

# HIOKI

Electronic  
Measuring  
Instrument

1994

# 3620

DATA ANALYZER

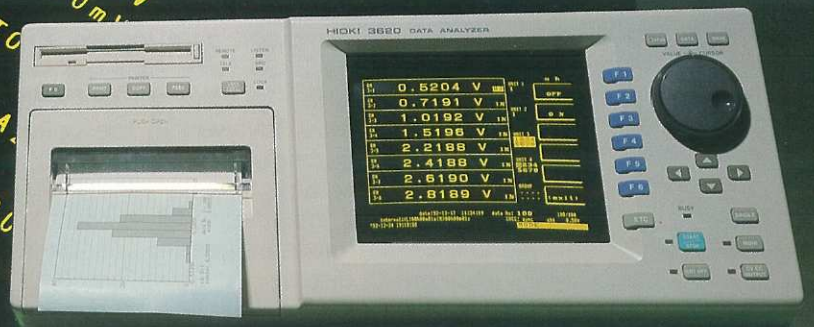
## 32-Channel Data Logging System *Total Support for System Measurement*



恒温恒温室

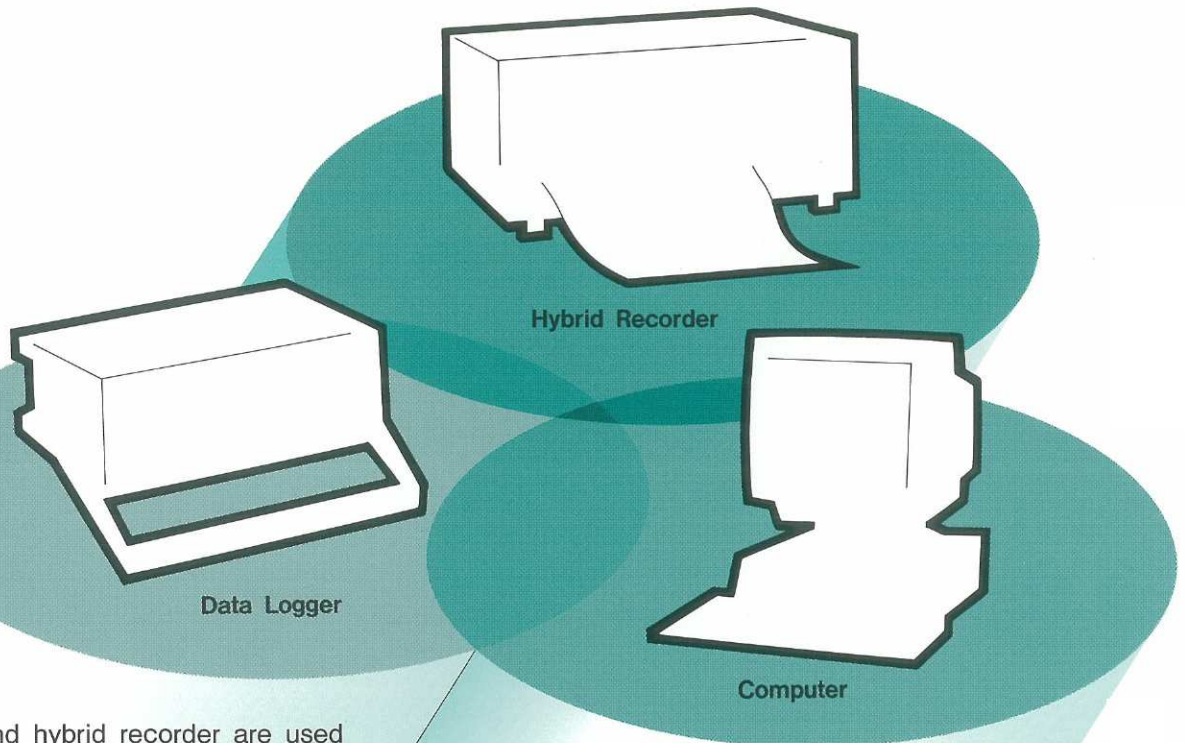


```
HIOKI 3620 PROGRAM  
TO OUT PROGRAM 1  
FUNC 1 1. V  
FUNC 1 2. V  
FUNC 1 3. V  
FUNC 1 4. V  
FUNC 1 5. V  
FUNC 1 6. V  
FUNC 1 7. V  
FUNC 1 8. V  
SETUP 1 1. V  
#LOOP  
OUT 1.0  
OUT 2.0  
OUT 3.0  
OUT 4.0  
OUT 5.0  
OUT 6.0  
OUT 7.0  
OUT 8.0  
#A100  
RANGE 1:1, 300mV  
RANGE 1:2, 300mV  
RANGE 1:3, 300mV  
RANGE 1:4, 300mV  
RANGE 1:5, 300mV  
RANGE 1:6, 300mV  
RANGE 1:7, 300mV  
RANGE 1:8, 300mV  
A = INP(1)  
IF A = 1 GOTO A300  
A = INP(2)  
IF A = 1 GOTO A400  
A = INP(3)  
IF A = 1 GOTO A500  
A = INP(4)  
IF A = 1 GOTO A600  
A = INP(5)  
IF A = 1 GOTO A700  
A = INP(6)  
IF A = 1 GOTO A800  
A = INP(7)  
IF A = 1 GOTO A800  
A = INP(8)  
IF A = 1 GOTO A800  
GOTO LOOP  
SETUP
```



# Combines All Measurement, Display, Processing, and Recording Functions in a Single Unit

Designed according to an all-in-one concept that makes on-site construction of an automatic measuring and data collection system simple.



A data logger and hybrid recorder are used to record a wide variety of physical measurements such as temperature, resistance and voltage and collect other data. However, a computer is inevitably required in order to analyze most of the data that is collected. In addition, work efficiency is improved if measurement, analysis and evaluation can be performed in real time and on site. Unfortunately, the many problems involved in connecting a data logger, computer and peripherals in the field make this approach undesirable.

These problems include:

- Lower noise resistance and durability for the system as a whole
- the display update rate and calculation speed when using a general-purpose computer that has been programmed for the task
- the printing speed of peripherals such as serial printers or plotters
- The difficulty of developing programs for different applications
- The bother of connecting the CRT, printer, computer, data logger, and other devices

The 3620 Data Analyzer was developed in order to solve all of these past problems involved in the collection of measurement data in the field. This unit integrates a wide variety of functions, including: high-precision multi-point data measurement; a real-time high-speed display, including graphics; an abundance of calculation processes; and high-speed graphic recording using a thermal line printer.



# How the 3620 can be used is illustrated by using forecasting control at a power station as an example.

## Programming



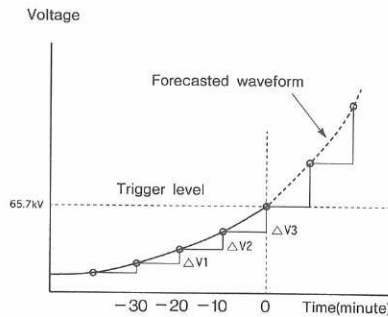
Assume that six generators are to be turned on and off by the system in accordance with amount of power used. Assume we are creating a program that follows the control sequence. A general-purpose word processor or personal computer can be used to program the 3620. The program is created by combining operating instructions according to the operation control needed. After the program is completed, it is saved to floppy disk in ASCII format. This disk is then inserted in the 3620, and once the conversion operation is performed, programming is completed.

## Measurement



Measurements are made by using transducers to input to the 3620 the output voltage of the generator. (Because the voltage of the input system of the 3620 is DC only, it is necessary to convert the measurement signal to

DC.) The indicated value can be directly linked to the generator output by using the scaling function. In our example, we will use a sampling cycle of one minute for our measurements.



## Control



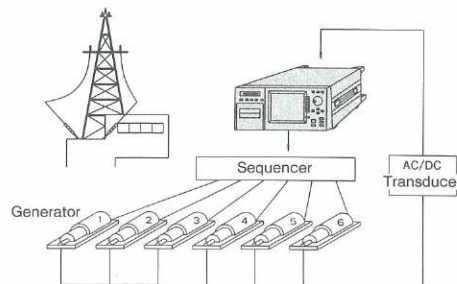
When the generator output exceeds the trigger level set in the program, the amount of increase in the voltage over the past 30 minutes is calculated, based on the measurement data stored in the 3620. The result of this calculation

is compared with the judgement level set in the program, and the appropriate control signals are then output from the 3620's I/O port (output signal terminal). These signals control whether the generators are to be turned on or off.

