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UDB 97
Up-Down Ramp Buffer
Instruction Manual

1.0 INTRODUCTION

These instructions refer to the above model. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple check should be performed to verify calibration before installation to ensure that it matches the field requirement.

2.0 GENERAL DESCRIPTION

The ADTECH UDB 97 Non-Isolated Up-Down Ramp Buffer provides supervisory process control. A contact change or a pulse input ramps the standard control signal output of 1-5 vdc or 4-20 ma dc up or down or holds the output signal at the desired level.

Two independent contact inputs control the direction of the output of the ramp and/or hold function.

Power Option P 1 Non-Isolated 24 vdc provides negative output signal and negative DC power common rail connection.

The output is a true current source and provides process signals such as 4-20 ma, 0-1 ma, 0-10 ma, 1-5 ma and 10-50 ma dc or alternatively, a voltage signal of 5 vdc full scale. Other current and voltage **Inputs/Outputs (I/O)** are available as specified on the Data Bulletin.

3.0 INSTALLATION

The instrument is supplied in a general purpose enclosure as standard. NEMA 4, 7 or 12 and plug in chassis enclosures are optionally available. Installation area/location must agree with the supplied instruments including operating temperature and ambient conditions.

Mounting

Refer to the appropriate outline drawing for mounting and clearance dimensions. The instrument is surface mounted with two #10-32 screws on 8.00 inch centers.

Electrical Connections

The wire used to connect the instrument to the control system **I/O** should be a twisted pair(s) and sized according to normal practice.

A 12 position barrier terminal block with #6-32 screws and 3/8" spacing is provided for **I/O** and power connection. A housing ground terminal marked G is also provided.

Controls

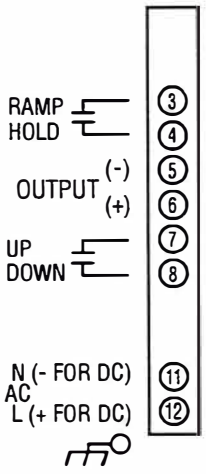
Multiturn ZERO, SPAN, UPRATE and DOWNRATE controls are provided to calibrate the instrument. The multiturn controls are accessible through the instrument front panel and are clearly marked for ease of use.

4.0 MAINTENANCE

These instruments are electronic and require no maintenance except periodic cleaning and calibration verification. If the unit appears to be mis-operating it should be checked as installed per section 6.0 or removed for a bench check per sections 6.0-7.0. MOST problems are traced to field wiring and/or associated circuits. If the problem appears to be with the instrument, proceed to sections 6.0 and 7.0.

5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



6.0 CALIBRATION

To perform a calibration check or re-calibration of the instrument follow this procedure.

A. Carefully remove the instrument from the housing to gain access to the inside components observing all normal safety and equipment precautions.

B. Make sure the unit I/O wiring is properly connected and that the correct power source per the label is also connected. The instrument must be at normal power for a minimum of 2 minutes before proceeding to C.

C. Connect the input contacts for Up-Down and Ramp-Hold to the appropriate inputs.

D. The output may be monitored either as a direct voltage for a voltage output signal or as a current that can be represented as a voltage across a resistor shunt.

E. Turn the multiturn potentiometers marked UPRATE and DOWNRATE fully CW. This sets the Ramp rates at the high value for the particular jumper configuration.

F. Temporarily set jumpers J14, J15, J16 and J18 to position B to set the output response at the fastest rate.

G. Set the input contacts to drive the output down to minimum value and adjust the multiturn potentiometer marked ZERO to provide the minimum calibrated output (e.g.) 4.00 ma ± 0.01 ma dc.

H. Set the input contacts to drive the output to maximum value and adjust the multiturn potentiometer marked SPAN to provide the maximum calibrated output (e.g.) 20.00 ± 0.01 ma dc.

I. Repeat steps G and H until within calibration; ± 0.1%.

J. From the RAMP TIME SELECTION TABLE Section 8.0 look up the value of N corresponding to the smaller of the UP RAMP TIME and DOWN RAMP TIME and calculate the frequencies;

$$f_{up} = \frac{4096N}{T_{up}} \text{Hz}, \quad \frac{f_{down} = 4096N}{T_{down}\ \text{Hz}}$$

where T_{up} and T_{down} are UP RAMP TIME and DOWN RAMP TIME in seconds.

K. To set the UP-RAMP TIME: connect a frequency counter from pin 13 of Z9 to Term #5; set the input contacts for UP-RAMP mode and adjust the multiturn potentiometer marked UP-RATE to provide a frequency equal to f up.

