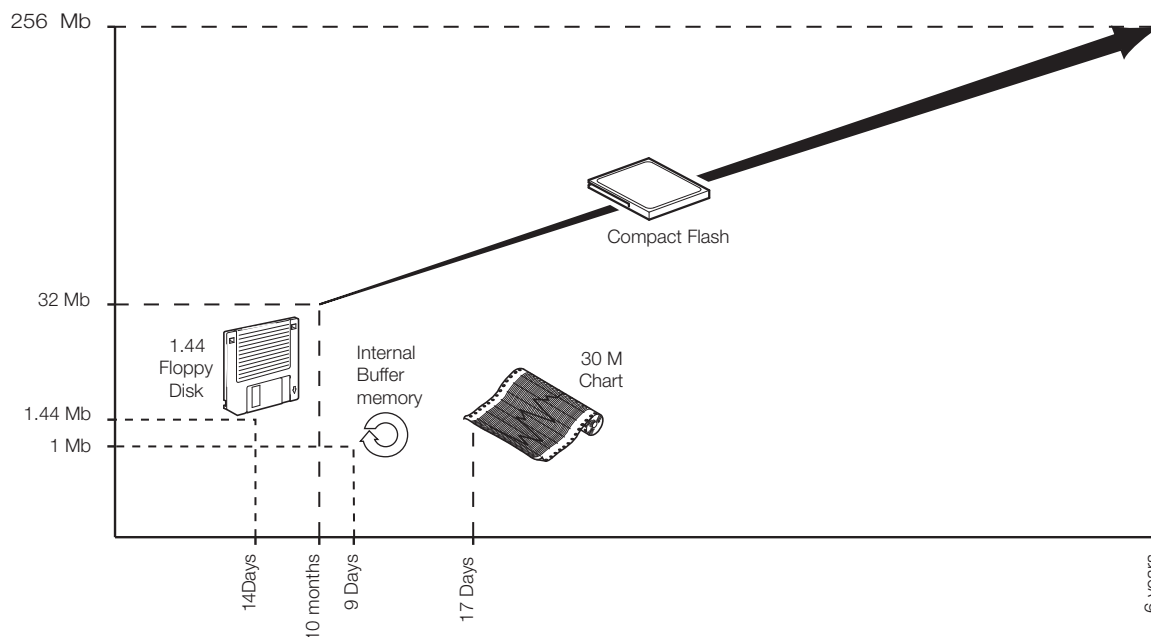
With its comprehensive audit trail, secure archiving format and extensive physical and configuration security features, the SM3000 is ideally suited to applications where compliance to 21CFR part 11 (the FDA's regulations regarding electronic record keeping) is required (for further information refer to [INF02/70A](#)).

In keeping with this, a template for validating the SM3000 videographic recorder is available. Following GAMP 5 (a risk-based approach to compliant GxP computerized systems), the template is designed to make the validation process as simple as possible and provides an IQ and OQ that is completed at the customer site, before and after installation. Once completed, the template is then packaged together with other documentation relating to the system as a whole, ready to be presented to the governing regulatory body for inspection.

Low Cost of Ownership

The large capacity of the Compact Flash memory cards used by the SM3000 ensures that the requirement for operator intervention to transfer process data to a PC on a regular basis is greatly reduced. Older floppy disk technology, used by many other manufacturers of graphical recorders, limits storage capability significantly; sometimes to levels below the ability of a traditional paper recorder.

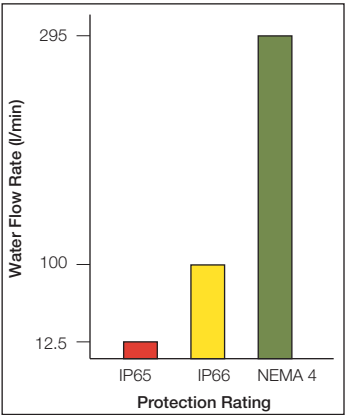
See below for an example of how memory storage times vary depending on the type of media device. The example shows the recording durations for a 6-channel recorder with a sample rate of 10 s. Also included in the example is how these storage times compare with a traditional paper recorder.



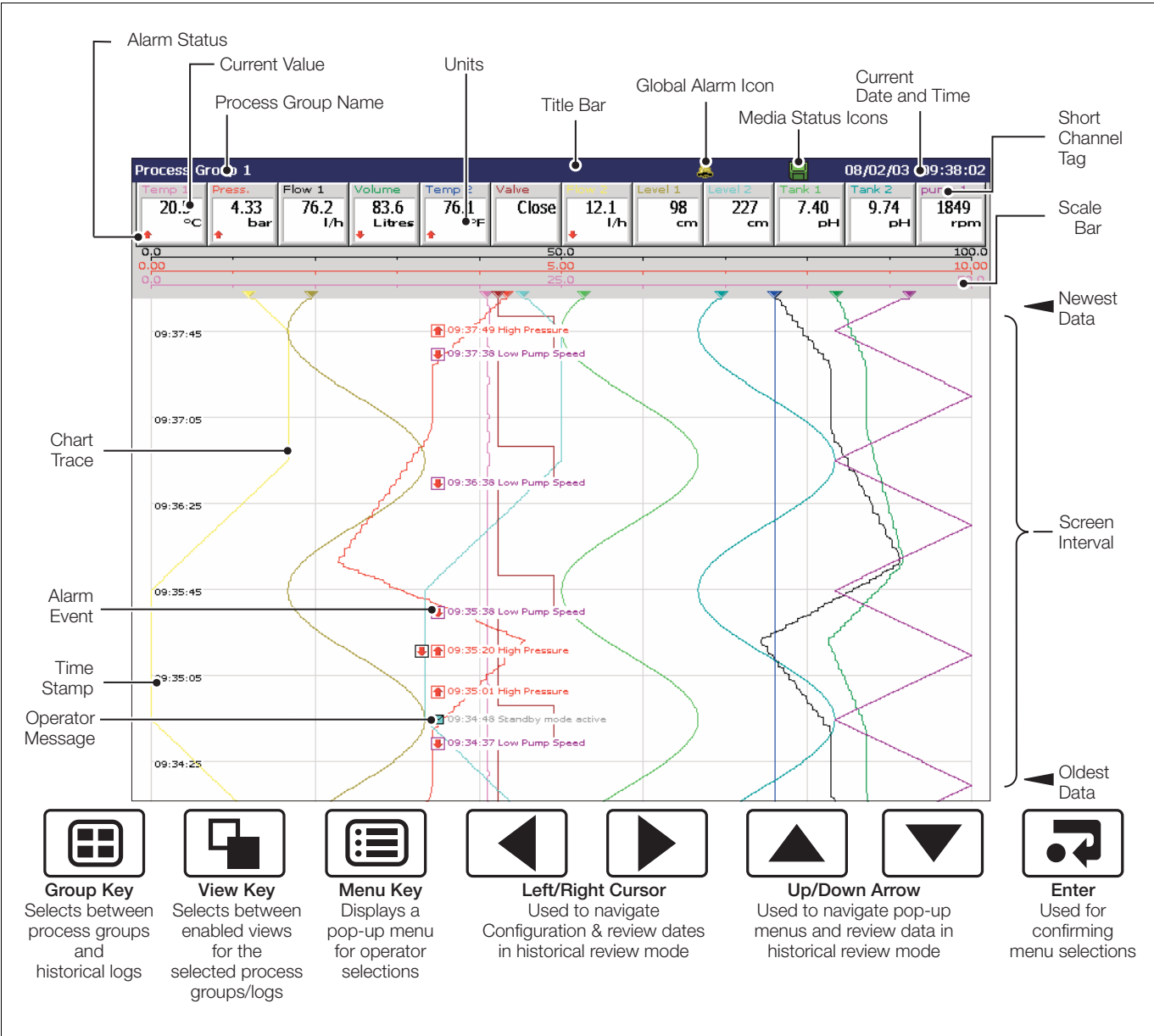


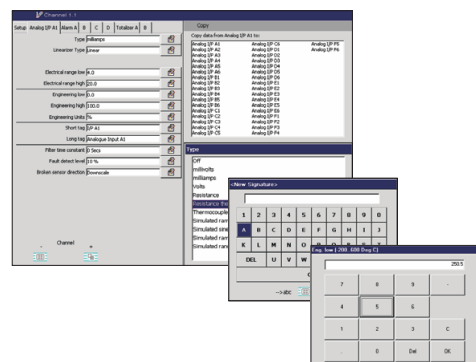
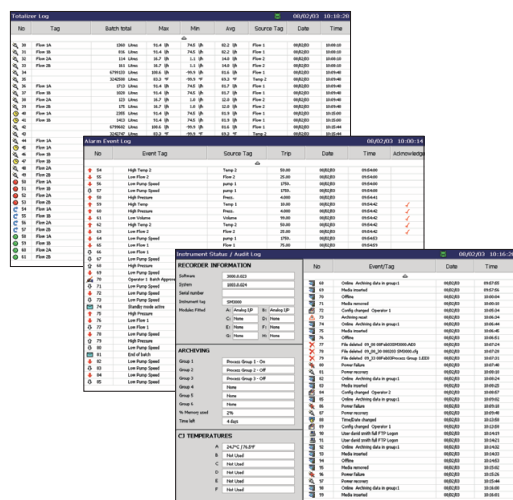
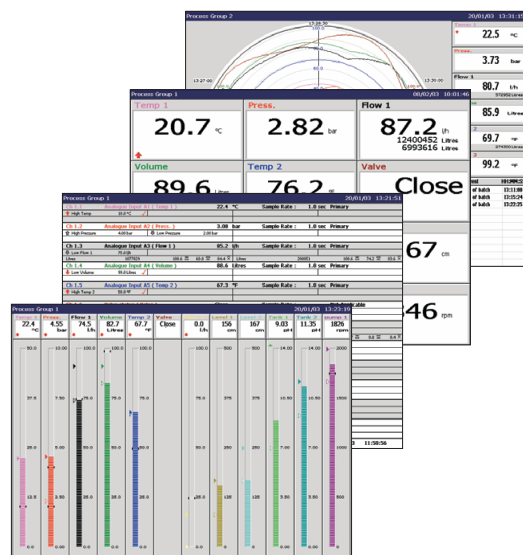
Unsurpassed Environmental Protection

Unique to this type of product, the SM3000 has unrivalled protection ratings of IP66 and NEMA4X and includes a fully-sealed, lockable media door. This enables the SM3000 to be installed, without additional protection, in applications that require frequent hosedown. With industrial standard noise emission and immunity protection, the SM3000 also operates effectively in high electrical-noise environments.



Intuitive User Interface





Operator Views

The 36 recording channels of the SM3000 can be freely distributed between 6 process groups and displayed using a number of different operator views. In addition to the standard strip chart views, the following views are available:

- **Circular Chart View**

Up to six trends can be plotted on a circular chart. In addition to digital indicators, including alarm status and totalizer values, a log is constantly in view showing a list of recent alarm activity.

- Digital Indicator View

Process value, engineering units, channel tag, totalizers and alarm status are all displayed clearly. An overview screen provides an at-a-glance view of all 36 recording channels.

- **Process View**

Provides an at-a-glance summary of each channel, including detailed alarm, totalizer and statistical (min., max. & average) information.

