ScreenMaster 1000

Videographic Recorder

Specification DataFile

- **Ideal replacement for paper recorder**
  – simple, cost-effective solution
- **Robust and convenient archive storage**
  – low cost, high reliability, SmartMedia and Compact Flash options
  – high capacity
- **Secure data recording**
  – internal Flash memory for 12 recording channels and logs
  – no battery back-up required
- **Intuitive user interface**
  – dedicated tactile operator keys and Windows™-style menus
- **Unsurpassed environmental protection**
  – hosedown to IP66/NEMA4X standards
- **Remote monitoring/access**
  – Ethernet communications, embedded web protocols/server

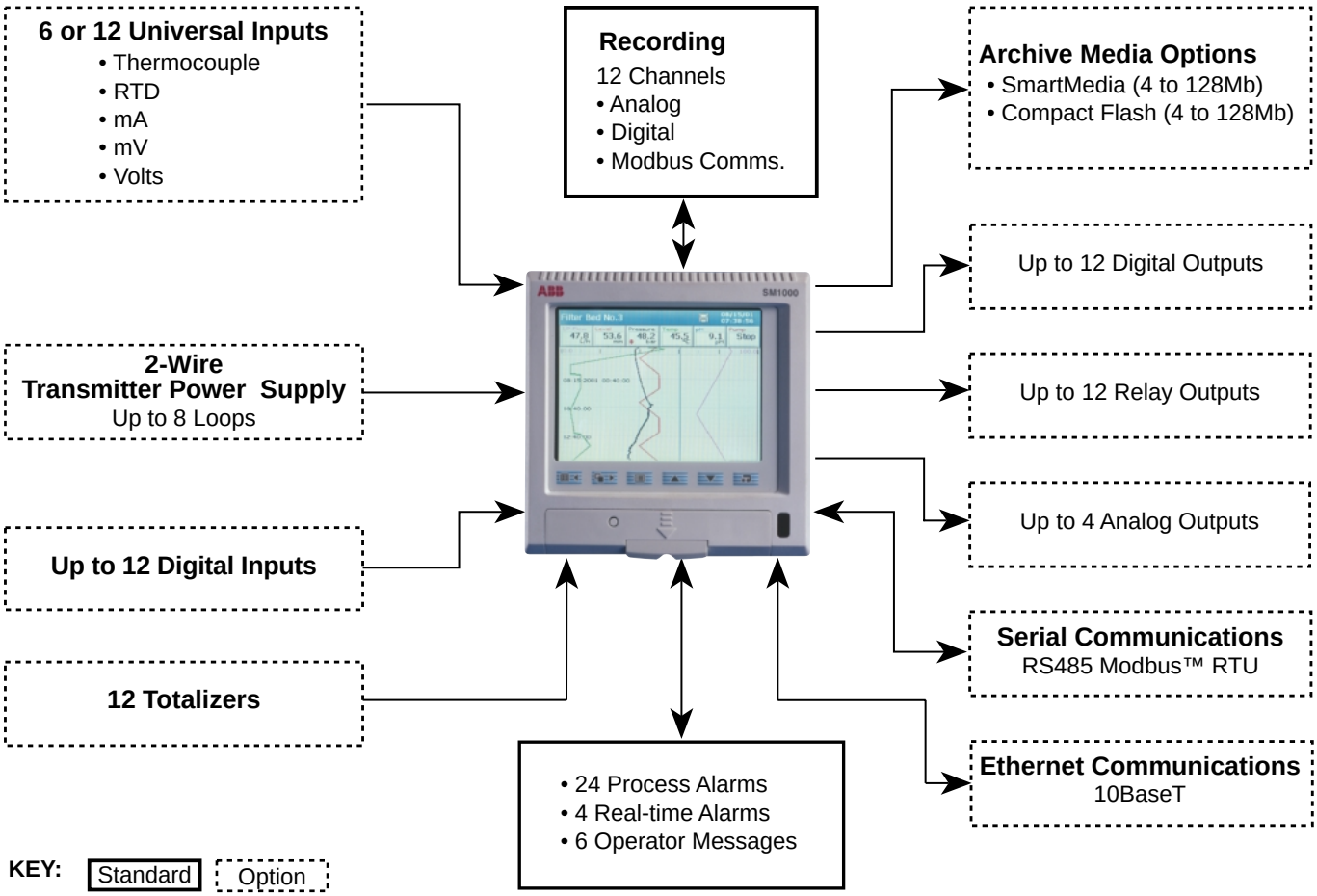
Simplicity without Compromise

The ScreenMaster 1000 is a state-of-the-art solution to recording and data storage. It provides 12 recording channels and up to 12 universal analog inputs which can be viewed in a variety of display formats: chart, bargraph, digital indicator and process summary. Historical logs are provided for recording alarms, operator and system events and totalizer values.

The ScreenMaster 1000 has onboard Flash memory for secure storage of process data. A choice of removable storage devices are available; either SmartMedia (4 to 128Mb) or Compact Flash (4 to 128Mb).

