Lista de Componentes

Todos los componentes (siguiente página) usados en los experimentos de Mediciones Ambientales se encuentran en muchos negocios de componentes electrónicos. Aquellos que deseen comprar un kit completo, pueden hacerlo a través de Parallax. Parallax recarga los costos de envío por los componentes, parcialmente compensado debido a los precios por grandes volúmenes que se obtienen de los fabricantes. Se puede lograr un ahorro de hasta un 10% en bajas cantidades (~10 unidades) del Kit de Componentes de Mediciones Ambientales , comprando los componentes por su cuenta, pero en cantidades más grandes, el ahorro en los kits Parallax es sustancial.

Cada experimento necesita la Plaqueta de Educación - Kit Completo(#28102):

Parallax también comercializa el Kit de la Plaqueta de Educación (#28150), que trae solamente la plaqueta y los cables de interconexión. Use este kit si usted ya tiene un módulo BS2-IC y una fuente de alimentación. Piezas individuales pueden también ser ordenadas usando los códigos de stock Parallax que se muestran a continuación.

Plaqueta de Educación Kit Completo (#28102)

Código Parallax	Descripción	Cantidad
28150	Plaqueta de Educación	1
800-00016	Cables de interconexión	6
BS2-IC	Módulo BASIC Stamp II	1
750-00008	Fuente de alimentación 300 mA 9 VCC	1
800-00003	Cable Serial	1

Kit Plaqueta de Educación (#28150)

Código Parallax	Descripción	Cantidad
28102	Plaqueta de Educación y cables de interconexión	1
800-00016	Cables de interconexión	6

Esta documentación impresa es muy útil para obtener información adicional:

Documentación BASIC Stamp

Código Parallax	Descripción	¿Disponibilidad en Internet?
27919	Manual BASIC Stamp Version 1.9	http://www.stampsinclass.com
28123	Texto ¿Qué es un Microcontrolador?	http://www.stampsinclass.com
27951	Programming and Customizing the BASIC Stamp Computer	Índice solamente en http://www.stampsinclass.com

Los experimentos de Mediciones Ambientales necesitan el Kit de Componentes de Mediciones Ambientales (#28126)

El contenido del Kit de Componentes de Mediciones Ambientales se lista a continuación. Estos componentes son necesarios para construir todos los proyectos. En el caso que necesite componentes específicos de Parallax, puede pedirlos a través del código de stock de la lista. Si usted quiere comprar estos componentes en otro lugar y necesita ayuda para identificar la fuente de algún componente, siéntase libre de contactarnos en stampsinclass@parallaxinc.com.

Kit de Componentes de Mediciones Ambientales (#28126)

Código Parallax	Descripción	Cantidad
150-01011	resistor 100 ohm ¼ wat 5%	4
150-01020	resistor 1K ¼ wat 5%	1
150-01030	resistor 10K ¼ wat 5%	1
150-01040	resistor 100K ¼ wat 5%	2
150-01000	resistor 10 ohm 1W (óxido metálico)	1
150-04710	resistor 470 ohm 1/4 wat 5%	2
200-01010	capacitor 100 pF	2
200-01040	capacitor 0.1 uF	3
200-01031	capacitor 0.01 uF 50V	1
200-02240	capacitor 0.22 uF 50V	3
350-00012	Fotodiodo (Photonic Detectors)	1
350-00001	LED, verde	1
350-00006	LED, rojo	1
500-00004	transistor de alta ganancia de 2 A (Zetex1049A)	1
400-00001	pulsador	1
604-00002	Termómetro Digital DS1620 (Dallas Semiconductor)	1
604-00010	Temporizador 555, 8-pin DIP	1
700-00020	Tornillos de acero inox. 2", 4-40	2
700-00036	Tuerca autoblocante 4-40	2
700-00019	Lazos para cables	2
800-00016	Cables de interconexión de 7 cm (paquete de 10)	2
800-00021	Cable rojo de 40cm	1
800-00022	Cable negro de 40cm	1
900-00001	Parlante piezoeléctrico (transductor de sonido)	1
28130	Punta de temperatura, ver Apéndice B (Analog Devices 592)	1
700-00018	Bomba (Edmund Scientific X50-345)	1

