

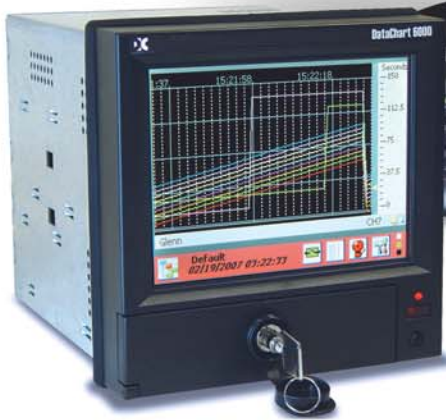
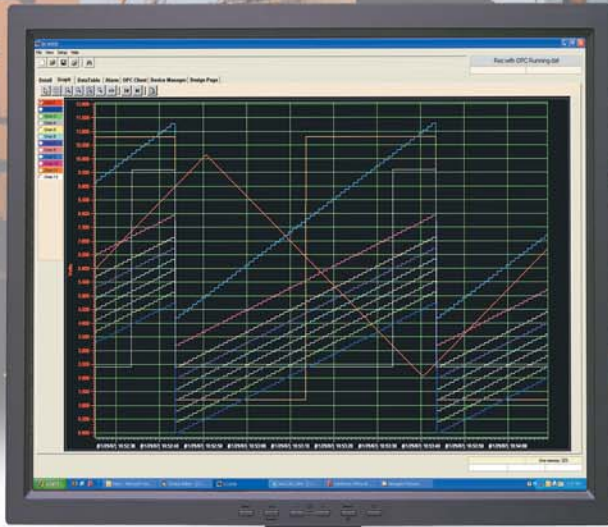
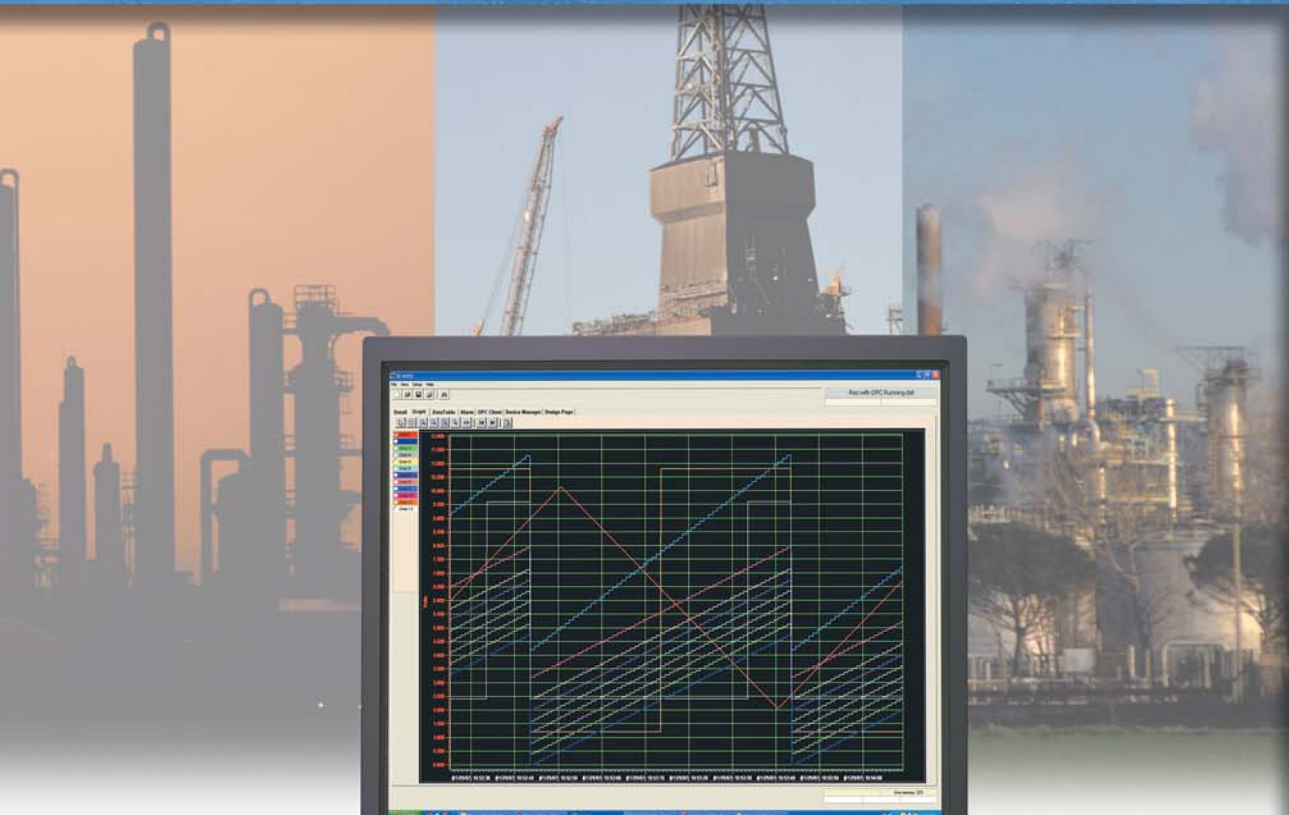


DataChart 6000

Paperless Data Acquisition System

Technical information

monarch



Monarch Instrument has been a pioneer in the development of paperless data acquisition systems for over 15 years. The utilization of state of the art technologies to develop intelligent, powerful and intuitive products has made Monarch Instrument's DataChart product line a global leader in paperless recording technology.

The DataChart 6000 is the most advanced paperless recording system available. It incorporates the latest in measurement, communication, interface and processing technologies to deliver unmatched performance for your data acquisition application.

The DataChart 6000 is like no other paperless recorder available. We listened carefully to our product users and developed a device with the unique features they demanded.