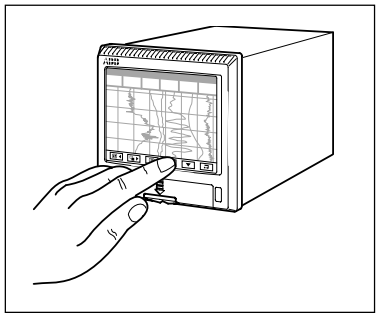
Application areas include:

- **Water treatment plants**
- **Cold storage**
- **Stack gas monitoring**
- **Environmental monitoring**
- **Autoclaves**
- **Food, Dairy & Beverage processing**
- **Furnaces**
- **Heat treatment**
- **Pulp & Paper**



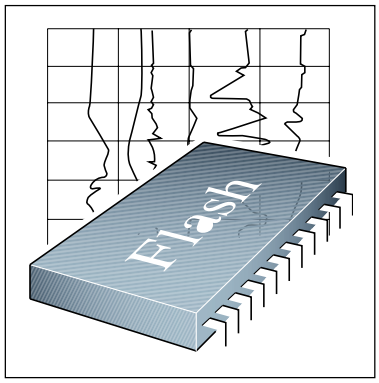
Simplicity of Use

- Six dedicated tactile keys are used for all aspects of operation and configuration of the ScreenMaster 1000.
- During everyday operation each key has a specific function ensuring simplicity of use.
- The use of a Windows-style pop-up menu and configuration screens ensures that the operation of the ScreenMaster 1000 is exceptionally easy and instantly familiar.



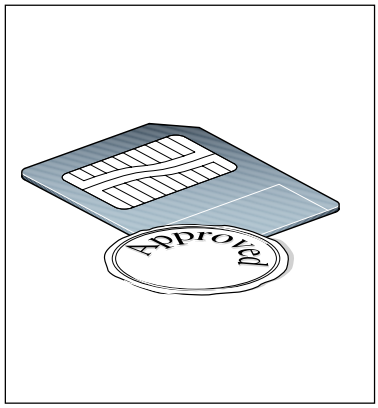
Guaranteed Data Integrity

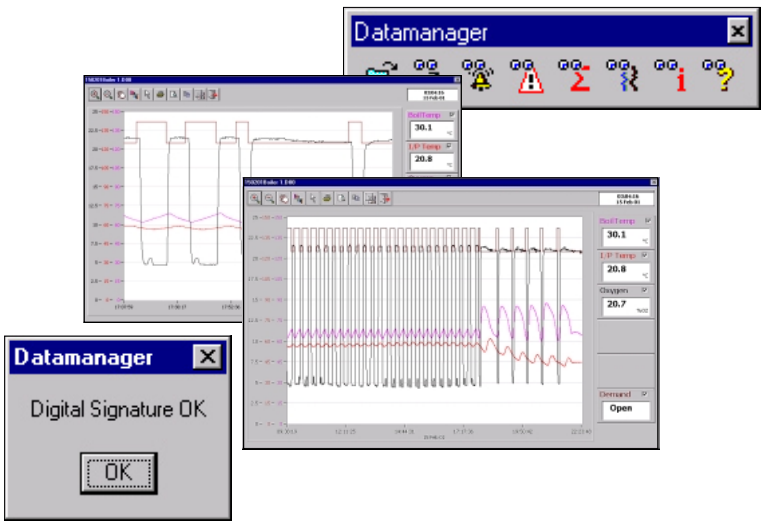
- The use of Flash memory technology ensures that the ScreenMaster 1000 is not reliant on batteries to preserve stored data during a power failure.
- In the internal memory, data is stored in small blocks with each block containing a checksum to ensure the integrity of that data.
- Internal flash memory is provided for buffering of process data. At any time the complete memory can be reviewed in the Chart View of the ScreenMaster 1000. Once this memory is full it automatically wraps-around and overwrites the oldest data, ensuring that the latest process data is always captured.
- 12 recording channels are provided, as standard, which can be used to record any analog, digital or communications (via Modbus™) signal. Two sample rates can be pre-set in the configuration of the ScreenMaster 1000; a primary and a secondary (fast or slow). Automatic switching between these two sample rates allows detailed information to be stored under specific process conditions, for example, critical process states or alarm conditions. Through the use of pre-storage filters it is possible to record the average, max./min. or instantaneous value of any analog data.



