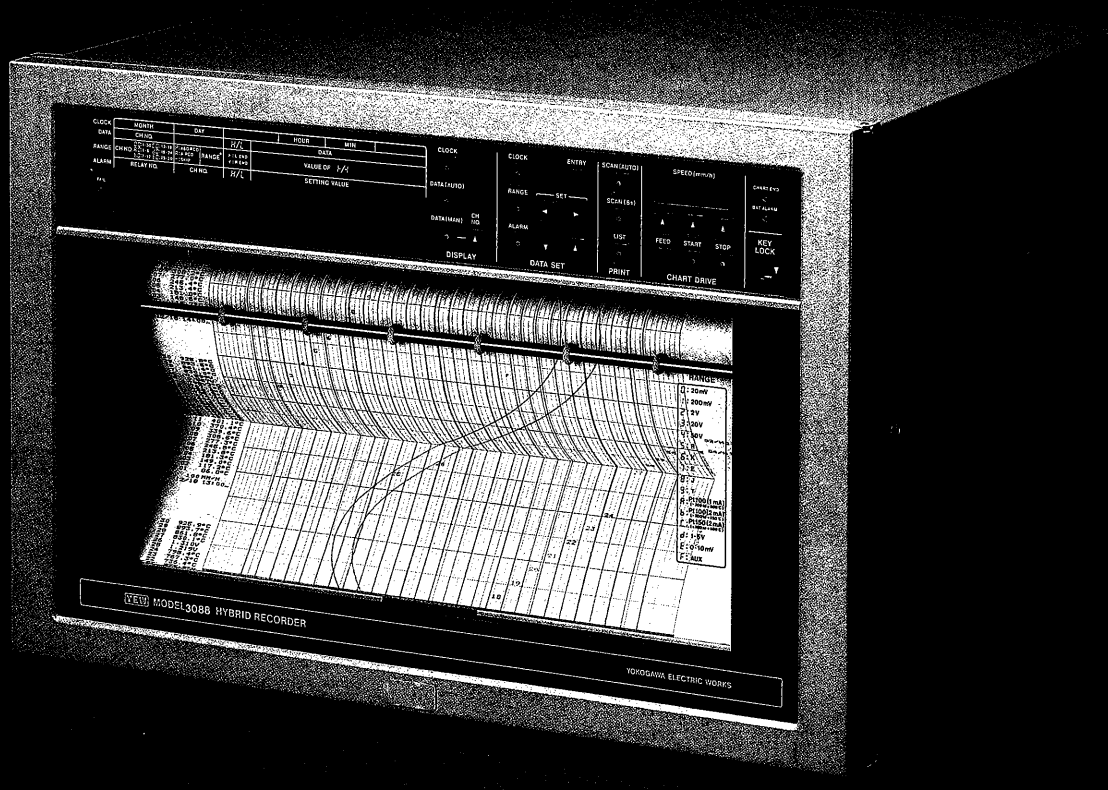
Bulletin

3000

3088
HYBRID RECORDER

Programmable 250mm Recorder...
offering 30-channel analog and digital data printout