Features

- 6 or 12 universal inputs
- Up to 4 pulse/frequency inputs
- 6 or 12 relay outputs
- Networkable using standard Ethernet Port
- 21 CFR Part 11
- 24 volt transmitter power supply
- IP65/NEMA4 compliant
- Locking media access door
- Onboard Media Drives:
 1. CompactFlash™
 2. USB (Memory stick, external drive etc.)
 3. Smart Digital (SD)
- Touch Screen Control
- Direct on screen chart annotation with integral stylus
- Built in OPC and MODBUS servers
- Built in E-mail client
- Shallow installation depth (6.5")

Benefits

- Maximum flexibility achieved with universal inputs
- Input pulse signals directly from flow meters
- Relay outputs for control or activating external alarms
- Accessible via LAN or WEB
- Reduce cost and complexity by providing transmitter power supply
- No additional equipment needed to panel mount in harsh environments
- Media and Data can be locked and secured
- Flexibility of multiple media drives
- Intuitive icon driven touch screen interface
- Write notes and comments directly on the virtual chart for permanent storage with data
- Seamlessly interfaces with third party software packages using OPC for MODBUS standard
- Send alarm, instantaneous data or activity information anywhere with E-mail capability
- Shallow depth allows the use of economical panels and enclosures for installation

Common Industries

Petro Chemical
Power
Pharmaceutical
Water and Waste Water

Process
Automotive
Steel
Oil and Gas

Pulp and Paper
Aerospace
Agricultural
Food and Dairy

Telecom
Transportation
Regulatory
Heat Treat



Graphic User Interface and Controls

User Interface and Control

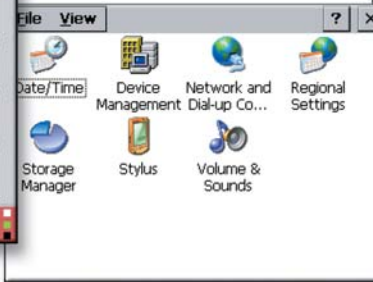
The DC6000 utilizes a high contrast 5.6-inch color Active Matrix TFT LCD display with a rugged touch screen. Use a finger or the onboard stylus, if you prefer, to perform data entry and system navigation. The front panel is also fully compliant to IP65 for use in dusty or wet areas. An intuitive icon driven menu system guides the user through easy to follow setup and control screens. The Display Builder feature makes setting up custom screens extremely simple. Design custom displays containing various combinations of indicator types such as horizontal and vertical bar graphs, large and small digital indicators and horizontal or vertical trends. On-screen help is available throughout the menu system to assist you during setup and use.