■ **Bargraph View**

Horizontal or vertical formats, including min./max. and alarm trip point markers.

Historical Logs

Providing functions unavailable in paper-based recorders, three full-time and date-stamped historical logs ensure complete validity of the recorder and it's data. Any or all of these logs can be archived to the removable memory card.

- Totalizer Log

All totalizer activity, e.g. starts, stops and resets, are recorded by the totalizer log. In addition individual log intervals can be configured for each totalizer, allowing total values to be logged regularly.

- Alarm Event Log

A detailed history of all alarm occurrences, including active and inactive transitions plus acknowledgement details.

- **Audit Log**

The highly-detailed secure log of all system events gathered by the Audit Log provides comprehensive evidence of the integrity, validity and traceability of data recorded by the SM3000. Included in the log are configuration changes, data archiving events, calibration adjustments, details of remote accesses and many more key events, all marked with operator IDs where applicable.

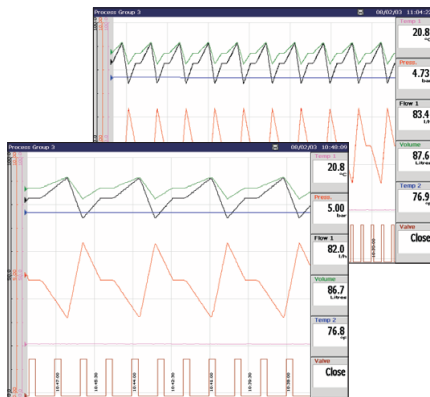
Configuration

A simple Windows-style structure provides an exceptionally easy approach to the setup of the SM3000. Text and numerical information is entered very quickly via an on-screen keyboard. Navigation of configuration menus is performed via the cursor keys and the pop-up menu.

It is also possible to configure the SM3000 via a Windows-based PC configuration package.

SM3000

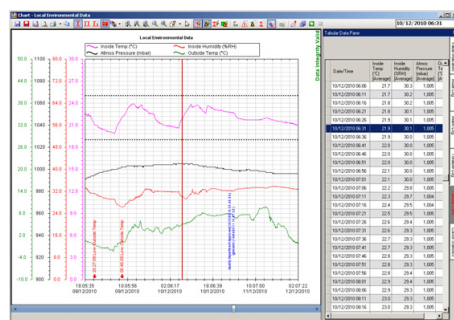
Multipoint videographic recorder



On-line Data Review

The SM3000 provides a number of unique features to provide a clear view of your process

- The screen interval can be altered to display between 48 s and 14 days of information, without it affecting the sample rate. This gives you the ability to 'zoom in' to a close-up view of the most current data or 'zoom out' to get the big picture.
- Individual traces can be temporarily removed from the screen to enable clear comparison of two or more trends.
- The SM3000 can easily review all historical data in the 8 Mb internal buffer memory at the touch of a button. During this time, recording of the process data to the internal memory remains unaffected.



Off-Line Review and Analysis

Using ABB's DataManager Pro software, archived process data and historical logs recorded to a removable media card can be reviewed easily.

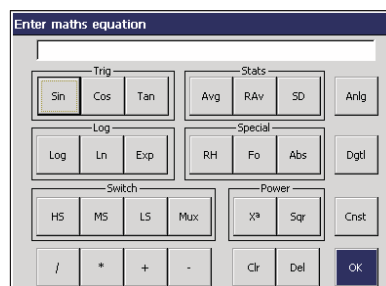
- Database management of data files provided by DataManager Pro ensures simple, secure long-term storage and retrieval of historical data.
- The graphing capabilities provided by DataManager Pro ensure easy interrogation of process data.
- The validity of all data files is always checked by DataManager Pro during the storage and retrieval process, ensuring maximum data integrity.

For further information on the capabilities of DataManager, Pro refer to data sheet DS/RDM500-EN.

Math and Logic

Available as an option are advanced math and logic capabilities. 12 multi-element math and 12 multi-element logic equations can be configured. Equations can be nested into each other to provide extensive capabilities.

- Mean, standard deviation and rolling averaging functions are provided.
- Standard addition, subtraction, multiplication and division are complemented with Log, Ln, Square root, power, Sin, Cos, Tan and absolute functions.
- Switching of process signals can be achieved via the high/low/mid signal selection and multiplexing functions.
- Predefined equations are provided for relative humidity and Fo measurements.
- AND, NAND, OR, NOR, XOR and NOT operators are available within the logic equations.

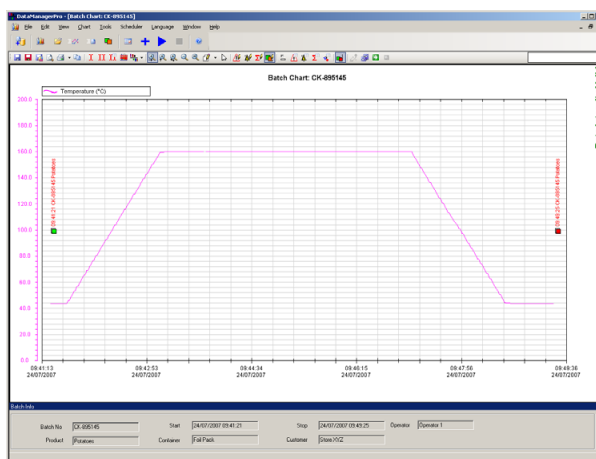


All math and logic equation results can be recorded on the display of the SM3000 and archived to the removable media. Detailed diagnostic functions are provided for both the math and logic equations.

Batch Recording

A batch recording option enables simple recording and reviewing of batch processes. When a batch is started it is tagged with a unique batch number, operator identification and three user-definable description fields. All information is entered on-screen with a history function allowing quick entry of commonly repeated descriptions.

Using DataManager Pro software batches can be simply and quickly traced for review using the unique batch number and description information entered at the time of recording. Additional functionality provides the ability to search and sort batch records for an entire production facility in many ways, including by product type, operator and time and date of processing.



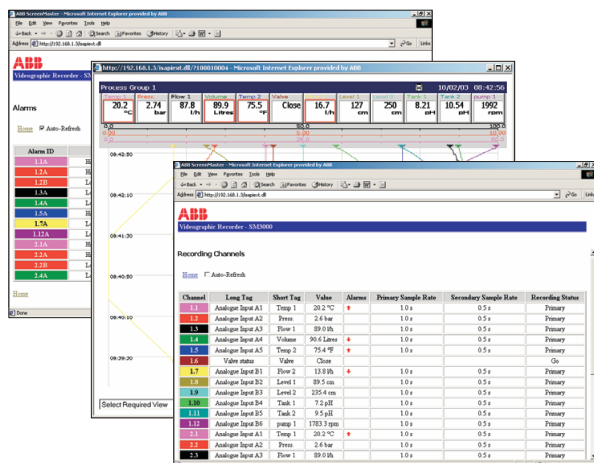
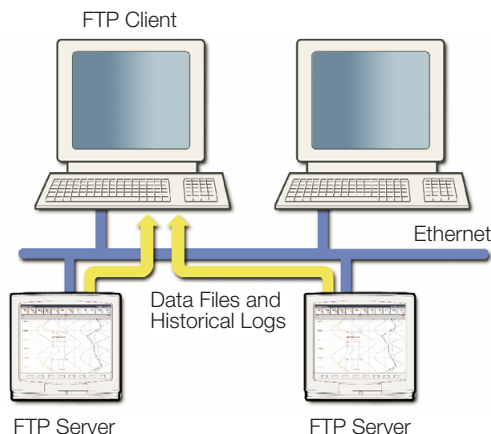
Ethernet Communications

The SM3000 provides 10BaseT Ethernet communications as standard via a standard RJ45 connector. The SM3000 uses industry-standard protocols TCP/IP, FTP and HTTP enabling easy integration into existing PC networks.

Data File Access via FTP (File Transfer Protocol)

The SM3000 features FTP server functionality that provides high-speed access via Ethernet to data archived by the recorder.

- Using a standard web-browser or other similar FTP client, data files contained within the recorder's internal memory and removable memory card can be accessed remotely and transferred to a PC or network drive.
- 8 individual FTP users can be programmed into the SM3000. Access rights can be configured for each user specifying their access level.
- All FTP log-on activity is recorded in the audit log of the SM3000.
- Using the SM series complementary FTS (File Transfer Scheduler) software, data files from multiple recorders can be backed-up automatically to a PC or network drive for long term storage, ensuring the security of valuable process data and minimizing operator intervention.



Embedded Web Server

Contained within the SM3000 is an embedded web-server, enabling access to web pages created within the recorder. The use of HTTP (Hyper Text Transfer Protocol) enables standard web browsers to view these pages.

- The web pages show the current display of the recorder, detailed information on process signals, alarm conditions, totalizer values, an overview screen showing the status of all 36 recording channels and other key process information.
- The historical logs stored in the SM3000's internal buffer memory can be displayed in full from within the web pages.
- Operator messages can be entered via the web server enabling comments to be logged to the recorder.
- All of the information displayed on the web pages is regularly refreshed enabling them to be used as a process supervision tool.

On-line Demonstration

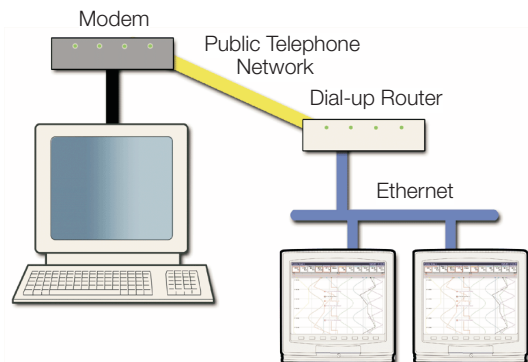
A demonstration of these features is available from an on-line recorder accessible via the internet. In the address bar of your web browser enter 'http://217.46.239.73'.

Remote Access/Monitoring

Ethernet communications can provide a link to recorders installed in remote locations. By using a dial-up router, multiple SM3000 recorders can be installed in remote locations and accessed via a public telephone network when required.

Email Notification

Using its inbuilt SMTP client the SM3000 is able to email notification of important events. Emails triggered from process alarms or other critical process events can be sent to multiple recipients. The recorder can also be programmed to email reports of the current status at specific times during the day. Status report content can be tailored to suit your specific process needs.



Specification

Operation and Configuration

Configuration

Via tactile membrane keys on front panel or
PC Configuration using removable media card

Multiple configuration files can be stored in internal (up to 5 files) or
external memory (with removable media option fitted)

Display

Thin film transistor (TFT), active-matrix, color, liquid crystal display
(LCD) with built-in backlight

Low-reflective, 31 cm (12.1 in.) diagonal display area,
480,000 pixel display*

Viewing angle — Horizontal 55 ° typ. (left side, right side)
Vertical 50 ° from below, 40 ° from above

***Note.** A small percentage of the display pixels may be either
constantly active or inactive. Max. percentage of inoperative pixels <
0.01 %.