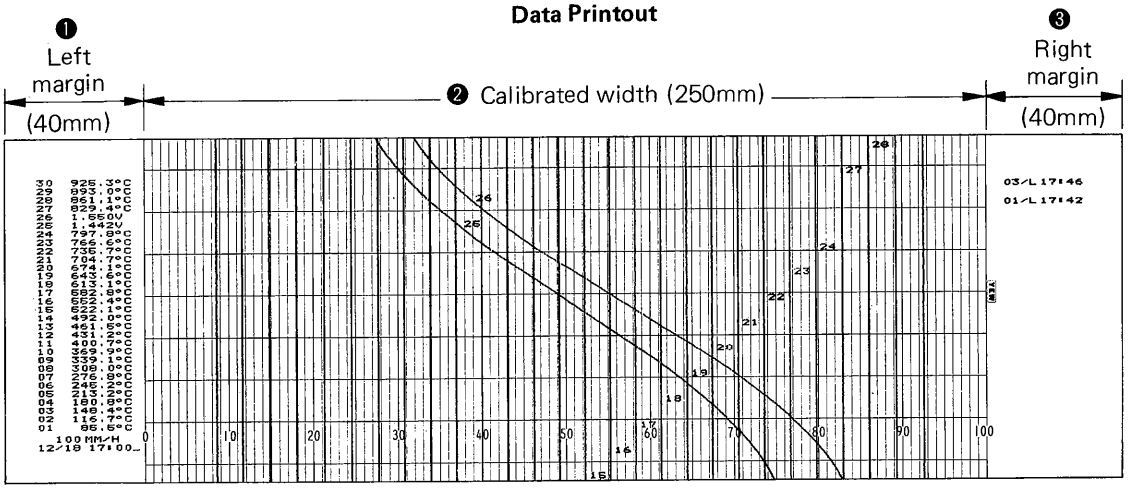
YOKOGAWA

The Model 3088 Hybrid Recorder is a flexible way to record a variety of variables. Entirely different from existing null-balancing servo recorders, it is a digital-controlled package using microprocessors. Model 3088 accepts inputs of up to 30 channels, and prints out both analog trace and digital data in six distinct colors through stepping motors and high-speed wire-dot printer. Input type can be DC voltage and the five most commonly used thermocouple types (conforming to ANSI, DIN or JIS), and/or resistance bulbs. Full-scale range, chart speeds, alarms, skip, and clock are programmed via keyboard on the front panel.

The high performance and a variety of easy-to-use features make it to meet a wide range of applications which require highly efficient analysis of data for multiple channels.

Printout Configurations

Data Printout

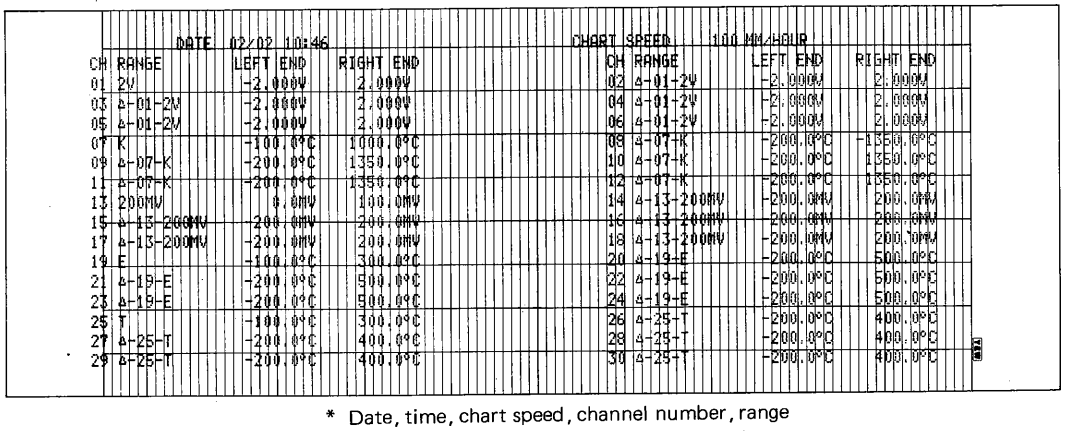


❶ Digital printout (blue) . . . printed in 1, 2, 4 or 12-hour interval (determined by chart speed from 10 to 300mm/h).
* Month, day, hours and minutes.
* Channel number and channel value.

❷ Analog printout (six colors)
* Channel value.
* Channel identification numbering.

❸ Digital printout of alarm (red) . . . printed when alarm condition is detected.
* Relay number.
* H or L sign.
* Time of out-of-limit occurrence.

Program List Printout



DATE 02/02 10:46 CHART SPEED 100 MM/HOUR

CH	RANGE	LEFT END	RIGHT END	CH	RANGE	LEFT END	RIGHT END
01	2V	-2.000V	2.000V	02	Δ-01-2V	-2.000V	2.000V
03	Δ-01-2V	-2.000V	2.000V	04	Δ-01-2V	-2.000V	2.000V
05	Δ-01-2V	-2.000V	2.000V	06	Δ-01-2V	-2.000V	2.000V
07	K	-100.0°C	1000.0°C	08	Δ-07-K	-200.0°C	-1350.0°C
09	Δ-07-K	-200.0°C	1350.0°C	10	Δ-07-K	-200.0°C	1350.0°C
11	Δ-07-K	-200.0°C	1350.0°C	12	Δ-07-K	-200.0°C	1350.0°C
13	200MV	0.0MV	100.0MV	14	Δ-13-200MV	-200.0MV	200.0MV
15	Δ-13-200MV	-200.0MV	200.0MV	16	Δ-13-200MV	-200.0MV	200.0MV
17	Δ-13-200MV	-200.0MV	200.0MV	18	Δ-13-200MV	-200.0MV	200.0MV
19	E	-100.0°C	300.0°C	20	Δ-19-E	-200.0°C	500.0°C
21	Δ-19-E	-200.0°C	500.0°C	22	Δ-19-E	-200.0°C	500.0°C
23	Δ-19-E	-200.0°C	500.0°C	24	Δ-19-E	-200.0°C	500.0°C
25	T	-100.0°C	300.0°C	26	Δ-25-T	-200.0°C	400.0°C
27	Δ-25-T	-200.0°C	400.0°C	28	Δ-25-T	-200.0°C	400.0°C
29	Δ-25-T	-200.0°C	400.0°C	30	Δ-25-T	-200.0°C	400.0°C