Intuitive System Menu

Main Setup Menu



Windows™ Control Panel

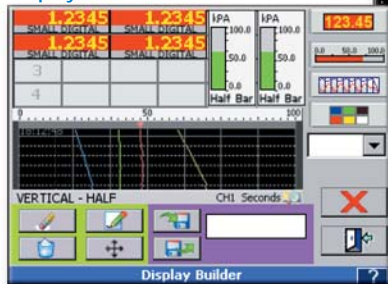


Windows™ Explorer Menu

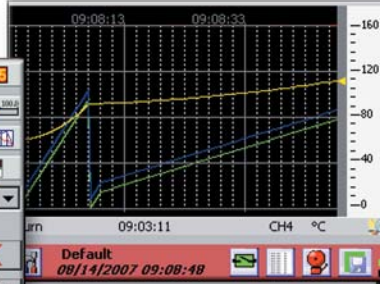


Custom Designable Display Screens

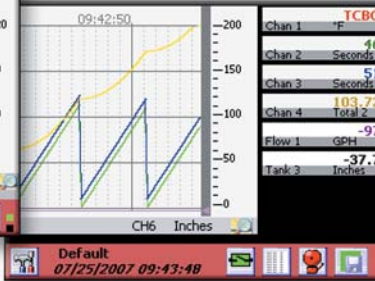
Display Builder



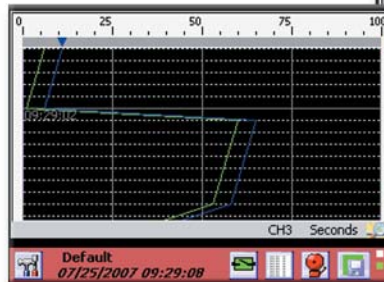
Horizontal Trend



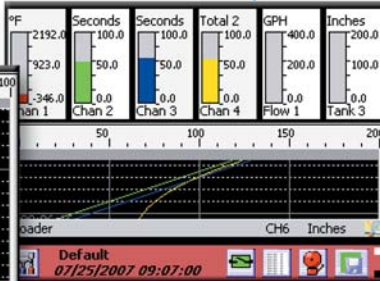
Horizontal Trend with Indicators



Vertical Trend



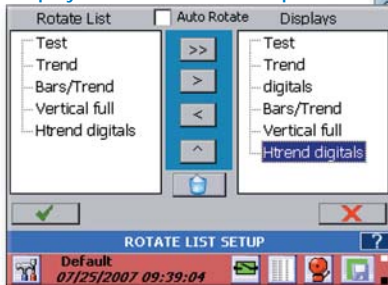
Vertical Trend with Bar Graphs



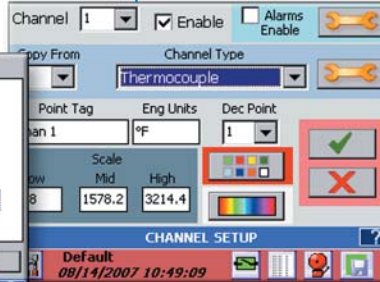
Digital Indicators with Bar Graphs



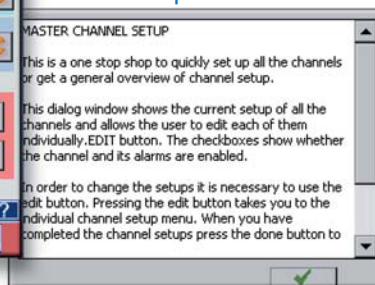
Display Screen Rotation Setup



Channel Setup



On-Screen Help



Data Storage and Security



Data Storage and Security

When it comes to storing data, the DC6000 is extremely flexible. Data can be stored to the non-volatile internal flash RAM or any of the available removable storage drives including CompactFlash™ and USB provided there is media present. Programmable record start and stop times allow the user to start and stop recording at predetermined intervals. Data may also be stored to a remote PC via Ethernet using the optional Exhibitor Software. In addition, the built in MODBUS and OPC Servers allows any compliant software client to connect to, communicate with and retrieve data. The DC6000 utilizes many layers of security to protect the integrity of your stored data. All data is stored in an encrypted binary format which prevents data tampering and maximizes compression. The front access media door is lockable to prevent unauthorized access to the internal removable storage media. There are 3 levels of password protection to prevent unauthorized entry into critical

recorder function menus. To ensure that data files are completely error free the DC6000 has a built-in rechargeable Nickel Metal Hydride battery backup system that constantly monitors the incoming power source. In the event of a power loss or power dip, the DC6000 seamlessly switches over to the internal power and begins a safe and controlled system shutdown. When power is restored the recorder immediately returns to the last state of operation. This guarantees that data files will never be corrupted by unexpected power conditions.

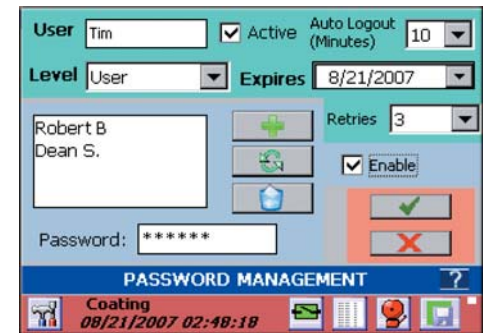


IP65 Front Locking Media Door

21CFR Part 11

The DC6000 is fully compliant with the requirements of 21CFR Part 11. This section of the Code of Federal Regulations sets forth the guidelines for handling all aspects of electronic data storage to ensure data is secure and accurate. The DC6000 provides a password management system that allows an administrator to set multiple unique user/password combinations and assign them to one of the 3 available access levels. Each users login password can be set to automatically expire to ensure passwords are regularly updated. The DC6000 also maintains a secure, time stamped audit trail to independently record the date and time of operator entries and actions that create, modify, or delete electronic records.

Use the optional 21CFRCDP Compliance Documentation Package to perform IQ/OQ/PQ and validate a compliant environment using the DC6000. We go the extra mile with our Installation Qualification, Operational Qualification and Performance Qualification step by step instructions and checklist. Use the verification checklist to quickly and easily guide yourself through the procedures avoiding extensive labor and setup costs. Use our OQ/PQ procedures and documents as an aid to complete the validation requirements associated with the use and installation of the DC6000 in a regulated environment. This enables you to develop your validation plan in accordance with the FDA's Good Manufacturing Practice described in 21 CFR 820.



Password Management Page

Recording Data

Using the Record Setup menu, the user can select which channels to record, the sample storage rate, whether to record alarms and/or events, and the start/stop time and date for the record session. The location of the data file is selected in this menu along with the data file name. The user can also configure the unit to start or stop recording on an alarm level or an externally triggered input.

Media Storage Locations

Front Accessible: (lockable)
CompactFlash™
USB Host (for memory stick)

Rear Accessible:
USB Host
Ethernet

Internal:
512 Meg Standard
(Larger sizes available)



Data Storage vs. Time Guide

Record Rate	1 Channel		2 Channels		4 Channels		6 Channels		12 Channels	
	64 Mb	1Gb	64 Mb	1G	64 Mb	1G	64 Mb	1G	64 Mb	1G
10/Sec.	3.1	49.4	2.5	40.8	1.9	30.4	1.5	24.2	22.5	15
	Days	Days	Days	Days	Days	Days	Days	Days	Hours	Days
5/Sec.	6.2	246.9	5	81.6	3.8	60.8	3	48.4	1.8	30
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
1/Sec.	30.8	1.3	25.5	1.1	19.0	303.9	15.1	241.8	9.4	150
	Days	Years	Days	Years	Days	Days	Days	Days	Days	Days
10 Sec.	308	13.5	251	10.6	190	8.0	150	6.4	50	4.1
	Days	Years	Days	Years	Days	Years	Days	Years	Days	Years
1 Min.	5.1	81.2	4.2	66	3.1	49.9	2.5	39.7	1.5	24.6
	Years	Years	Years	Years	Years	Years	Years	Years	Years	Years
10 Min.	50.6	811.7	42	666	31	499	25	397	15	246
	Years	Years	Years	Years	Years	Years	Years	Years	Years	Years

Removable Media Types

CompactFlash™



USB Memory Stick

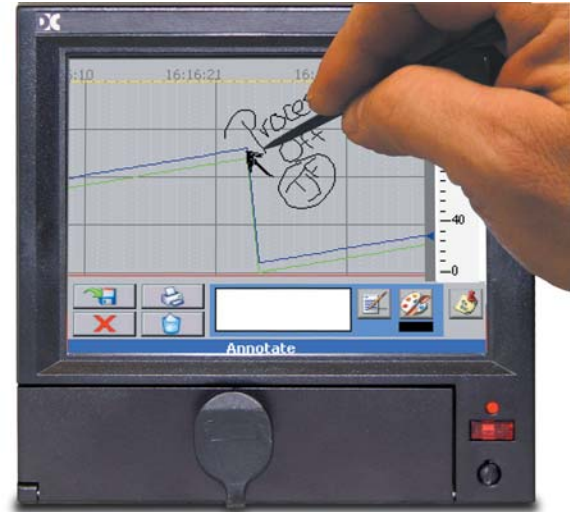
Unique Features

Write directly on the screen

The innate feature of handwriting notes and comments on the chart of paper recorders had been lost with the onset of video graphic recorders until the arrival of the DC6000. Using the high-resolution touch screen interface and the integral stylus you can once again make notes or comments directly on the chart. This on-screen annotation is stored within the data file directory and can be recalled and displayed on the recorder or in Exhibitor Software.