Screensaver

Can be programmed to dim the backlight if operator keys are not
pressed for a selected period of time

Languages

English, German, French, Italian and Spanish

Dedicated operator keys

- Group select
- View select
- Menu key
- Left cursor
- Right cursor
- Up/Increment key
- Down/Decrement key
- Enter key

Vertical chart screen intervals

Selectable from 48 s to 14 days

Horizontal chart screen intervals

Selectable from 70 s to 20 days

Circular chart duration

Selectable from 9 minutes to 32 days

Chart scales

Independent primary and secondary ranges for each channel

Vertical/horizontal chart divisions

Programmable for up to 10 major and 10 minor divisions

Circular chart divisions

Programmable up to 10 divisions

Chart annotation

Alarm and operator messages may be annotated on the chart

Icons to identify the type of event, time of occurrence and tag are
displayed

Operator Views

Contents	Views Available			
	Chart	Bargraph	Digital Indicator	Process
Instantaneous values/states	✓	✓	✓	✓
Units of measure	✓	✓	✓	✓
Short tags	✓	✓	✓	✓
Long tags	—	—	—	✓
Alarm status	✓	✓	✓	✓
Alarm trip markers	—	✓	—	—
Alarm trip values	—	—	—	✓
Max./Min. markers	—	✓	—	—
Analog bargraphs	—	✓	—	—
Totalizer values & units of measure	—	—	✓	✓
Totalizer tags	—	—	—	✓
Max., min. and average batch values	—	—	—	✓
Graphical view of historical data	✓	—	—	—

SM3000

Multipoint videographic recorder

Security

Configuration security

Password protection	Access to configuration is allowed only after the user has entered a password
Internal switch protection	Access to configuration is allowed only after a hardware switch has been set. This switch is situated behind a tamper evident seal

Setup security

Configuration	Can be configured for password protection or free access to setup levels
---------------	--

Users

Number of users	Up to 15
Username	Up to 20 characters, Usernames are unique, i.e. names cannot be repeated
Access privileges	Setup access — Yes/No Electronic signature access — Yes/No Configuration access — None/load file only/limited/full
Passwords	Up to 20 characters A minimum required password length of 4 to 20 characters can be configured and a password expiry time can be applied to eliminate password ageing
Password failure limit	Configurable for 1 to 10 consecutive occasions or 'infinite' A user is deactivated if a wrong password is entered repeatedly
Deactivation of inactive users	Can be disabled or configured for 7, 14, 30, 60, 90, 180 or 360 days of inactivity Users are deactivated (by removal of access privileges) after a period of inactivity

Electronic signature

Protection	Only accessible to users with electronic signature access privileges Access requires a valid username and password
Function	Provides an electronic equivalent to the signing of a conventional paper chart Enables operator to securely approve recorded data
Content	Date/Time, operator ID and operator defined 20-character message are stored in the alarm/event log and can be displayed on the chart

Standard Functionality

Operator Messages

Number

- 24 configurable messages of up to 20 characters each
- 1 operator defined message of up to 20 characters

Trigger

- Via front panel or digital signals

Recording in alarm/event log

- Can be enabled or disabled on configuration

Process Alarms

Number

- 144 (4 per recording channel)

Update rate

- Up to 12 alarms processed every 100 ms, e.g. with 36 alarms enabled each alarm is updated once every 300 ms.

Types

- High/low: process, latch & annunciator, delayed process
- Rate: fast/slow

Tag

- 20-characters tag for each alarm

Hysteresis

- Programmable value and time hysteresis 1 to 9999 s

Alarm enable

- Allows alarm to be enabled/disabled via a digital input

Alarm log enable

- Recording of alarm state changes in the alarm/event log can be enabled/disabled for each alarm

Acknowledgement

- Via front panel or digital signals

Real-time Alarms

Number

- 12

Programmable

- Day of the week, 1st of month, start and duration times

Totalizer

Number

72 (2 per recording channel) 10-digit totals

Type

Analog or digital, batch and secure totals

Statistical calculations

Average, maximum, minimum (for analog signals)

Date and time of max. and min. values

Update rate

Up to 4 totalizers processed every 100 ms, e.g. with 12 totalizers enabled each total is updated once every 300 ms.

Custom Linearization

Number

4

Number of breakpoints

20 per linearizer

Number of Channels v. Number of Groups

Groups	Channels per Group
1, 2, 3	Up to 12
4	Up to 9
5	Up to 7
6	Up to 6

Recording Duration

Approximate duration calculated for continuous recording of 12 channels of analog data (for 24 channels divide by 2, for 6 channels multiply by 2 etc.)

Sample Rate	1 s	10 s	40 s	60 s	120 s	480 s
Internal Flash buffer memory	1½ days	27½ days	3½ months	5½ months	11 months	3½ years

Sample Rate	1 s	10 s	40 s	60 s	120 s	480 s
512 Mb Compact Flash	8 months	6 years	26 years	40 years	79 years	319 years
1 Gb Compact Flash	1 year	13 years	52 years	77 years	155 years	623 years

Recording — to Internal Memory

Data Channels

Internal buffer memory

8 Mb Flash memory provides storage for 2.9 million samples

Oldest data is automatically overwritten by new data when memory is full

Data integrity checks

Checksum for each block of data samples

48-bit code for error detection/correction built-in

Independent process groups

6

No. of recording channels

36

Sources

Analog inputs, Modbus input, any digital signal

Filters

Programmable for each channel to allow recording of instantaneous values, average, max., min. and max. & min. value over sample time

Primary/secondary sample rates

Programmable from 0.1 s to 12 hours for each process group

Primary/secondary sample rate selection

Via any digital signal or from password protected menu

Recording start/stop control

Via any digital signal or from password protected menu

SM3000

Multipoint videographic recorder

Historical Logs

Types

Alarm/Event, Totalizer and Audit logs

No. of records in each historical log

Up to 200 in internal memory

Oldest data is automatically overwritten by new data when log is full

Historical Logs

Log Type	Alarm/Event Log		Totalizer Log		Audit Log	
Information Recorded in Logs	Log Entry Events					
	In Log	On Screen	In Log	On Screen	In Log	On Screen
Date & time of event	✓	✓	✓	✓	✓	✓
Type of event	✓	✓	✓	✓	✓	✓
Tag	✓	✓	✓	✓	—	—
Source tag	✓	—	✓	—	—	—
Alarm trip value & units of measure	✓	—	—	—	—	—
Alarm trip	✓	✓	—	—	—	—
Alarm acknowledgement state	✓	✓	—	—	—	—
Operator ID	✓	—	—	—	✓	✓
Description	—	—	—	—	✓	✓
Batch total and units of measurement	—	—	✓	✓	—	—
Max., Min. and average values plus units	—	—	✓	✓	—	—
Secure total	—	—	✓	—	—	—
Time & date of min./max. values	—	—	✓	✓	—	—

Archiving — To Memory Card

File types that can be saved to removable media

Recorded data for each channel
Alarm event log for each group
Totalizer log for each group
Audit log
Configuration

File Structure

Binary encoded with built-in data integrity checks

Automatic updating of archive files

At regular time intervals according to the sample rate
When a media card is inserted

Data verification

Carried out automatically on all writes to removable-media files

Card compatibility

ABB recorders comply with approved industry standards for memory cards and ABB has fully tested and recommend the use of SanDisk Standard Grade or Ultra II memory cards. Other brands may not be fully compatible with this device and therefore may not function correctly

Card size

Cards up to 4 Gb capacity may be used

Analog Input Modules

General

Number of inputs

6 per board, max. of 36 inputs

Input types

Milliamps, millivolts, voltage, resistance, THC, RTD, digital input*

* Digital input is not available on high specification analog input modules

Digital input types

Type Volt-free contact

Minimum pulse duration 1 s

Thermocouple types

B, E, J, K, L, N, R, S, T

Resistance thermometer

PT100

Other linearizations

\sqrt{x} , $x^{3/2}$, $x^{5/2}$, custom linearization

Digital filter

Programmable 0 to 60 s

Display range

—999 to 9999

Common mode noise rejection

> 120 dB at 50/60 Hz with 300 Ω imbalance resistance

Normal (series) mode noise rejection

> 60 dB at 50/60 Hz

CJC rejection ratio

0.05 $^{\circ}\text{C}/^{\circ}\text{C}$

Sensor break protection

Programmable as upscale or downscale

Temperature stability

0.02 $\%/^{\circ}\text{C}$ or 2 $\mu\text{V}/^{\circ}\text{C}$

Long term drift

< 0.2 % of reading or 20 μV annually

Input impedance

> 10 M Ω (millivolts inputs)

500 k Ω (voltage inputs) externally mounted divider

10 Ω (mA inputs) externally mounted on terminals*

* Hart transmitters require a minimum 250 Ω loop impedance. A 250 Ω shunt resistor can be used together with the voltage divider board (GR2000/0375) to meet this requirement. In such cases the input should be programmed for 1 to 5 V.

Analog to digital converter resolution

16 bit

Standard/High Specification Analog Input Modules

Linear Inputs	Standard Analog Input	High Specification Analog Input	Accuracy (% of reading)
Millivolts Milliamps Volts Resistance Ω	0 to 2000 mV 0 to 50 mA 0 to +20 V* 0 to 5000 Ω	—1000 to +1000 mV —100 to +100 mA —50 to +50 V* 0 to 2000 Ω	0.1 % or $\pm 10 \mu\text{V}$ 0.2 % or $\pm 2 \mu\text{A}$ 0.2 % or $\pm 10 \text{ mV}$ 0.2 % or $\pm 0.08 \Omega$
Sample Interval	100 ms per sample (2 modules are processed in parallel) gives worst case update times as follows: 600 ms for 6 or 12 channels — mV, mA, voltage 800 ms for 6 or 12 channels — THC 1100 ms for 6 or 12 channels — resistance, RTD	100 ms per sample (2 modules are processed in parallel) gives worst case update times as follows: 100 ms for 6 or 12 channels — all input types	
Input Isolation	35 V DC channel-to-channel	500 V DC channel-to-channel	
Isolation from Rest of Instrument	Galvanically isolated to 500 V DC		Galvanically isolated to 500 V DC

*Requires external voltage divider board Part No. GR2000/0375

Analog Input Types

Thermocouple	Maximum Range °C	Maximum Range °F	Accuracy (% of reading)
B	−18 to 1800	0 to 3270	0.1 % or ± 2 °C (3.6 °F) (above 200 °C [392 °F])
E	−100 to 900	−140 to 1650	0.1 % or ± 0.5 °C (0.9 °F)
J	−100 to 900	−140 to 1650	0.1 % or ± 0.5 °C (0.9 °F)
K	−100 to 1300	−140 to 2350	0.1 % or ± 0.5 °C (0.9 °F)
L	−100 to 900	−140 to 1650	0.1 % or ± 1.5 °C (2.7 °F)
N	−200 to 1300	−325 to 2350	0.1 % or ± 0.5 °C (0.9 °F)
R	−18 to 1700	0 to 3000	0.1 % or ± 1 °C (1.8 °F) (above 300 °C [540 °F])
S	−18 to 1700	0 to 3000	0.1 % or ± 1 °C (1.8 °F) (above 200 °C [392 °F])
T	−250 to 300	−400 to 550	0.1 % or ± 0.5 °C (0.9 °F)

RTD	Maximum Range °C	Maximum Range °F	Accuracy (% of reading)
PT100	−200 to 600	−325 to 1100	0.1 % or ± 0.5 °C (0.9 °F)

2-wire Transmitter Power Supply

Number

1 fitted as standard

Voltage

24 V DC

Drive

Up to 45 mA, i.e. can drive 2 loops

Ethernet

Physical medium

10BaseT

Protocols

TCP/IP, ARP, ICMP, FTP (server), HTTP, MODBUS TCP (client + server)

FTP server functions

Directory selection and listing

File upload/download

12 configurable users with full or read-only access

Web server functions

Operator screen monitoring/selection. Remote monitoring of recording channels, analog/digital signals, alarms, totalizers and archiving

SMTP client compatibility

Compatible with MS Exchange versions up to and including MS Exchange 2003

Advanced Math

Math Blocks

Type

12 equations provide ability to perform general arithmetic calculations including F_0 , mass flow (of ideal gases), relative humidity and emissions calculations

Size

40-character equation

Functions —

+, −, /, log, Ln., Exp, X^n , $\sqrt{}$, Sin, Cos, Tan, mean, rolling average, standard deviation, high/median/low select, multiplexer, absolute, relative humidity

Tags

8- and 20-character tags for each block

Update rate

1 enabled block every 100 ms

Logic Equations

Number

12

Size

11 elements each

Functions

AND, OR, NAND, NOR, XOR, NOT

Tags

20-character tag for each equation

Update rate

300 ms

SM3000

Multipoint videographic recorder

Modules

3- or 6-Relay Output Modules (max. of 4 Modules)

Number of relays

3 or 6 per module, max. of 4 modules (24 relays)

Type and rating

Relay type single-pole changeover

Voltage	250 V AC	30V DC
Current	5 A AC	5 A DC
Loading (non-inductive)	1250VA	150 Ω

Note. The total load for all relays within the instrument must not exceed 36 A.