S/N	Tapa de vaso hecha de plástico o plaqueta de circuito impreso, con dos agujeros de 1/8" para tornillos 0.4	1
Por el cliente	Vaso y bandeja	1

Suministros

La red de distribución de Parallax funciona en aproximadamente 40 países por todo el mundo. Algunos de esos distribuidores también son distribuidores autorizados de Stamp en Clase . Los distribuidores de Stamp en Clase normalmente tienen en stock la Plaqueta de Educación (#28102 y #28150) . También se listan algunas compa ías de componentes electrónicos para aquellos clientes que deseen armar sus propios Kits de Componentes.

País	Compañía	otas
Estados Unidos	**Parallax Inc** 3805 Atherton oad, Suite 102 ocklin, CA 95765 USA (916) 624-8333, fax (916) 624-8003 http://www.stampsinclass.com http://www.parallaxinc.com	Suministra Parallax y Stamp en Clase. Fabricante del BASIC Stamp.
Estados Unidos	**Digi-Key Corporation** 701 Brooks Avenue South Thief iver Falls, MN 66701 (800) 344-4539, fax (218) 681-3380 http://www.digi-key.com	Fuente de componentes electrónicos. Distribuidor Parallax. Excelente fuente de componentes. Puede tener en stock la Plaqueta de Educación.
Australia	35 Woolart Street Strathmore 3041 Australia phone / fax 613 9338-3306 http://people.enternet.com.au/~nollet	Distribuidor Parallax y Stamp en Clase.
Australia	**Micro ed Computers** P Box 634 Armidale 2350 Australia Phone 612-67-722-777, fax 61-67-728-987 http://www.microzed.com.au	Distribuidor Parallax. Distribuidor de Stamp en Clase. Excelente soporte técnico.
Canadá	**Aerosystems** 3538 Ashby St-Laurent, QUE 4 2C1 Canada (514) 336-9426, fax (514) 336-4383	Distribuidor Parallax y Stamp en Clase.

Canadá	**ec nologies** 300-8120 Beddington Blvd NW, #473 Calgary, AB T3K 2A8 Canada (403) 730-8603, fax (403) 730-8903 http://www.hvwtech.com	Distribuidor Parallax y Stamp en Clase.
Alemania	**Ele troni laden** W. Mellies Str. 88 32758 Detmold Germany 49-5232-8171, fax 49-5232-86197 http://www.elektronikladen.de	Distribuidor Parallax y Stamp en Clase.
Nueva Zelandia	**rade ec** Auckland ead ffice, P. . Box 31-041 Milford, Auckland 9 New Zealand 64-9-4782323, fax 64-9-4784811 http://www.tradetech.com	Distribuidor Parallax y Stamp en Clase.
Inglaterra	**Milford Instruments** Milford ouse 120 igh St., S. Milford Leeds KS LS25 5AQ United Kingdom 44-1-977-683-665 fax 44-1-977-681-465 http://www.milinst.demon.co.uk	Distribuidor Parallax y Stamp en Clase.

Libros y ecursos en Internet

Si usted es nuevo con el BASIC Stamps, electrónica, o programación, hay varias fuentes en Internet o impresas que tal vez quiera investigar.

Libros y Publicaciones

Programming Customizing the Basic Stamp Computer por Scott Edwards. ISBN 0-07-913684-2. Disponible en Parallax (#27905) y Amazon (http://www.amazon.com).

Parallax BASIC Stamp Manual Version 1.9 de Parallax (#27919) y distribuidores.

Nuts and Volts Magazine Stamp Applications. Publicadas mensualmente en la revista Nuts and Volts (http://www.nutsvolts.com), con artículos anteriores disponibles gratuitamente en su sitio web.

Getting Started in Electronics por Forrest M. Mimms. Disponible en las tiendas adio Shack.

Internet

Sitio web Parallax http://www.parallaxinc.com y el sitio web Parallax Stamps in Class http://www.stampsinclass.com incluyen recursos para bajar gratuitos del BASIC Stamp.