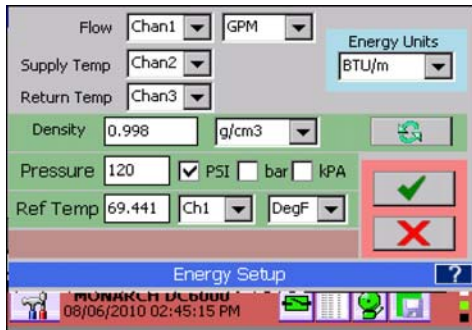


Make notes, sign files or make other graphic indications directly on the virtual chart in your own handwriting or use the built-in keyboard to type messages on the screen. Your notes are stored within the data file directory for future review.



Energy Calculation

Use the DC6000 to calculate energy with its' included flow calculator which looks up enthalpy, computes mass flow and compensates for density to output BTU rates for hot and cold water heating and cooling systems. Track your buildings energy usages and generate accurate billing data with this powerful unique feature. Use additional math functions to determine peaks, averages and totals.



Energy Setup Page

Wireless Connectivity

The optional Wireless-N USB Dongle extends the connectivity of the DC6000 to areas where conventional hard wired networks are not available. Simply plug the dongle into an open USB port on your DC6000 and configure a secure connection to your wireless router. Compatible with IEEE 802.11 b/g/n.



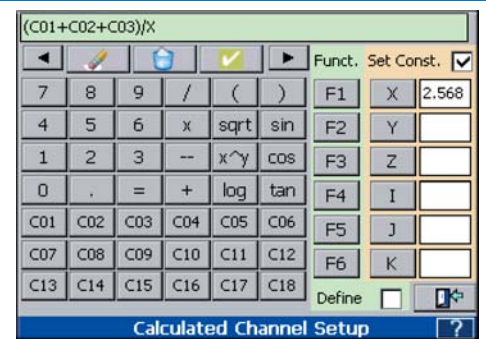
Automatic FTP Function

The DC6000 can be setup to automatically transfer files daily or weekly and delete or archive the data files after the transfer is successful. This greatly simplifies data file management and offers redundancy for critical data. Multiple data files can later be "stitched" together to create larger files for review in Exhibitor Software allowing ultimate flexibility when reviewing data over any period of time.

Powerful Math Package

The onboard math package is extremely powerful. It allows the user to input complex polynomial equations using constants, custom functions and variable inputs obtained from live channels. The resultant information can be displayed and recorded as a real time channel.

Using the intuitive Calculated Channel Setup menu the user enters in the formula and can perform a test to make sure the formula is accurate.