Industrial Standard, Robust, Archive Storage

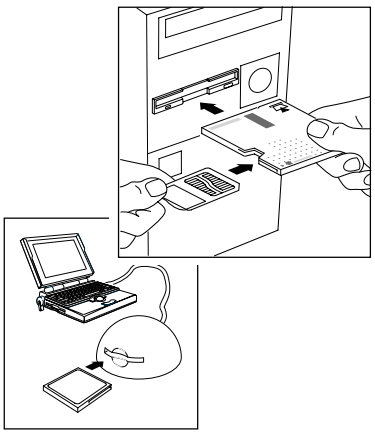
- Either SmartMedia or Compact Flash memory cards can be used for archiving purposes. The solid state nature of these devices ensures that the ScreenMaster 1000 can truly operate in ambient temperatures up to 50°C (122°F), whereas traditional electro-mechanical floppy disk drives can operate only in temperatures up to 40°C (104°F).
- Every write to the archive storage media is verified to ensure the integrity of the data.
- New archive files can be generated automatically at one of three specifiable intervals and have clearly identifiable file names comprising time, date and a user-definable 20-character ID. In addition to the analog/digital recording channels, the alarm event, totalizer (if fitted) and audit logs can also be archived to the removable media.
- A unique miniature 'finger print' is created for each archive file. This is encrypted to form a digital signature that is stored with the archived data to provide an extremely secure way of proving the validity of the data.
- A Media door lock is fitted as standard to prevent unauthorized access to the removable media.





Off-Line Review and Analysis

- All archived analog/digital data, alarm events, totalizers and audit log files are saved in comma-separated variable format and can be directly imported into standard spreadsheets for reviewing.
- To ensure that a data file has not been tampered with, it's Encrypted Digital Signature can be checked via the use of ABB's DataManager software. DataManager also provides additional analysis of process data. For further information on DataManager please refer to the Specification Sheet SS_DATMGR.



PC Interface for Archive Storage Media

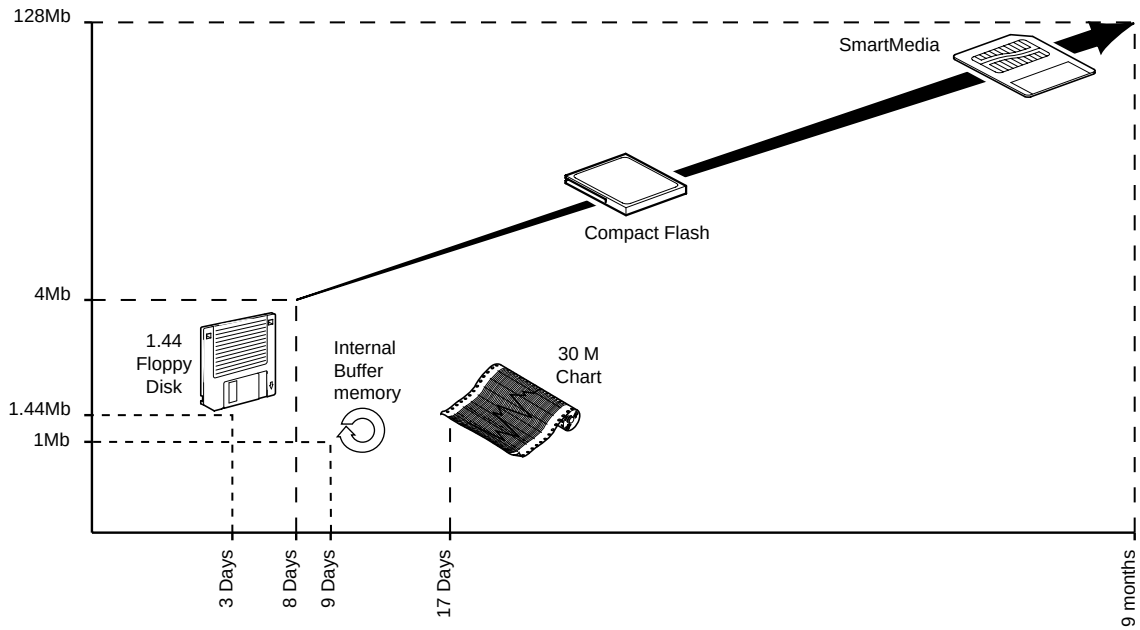
Through the use of PC adapters for SmartMedia and Compact Flash, both options provide the advantages of very robust, solid-state storage with the convenience-of-use previously found only with floppy disks.

- A SmartMedia-to-floppy disk drive adapter enables SmartMedia cards to be read directly by the existing floppy disk drive on your computer.
- Archives stored on Compact Flash can be accessed via a Compact Flash reader which plugs into the parallel port of any desk/lap-top computer.

Low Cost of Ownership

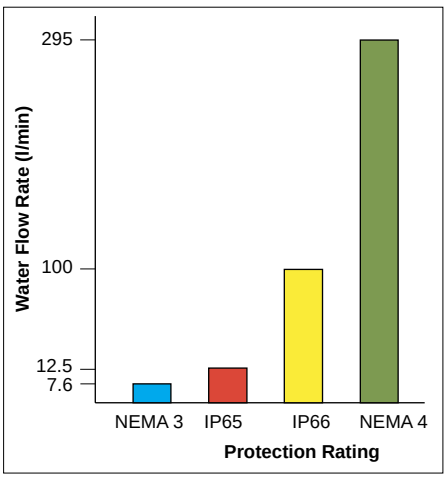
The large capacity of the storage media used on the ScreenMaster 1000 ensures that the requirement for operator intervention to transfer the data to a PC on a regular basis is greatly reduced. Older floppy disk technology, used by many other manufacturers of graphical recorders, limits storage capability 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 media device. The example shows the recording duration for a 6-channel recorder with a sample time of 10s. Also included in the example is how these storage times compare with a traditional paper recorder.

