

2680 Series Data Acquisition Systems

Technical Data

The Fluke 2680A Data Acquisition System and Fluke 2686A Data Logging System (the 2680 Series) are the newest in a long line of Fluke precision data acquisition products. Both systems feature:

- 120-channel capacity chassis designed for small- and large-scale precision data acquisition applications.
- User-scalability from 20 to 120 universal analog input channels; can include digital input/output and alarm contact outputs in a single chassis.
- Ethernet TCP/IP protocol with network interface for 10/100 BaseT.
- Powerful HMI development software and OPC server software available.



Fluke 2680 Series: A powerful choice

The Fluke 2680 Series offers the choice of networked data acquisition, stand-alone data logging, or a combination of both. Choose from two basic chassis models:

2680A Data Acquisition System chassis

The Fluke 2680A Data Acquisition System is the choice for multi-channel applications requiring reliable Ethernet communications. It features a front-end style data acquisition system that communicates and distributes data anywhere you need it to go. The 10BaseT and 100BaseT communications interface makes it compatible with both older and newer network installations.

2686A Data Logging System chassis

The Fluke 2686A Data Logging System writes data to a memory card for easy retrieval and storage, making it ideal for remote locations and mobile or non-computer assisted data logging applications. The system comes with a 16 MB ATA memory card, and supports ATA flash memory cards of up to 1 GB to provide the memory capacity you need. The 2686A is easily configured for stand-alone data logging operations by simply selecting a preset configuration from the memory card. It can also be used in networks in tandem with the 2680A to provide the extra data security of a memory card.

Key system features:

- 20 to 120 universal analog inputs per chassis; systems to +2,000 channels
- Stand-alone data logger operation with the 2686A
- Large scalable LAN systems using the 2680A with 10BaseT/100BaseT
- Two types of Universal Input Modules: high-isolation precision modules or fast scan modules, with 16- to 18-bit resolution
- Throughput of more than 3,000 channels per-second per chassis with 2680A-FAI modules
- Superior thermocouple measurement accuracy (J, K, R, S, T, N, L, U, C, B)
- 20 digital I/O and 8 form C, 1 Amp relay output modules for direct control of equipment
- Up to 300 V input isolation, 1600 V transient overvoltage protection (2680A-PAI)
- Universal input conditioning for any input, on any channel, in any combination (V dc, V ac, Ohms, frequency, RTD, thermocouple, thermistor or current)
- ATA flash memory card for stand-alone operation—from 16 MB to 1 GB (2686A only)
- Multiple power sources: 100 V to 240 V and 9 V to 45 V dc
- Includes Fluke DAQ Software which:
 - Controls all 2680 Series functions and data files
 - Provides real-time and historical trending
 - Also communicates with and controls Fluke 2640A, 2645A NetDAQ products

Scale your system to meet your needs

With the Fluke 2680A and the 2686A, you can seamlessly expand your system from 20 to more than 2,000 channels just by adding modules and chassis. Both models feature six slots in each chassis that you can fill with modules as needed to meet your application requirements. Five slots in each chassis are available for any combination of 20-channel analog input modules available for the 2680 Series. The sixth slot is also available for a digital I/O relay module to add control capabilities to your system. If you don't need the sixth slot for control, you can plug in an additional analog input module, increasing your input channel count to 120 in one chassis.

You can also link multiple 120-channel systems together seamlessly for the widest possible view of your data. And, with TCP/IP connectivity, you can connect to existing LANs to distribute information wherever it needs to go.

Whether you need speed and throughput, isolated precision, or digital I/O and relays, the Fluke 2680 Series can scale up to thousands of channels to meet your needs. Buy just the modules you need in the combinations you need and expand your system as your requirements grow.

2680A-FAI: The speed to capture dynamic process changes

The Fluke 2680A-FAI (Fast Analog Input) is a perfect choice when you need a lot of information in a hurry and still need to maintain a high degree of accuracy for your measurements. The 2680A-FAI module provides chassis throughput rates of more than 3,000 channels-per-second. Specially manufactured field effect transistors (FETs) allow up to ± 50 V input, and channel-to-channel isolation well above the 15 V industry norm, to give you more confidence in the integrity of your measurements.