Hybrid Module (max. of 4 Modules)

Digital I/O

Number	6 inputs and 6 outputs per card
Type	Volt-free switching inputs
Polarity	Negative, i.e. closed switch contact or 0 V = active signal
Digital input min. pulse	125 ms
Digital output voltage	5 V
Isolation	500 V from any other I/O

Analog output

Number	2 isolated
Configurable current range	0 to 20 mA
Max. load	750 Ω
Isolation	500 V DC from any other I/O
Accuracy	0.25 %

2-Wire Transmitter Power Supply Module (max. of 2 Modules)

Number

2 isolated supplies per module

Voltage

24 V DC nominal

Drive

45 mA per supply, i.e. each module can drive $2 \times 2 = 4$ loops

RS485 Serial Communications Module (Max. of 1 Module)

Number of ports

1

Connections

RS485, 2- or 4-wire

Protocol

Modbus RTU slave + master

EMC

Emissions & Immunity

Meets requirements of:

EN50081-2

EN50082-2

EN61326 for an industrial environment

Electrical

Power supply

100 to 240 V AC ± 10 % (90 min. to 264 V max.) 50/60 Hz

24 V DC ± 2.4 V (optional)

Power consumption

35 VA max.

Power interruption protection

No effect for interruptions of up to 20 ms

Maximum accepted cable size

Instrument terminal block 14 AWG (1.63 mm OD)

GR2000/0375, GR2000/0377 15 AWG (1.45 mm OD)

Safety

General safety

EN61010-1

cULus

cCSAus

Overvoltage Class III on mains, Class II on inputs and outputs

Pollution category 2

Isolation

500 V DC to earth (ground)

Environmental

Operating temperature range

0 to 50 °C (32 to 122 °F) with SmartMedia/Compact Flash

Operating humidity range

5 to 95 % RH (non-condensing)

Storage temperature range

–20 to 60 °C (–4 to 140 °F)

Front panel sealing

IP66 and NEMA4X

Rear panel sealing

(with rear cover) IP40

(without rear cover) IP20

Physical

Size

288 mm (11.34 in.) x 288 mm (11.34 in.) x 195 mm (7.68 in.) (depth behind panel)

Weight

8 kg (17.4 lb) approx. (unpacked)

Panel cutout

281 mm (11.06 in.) x 281 mm (11.06 in.)

Case material

20 % glass-filled polyester/stainless steel (grade 304)

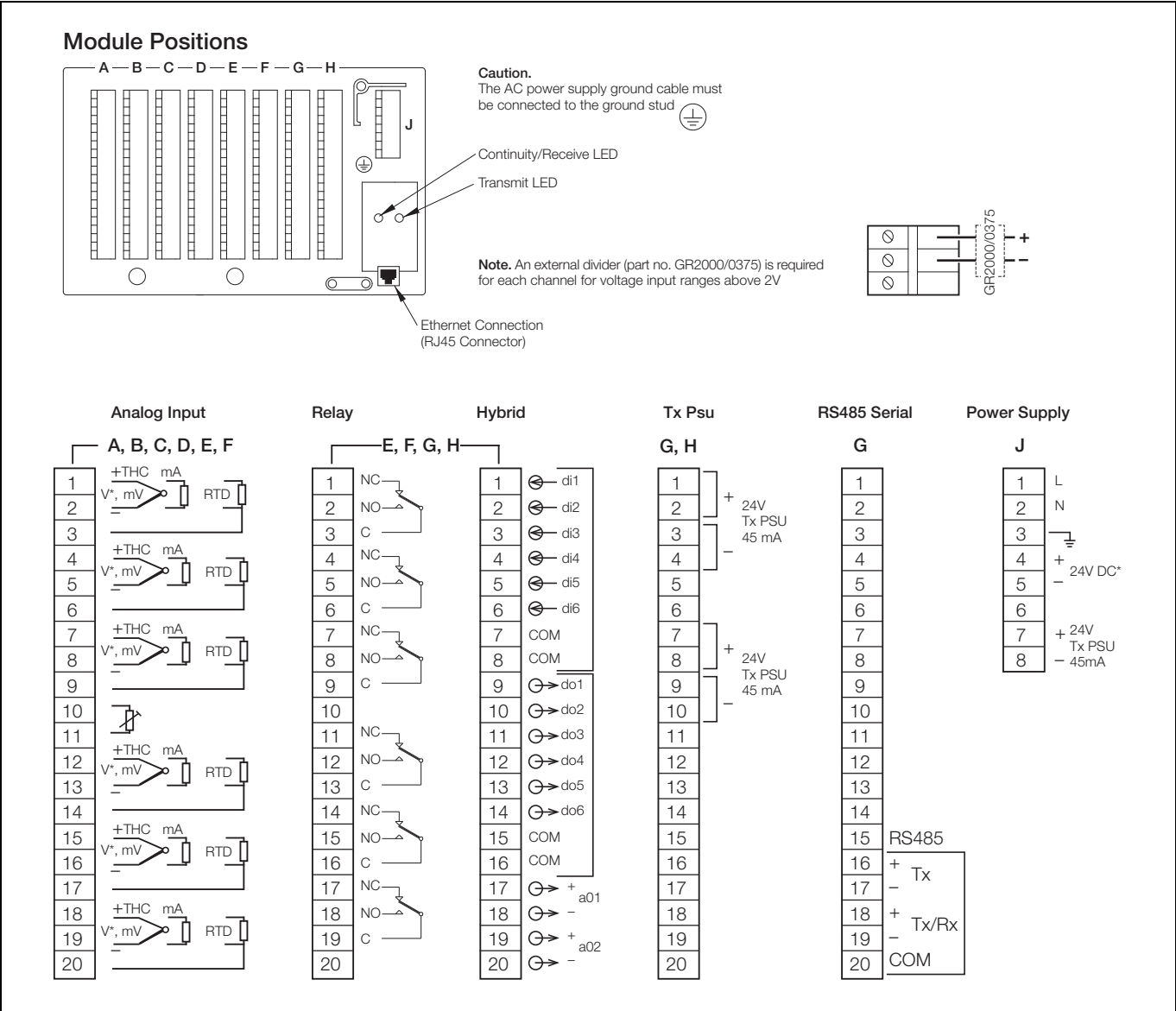
Display housing material

25 % glass-filled polyester

Screen

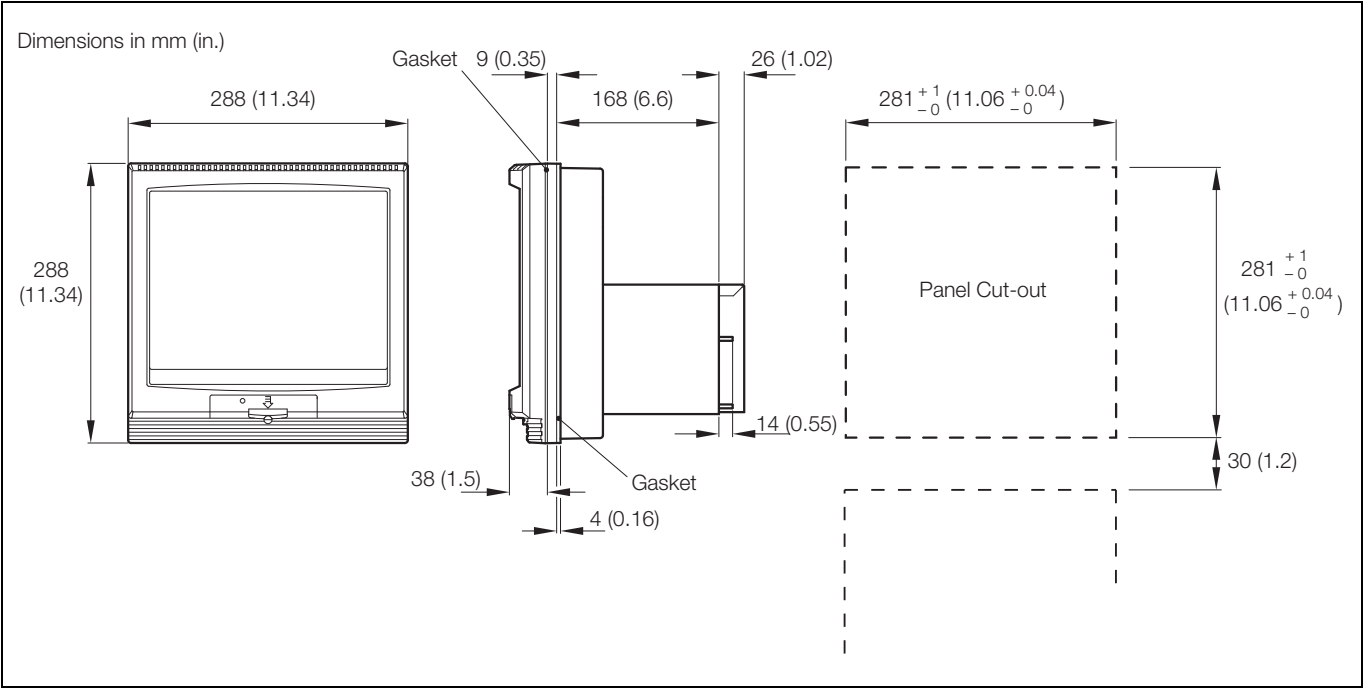
Double layer polyester coated toughened glass

Electrical Connections



*Note. 24 V DC instrument power supply must be specified when ordering.

