

K4 Series 100 mm Strip Chart Recorders

K4 Series 4" (100 mm) Continuous Trace and Multipoint Trace Strip Chart Recorders

- *Up to Four Pens for Continuous Traces*
- *Up to Six Inputs for Dot Traces*
- *Compact Size*
- *High Reliability*
- *Memory Card / PC Configuration Option*
- *Math, Counters, Timers Option*
- *Communications Option*



optional optional

K4 Series strip chart recorders offer a full family of products from a single pen model K4CA to the full featured K4MB.

Introduction

Barber-Colman K4 Series Strip Chart Recorders are available with continuous trace writing pens (up to four) or a multipoint printhead that will provide dot printed traces for up to six inputs. Both the continuous and multipoint trace models are available with either an analog display or a digital display. In addition, the K4 is available with *both* digital display and segment bar display. This model also offers several advanced features such as memory card reader, math capabilities, totalizers, timers and counters, and serial communications.

The K4 is housed in a compact case that extends less than 9-1/2" behind the mounting panel. It uses 100 mm x 16 m long (4" x 52-1/2 feet long) fanfold paper that is easily accessible from the front door.

Contactless Feedback

All K4 models use a state-of-the-art optical feedback system with brushless motors. This ensures that the combined motor and feedback system have high reliability and an excellent immunity to electromagnetic interference common to many switching cabinets.

Input Card Technology

Custom chips form the basis of a configurable, high accuracy, isolated input system. Auto calibration provides improved accuracy and stability with long-term calibration free service.

By using second order Delta-Sigma modulators, each input is continuously sampled to provide integrated values for the measured variable. Data acquisition is updated regularly by digitally interrogating the variables through optical isolators. Each channel has its own measuring circuit to ensure high sample accuracy and fast input response.

Wide Range of Models

The line-up of K4 recorders includes:

Model K4CA –	Continuous Trace Recorder with Analog Display
Model K4MA –	Multipoint Trace Recorder with Analog Display
Model K4CD –	Continuous Trace Recorder with Digital Display
Model K4MD –	Multipoint Trace Recorder with Digital Display
Model K4CB –	Continuous Trace Recorder with Digital Display and Segment Bar
Model K4MB –	Multipoint Trace Recorder with Digital Display and Segment Bar

Models K4XA and K4XD are configured at the factory to the specifications on your order and are ready for immediate use. Model K4XB is configurable from the front panel which makes it the ideal instrument for applications where configuration needs to be regularly modified.

K4 Series 100 mm Strip Chart Recorders

Ordering Information

Model K4XA and K4XD Recorders

MODEL K 4 - - - -
Field No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Fields 1, 2, 3, 4. BASE MODEL

- K4CA - 4", continuous, analog display
- K4MA - 4", multipoint, analog display
- K4CD - 4", continuous, digital display
- K4MD - 4", multipoint, digital display

Field 5. NUMBER OF PENS

Model K4MA or K4MD

- 0 - None. Multipoint model

Model K4CA or K4CD

- 1 - One trace pen
- 2 - Two trace pens
- 3 - Three trace pens
- 4 - Four trace pens
- 5 - One trace pen with annotating pen
- 6 - Two trace pens with annotating pen
- 7 - Three trace pens with annotating pen
- 8 - Four trace pens with annotating pen

Note: Annotating pen required if you want to print the time, date and channel information on the chart.

Field 6. NUMBER OF INPUTS

Information must be specified with order.

Model K4CA or K4CD

- 0 - Four fixed inputs

Model K4MA or K4MD

- 0 - Six fixed inputs

Fields 7, 8, 9, 10. RELAY / RETRANSMISSION CARDS

Four cards maximum.

- 0 - None
- 1 - Normally open (four outputs; three cards max.)
- 2 - Normally closed (four outputs; three cards max.)
- 3 - SPDT, Form C (four outputs; four cards max.)
- 4 - Analog retransmission (two outputs; two cards max.)