Sitio web de Tracy Allen, Ph.D. http://www.emesystems.com. El Dr. Allen escribió el texto Mediciones Ambientales y usa el BS2SX-IC en sus dataloggers disponibles comercialmente.

Al Williams Consulting tiene el Proyecto BASIC Stamp del mes en http://www.al-williams.com.

List of Stamp Applications en http://www.hth.com provee más de 150 proyectos que usan el BASIC Stamp.

Construyendo la Punta de emperatura AD5 2

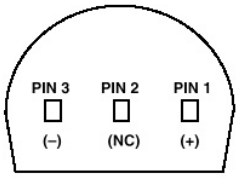
Los experimentos de Mediciones Ambientales usan el transductor de temperatura AD 592. El componente debe ser protegido antes de ser insertado en un medio líquido. Parallax arma esta punta de temperatura (#28130), pero puede armarla usted mismo con este procedimiento. Una hoja de datos abreviada del AD 592 (en inglés) se incluye en el Apéndice D de este libro.

sted necesitará los siguientes materiales:

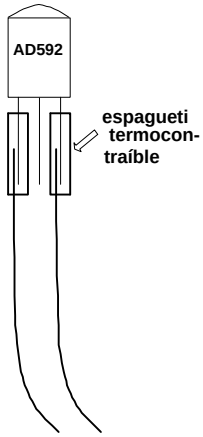
(1) Transductor de Temperatura AD592 en encapsulado plástico TO-92 (Newark Electronics)
(2) cables de 40 cm, uno rojo y el otro negro, pelados en ambos extremos
(2) 3 cm de espaguetis termocontraíbles, para cubrir las soldaduras (Powell Electronics CWT-1502 o eq.)
(1) 4 cm de espaguetis termocontraíbles con diámetro interno de 0,7 cm (Digi-Key EPS3316NK-ND o eq.)
(1) soldador

Para construir la punta:

1. Identifique los pines del AD 592 (-), NC (No Conectar), y ( )que se muestran en la imagen

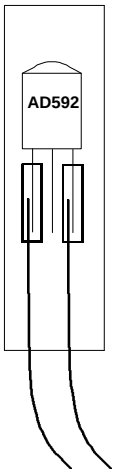


2. Suelde el cable negro en el pin 3 (-). Suelde el cable rojo en el pin 1 ( ). Deslice los espaguetis termocontraíbles sobre las soldaduras (como se muestra en al figura), y caliéntelos.



3. Deslice el termocontraíble grande sobre todo el montaje (dispositivo y soldaduras). Caliente todo con el soldador y mientras esté caliente, selle la parte superior para asegurarse estanqueidad.

Selle aquí →



Código de Colores de esistores

La mayoría de los tipos comunes de resistores tienen bandas de colores que indican su valor. Los resistores que usaremos en esta serie de experimentos son normalmente 1/4 wat, de carbón, con una tolerancia del 5% . Si se fija en la secuencia de bandas observará que una de las bandas (en un extremo) es dorada. sta es la cuarta banda, y el color dorado significa que tiene una tolerancia del 5%.

El código de colores del resistor es un estándar industrial para la identificación de valores de resistores. Cada banda de color representa un número y el orden en que se encuentran tiene un significado. Las dos primeras bandas indican un número. La tercera banda de color indica el multiplicador, o en otras palabras, la cantidad de ceros. La cuarta banda indica la tolerancia del resistor /- 5, 10 o 20 %.

Color	1er Dígito	2do Dígito	Multiplicador	olerancia
negro	0	0	1	
marrón	1	1	10	
rojo	2	2	100	
naranja	3	3	1,000	
amarillo	4	4	10,000	
verde	5	5	100,000	
azul	6	6	1,000,000	
violeta	7	7	10,000,000	
gris	8	8	100,000.000	
blanco	9	9	1,000,000,000	
dorado			1/10	5%
plateado			1/100	10%
Sin color				20%

Un resistor tiene las siguientes bandas de color:

Banda 1.	rojo
Banda 2.	violeta
Banda 3.	amarillo
Banda 4.	dorado

Mirando la lista de arriba vemos que el rojo vale 2.