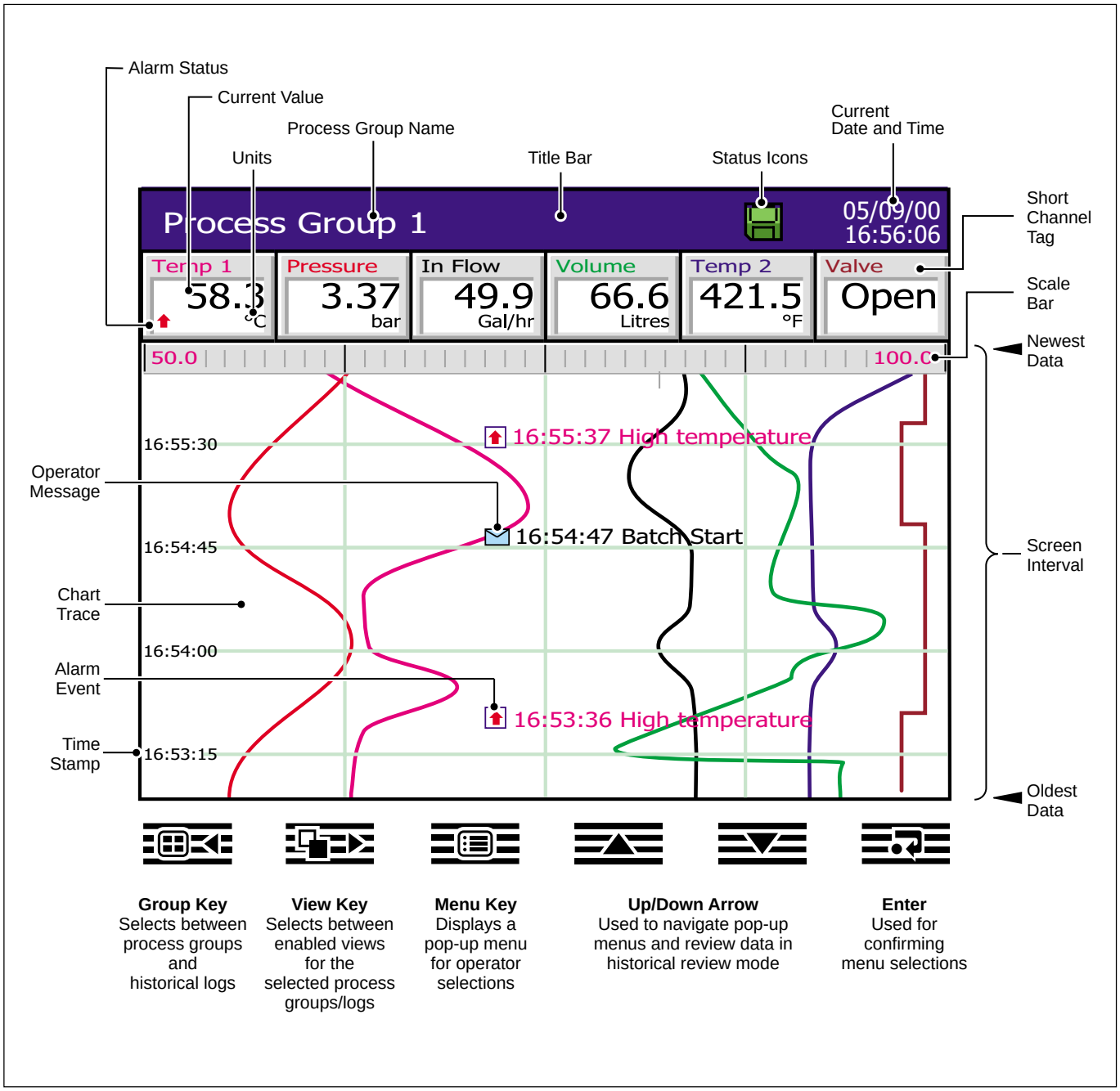


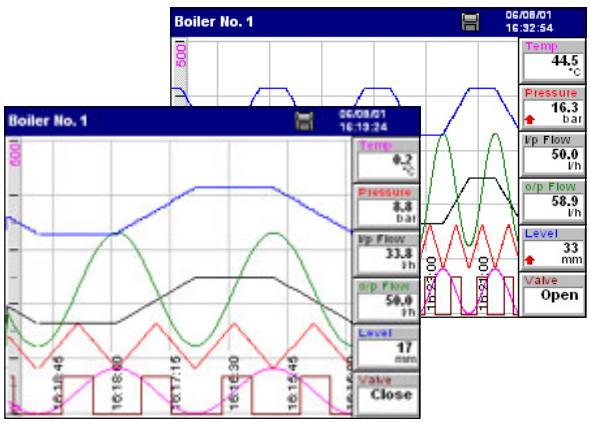
Unsurpassed Environmental Protection

Unique to this type of product, the ScreenMaster 1000 has an unrivalled protection rating of IP66/NEMA4X which includes a fully-sealed, lockable media door. This enables the ScreenMaster 1000 to be installed, without additional protection, in applications that require frequent hosedown. With industrial standard noise emission and immunity protection, the ScreenMaster 1000 also operates effectively in high electrical-noise environments.