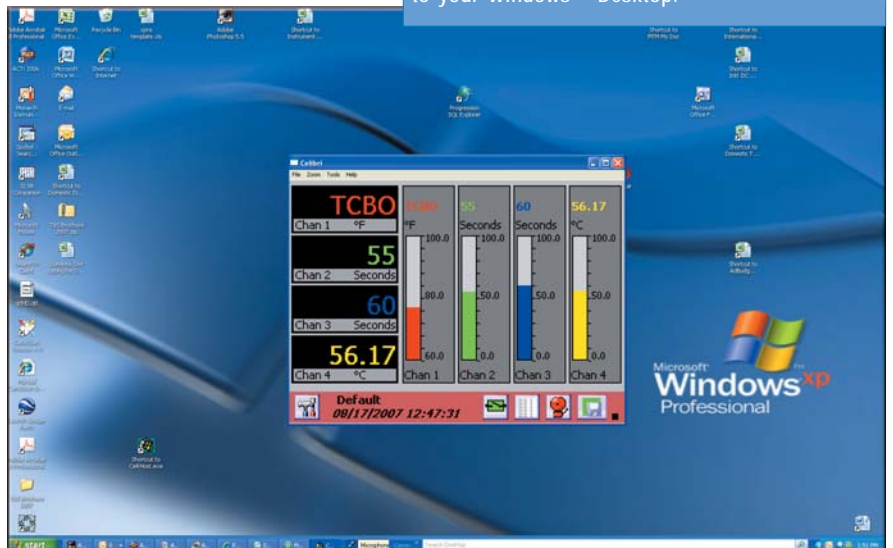


Formula Entry Page

Remote Control

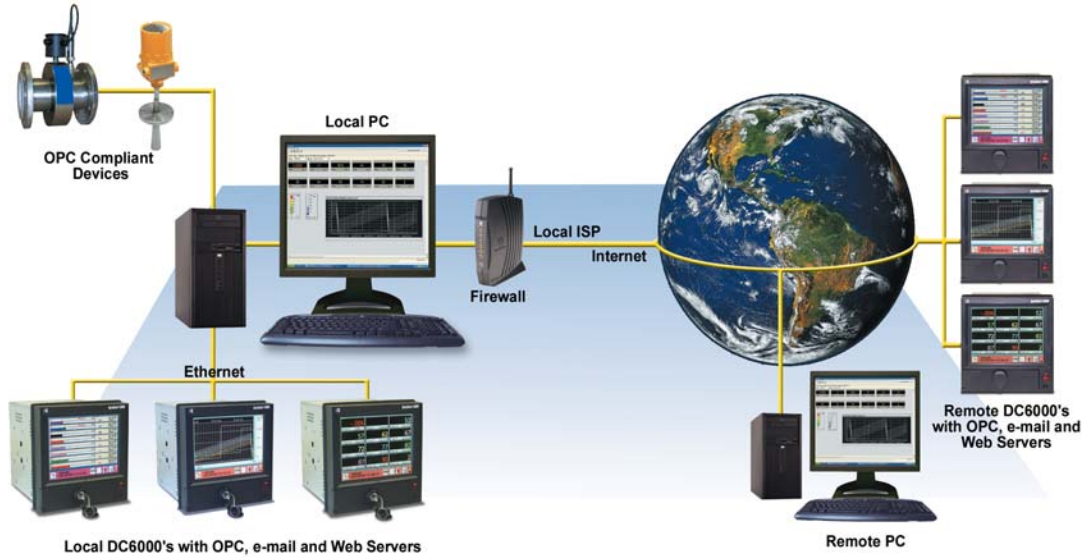
The Remote Control feature extends the graphic user interface of the DC6000 directly onto your local PC. Use remote control and your desktop PC's mouse and keyboard to view real time data, change settings, start and stop recording or virtually anything else you can do with the recorders touch screen. Across the plant or across the planet, remote control empowers you with virtual presence.

Remote control brings a virtual real time graphic display from your remotely located DC6000 directly to your Windows™ Desktop.



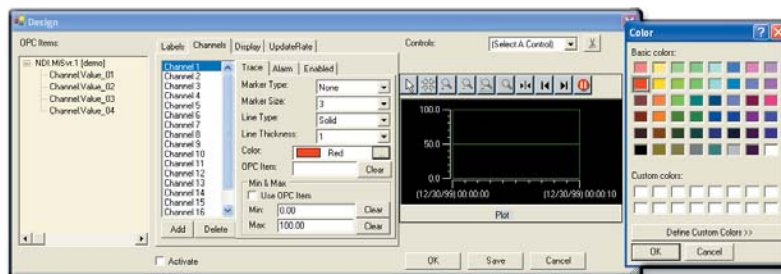
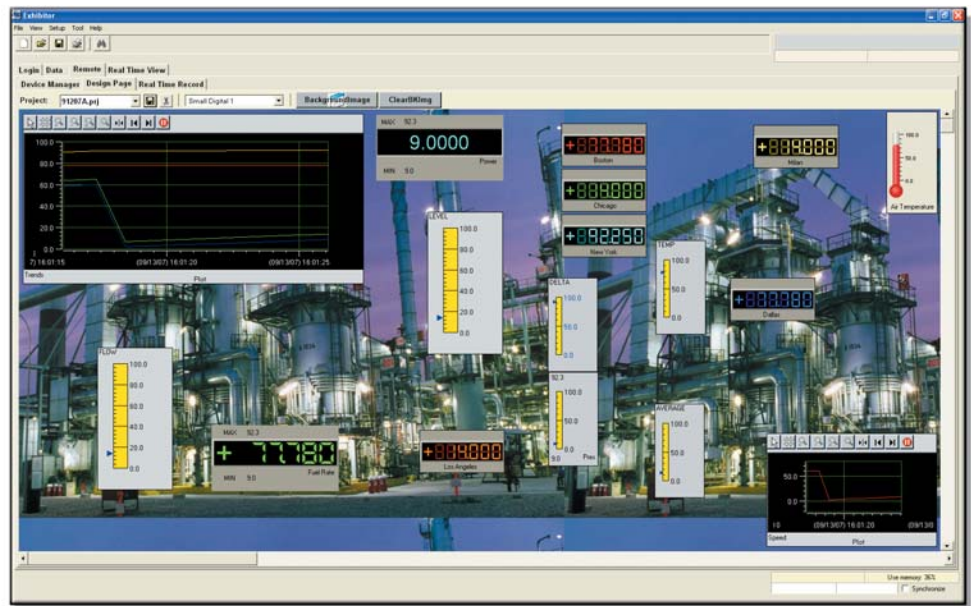
Exhibitor Software is an extremely powerful set of tools that compliments the DC6000 and other OPC or MODBUS compliant devices. Incorporating functions to simplify data management via searching, reviewing, printing, or exporting historic data, Exhibitor Software allows real-time monitoring and recording independently as well, while historic recording is not affected. Also featured are the OPC and MODBUS clients which enables the user to build custom screens selecting various display elements and data from multiple servers, including devices other than DC6000's. (Compatible with Windows XP, Vista and 7).

Network Overview



Customizable Real-Time View

Use Exhibitor's design page features to create custom real-time display projects that can be saved and recalled with a click of the mouse. Create bar graphs, digital panel meters, thermometers or trend screens from live data coming from any DC6000 or other OPC or MODBUS compliant device accessible on the network. Using the Device Manager, Exhibitor allows you to connect to servers anywhere there is a network connection. A user definable list of data is then accessible by the Design Page, where customized Real Time Views are built using the user friendly graphic user interface. To place items, simply point, click, and drag. Save your project for future use and the next time it is opened all servers are automatically connected and data will begin displaying immediately. Go one step further, and record real time data to your PC.



Specifications

General

Input Resolution: 0.0015% of full scale, 16 bit unless otherwise stated

Input Impedance: >1 Mohm

Input Channels: 6 or 12 direct plus 6 additional calculated channels.

