

Bristol® Acculine Series DR 4500 **Digital Circular Chart Recorder**

The Bristol® Acculine recorder, from Emerson Process Management, 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 Acculine prints. This eliminates the error caused by pen alignment offsets in conventional pen designs. With microprocessor electronics and single printhead, the Acculine recorder is easily configured by users to meet a variety of application requirements - from metals to food processing. In addition to printing informative, accurate chart records, the Acculine recorder alternately displays process variable values for all channels in the selected engineering units.

Features

- User configurable
- English language prompts
- Comprehensive operator interface includes, brilliant alphanumeric displays and keypad
- One all-purpose, blank chart
- Up to four channels
- "One-pen" printer
- Real-time, clock, dates and time of printing
- Up to two versatile PID digital controllers
- Up to six integral "soft alarms"

User Configurable

The user configures the recorder by following English language prompts that appear in the digital displays. The configuration data (type of input, chart speed, chart range, alarm settings, tuning constants, etc.) are stored in nonvolatile memory for safe keeping in the event of a power failure.



Operator Interface

Two digital displays present the process variable (PV) value and by key selection, the controller set point. 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

Chart speed is configurable through the keypad. The microprocessor uses the configured chart range data as well as the input data to determine the proper printhead position.

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Chart data as range marking is in engineering units, digital values for process variables, and trace identification are easily personalized for the application. This data eliminates the need to maintain an inventory of a variety of preprinted charts.

Time/Date

Real-time clock provides accurate timing for the recorder's time and date printing. A 10-year life battery backup assures correct timing even when power fails.

Input Processing

- Each input is sampled at a rate of 3 times per second for 1 or 2 inputs.
- A digital filter lets users apply input signal smoothing.
- All nonlinear inputs are linearized.
- 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
- Totalizer has an eight digit display and 14 digit printing on the chart

Optional Digital Controller

The Acculine 4500 series recorder controller includes an integral microprocessor-based, single-loop, 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.

Diagnostics

All 4500 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 con-

trolled diagnostic program that runs test on selected circuitry when the recorder is powered up. A "key" test allows the user to initiate, on demand, a self-diagnostic routine that checks the keypad and front panel displays.

Construction

The 4500 series recorder is housed in a molded case which can be panel or surface mounted. Circuitry is partitioned on printed circuit boards for ease of service.

Options*

- Chart Illumination
- Alarm Output
- Digital Input
- Set Point Ramp/Soak Programming
- Control
- Acrylic Window
- Door Lock
- NEMA 4X Door
- Customer ID Tag

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

Specifications

Digital Indication Accuracy

- 1 digit

Input Impedance

- 4-20 mAdc: 250 ohms 0-10 Vdc: 200K ohms All others: 10 Megohms

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Span Step Response Time

- 6-seconds maximum with no filtering

Sampling Rate

- Each input sampled 3 times a second (1 or inputs); 3 times in 2 seconds (3 or 4 inputs)

Digital Displays

- Vacuum fluorescent, alphanumeric

Indicators

- Channel PV display (CHN 1, 2, 3, or 4) Alarm Status (ALM 1,2) Controller Output Remote Set Point Temperature Unit Controller's mode

Deviation Bargraph

- 21 segment, color coded deviation bargraph

Transmitter Supply

- 22 to 26 Vdc at input

Voltage

- Terminals (50 mA dc at 24 Vdc)

Number of Inputs

- Up to four

Types of Input Actuation

- Thermocouples
 - B - RTDs
 - E - Milliamperes dc
 - J - Millivolts dc
 - K - Volts
 - R - Relative Humidity
 - S
 - T

Configurable Parameters

- Control Tuning
- Spramp Set Point Ramp
- Chart Speed
- Channels
- Inputs

Case

- Molded with gasketed door to meet NEMA 3 enclosure requirements

Chart

- 12-inch (304.8 mm) diameter chart. Plain thermal sensitive paper

Color

- Case: Black, with Gray Door

Dimensions

- See figure 1

Weight

- 13.2 lbs (6 kg)

Mounting

- Panel or surface mounted

Options

- Alarm Output
- Digital Input
- Totalizers
- Calculations

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- Miscellaneous
 - Door Lock
 - Chart Illumination
 - Control
 - Plastic Window
 - Customer ID Tag
 - Pulse Output Counter

Power Requirements

- Power Consumption 24 watts maximum

RFI Susceptibility

- Capable of withstanding an EMI-field generated from a 5-watt transmitter being held at 1 meter, and operating at 151.685 and 450 MHz

Stylus Life

- Typically capable of printing one chart per day for five years under clean room conditions

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Emerson Process Management Remote Automation Solutions

Watertown, CT 06795 USA

Mississauga, ON 06795 Canada

Worcester WR3 8YB UK

T 1 (860) 945-2200

T 1 (905) 362-0880

T 44 (1) 905-856950

Website: www.EmersonProcess.com/Remote



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Model DR45D__ - A B C D - E F - G H I