Overall Dimensions



Standard Accessories

Included with each recorder:

- Panel-mounting Clamps
- Media-door Lock keys
- Shunt Resistors (1 per analog input)
- Compact Flash Card (only with Compact Flash Memory Card option)

Optional Accessories

Compact Flash Cards

B12568 Compact Flash Card (2 GB)

Card Reader

B12028 Compact Flash Reader (USB Interface)

Other

GR2000/0375	Voltage divider board (2 to 20 V) – per voltage input channel
GR2000/0375	Voltage divider board fitted with a 250 Ω shunt resistor
RDM500-CD	DataManager Pro software
RDM500L	DataManager Pro single user license
RDM500ML	DataManager Pro multi-user license
CD/VALSM3000	SM3000 validation package template
ENG/REC	After-sales engineered configuration service

Acknowledgements and Trademarks

Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries

Modbus is a registered trademark of the Modbus-IDA organization

SM3000

Multipoint videographic recorder

Ordering Information

Multipoint Videographic Recorder		SM30	XX	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XXX
Analog Inputs																				
None		00																		
6 inputs		06																		
12 inputs		12																		
18 inputs		18																		
24 inputs		24																		
30 inputs		30																		
36 inputs		36																		
Universal Inputs																				
Standard				S																
High Specification				H																
Build Option																				
Standard																				
cCSAus*																				
UL*																				
Archive Media																				
None — (8 Mb internal flash memory only)																				
Compact flash drive																				
Software Option																				
None																				
Advanced Math & Logic																				
Batch Recording																				
Advanced Math & Logic & Batch Recording																				
Option Modules																				
Position A Reserved for analog inputs																				
Position B Reserved for analog inputs																				
Position C Reserved for analog inputs																				
Position D Reserved for analog inputs																				
Position E None (only option available if 30 or more analog inputs or a 24 V DC powered instrument is specified)																				
3 relays																				
6 relays																				
Hybrid																				
Position F None (only option available if 36 analog inputs or a 24 V DC powered instrument is specified)																				
3 relays																				
6 relays																				
Hybrid																				
Position G None																				
3 relays																				
6 relays																				
Hybrid																				
2-wire transmitter power supply																				
RS485 serial communications																				
Position H None																				
3 relays																				
6 relays																				
Hybrid																				
2-wire transmitter power supply																				
Mechanical Build																				
Without rear terminal cover																				
With rear terminal cover																				
Power Supply																				
100 to 240 V AC $\pm 10\%$ (90 min. to 264 V max.) 50/60 Hz																				
24 V DC																				
Language																				
English																				
French																				
German																				
Italian																				
Spanish																				
Special Features																				
Standard																				
Custom configuration (customer to complete and supply SM3000 custom configuration sheet – INF08/035)																				
GAMP validation compatible instrument**																				
Engineered configuration (customer to supply configuration details required)																				

* Not available in conjunction with 24 V DC power supply

** Instrument supplied preconfigured to customer's requirements, together with calibration and conformity certificates. Configuration must be supplied using custom configuration sheet – [INF08/035](#)

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3KXR103001R1001



Sales



Service



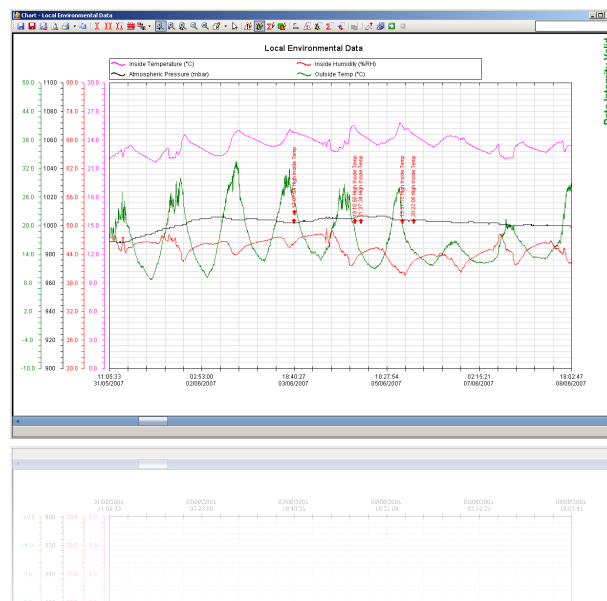
Software

DataManager Pro RDM500

Advanced data review software

Complete management of ScreenMaster data archives

Measurement made easy



Guaranteed data security

- Automatic validation of data files

Long term data management

- Database storage and management of process data

Information at your fingertips

- Automatic data collection direct from multiple recorders via Ethernet

Secure data distribution

- Create packages of specific process data

DataManager Pro

DataManager Pro is an advanced process data management and analysis application used to store and review data archived by ScreenMaster videographic recorders. Stored data can be displayed in both tabular and graphical format and analyzed using the extensive array of tools provided. A ScreenMaster's archived data can be transferred to DataManager Pro either manually, via the ScreenMaster's memory card, or automatically, via Ethernet communications. DataManager Pro provides automatic, secure, long-term process data storage and enables data to be retrieved quickly when required.

DataManager Pro RDM500

Advanced data review software

Data analysis

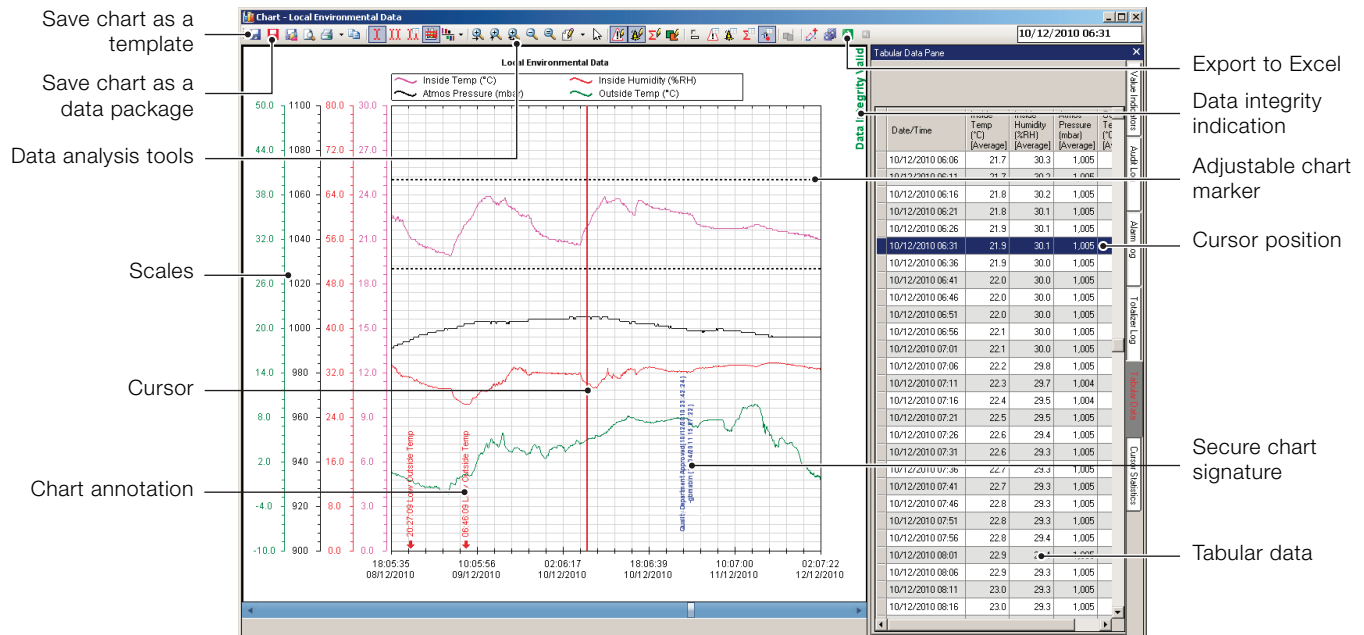


Fig. 1: DataManager Pro chart view

DataManager Pro enables detailed analysis of process data by presenting the data in graphical chart format.

- Data recorded on different ScreenMasters can be combined on a single chart and analyzed side-by-side.
- Once a chart has been configured to display data in the required format, it can be saved as a template. When the template is reopened, the same chart format is presented, complete with any new process data imported to DataManager Pro's database.
- A cursor can be positioned on the chart to display the exact values of the traces at the cursor's position. A second cursor can also be placed on the chart; statistical information on the data between the 2 cursors is then displayed.
- During data analysis, signatures and comments can be added securely to the chart – ideal for approval or verification purposes.

Data management

At the heart of DataManager Pro is a secure database.

- Data from any number of ScreenMaster recorders can be imported manually, via a recorder's memory card, or automatically, via Ethernet communications.
- Once imported into the database, data is conveniently and securely held for long-term storage.
- When required, data can be displayed quickly and easily by either opening a predefined chart template or selecting the channels and time period required.

Batch data

A batch record recorded by a ScreenMaster can be instantly analyzed using DataManager Pro.

- Powerful search functionality enables batch records to be located easily and displayed regardless of when, or on which instrument, it was recorded.
- Batches with common attributes (for example, date of manufacture, product type or product line) can be identified easily and charts drawn for side-by-side comparison.
- Batch information entered by the operator at the time the batch was recorded is presented clearly at the base of the chart.

Data distribution

Data from DataManager Pro's database can be exported for use and analysis elsewhere.

- Secure data packages (that maintain the original data file integrity) can be created and passed to another DataManager Pro user for analysis. This feature is ideal for ScreenMaster users who process third-party products as it enables the product owner to be given a package of data relating to the processing of their product and analyze it using their own copy of DataManager Pro. A free-of-charge (unlicensed) version of DataManager Pro is all that is required for such analysis.
- Data can also be exported in Excel spreadsheet format.

Recorder networking

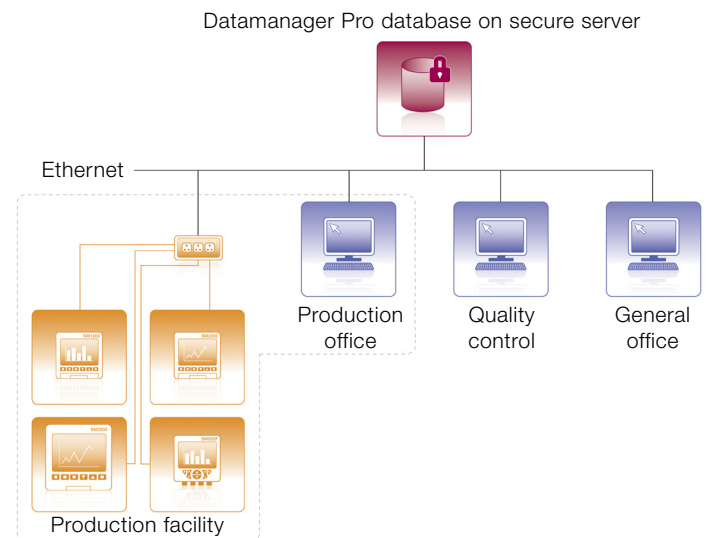


Fig. 2: Network diagram

When connected to ScreenMaster recorders via an Ethernet network, DataManager Pro provides excellent security for, and ease of access to, process data.