Field 11. QUANTITY of 250 Ω SHUNTS

- 0 - None
- 1 - One
- 2 - Two
- 3 - Three
- 4 - Four
- 5 - Five
- 6 - Six

Field 12. CHART SPEED

All Models

- 1 - Off, 5, 20, 60, 120 mm/hr
- 2 - Off, 10, 20, 60, 120 mm/hr
- 3 - Off, 10, 30, 60, 120 mm/hr
- 4 - Off, 20, 30, 60, 120 mm/hr
- 5 - Off, 30, 60, 120, 300 mm/hr

Model K4CA and K4CD only

- 6 - Off, 20, 120, 600, 1200 mm/hr
- 7 - Off, 20, 300, 1200, 3600 mm/hr
- 8 - Off, 20, 3600, 18000, 36000 mm/hr

Field 13. CHART DIVISIONS

- 0 - None
- 1 - 40
- 2 - 45
- 3 - 50
- 4 - 60
- 5 - 70
- 6 - 75

Field 14. CHART ILLUMINATION/ TRANSDUCER POWER SUPPLY

- 0 - None
- 1 - Chart illumination
- 2 - Transducer power supply (six signals)
- 3 - Chart illumination and transducer power supply

Field 15. SPECIALS

- 0 - None
- 1 - Certified calibration
- 2 - CSA testing/labeling
- 3 - CE (European Community) approval
- 4 - Certified calibration and CSA label
- 5 - Certified calibration and CE approval
- 6 - Certified calibration and CSA and CE approval

K4 Series 100 mm Strip Chart Recorders

Ordering Information (continued)

Model K4XB Recorder

MODEL K 4 **B** - - - -

Field No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Fields 1, 2, 3, 4. BASE MODEL

K4CB - 4", continuous, bargraph/digital display

K4MB - 4", multipoint, bargraph/digital display

Field 5. NUMBER OF PENS

Model K4MB

0 - None. Multipoint model

Model K4CB

1 - One trace pen

2 - Two trace pens

3 - Three trace pens

4 - Four trace pens

5 - One trace pen with annotating pen

6 - Two trace pens with annotating pen

7 - Three trace pens with annotating pen

8 - Four trace pens with annotating pen

Note: Annotating pen required if you want to print the time, date and channel information on the chart.

Field 6. INPUTS

Model K4CB

0 - Four fixed Inputs

Model K4MB

2 - Two

3 - Three

6 - Six

Fields 7, 8, 9, 10. OPTION CARDS

Four cards maximum.

0 - None

1 - Normally open (four relay outputs)

2 - Normally closed (four relay outputs)

3 - SPDT, Form C (four relay outputs)

4 - Analog retransmission
(two outputs; two cards maximum)

5 - Contact inputs (six inputs; one card maximum)

Field 11. MATH

0 - None

1 - Level 1

2 - Level 2

3 - Totalizers, timers, counters

4 - Level 1, plus totalizers, timers, counters

5 - Level 2, plus totalizers, timers, counters

Field 12. TRANSDUCER POWER SUPPLY

0 - None

3 - Three channel

6 - Six channel

Field 13. MEMORY CARD / COMMUNICATIONS

0 - None

R - Reader only (configuration storage)

1 - Reader and 128K card (configuration storage)

2 - Reader and 512K card (configuration storage)

3 - Reader and 2M card (configuration storage)

4 - Serial communications only

5 - Serial communications, reader and 2M card

6 - Reader only (ASCII storage w/configuration)

7 - Reader and 512K card (ASCII storage
with configuration)

8 - Reader and 2M card (ASCII storage
with configuration)

9 - Reader, 2M card (ASCII w/config) and
serial communications

Field 14. CHART ILLUMINATION/ PEN OFFSET COMPENSATION

0 - No

1 - Chart illumination

Model K4CB only

4 - Pen offset compensation

5 - Chart illumination and pen offset

Field 15. SPECIALS

0 - None

1 - Certified calibration

2 - CE (European Community) approval

3 - Custom messages (20 messages)

4 - CSA testing/labeling

5 - Option codes 1, 2 (Cert. cal. and CE approval)

6 - Option codes 1, 3

7 - Option codes 1, 4

8 - Option codes 2, 3

9 - Option codes 2, 4

A - Option codes 3, 4

B - Option codes 1, 2, 3

C - Option codes 1, 2, 4

D - Option codes 1, 3, 4

E - Option codes 2, 3, 4

F - Option codes 1, 2, 3, 4

Shunts and attenuators to be ordered separately.