			1	2	T	R	W
SELECT	DESCRIPTION	CODE	RESTRICTIONS				
KEY NUMBER							
	1 Pen - Classic	DR45D1	*				
	2 Pen - Classic	DR45D2		*			
	Acculine	DR45DT			*		
	Acculine - Relay Expansion	DR45DR				*	
	Acculine - Flow Recorder	DR45DW					*
INPUT ACTUATIONS - TABLE I							
A <i>Channel 1</i>	T/C, RTD, mV, 0-5 Vdc, 4-20 mA, radimatic	1 ___	*	*	*	c	*
	0-10 Vdc	3 ___	*	*	*	c	*
B <i>Channel 2</i>	None	_ 0 _	*		*	c	*
	T/C, RTD, mV, 0-5 Vdc, 4-20 mA, radimatic	_ 1 _		*			
	T/C, RTD, mV, 0-5 Vdc, 4-20 mA, radimatic	_ 1 _			*	c	*
	0-10 Vdc	_ 3 _		*			
C <i>Channel 3</i>	0-10 Vdc	_ 3 _			*	c	*
	None	__ 0 _	*	*	*	*	*
	T/C, RTD, mV, 0-5 Vdc, 4-20 mA, radimatic	__ 1 _			d	e	d
D <i>Channel 4</i>	0-10 Vdc	__ 3 _			d	e	d
	None	___ 0	*	*	*	*	*
	T/C, RTD, mV, 0-5 Vdc, 4-20 mA, radimatic	___ 1			f	g	f
E	0-10 Vdc	___ 3			f	g	f
	None	0 _	*	*	*	*	*
	Control Output #1	1 _	*	*			
F	Control Output #1	1 _					
	Control Output #1 with Setpoint Programming	4 _			*	h	
	Pulse Output	5 _					*
	None	_ 0	*	*	*	*	*
F	Control Output #2	_ 1	*	*			
	Control Output #2 with Setpoint Programming	_ 4			*	h	
EXTERNAL OUTPUTS - TABLE II							

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EXTERNAL INTERFACE - TABLE III							
G	None	0 __	*	*	*	*	*
	Auxiliary 4-20 mA output	1 __	*	*	*	*	*
	Modbus Communications (RS485)	3 __	*	*	*	*	*
	Modbus Communications w/1 Auxiliary output	4 __	*	*	*	*	*
H	Standard Pen (Classic) Fiber Tip	_ 0 _	*	*			
	Acculine Thermal Pen	_ 0 _			*	*	*
	Acculine Thermal Pen (Abrasion Resistant Tip)	_ 1 _			k	k	k
I	None	-- 0	*	*	*	*	*
	2 Alarms/2 Digit Inputs	-- 1	*	*	*	*	*
	4 Alarms/2 Digit Inputs(See note 4)	-- 2				*	v
	6 Alarms/2 Digit Inputs (See note 4)	-- 3				*	w
	1 Alarm/1 Timer output/2 Digit Inputs	-- 4	*	*	*	*	*

Model DR45D__ J - K L M N O P R

SELECT	DESCRIPTION	CODE	RESTRICTIONS				
			1	2	T	R	W
J	SOFTWARE OPTIONS - TABLE IV						
	None	O	*	*	*	*	*
	Totalization (Input #1)	A	*	*	*	*	*
	Totalization (Input #1 and #2)	E		*	*	*	*
	Totalization (Input #1, #2, #3 and #4)	H					*
	Fo Sterilization Calculation	F				*	
	Math (Note #3)	B			*	*	*
	Totalization (Input #1) Plus Math	K			*	*	*
	Totalization (Input #1 and #2) Plus Math	L			*	*	*
	Totalization (Input #1, #2, #3 and #4) Plus Math	M					*