Intuitive User Interface

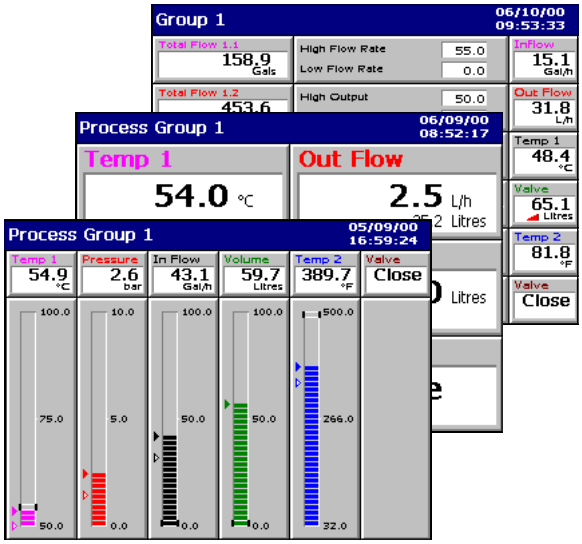




On-line Data Review

The ScreenMaster 1000 provides a number of unique features to provide a clear view of your process.

- The screen interval can be altered to display between 18s and 7 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' and get the big picture.
- Individual traces can be removed temporarily from the screen to enable clear comparison of two or more channels.
- The instrument can easily review all historical data in the internal buffer memory at the touch of a button. During this time, recording of the process data to the internal memory remains unaffected.



Operator Views

In addition to the standard chart view, a number of other operator views are available:

Process View

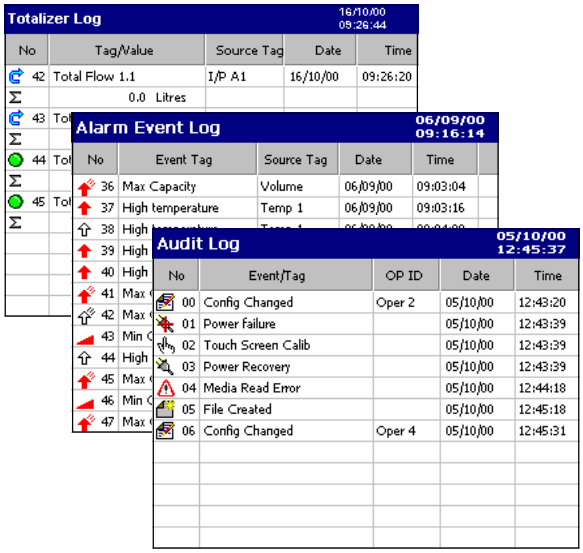
Provides an at-a-glance summary of each channel including alarm, totalizer and statistical (max./min.) information.

Digital Indicator View

Process value, engineering units, channel tag, associated totalizer (if fitted), and alarm status are all shown. Auto-sizing always ensures the clearest possible display.

Bargraph View

Horizontal or Vertical format which includes min./max. and alarm trip point markers.



Historical Logs

Providing functions unavailable in paper based recorders, three historical logs ensure complete validity of the recorder and its data. Any or all of these logs can be exported to the removable media:

Alarm Event Log

Complete display of all acknowledged and unacknowledged alarms, alarm state changes and operator messages.

Audit Log

Displays time, date and ID stamped system data including configuration, calibration changes, system errors and operation actions. This provides comprehensive evidence of the integrity, validity and traceability of the ScreenMaster 1000 and its measured data.

Totalizer Log

Independent log intervals for each channel, enabling total, average, maximum and minimum readings to be time and date stamped.

Configuration

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

The configuration mode is protected via a user-specific password system. All configuration changes are logged in the Audit log complete with operator ID's.

It is also possible to configure the ScreenMaster 1000 with a Windows-based PC configuration package.

Ethernet Communications

The ScreenMaster 1000 can provide 10baseT Ethernet communications via a standard RJ45 connector. ScreenMaster 1000 uses industry-standard protocols: TCP/IP, FTP and HTTP. These protocols permit straightforward seamless integration of a ScreenMaster 1000 into an Ethernet network. This enables rapid transfer of data files for off-line storage and review.

The ScreenMaster 1000's embedded web server provides remote monitoring of the recorder. All information is displayed and navigated via use of standard internet browsers.

