DR4500A Truline® Circular Chart Recorder

Specification

Function

Honeywell's Truline recorder is a one to four-channel, microprocessor-based, circular chart recorder. Its "one-pen" stylus printhead produces up to four analog traces and prints alphanumeric chart data on a blank heat-sensitive chart. All four traces share the *same time line* reference which the Truline prints. This eliminates the error caused by pen alignment offsets in conventional pen designs. Since the Truline prints the chart and generates the analog traces at the same time, there is no error due to variations in chart size caused by changes in temperature and humidity.

With microprocessor electronics and single printhead, the Truline recorder is easily configured by users to meet a variety of application requirements - from metals to food processing. Models with up to four input channels accept inputs from any one of a variety of sensors or transmitters within the configurable range limits.

Also, models are available with one or two independent digital controllers to generate controlled output signals which will operate valves, dampers, heating elements, etc. for process control.

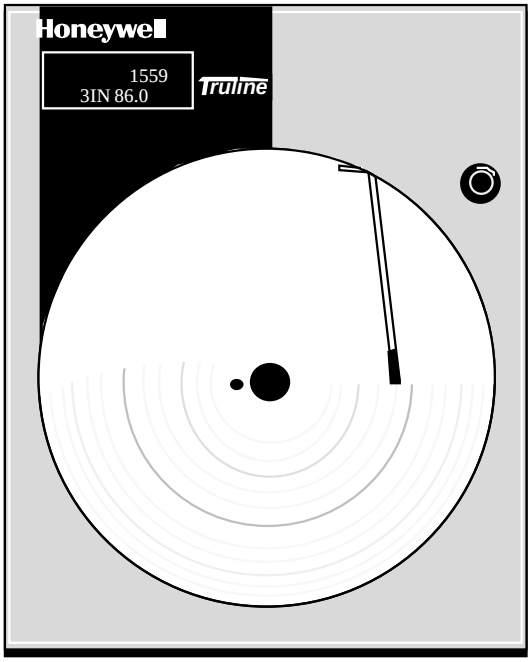

Figure1 - Truline recorder provides printed chart data and continuous digital indication of process variable value.

Features

• ***User Configurable*** — means that users, using English language prompts, can set and/or alter operating parameters to fit their requirements, including type of input, without recalibration.

• ***Operator Interface*** — includes clear, brilliant alphanumeric displays; indicators; deviation bargraph; and keypad for visual and tactile interaction.

• ***All-Purpose Chart*** —blank chart eliminates the need for ordering and stocking several types of charts. And, users can design the chart to match specific applications.

• ***Four Channels*** — up to four channels that monitor process variables from a variety of sensors reduce panel space requirements.

Features, continued

• ***"One-pen" Printer*** — prints configurable alphanumeric chart data including time and trend lines. This automatically compensates for chart width variations caused by changes in the ambient relative humidity.

• ***Control Output*** — up to two versatile PID digital controllers let users configure the exact control action needed for their process.

• ***Time/Date*** — real-time, clock, dates, time of printing (hour, minutes, date and year) and any operator changes in real time guard against unauthorized chart advancement. There is a 10-year life battery backup.

• ***Accutune II™*** —This standard feature provides a new, truly plug and play tuning algorithm, which will, at the touch of a button or through a digital input, accurately identify and tune any process including those with deadtime and integrating processes. This speeds up and simplifies start-up plus allows retuning at any setpoint.

Features, continued

• ***Fuzzy Logic*** — This standard feature uses fuzzy logic to suppress process variable overshoot due to SP changes or externally induced process disturbances. It operates independently from AccutuneII™ tuning. It does not change the PID constants, but temporarily modifies the internal controller response to suppress overshoot. This allows more aggressive tuning to co-exist with smooth PV response. It can be enabled or disabled depending on the application or the control criteria.

• ***Setpoint Ramp*** — a single set point ramp is user programmable and is easily repeated and activated through the Run/Hold key.

• ***Setpoint Rate*** — lets you define a ramp rate applied to any local setpoint change. A separate upscale or downscale rate is configurable.

• ***Six Alarms*** — up to six integral "soft" alarms are easily set by users to announce selected, out-of-limit conditions.

Features, continued

• ***Event Messages*** — up to six event messages can be printed on designated areas of the chart and can be triggered by a specific selectable event.

• ***Two Totalizers*** — one or two totalizers are available. Eight digit totals with multiplier on digital display. Fourteen digits totalization print out on chart, a grand total can be printed.

• ***CE Mark*** — Conformity with 73/23/EEC, Low Voltage Directive and 89/336/EEC EMC Directive.

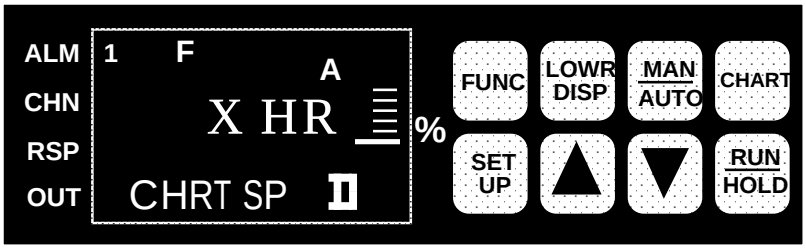

Figure 2 - Operator interface includes displays and keypad for comprehensive interaction with the recorder and the process.