2680A-PAI provides high precision and high isolation for the most demanding jobs

The Fluke 2680A-PAI (Precision Analog Input) 20-channel high-precision, high-isolation module serves the most demanding jobs where precision is paramount and isolation is critical. Some of the most notable applications for this module include temperature measurement in semiconductor and pharmaceutical manufacturing, as well as nuclear plant performance monitoring. The 2680A-PAI module offers 300 V of isolation on two channels and 150 V on 18 channels, as well as 18-bit resolution and excellent thermocouple accuracy, all in a scalable system.

Both the 2680A-FAI and the 2680-PAI modules support a wide range of inputs including dc volts, ac volts, RTD, Ohms, thermocouple, thermistor, dc current, ac current, and frequency. Other sensors and transducers, such as load cells, pressure sensors, and displacement sensors can be easily incorporated into your measurement system.

2686A Active Channels and Memory Card Capacity (Scans)

Memory Card/ Active Channels	20 ch	40 ch	60 ch	80 ch	100 ch	120 ch
16 MB	100,548	66,765	50,074	40,059	33,382	28,613
128 MB	800,000	528,000	400,000	320,000	264,000	224,000
256 MB	1.6 M	1.056 M	800,000	640,000	528,000	448,000
512 MB	3.2 M	2.112 M	1.6 M	1.28 M	1.056 M	896,000
1 GB	6.2 M	4.224 M	3.2 M	2.56 M	2.112 M	1.792 M

2680A-DIO: Digital I/O and relay outputs add control

For data acquisition systems that also require control functionality, the Fluke 2680A-DIO digital I/O and relay output module provides 20 digital I/O and eight hard-contact 1 Amp form-C relays. This equips each chassis to respond to a wide range of alarm or control situations. The 2680A-DIO also includes an up/down counter with preset start count capability, so you don't need to begin all counts at zero.

2680A-180: Universal Input Module requires no external signal conditioning

Fluke's patented Universal Input Module is included with all Fluke data acquisition products, providing unparalleled thermocouple accuracy and compatibility with a broad range of diverse inputs. The Universal Input Module enables you to easily measure just about any electrical or physical parameter without changing hardware or adding external signal conditioning. You can connect any combination of dc voltage, ac voltage, thermocouples, current, RTD, resistance (2- or 4-wire), or frequency measurement inputs directly to the input module.



2680 Series DIO Module and Universal Input Module

Fluke DAQ Software makes it easy to get the most out of your data

Each Fluke 2680A and 2686A comes with our powerful, highly- flexible, yet easy-to-use Fluke DAQ Configuration Software. Fluke DAQ allows you to configure the 2680 Series for:

- Input type
- Alarms
- Math functions
- Totalizer function
- Digital I/O lines
- Scan speed
- Interval
- Trigger type

You can use Fluke DAQ Software to set up data files, collect and chart data in real-time or historical mode, and manage memory card files. Using Fluke DAQ, you can collect data from your system the way you need to and distribute it where you want it. And you can share data with others, anywhere on your LAN or anywhere around the world using Web servers.

Fluke DAQ Software also enables you to integrate Fluke NetDAQ® data acquisition products (2640A and 2645A) into your 2680 Series system, providing almost unlimited channels working together seamlessly.

Optional software extends system capabilities

Fluke has partnered with industrial software developer Indusoft to create additional tools to extend the power of your 2680 Series system. Optional software tools allow you to create human machine interfaces and develop custom applications that interact with other equipment and software packages.

Fluke 2680A-DEVSW: Development software for HMI design

The optional 2680A-DEVSW tool is based on Indusoft Web Studio, an object oriented development software program that works with Fluke DAQ Software. This unique development system allows programmers and non-programmers to develop modern human machine interfaces (HMI) which open graphical windows to your application.