L. To set the DOWN-RAMP TIME: connect a frequency counter from pin 13 of Z9 to Term #5; set the input contacts for DOWN-RAMP mode and adjust the multiturn potentiometer marked DOWN-RATE to provide a frequency equal to f down.

M. Repeat steps K and L until within calibration; ± 0.1% of frequency.

N. Note the jumper configuration corresponding to the value of N in the table and set jumpers J14, J15, J16 and J18 accordingly. This step provides the actual desired UP RATE and DOWN RATE.

O. This completes the calibration.

7.0 FIELD TROUBLE SHOOTING GUIDE

This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

SYMPTOM	CORRECTIVE ACTION
No output	1. Check the input and output connections carefully. 2. Check that the power supply polarity is correct and that power is present on the instrument terminals. 3. Check that the input contacts are correct and that they change their state from open to close. 4. If the output is a current signal (4-20 ma, etc.), make sure the output loop is complete and that the correct meter range is selected. All external checks are complete. Problem seems to be internal.

The following information is provided for a qualified technician or serviceman as check points for use in internal troubleshooting.

CHECKPOINT/ COMPONENT	VOLTAGE/RANGE
(across) C20	26 ± 4 vdc
Term 1(-) to E_2(+)	12 ± 0.6 vdc
Term 1(-) to E_1(+)	–12 ± 0.6 vdc
Term 1(-) to pin 19 of Z_4(+)	9.4 ± 0.5 vdc

8.0 TABLES, PCB LAYOUT

INPUT TABLE

TERM. 3 and 4	J32	TERM. 7 and 8	J31
Ramp on closed	X	Up on closed	X
Hold on open	X	Down on open	X
Ramp on open	–	Up on open	–
Hold on closed	–	Down on closed	–

(X) = Present (–) = Absent

OUTPUT TABLE

OUTPUT SIGNAL FULL SCALE	OUTPUT SHUNT RL	FEEDBACK RES RF
50 ma dc	NONE	20 ohm
20 ma dc	NONE	49.9 ohm
10 ma dc	NONE	100 ohm
1 ma dc	NONE	1K ohm
10 vdc	604 ohm, 1/4 W	49.9 ohm
5 vdc	250 ohm, 1/2 W	49.9 ohm