Options*

• ***Chart Illumination*** — Lights the chart area to improve readability in lower light areas.

• ***Alarm Output*** — Ties "soft" alarms to up to six integral SPST relays to activate user's external equipment.

• ***Timer*** — This optional feature provides a configurable time period of 0 to 99 hours, 59 minutes or units of minutes and seconds. It can be started via the keyboard, alarm 2, or by a digital input. The timer output is Alarm 1 which energizes at the end of the Timer Period. Alarm 1 can be automatically reset. The Timer Period can be changed between each batch. Status is shown on the lower display.

• ***Digital Input*** — Allows users to initiate from a remote location through two dry contact closures, selected recorder functions, such as automatic to manual control mode, direct to reverse controller action, or initiate autotune.

• ***Modbus™ Communications*** — option allows you to network your recorders to take advantage of overall monitoring of the system using an RS485 network.

• ***Set Point Ramp/Soak Programming*** — Lets users program and store 18 ramp and 18 soak segments. Run or Hold of program is keyboard or remote switch selectable. Each Control Loop can run one of the 6 profiles using any number of consecutive segments of the program.

You can select a recovery mode for powerup.

Options*, continued

• ***Math Functions***

Algorithms — preconfigured algorithms for easy implementation into other control loop with Ratio and Bias.

Summer - will add three inputs with the result as the derived PV.

Multiplier/Divider - uses three analog inputs to calculate a derived PV with or without square root.

Multiplier- will multiply three inputs with the result as the derived PV with or without square root.

Subtractor/Multipler - the difference between input 1 and input 2 is multiplied by input 3.

Input High/Low Select - specifies the PV as the higher or lower of two inputs.

Polynomial Curve Characteristics -- A fifth order polynomial equation can be used on any one of the analog inputs.

• ***Auxiliary Output*** — there is also a 4 to 20 mA current output available. It can be used to retransmit a process variable.
In addition, the 4-20 outputs on the control board can be used as an auxiliary output if not used for control.

• ***Door Options*** — Choice of gray, black or blue doors with standard latch or optional lock. Heavy duty Stainless Steel door available.

• ***Approval Body Options*** — FM approval, CSA certification and UL Listing or a combination are available options.

• ***Customer ID Tag*** — (30 characters max.)

*Restrictions apply -- Not all of the options can be supplied together.

User Configurable

In the DR4500A Series recorder, microprocessor control replaces conventional electro-mechanical recording techniques. This means that the recorder's capabilities are now primarily determined by its software. Since Honeywell has preprogrammed a variety of functional capabilities into the recorder, a user only has to configure those functions that are specific for the given application.

Operator Interface

Two digital displays present the process variable (PV) value and by key selection, the controller set point; controller output; deviation from reference input; dry bulb temperature; totalization value; or engineering units as desired. The lower display can also be set to scroll or hold.

In configuration mode, digital displays are pre-empted by English language prompts and values that you use to enter configuration data (type of input, chart speed, chart range, alarm settings, tuning constants, etc.) and then stored in nonvolatile memory for safe keeping in the event of a power failure.

Indicators light to show alarm conditions, which channel PV is on display, use of remote set point, which output relay is on, selected temperature unit, and controller's mode of operation. A deviation bargraph lets operators tell at a glance if the process variable is at, above, or below the controller's set point.

The keypad through which configuration data is entered also serves as an integral automatic/ manual station that provides bumpless transfer for controllers.

Microprocessor Controlled Recording and Printing

Both the chart and the printhead are driven by the stepper motors which are controlled by the microprocessor. The microprocessor uses the configured chart range data as well as the input data to determine the proper printhead position. The stepper motor accurately positions the printhead drive.

Since chart speed is configurable, users can easily alter the chart speed through the keypad. Gear changing or additional motors are no longer required.

By using a “one-pen” printhead that is capable of printing alphanumeric characters, users can now set various “printed” chart data through configuration. This means that such chart data as range marking in engineering units, digital values for process variables, and trace identification are easily personalized for the application.

This data, plus printed time lines and engineering units of scale, eliminate the need to maintain an inventory of a variety of preprinted charts.

The Truline recorder uses a dot fill technique from a microprocessor algorithm to produce a continuous analog trace of a process variable.

Input Processing

The input can be one of many standard low-level electrical signals. Since inputs are isolated, users can connect different types of input signals to multi-channel models in any combination. And, for models with 2 or more channels, a relative humidity (wet/dry bulb) actuation is available using 100 ohm platinum bulbs (Alpha (α) = 0.00385).

The input type and range are user configurable. Ranges are easily expanded and compressed within their span limitations to meet specific measurement needs. Users can select upscale or downscale sensor break protection for many of the actuations.

An integral 24 Vdc power supply, along with 4-20 mA input configuration, allows direct operation with up to two transmitters without the need for any additional/external transmitter power supply.

To totalize a variable, such as a flow signal, users select the applicable input and set the digital display scaling factor through configuration. This eliminates the need for additional integration hardware including a mechanical counter. The totalizer has an eight digit display and 14 digit printing on the chart.