* Date, time, chart speed, channel number, range (input type), H and L values of all channels
ΔT setting

Panel Layout and Control Functions

❶ FAIL Lamp
Lights up to indicate the fail condition of the recorder. This fail condition also produces the contact output (open signal) on the rear panel.

❷ Display, and
❸ DISPLAY Selector Buttons
DISPLAY buttons select the following three types of display:

DISPLAY button	Display	
CLOCK	Month, day, hours and minutes	
DATA (AUTO)	Channel number, alarm sign (H or L), polarity sign(+ or −), measured data, and unit mark (°C, mV, or V).	In three-second intervals, display is automatically changed from first to last(up to 30) channel.
DATA (MAN)−CH NO		Display is manually changed sequentially from first to last channel at the push of [Δ] button.

❹ DATA SET Buttons
CLOCK. . . The keyboard entry of CLOCK(month, day, hours and minutes can be entered at the push of SET and ENTRY buttons).
RANGE. . . The keyboard entry of RANGE(channel number, input type, and full-scale range values can be entered at the push of SET and ENTRY buttons).
ALARM. . . The keyboard entry of ALARM(relay number, channel number, and H and L values can be entered at the push of SET and ENTRY buttons).
SET. . . Data entry buttons for CLOCK, RANGE and ALARM.

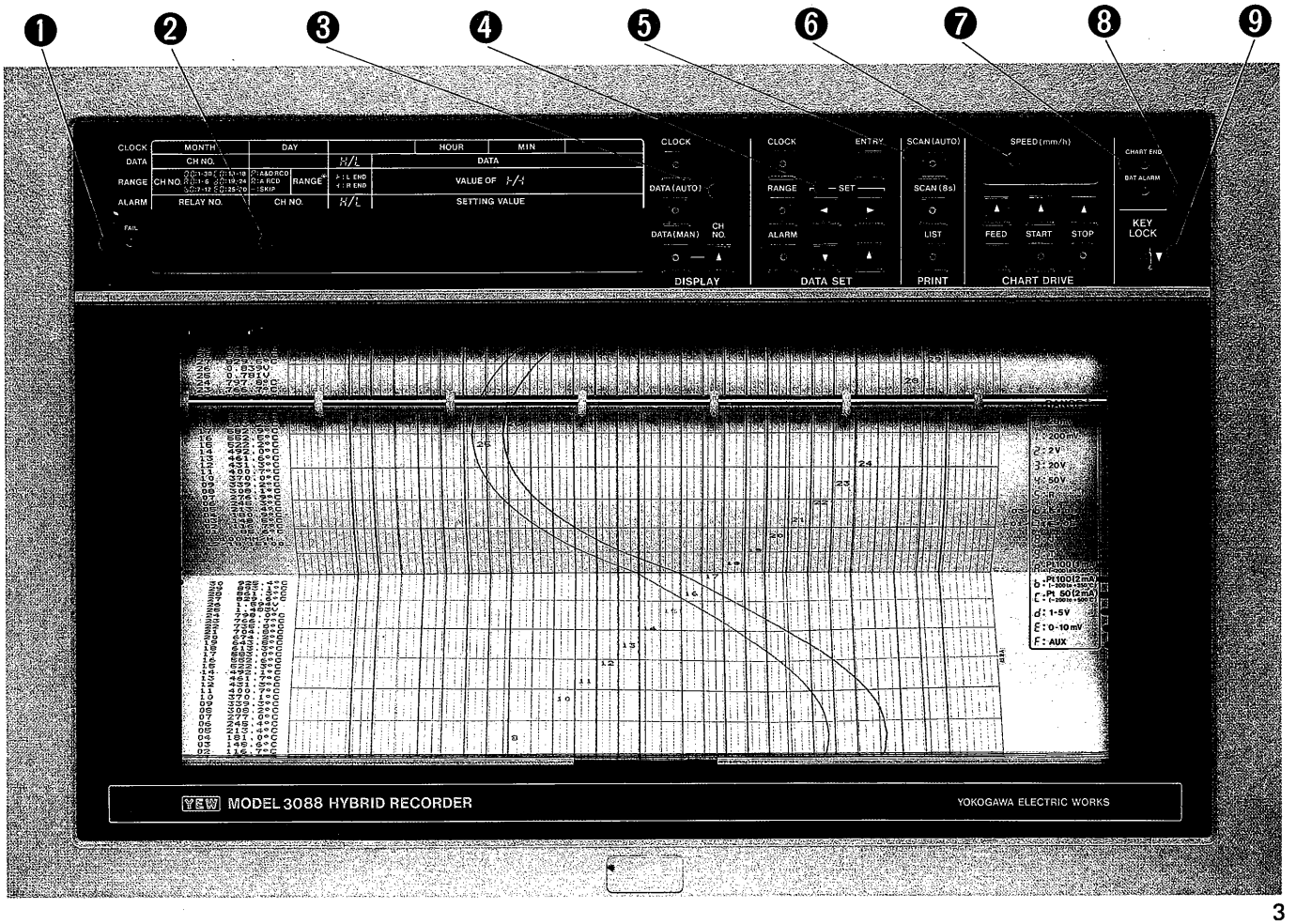
❺ SCAN Selector and LIST Buttons
SCAN(AUTO). . . Scan interval is automatically changed in response to the programmed chart speed. Chart advances 0.25mm in a single scan.
SCAN(8s). . . Scan interval is fixed at eight seconds.
LIST. . . Lists all program memory on the chart.