Specification

Operation and Configuration

Configuration
- Via tactile membrane switches on front panel or PC Configuration using serial communication
- Multiple configuration files can be stored in internal (up to 16 files) or external memory (with removable media option fitted)

Security
- 4 individual passwords for each user/class of user
- Two security modes: Password protection; Internal security switch protection
- Provision for tamper-proof seal to prevent unauthorized changing of the configuration mode when using the internal security switch mode
- Lock on media door as standard

Configuration ports
- 3.5mm jack socket for connection to RS232 port on a PC via an adapter

Display
- Color passive matrix, liquid crystal display (l.c.d.) with built-in backlight
- 125mm (5 in.) diagonal display area, 76800 pixel display*
- *Note. A small percentage of the display pixels may be either constantly active or inactive. Max. percentage of inoperative pixels <0.01%.

Language
- English, German (French, Italian and Spanish pending)

Dedicated operator keys
- Group select/left cursor
- View select/right cursor
- Menu key
- Up/Increment key
- Down/Decrement key
- Enter key

Chart screen intervals
- Selectable from 18s to 7 days

Chart divisions
- Programmable for up to 10 major and 10 minor 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

Standard Functionality

Operator Messages

Number
- 6

Trigger
- Via front panel or digital signals

Recording in alarm/event log
- Can be enabled or disabled on configuration

Process Alarms

Number
- 24 (2 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 9999s)

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

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	✔			

*If Totalizer option is fitted and selected

Recording

Data Channels

Internal buffer memory
1Mb Flash memory provides storage for 512k samples
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
2

No. of recording channels
12 (6 per group)

Sources
Analog inputs, Modbus™ inputs, 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 0.1s 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

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

Archiving

Removable storage media options
- None
- SmartMedia
- Compact Flash

Data that can be saved to removable media
- Recorded data for group 1 & 2 channels
- Alarm event log data
- Totalizer log data
- Audit log data
- Configuration

File structure
Comma-separated file

File protection
Encrypted digital signature

New file generation interval
Programmable for automatic file generation every hour, day or month.

Archive sample rates
Programmable from 0.1s to 12 hours for each process group

Automatic updating of archive files
At regular time intervals according to the sample rate
When a media card is inserted

Filename
20-character tag, prefixed with date/time

Data verification
Carried out automatically on all writes to removable-media files

Recording Duration

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

Sample Rate	1	10	40	60	120	480
1Mb Internal Flash buffer memory	23 hours	9 days	38 days	57 days	4 months	1 year

Sample Rate	1s	10s	40s	60s	120s	480s
8Mb SmartMedia/Compact Flash	40 hours	17 days	2 months	3 months	7 months	2 years
32Mb SmartMedia/Compact Flash	7 days	2 months	9 months	13 months	2 years	9 years
64Mb SmartMedia/Compact Flash	13 days	4 months	18 months	2 years	4 years	18 years
128Mb SmartMedia/Compact Flash	27 days	9 months	3 years	4 years	9 years	35 years

Historical Logs

Log Type	Alarm/Event Log		Totalizer Log*		Audit Log	
Log Entry Events	• Alarm state changes • Operator messages		• User defined logging intervals • Totalizer stop/start, reset, wrap • Power up/down		• Configuration/calibration changes • System events • Errors, operator actions	
Information Recorded in Log	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*			✔	✔		
Max., min. and average values plus units*			✔	✔		
Secure total			✔			

*If Totalizer option fitted and selected

Analog Input Modules

General

Number of inputs
6 per board, max. of 12 inputs

Input types
mA, mV,voltage, resistance, THC, RTD

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 60s

Display range
–999 to 9999

Common mode noise rejection
>120dB at 50/60Hz with 300Ω imbalance resistance

Normal (series) mode noise rejection
>60dB at 50/60Hz

CJC rejection ratio
0.05°C/°C

Sensor break protection
Programmable as upscale or downscale

Temperature stability
0.02%/°C or 2µV/°C

Long term drift
<0.2% of reading of 20µV annually

Input impedance
>10MΩ (millivolts inputs)
500kΩ (voltage inputs) externally mounted divider
10Ω (mA inputs) externally mounted on terminals

Standard Analog Input Modules

Linear Inputs	Standard Analog Input
Millivolts Milliamps Volts Resistance Ω	0 to 2000mV 0 to 50mA 0 to +20V* 0 to 5000Ω
Sample Interval	100ms per sample (2 modules are processed in parallel) gives worst case update times as follows: 600ms for 6 or 12 channels – mV, mA, voltage 800ms for 6 or 12 channels – THC 1100ms for 6 or 12 channels – resistance, RTD
Input Isolation	12.5V d.c. channel-to-channel
Isolation from Rest of Instrument	Galvanically isolated to 500V d.c.