Key features of this powerful development package include:

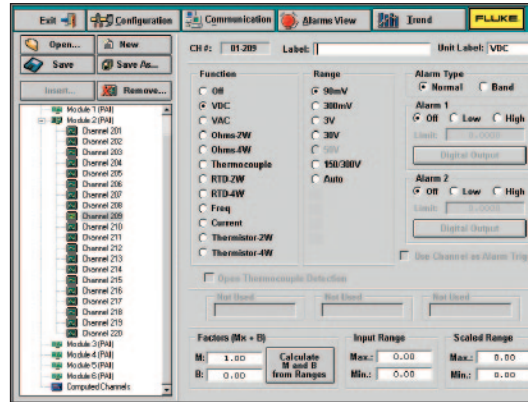
- An extensive graphics library
- Drag & drop programming
- More than 140 device drivers
- OPC client/server compliance
- Support for DNA, OPC, DDE, OBDC, XML, SOAP and Active X
- Automatic language translation at run-time
- Internationalization using Unicode
- Web display and alarm paging
- Support for imported graphics formats
- The ability to view multiple clients from one web browser

Fluke 2680A-OPC: Create custom applications using OLE for Process Control

Optional Fluke 2680A-OPC software gives you the freedom to integrate your 2680 Series into any OPC-compliant application. Create custom applications using 2680A-OPC software and just about any popular industrial software package such as Wonderware®, LabVIEW™, Test Point, or Indusoft Web Studio, as well as software from Canary Labs, Daisy Labs, and others. Open, non-proprietary OPC support enables you to use the software you choose or the software you create.

Fluke 2680A-DLL library: For developing or modifying applications

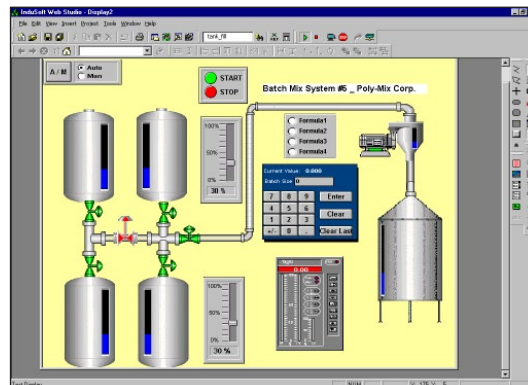
The 2680A DLL library is designed for programmers who want to develop or modify their own applications for the 2680 Series, using C++, Visual Basic, and other languages.



Fluke DAQ Software: Configuration made simple



Fluke DAQ Software: Real time and historical trending



2680A-DEVSW: Powerful HMI development software

2680A Series Specifications

Channel capacity (2680A or 2686A)

20 to 120 channels per chassis (6 analog input modules of 20 channels each)

One master alarm (open collector) per chassis

Communications: 10BaseT/100BaseT, TCP/IP via RJ45 connector, Cat 5

Math functions

In addition to its analog and digital input channels, each system supports 60 computed channels. Calculations include time & rate, addition, subtraction, multiplication, division, log, natural log, exponent, square root, absolute value, integer function and average.

Measurement speed (2680A-PAI)

Slow: 6 readings/second nominal

Medium: 41 (50 Hz), 48 (60 Hz) readings/second nominal

Fast: 143 readings/second nominal (5 readings/second for V ac nominal, 140 readings/second on 300 Ω range, 37 readings/second on 3 MΩ range)

Measurement speed (2680A-FAI)

Slow: 45 (50 Hz), 54 (60 Hz) readings/second nominal

Medium: 200 readings/second nominal

Fast: 800 readings/second nominal (5 readings/second for V ac nominal, 370 readings/second on 300 Ω range, 44 readings/second on 3 MΩ range)

Analog to digital converter

2680A-PAI: 18 bit, multi-slope type

2680A-FAI: 16 bit, multi-slope type

Common mode rejection

2680A-PAI:

AC: ≥ 120 dB (50/60 Hz, ± 0.1 % max 1 kΩ source imbalance)

DC: ≥ 120 dB

2680A-FAI:

AC: ≥ 100 dB (50/60 Hz, ± 0.1 % max 1 kΩ source imbalance)

DC: ≥ 100 dB

Normal mode rejection

50 dB @ 50/60 Hz, ± 0.1 %

Common mode voltage maximum

2680A-PAI: 300 V dc or V ac rms (channels 1.11);

150 V dc or V ac rms (all other channels)

2680A-FAI: 50 V dc or 30 V ac rms (all channels)

2680A-DIO

Totalizing input

Pre-settable starting count up/down counter
DC coupled, non-isolated, max +30 V, min -4 V

