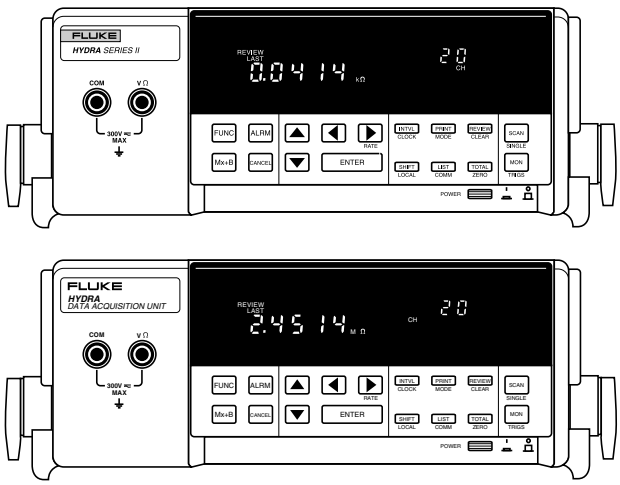
FLUKE®

Data Acquisition
Detailed Specifications

Hydra Series
Models 2620A, 2620A/05, 2625A, 2635A

This document provides detailed specifications for the Fluke 2680A Series, Hydra Series and NetDAQ data acquisition products. This is a supplement to the Fluke Data Acquisition Tools brochure (1267610). If you wish to obtain a copy of this product brochure you may call: in the U.S.A., (800) 44-FLUKE; Canada, (905) 890-7600; Europe, +31 (0) 40 2 678 200; other countries, (425) 356-5116, or contact your local representative.



Hydra Series

Channel capacity
Analog inputs: 21
Digital I/O and alarm outputs: 12 total
Totalizer: 1

Power
90 to 264 Vac, 50 or 60 Hz (<10W), or 9 to 16 Vdc (<4W) (If both sources are applied simultaneously, the greater of ac or dc is used.) At 120 VAC the equivalent DC voltage ~14.5V.

Temperature, humidity (non-condensing)
Operating: 0°C to 28°C, ≤ 90% RH; 28°C to 40°C,≤ 75% RH; 40°C to 60°C, ≤ 50% RH
Storage: -40°C to 75°C, 5% to 95% RH

Altitude
Operating: 2000 m
Storage: 12000 m

Voltage ratings
300 Vdc or Vac rms (channels 0,1,11); 150 Vdc or Vac rms (all other inputs) IEC Overvoltage Category II

Common mode voltage
300V dc or ac rms maximum from any analog input (channel) to earth provided that channel to channel maximum voltage ratings are observed

Standards
IEC1010, ANSI/ISA-S82.01-1994, CSA-C22.2 No. 1010.1-92, and EN61010-1:1993. Complies with EN 50081-1, EN 50082-1, Vfg. 243/1991 and FCC-15B at the Class B level, when shielded cables are used.

Size
9.3 cm H x 21.6 cm W x 31.2 cm D

Weight
3.0 kg

Memory life
10 years minimum for real time clock, setup configuration and measurement data (from date of manufacture)

Interfaces
RS-232

connector:	Nine pin male (DB-9P)
signals:	TX, RX, DTR, GND, CTS,* DSR,* RTS*
modem control:	Full duplex
baud rate:	300, 600, 1200, 2400, 4800, 9600, 19.2k*, 38.4k*
data format:	8 data bits, no parity, one stop bit; or 7 data bits, one parity bit, one stop bit
parity:	Odd, even, none
echo:	On/Off
flow control:	XON/XOFF, CTS*

* 2635A only

IEEE-488 (Optional, 2620A only) Disables RS-232 interface while in use.

2635A memory card

Type: SRAM type only; PCMCIA compliant

Capacity: The chart below shows Memory Card storage capacity in scans for one data file. One scan comprises date and time, readings from all defined analog input channels, the status of the four alarm outputs and eight digital I/O, and the totalizer count.

Number of scans per card

Memory Card size	Channels in scan 4	10	20
256 kb	8900	4800	2710
512 kb	18250	9840	5560
1 Mb	36860	19860	11210
2 Mb	74110	39910	22550
4 Mb	149039	80251	45359

2625A data memory

- Stores 2,047 scans
- Stored with each scan: time stamp, all defined analog input channels, the staus of four alarm outputs and eight digital I/O, and the totalizer count
- Memory life: 5 years minimum; at 25°C

RTD (Pt 100)			Accuracy[1,3] ±°C (4-Wire)	
Temp. (°C)	Resolution Slow	Fast	Slow	Fast
-200°C	0.02	0.1	0.05	0.47
0°C	0.02	0.1	0.09	0.55
100°C	0.02	0.1	0.10	0.58
300°C	0.02	0.1	0.14	0.65
600°C	0.02	0.1	0.20	0.76