* 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 ±1°C (1.8°F) (above 200°C [392°F])
E	–100 to900	–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	–1200 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)

Modules

3- or 6-relay Output Modules

Number of relays
3 or 6 per module, max. of 2 modules (12 relays)

Type and rating
Relay type single-pole changeover

Voltage	250V a.c	30V d.c.
Current	5A a.c.	5A d.c.
Loading (non-inductive)	1250VA	150W

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

Hybrid Module

Digital I/O

Number	6 inputs and 6 outputs per card
Type	Volt-free switching inputs
Polarity	Negative i.e. closed switch contact or 0V = active signal
Digital input min. pulse	100ms
Digital output voltage	5V
Isolation	500V d.c. from any other I/O

Analog output

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

2-wire Transmitter Power Supply Module

Number
2 isolated supplies per module (max. of 2 modules)

Voltage
24V d.c. nominal

Drive
45mA per supply, i.e. each module can drive 2 x 2 = 4 loops

Ethernet Module

Physical medium
10BaseT

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

FTP server functions
Directing selection & listing
File upload/download

Web server functions
Operator screen monitoring/selection, recording channels, analog/digital signals, alarms, totalizers, archiving, remote monitoring

RS485 Serial Communications Module

Number of ports
1 as option

Connections
RS485, 2- or 4-wire

Protocol
Modbus™ RTU slave

Totalizer (optional)

Number
12 (1 per recording channel) 10-digit totals

Type
Analog or digital, batch and secure totals

Statistical calculations
Average, maximum, minimum (for analog signals)

EMC

Emissions & immunity
Meets requirements of:
EN50081-2
EM50082-2
EN61326 for an industrial environment

Electrical

Power supply
85 to 265V a.c. 50/60Hz
24V d.c. ±4V (optional)

Power consumption
30VA max

Power interruption protection
No effect for interrupts of up to 20ms

Safety

General safety
EN61010-1
Overvoltage Class III on mains, Class II on inputs and outputs
Pollution category 2

Isolation
500V d.c. 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
–10 to 60°C (14 to 140°F)

Front panel sealing
IP66/NEMA4X

Rear panel sealing
(with rear cover) IP40
(without rear cover) IP20

Physical

Size
144mm (5.67in.) x 144mm (5.67in.) x 195mm (7.68 in.) depth behind panel

Weight
2.6kg (5.6 lb) approx. (unpacked)

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

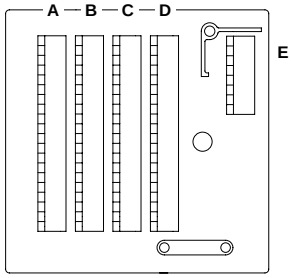
Case material
10% glass-filled polycarbonate

Display housing material
40% glass-filled polycarbonate

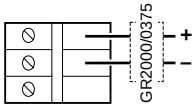
Membrane switch
Polyester, metal dome, tactile feel

Electrical Connections

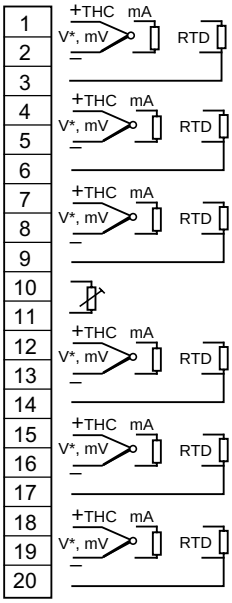
Module Positions



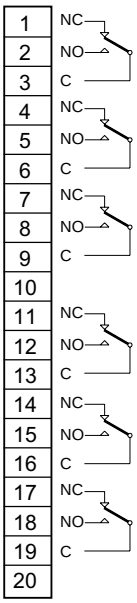
***Note**. An external divider (part no. GR2000/0375) is required for each channel for voltage input ranges above 2V