Max count: 4,294,967,295

Minimum signal: 2 V peak

Threshold: 1.4 V

Rate: 0 kHz to 5 kHz (debounce off)

Hysteresis: 500 mV

Input debouncing: None or 1.66 ms

Digital inputs/outputs: 20

Threshold: 1.4 V

Hysteresis: 500 mV

Maximum input: +30 V, min -4 V; non-isolated

Logical "zero" output:

0.8 V max |out = -1.0 mA (1 LSTTL load equivalent)

1.8 V max |out = -20 mA

3.25 V max |out = -50 mA

Logical "one" output:

Output voltage depends on external load 3.8 V min|out = 0.05 mA (1 LSTTL load equivalent)

Relays

Quantity: 8

Type: Form C; DPST

Current: 1 amp, non-inductive

Operation time: 75 ms

Alarm associations

Each Digital I/O may be randomly assigned as a digital input, status output, or alarm output (associated with any input channel or channels)

Trigger input

Minimum pulse: 5 μs

Minimum latency: 100 ms

Input "High": 2.0 V min, 7.0 V max

Input "Low": -0.6 V min, 0.8 V max non-isolated, contact closure and TTL compatible

Clock

Accurate to within 1 minute/month for 0 °C to 50 °C range

Measurement accuracy cont.

Model 2680A-PAI

AC Voltage				
Range	Resolution	Frequency	Accuracy ^{1,2,3σ} , (% input+counts)	
			Slow	Fast
300 mV	1 μV	20 Hz-50 Hz 50 Hz-20 kHz 20 kHz-50 kHz 50 kHz-100 kHz	3.0%+25 0.4%+25 2.0%+30 5.0%+50	6.0%+50 1.0%+50 3.0%+50 5.0%+100
3V	100 μV	Same frequencies, similar accuracies as above		
30V	1 mV	Same frequencies, similar accuracies as above		
150/300V	10 mV	Same frequencies, similar accuracies as above		
RTD (Pt 100)		Accuracy ^{1,5} , 3σ, C (4-wire)		
Temperature C	Resolution C	90 Day, 18 to 28 C	1 Year, 18 to 28 C	
			Slow	
			Slow	Slow
-200	0.003	0.06	0.09	
0	0.003	0.09	0.13	
100	0.003	0.10	0.16	
300	0.003	0.14	0.21	
600	0.003	0.19	0.30	
Thermistor ¹⁰ 2 k to 100 kΩ				
-40 C to 150 C	0.003	0.3	0.4	
Frequency Measurement Accuracy ^{1,8} , -20 to 60 C				
Range	Resolution		Accuracy, 3σ, (% input +Hz)	
	Slow	Fast	Slow	Fast
15 Hz-900 Hz	0.01 Hz	0.1 Hz	0.05%+0.02 Hz	0.05%+0.2 Hz
900 Hz-9 kHz	0.1 Hz	1 Hz	0.05%+0.1 Hz	0.05%+1 Hz
9 kHz-90 kHz	1 Hz	10 Hz	0.05%+1 Hz	0.05%+10 Hz
90 kHz-900 kHz	10 Hz	100 Hz	0.05%+10 Hz	0.05%+100 Hz
1 MHz	100 Hz	1 kHz	0.05%+100 Hz	0.05%+1 kHz
Frequency Measurement Sensitivity (sine wave)				
Frequency	Minimum Signal		Maximum Signal	
15 Hz - 200 Hz	100 mV rms		150/300V rms	
200 Hz - 70 kHz	100 mV rms		30V rms	
70 kHz - 100 kHz	100 mV rms		20V rms	
100 kHz - 200 kHz	150 mV rms		10V rms	
200 kHz - 300 kHz	150 mV rms		7V rms	
300 kHz - 1 MHz	linearly increasing from 150 mV rms at 300 kHz to 2V rms at 1 MHz		linearly decreasing from 7V rms at 300 kHz to 2V rms at 1 MHz	

¹ Total instrument accuracy for the indicated time period and ambient temperature range. Includes A/D errors, linearization conformity, initial calibration error, isothermality errors, reference junction conformity and power line voltage effects within the range from 100VAC to 264VAC.