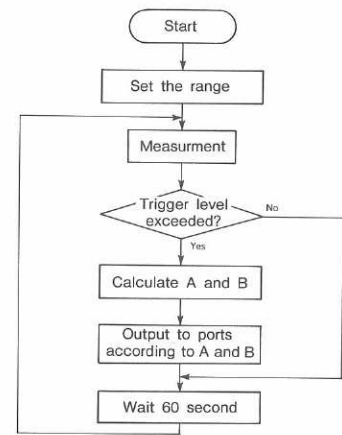
In this way, the 3620 Data Analyzer combines the functions of a data logger with the functions of a computer and measuring apparatus. By eliminating the need for a control computer, the 3620 shows its true power in on-site measurement and on-site control.

Port		1	2	3	4
0.1k V	A < 0.1k V	L	L	L	L
0.2k V	A < 0.2k V	H	L	L	L
0.4k V	A < 0.4k V	L	H	L	L
0.8k V	A < 0.8k V	L	L	H	L
0.8k V	A	L	L	L	H
Port		5	6	7	8
0.1k V	B < 0.1k V	L	L	L	L
0.2k V	B < 0.2k V	H	L	L	L
0.4k V	B < 0.4k V	L	H	L	L
0.8k V	B < 0.8k V	L	L	H	L
0.8k V	B	L	L	L	H

H=ON L=OFF



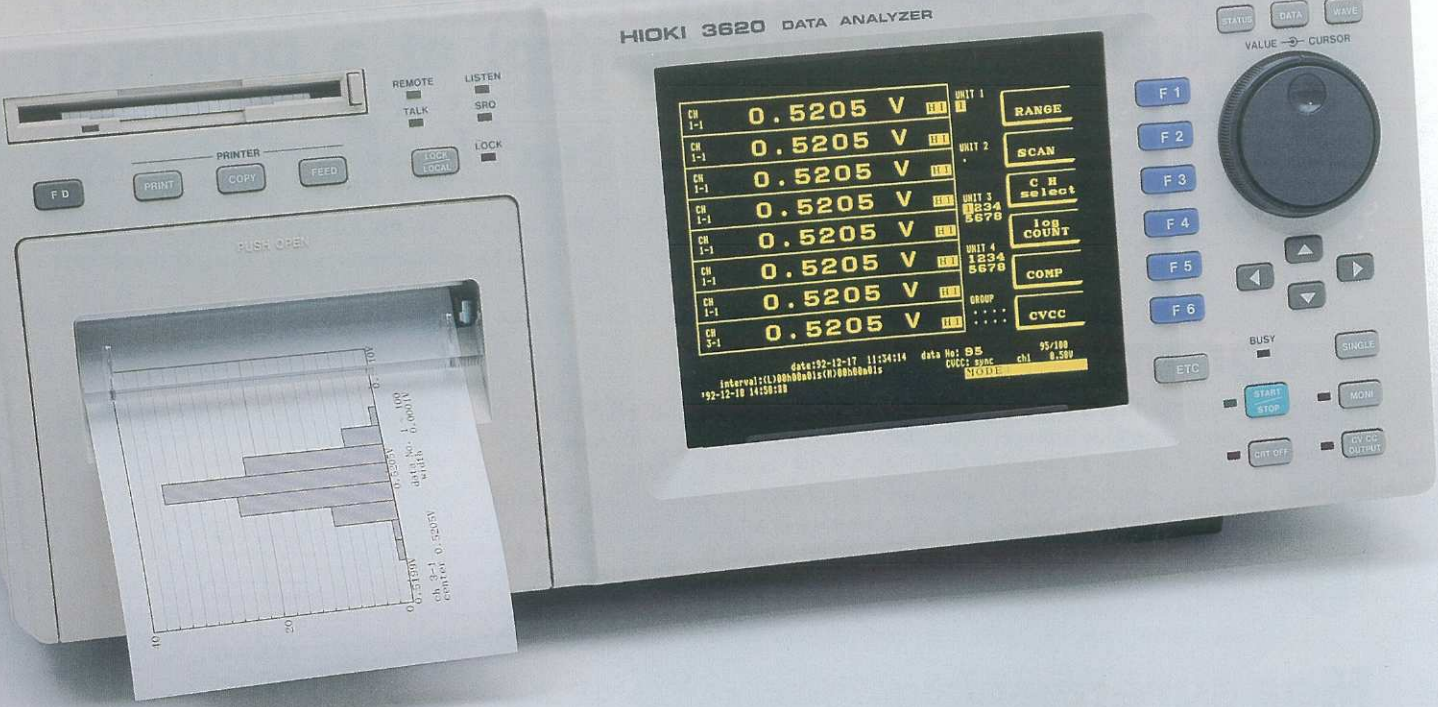
## Forecasting control



## Program list (example)

```

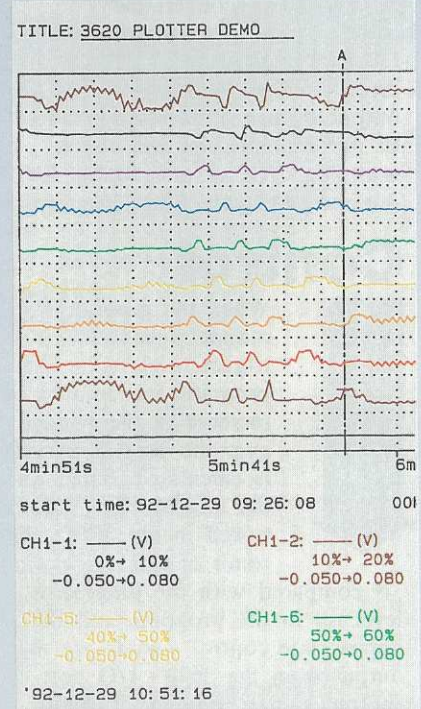
H10K1 3620 PROC (Identify the program)
FUNC 1:1, V (Function: voltage)
RANGE 1:1, 25V (25V range)
SETUP
#LOOP
OUT 1, 0 (Output "OFF" to all ports)
OUT 2, 0
OUT 3, 0
OUT 4, 0
OUT 5, 0
OUT 6, 0
OUT 7, 0 (Measure once)
OUT 8, 0 (If less than the trigger level, do not perform the processing)
MEASURE MON
IF BUF(1:1, 0) < 65700 GOTO LOOPEND
A = BUF(1:1, -30) - BUF(1:1, -20) (Calculate A)
B = BUF(1:1, -20) - BUF(1:1, -10) (Calculate B)
IF A < 1000 GOTO B
IF A < 2000 GOTO A1
IF A < 4000 GOTO A2 (Branch according to A)
IF A < 8000 GOTO A3
GOTO A4 (Output to port)
#A1
OUT 1, 1
GOTO B
#A2
OUT 2, 1
GOTO B
#A3
OUT 3, 1
GOTO B
#A4
OUT 4, 1
GOTO B
#B
IF B < 1000 GOTO LOOPEND
IF B < 2000 GOTO B1
IF B < 4000 GOTO B2
IF B < 8000 GOTO B3
GOTO B4 (Output to port)
#B1
OUT 5, 1
GOTO LOOPEND
#B2
OUT 6, 1
GOTO LOOPEND
#B3
OUT 7, 1
GOTO LOOPEND
#B4
OUT 8, 1
GOTO LOOPEND
#LOOPEND
WAIT 60 (Wait one minute)
GOTO LOOP (Return to start)
  
```



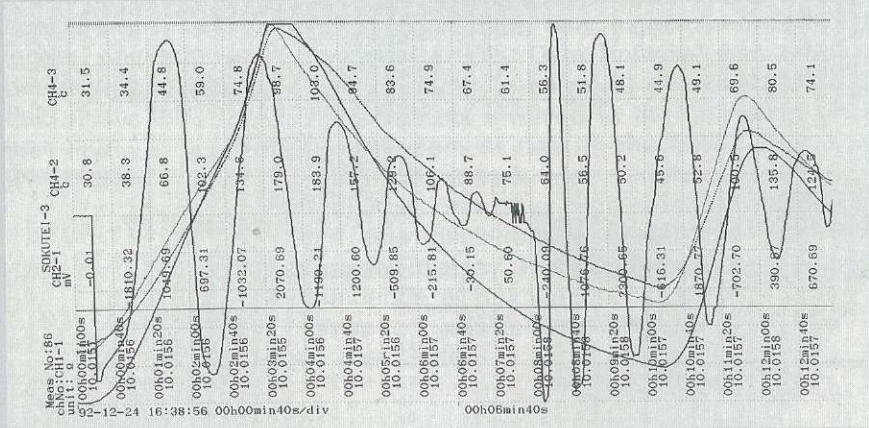
The high-speed printer and jog/shuttle dial provide for comfortable operation.