- DataManager Pro's database can be located on a secure, backed-up network drive:
 - enhances data security
- DataManager Pro can import new data automatically from any number of ScreenMaster recorders on a scheduled basis:
 - ensures the latest process data is always available for review
- When located on a shared network drive, data from DataManager Pro's database is accessible to multiple users:
 - company-wide accessibility to process data speeds up the review and approval process and increases productivity
- DataManager Pro can synchronize the clocks of multiple ScreenMaster recorders using Ethernet communications:
 - enhances the accuracy of side-by-side comparison of process data

Functionality

DataManager Pro can be used either licensed or unlicensed; when used unlicensed, it offers basic functionality only. To enable full functionality, the software must be licensed. Table 1 details the features available in each version.

After the first installation DataManager Pro will work in licensed (full functionality) mode for a 30 day evaluation period.

Feature	Unlicensed (Basic functionality)	Licensed (Full functionality)
Manual data import	X	X
Scheduled automatic data import via ethernet (FTS)		X
Database data management	X	X
Data quick view	X	X
Chart display	X	X
Tabular display	X	X
Log files display	X	X
Chart printing	X	X
Predefined chart templates		X
Chart signature		X
Create chart package		X
Display chart package	X	X
Export to Excel		X
Batch data search and access	X	X

Table 1: Licensed / unlicensed features

Minimum system requirements

- 2 GHz Intel™ Pentium™ Dual Core processor or equivalent with 1 GB of RAM
- Windows 7™ SP2 (32 or 64 bit)
or Windows 8.1™ Pro (32 or 64 bit) operating systems
- 50 MB of free hard disk space
- 1024 x 768 minimum screen resolution

Compatible products

Datamaner Pro can be used to analyze data from the following products:

- SM series videographic recorders *
- C1300 circular chart recorder
- Aztec series analyzers
- Navigator series analyzers

* Recorders manufactured from 2003 onwards

Ordering information

DataManager Pro is available for download from

ABB.com/recorders

- Single user license – part number RDM500L**
- Multi-user site licence – part number RDM500ML***
- Software CD – part number RDM500CD

**The purchase of a single-user license authorizes the installation and use of DataManager Pro on a single PC.

***The purchase of a multi-user site license authorizes the installation and use of DataManager Pro on multiple PCs at a single (geographic) site.

A geographic site is defined as a site covered by a single postal address.

Acknowledgements

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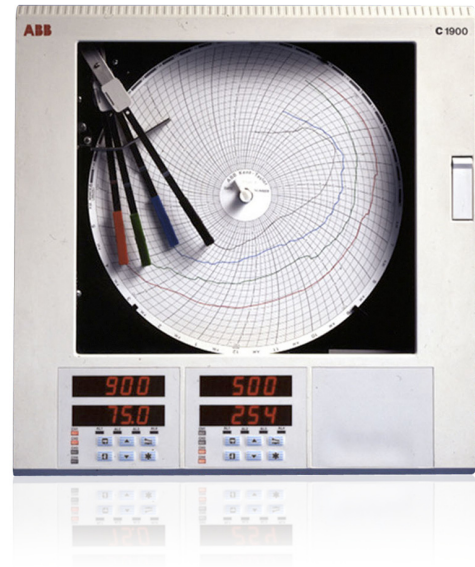
Sales



Software

C1900 Series Circular Chart Recorder

C1900 – a rugged, reliable recorder with the full capability to meet your needs



1 to 4 pen recording

- full application flexibility

NEMA 4X/IP66 construction

- hose-down protection

Analog, relay outputs, digital inputs and transmitter power supply as standard

- range of inputs and outputs built-in

Multiple indicator panels

- continuous display of all signal values

0.1% measurement accuracy

- precise process information

High noise immunity

- robust, dependable operation

RS485 Modbus serial communications

- open system compatibility

Totalizers and math functions built-in

- fully integrated solutions

C1900

The C1900 is a fully programmable circular chart recorder for up to four process signals. The C1900's straightforward operator controls and robust construction make it suitable for a variety of industrial environments. Excellent standard facilities are complemented by a powerful range of options to give the flexibility to match your application.

Comprehensive Process Information

The C1900 lets you see the status of your process at a glance: high visibility 6-digit displays provide a clear indication of up to four process values simultaneously and active alarms are signalled by flashing LEDs below the main display.

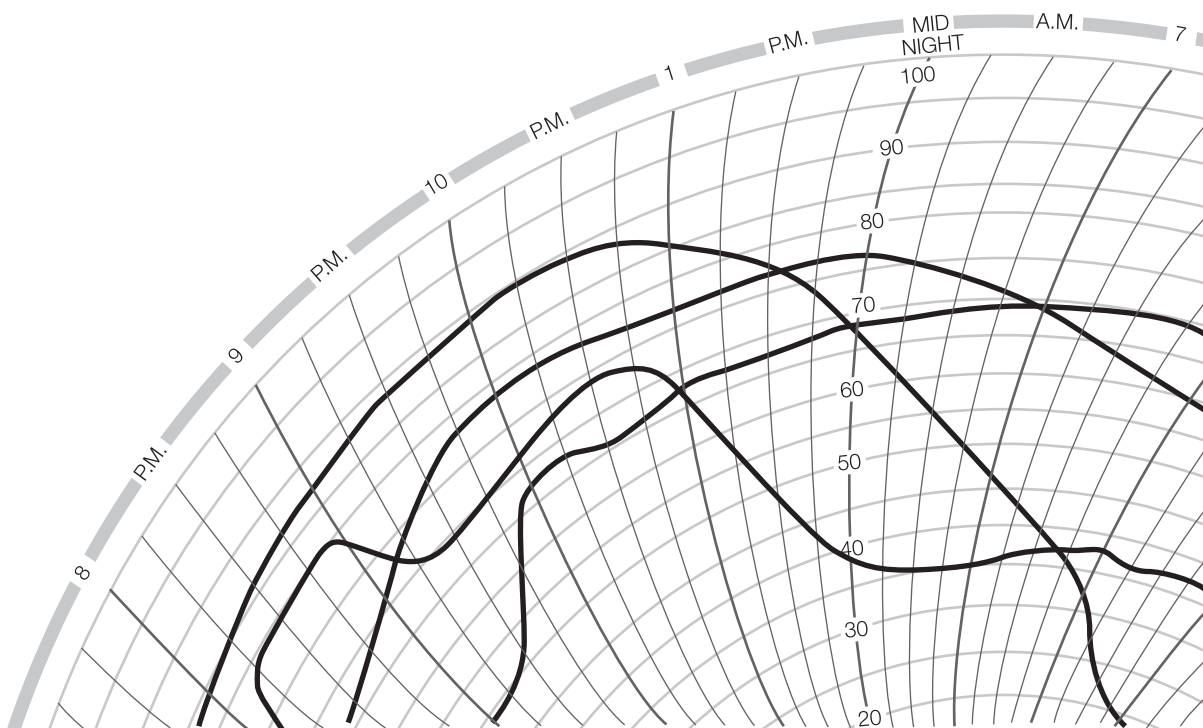


The chart is easily set up to show the information you need in the way you want. Pen ranges are individually set to give the best resolution for each signal; the time per revolution can be selected between 1 hour and 32 days. Additionally a true time event pen facility enables one pen to be set up as a 3-position event marker on the same time line as Pen 1.

Simple Operation



The clearly-labelled tactile keypad gives direct access for operator adjustments and configuration programming, without the need to open the recorder's door. Clear text prompts on the digital displays guide the user around the various menus. A password-protected security system prevents unauthorized access to configuration adjustment menus.



Flexibility to Solve Problems

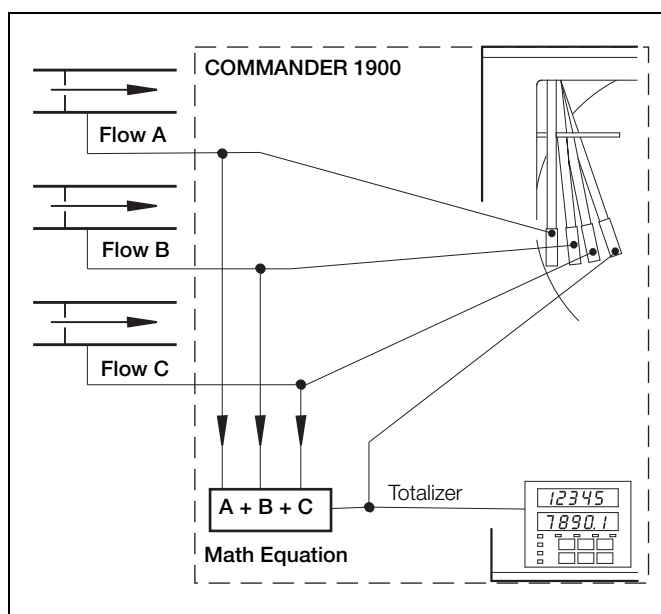
The C1900 offers seamless integration of loop functionality to solve process problems, eliminating the need for auxiliary devices.

Totalizers, Math and Logic

Integrating fluid flow to calculate total volume is performed by the built-in totalizers available for each channel. Relays can be assigned to increment or reset external counters to match the recorder's totalizer values.

User configurable math functions, mass flow calculations and RH tables are all fully supported.

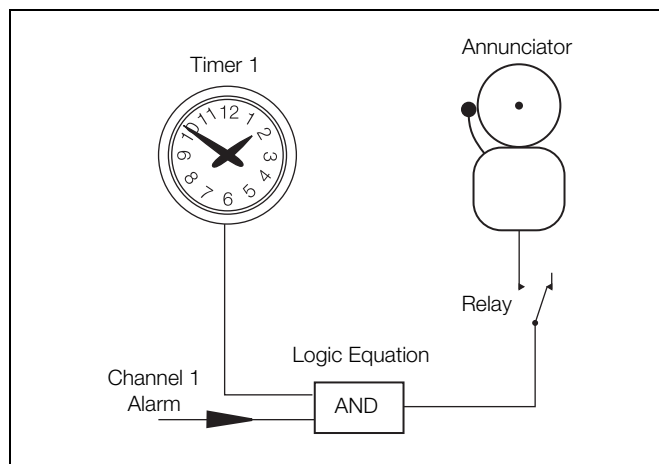
Logic capability allows interlocking and integration of discrete and continuous functions to solve a wide range of process problems.



Summation of Three Flows

Timers and Clock

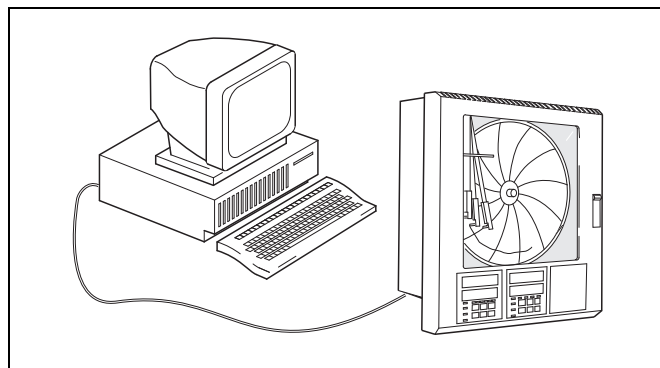
The C1900 offers two event timers driven by the recorder's real-time clock. The timers can be configured to operate relays, start/stop the chart or trigger other actions within the recorder.



Alarm annunciation enabled during night hours only

Modbus RS485 Communications

Communications with PCs or PLCs are achieved via the RS485 serial communications link, enabling the C1900 to serve as the front end of plant-wide data acquisition systems. Using Modbus RTU protocol all process inputs and other variables can be continuously read by a host PC running any of a wide variety of standard SCADA packages.