Maximum Input: 50Vdc

Isolation: Channel to Channel: 350Vdc or RMS AC

Channel to Chassis: 2000 Vdc or RMS AC

Isolation category II: Pollution Degree 2

Measurement Rate: 10 times per second on all direct input channels

Common Mode Noise Rejection: >100dB, 50/60 Hz, filter enabled

Normal Mode Noise Rejection: >50dB at 50/60 Hz, filter enabled

Math Functions: Fully programmable +, -, x, /, square root, sine, cosine, tangent, log, totalization, powers, averages, conditional logic; AND, NOT, OR, +, >, <, gated timers, energy calculation/BTU. Can use live channels in calculation. Can define 6 constants and 6 functions per channel.

Analog Inputs

DC Voltage: +/-125mV, +/-250mV, +/-500mV, +/-1.00V, +/-3.0V, +/-6.0V, +/-12.0V, +/-24.0V

Accuracy: Ranges to 1V +/-0.06%, Ranges > 1V +/-0.1%

DC Current: 4-20mA, 0-20mA, 10-50mA

Accuracy: +/-0.15% using external 50 ohm 0.1% 1/4 watt shunt.

Thermocouple (Per ITS90)

Resolution: 0.1C, thermocouple burnout detection: Automatic

Type	Range (°C)	Accuracy (°C)	Range (°F)	Accuracy (°F)
J	-210 to 0°C +/- 1.6°C		-346 to 32°F +/-3.0°F	
	0 to 1200°C +/- 0.7°C		32 to 2192°F +/-1.2°F	
K	-270 to -162°C +/- 5°C		-454 to -94°F +/- 9.0°F	
	-162 to -70°C +/- 2.2°C		-260 to -94°F +/-4.0°F	
	-70 to 1372°C +/- 0.7°C		-94 to 2500°F +/- 1.2°F	
T	-270 to -73°C +/- 2.5°C		-454 to -100°F +/-4.5°F	
	-73 to 200°C +/- 1.0°C		-100 to 400°F +/-1.8°F	
E	-270 to -70°C +/- 2.5°C		-454 to -94°F +/-4.5°F	
	-70 to 1000°C +/- 0.7°C		-94 to 1832°F +/- 1.3°F	
N	-270 to 100°C +/- 3.0°C		-454 to 212°F +/-5.4°F	
	100 to 1300°C +/- 0.9°C		212 to 2372°F +/- 1.6°F	
S	-50 to 0°C +/- 2.8°C		-58 to 32°F +/-5.0°F	
	0 to 1000°C +/- 1.4°C		32 to 1832°F +/-2.5°F	
	1000 to 1710°C +/-1.1°C		1832 to 3110°F +/-2.0°F	
	1710 to 1768°C +/-1.4°C		3110 to 3214°F +/-2.5°F	
B	0 to 535°C +/- 4.0°C		32 to 1000°F +/-7.2°F	
	535 to 1800°C +/- 2.1°C		1000 to 3300°F +/-3.8°F	
U	0 to 100°C +/- 0.9°C		32 to 212°F +/- 1.6°F	
R	0 to 260°C +/- 3.0°C		32 to 500°F +/-5.4°F	
	260 to 650°C +/- 1.4°C		500 to 1200°F +/-2.5°F	
	650 to 1760°C +/- 1.0°C		1200 to 3200°F +/- 1.9°F	
C	0 to 180°C +/- 2.5°C		32 to 360°F +/-2.5°F	
	180 to 1200°C +/- 0.8°C		360 to 2220°F +/- 1.5°F	
	1200 to 2315°C +/- 3.6°C		2220 to 4199°F +/-6.5°F	
L	-200 to 0°C +/- 1.1°C		-328 to 32°F +/-2.0°F	
	0 to 890°C +/- 0.7°C		32 to 1650°F +/- 1.2°F	

NOTE: Field calibration improves accuracy to better than +/- 2 °F and up to +/- 0.5° and ensures compliance with AMS2750D measurement accuracy requirements for Nadcap accredited suppliers.

RTD

Base Accuracy: 0.2% or 0.5 °C (1 °F). **Resolution:** 0.1 °C

2 or 3 wire connection. Cable compensation to +50 ohm. Open and short circuit detection.

Type	Range °C	Range °F
100 ohm Plt. 385	-220 to 850 °C	-364 to 1560 °F
100 ohm Plt. 392	-180 to 820 °C	-292 to 1500 °F
200 ohm Plt. 385	-220 to 400 °C	-364 to 750 °F
200 ohm Plt. 392	-180 to 400 °C	-292 to 750 °F
1000 ohm Plt. 385	-200 to 200 °C	-328 to 392 °F
500 ohm Plt. 385	-220 to 850 °C	-364 to 1562 °F
50 ohm Plt. 385	-200 to 850 °C	-328 to 1562 °F
50 ohm Plt. 391	-200 to 1100 °C	-436 to 2012 °F
100 ohm Ni.	-70 to 300 °C	-94 to 570 °F
120 ohm Ni.	-70 to 300 °C	-94 to 570 °F
1000 ohm Ni.	-60 to 209 °C	-76 to 408 °F

RTD (Cont.)

Type	Range °C	Range °F
10 ohm Cu.	-70 to 170 °C	-94 to 338 °F*
50 ohm Cu. 426	-50 to 200 °C	-58 to 392 °F
50 ohm Cu. 428	-200 to 200 °C	-328 to 392 °F
100 ohm Cu. 426	-50 to 200 °C	-58 to 392 °F
100 ohm Cu. 428	-200 to 200 °C	-328 to 392 °F
100 JIS	-200 to 649 °C	-328 to 1200 °F
*0.5% +/- 0.5 °C		

Frequency inputs (2 or 4 channels)

Range: 0 to 5,000Hz all channels, 0 to 10,000Hz 1 channel

Accuracy: 0.005% +/- 1 digit

Recording

Recording Rates: User programmable from 10 samples per second to 1 sample every 24 hours.

Data Format: Proprietary encrypted format, User file naming.