92-12-28 10:45:17	92-12-28 10:45:18	92-12-28 10:45:19	92-12-28 10:45:20	92-12-28 10:45:21	92-12-28 10:45:22	92-12-28 10:45:23	92-12-28 10:45:24	92-12-28 10:45:25	92-12-28 10:45:26
loa data	mon data	alm data	loa data	alm data	alm data	loa data	alm data	alm data	alm data
IN 15.001	IN 15.001	IN 15.001	IN 15.002	IN 15.001	IN 15.002	IN 15.001	IN 15.001	IN 15.001	IN 15.001
IN 2.5008	IN 2.5008	IN 2.5008	IN 2.5008	IN 2.5011	IN 2.5008	IN 2.5008	IN 2.5010	IN 2.5009	IN 2.5009
IN 1.5019	IN 1.5019	IN 1.5020	IN 1.5019	IN 1.5020	IN 1.5021	IN 1.5019	IN 1.5019	IN 1.5021	IN 1.5019
LO 0.9996	LO 0.9996	LO 0.9997	LO 0.9997	LO 0.9997	LO 0.9997	LO 0.9996	LO 0.9996	LO 0.9995	LO 0.9992
IN 251.42	IN 251.42	IN 251.45	IN 251.50	IN 251.49	IN 251.53	IN 251.49	IN 251.51	IN 251.41	IN 251.21
LO 20.666	LO 20.666	LO 20.718	LO 20.610	LO 20.745	LO 20.769	LO 20.528	LO 20.547	LO 20.355	LO 20.451
IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000	IN 0.0000
IN -1.9377	IN -1.9376	IN -1.7376	IN -1.6373	IN -1.4876	IN -1.3379	IN -1.4377	IN -1.4377	IN -1.4377	IN -1.4377
IN 0.0000	IN 0.0000	IN 0.2000	IN 0.2000	IN 0.2999	IN 0.4999	IN 0.6000	IN 0.4999	IN 0.5001	IN 0.5001
IN 0.5634	IN 0.5634	IN 0.7632	IN 0.7632	IN 0.8633	IN 1.0632	IN 1.1632	IN 1.0633	IN 1.0632	IN 1.0632
IN 1.407	IN 1.658	IN 1.908	IN 1.908	IN 2.158	IN 2.408	IN 2.658	IN 2.658	IN 2.658	IN 2.658
LO 11.264	LO 13.266	LO 15.268	LO 17.270	LO 19.272	LO 21.274	LO 23.276	LO 21.264	LO 21.266	LO 21.266
LO 50.563	LO 50.663	LO 50.763	LO 50.763	LO 50.863	LO 51.163	LO 51.463	LO 51.063	LO 51.063	LO 51.063
IN 9644	IN 10291	IN 10938	IN 11584	IN 12231	IN 12878	IN 13525	IN 12878	IN 12878	IN 12878
LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773	LO 0.4773
LO 101.44	LO 101.46	LO 101.46	LO 101.44	LO 101.44	LO 101.44	LO 101.44	LO 101.44	LO 101.44	LO 101.46
LO 101.42	LO 101.42	LO 101.42	LO 101.42	LO 101.42	LO 101.42	LO 101.42	LO 101.42	LO 101.44	LO 101.44
LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.44	LO 323.48
LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.00	LO 214.01
LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.78	LO 213.80
LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.63	LO 103.66
LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5	LO 115.5
LO 10.0	LO 10.0	LO 9.9	LO 9.9	LO 9.9	LO 9.9	LO 9.9	LO 10.0	LO 10.0	LO 10.0
LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95	LO 27.95
LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0	LO 374.0
LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654	LO 16.654
LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673	LO 18.673
LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.91	LO 213.90
LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.99	LO 10.14
LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534	LO 0.534

The measured values for each sampling cycle are printed out.

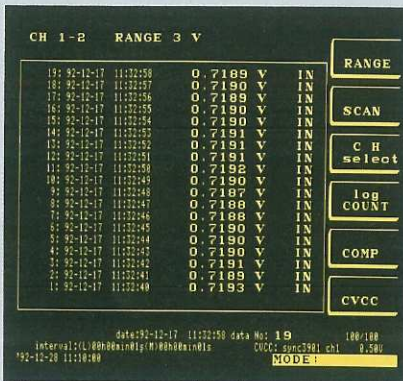
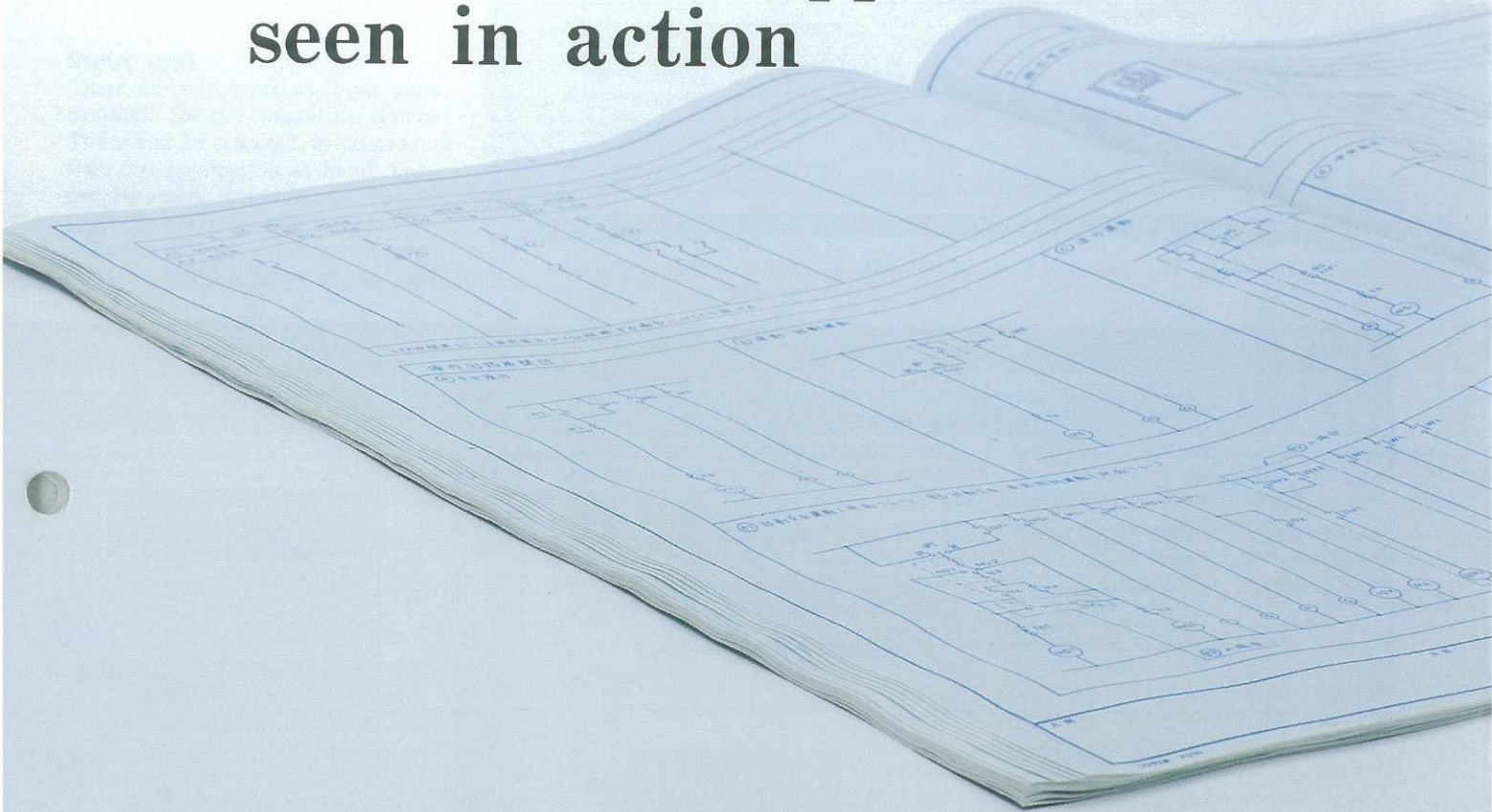


It is possible to connect the 3620 with an external HP-GL plotter via the GP-IB interface. Up to eight different pen colors can be specified; therefore, when used with solid and dotted lines, the measurements of up to 16 different items can be plotted.