❻ Chart SPEED Selector Buttons and CHART DRIVE Buttons
SPEED(mm/h). . .Chart speed is selectable from 1 to 999 mm/h.
CHART DRIVE. . . FEED, START, and STOP buttons.

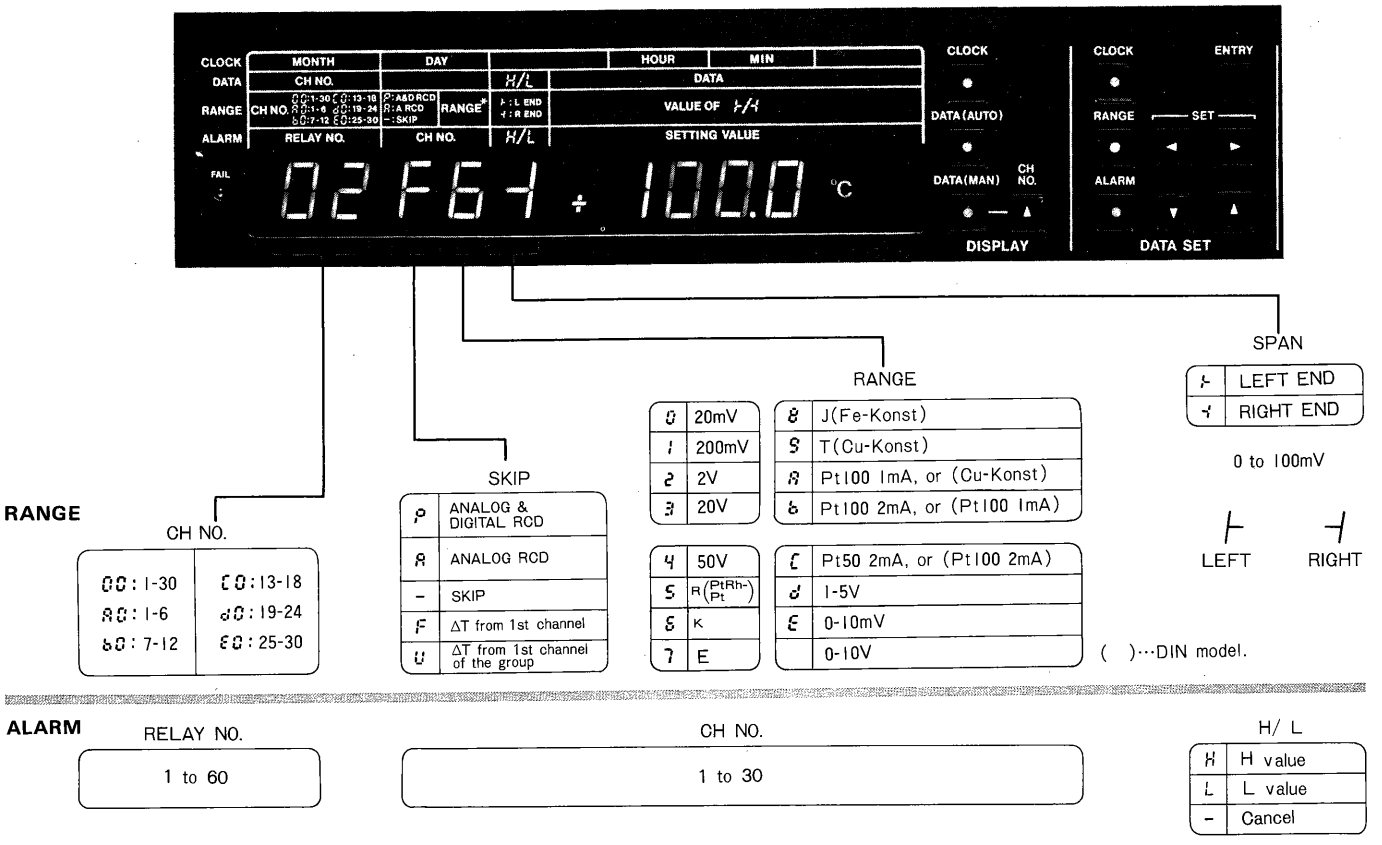
❼ CHART END Lamp
End-of-chart condition is indicated by lighting this LED indicator.