Data Storage Capacity: Data stored in non-volatile RAM and recorded automatically to:

Removable media types:

CompactFlash™ or USB drive to 16 GB

Internal media type:

SD card (secure digital) to 16 GB

File Types: Data files, alarm event and activity files, configuration files, language files, multiple files of different names on a single disk.

Display

Type: Color LED backlit Active Matrix TFT Liquid Crystal Display

Size: 5.6 inch diagonal, **Resolution:** 320 (W) x 240 (H) pixels

Interface: Resistive analog touch screen control

Display Builder: Allows user to create custom displays

Display Modes: Graphic Trending (vertical or horizontal), Bar Graphs (vertical or horizontal), Digital Meter (large or small), Alphanumeric Alarm Activity and Event Log.

Virtual Chart Speed: Programmable from 0.5 inch/hour to 72 inches/hour (10 mm/hr to 828 mm/hr)

Display Windows: Time/Date, Graphics (bars, large digital, trends) Disk Status, System Status, Menu Button Bar, Unit Identification, Alarms, Events and Activity logs.

Communications

Network: 10/100 BaseT Ethernet per 802.3, RJ45 connection standard.

Servers: Webserver supports http and ftp protocols, OPC server, Modbus over Ethernet server.

Serial: Isolated RS485/RS232 Modbus Interface (option)

Email: SMTP standard TCP/IP for sending email.

Time: Selectable synchronization via private or public NTP server.

File Transfer: Automatic, scheduled file transfer via FTP.

Power

Requirements: 100 to 240 Vac, 50/60Hz. 35 VA max. 24Vdc optional

Power Fail Protection: Programmed parameters stored in non-volatile memory. Clock battery backed. Internal battery backup provides orderly shutdown and the ability to survive brownouts and short blackouts (<20 seconds).

Power Output: Optional isolated 24Vdc @ 120mA output.

Input/Output

Digital I/O: 6 or 12 relay outputs, Form A (normally open SPST contacts) rated at 200 Vdc @ 0.5A Max, 2 digital control inputs +5 to +12Vdc @ 20mA (optional), Control inputs may be used for record start/stop, alarm acknowledge and channel reset functions

Safety and Environmental

Operating Range: 0 °C to 50 °C, 10% to 80% RH non-condensing

Protection: IP65 when mounted in panel.

Safety: Meets the requirements of EN61010-1 when installed in accordance with the instructions in the manual.

UL and cUL: File #: E175096

EMC: Meets requirements of EN61326:2003 and CE directive 89/336/EEC.

Weight: 7 lbs. (3.17 kg) - weight will vary depending on options.

Ordering Information

Standard DC6000 Features:

5.6" color QVGA TFT LCD display with touch screen and integral stylus
 CompactFlash™ Drive (Front), USB thumb drive port (Front)
 USB master (rear), USB slave (Rear), Internal memory
 Mouse/keyboard connection (Rear)
 Audio: Line in, Line out, Microphone (Rear)
 RJ45 Ethernet port (Rear)
 NEMA 4/IP65 Front Bezel with locking media drive door

Determining model number configuration

To specify your DataChart™ 6000, select desired options and enter the appropriate selection in the boxes below. Example model number: DC6-1-06-1-0-1-0-1

Select options

Build model #: **DC6** —

Input Power

- 1 100 to 240 Vac 50/60Hz / 125 Vdc with cable and plug
- 2 18 - 30 Vdc
- 3 100 to 240 Vac 50/60Hz / 125 Vdc with Screw Terminals

Input Signals

- 06 6 Total: 4 (V, I, TC, RTD), 2 (V, I, TC, RTD, Frequency)
- 12 12 Total: 8 (V, I, TC, RTD), 4 (V, I, TC, RTD, Frequency)

Output Options

- 0 None
- 1 6 Form A relay contacts 0.5 Amp @ 200Vdc, 2 Control Inputs
- 2 12 Form A relay contacts 0.5 Amp @ 200Vdc, 2 Control Inputs

Serial Communications

- 0 None
- 1 RS232/485 (9 pin "D" shell connector)

Transmitter Power Supply

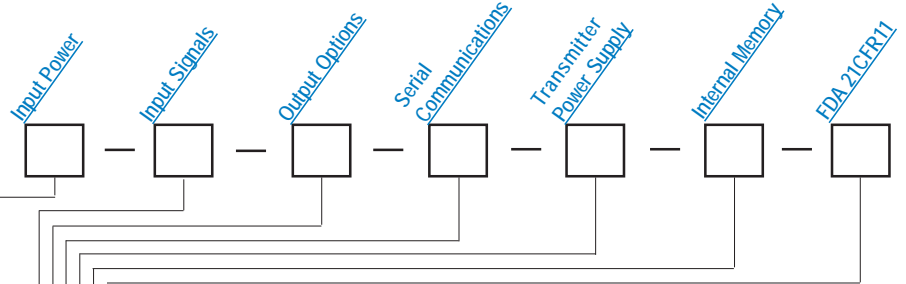
- 0 None
- 1 24 Vdc, 100mA auxiliary output

Internal Memory

- 1 512 Megabyte
- 2 1 Gigabyte
- 3 2 Gigabyte

FDA 21CFR11 Compliance

- 0 None
- 1 21CFR11 Compliance



Field Upgradeable Options

Part No.	Description
6CH-ADD	6 Channel input module with connectors
6-FormA	6 Form A relay output module with connectors
12-FormA	12 Form A relay output module with connectors
24-TP	24 volt transmitter power supply module with connector