Así que escribimos: 2 .
Violeta tiene un valor de 7.
Así que escribimos: 27
Amarillo tiene un valor de 4.
Así que escribimos: 27 y cuatro ceros o 270.000 .

Este resistor tiene un valor de 270,000 ohms (o 270k) y una tolerancia del 5%.

o as de Datos

El Apéndice D tiene hojas de datos abreviadas de los componentes claves usados en estos experimentos. Las hojas de datos completas están disponibles en los sitios web de los fabricantes que se muestran debajo. Este apéndice incluye solamente las dos primeras páginas de las hojas de datos. Toda esta información se encuentra en Inglés

bicación de las o as de Datos

Componente	Dirección de abricante en Internet	Páginas en su sitio eb
Analog Devices 592	http://www.analogdevices.com/	8
Dallas Semiconductor 1620	http://www.dalsemi.com/	12
Edmund Scientific Pump	http://www.edmundscientific.com/	1

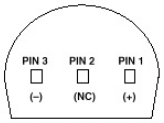
ANALOG DEVICES

Low Cost, Precision IC Temperature Transducer

AD592*

FEATURES
High Precalibrated Accuracy: 0.5°C max @ +25°C
Excellent Linearity: 0.15°C max (0°C to +70°C)
Wide Operating Temperature Range: –25°C to +105°C
Single Supply Operation: +4 V to +30 V
Excellent Repeatability and Stability
High Level Output: 1 μA/K
Two Terminal Monolithic IC: Temperature In/ Current Out
Minimal Self-Heating Errors

CONNECTION DIAGRAM



★ PIN 2 CAN BE EITHER ATTACHED OR UNCONNECTED
BOTTOM VIEW

PRODUCT DESCRIPTION

The AD592 is a two terminal monolithic integrated circuit temperature transducer that provides an output current proportional to absolute temperature. For a wide range of supply voltages the transducer acts as a high impedance temperature dependent current source of 1 μA/K. Improved design and laser wafer trimming of the IC's thin film resistors allows the AD592 to achieve absolute accuracy levels and nonlinearity errors previously unattainable at a comparable price.

The AD592 can be employed in applications between –25°C and +105°C where conventional temperature sensors (i.e., thermistor, RTD, thermocouple, diode) are currently being used. The inherent low cost of a monolithic integrated circuit in a plastic package, combined with a low total parts count in any given application, make the AD592 the most cost effective temperature transducer currently available. Expensive linearization circuitry, precision voltage references, bridge components, resistance measuring circuitry and cold junction compensation are not required with the AD592.

Typical application areas include: appliance temperature sensing, automotive temperature measurement and control, HVAC (heating/ventilating/air conditioning) system monitoring, industrial temperature control, thermocouple cold junction compensation, board-level electronics temperature diagnostics, temperature readout options in instrumentation, and temperature correction circuitry for precision electronics. Particularly useful in remote sensing applications, the AD592 is immune to voltage drops and voltage noise over long lines due to its high impedance current output. AD592s can easily be multiplexed; the signal current can be switched by a CMOS multiplexer or the supply voltage can be enabled with a tri-state logic gate.

The AD592 is available in three performance grades: the AD592AN, AD592BN and AD592CN. All devices are packaged in a plastic TO-92 case rated from –45°C to +125°C. Performance is specified from –25°C to +105°C. AD592 chips are also available, contact the factory for details.

***Protected by Patent No. 4,123,698.**

REV. A

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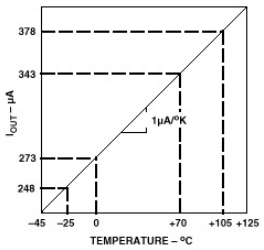
PRODUCT HIGHLIGHTS

1. With a single supply (4 V to 30 V) the AD592 offers 0.5°C temperature measurement accuracy.
2. A wide operating temperature range (–25°C to +105°C) and highly linear output make the AD592 an ideal substitute for older, more limited sensor technologies (i.e., thermistors, RTDs, diodes, thermocouples).
3. The AD592 is electrically rugged; supply irregularities and variations or reverse voltages up to 20 V will not damage the device.
4. Because the AD592 is a temperature dependent current source, it is immune to voltage noise pickup and IR drops in the signal leads when used remotely.
5. The high output impedance of the AD592 provides greater than 0.5°C/V rejection of supply voltage drift and ripple.
6. Laser wafer trimming and temperature testing insures that AD592 units are easily interchangeable.
7. Initial system accuracy will not degrade significantly over time. The AD592 has proven long term performance and repeatability advantages inherent in integrated circuit design and construction.