Also, there is the capability to reset the totalizer remotely with digital inputs and a low flow cutoff can be set, in percent of range, below which the applicable totalizer does not increment. Elapsed time can also be totalized. A grand total can be enabled to print the sum of all the totalizers.

Digital Controller

The DR4500A Series recorder controller (1 or 2 loops) includes an integral microprocessor-based, PID controller. A variety of output types, including a duplex variation for heat-cool applications, lets users select the output that is right for their final control element.

Depending on the output type, users can configure the control action as On-Off, PID-A, PID-B, PD with Manual Reset or 3 Position Step control.

As with the record functions, English language prompts quickly guide users through the entry of all the controller’s configurable parameters.

Diagnostics

All DR4500A Series recorders include self-diagnostic systems that check critical operations and provide error messages to alert users about detected faults.

Power-up self-diagnostics is a microprocessor controlled diagnostic program that runs tests on selected circuitry when the recorder is powered up. A “key” test allows a user to initiate, on demand, a self-diagnostic routine that checks the keypad and front panel displays.

Construction

The DR4500A Series recorder is housed in a molded case which can be panel or surface mounted. A glass or optional acrylic window, gasketed door protects internal components from harsh industrial environments while allowing easy access to the chart and operator interface. Circuitry is partitioned on printed circuit boards for ease of service. A Heavy Duty stainless steel door is available as an option.

Process Interface

Power, input, and output wiring connect to terminations inside the case. Knockouts in the sides and bottom of the case accept conduit connections for convenient wire entry.

Specifications

Design

Digital Indication Accuracy	1 digit
Minimum Input Span	Range is fully configurable with span limitation of the operating range selected
Input Impedance	*4-20 mA dc:* 250 ohms *0-10 Vdc:* 200K ohms *All others:* 10 Megohms
Source Impedance	*RTD:* 100 ohms per lead maximum
Sampling Rate	Each input sampled 3 times a second (1 or 2 inputs); 3 times in 2 seconds (3 or 4 inputs)
Input Filter	*Software*: Single pole low pass section with selectable time constants (off to 120 seconds)
Digital Displays	Vacuum fluorescent, alphanumeric. A six digit display dedicated to the process variable. Alternate information displayed during configuration mode. An eight digit display shows key selected operating parameters. Also provides guidance during configuration.
Indicators	Channel PV display (CHN 1, 2, 3, or 4) Alarm status (ALM 1, 2) Controller Output (OUT 1 or 2) Remote Set Point (RSP) Temperature unit (F or C) or Engineering units Controller's mode (A or MAN)
Deviation Bargraph	21 segment, color coded deviation bargraph: Green (large) = On Control Green (Small) = Deviation to ± 10% of PV
Controller Modes of Operation	Manual Operation Automatic with local set point Automatic with remote set point
Transmitter Supply Voltage	22 to 26 Vdc at input terminals (50 mAdc at 24 Vdc)

Performance

Number of Inputs	*One channel model:* One input *Two channel model:* Two inputs *Three channel model:* Three inputs *Four channel model:* Four inputs

Types of Input Actuation[1]	**Range**		**Reference Accuracy**		**Temp. Stability ± Degrees Error Per 1 Degree ΔT**
	°F	**°C**	**± °F**	**± °C**	
Thermocouples[2]	**105** to **3300**	**41** to **1816**			
B	105 to 150	41 to 66	42.00	23.00	2.00
	150 to 500	66 to 260	14.00	7.70	2.00
	500 to 1000	260 to 538	3.00	1.70	0.50
	1000 to 3300	538 to 1816	1.50	0.80	0.20
E	**-454** to **1832**	**-270** to **1000**			
	-454 to -202	-270 to -130	18.00	10.00	0.70
	-202 to 1832	-130 to 1000	1.00	0.55	0.35
E (low)	**-200** to **1100**	**-129** to **593**	0.50	0.30	0.20
J	**0** to **1600**	**-18** to **871**	0.40	0.22	0.06
J (low)	**20** to **770**	**-7** to **410**	0.20	0.11	0.04