² Sine wave inputs >2000 counts (slow), >200 counts (fast). Accuracies for crest factor 2.0.

³ For two-wire measurements add 5Ω to basic accuracy (does not include lead-wire resistances).

⁴ For two-wire measurements add 700-1000Ω to basic accuracy (does not include lead-wire resistances). Ohms varies due to the resistance of the solid state switches.

⁵ DIN/IEC 751 only, assumes no lead-wire resistance errors.

Model 2680A-FAI

AC Voltage				
Range	Resolution	Frequency	Accuracy ^{1,2,3σ} , (% input+counts)	
			Slow	Fast
300mV	10 μV	20 Hz-50 Hz 50 Hz-20 kHz 20 kHz-50 kHz 50 kHz-100 kHz	3.0%+25 0.4%+25 2.0%+30 5.0%+50	6.0%+50 1.0%+50 3.0%+50 5.0%+100
3V	100 μV	Same frequencies, similar accuracies as above		
30V	1 mV	Same frequencies, similar accuracies as above		
RTD (Pt 100)		Accuracy ^{1,5} , 3σ, C (4-wire)		
Temperature C	Resolution C	90 Day, 18 to 28 C	1 Year, 18 to 28 C	
			Slow	
			Slow	Slow
-200	0.03	0.16	0.25	
0	0.03	0.20	0.31	
100	0.03	0.23	0.34	
300	0.03	0.30	0.41	
600	0.03	0.53	0.63	
Thermistor 10 k to 100 kΩ				
-40 C to 150 C	0.03	0.4	0.5	
Frequency Measurement Accuracy ^{1,8} , -20 to 60 C				
Range	Resolution		Accuracy, 3σ, (% input +Hz)	
	Slow	Fast	Slow	Fast
15 Hz-900 Hz	0.01 Hz	0.1 Hz	0.05%+0.02 Hz	0.05%+0.2 Hz
900 Hz-9 kHz	0.1 Hz	1 Hz	0.05%+0.1 Hz	0.05%+1 Hz
9 kHz-90 kHz	1 Hz	10 Hz	0.05%+1 Hz	0.05%+10 Hz
90 kHz-900 kHz	10 Hz	100 Hz	0.05%+10 Hz	0.05%+100 Hz
1 MHz	100 Hz	1 kHz	0.05%+100 Hz	0.05%+1 kHz
Frequency Measurement Sensitivity (sine wave)				
Frequency	Minimum Signal		Maximum Signal	
15 Hz - 200 Hz	100 mV rms		30V rms	
200 Hz - 70 kHz	100 mV rms		30V rms	
70 kHz - 100 kHz	100 mV rms		20V rms	
100 kHz - 200 kHz	150 mV rms		10V rms	
200 kHz - 300 kHz	150 mV rms		7V rms	
300 kHz - 1 MHz	linearly increasing from 150 mV rms at 300 kHz to 2V rms at 1 MHz		linearly decreasing from 7V rms at 300 kHz to 2V rms at 1 M	

⁶ Resolution is 0.02 C or 0.04 F over the useful range of base metal thermocouples (J, K, T, E, N, L, U) and 0.1 C or 0.2 F resolution for types R, S, B, and C with slow scan.

⁷ Resolution is 0.2 C or 0.4 F over the useful range of base metal thermocouples (J, K, T, E, N, L, U) and 1.0 C or 2.0 F resolution for types R, S, B, and C with slow scan.

⁸ Accuracy for both slow and fast scan speeds.

⁹ Open thermocouple detection is performed on each thermocouple channel unless defeated by computer command.

¹⁰ Using Stein hart - Hart thermistor polynomial: $T = A+B (\ln R) + C (\ln R)^3$

T = temp in K

A, B and C = fitting constants

R = resistance of thermistor in Ω.