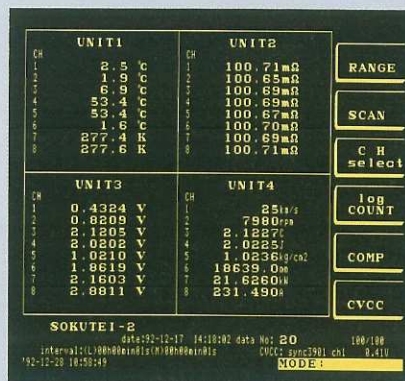


The changes in the measured values can be printed out graphically and numerical data.

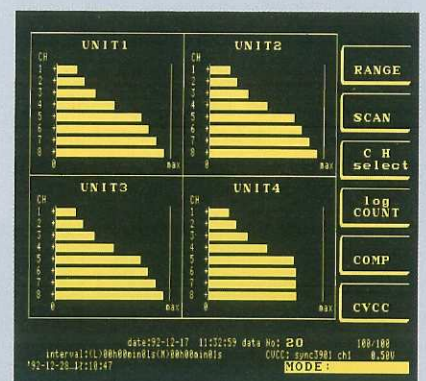
# The latent capabilities of the 3620 become apparent when seen in action



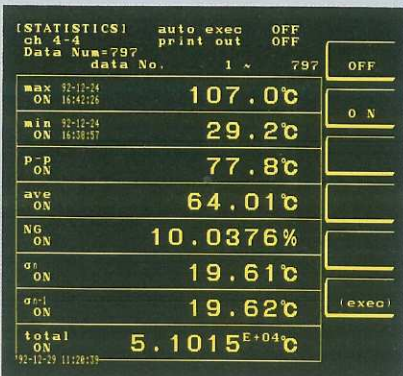
The measured value for any one channel can be displayed along with past data.



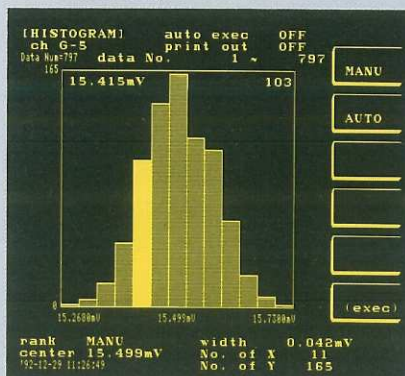
The measured values for all channels can be viewed simultaneously.



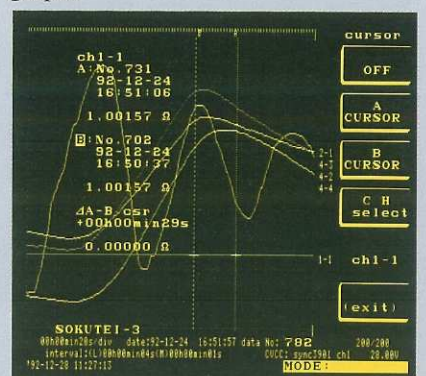
The measured quantities for all channels can be displayed by a bar graph.



Statistical processing can be performed on data from a specified interval.



The frequency distribution of data can be displayed graphically.



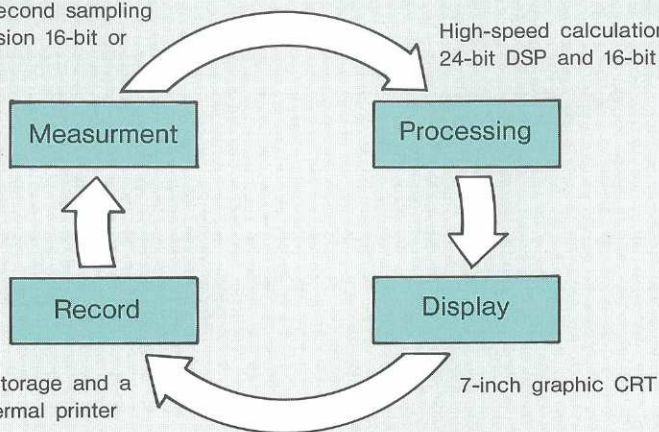
Values can be displayed on screen graphically and numerically.

# High-Precision Measurement Capabilities and Outstanding Functions

## Hardware configuration

Up to 32-ch/second sampling and high-precision 16-bit or 19-bit A/D

High-speed calculations with a 24-bit DSP and 16-bit CPU



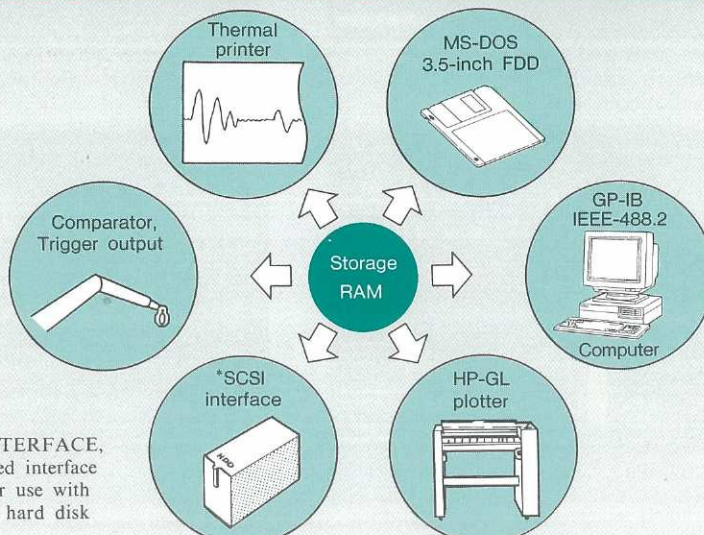
## Abundant

Program function

Time setting

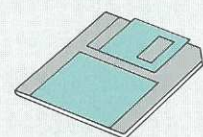
External I/O

## Data/control output



## Lotus 1-2-3, DA

(For normal use)

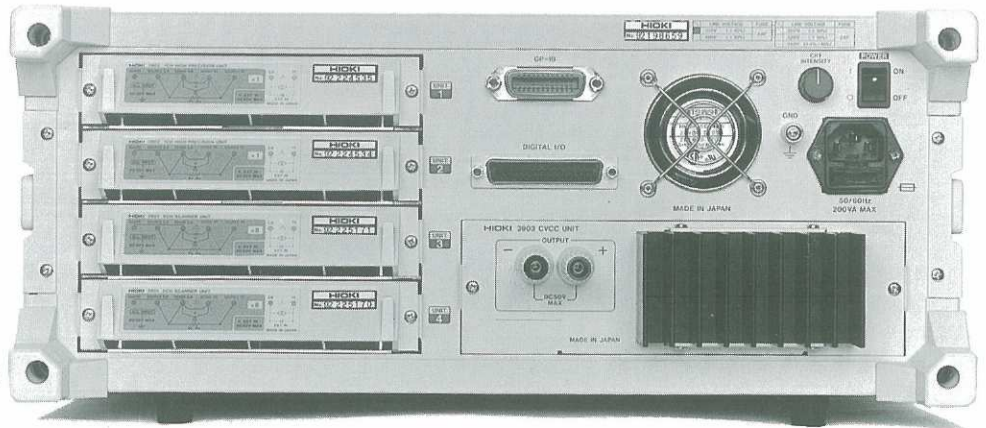


Binary-format

# ilities

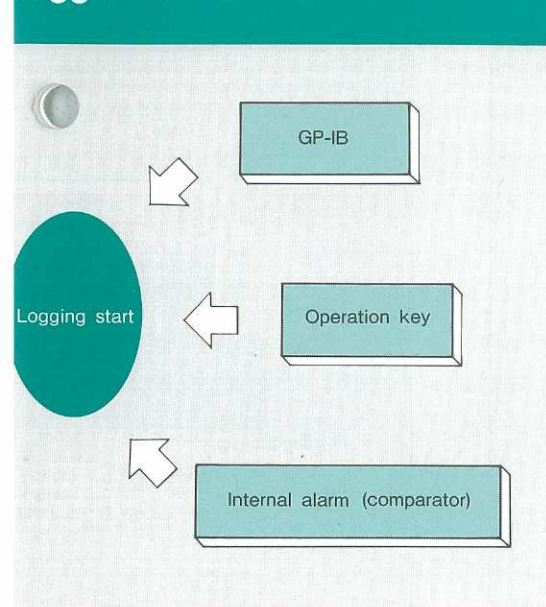
## Input unit

There are two types of input units available for the measuring system. These can be selected in accordance with the application at hand, and can be easily interchanged. The 3902 supports input for one channel in one unit, but provides measurement resolution of ten times of the 3901.