❽ BAT ALARM Lamp
Lights up to indicate low battery (battery life is about six months).

❾ KEY LOCK Selector
When the selector is in the down position, program entries are not accepted from the keyboard.



Examples of Keyboard Operation



■ **Full-scale range setting**

1st to 6th channels . . . Type K, 0 to 800°C full scale

1) Push RANGE button.
2) Using four SET buttons, set each item in the sequence of light display:

Item	Setting
CH NO.	80
SKIP	P
RANGE	6
SPAN	F
SETTING VALUE	+000.0

Item	Setting
Push ENTRY button	
SPAN	1
SETTING VALUE	+800.0
Push ENTRY button	

■ **Alarm setting**

Relay No. 5, 27th channel, H value . . . 600°C

1) Push ALARM button.
2) Using four SET buttons, set each item in the sequence of light display:

Item	Setting
RELAY NO.	05
CH NO.	27
H/L	H
SETTING VALUE	+600.0
Push ENTRY button	

■ **ΔT setting**

Reference channel . . . 1st channel, Type K (0 to 800°C)
Other channels . . . . . 02nd to 30th channels, Type K (±100°C)

1) Set the 1st channel in the same manner as "full-scale range setting".
2) Set 02nd to 30th channels as follows:

Item	Setting
CH NO.	02
SKIP	F
RANGE	6

Set each item in the same manner as "full-scale range setting".

DATA display under printout:
ΔT from the 1st channel.

Specifications

Type of Printer: High-speed wire-dot printer using a six-color ribbon (left-right-left printing system).
Number of Inputs: Up to 30.
Effective Recording Span: 250mm.
Basic Accuracy: ±0.25% of span.
Dead Band: Less than 0.1% of span.
Print Cycle Time (SCAN): 8 seconds max. (printing rate . . . 30 channels/8 seconds).
Chart: Z-fold chart (344mm x 20m), with calibrated width of 250mm (100 uniform divisions).
Chart Speeds: 1 to 999mm/h (selectable via keyboard).
Inputs:

Input Type	Measuring Range
DC V	3mV span (ex . . . 0 to 3mV, –3mV to 0) to ±50V, 0 to 10mV, 1 to 5V, and 0 to 10V
TC (JIS & ANSI, or DIN)	R(PtRh-Pt equivalent to S) . . . 0 to 1,600°C K(NiCr-Ni). . . –200 to 1,350°C E . . . . . –200 to 800°C J (Fe-Konst). . –200 to 900°C T (Cu-Konst).. –200 to 400°C (Cu-Konst). . . –200 to 600°C
RTD (JIS, or DIN)	Pt 100Ω . . . . –200 to 500°C (1mA), JIS, –200 to 550°C (1mA), DIN, –200 to 250°C (2mA), JIS, DIN Pt 50Ω . . . . –200 to 550°C (2mA), JIS

Full-Scale Range Setting: Programmable via keyboards for each channel, all channels or 6 channels as a group.
Compensation Accuracy: ±0.5°C for K, E, J and T, ±1°C for R.