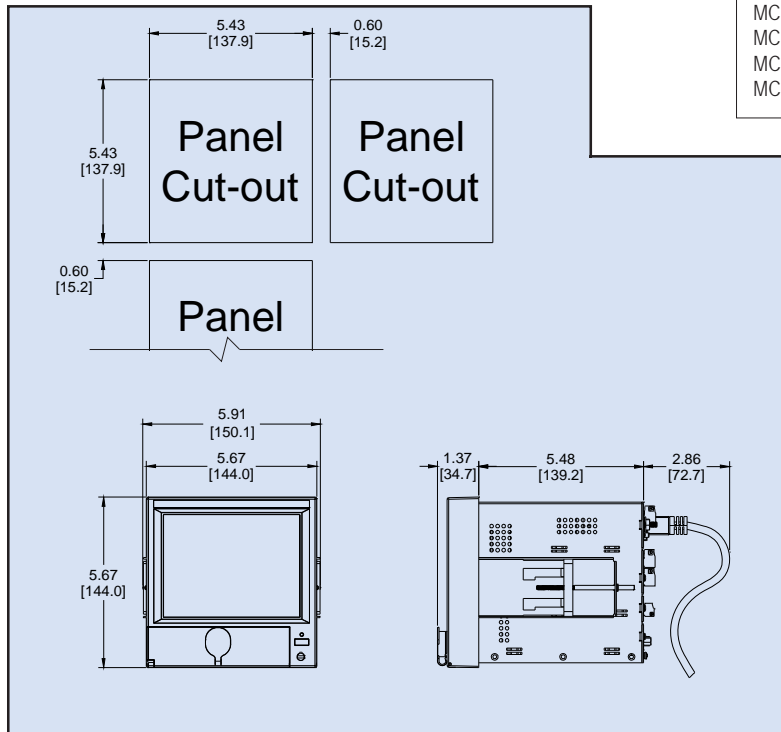
Accessories

Part No.	Description
Exhibitor	Windows compatible software program
Exhibitor SE	21CFR11 Compliant Windows compatible software program
NIST 6000	N.I.S.T. traceable certificate of calibration with documentation
21CFR CS	21CFR p.11 Compliance Statement
21CFR CDP	21CFR p.11 IQ/OQ/PQ Validation Package
MAS50R	50 ohm external shunt resistor, 0.1% accuracy
CC-8	Padded nylon carrying case with shoulder strap
CFCR	Compact Flash Card Reader with USB cable
Audio Splitter	Splitter for audio port (includes cables)
Keyboard Splitter	Splitter for keyboard and mouse port (includes cable)
Stylus Pak	3 pack of stylus'
Keys	Replacement media door key (pair)
NEMA 6000	NEMA 4 hinged enclosure, wall mount 11"D x 18"H x 16"W
USB WNA	Wireless N USB network adapter, 2.4GHz 802.11 b/g/n

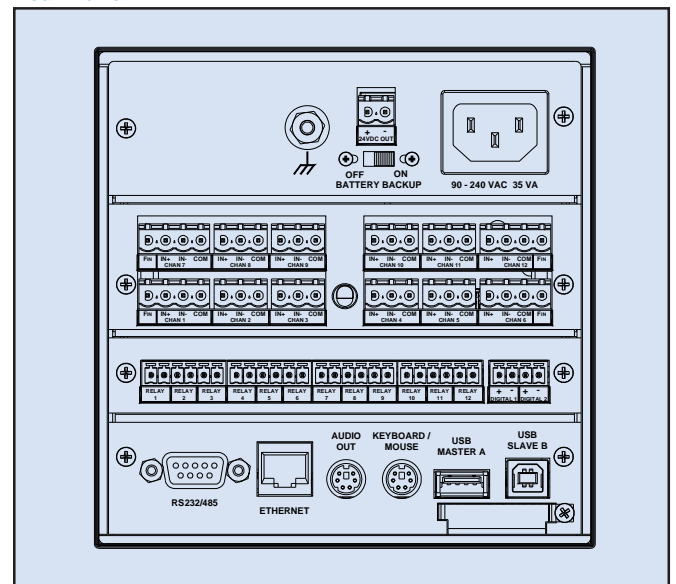
Compact Flash Memory Cards

Part No.	Capacity
MC256MBCF	256 Megabyte
MC512MBCF	512 Megabyte
MC1024MBCF	1 Gigabyte
MC2048MBCF	2 Gigabyte

Dimensions



Rear Panel



CORPORATE HISTORY

Innovation in Instrumentation

Monarch International, Inc. was founded in 1977 as a sales and service organization for a diverse range of instrumentation. In 1982, the Monarch Instrument Division was established to manufacture and market the first microprocessor based portable tachometers.



Monarch International's 30,000 square-foot facility in Amherst, New Hampshire, U.S.A.

With the addition of new models of tachometers and the introduction of the Nova-Strobe Series of portable stroboscopes, Monarch rapidly became the worlds' largest supplier of rotational speed measuring instrumentation and stroboscopic inspection equipment.

In 1992, Monarch introduced the DataChart Paperless Recorder. Today, we offer a wide range of technical capabilities and competitive pricing throughout the DataChart product line to include color touchscreens and multi-channel recorders.

"Innovation in Instrumentation" is the Monarch design philosophy and in recent years we have introduced state-of-the-art products:

- ▶ **Pocket Laser Tachometer**
- ▶ **Palm Strobe x**
- ▶ **Nova-Strobe DBx Stroboscope**
- ▶ **Track-It USB Data Loggers**
- ▶ **DataChart 1250 Paperless Recorder**
- ▶ **DataChart 6000 Networkable Paperless Recorder**

Monarch Instrument remains committed to innovations and



Thank you from all of us at Team Monarch

Our full service sales force and world-wide distribution force stands ready to answer purchase and applications questions. Please feel free to contact us via our toll free telephone line, website, e-mail, fax or surface mail. We offer a comprehensive line of precision products and calibration services, all with the convenience of the Internet.



Monarch Instrument also manufactures a full line of proactive maintenance and monitoring instruments. Please visit www.monarchinstrument.com for more information.



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