



KIPP & ZONEN

DELFT-HOLLAND

Manual No. 776
for BD 40/41 - recorder

INSTRUCTION MANUAL FOR
BD 40 / BD 41 - RECORDER
(provisional issue)



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Instructions for use BD 40 and BD 41.

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1.

GENERAL INFORMATION.

1.1

INTRODUCTION.

The faultbed recorders BD 40 and BD 41 are compact recorders meeting to-day's technology. The recorders use a null-balancing potentiometric system. The two channel version BD 41 offers two completely independent and isolated servo systems. Both the pens use the full scale (200 mm.) width. Disposable fibre pens are used, avoiding the inconvenience of bleeding the ink system.



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1.2

SPECIFICATIONS.

1.2.1

Specifications of standard model. ^x

measuring ranges

option 01/07: single span to be specified by the OEM from 1. mV

option 02: multi range 10 - 20 - 50 - 100 - 200 - 500 - 1000 mV; variable attenuator (x 1 to x 0.4)

option 05: multi range 10 - 20 - 50 - 100 - 200 - 500 mV; fixed attenuator (100 x) variable attenuator (x 1 to 0.4)

option 06: multi range 1 - 2 - 5 - 10 - 20 - 50 mV; fixed input attenuator (100 x) variable attenuator (x 1 to x 0.4)

accuracy
dead zone
linearity
response

better than 0.3% fsd (200 mm.)
within 0.2 % fsd
better than 0.3 % fsd
full scale deflection (200 mm.) within 0.4 sec. (0 - 95 % fsd)

^x Note: The description in the following text is based on option 02.



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pen speed	max. 450 mm/sec.
input impedance	1 Mohm fixed
zero	adjustable (-50 % fsd to + 150 % fsd)
zero drift 2 $\mu\text{V}/^\circ\text{C}$	
input current 5 NA	
input	
input polarity	floating, asymmetrical
common mode rejection	pen travel can be reversed, internal setting.
permissible mains freq.	130 dB D.C.
interference	
pen travel	max. 5 times full scale (p.p.)
pen lift	200 mm
pens	manual
chart drive	fibre pens, disposable
chart speeds	stepping motor
	0.1 - 0.2 - 0.5 - 1 - 2 - 5 - 10 mm/sec.
	0.1 - 0.2 - 0.5 - 1 - 2 - 5 - 10 mm/min.
chart length	25 meters
chart life	4100 hrs/41 minutes (lowest speed/highest speed)
external chart control	on/off - external generator
mains supply	115/220 V; -15 % +20 %; 50/60 Hz
power consumption	15 Watts
dimensions	366 x 236 x 108 mm ^x
weight	6.5 Kg

^x See option BD 405



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1.2.2

Specifications of options.

BD 401 zero offset module	zero offset of 1, 2 or 3 times selected span, positive or negative; accuracy better than 0.3 % of offset voltage
BD 402 event marker	pen normally lifted. closure of external contacts results in a line on the lefthand side of chart
BD 403 retransmitting potentiometer	resistance value $5000 \text{ Ohms} \pm 10 \%$; lin. 0.25 %; max. voltage 70 Volts
BD 404 remote controlled penlift	closure of external contacts results in putting the pen on the chart
BD 405 paper take-up reel	if the instrument is ordered with option BD 405, the dimensions of the instrument will be 366 x 291 x 108 mm
BD 406 limit switches	max. current 1 Amp. max. voltage 110 Volts max. power 12 Watts max. voltage to earth 110 Volts



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1.3

INSTALLATION AND INSPECTION.

1.3.1

Unpacking.

The recorder is packed in a special developed shipping carton and if damage to this carton is evident, ask the carrier's agent to be present when the instrument is unpacked. Inspect the instrument for mechanical damage and if there is damage contact your local supplier. Check before throwing away the carton whether the standard spares are delivered.

Standard BD 40 accessories: 6 fibrepens
 1 paper chart roll
 1 mains supply cord
 10 fuses
 1 instruction manual.

Standard BD 41 accessories: 6 fibrepens red
 6 fibrepens blue
 1 paper chart roll
 1 mains supply cord
 10 fuses
 1 instruction manual.



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1.3.1. Insertion of a chart roll

Turn the papercassette 11 in its upper snap-in position. (see fig. 2)

fig.2

Two plastic guide cones become visible.

To load the cassette, the paper roll is pressed to the right against the spring loaded flange, till the chart roll can be pushed over the cone 1.

In case paper is used graduated from 0 - 100%, the oval perforation should be at the right hand side. Consequently when paper is used graduated from 100 - 0 %, the oval perforation should be at the left hand side.

Insert the paper in the slit (fig. 3.4) marked with an arrow and push till the paper becomes visible at the writing area.

Return the paper cassette into its original position by releasing the lever (fig. 3.5)

Push the paper guides (fig. 1.15) upwards. Pull the chart by hand till the perforations match the chart drive sprockets.

Push down the paper guides and transport the paper with the manual chartdrive (fig. 1.12)

Ensure that the paper is parallel to the side of the recorder.



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1.3.2

Operating controls.

(See fig.....)

1. Power switch
2. Pilot lamp
3. Variable range setting
4. Chart speed selector
5. Terminals external chart control and options
6. Measuring range selector
7. Input terminals
8. Zero setting
9. Covering lid
10. Penlift lever
11. Chart cassette
12. Manual chart drive
13. Recorder pen
14. Marker pen (option)
15. Chart guides
16. Zero offset selector (option)
17. Mains connector
18. Fuse
19. Identification transfer.