Recording Colors:
Analog data . . .

Channel number	1, 7, 13, 19, 25	2, 8, 14, 20, 26	3, 9, 15, 21, 27	4, 10, 16, 22, 28	5, 11, 17 23, 29	6, 12, 18, 24, 30
Color	Purple	Red	Green	Blue	Brown	Black

Digital data . . . program list (blue), alarm (red), channel identification numbering (the same color as those of analog data).
Input Impedance: More than 10MΩ (less than 2V) without voltage divider, approx. 1MΩ (2 to 50V) with divider.
Maximum Allowable Input Voltage (Continuous): 20V DC for ranges of less than 2V DC, or 100V DC for ranges of 20 to 50V DC.
External Resistance: DC V and TC inputs . . . less than 2kΩ, RTD input . . . less than 10Ω/wire (Pt 100Ω), or less than 5Ω/wire (Pt 50Ω).
Operating Position: Vertical.
Operating Temperature Range: 5 to 40°C (41 to 104°F).
Humidity Range: 20 to 80%, relative humidity.
Dielectric Strength: 1,500V AC for one minute between power line and case, 500V AC between terminals and case.
Insulation Resistance: More than 20MΩ at 500V DC between terminals and case.
Power Requirements: 100, 115, 200 or 230V AC (must be specified), 50 and 60Hz.
Power Consumption: Approx. 60VA.
Finish: Gray case, semi-gloss black door.
Dimensions: Approx. 288 x 444 x 375.5mm (11-3/8 x 17-1/2 x 14-3/4").
Weight: Approx. 27.0 kg (59.5 lbs).
Accessories supplied at no extra cost: Power cord . . . 1 set, chart . . . 3 charts, six-color ribbon . . . 1 pc., lubricating oil . . . 1 bottle (2 cc), hex wrench . . . 4 pcs., fuse . . . 1 pc. (1A), 2 pcs. (2A), battery (SUM-2) . . . 3 pcs.

Standard Functions

Standard function	Description
Full-scale range setting	Programmable via keyboard for each channel, all channels, or six channels as a group.
Skip	Printout skips for the group programmed (each channel, all channels, or six channels).
Program list print-out	Contents of entire program memory are listed on the chart.
Digital printout of measured data	Channel numbers and measured data are printed out in digital in the left margin of the chart (at a chart speed of 10 to 300mm/h).
Digital printout of alarm	Relay number, H or L sign, and the time of out-of-limit occurrence are printed out in digital (red) in the right margin of the chart.
ΔT measurement	Digital printout of temperature difference between the first and any other channel.
Scaling (DCV)	Scaling for data display on input ranges of 0 to 10mV, 1 to 5V, and 0 to 10V.
Channel identification numbering	Channel identification numbering (up to 30 in six colors) is marked along the right of each trace (at a chart speed of 1 to 300mm/h).
Digital display	Clock, measured data, range, or alarm setting value is displayed.
Chart END alarm lamp	LED indicator lights up before out-of-chart conditions.
Battery-back up memory	Three 1.5V batteries maintain all programming when power is removed.
FAIL alarm	FAIL lamp lights up when the recorder is in fail condition.

Available Models

Basic Code	Input Type	
308821	DC V & TC	JIS, ANSI
308822	RTD	
308823	DC V, TC & RTD (6 inputs)	
308824	DC V, TC & RTD (12 inputs)	
308841	DC V & TC	DIN
308842	RTD	
308843	DC V, TC & RTD (6 inputs)	
308844	DC V, TC & RTD (12 inputs)	

Optional Features

Option Code	Description
/GP-IB	General purpose interface bus (GPIB)
/AK-02	Alarms (two common set points, indiscriminate outputs . . . self-contained)

Note: Both optional features cannot be provided with a single unit of Model 3088.