\*The photograph shows the product with all of the input units and output unit mounted which are sold separately.

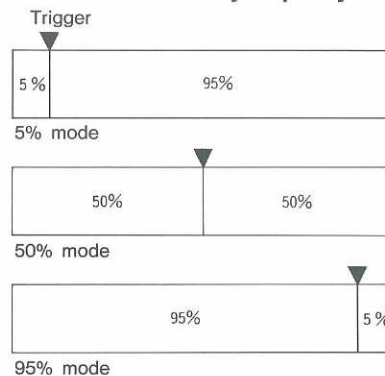
## trigger functions



## Data memory and pretrigger function

The main unit is equipped with a large 3MB memory as a standard feature. Even if all 32 channels are turned on, data for up to 22,400 measurements per channel can be logged. The "pretrigger" function is provided which store the data before and after the alarm and data prior to the alarm in memory is provided.

### Buffer memory capacity



## Digital I/O terminals

External trigger, external start/stop, eight-bit input control in program mode are possible. And the comparator results output various status signals, eight-bit output control in program mode are also possible.

## 3904 SCSI interface unit (option)

The 3904 option allows an external hard disk to be connected, which provides both long-term data capture and high-speed recording functions. The main 3620 unit has a memory capacity of 3 megabytes, but adding a fast access time external hard disk and saving to disk while capturing data allows this limit to be greatly exceeded.

## Program functions

It is possible to program the measurement sequence. It is possible

to use a general-purpose word processor for creating the program, and functions are available for writing the commands as ASCII-format character strings on a floppy disk and then compiling those commands in the 3620 main unit. Another method of programming involves the selection of commands on the screen of the 3620 main unit.

## Statistical processing functions

"Interval Statistical Computations" showing maximum values, minimum values, standard deviation values, integrated values, for each channel are possible. There is also a "histogram" function which depicts the frequency distribution of measured values in the form of a graph.

## Waveform analysis function

On the waveform graph screen, the jog/shuttle dial can be used to search for a particular section to be examined (the waveform scrolling function); (the waveform zooming function); In addition, it is also possible to make measurements by tracing the graph on the screen with the cursor (the cursor measurement function).

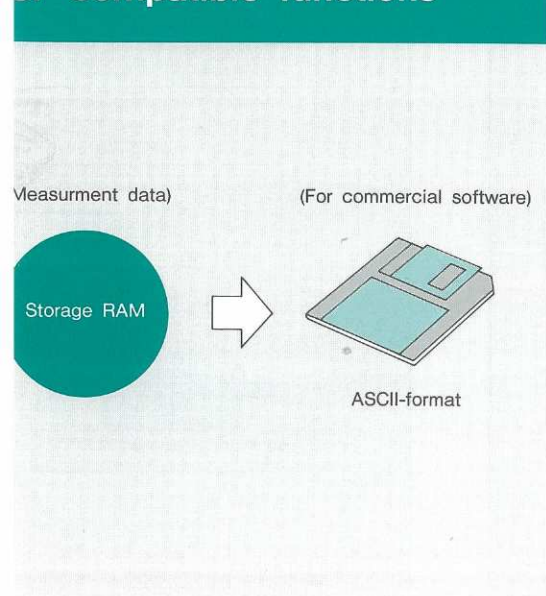
## Plotter connection possible

A GP-IB interface is standard equipment on the 3620. Then remote control is possible. Because the unit conforms with HP-GL commands for plotters, it is possible to connect an HP-GL plotter and plot measurement values and waveform graphs.

## Support for Lotus 1-2-3

There is a choice of binary or character (ASCII) format when saving data to floppy disk. Selecting ASCII format allows immediate data analysis using application software such as Lotus 1-2-3 or DADiSP.

## SP-compatible functions



# An Outstanding Design Concept Boosts Practical Power

## Temperature/voltage/resistance measurement

The measurement functions allow three types of measurements with one unit. Temperature measurements can be made with ten different types of thermocouple sensors and one type of platinum

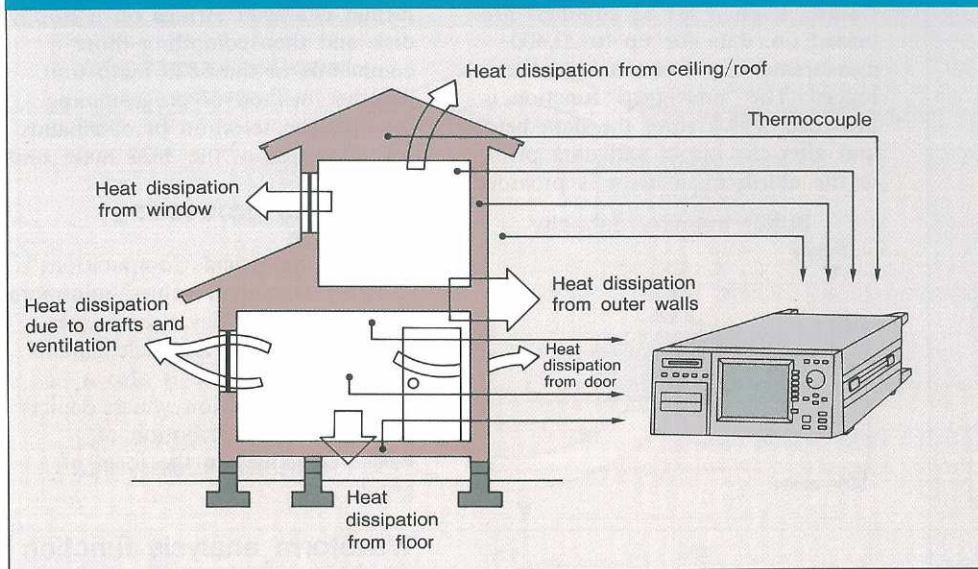
temperature-measuring resistor.

There are four ranges for measuring DC voltage (only three ranges on the 3902), and six ranges for measuring resistance, so the unit is capable of measuring even small resistances. The measuring functions can be set separately for each channel

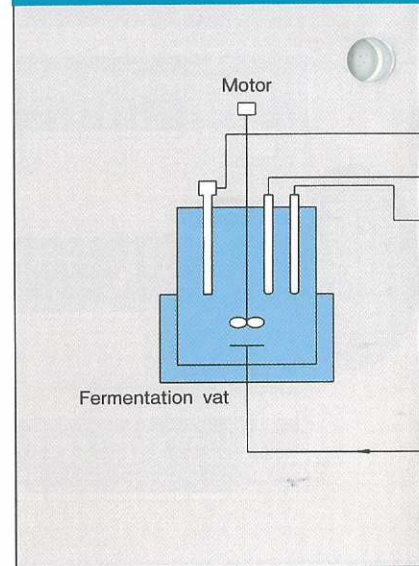
## Recording temperatures within a building

The 3620 can be used for multipoint temperature measurement functions in a building, including heating/cooling performance evaluation of typical housing, temperature control of an intelligent building, and data gathering.