Specifications, continued

Types of Input Actuation[1]	Range °F	Range °C	Reference Accuracy ± °F	Reference Accuracy ± °C	Temp. Stability ± Degrees Error Per 1 Degree ΔT
K	**-320** to **2500**	**-196** to **1371**			
	-320 to 0	-196 to -18	1.25	0.70	0.18
	0 to 2500	18 to 1371	0.60	0.35	0.09
K (low)	-**20** to **1000**	**-29** to **538**	0.30	0.16	0.05
NNM (Ni Ni Moly)	**32** to **2500**	**0** to **1371**			
	32 to 500	0 to 260	0.75	0.40	0.09
	500 to 2500	260 to 1371	0.50	0.30	0.07
NIC (Nicrosil Nisil)	**0** to **2372**	**-18** to **1300**	1.0	0.55	0.01
R	**0** to **3100**	**-18** to **1704**			
	0 to 500	-18 to 260	2.00	1.10	0.25
	500 to 3100	260 to 1704	1.00	0.55	0.13
S	**0** to **3100**	**-18** to **1704**			
	0 to 500	-18 to 260	2.00	1.10	0.23
	500 to 3100	260 to 1704	1.00	0.55	0.13
T	**-300** to **700**	**-184** to **371**	0.60	0.35	0.07
T (low)	**-200** to **600**	**-129** to **316**	0.40	0.22	0.07
W5W26	**0** to **4200**	**-18** to **2315**			
	0 to 600	-18 to 316	1.40	0.77	0.17
	600 to 3600	316 to 1982	1.30	0.70	0.17
	3600 to 4200	1982 to 2315	1.60	0.90	0.29
W5W26 (low)	**0** to **2240**	**-18** to **1227**			
	0 to 600	-18 to 316	1.10	0.60	0.14
	600 to 2240	316 to 1227	1.00	0.55	0.10
Radiamatic (RH)	**1400** to **3400**	**760** to **1871**	1.00	0.55	0.10
RTDs[2]					
Platinum					
100 ohms	**–300** to **900**	**–184** to **482**	0.40	0.22	0.05
200 ohms (High)**	**32** to **752**	**0** to **400**	0.30	0.16	0.05
200 ohms (Low)**	**32** to **392**	**0** to **200**	0.20	0.12	0.05
500 ohms	**–300** to **900**	**–184** to **482**	0.20	0.11	0.05
Linear					
Milliamperes dc	4 to 20	--	0.10%	--	0.004% /˚F
Millivolts dc	0 to 10	--	0.05%	--	0.004% /˚F
	10 to 50	--	0.05%	--	0.004% /˚F
Volts dc	1 to 5 (can be calibrated 0 to 5)	--	0.05%	--	0.004% /˚F
	0 to 10	--	0.10%	--	0.004% /˚F
Relative Humidity					
Platinum 100 ohm Wet/Dry Bulb* **Wet/Dry Input**	**–130** to **392**	**–90** to **200**	0.30	0.16	0.03
	Measured %RH	**Dry Bulb Range °F**	**°C**	**Reference Accuracy ± °F / ± °C**	**Temp. Stability 53 to 104°F/ 12 to 40°C**
%RH[3]	0 to <20	–103 to 212	–75 to 100	2% RH	0.11% RH/**°F**
	20 to 100	35 to 40	2 to 4	2% RH	0.11% RH/**°F**
		>40 to 100	>4 to 38	1% RH	0.06% RH/**°F**
		100 to 212	38 to 100	1% RH	0.03% RH/**°F**

[1]Not all Input Actuations are available on all models of the Truline Recorder. Consult Model Selection Guide for information.

[2]Includes reference junction calibration of ± 0.01degrees using standard "ice bath" method of calibration. Factory calibration at reference ± 1.2°F. Note that factory calibration may vary by as much as ± 10 microvolts or ± 0.3 ohms for RTDs which means recalibration may be required to achieve stated accuracy.

[3]The RH calculation is inoperative when temperature goes below 32°F (0°C) or above 212°F (100°C). However, the dry bulb temperature will be monitored to -103°F (-75°C). Accuracy stated is for Truline Recorder only and does not include remaining system accuracies.

*IEC Alpha (α) = 0.00385 Ω/Ω/°C

**Only available with Model DR45AR

Specifications, continued

Configurable Parameters: These parameters can be set through the keypad for Recorder DR45AT -- Different parameters apply for DR45AR, DR45AW, DR45AH, and DR45AP Models.

Group	Parameters	Setting Range or Selection	Resolution
INPUT 1	Decimal point location	None, 1 (XXX.X) or 2 (XX.XX) -- one decimal place only for non-linear inputs	
	Units	°F, °C or engineering units	
	Engineering Units	A to Z, 0 to 9, +, –, \ .	
	Actuation type	See input types	
	Transmitter characterization	All non-linear input types, linear, square root	0.1
	High range value	–999.0 to 9999	0.1
	Low range value	–999.0 to 9999	
	Low Flow Cutoff	0 to 100% of input range	0.1
	Input compensation	–999.0 to 9999	1.0
	Filter 1	0 to 120	
	Sensor break protection	None, Up or Down(burnout)	
	Emissivity	.01 to 1.00	0.01
INPUT 2	SAME AS INPUT 1		
INPUT 3	SAME AS INPUT 1		
INPUT 4	SAME AS INPUT 1		
PEN 1	Pen 1	Disable or Enable	
	Pen 1 input	Input 1,2,3,or 4, Output 1, SP 1, Dgtl1, Dgtl2, Output 2, SP 2, RH, PV1	
	Chart 1 high range value	–999.0 to 999	0.1
	Chart 1 low range value	–999.0 to 999	0.1
	Major chart division	2 to 10	
	Minor chart division	2 to 10	
	Range 1 Tag	Up to five characters	
	Pen 1 On	0 to 100% of chart	1
	Pen 1 Off	0 to 100% of chart	1
PEN 2	Same as PEN 1		
PEN 3	Same as PEN 1		
PEN 4	Same as PEN 1		
CHART	Chart speed	8 hrs, 12 hrs, 24 hrs, 7 days, or selected hours per revolution	
	Hours per revolution	6 to 744 hrs* (12 hrs. for Abrasion Resistant Pen)	
	Time Div	8 to 24	
	Minor Div	4 or 8	
	Continue	Yes or No (Chart rotation beyond 360 degrees)	
	Chart Name	Up to six characters	
	Header	Yes or No	
	Rem Chart	None, Extsw1, Extsw2, Alarm1,2, 3, 4, 5, or 6, Time	
	Wake Minute	0 to 59	
	Wake Hour	0 to 23	
	Wake Day	0 to 31	
	Wake Month	0 to 12	
		* Below 8 hrs. chart speed and 24 hrs. chart speed with Abrasion Resistant Pen, printing may be degraded.	
TIME	Minutes	1 to 59	
	Hours	0 to 23	
	Day	1 to 31	
	Month	1 to 12	
	Year	4-digits	
	Day	Monday to Sunday	
TOTAL 1	Totalized Value (Read only)	(8 digits displayed, 14 digits printed on chart)	
	Reset total	Yes or No	
	Total 1	Input 1, 2, 3, 4, PV1. ETime	
	Total engineering units	Desired alphanumeric title	
	Rate	Second, Minute, Hour, Day or Million/Day	
	Scaling factor	1, 10, 100, 1000, 10,000, 100,000 or 1E6	
	Resettable	No, Local, EXTSW1, EXTSW2	