Built to Meet Your Needs

The C1900's modular architecture gives rise to a high level of hardware choice: up to five I/O modules can be added to the basic instrument.

The standard input/output module supplied with every pen comes complete with a fully isolated analog input, a relay output, transmitter power supply, isolated analog retransmission and two digital inputs.

Further input and output capability is provided by a range of plug-in modules:

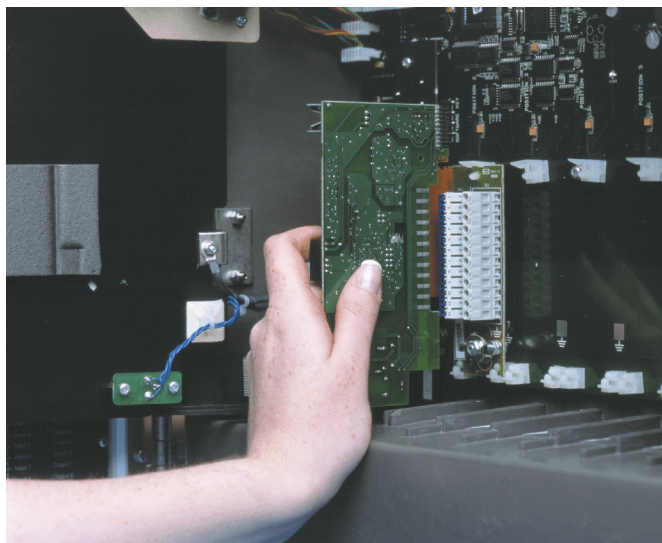
- **Analog input and relay** – for use with math functions
- **Four relays** – channel alarm outputs
- **Eight digital inputs** – linked using logic equations
- **Eight digital outputs** – TTL level alarm outputs
- **Modbus RS485 communications** – interfaces with PCs

Expandable for the Future

The C1900 may be quickly upgraded to meet your changing process requirements.

Additional recording channels, math capability or input and output functions can be retrofitted on-site using plug-in cards and easily fitted pen arms. Input calibration data is stored on each card, allowing quick changes to input cards without the need for recalibration.

Changes to input sensors or recording procedures are accommodated by reconfiguration using the main keypad.



Designed to Survive

NEMA 4X protection ensures the C1900 can survive in the harshest environments and makes the recorder ideal for use in panels which are regularly hosed down. The tough, acid-resistant case and secure cable-entry glands maintain the NEMA 4X rating for wall-mounted or pipe-mounted instruments.

Noise Immunity

Recording accuracy is maintained in noisy industrial environments due to the advanced EMC shielding within the recorder. The power supply has been designed to give excellent protection from power spikes and brownouts and all configuration and status information is held in nonvolatile memory to ensure rapid recovery after a power failure.

Minimal Maintenance

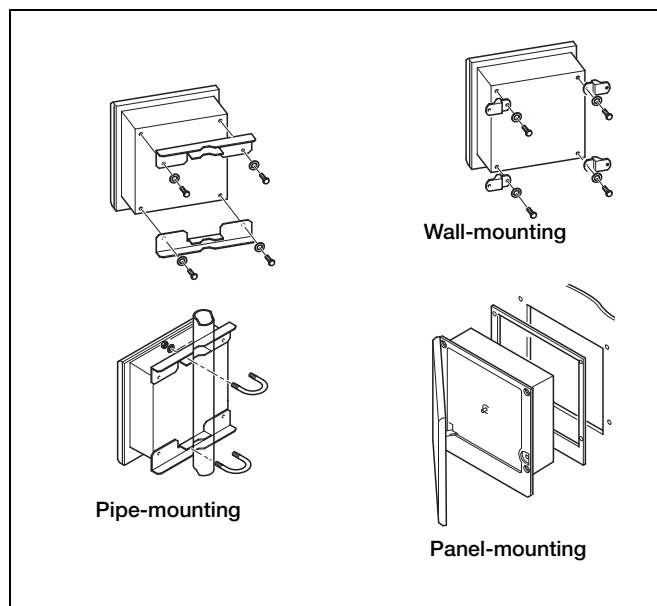
Excellent long-term stability keeps recalibration to a minimum, cutting the costs of ownership. User-selectable chart speeds and long-life pens combine to limit usage of consumables.

Built-in Quality

The C1900 is designed, manufactured and tested to the highest quality standards, including ISO 9001.

Easy to Install

A choice of mounting options enables simple installation of the recorder in a panel, on a wall or on a pipe. Detachable terminal blocks allow for trouble-free connection of input and output wiring, with mains isolation provided by a power switch within the instrument.



Summary

- 1, 2, 3 or 4 pens
- 10 in. chart size

Standard I/O with each pen includes:
Analog input, analog output, transmitter power supply, relay output and 2 digital inputs.

Specification

General	
Construction	
Size	15.23 in. (h) x 15.04 in. (w) x 5.57 in. (d) (386.8 x 382.0 x 141.5mm)
Weight	18lb (8.2kg)
Case material	Glassfiber-filled reinforced polyester
Window material	Polycarbonate
Door latch	High-compression with optional lock
Environmental	
Operational temperature range	0° to 55°C (32° to 130°F)
Operational humidity range	5 to 95%RH (non-condensing) 5 to 80%RH (chart only)
Case sealing	NEMA 4X (IP66)
Fast transients	IEC 801-4 Level 3
Installation	
Mounting options	Panel, wall or pipe
Terminal type	Screw
Wire size (max.)	14 AWG (I/O), 12 AWG (power)
Operation and Configuration	
Programming method	Via front panel keys
Security	Password-protected menus
Safety	
General safety	IEC348
Dielectric	500V DC (channel/channel) 2kV DC (channel/ground)
Memory protection	Nonvolatile EEPROM
Approvals	CSA UL CSA/FM Class 1 Div. 2 CE
Power Supply	
Voltage	100 to 240V AC ±10% (90V min. to 264V max. AC), 50/60Hz
Consumption	<30VA (typical for full spec. unit)
Line interruption	Up to 60ms

Process Inputs and Outputs

General

Noise Rejection	Common mode >120dB at 50/60Hz Normal (series) mode >60dB at 50/60Hz
CJC rejection ratio	<0.05°C/°C
Sensor break protection	Upscale or downscale drive
Out of range detection	0 to 100% of engineering span
Temperature stability	<0.02% of reading/°C or 1µV/°C
Long-term drift	<0.01% of reading 10µV annually
Input impedance	>10MΩ (mV and V inputs) 39Ω (mA inputs)

Analog Inputs

Signal types	mV, V, mA, Ω
Thermocouple types	B, E, J, K, N, R, S, T
Resistance Thermometer	Pt100
Other linearizations	$x^{1/2}$, $x^{3/2}$, $x^{5/2}$, linear
Sample interval	250ms per channel
Dielectric	500V DC channel/channel
Digital Filter	0 to 60s programmable

2-Wire Transmitter Power Supply

Number	1 per channel
Voltage	24V DC nominal
Drive	Up to 25mA
Isolation	500V DC channel/channel

Analog Outputs

Type	4 to 20mA
Accuracy	± 0.1%
Maximum load	750Ω
Dielectric	500V DC

Relay Outputs

Type	SPDT
Rating (with non-inductive load)	5A at 115/230V AC

Digital Inputs

Type	TTL or volt-free
Minimum pulse	250ms
Dielectric	50V DC between modules, no isolation within module

Digital Outputs

Type	5V TTL
Rating	5mA per output
Dielectric	500V DC between modules, no isolation within module

Serial Communications

Connections	RS485, 4-wire
Protocol	Modbus RTU

Analog Input Performance

Type	Range Lo	Range Hi	Min. Span	Accuracy
mV	0	150	5	±0.1% reading or 10µV
V	0	5	0.1	±0.1% reading or 20mV
mA	0	50	1	±0.2% reading or 0.2µA
Ohms (high)	0	750	20	±0.2% reading or 0.1Ω
Ohms (low)	0	10k	400	±0.5% reading or 10Ω

Type	°C		°F		Accuracy (excl. CJC)
	Range Lo	Range Hi	Range Lo	Range Hi	
B	-18	1800	0	3270	± 2 °C (above 200 °C) (3.6 °F above 434 °F)
E	-100	900	-140	1650	± 0.5 °C (± 0.9 °F)
J	-100	900	-140	1650	± 0.5 °C (± 0.9 °F)
K	-100	1300	-140	2350	± 0.5 °C (± 0.9 °F)
N	-200	1300	-325	2350	± 0.5 °C (± 0.9 °F)
R	-18	1700	0	3000	± 1 °C (above 300 °C) (1.8 °F above 572 °F)
S	-18	1700	0	3000	± 1 °C (above 200 °C) 1.8 °F above 572 °F)
T	-250	300	-400	550	± 0.5 °C (± 0.9 °F)
PT100	-200	600	-325	1100	± 0.5 °C (± 0.9 °F)

Recording System

Pens

Number	1, 2, 3, or 4 (red, blue, green, black)
Response	7 seconds (full scale)
Resolution	0.1% steps
Pen lift	Motor-driven, with optional auto-drop

Event Pens

Standard	3-position event recording on any channel
Real time	3-position event recording on the same time line as Pen 1

Chart

Chart size	10 in. or 105 mm
Chart speed	1 to 167 hours or 7 to 32 days per revolution
Rotation accuracy	<0.5% of rotation time

Display and Operator Panels

Displays

Number	2 (1 or 2 pens) or 4 (3 or 4 pens)
Type	6-digit red LED, 0.56 in. (14mm) high
Status indicators	Indicate channel number on display
Alarm indicators	Indicate channels with active alarms

Panel keys

Function	Programming access, increment/decrement, pen lift and user-defined function key.
----------	--

Alarms and Logic

Alarms

Number	4 per channel
Type	High/low process, fast/slow rate of change, time delay
Adjustments	Hysteresis, time delay

Logic Equations

Number	4
Function	OR, AND
Inputs	Alarm states, digital inputs, totalizers, logic
Outputs	Relays, digital outputs, chart stop, alarm acknowledge

Advanced Software Functions

Totalizers

Number	1 per pen
Size	99,999,999 max.
Output	External counter driver, 'wrap' pulse signal

Math

Number of equations	4
Type	+, -, x, ÷, low & high select, max., min., average, mass flow, RH

Timers

Number	2
Type	Real-time clock driven event, adjustable duration
Output	Relay, digital output, logic equation

Option Module*

Number	5 plus 1 x standard input/output module
Connection	Plug-in cards with detachable connection blocks

EMC

Design & Manufacturing Standards

CSA General Safety	Approved
UL General Safety	Approved
CSA/FM Class 1 Div. 2	Approved

Emissions and Immunity

Meets requirements of:
EN 50081-2
EN 50082-2
IEC 61326 for an Industrial Environment
CE Mark

Option Module Types

Option Module Types	I/O per module							Max. no. per instrument
	Analog I/P	Analog O/P	Trans. PSU	Relays	Digital I/P	Digital O/P	Comms.	
Standard I/O	1	1	1	1	2			3
Analog I/P + relay	1			1				5
4 relays				4				2
8 digital I/P					8			3
8 digital O/P						8		3
RS485 communications							1	1
1901J (non-upgradeable)	1							