K4 Series 100 mm Strip Chart Recorders

Specifications

		K4CA	K4MA	K4CD	K4MD	K4CB	K4MB	
General	Maximum Inputs	4	6	4	6	4	6	
	Input Ranges	±150 mVdc, ±1 Vdc, ±10 Vdc (0 - 10 Vdc for channel 1)				±38 mVdc, ±150 mVdc, ±1 Vdc, ±10 Vdc, ±100 Vdc with voltage divider		
	Input Types	Vdc, mVdc, mA dc (w/shunt), TC, 2/3 wire RTD (not channel 1 if any other channel is TC)						
	Input Type Mix	As specified on order				Configurable		
	Noise Rejection (48 to 62 Hz)	Common Mode: Greater than 140 dB (channel to channel and channel to ground); Series Mode: Greater than 60 dB						
	Max. Common Mode Voltage	250 Vac continuous						
	Max. Series Mode Voltage	180 mVdc at lowest range; 12 Vdc peak at highest range				45 mVdc at lowest range; 12 Vdc peak at highest range		
	Isolation (DC to 65 Hz; EN61010)	250 Vdc (channel to channel and channel to ground)						
	Dielectric Strength	Channel to ground = 1350 Vac for 1 min; Channel to channel = 2300 Vac for 1 min.						
	Insulation Resistance	Greater than 10 MΩ at 500 Vdc						
	Input Impedance	150 mVdc & 1 Vac ranges: Greater than 10 MΩ; 10 Vdc range: 245 kΩ						
	Overvoltage Protection	50 Volts peak						
	Open Circuit Detection	±57nA max. 125 msec recognition time, 10 MΩ minimum break						
DC Input Ranges	Temperature Performance (typical)	0.01% range + 35 ppm of reading per °C from 20°C						
	Shunt	Externally mounted resistor						
	Additional Error due to Shunt	250 Ω = 0.2%; 100 Ω = 0.1%						
	Typical Performance	See Table 1						
TC Data	Accuracy	0.2% span or 0.2°C within TC range						
	Bias Current	0.05 nA						
	Reference Junction Types	Off, internal, external as specified on order						
	Reference Junction Error	1°C or better						
	Reference Junction Rejection Ratio	50:1 minimum						
	Upscale/Downscale Drive	High, low or none as specified on order				Selectable high, low, none per channel		
	Types and Ranges	See Table 2						
Resistance Inputs	Ranges (including leads)	0 to 600 Ω, 0 to 6 kΩ						
	Accuracy	0.01 Ω ±20 ppm (typical)						
	Resolution	600 Ω range = 30 mΩ; 6 kΩ range = 200 mΩ						
	Influence of load resistance	Error = negligible; Mismatch = 1 Ω/Ω						
	Temperature Performance	0.1% reading + 100 mΩ (typical for both ranges in instrument at 20°C)						
	RTD Types	P5100, Pt1000, Ni100, Ni1000						
	Typical Pt100 Linearization Error	0.2% range or 0.2°C						
	Typical Pt100 Accuracy	0.1% reading + 0.2°C						
	Typical Pt100 Resolution	0.08°C						

K4 Series 100 mm Strip Chart Recorders

Specifications (continued)

		K4CA	K4MA	K4CD	K4MD	K4CB	K4MB
Environmental Performance	Temperature Limits	Operating: 0 to 50°C; Storage: -20 to 70°C					
	Humidity Limits	Operating: 5 to 80% RH (non-condensing); Storage: 5 to 90% RH (non-condensing)					
	Protection	Door and Bezel: IP54 (similar to NEMA 3); Case: IP31 (similar to NEMA 1)					
	Shock	IEC348; IEC873 (also recovers from 2g peak at 10 Hz to 150 Hz)					
	Vibration						
Power Requirements	Line Voltage	45 to 65 Hz, 90 to 264 Vac; 24/48 Vdc (option)					
	Maximum Power	100 VA; 100 W					
	Fuse Type	None					
	Interrupt Protection	40 ms at 75% instrument load					
Electromagnetic Compatibility	Static	IEC801-2 level 4 to 15 kVdc (air discharge when panel mounted with its door open)					
	RF Emissions	To EN55022 level B assuming sensible wiring precautions					
	Fast Transients	IEC801-3 (Instrument totally within specification); IEC801-4 (Automatic recovery from any errors/malfunctions)					
	RF Immunity	IEC801-3 to 10 V/m (level 3) with -1% deviation on 0 to 100°C range					
	Electrical Safety	To ENC61010, Installation II, Pollution Category II					

Table 1. DC Inputs

Range	Resolution	Typical Performance at 20°C Ambient					
		K4CA	K4MA	K4CD	K4MD	K4CB	K4MB
±150 mV	8 μV	0.1% reading +0.005% range	0.1% reading + 7.5 μV			Same as K4CA	Same as K4MA
±1 V	50 μV		0.1% reading + 50 μV				Same as K4MA
±10 V	500 μV	0.15% reading +0.005% range	0.15% reading + 500 μV			Same as K4CA	Same as K4MA