Specifications, continued

Group	Parameters	Setting Range or Selection	Resolution
TOTAL 2	SAME AS TOTAL 1		
Controller			
Input Algorithm	Input Algorithm	Summer w/ratio-bias, multiplier with or without square root, multiplier/divider with or without square root, subtractor multiplier, or High/Low Select.	
	K Coefficient	00.000 to 1000	
	PV High Limit	-999 to 9999	
	PV Low Limit	-999 to 9999	
	Ratio A	-20 to +20	
	Bias A	-999 to 9999	
	Ratio B	-20 to +20	
	Bias B	-999 to 9999	
	Ratio C	-20 to +20	
	Bias C	-999 to 9999	
	Polynomial Characterization	None, Input 1, Input 2, Input 3, Input 4	
	Polynomial coefficient C0	–99.99 to 99.99	
	Polynomial coefficient C1, C2, C3, C4, and C5	–9.999 to 9 999	
Control 1 (2)	PID tuning sets	1 or 2 (keyboard or automatic switchover)	
	Set point source	Local, Remote* (Control 1 only), 2 Local, or Control Loop 2 output	
	Ratio (input 2)	–20.00 to 20.00	0.01
	Bias	–999 to 9999	1.0
	SP tracking	None or RSP (Control 1 only)	
	Power-up mode recall	Manual, Auto LSP, Auto RSP, AMSP, or AMLSP	
	Power Out	Last or Failsafe	
	High and low SP limits	0 to 100% of span in engineering units	
	Action	Direct or reverse	
	High and low output limits	–5 to 105% of output	1.0
	Dropoff value	–5 to 105% of output	1.0
	Deadband	–5.0 to 25%	0.1
	Output Hyst	0.0 to 5.0	0.1
	Failsafe output value	Within the output limits	1.0
	Remote Switching	None, ToMan, ToLSP, To2SP, ToDir, RN/HLD, TUNE	
	Man Key	Disable or Enable	
	PB or Gain	Proportional band (%) or gain	1.0
	Reset units	Repeats/minute or minutes/repeat	
	Control 1 Algorithm	PIDA, PIDB, PD + MR, ON-OFF, 3 Position Step	
	Output 1 Algorithm	Current, Position Prop, TimeD, Cur TI, TI Cur, Time	
TUNING 1(2)	Gain (or Prop Band)	0.1 to 1000	0.1
	Rate Min (or RPM)	0.00 to 10.00	0.01
	Reset Min (or RPM)	0.02 to 50.00	0.01
	Man Rset	–100 to 100% output	1
	Cyc Sec	1 to 120 sec.	1
SPRAMP 1(2)	SP Ramp (1 or 2)	Disable or Enable	
	Time Min	0 to 255	
	Final SP	0 to 100% of Span	
	SPRate	Enable or Disable	
	EU/HR UP	0 to 9999	
	EU/HR DN	0 to 9999	
	SP Program	Disable or Enable	
	Recycles	0 to 99	
	Soak Deviation	0.0 to 99.0	
	Profile	1 to 6	
	State	Disable or Hold	
	Recovery	Enable or Disable	
	Program End	Last Setpoint or Failsafe	

* For Remote Setpoint Input #3 is automatically assigned as your RSP source for Control #1; Input #4 is assigned for Control #2. However, if the recorder has only 2 inputs, then the RSP will be on Input #2.