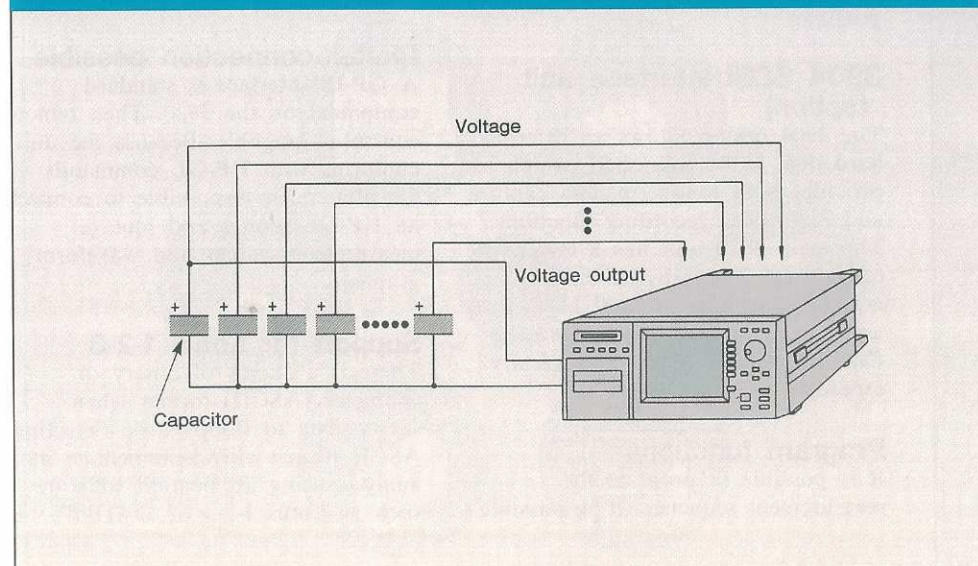
### Recording temperatures within a building



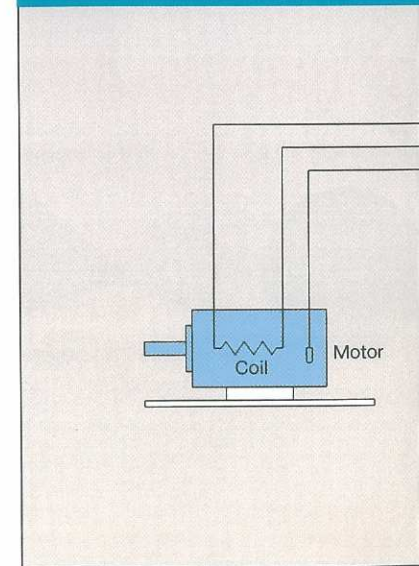
### Recording parameters



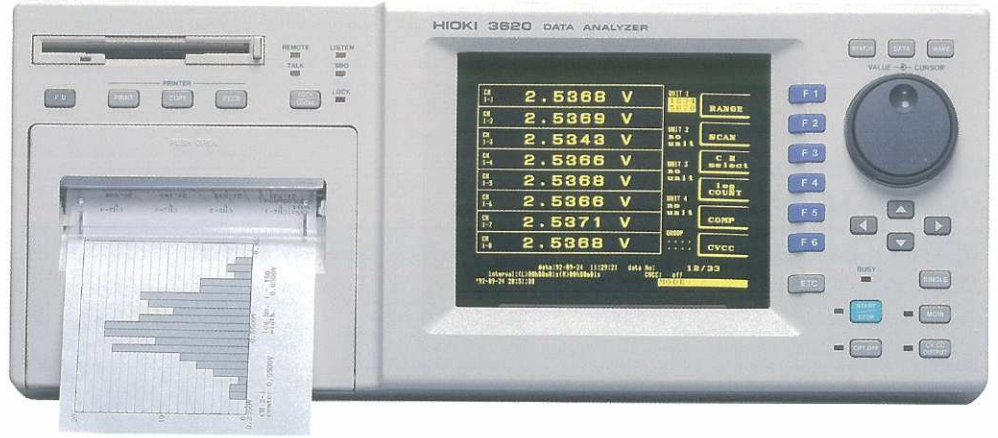
### Capacitor charging/discharging characteristics



### Motor coil







Monitoring of measurement values, printing, graph creation, and statistical processing can all be performed on site. Because the operating settings of the equipment can also be saved to floppy disk, on-site measuring can be easily and reliably implemented.

### concerning fermentation vats

### CVCC unit

Low resistances are measured by the 3620 by according to the drop in voltage when a constant current is applied. When measuring resistances with just the 3620 main unit, only 100mA can be applied to the element being measured, but using the 3903 makes it possible to apply up to 1A. The 3903 can also be easily used as a built-in generator for the main unit when measuring the accuracy of a potentiometer, for measuring voltage by applying a constant voltage to the item being tested, or as a DC signal source for a test circuit.

### Recording parameters concerning fermentation vats

The 3620 can record a variety of parameters needed for optimizing fermentation conditions, including temperature, pH levels, oxygenation, etc. By using the scaling computation function, it is possible to directly read the actual measured values of transducer output, etc.

### Capacitor charging/discharging characteristics

The CVCC unit supplies a constant voltage for charging capacitors (primarily electrolytic capacitors). After a capacitor is charged, it can be tested by discharging it over a fixed period of time and recording the discharge voltage.

### Motor coil resistance measurement

The resistance method used for motor coil temperature increase testing is defined by JIS regulations. In order to take the measurements automatically in accordance with the regulations, simply use the 3620's programming functions to input the calculations.

Note: The following program is for JIS regulation.

Average temperature increase

$$\theta(^{\circ}\text{C}) = \theta_2 - \theta_a = (R_2/R_1 - 1) \times (T - \theta_1) + (\theta_1 - \theta_a)$$

$R_2$  : Coil resistance ( $\Omega$ ) in hot state (temperature  $\theta_2$ )

$R_1$  : Coil resistance ( $\Omega$ ) in cold state (temperature  $\theta_1$ )

$\theta_2$  : Coil temperature ( $^{\circ}\text{C}$ ) immediately after test

$\theta_1$  : Temperature ( $^{\circ}\text{C}$ ) for  $R_1$  in cold state

$\theta_a$  : Cooling medium temperature ( $^{\circ}\text{C}$ ) immediately after test

$T$  : Constant (copper = 235; aluminum = 230)

### Computational processing functions

The 3620 includes as standard features a variety of functions, including: "differential computation," for example, which calculates the difference from the initial measured value; "scaling," which converts measured values through a first-order function; "resistance temperature compensation," which converts and displays resistance values with temperature characteristics, such as the resistance of a coil, into a value for a standard temperature; and "group computation processing functions," for example, which derive the maximum values for a channel.

### Resistance measurement

## Main unit specifications 3620 DATA ANALYZER

### Basic specification

#### Measurement functions:

- 1) Log measurement mode (display and storage in memory)
- 2) Monitor measurement mode (display only)

#### Number of measuring points:

From 8 to 32 (using 3901 input unit)

#### Objects of measurement:

Temperature (thermocouple, platinum temperature-measuring resistor), DC voltage, resistance

#### Memory capacity:

3MB = 768K words (equivalent to 150,000 items of data)

#### External memory:

3.5-inch floppy disk drive, 2HD/2DD type

#### External control:

I/O (alarm, start, synchronization, etc.)  
GP-IB (conforms with IEEE-488.2 1987, compatible with HP-GL plotter)

#### Operation temperature/humidity ranges:

5 to 40°C, less than 85%R.H. non-condensing

#### Power:

100/120/200/220/240VAC (specify at order)  
±10% (max. 250VAC), 50/60Hz

#### Power consumption:

200VA max.

#### Dimensions/weight:

Approx. 177H × 430W × 500Dmm, 17.5kg (main unit only)

#### Accessories:

Power cord 1, recording paper 1, spare fuse 1

### Measurement functions

#### (1) Logging mode

Monitor scan or log scan: Measurement values are displayed at the set interval, and also saved in memory.

Single log scan: A log scan (data saved in internal memory) is carried out once only at a freely selectable time.

#### (2) Monitoring mode

Measurement range can be changed; measurement interval fixed at 2 seconds.