Table 2. Thermocouple Ranges

Type	Overall Range °C	Limits of Guaranteed Accuracy	Reference Standard
B	0 to 1820	490 to 1820	IEC584.1-S: 1977
C	0 to 2300	220 to 2300	Hoskins
E	0 to 1000	-160 to 1000	IEC584.1-S: 1977
J	-210 to 1200	-160 to 1200	
K	-270 to 1372	-180 to 1370	
L	-200 to 900	-100 to 900	DIN 43710
N	-270 to 1300	-160 to 1300	IEC584.1-S: 1977
R	-50 to 1767	0 to 1765	
S	-50 to 1767	0 to 1765	
T	-270 to 400	-120 to 400	
U	-200 to 600	-100 to 600	DIN 43710-85
NiNiMo	0 to 1400	80 to 1400	Ipsen
Platinel	0 to 1370	30 to 1370	Englehard

K4 Series 100 mm Strip Chart Recorders

Continuous Trace and Multipoint Trace Applications

Continuous

The continuous trace pen models offer the best resolution for applications where pen position and recent history are vital information. A dedicated annotation pen (optional) prints scale, time, date and chart speed on the chart without interrupting the traces, and thus removing the need for expensive special charts.

Pen (numbered 1 through 4) colors are blue, red, green and violet. Annotation is performed with a separate black pen. Pen resolution is 0.15 mm. Update rate is 4 Hz and response time is two seconds maximum. Typical pen life is three months.

Multipoint

Multipoint printing models combine needle printing technology with felt tip pens and offer an unusually high update rate for this class of recorder. With few moving parts and a proven robust printhead, the K4 multipoint recorders offer a very high level of reliability in hostile industrial environments.

Pen (numbered 1 through 6) colors are violet, red, black, green, blue, brown. Annotation is performed with pen #1 – violet. Resolution is 0.2 mm. Update rate is 1 Hz and response time is five seconds for all channels. Typical printhead life is three months.

Analog Display or Digital Display – Models K4XA, K4XD

Your recorder can be equipped with either an analog or digital display. Model K4XA is fitted with a front panel that is printed with the analog range and engineering units specified on your order. The digital display model – K4XD – offers a large four digit indication of the measured parameters, channel identification and alarm status.

Digital Display with Segment Bar – Models K4XB

The four color vacuum fluorescent display of these recorders offer crisp high contrast viewing from a distance. With three operating modes plus configuration, the display enables the operator to optimize his view of the process. In the configuration mode, the 20 character display allows programming in plain text. Six programming keys permit easy movement through the menu items.

In the operating mode the digital display shows the channel number and value, as well as engineering units with zero/full scale, channel tag, or alarm status. The 100 segment bargraph simultaneously displays values of all four channels of a continuous type recorder, or alternately displays values of three channels of the six point multipoint recorder.

Optional Features

The K4 recorders accommodate a wide range of optional features, including:

- Analog Retransmission
- Transducer Power Supply
- Certified Calibration (Certificate supplied)
- CSA Testing and Labeling
- CE (European Community) Approval

Additional Trace Pens

The following features are also available:

(Continuous trace models only.) One pen is included in the base price of the recorder. Up to three additional pens can be specified on your order.

A six pen printhead is included in the base price of a multipoint recorder.

Annotating Pen

(Continuous trace models only.) It enables you to print time, date, scale and chart speed on a plain paper chart, thus avoiding the need for more expensive pre-printed charts.

K4 Series 100 mm Strip Chart Recorders

Optional Features (continued)

Inputs	Your recorder will accept mAdc, mVdc, Vdc, RTD, and TC input signals. Models K4XB will also accept contact closure input. Thermocouple information is shown in Table 2. Four inputs are included in the base price of a continuous trace recorder; one input is included in the base price of a multipoint recorder. You can specify as many as five additional inputs – total of six – for your multipoint recorder.
Outputs	Inputs for models K4XB are configurable in the field. Inputs for models K4XA and K4XD must be specified on your order and will be configured at the factory.
Transducer Power Supply	The K4 recorder can provide normally open, normally closed, or form C relay outputs. Three or six channel isolated 24 Vdc, 20 mAdc power supplies. Used to power external unpowered 4 to 20 mAdc transducer.
Analog Retransmission	Isolated, scaled, 4 to 20 mAdc (up to 600 Ω) or 1 to 5 Vdc output.