* *Communications only

Specifications, continued

Controller (continued)			
Group	**Parameters**	**Setting Range or Selection**	**Resolution**
SPPSEGS	Profile Start Segment Profile End Segment Ramp Unit Synchronize Profiles Segment X Ramp Segment X Setpoint Segment X Time	Ramp 1 to Ramp 35 Soak 2 to Soak 36 Time or Rate Enable, Disable 0.00 to 99:59 within High/Low Range Limits 0.00 to 99.59	
SPP EVENT	Segment X Event	None, Alarm 1, 2, 3, 4, 5, or 6	
TIMER	Timer Period Start Ldisplay Reset Increment	Enable/Disable 0.00 to 99:59 Run/Hold Key or Alarm 2 Time Remaining or Elapsed Time Run/Hold key or Alarm 1 Minute or Second	
OPTIONS	Reject Frequency Relative Humidity Atm. Pressure Scroll Grand Totalizer Deviation Deviation Setpoint	60 or 50 Hz Yes or No 590 to 800 None, 1 sec, 2 sec, 3 sec Enable or Disable (Prints sum of all active totalizer at each major time line) None, SetPnt, Chan 1 –999.0 to 9999	
ALARMS (1, 2, 3, 4, 5, 6)	SP Value SP Type Alarm Type Alarm Scaling Multiplier for Totalizer Alarm Alarm Hysteresis	-999 to 9999 None, Input 1 (2, 3, 4), RH/PV, Dev, Output, Dev2, Out2, Event, Total 1, Total 2 High or Low 1, 10, 100, 1000, 10000, 100000, 1E6 0.0 to 100% of span or full output	 0.1
AUXILIARY OUTPUT	Aux Output 4mA Val 20mA Val	Disable, IN1, IN2, PV1, PV2, Dev1, Dev2, Out1(2),SP1 (2) Low scaling factor High scaling factor	
MODBUS	Communications State Communications Address Baud Transmit Delay	Enable/Disable 1 to 99 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 None, 10msec, 20msec, 30msec, 40msec, 50msec.	
ADJUST PRINTING	Trace Line Grid Line Pen Type	Dark, Medium, Light Dark, Medium, Light Normal, Jewel	
EVNT MSG	Event 1 (2,3,4,5,6) MESSAGE 1 (2,3,4,5,6) POSITION 1 (2,3,4,5,6)	EXTSW1, EXTSW2, ALARM 1, ALARM 2, ALARM 3, ALARM 4, ALARM 5, ALARM6 Message for event (up to 6 characters) Chart position for message printing (0 to 100%)	
LOCKOUT	Password Lockout (software and/or hardware) Change	Up to four characters None, Calib, +Conf, Max (hardware configuration lockout-option) Used if changing Password	
STATUS	Version Failsafe RAM Test Configuration Test Calibration Test * Comm Test Fact CRC (Factory Set Input Constants) Battery test	Latest Software Version Yes or No Pass or Fail Pass or Fail Pass or Fail Pass or Fail Pass or Fail Pass or Fail	

* Communications only

Specifications, continued

Controller (continued)	
Controller Output[1] (Optional)	• *On-Off or Time Proportional* One SPST electromechanical relay. Control action can be set for direct or reverse; N.O. or N.C. contact selectable. • *On-Off Duplex , 3 Position Step, or Time Proportional Duplex* Two SPST electromechanical relays. Control action can be set for direct or reverse; N.O. or N.C. contact selectable. • *Current Proportional* 21 mAdc maximum into a negative or positive grounded or non-grounded load of 0 to 1000 ohms. Output range can be set between 4 and 20 mA, and as direct or reverse action. Resolution: 10 bits Accuracy: 0.5% full scale FM Approved Output (Optional) • *Position Proportional* Two SPST electromechanical relays operate motor having a 100 ohm to 1000 ohm slidewire. • *Current/Time Duplex and Time /Current Duplex* Variation of time proportional duplex for Heat/Cool applications. Time proportional output (heat or cool) is a SPST electromechanical relay. Current proportional output (heat or cool) is a 4-20 mA signal that can be fed into a negative or positive grounded load of 0 to 1000 ohms and is operational over 50 % of range or the entire range. Time Proportional Relay Resolution: 4.4 mSec. Relay Contact Ratings: Resistive Load: 5A @ 120 Vac, 2.5A @ 240 Vac Inductive Load: 50 VA @ 120 Vac or 240 Vac Cycle Time: 1 to 120 seconds Current Proportional : Resolution: 10 bits Accuracy: 0.5% full scale
CE Conformity (Europe) (Optional)	This product is in conformity with the protection requirements of the following European Council Directives: **73/23/EEC**, the Low Voltage Directive, and **89/336/EEC**, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.
Product Classification:	Class I: Permanently Connected, Panel Mounted Industrial Control Equipment with protective earthing (grounding). (EN 61010-1)
Enclosure Rating:	Panel Mounted Equipment, IP 00, this recorder must be panel mounted. Terminals must be enclosed within the panel. Front panel IP 65 (IEC 529)
Installation Category (Over-voltage Category)	Category II: Energy-consuming equipment supplied from the fixed installation. Local level appliances, and Industrial Control Equipment. (EN 61010-1)
Pollution Degree:	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (Ref. IEC 664-1)
EMC Classification	Group 1,Class A, ISM Equipment (EN 55011, emissions), Industrial Equipment (EN 50082-2, immunity)
Method of EMC Assessment	Technical File (TF)
Declaration of Conformity	51197639-000
Case	Molded, foamed-Noryl* with gasketed door to meet NEMA 3 enclosure requirements. Stainless Steel Heavy Duty door available as an option.
Chart	12-inch (304.8mm) diameter chart. Plain thermal-sensitive paper.
Wiring Connections	Terminals inside the case
Color	*Case:* Black *Door (standard):* Caribbean Blue, Black or Gray
Approval Bodies	U.L. approval depending on model. Consult Model selection Guide for information. FM approved for Class I, Div 2, Groups A, B, C, D areas depending on model.
Dimensions	See Figure 3
Weight	13.2 lb. (6 kg)
Mounting	Panel or surface mounted. Some adapter kits available for existing panel cutouts.