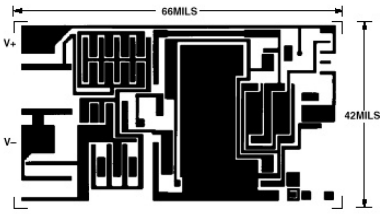
One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 617/329-4700 Fax: 617/326-8703

AD592–SPECIFICATIONS (typical @ T_A = +25°C, V_S = +5 V, unless otherwise noted)

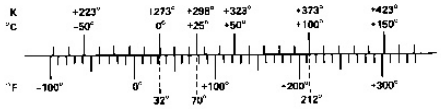
Model	AD592AN Min	AD592AN Typ	AD592AN Max	AD592BN Min	AD592BN Typ	AD592BN Max	AD592CN Min	AD592CN Typ	AD592CN Max	Units
ACCURACY										
Calibration Error @ +25°C[1]		1.5	**2.5**		0.7	**1.0**		0.3	**0.5**	°C
T_A = 0°C to +70°C										
Error over Temperature		1.8	3.0		0.8	1.5		0.4	0.8	°C
Nonlinearity[2]		0.15	0.35		0.1	0.25		0.05	0.15	°C
T_A = –25°C to +105°C										
Error over Temperature[3]		2.0	**3.5**		0.9	**2.0**		0.5	**1.0**	°C
Nonlinearity[2]		0.25	0.5		0.2	0.4		0.1	0.35	°C
OUTPUT CHARACTERISTICS										
Nominal Current Output @ +25°C (298.2K)		298.2			298.2			298.2		µA
Temperature Coefficient		1			1			1		µA/°C
Repeatability[4]			0.1			0.1			0.1	°C
Long Term Stability[5]			0.1			0.1			0.1	°C/month
ABSOLUTE MAXIMUM RATINGS										
Operating Temperature	–25		+105	–25		+105	–25		+105	°C
Package Temperature[6]	–45		+125	–45		+125	–45		+125	°C
Forward Voltage (+ to –)			**44**			**44**			**44**	V
Reverse Voltage (– to +)			**20**			**20**			**20**	V
Lead Temperature (Soldering 10 sec)			300			300			300	°C
POWER SUPPLY										
Operating Voltage Range	4		30	4		30	4		30	V
Power Supply Rejection										
+4 V < V_S < +5 V			**0.5**			**0.5**			**0.5**	°C/V
+5 V < V_S < +15 V			**0.2**			**0.2**			**0.2**	°C/V
+15 V < V_S < +30 V			**0.1**			**0.1**			**0.1**	°C/V

NOTES
[1]An external calibration trim can be used to zero the error @ +25°C.
[2]Defined as the maximum deviation from a mathematically best fit line.
[3]Parameter tested on all production units at +105°C only. C grade at –25°C also.
[4]Maximum deviation between +25°C readings after a temperature cycle between –45°C and +125°C. Errors of this type are noncumulative.
[5]Operation @ +125°C, error over time is noncumulative.
[6]Although performance is not specified beyond the operating temperature range, temperature excursions within the package temperature range will not damage the device.
Specifications subject to change without notice.
Specifications shown in boldface are tested on all production units at final electrical test. Results from those tests are used to calculate outgoing quality levels. All min and max specifications are guaranteed, although only those shown in boldface are tested on all production units.