#### Channel scanning speeds:

- 8 points/second (when using one 3901)
- 32 points/second (when using four 3901s)
- 1 point/second (when using one 3902)
- 4 points/second (when using four 3902s)

#### Scanning time interval:

Measures all channels at an interval from one second to 24 hours

#### Alarm function:

Sets the upper limit and lower limit values and compares them to the displayed value

#### Computation processing functions:

- Processing involving a single channel  
ΔI (difference from initial measurement), ΔT (difference from previous measurement)
- Processing involving any channels within a single measurement scan  
N (difference), MAX (maximum), MIN (minimum), and AVE (average)
- Scaling  
Converts using  $Y = A \times X - B$  and  $Y = (X - B) / A$
- Temperature compensation  
Converts using  $R_t = R_{t_0} \{ 1 + \alpha (t - t_0) \}$

#### Statistical processing functions:

Processing involving a specified interval for any channel  
MAX (maximum), MIN (minimum), P-P (maximum-minimum), NG ratio, average value, standard deviation, integration

#### Histogram display function:

Processing involving a specified interval for any channel  
Auto, manual

#### Program operation functions:

Programs are created on the main unit, or are compiled by the main unit from ASCII files stored on floppy disk

### Recording & display section

#### Recording method:

Thermal printing with thermal line head

#### Recording paper:

110mm × 30m, roll type thermal paper

#### Printing contents:

Screen copy, log measurement data, setting conditions

#### Display method:

7-inch CRT, measurement values, graph, setting conditions, and program lists

### Miscellaneous

#### Additional functions:

Power failure response processing, self-diagnostics, key lock feature

## Optional unit specifications (sold separately)

### 3901 8CH SCANNER UNIT

#### Number of input channels:

8 channels (floating, using mechanical relays)

#### Thermocouple measurements:

K(CA), E(CRC), J(IC), T(CC), B, R, S, N, W(W5Re/W26Re), KPAuFe(KP/Au0.07Fe)

#### Platinum temperature-measuring resistor measurements:

Pt100 (nominal resistance: 100Ω), three-wire type/four-wire type

#### DC voltage measurements:

30m, 300m, 3, 30V f.s.

#### Resistance measurements:

300m, 3, 30, 300, 3k, 30kΩ f.s.

#### Maximum display:

±30000 \*30 kΩ only: ±3000

#### A/D conversion method:

Sequential comparison, 16 bits

#### Input resistance:

Approx. 10MΩ (approx. 50 kΩ when outside the range from 30m to 3V)

#### Max. floating voltage:

50V DC (between channels, between units, between inputs and cabinet)

#### Allowable input voltage:

50V DC (between input terminals)

#### Dimensions/weight:

Approx. 33H × 140W × 235Dmm, 700g

### 3902 1CH HIGH PRECISION UNIT

#### Number of input channels:

1 channel (floating)

#### Objects of measurement:

Thermocouples, platinum temperature-measuring resistor, DC voltage, resistance

#### DC voltage measurements:

250m, 2.5, 25V f.s.

#### Resistance measurements:

250m, 2.5, 25, 250, 2.5k, 25kΩ f.s.  
\*The 250mΩ range applies only when using the 3903 or an external current source

#### Maximum display:

±250000 \*25kΩ only: ±25000

#### A/D conversion method:

Δ-Σ method, 19 bits

#### Input resistance:

Approx. 10MΩ (approx. 50kΩ when outside the 250mV range; approx. 1MΩ when outside the 2.5V range)

#### Dimensions/weight:

Approx. 33H × 140W × 235Wmm, 650g

#### Miscellaneous:

Other specifications are the same as for the 3901 8CH SCANNER UNIT

### 3903 CVCC UNIT

#### CV (constant voltage) output function:

Used for measuring potentiometer position, etc.

Bipolar output (current intake possible), positive voltage output only, floating

#### CC (constant current) output function:

Used as a current source for measuring small resistances, etc.

Unipolar output (current intake not possible), positive current output only, floating

### 3903 Output range/accuracy

(with 3620 power supply and connected load conditions constant)

#### Output range:

(CV range) 0 to +50.00V

(CC range) 1.0000A

#### Resolution:

(CV range) 10mV

(CC range) fixed

#### Accuracy:

(CV range) ±0.05% setting, ±25mV

(CC range) ±0.05% range

#### Temperature characteristics:

(Both CV and CC) ±0.01% range/°C (at 5 to 40°C)

#### Load regulation:

(CV range) 0.01% range and less

(CC range) 0.03% range and less

#### Output response:

(Both CV and CC) 1msec. or less

#### Output noise level:

(CV range) 3mVrms or less

(CC range) 1mA<sub>rms</sub> or less

#### Limit level:

(CV range) When 50V: approx. 120mA

(CC range) When 1A: approx. 6V

#### Synchronous output:

Monitor scan, log scan, and synchronous output/asynchronous output possible

### 3904 SCSI INTERFACE UNIT

#### Standard compliance:

ANSI X3.131-1986 (SCSI level 2)

#### Hardware specification:

Driver / receiver: Single-ended type

Terminator power terminal: Provided

Connector: 50-pin half pitch

#### Target supported:

Hard disk drive up to 2 gigabyte capacity

Recommended connection configuration: One drive in 1:1 configuration only

#### Initiator operation:

- (1) Not operable as a target
- (2) Arbitration phase supported
- (3) Single initiator
- (4) Reselection not supported

#### Format:

MS-DOS format for PC9801, directories and partitions supported; 1 file = 3 megabytes



3903 CVCC unit

3904 SCSI interface unit

Accurate at 23±5°C and less than 85% R.H. at least 30 minutes after power is turned on; accuracy is guaranteed for six months.)

※Guarantee of accuracy after unit calibration is performed

■3901 Ranges/Accuracy		(not including base contact compensation accuracy and sensor accuracy)	
Item	Measurement range (measured current)	Resolution	Accuracy
K	-200.0 ~ -0.1°C 0.0 ~ 720.0°C	0.1°C	±(0.2%rdg. +1.5°C) ±(0.2%rdg. +0.8°C)
E	-60.0 ~ 1000.0°C	0.2°C	±(0.2%rdg. +1.2°C)
J	-210.0 ~ -100.1°C -100.0 ~ 550.0°C	0.1°C	±(0.2%rdg. +1°C) ±(0.2%rdg. +0.7°C)
T	-230.0 ~ -0.1°C 0.0 ~ 400.0°C	0.1°C	±(0.2%rdg. +2°C) ±(0.2%rdg. +0.8°C)
B	600.0 ~ 1820.0°C	0.2°C	±(0.2%rdg. +4°C)
R	20.0 ~ 799.8°C 800.0 ~ 1769.0°C	0.2°C	±(0.2%rdg. +4°C) ±(0.1%rdg. +2°C)
S	20.0 ~ 799.8°C 800.0 ~ 1769.0°C	0.2°C	±(0.2%rdg. +4°C) ±(0.1%rdg. +2°C)
N	-190.0 ~ 99.9°C 100.0 ~ 840.0°C	0.1°C	±(0.2%rdg. +2°C) ±(0.2%rdg. +1°C)
W	0.0 ~ 1740.0°C	0.1°C	±(0.2%rdg. +2°C)
KP/ AuFe	0.0K ~ 9.8K 10.0K ~ 279.0K	0.2K	±4K ±2K
3wirePt	-200.00~660.00°C (1mA)	0.05°C	±(0.2%rdg. +0.7°C)
4wirePt	-200.00~560.00°C (1mA)	0.05°C	±(0.2%rdg. +0.6°C)
30mV	-30.000mV~+30.000mV	1μV	±(0.05%rdg. +12dgt.)
300mV	-300.00mV~+300.00mV	10μV	±(0.05%rdg. +6dgt.)
3V	-3.0000V~+3.0000V	100μV	±(0.05%rdg. +6dgt.)
30V	-30.000V~+30.000V	1mV	±(0.09%rdg. +6dgt.)
300mΩ	(1A when using the 3903) (100mA : default)	10μΩ	±(0.1%rdg. +6dgt.) ±(0.09%rdg. +12dgt.)
3Ω	(1A when using the 3903) (100mA:default) (10mA)	100μΩ	±(0.1%rdg. +6dgt.) ±(0.09%rdg. +6dgt.) ±(0.09%rdg. +12dgt.)
30Ω	(10mA:default) (1mA)	1mΩ	±(0.09%rdg. +6dgt.) ±(0.09%rdg. +12dgt.)
300Ω	(10mA) (1mA:default)	10mΩ	±(0.09%rdg. +12dgt.) ±(0.09%rdg. +6dgt.)
3kΩ	(1mA:default)	100mΩ	±(0.09%rdg. +6dgt.)
30kΩ	(100μA:default)	1Ω	±(0.1%rdg. +4dgt.)