* Registered Trademark -- General Electric Co.

1. Not all controller outputs are available on all models of the Truline Recorder. Consult Model Selection Guide for information.

Specifications, continued

Options	
Alarm Output	Two, four or six relays available. Relays 3 through 6 available if not used for control outputs. *Relay Contact Raings:* First Relays, Resistive Load: 1A @ 120 Vac, 1/2A @ 240 Vac. Relays 3 through 6, Resistive Load: 5A @ 120 Vac, 2.5A @ 240 Vac.
Auxiliary Linear Output (Optional)	Three Auxiliary Outputs are available: 21 mA dc maximum into a negative or positive grounded load or non-grounded load of 0 to 1000 ohms. Output range can be set between 2 to 21 mA, and as direct or reverse action. It can be configured to represent any one of 12 parameters: Input 1-4, PV 1-2, Deviation 1-2, Output 1-2, Setpoint 1-2. The range of the auxiliary output, as a function of the selected variable, can be scaled. Auxiliary Output 2 and Auxiliary Output 3 use Control Current Output 1 and Control Current Output 2 if Control "OUTALG" is not set to "CURRENT" or "POSITION".. *Resolution:* 12 bits over 0 to 21 mA (10 bits for Auxiliary Output 2 and 3) *Accuracy:* 0.2% of full scale *Temperature Stability:* 0.03% F.S. / °C
Digital Input	+20 Vdc source for external dry contact or isolated solid state contacts. Selects one configured input.
Totalizers	One or two totalizers on DR45A1, DR45A2, DR45AT and DR45AR Models. Up to four totalizers on DR45AW Model. Eight digit "totals" with multiplier on digital display; 14-digit totalization printout on chart. Grand total can be printed at each major time line.
Calculations	F_O calculation available on DR45AR Model. Open channel flow calculations available on DR45AW Model.
Math Algorithms	Eight algorithms are available: A + B + C (summer with ratio and bias) √A • B/C (square root multiplier/divider) √A • B • C (square root multiplier) A • B/C (multiplier/divider) A • B • C (multiplier) (A-B) • C (difference multiplier) where: A = Input 1 • ratio A + bias A B = Input 2 • ratio B + bias B C = Input 3 • ratio C + bias C Limit of Ratio = -20 to +20 Limit of Bias = -999 to +9999 High/Low Select between Input 1 and Input 2 Polynomial Equation – Fifth order provides equation
Miscellaneous	• Heavy Duty Stainless Steel door • Door Lock • Chart Illumination • U.L. Listing, FM Approval, CSA, CE Conformity • Control with Accutune II Tuning Capability • Auxiliary 4-20 mA output • Glass or Acrylic Window • Customer ID Tag • 2 Pulse output counter alarm functions on DR45AW Model • Lead seal provisions
RS485 Modbus® RTU Communications	*Baud Rate:* 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 *Protocol:* RS485 Modbus RTU Communications *Length of Link:* 4000 ft (1,219 m) maximum *Link Characterics:* Two wire, multidrop

®registered trademark of Modicon

Specifications, continued

Environmental and Operating Conditions				
Parameter	**Reference**	**Rated**	**Extreme**	**Transport and storage**
Ambient Temperature	67 to 77 °F 19 to 25 °C	58 to 131 °F 15 to 55 °C	32 to 131 °F 0 to 55 °C	–40 to 151 °F –40 to 66 °C
Relative Humidity (%RH)	0 to 55*	10 to 90*	5 to 90*	5 to 95*
Vibration				
Frequency (Hz)	0	0 to 70	0 to 200	0 to 200
Acceleration (g)	0	0.1	0.2	0.5
Mechanical Shock				
Acceleration (g)	0	1	5	20
Duration (ms))	0	30	30	30
Mounting Position from Vertical				
Tilted Forward	5°	5°	5°	Any
Tilted Backward	5°	30°	90°	Any
Tilted to Side (**±**)	5°	10°	20°	Any
Power Requirements				
Voltage (VRMS)	119 to 121 238 to 242	102 to 132 204 to 264	102 to 132 204 to 264	N/A N/A
Frequency (Hz)	49.8 to 50.2 59.8 to 60.2	49 to 51 59 to 61	48 to 52 58 to 62	N/A N/A
Power Consumption	20 VA maximum			

General Reference Data	
Stray Rejection	*Common Mode Rejection Ratio:* 120dB or 1 LSB (whichever is greater) at 60 Hz with maximum source impedance of 100 ohms. *Normal Mode Rejection Ratio:* 60dB with a 100% span peak-to-peak maximum at 60 Hz.
Static Charge Effects	Exposed panel surfaces capable of withstanding a discharge from a 250pf capacitor charged to 10KV through 100 ohms.
Line Noise Effects	Field terminals for connecting power line to recorder can withstand the IEEE Surge Withstanding Capability Test to a level of 2.5KV.
Stylus Life	Typically capable of printing one chart per day for five years under clean room conditions.
Technical Assistance	Toll-free 800 number puts technical assistance only a phone call away.