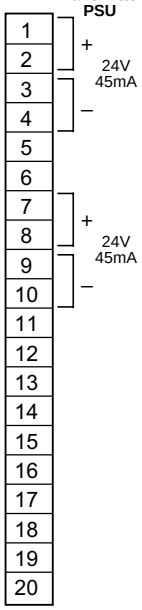
A, B Analog Input



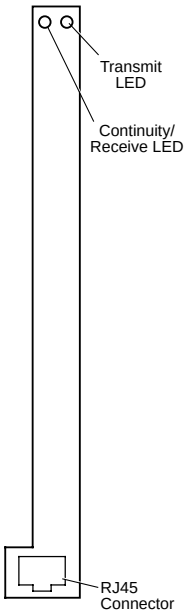
C, D Relay



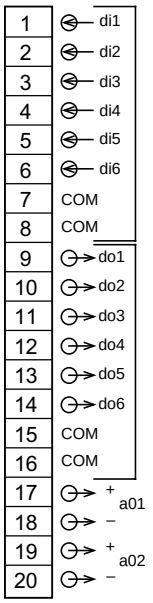
C, D Transmitter PSU



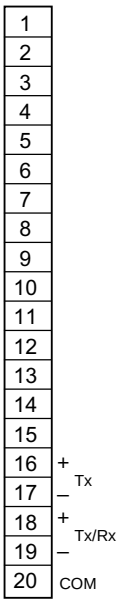
C Ethernet



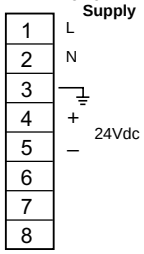
C, D Hybrid



D RS485

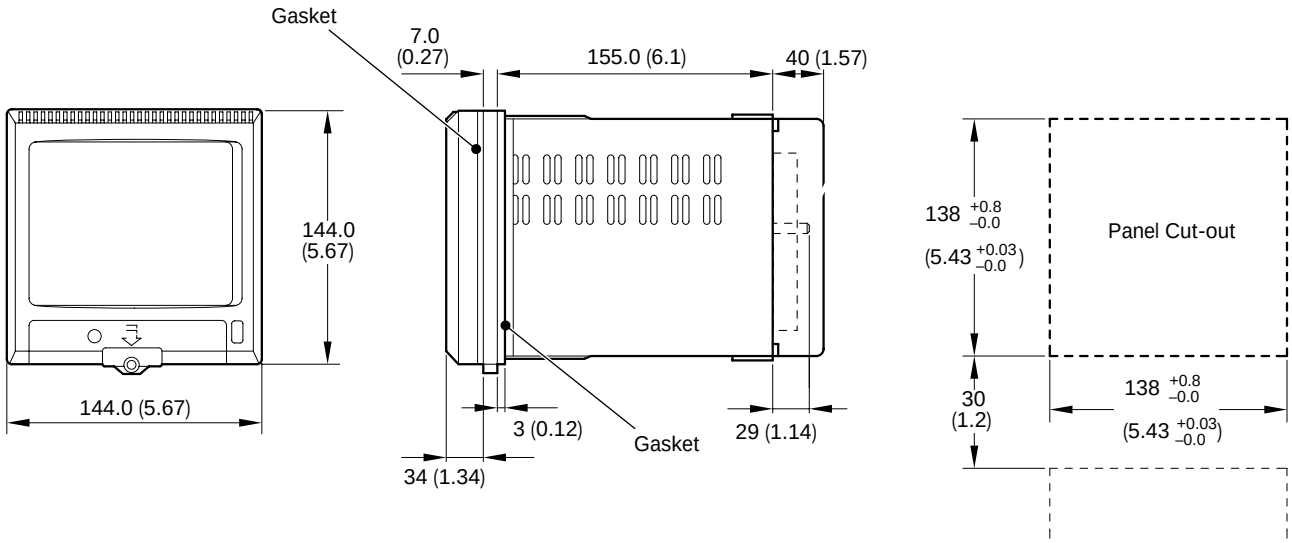


E Power Supply



Overall Dimensions

Dimensions in mm (in.)



Ordering Information

ScreenMaster 1000 Videographic Recorder		**SM10**	**XXX/**	**X**	**X**	**X/**	**X**	**X**	**X**	**X/**	**X**	**X/**	**XXX**
Universal Analog Inputs	None		00S										
	6 – standard specification		06S										
	12 – standard specification		12S										
Build Option	Standard			B									
	CSA (pending*)			C									
	UL (pending*)			U									
Archive Media	None – (internal flash memory only)				0								
	SmartMedia drive				1								
	Compact flash drive				2								
Software Option	None					0							
	Totalizers					2							
Option Modules													
Position A	Reserved for analog inputs						0						
Position B	Reserved for analog inputs							0					
Position C	None								0				
	3 relays								3				
	6 relays								6				
	Ethernet (10BaseT) communications (pending*)								E				
	Hybrid – 6 digital inputs, 6 digital outputs, 2 analog outputs								H				
	2-wire transmitter power supply								T				
Position D	None									0			
	3 relays									3			
	6 relays									6			
	Hybrid – 6 digital inputs, 6 digital outputs, 2 analog outputs									H			
	2-wire transmitter power supply									T			
	RS485 Modbus serial communication (pending*)									S			
Case	Without terminal compartment										2		
	With terminal compartment										3		
Power Supply	85 to 265V a.c.											2	
	24V d.c. (pending*)											3	
Special Features	Standard												STD
	Custom configuration												CUS

* For more information, please contact your local Sales Office

Optional Accessories

Part No.	Description
B11825	SmartMedia Card (8Mb)
B11860	SmartMedia Card (16Mb)
B11861	SmartMedia Card (32Mb)
B11862	SmartMedia Card (64Mb)
B11863	SmartMedia Card (128Mb)
B11826	SmartMedia-to-3$^{1}/_{2}$ inch Floppy Disk Drive Adapter
GR2000/0375	Voltage divider board (2 to 20V) – per voltage input channel

Part No.	Description
B11844	Compact Flash Card (8Mb)
B11844	Compact Flash Card (16Mb)
B11844	Compact Flash Card (32Mb)
B11844	Compact Flash Card (64Mb)
B11844	Compact Flash Card (128Mb)
B11827	Compact Flash Reader (parallel port interface)
SW/DATMGR	DataManager Software

SS/SM1000 Issue 1

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