All selected resistors are 1%, M.F.,1/4 W, 50 PPM, unless otherwise noted

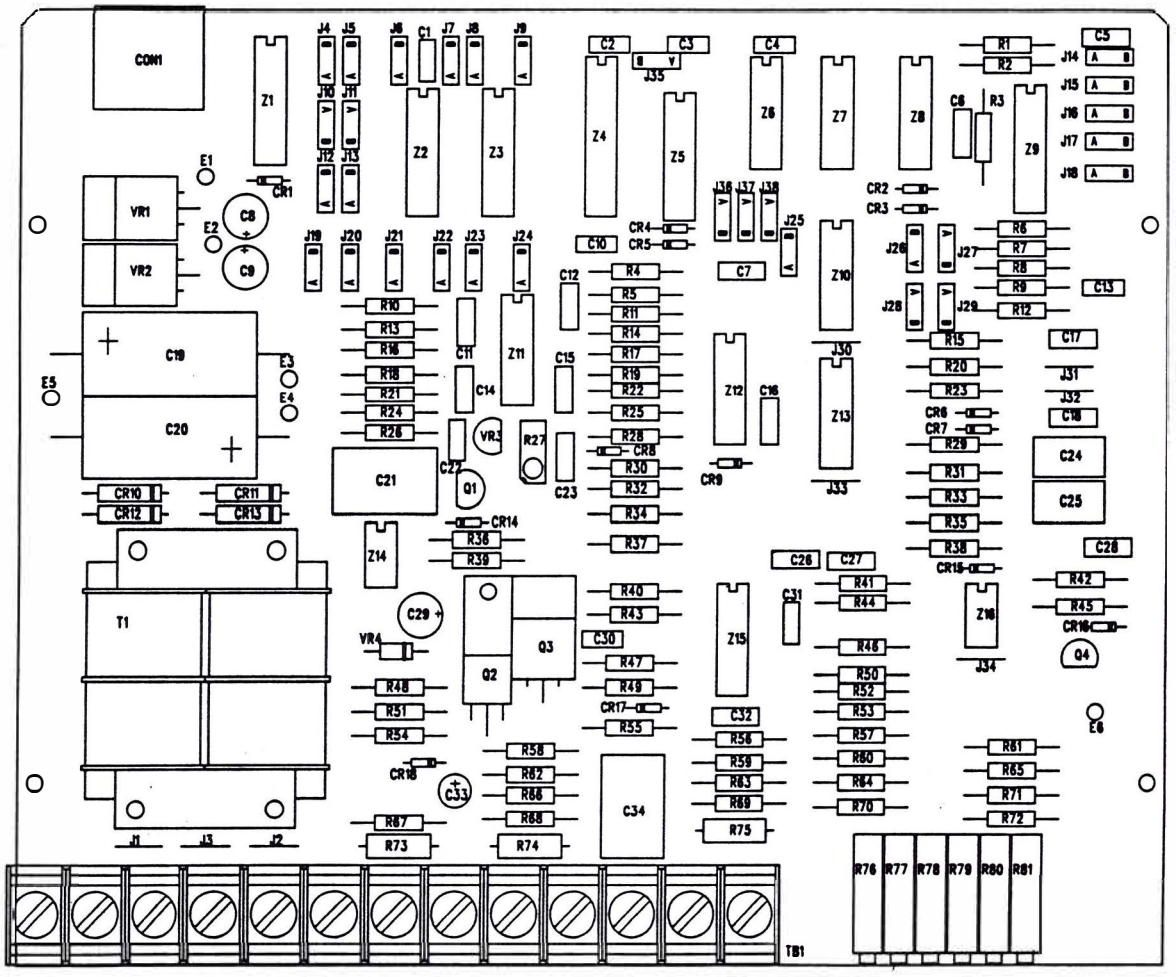
UDB 97 RL = R74 RF = R58

RAMP TIME SELECTION TABLE

RAMP TIME (T) FULL SCALE	N	J14	J15	J16	J18
0.160 - 0.32 sec.	1	B	B	B	B
0.320 - 0.64 sec.	2	B	B	B	A
0.64 - 1.28 sec.	4	B	B	A	B
1.28 - 2.56 sec.	8	B	B	A	A
2.56 - 5.12 sec.	16	B	A	B	B
5.12 - 10.24 sec.	32	B	A	B	A
10.24 - 20.48 sec.	64	B	A	A	B
20.48 - 40.96 sec.	128	B	A	A	A
0.67 - 1.33 min.	256	A	B	B	B
1.33 - 2.66 min.	512	A	B	B	A
2.66 - 5.32 min.	1024	A	B	A	B
5.32 - 10.64 min.	2048	A	B	A	A
10.64 - 21.30 min.	4096	A	A	B	B
21.30 - 42.60 min.	8192	A	A	B	A
42.60 - 85.2 min.	16,384	A	A	A	B
85.2 - 170.0 min.	32,768	A	A	A	A

X = Jumper Present A = Jumper Absent

NOTE A: Components as shown may or may not be present on the p.c. board due to design updates or options.



9.0 SPECIFICATIONS

INPUT/OUTPUT

INPUT SIGNALS

a. Contact 24 vdc @ 2 ma rating, N.O. or N.C.: specify
b. Voltage: 0 to 12 vdc minimum, 30 vdc maximum
c. Ramp Range: 0.1 second to 50 hours
d. Ramp hold and up/down command input

OUTPUT SIGNALS/OUTPUT DRIVE

	AC Power	DC Power
a. 4-20 ma dc	0-1000 ohms max.	0-900 ohms max.
b. 10-50 ma dc	0-400 ohms max.	0-350 ohms max.
c. 0-1 ma dc	0-20,000 ohms max.	0-18,000 ohms max.
d. 1-5 vdc	250 ohms Z out	250 ohms Z out
e. 0-10 vdc	500 ohms Z out	500 ohms Z out

Or zero based in the same ranges. Other voltage and currents optional.

PERFORMANCE

a. **Calibrated Accuracy:** ± 0.1%
b. **Linearity:** ± 0.1% maximum, ± 0.04% typical
c. **Repeatability:** ± 0.05% maximum
d. **Temperature Stability:** ± 0.01%/°F maximum, ± 0.004%/°F typical
e. **Load Effect:** ± 0.01% zero to full load
f. **Output Ripple:** 10 mv P/P maximum
g. **Response Time:** As calibrated
h. **Temperature Range:** 0° to 140°F (-18° to 60°C) operating
-40° to 185°F (-40° to 85°C) storage
i. **Power Supply Effect:** ± 0.05% for a ± 10% power variation

Note: All accuracies are given as a percentage of span

POWER

a. 115 vac: ± 10%, 50/60 Hz, 3 watts, 0.7 Pf (standard)
b. 24 vdc: ± 10% isolated, 3 watts (Option P2)
c. 48 vdc: ± 10% isolated, 3 watts (Option P3)
d. 125 vdc: Nominal (105-140 vdc) isolated, 3 watts (Option P4)
e. 230 vac: ± 10%, 50/60 Hz, 3 watts, 0.7 PF (Option P5)

10.0 OUTLINE & MOUNTING