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K	HARDWARE OPTIONS - TABLE V						
	Gray Door with Glass Window	0 _ _ _ _ _	*	*	*	*	*
	Gray Door with Acrylic Window	1 _ _ _ _ _	*	*	*	*	*
	Stainless Steel Door with Glass Window	2 _ _ _ _ _	*	*	*	*	*
	Stainless Steel Door with Acrylic Window	3 _ _ _ _ _	*	*	*	*	*
	Blue Door with Glass Window	5 _ _ _ _ _	*	*	*	*	*
	Blue Door with Acrylic Window	6 _ _ _ _ _	*	*	*	*	*
	NEMA 4 X Door with Glass Window	P _ _ _ _ _	*	*	*	*	*
	NEMA 4 X Door with Acrylic Window	R _ _ _ _ _	*	*	*	*	*
L	DOOR LATCH						
	Standard Door Latch	_ 0 _ _ _ _	n	n	n	n	n
	Keyed Latch (Required for NEMA 4 Door)	_ A _ _ _ _	*	*	*	*	*
	Door Lock with Key	_ K _ _ _ _	q	q	q	q	q
M							
	None	_ _ 0 _ _ _	*	*	*	*	*
	Configuration Lockout/Chart Plate Seal	_ _ L _ _ _	*	*	*	*	*
	Configuration Lockout/Chart Plate Seal with Illumination	_ _ M _ _ _	t	t	t	t	t
	Chart Illumination	_ _ N _ _ _	t	t	t	t	t
N	None						
	CE Mark	_ _ _ K _ _	*	*	*	*	*
O	None						
	Customer Identification Tag (30 characters max)	_ _ _ _ _ T _	*	*	*	*	*
	Certificate of Conformance (F3391)	_ _ _ _ _ B _	*	*	*	*	*
	Customer Calibration/Test Report (F3399) - Note 0	_ _ _ _ _ C _	*	*	*	*	*
	Certificate of Conformance and Identification Tag	_ _ _ _ _ D _	*	*	*	*	*
	Customer Calibration and Identification Tag - Note 0	_ _ _ _ _ E _	*	*	*	*	*
P	Printed Manual						
		_ _ _ _ _ E	*	*	*	*	*
R	None (Future) - Table VI						
		0	*	*	*	*	*

Note: * Selections 2, 3, 4 and 7 are rated NEMA 4. Selection "A" Keyed Latch is required with any NEMA 4 option.

Note: 3 Math includes summer, multiple divider with square root

Note: 4 Four Alarms require control output #1, code 4, select E.

Six Alarms require control output #1 and #2, code 44, select E and F.

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Model DR45D__-

(PC 177)

RESTRICTIONS				
Restriction		Available Only With	Not Available With	
Letter	Table	Selection	Table	Selection
c		Not available with T/Cs B, N, R, W; but includes 200 ohm RTD actuation		
d	I	11 __, 31 __, 13 __, 33 __		
e	I	11 __, 31 __, 13 __, 33 __ Not available with T/Cs B, N, R, W; but includes 200 ohm RTD actuation		
f	I	111 __, 113 __, 131 __, 133 __ 311 __, 313 __, 331 __, 333 __		
g	I	111 __, 113 __, 131 __, 133 __ 311 __, 313 __, 331 __, 333 __ Not available with T/Cs B, N, R, W; but includes 200 ohm RTD actuation		
h		Available only with 4-20 mA control output		
j	I II	11 __, 31 __, 13 __, 33 __ 1_ for Classic or 4_ for Acculine (DR45AT or DR45DR)		
k		Available only with chart rotations of 24 to 744 hours on Acculine		
m		Not available with UL, CSA or FM Agency Approvals	V	__L__, __W__, __M__, __N__, __P__, __C__, __R__, __T__, __U__, __S__,
n			V	2____, 3____ 4____, 7____
p	II III	00, 60, 66 __0		
q		Not available with NEMA 4 or Heavy Duty Door options	V	2____, 3____ 4____, 7____ A____, B____ C____

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r	I II	11 __, 31 __, 13 __, 33 __ 6_, (1_, for DR45DP Model) Available only with 4-20 mA control output		
s			V	7XXXXX
t		Not available with CE Mark Option	V	XXXKXX, XXXLXX, XXXMXX, XXXNXX, XXXWXX

Model DR45A__-

RESTRICTIONS			
<i>Restriction</i>		<i>Available Only With</i>	<i>Not Available With</i>
<i>Letter</i>	<i>Table</i>	<i>Selection</i>	<i>Table</i>
u	I II	11 __, 31 __, 13 __, 33 __ 1_ for Classic, 4_ for Acculine (DR45AT or DR45AR) Available only with 4-20 mA control output	
v	II	4_, Alarms 1 - 4 Plus 4-20ma Control Output Supplied	
w	II	_4, Alarms 1 - 6 Plus 2nd 4-20ma Control Output Supplied	
Accessories			
Acculine			
Standard Stylus			V30756304501
Abrasion Resistant Stylus/per Box			V30756304502
Chart Paper (Blank no Logo)			V30755317003
Thermal sensitive - 100 per box			
Hub Kit			V30756150001
Classic			
#1 Pen - Purple		(6/pk)	V30735489007
# 2 Pen - Red		(6/pk)	V30735489002
Chart Paper		(Contact Watertown for price availability)	
Standard Preprinted Charts			
Spare Chart Drive			V30756113501

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Note: 1	Customer must supply input Actuation type and range for each input in free form in order to have unit custom calibrated.
Note: 2	All control outputs come standard with Accutune II tuning capability. Setpoint Programming capability is available on all models except DR45DH/DS/DP.
Note: 3	Math includes summer, Multiple Diver with Square Root, Multiplier with Square Root, Multiplier Divider, Multiplier, Subtractor Multiplier, HiLo select.

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