Reference junction compensation:  
Internal (using Pt100)/External (KPAuFe is for external only)

Compensation accuracy:  
±1.5°C (at 23±5°C), ±2°C (at 5 to 18°C and 28 to 40°C)

Temperature characteristics:  
At 5 to 18°C and 28 to 40°C,  
add (measurement accuracy/10)/°C to the accuracy  
In the 300mΩ or 3Ω range,  
add (measurement accuracy/5)/°C when using the 3903.

Note: Thermocouples must be 400Ω or less and Pt must be 10Ω or less, with detection of broken thermocouple wiring possible (except for E)



3901 8CH SCANNER UNIT



3902 1CH HIGH PRECISION UNIT

※Guarantee of accuracy after unit calibration is performed

■3902 Ranges/Accuracy		(not including base contact compensation accuracy and sensor accuracy)	
Item	Measurement range (measured current)	Resolution	Accuracy
K	-265.0 ~ -190.1°C -190.0 ~ 1232.0°C	0.1°C	±(0.06%rdg. +3.7°C) ±(0.06%rdg. +1.0°C)
E	-270.0 ~ -230.1°C -230.0 ~ 661.0°C	0.1°C	±(0.06%rdg. +3.7°C) ±(0.06%rdg. +1.0°C)
J	-210.0 ~ 870.0°C	0.1°C	±(0.06%rdg. +0.8°C)
T	-268.0 ~ -200.1°C -200.0 ~ 400.0°C	0.1°C	±(0.06%rdg. +3.7°C) ±(0.06%rdg. +1.0°C)
B	193.0 ~ 599.9°C 600.0 ~ 1820.0°C	0.1°C	±(0.06%rdg. +3.7°C) ±(0.06%rdg. +1.0°C)
R	-50.0 ~ 29.9°C 30.0 ~ 1769.0°C	0.1°C	±(0.06%rdg. +2.7°C) ±(0.06%rdg. +1.0°C)
S	-50.0 ~ 29.9°C 30.0 ~ 1769.0°C	0.1°C	±(0.06%rdg. +1.9°C) ±(0.06%rdg. +1.0°C)
N	-260.0 ~ -220.1°C -220.0 ~ 1300.0°C	0.1°C	±(0.06%rdg. +3.7°C) ±(0.06%rdg. +1.0°C)
W	0.0 ~ 2315.0°C	0.1°C	±(0.06%rdg. +0.9°C)
KPAuFe	0.0K ~ 279.0K	0.1K	±1.5K
3wirePt	-200.00~408.00°C (1mA)	0.01°C	±(0.06%rdg. +0.16°C)
4wirePt	-200.00~408.00°C (1mA)	0.01°C	±(0.06%rdg. ±0.16°C)
250mV	-250.000mV~+250.000mV	1μV	±(0.03%rdg. +16dgt.)
2.5V	-2.50000V~+2.50000V	10μV	±(0.03%rdg. +16dgt.)
25V	-25.0000V~+25.0000V	100μV	±(0.04%rdg. +16dgt.)
250mΩ	(1A when using the 3903) ※	1μΩ	±(0.08%rdg. +16dgt.)
2.5Ω	(100mA)	10μΩ	±(0.06%rdg. +16dgt.)
25Ω	(10mA)	100μΩ	±(0.06%rdg. +16dgt.)
250Ω	(1mA)	1mΩ	±(0.06%rdg. +16dgt.)
2.5kΩ	(100μA)	10mΩ	±(0.06%rdg. +16dgt.)
25kΩ	(10μA)	1Ω	±(0.08%rdg. +16dgt.)

Reference junction compensation:  
Internal (using Pt100)/External (KPAuFe is for external only)

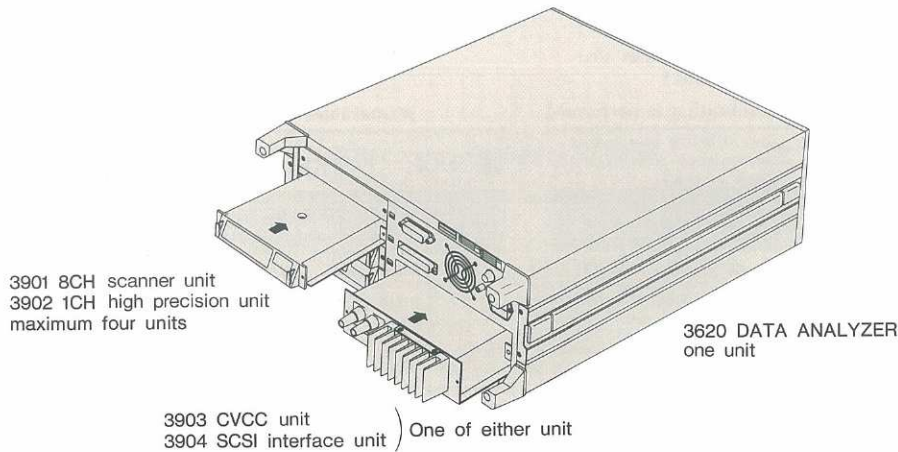
Compensation accuracy:	Normally ±1.5°C (at 23±5°C), ±1.8°C (at 5 to 18°C and 28 to 40°C)
K:-265 to -190.1°C	±3.5°C (at 23±5°C), ±3.8°C (at 5 to 18°C and 28 to 40°C)
E:-270 to -230.1°C	±4.5°C (at 23±5°C), ±4.8°C (at 5 to 18°C and 28 to 40°C)
T:-268 to -200.1°C	±3.5°C (at 23±5°C), ±3.8°C (at 5 to 18°C and 28 to 40°C)
N:-260 to -220.1°C	±2.5°C (at 23±5°C), ±2.8°C (at 5 to 18°C and 28 to 40°C)

Temperature characteristics:  
At 5 to 18°C and 28 to 40°C, add (measurement accuracy/10)/°C to the accuracy  
In the 250mΩ range, add (measurement accuracy/5)/°C when using the 3903.

Note: Thermocouples must be 1kΩ or less and Pt must be 10Ω or less, with detection of broken thermocouple wiring possible (all sensors)

※250mΩ range is available only when the 3903 is installed or an external current supply unit is used with.

## Option combination chart



**3620 main unit + (3901, 3902 unit) × required number + other options**

Max. No. of channels	Data display: 30,000 max.				Data display: 250,000 max.			
	8ch	16ch	24ch	32ch	1ch	2ch	3ch	4ch
Number of 3901s	1unit	2units	3units	4units	0	0	0	0
Number of 3902s	0	0	0	0	1unit	2units	3units	4units
No. of log measurements possible (memory)	71,400times	41,300times	29,100times	22,400times	150,000times	150,000times	131,000times	112,300times
3903 CVCC unit	1 unit							
3904 SCSI interface unit	1unit (Note that the 3904 and 3903 cannot be connected simultaneously.)							

★ Not all hard disk drives are supported. Check first with your supplier that a particular drive can be connected.

**Note:** When using either the 3901 or the 3902, up to 150,000 measurements can be logged when only using two channels.

## Ordering information

### 3620 DATA ANALYZER main unit

\*Measurement is not possible with just the 3620 main unit. It is also necessary to purchase input units, thermocouple sensors, etc. (sold separately). Note that the optional units are designed to be installed by the customer. Even when ordered at the same time as the main unit, the different units will be packed and shipped separately.

\*HIOKI does not sell thermocouples, platinum temperature-measuring resistor, etc. Use those which are available from other manufacturers.

### Options

3901 8CH scanner unit  
 3902 1CH high precision unit  
 3903 CVCC unit  
 3904 SCSI interface unit

### Accessories

9221 Recording paper (30m, 10 rolls)  
 9151-02 GP-IB cable (2m)  
 9151-04 GP-IB cable (4m)  
 220H Recording paper winder

■ In addition to the 3620 DATA ANALYZER, HIOKI also produces: the 16-channel 8825 MEMORY HiCORDER, capable of high speed waveform recording/monitoring and temperature recording; the portable 8830 Series MEMORY HiCORDER; and many other fine products.

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