Frequency			Accuracy (Slow/Fast) ±(%+counts)
Range	Resolution Slow	Fast	
15-900 Hz	0.01 Hz	0.1 Hz	0.05 + 2
9 kHz	0.1 Hz	1.0 Hz	0.05 + 1
90 kHz	1 Hz	10 Hz	0.05 + 1
900 kHz	10 Hz	100 Hz	0.05 + 1
1 MHz	100 Hz	1 kHz	0.05 + 1

Sensitivity	
Frequency	Level
15 Hz-100 kHz	100 mV rms sine wave
100 kHz-300 kHz	150 mV rms sine wave
300 kHz-1 MHz	2V rms sine wave
Above 1 MHz	not specified

Measurement accuracy

DC Voltage			Accuracy[1], 3σ, ±(%+V)		
Range	Resolution Slow	Fast	Slow 90 days	1 year	Fast 1 year
90 mV*	1 μV	10 μV	.019% + 6 μV	.024% + 6 μV	.044% + 20 μV
300 mV	10 μV	100 μV	.018% + 20 μV	.023% + 20 μV	.040% + 0.2 mV
3V	100 μV	1 mV	.019% + 0.2 mV	.024% + 0.2 mV	.041% + 2 mV
30V	1 mV	10 mV	.019% + 2 mV	.024% + 2 mV	.041% + 20 mV
300/150V	10 mV	100 mV	.019% + 20 mV	.024% + 20 mV	.041% + 0.2V
Resistance			**Accuracy (4-wire)[1,3] ±(%+Ω)**		
300Ω	10 mΩ	100 mΩ	0.013% + 20 mΩ	0.014% + 20 mΩ	0.014% + 200 mΩ
3 kΩ	100 mΩ	1Ω	0.015% + 0.2Ω	0.016% + 0.2Ω	0.016% + 2Ω
30 kΩ	1Ω	10Ω	0.013% + 2Ω	0.014% + 2Ω	0.014% + 20Ω
300 kΩ	10Ω	100Ω	0.020% + 20Ω	0.021% + 20Ω	0.021% + 0.2 kΩ
3 MΩ	100Ω	1 kΩ	0.059% + 0.2 kΩ	0.063% + 0.2 kΩ	0.063% + 2 kΩ
10 MΩ	1 kΩ	10 kΩ	0.168% + 2 kΩ	0.169% + 2 kΩ	0.709% + 20 kΩ
AC Voltage (True rms, ac coupled) Frequency				**Accuracy[1,2] ±(%+counts)**	
			20 Hz-50 Hz	1.43% + 15	1.43% + 4
300 mV	10 μV	100 μV	50 Hz-150 Hz	0.3% + 15	0.3% + 4
3V	100 μV	1 mV	150 Hz-10 kHz	0.16% + 15	0.16% + 4
30V	1 mV	10 mV	10 kHz-20 kHz	0.37% + 15	0.37% + 4
300/150V	10 mV	100 mV	20 kHz-50 kHz	1.9% + 20	1.9% + 4
			50 kHz-100 kHz	5.0% + 50	5.0% + 10

Thermocouples[5] 2635A ITS90		Accuracy[1,4], 3σ, (± °C) 18 to 28°C			0 to 60°C	
Type	Temp. (°C)	90 days slow	1 year slow	1 year fast	1 year slow	1 year fast
J	-100°C to -30°C	0.42	0.43	0.91	0.55	1.08
	-30°C to 150°C	0.37	0.39	0.80	0.57	1.02
	150°C to 760°C	0.44	0.48	0.94	0.88	1.38
K	-100°C to -25°C	0.52	0.53	1.13	0.65	1.31
	-25°C to 120°C	0.43	0.44	0.93	0.62	1.16
	120°C to 1000°C	0.61	0.68	1.38	1.28	2.03
	1000°C to 1372°C	0.89	0.98	1.87	1.85	2.79
N	-100°C to -25°C	0.62	0.63	1.44	0.75	1.61
	-25°C to 120°C	0.53	0.55	1.22	0.67	1.39
	120°C to 410°C	0.47	0.49	1.08	0.69	1.28
	410°C to 1300°C	0.70	0.78	1.52	1.45	2.23
E	-100°C to -25°C	0.44	0.46	0.91	0.57	1.09
	-25°C to 350°C	0.38	0.39	0.77	0.61	0.98
	350°C to 650°C	0.39	0.43	0.82	0.80	1.23
	650°C to 1000°C	0.50	0.56	1.05	1.11	1.63
T	-150°C to 0°C	0.68	0.69	1.50	0.82	1.71
	0°C to 120°C	0.45	0.46	0.95	0.59	1.13
	120°C to 400°C	0.36	0.39	0.78	0.61	1.02
R	250°C to 400°C	0.83	0.85	2.47	1.02	2.66
	400°C to 1000°C	0.79	0.81	2.30	1.15	2.53
	1000°C to 1767°C	0.96	1.05	2.59	1.85	3.42
S	250°C to 1000°C	0.88	0.89	2.60	1.26	2.80
	1000°C to 1400°C	0.83	0.89	2.34	1.47	2.94
	1400°C to 1767°C	1.07	1.17	2.96	2.03	3.84
B	600°C to 1200°C	1.11	1.12	3.53	1.27	3.69
	1200°C to 1550°C	0.74	0.77	2.25	1.18	2.57
	1550°C to 1820°C	0.82	0.89	2.35	1.43	2.90
C	0°C to 150°C	0.72	0.73	1.90	0.86	2.08
	150°C to 650°C	0.62	0.64	1.62	0.99	1.94
	650°C to 1000°C	0.70	0.76	1.81	1.29	2.38
	1000°C to 1800°C	1.12	1.25	2.86	2.38	4.04
	1800°C to 2316°C	1.86	2.08	4.61	4.06	6.66