* The maximum rating only applies up to 104°F (40°C). For higher temperatures, the RH specification is derated to maintain constant moisture content.

Reference Specifications	
44-45-03-11	**DR45AW Flow Model** for Weir, Parshall flume or Palmer-Bowles flume calculations and up to 4 totalizers
44-45-03-12	**DR45AR Model** for up to 6 relays, special RTD ranges, and F_o calculation
44-45-03-16	**DR45AH High Temperature Short Time (HTST)** **DR45AS Safety Thermal Limit Recorder (STLR)** **DR45AP Model for Dairy Flow/Timing Applications** for the dairy industry with lead seal provisions and FDA compliance

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

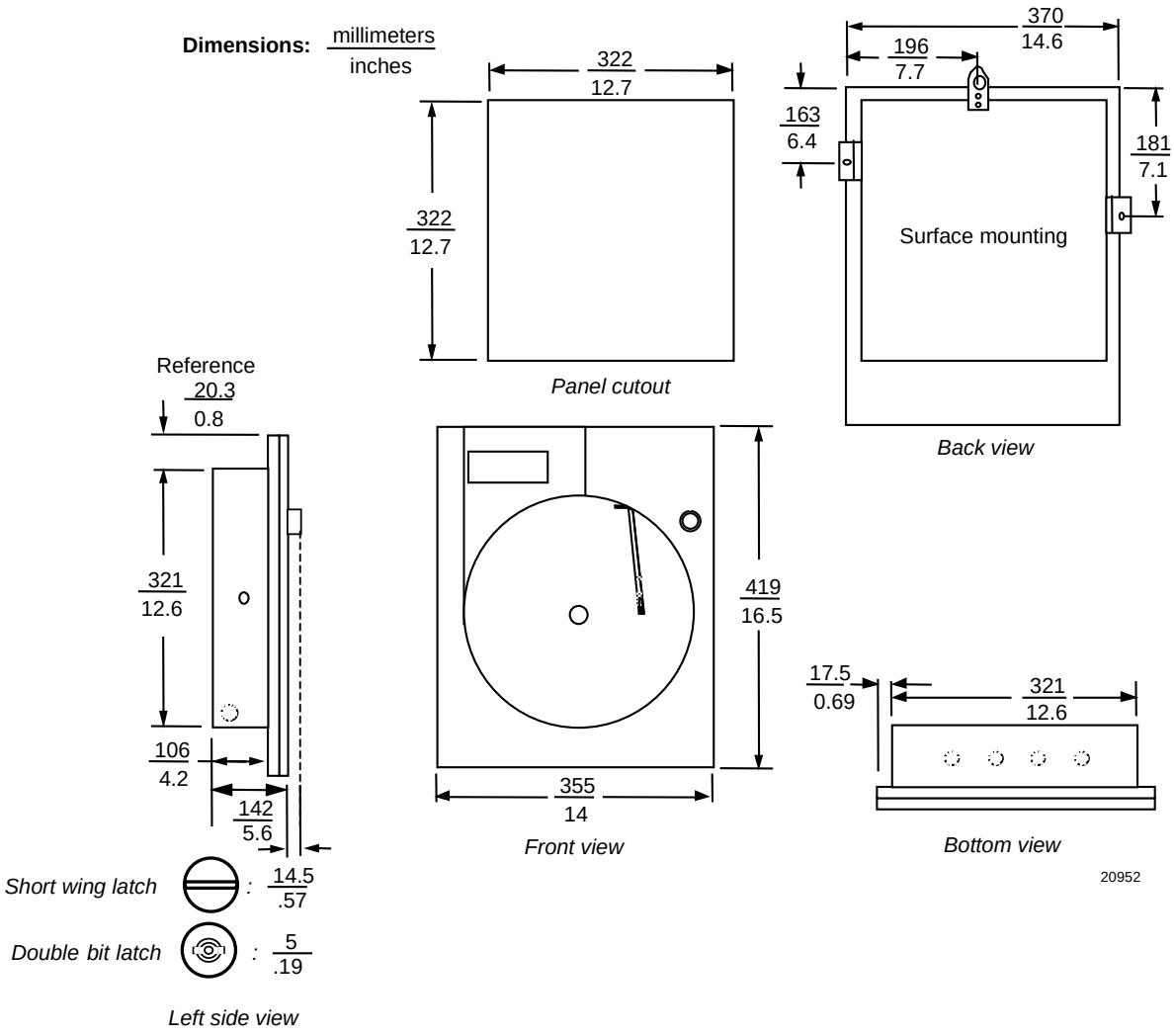

Figure 3— DR4500A series recorder dimensions - for reference only

Ordering Information

For complete ordering information, request Model Selection Guide 44-45-16-07 for DR4500A Series Circular Chart Recorder.
Honeywell offers a full line of sensors and transmitters that produce a compatible range of dc voltage or current signals which can be used as inputs to the DR4500A Series Recorder.
These devices measure:

Temperature: (Thermocouple or RTD)
Pressure
Flow {4 to 20 mA dc or 1 to 5 Vdc process transmitter}
Liquid Level
Relative Humidity

Honeywell

Sensing and Control
Honeywell
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