2680A Series General Specifications

General specifications

Power

100 V ac to 240 V ac, 50 Hz or 60 Hz 100 VA max, or 9 V dc to 45 V dc (50W dc) (if both sources are applied simultaneously, the greater of ac or DC is used.), at 120 V ac the equivalent DC voltage ~14.5 V

Temperature, humidity (non-condensing)

Operating: -20 °C to 28 °C, ≤ 90 % RH; 28 °C to 40 °C, ≤ 75 % RH; 40 °C to 60 °C, ≤ 50 % RH

Storage: -40 °C to 70 °C, 5 % to 95 % RH

Altitude

Operating: 2000 m

Storage: 12,200 m

Standards

All inputs: IEC Overvoltage rating Category II
Product conforms to the following safety and emission standards:

EN50082-2

EN55022-1

EN55011 class A

EN610000-4-2,3,4,6,8

EN61326

EN61010-1, CAT II

CSA C22.2 No. 1010.1

Operating temperature

-20 °C to 60 °C (-4 °F to +140 °F)

Storage temperature

-40 °C to 70 °C (-40 °F to +158 °F)

Size: 473 mm x 423 mm x 237 mm
(18.6 in x 17 in x 9.3 in)

Weight

2680A/2686A chassis only: 8.47 kg (18.86 lb)

2680A-FAI: 0.79 kg (1.74 lb)

2680A-PAI: 1.21 kg (2.66 lb)

2680A-DIO: 0.80 kg (1.75 lb)

Interfaces

Ethernet: Conforms to IEEE 802.3 Ethernet standard, compatible with 100BaseT and 10BaseT standards, uses TCP/IP protocol

RS-232C: For calibration only

System requirements

System requirements:

IBM compatible, Pentium II processor, 333 MHz

Microsoft Windows NT/98/2000/XP

64 MB RAM

150 MB free hard disk space

VGA or SVGA display, 100% IBM compatible with

2 MB Video RAM (VRAM)

CD-ROM Drive

Microsoft Internet Explorer 4.0 or later



Easy access to expansion slots and rear panel

Ordering Information

Models

Model #	Description
2680A	Data Acquisition System Chassis 6 slots
2686A	Data Logging System Chassis 6 slots ATA Flash memory drive Includes 16 MB memory card
2680A-FAI*	Fast Analog Input Module 20 universal channels 50 V max isolation 16-bit resolution 1000 ch/sec scan rate
2680A-PAI*	Precision Analog Input Module 20 universal channels 300 V Max isolation 18-bit resolution 140 ch/sec scan rate
2680A-DIO*	Digital I/O and relay module (one per chassis), 20 digital input/outputs, 8 1-Amp contacts, 1 totalizer

*Includes universal input module or DIO connector module as appropriate

Software

Model #	Description
Fluke DAQ	Configuration software for Fluke 2680 Series and NetDAQ Series.(Included with purchase of 2680A, 2686A system chassis)
2680A-DEVSU	Indusoft Web Studio development software for Fluke DAQ
2680A-DLL	DLL Library for Fluke 2680 Series
2680A-OPC	OPC software for Fluke 2680 Series

Accessories

Model #	Description
2680A-180	Universal Input Module, extra connector
2680A-102	2680A-DIO connector module, extra connector
2620A-101	Shunt resistor set (12 ea), 10 ohm, .1%
2686A-800	16 MB ATA Flash memory card for Fluke 2686A
2686A-801	128 MB ATA Flash memory card for 2686A
2686A-802	256 MB ATA Flash memory card for 2686A
2686A-805	512 MB ATA Flash memory card for 2686A
2686A-810	1 GB ATA Flash memory card for 2686A
Y2680	19-inch rack mount kit for Fluke 2680 Series

Sample order:

The following is a sample order for a data logger with 40 channels of analog input and a digital output module.

Model #	Description	Quantity
2686A	Fluke 2686A Data Logging System Chassis with 16 MB memory card	1
2680A-PAI	Precision Analog Input Module for Fluke 2680 Series, 20 channels	1
2680A-FAI	Fast Analog Input Module for Fluke 2680 Series, 20 channels	1
2680A-DIO	Digital output and relay alarm card for Fluke 2680 Series	1

Calibration

Each analog input module comes with a serialized Statement of Calibration Practices and calibration seal. Placement of modules between chassis slots or between chassis does not affect module calibration. The chassis and 2680A-DIO do not require calibration.

Sealed calibration is performed via RS-232 port on the chassis. Recommended 1-year calibration cycle.

Fluke. *Keeping your world up and running.*®

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