*2635A only

Note: The terms "slow" and "fast" in these tables refer to the minimum and maximum measurement speed (Rdgs/s) as listed in the specifications for a specific model.

Measurement accuracy cont.

Thermocouples[5]		Accuracy[1,4], 3σ, (± °C)				
		18 to 28°C			0 to 60°C	
B	600 to 1200	1.11	1.12	3.53	1.27	3.69
	1200 to 1550	0.74	0.77	2.25	1.18	2.57
	1550 to 1820	0.82	0.89	2.35	1.43	2.90
C	0 to 150	0.72	0.73	1.90	0.86	2.08
	150 to 650	0.62	0.64	1.62	0.99	1.94
	650 to 1000	0.70	0.76	1.81	1.29	2.38
	1000 to 1800	1.12	1.25	2.86	2.38	4.04
	1800 to 2316	1.86	2.08	4.61	4.06	6.66

[1] Total instrument accuracy for 1 year following calibration (unless otherwise stated). Ambient operating temperature 18°–28°C (unless otherwise stated). Includes A/D errors, linearization conformity, initial calibration error, isothermality errors, and reference junction conformity. (Sensor inaccuracies not included.) Relative humidity up to 90% non-condensing (except up to 70% for the 300 kΩ, 3 MΩ, and 10 MΩ ranges).
[2] Sine wave inputs >2000 counts (slow), >200 counts (fast). Accuracies for crest factor ≤2.0.
[3] DIN/IEC 751 only, 4-wire configurations.
[4] Resolution is 0.1°C or 0.1°F over the useful range of base metal thermocouples (J, K, T, E, N) and 0.2° resolution for types R, S, B, and C, with slow scan. Fast scan resolution =1°C or F.
[5] Open thermocouple detection is performed on each thermocouple channel unless defeated by computer command. IPTS 68 specifications are published in the user manual.

Front panel input
DCV, ACV, (300V maximum) resistance, frequency. Use any of the Fluke TL Series of test leads. (One set of TL70 test leads included with Hydra)

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

Normal mode rejection
53 dB (60 Hz, ±0.1%)
47 dB (50 Hz, ±0.1%)

Scan speed
Slow: 4 readings/second nominal
Fast: 18 readings/second nominal (1.5 readings/second for ACV and Ω inputs nominal)

Analog to digital converter
Dual Slope type, linear to 17 bits

Totalizing inputs
DC coupled, non-isolated, max + 30V, min –4V
Max count: 65,535
Minimum signal: 2V peak
Threshold: 1.4V
Rate: 0–5 kHz (debounce off)
Hysteresis: 500 mV
Input debouncing: None or 1.66 ms

Digital inputs
Threshold: 1.4V
Hysteresis: 500 mV
Maximum input: +30V, min –4V; non-isolated

Digital/Alarm outputs
The open collector output lines are non-isolated, TTL compatible with the following logic levels:
Logical "zero" output:
0.8V max | out = –1.0 mA
(1 LSTTL load equivalent)
1.8V max, | out = –20 mA
3.25V max, | out = –50 mA
Logical "one" output:
Output voltage depends on external load
3.8V min, | out = 0.05 mA
(1 LSTTL load equivalent)

Trigger input
Minimum pulse: 5 μs
Maximum latency: 100 ms
Repeatability: 1 ms
Input "High": 2.0V min, 7.0V max
Input "Low": –0.6V min, 0.8V max
Non-isolated, contact closure and TTL compatible

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

Calibration
Calibration is performed closed-case via software, eliminating troublesome mechanical adjustments. This improves operational reliability by avoiding the drift caused by vibration, temperature, and humidity on conventional calibration controls.

Alarms associations

Configured from	Alarm outputs				Digital I/O							
	0	1	2	3	0	1	2	3	4	5	6	7
Front panel	ch0 (Fixed)	ch1 (Fixed)	ch2 (Fixed)	ch3 (Fixed)	digital inputs				ch4 ch8 ch12 ch16/20	ch5 ch9 ch13 ch17	ch6 ch10 ch14 ch18	ch7 ch11 ch15 ch19
Computer	ch0 (Fixed)	ch1 (Fixed)	ch2 (Fixed)	ch3 (Fixed)	Each Digital I/O may be randomly assigned as a digital input, status output, or alarm output (associated with any input channel or channels), except ch 0–3							