In case of BD 40 the once encircled numbers apply.



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1.3.4

Writing system.

The writing system is very simple and convenient, reliable fibre pens are used as a standard. After having removed the cap, the pen must be gently inserted into the penholder avoiding sideways pressure. This applies also the markerpen (see fig. 5)

When the recorder is not in use, the tips of the fibre pens should be covered by their caps, avoiding drying out of the pens.

The fibre pens are supplied in a standard box of 6 fibre pens.



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1.3.5

Electrical Connection (see fig. 1, fig. 2, fig. 6)

Before making any connections check the correct mains supply, it should read 220V or 110V. (see fig. 1.19)

If the mains supply differs from the indication on the recorder.

Execute the following procedure: (see fig. 2)

- a. turn the recorder on its side
- b. remove the 3 screws at the bottom (fig. 2.2) and put the recorder back in its normal position
- c. remove the screws (fig. 2.3)
- d. disconnect the plug of the paper cassette from the mother board and remove the main frame from the housing
- e. change the connections on the transformer in accordance with fig. 6
- f. reassemble the recorder
- g. indicate the correct voltage on your instrument

fig. 6



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The input signal is connected to terminal strip 7. (fig. 1)
The terminal marked "L" must be connected to that side of the source having the lowest impedance to ground, the other side of the source to "H".
The terminal marked with the earth symbol can be used to ground the signal source (terminal "L") unless it is already grounded elsewhere.
Terminal block 5 (fig. 1) is used for all other electrical connections, as indicated on the diagram in fig. 7.
This diagram is also shown on the inside of the covering lid.
The fitted options of your instrument are marked with a black dot.



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1.3.6.

Recording (See fig. 1)

When all the connections are made the recorder is ready for operation.

Before switching on the mains, the paper transport "off" button should be in the "off" position and the zero of the sensitivity selector should be pushed in.

Switch on the mains and adjust the zero by means of ...

Select the required range and release the zero button.

Should the amplitude of the signal not be known start with the less sensitive range and then increase the range until a suitable pen deflection is obtained.

Lower pen on paper with lever (10)

Select a suitable chart speed and release "off" button of switch...

The recorder is also equipped with a position "Var" which enables the user to select a voltage range between the fixed spans.

Example:

Suppose one has a signal varying between 0 and 25 mV and wants to use the full scale width. Push the 50 mV button, the amplitude reaches 50% of scale = 25 mV, push in the "Var" button (6) and regulate by the "Var" (3) potentiometer till the amplitude reaches 100% of scale.

When recording is finished tear off the paper as shown in figure 8.



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1.3.7. Chart drive.

Paper transport speeds. (internal)

Paper drive is controlled by a stepping motor. The push button marked "ext." should be in the released position. A built in frequency generator powers the stepping motor resulting in the speeds selected by push buttons.

Paper transport speeds. (external)

An external frequency can be used to power the stepping motor, the push button marked "ext." should be pushed in. When an external frequency source of 200 Hz is used the paper speeds will be in strict accordance with the speeds as indicated at the push buttons nr. When a frequency of f Herz is used a speed of $\frac{f}{200}$ times the selected speed will be obtained.

For proper operation of the paper transport drive it is recommended not to exceed the speed of 10 mm/sec.

The connections for external paper drive control can be found on the connecting strip 5. (terminals 2 and 3) The voltage level of the external frequency should be TTL (i.c.: 0-5V) of strip 5.

Paper drive start / stop.

When the button marked "off" is pushed in, the chart drive stops.

Remote control may be effected by an external switch which can be connected to terminals 1 and 3 of strip 5. (Switch open = chart drive; switch closed = chart stop).

These functions can also be effected by using a voltage of T.T.L. level on the same terminals 1 and 3 of strip 5. (5 Volt = chart drive; 0 Volt = chart stop).

Note:

Terminal 3 on strip 5 is ground.

Terminal 1 and 2 should be positive to ground.



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1.3.8.

Options.

BD 401

zero offset option (see fig. 0)

The push buttons marked 1, 2, and 3 activate a zero shift of 100, 200 and 300% of selected span. The push button +/- indicates a zero shift to the right or left respectively, the push button 0, when depressed, overrules the zero suppression.

BD 402

Marker option.

Control of marker pen may be effected by using an external switch, connected to terminals 15 and 16 or 17 of strip 5.
The marker pen is in the position up when the switch is open.
The marker pen is in the position down when the switch is closed, giving a straight line on the paper.

BD 403

Retransmitting potentiometer option

The recorder can be equipped with a transmitting slide wire (5000 Ohms + 10%), mechanically coupled to the servopotentiometer (electrically isolated and dust tight).

The retransmitting potentiometers are wired to terminals 4, 5 and 6 (BD 40) of strip 5 and additionally to terminals 18, 19 and 20 (BD 41).

The max. allowable voltage over the potentiometer is 70 Volts.

BD 404

Electrical pen lift option.

Control of the electrical pen lift may be effected by using an external switch connected to terminals 14 and 16 or 17 of strip 5 (BD 40) and additionally to terminals 13 and 16 or 17 (BD 41).

The position down can always be overruled manually by using the pen lift lever 10.