Optional Features for Models K4XB Only

Memory Card Reader	<p>These recorders offer the personal computer memory card reader option. The memory card is a convenient, cost effective means of capturing, storing, and transferring information – both process data and instrument configurations.</p> <p>Barber-Colman K4XB recorders are designed for Type I, Release 2, SRAM (Static Random Access Memory) cards.</p> <p>Several different types of PCMCIA (Personal Computer Memory Card International Association) cards are commercially available. Each type is manufactured to specific sets of operating and electrical standards. Although commercially available cards are acceptable, all Barber-Colman PCMCIA cards have been modified to provide additional grounding to protect against static electricity. Since it is not practical to always power down a recorder before inserting or removing a memory card, the additional grounding minimizes the danger of static discharge damage.</p>
PC Configuration	Model K4XB allows you the convenience and time to prepare a configuration at a personal computer and then download it to the recorder. Downloading can be accomplished through a dedicated configuration port on the recorder, or through the PCMCIA memory card.
Communications	Two way communication up to 19,200 baud with built-in MODBUS® protocol assuring compatibility with any standard SCADA system and many other instruments. A host computer can read up to 16 recorders on the RS232/422-485 multi-drop communications loop.
Math	A wide range of calculations from channel averages to complex formulas can be evaluated by the use of math function blocks. More advanced strategies can be implemented by the use of timers and counters, while totalizers are available for such task as integration of liquid flow or power signals.
Pen Offset Compensation	Applies only to model K4CB with more than one pen. Electronically delays the channels so that all events are printed on same time axis.

K4 Series 100 mm Strip Chart Recorders

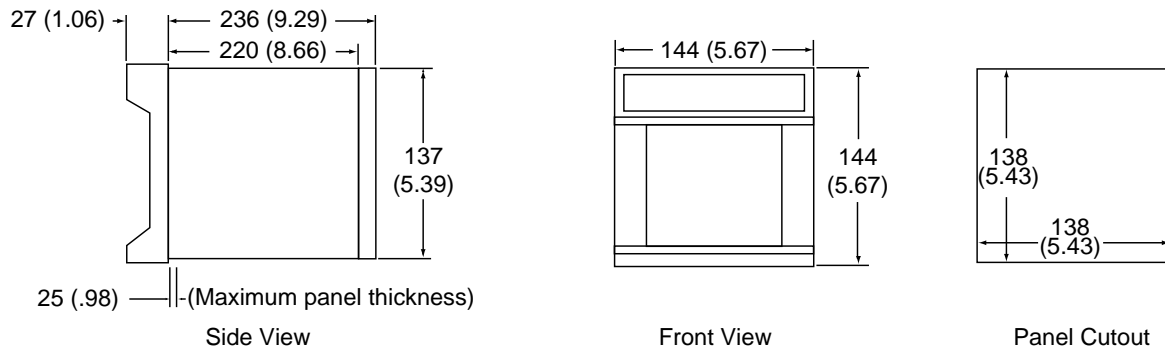
Wiring Information

<p>Vdc (-10V* < Vin < 10V) mVdc, Thermocouples</p> <p>*Range is 0 to 10V for channel 1.</p>	<p>Attenuator Assembly</p> <p>Vdc (-100 to 100)</p>	<p>Shunt Assembly</p> <p>mAdc</p>	<p>Line Input 90 to 264 V 45 to 65 Hz</p> <p>Earth Line Neutral (Safety cover not shown for clarity)</p>	
<p>Two Wire RTD</p>	<p>Three Wire RTD</p>	<p>Potentiometer</p>		<p>Option Board(s)</p> <p>Option Board(s)</p> <p>Input Board</p> <p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22</p> <p>Ch 1 Ch 2 Ch 3 Ch 4 Ch 5 Ch 6</p>
<p>Closure must last >60 msec</p> <p>Contact Closure (not channel 1)</p>	<p>Wire sizes: Power: 0.5 mm² (min.) Signal: 2.5 mm² (max.)</p>			<p>Rear view Series K4 Recorders</p> <p>Note: Channels 5 and 6 not available on continuous trace recorders.</p>

Recorders

Mounting Dimensions

Panel mount: vertical $\pm 30^\circ$
Weight: 7.75 pounds (3.5 kg)



Dimensions shown in millimeters, inches in parenthesis ().