METALIZATION DIAGRAM



TEMPERATURE SCALE CONVERSION EQUATIONS



$$°C = \frac{5}{9}(°F - 32) \qquad K = °C + 273.15$$

$$°F = \frac{9}{5}°C + 32 \qquad °R = °F + 459.7$$

ORDERING GUIDE

Model	Max Cal Error @ +25°C	Max Error –25°C to +105°C	Max Nonlinearity –25°C to +105°C	Package Option
AD592CN	0.5°C	1.0°C	0.35°C	TO-92
AD592BN	1.0°C	2.0°C	0.4°C	TO-92
AD592AN	2.5°C	3.5°C	0.5°C	TO-92

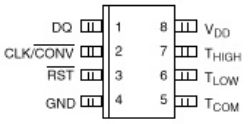
DALLAS SEMICONDUCTOR

DS1620
Digital Thermometer and Thermostat

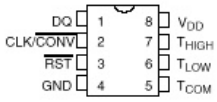
FEATURES

- Requires no external components
- Supply voltage range covers from 2.7V to 5.5V
- Measures temperatures from –55°C to +125°C in 0.5°C increments. Fahrenheit equivalent is –67°F to +257°F in 0.9°F increments
- Temperature is read as a 9–bit value
- Converts temperature to digital word in 1 second (max)
- Thermostatic settings are user–definable and non–volatile
- Data is read from/written via a 3–wire serial interface (CLK, DQ, $\overline{RST}$)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system
- 8–pin DIP or SOIC (208 mil) packages

PIN ASSIGNMENT



DS1620S 8–PIN SOIC (208 MIL)
See Mech Drawings Section



DS1620 8–PIN PDIP (300 MIL)
See Mech Drawings Section

PIN DESCRIPTION

DQ	–	3–Wire Input/Output
CLK/$\overline{CONV}$	–	3–Wire Clock Input and Stand–alone Convert Input
$\overline{RST}$	–	3–Wire Reset Input
GND	–	Ground
T_{HIGH}	–	High Temperature Trigger
T_{LOW}	–	Low Temperature Trigger
T_{COM}	–	High/Low Combination Trigger
V_{DD}	–	Power Supply Voltage (3V – 5V)

DESCRIPTION

The DS1620 Digital Thermometer and Thermostat provides 9–bit temperature readings which indicate the temperature of the device. With three thermal alarm outputs, the DS1620 can also act as a thermostat. T_{HIGH} is driven high if the DS1620's temperature is greater than or equal to a user–defined temperature TH. T_{LOW} is driven high if the DS1620's temperature is less than or equal to a user–defined temperature TL. T_{COM} is driven high when the temperature exceeds TH and stays high until the temperature falls below that of TL.

User–defined temperature settings are stored in non–volatile memory, so parts can be programmed prior to insertion in a system, as well as used in stand–alone applications without a CPU. Temperature settings and temperature readings are all communicated to/from the DS1620 over a simple 3–wire interface.

OPERATION–MEASURING TEMPERATURE

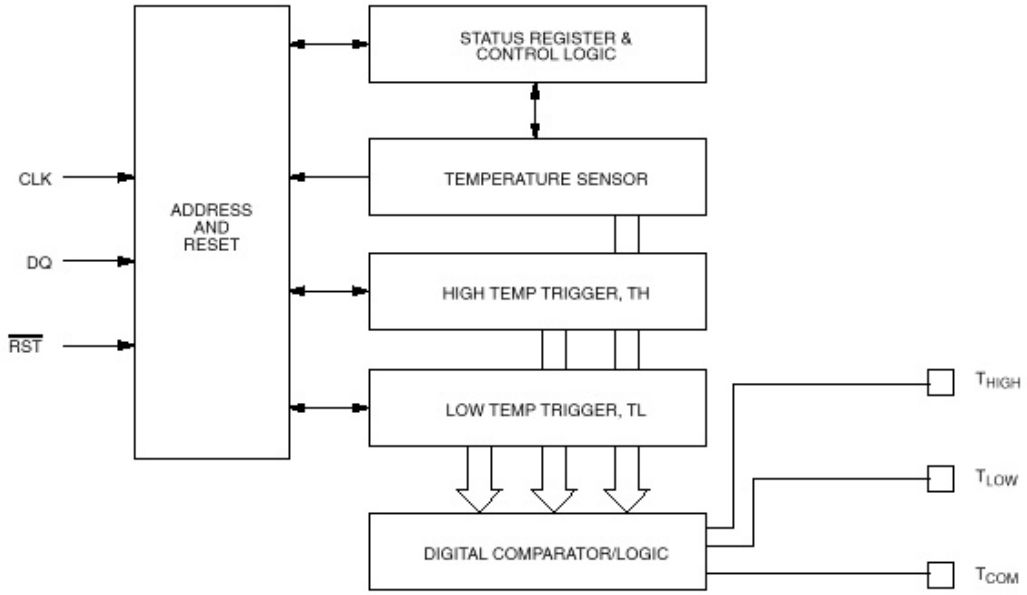
A block diagram of the DS1620 is shown in Figure 1. The DS1620 measures temperatures through the use of an on–board proprietary temperature measurement technique. A block diagram of the temperature measurement circuitry is shown in Figure 2.