Optional Accessories

Code	Name
308981	Rack mount kit (Metric)
308982	Rack mount kit (Inch)

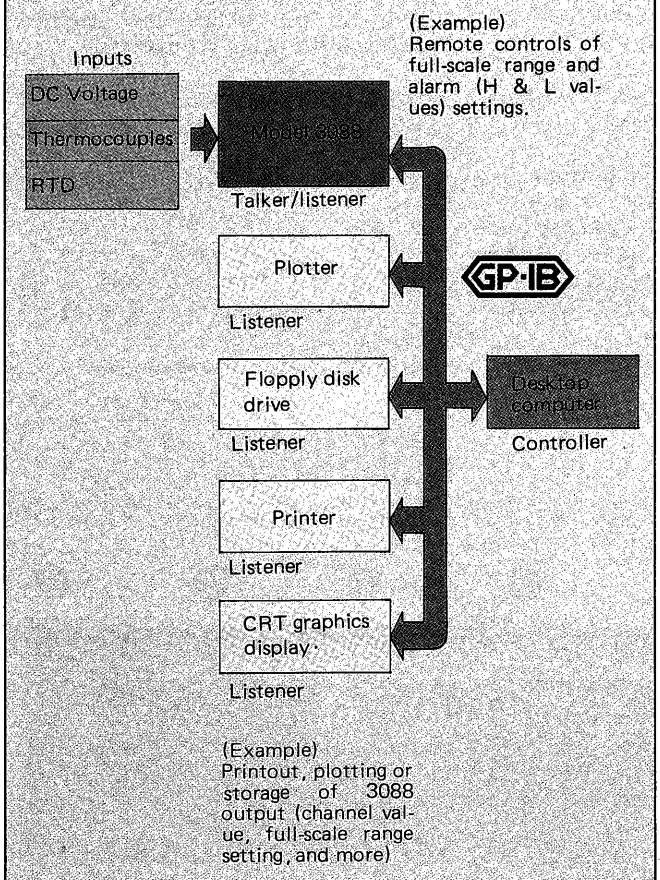
Spares

Name	Part No.	Description
Six-color ribbon	B9538JZ	1 pc.
Z-fold chart	B9538RN-01	6 charts (100 uniform divisions)

Optional Feature

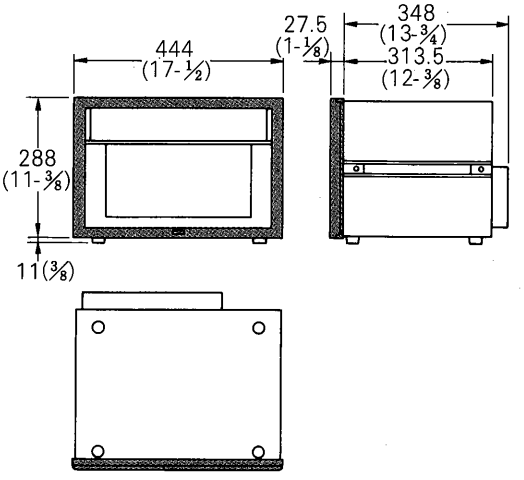
General Purpose Interface Bus (GPIB)
Functional, Electrical and Mechanical Specifications:
Meets IEEE Standard 488-1975 "Digital Interface for Programmable Instrumentation", interface function and identification . . . SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0.

An optional GPIB further expands the applications of the hybrid recorder



Dimensions

Unit: mm(approx. inch)



YOKOGAWA

YOKOGAWA ELECTRIC CORPORATION
9-32, Nakacho 2-Chome, Musashino-shi, Tokyo 180, JAPAN
Phone: Tokyo 0422-54-1111, Telex: 02822-327 YEW MT J
TOKYO NO.2 SALES OFFICE: Shinjuku NS Bldg. (10F),
2-4-1 Nishi Shinjuku, Shinjuku-ku, Tokyo 163, JAPAN
Phone: 03-349-0621, Telex: J27473 YEWTOK

YOKOGAWA CORPORATION OF AMERICA
2 Dart Road, Shenandoah, Ga. 30265, U.S.A.
Phone: 404-253-7000, TWX: 810-766-4760 YCA SHEN

YOKOGAWA ELECTROFACT B.V.
Radiumweg 30, 3812 RA Amersfoort, THE NETHERLANDS
Phone: (0)33-641611, Telex: 79118 YEF NL

Represented by:

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