Ordering Information

PART 1

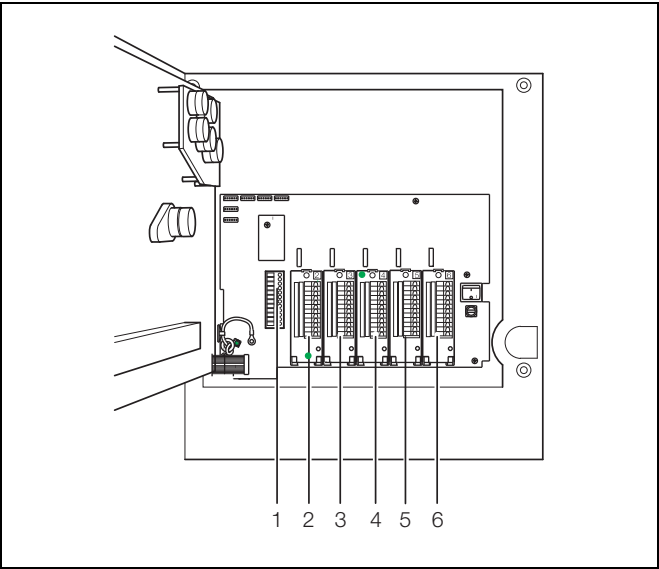
C1900 Recorder		19XX	X	X	X	X	X	X	X	X	X	X	X	XXX
Recorders *	One Pen (Red)	11												
	Two Pens (Red & Green)	12												
	Three Pens (Red, Green, Blue)	13												
	Four Pens (Red, Green, Blue, Black)	14												
Chart Type	Standard (Recorder/Controller)	J												
	KPC 105 PX and PXR type charts	K												
	Chessell Brand charts	C												
Electrical Code	Standard	A												
	CSA approval	B												
	UL approval	U												
	CSA/FM Class 1 Div. 2	F												
Option Module	None	0												
	Additional Modules – Complete PART 2	A												
Options	None	0												
	Totalizer	3												
	Totalizer, Math & Timer	B												
Door Lock	Not Fitted	1												
	Fitted	2												
Power Supply	115 V AC	1												
	230 V AC	2												
	115 V AC with On/Off Switch	4												
	230 V AC with On/Off Switch	5												
PART 2 Additional Modules		Module Type												
Module Position 2 / Channel 2 Input*		0	1	2										
Module Position 3 / Channel 3 Input*		0	1	2										
Module Position 4 / Channel 4 Input*		0	1	2	3	4	5	6						
Module Position 5		0		2	3	4	5							
Module Position 6		0	2	4	5	8								
Special Settings	Company Standard													STD
	Custom configuration (customer to complete and supply C1900R custom configuration sheet – INF08/032)													CUS
	Special													SXX
	Engineered configuration (customer to supply configuration details required)													ENG

* Each pen fitted has an associated standard Input/Output module comprising Analog Input, Analog Output, Relay, Transmitter Power Supply and Two Digital Inputs.

Additional Input/Output modules may be fitted in the unused Module Positions as required. These additional modules should be specified in PART 2 of the Ordering Information.

Accessories

Case-to-panel gasket	C1900/0149
Wall-mount kit	C1900/1712
Pipe-mount kit	C1900/0712
Pack of Red Pens	C1900/0121
Pack of Green Pens	C1900/0122
Pack of Blue Pens	C1900/0120
Pack of Black Pens	C1900/0119
Pack of Purple Pens	C1900/0123
After-sales Engineered Configuration Service	ENG/REC



Module Positions

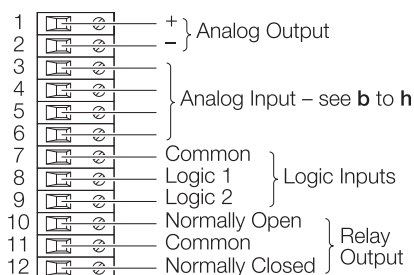
Key to Module Types

- 0 No module fitted / Pen input channel *
- 1 Standard Input/Output
- 2 Analog Input (Math Input) + Relay
- 3 Four Relays
- 4 Eight Digital Inputs
- 5 Eight Digital Outputs
- 6 True Time Event Pen (Violet)
- 8 Modbus RS485 Communications

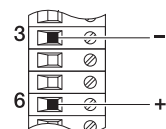
* On 2, 3 or 4 pen instruments a standard I/O module is always fitted in the corresponding module position (enter '0' in the corresponding order code field).

Example. 1 9 1 3 J A A 0 1 1 0 0 3 0 8 STD
3 pens _____
4 relays _____
Modbus RS485 Communications _____

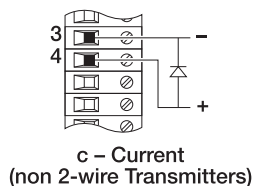
Electrical Connections



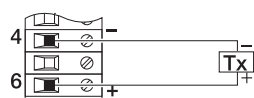
Summary of Connections



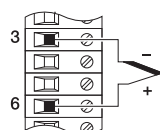
b – Voltage



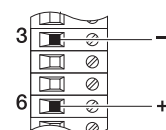
c – Current
(non 2-wire Transmitters)



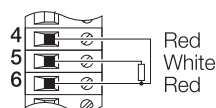
d – 2-wire Transmitter



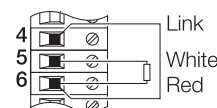
e – Thermocouple



g – Low Voltage (mV)

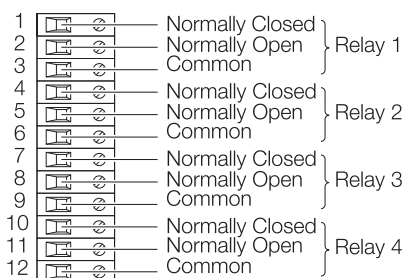


f – 3-wire RTD

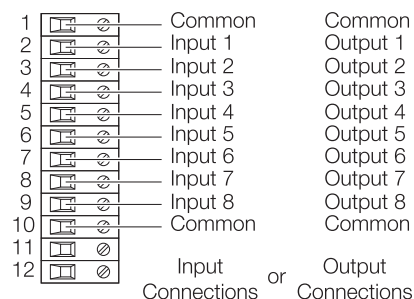


h – 2-wire RTD and Resistance

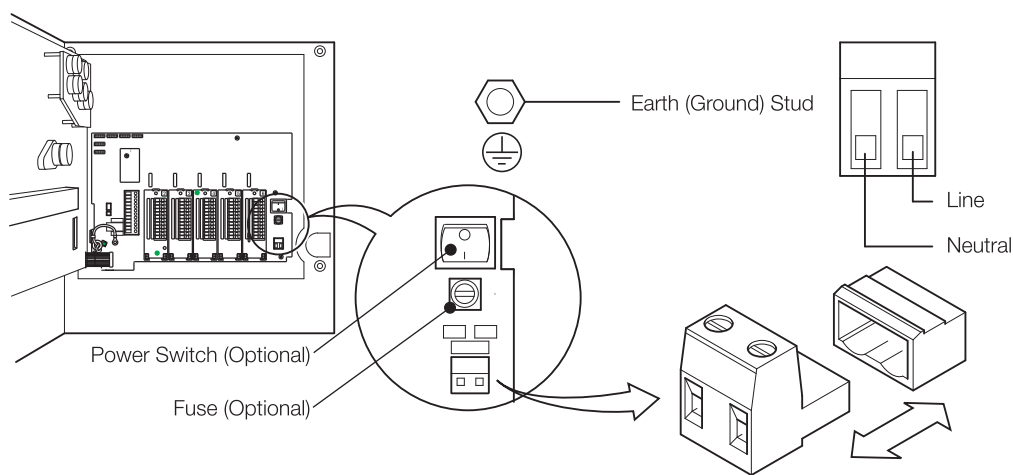
Standard Input/Output Modules



Four-Relay Output Module

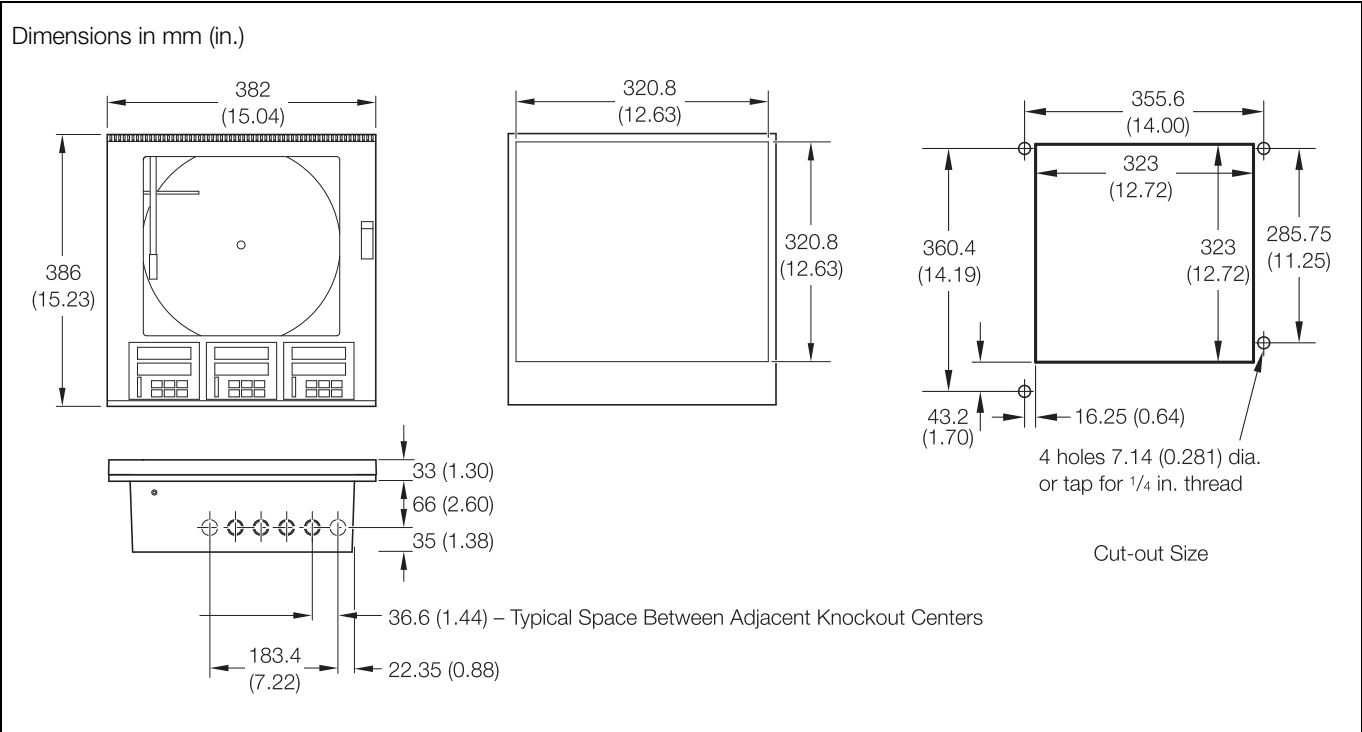


Digital Input/Output Module



Power Supply Connections

Overall Dimensions



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Service



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