The DS1620 measures temperature by counting the number of clock cycles that an oscillator with a low temperature coefficient goes through during a gate period determined by a high temperature coefficient oscillator. The counter is preset with a base count that corresponds to –55°C. If the counter reaches zero before the gate period is over, the temperature register, which is also preset to the –55°C value, is incremented, indicating that the temperature is higher than –55°C.

At the same time, the counter is then preset with a value determined by the slope accumulator circuitry. This circuitry is needed to compensate for the parabolic behavior of the oscillators over temperature. The counter is then clocked again until it reaches zero. If the gate period is still not finished, then this process repeats.

The slope accumulator is used to compensate for the nonlinear behavior of the oscillators over temperature, yielding a high resolution temperature measurement. This is done by changing the number of counts necessary for the counter to go through for each incremental degree in temperature. To obtain the desired resolution, therefore, both the value of the counter and the number of counts per degree C (the value of the slope accumulator) at a given temperature must be known.

DS1620 FUNCTIONAL BLOCK DIAGRAM Figure 1

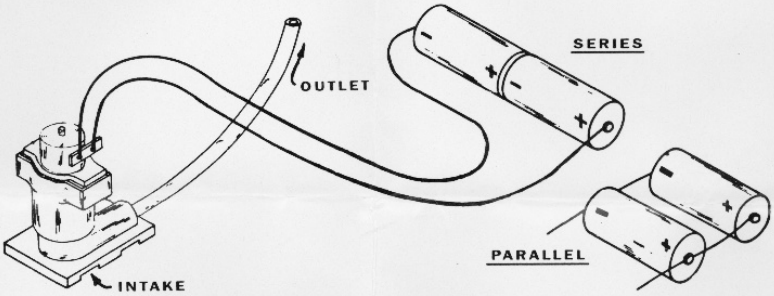


Edmund Scientific

INFORMATION AND INSTRUCTIONS

MINIATURE WATER PUMP
NO.50,345

This small water pump operates on 1½ to 3 volts direct current provided by batteries, either standard "D" cells or longer lasting No.6 ignition cells. The batteries may be connected in series, if you want highest capacity, or parallel for longer life. The illustration, below shows how to connect cells in series and parallel. To connect cells in series, connect the plus terminal of one to the minus terminal of the other; connect the pump wires to the remaining terminals on each battery. To connect cells in parallel, connect both plus terminals to one wire of the pump and both negative terminals to the other.



Capacity: **Approximately 1 pint/minute at 12" head.**
Current: **3 to 4 amperes at 3 volts.**

Although it will pump water from the outlet whem the impeller is rotating either way, the pump is slightly more efficient when the impeller is rotating counter clockwise (as viewed from the top).

Some suggested uses for this water pump:

1. Temperature control and circulation of darkroom chemicals
2. Table fountains and displays
3. Model waterfalls, hydroelectric installations, canal locks, etc.
4. Water filtration and aeration of fish tanks
5. Flow models of circulatory systems
6. Automatic plant watering unit
7. Humidifier

A NOTE OF CAUTION: The pump should not be placed in more than 1" of water as higher water level will flood the motor.

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