



Technical Manual
ROTARY DISPLACEMENT TRANSDUCER
TYPE RCDT

Doc. Ref CD1042G



BS EN ISO 9001
Certificate No. FM13141



Affirmed by Declaration
of Conformity

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INDEX

1	INTRODUCTION	3
2	MOUNTING	3
2.1	COUPLING TO THE SHAFT	3
3	INSTALLATION & EMC INFORMATION	4
3.1	Installation Instructions	4
3.2	EMC Performance	4
3.3	Declaration of EMC Conformity	4
4	CONNECTIONS	5
4.1	Output Loading	5
4.2	Considerations in the Configuration of Instrumentation	5
5	OUTPUT CURVE	6
6	DUAL (GANGED) VERSION	6
7	SPECIFICATION	7
8	DIMENSIONS	7
9	WARRANTY AND SERVICE	8

1 INTRODUCTION

The rotary capacitive displacement transducer uses a non-contact capacitance based sensor to measure shaft position.

The RCDT/300 transducer measures the angular position of its shaft with respect to its body. The unit has integral electronics meaning that it can be supplied with dc and has a dc output. The output ranges from 0 to 3V for the full-scale range of 0 to 300°. One of the main advantages of the RCDT is that there is no physical contact across the sensing element. The rotary position of an eccentric shaft is measured using a well-proven non-contact position measurement technique. This ensures that, unlike potentiometers, the quality of the data is maintained, as the sensing element does not wear. As the RCDT is absolute, data is accurate from switch on and there is no need for repeated zero referencing.

Applications for the RCDT include the obvious rotary applications for angular position as well as less obvious applications in incline or tilt measurement.

2 MOUNTING

The body of the transducer can be mounted in several ways.

Attachment can be made by fitting clamps into the groove or the M3 screws can be screwed into the tapped holes on either the rear face or front face of the RCDT.

2.1 Coupling to the shaft

The RCDT contains a precision bearing set to maintain its excellent resistance to off-axis forces. In order to protect the bearings the unit should be mounted such that it is well aligned and/or using a flexible coupling as bearing wear may reduce accuracy.

3 INSTALLATION & EMC INFORMATION

3.1 Installation Instructions

- 1) Where customer-provided cable is used, this should be screened and of good quality
- 2) Where the transducer is connected to an instrument (e.g. an amplifier), the cable screen should be grounded at the instrument end.
- 3) Ensure any d.c. supply is of good quality and performance, e.g. supply well smoothed and stable.
- 4) Ensure cable(s) connecting to the transducer is/are routed away from electrically noisy cables (e.g. heavy power cables) and away from obviously powerful sources of electrical noise (e.g. electric motors, relays and solenoids).
- 5) The body of the transducer should be earthed. If the transducer fixing attachments do not provide a good earth, then an earth strap should be used.

3.2 EMC Performance

When subjected to radiated electromagnetic energy in the frequency range 80MHz to 1000MHz (as IEC801-3), an additional measuring error can occur at certain frequencies.

R.F. Field Strength	Typical Maximum Error
10V/m	2%
3V/m	0.2%

3.3 Declaration of EMC Conformity

DECLARATION OF CONFOMITY

RDP Electronics Ltd., Grove Street, Heath Town,
Wolverhampton, WV10 0PY, U.K.

We declare that the product detailed in the Technical Manual, when installed as instructed, performs in conformity with the Electromagnetic Compatibility Directive 89/336/EEC and as such are duly CE marked.

4 CONNECTIONS

The transducer is fitted with a 1m long, four-core screened cable. The connections are:

Core Colour	Connect to:
Red	Positive Supply (+15V)
Blue	Negative Supply (0V)
Black	Output common
Yellow	Output
Screen (shield)	Ground

WARNING: Do not connect black to ground if blue is grounded.

The cable screen (shield) is connected to the body of the transducer. The cable screen should be connected to ground. The red, blue, black and yellow wires are isolated from the body/screen.

The output voltage common (black wire) is equal to:

$$\frac{V \text{ supply } - 0.5V}{2}$$

which is 7.25 volts when supply is 0V and +15V. The output voltage range of 0.5 to 3.5 volts (nominal) with respect to the black wire, is 7.75V to 10.75V with respect to 0 volts.

4.1 Output Loading

The output voltage (black to yellow) should be measured with a high impedance load. A load of up to 10k ohms connected between output (yellow) and 0 volts (blue) can be driven.

4.2 Considerations in the Configuration of Instrumentation

To connect the RCDT to an electronic system, the following points may need addressing:

- (a) Supply voltage 15V \pm 10% dc 6mA.
- (b) Gain adjustment.
- (c) Zero adjustment. [Back off the null (0°) output voltage.]
- (d) Ideally a differential input amplifier should be used to optimise the temperature stability and remove the effect of the voltage level of the OUTPUT COMMON.

The following RDP instruments are suitable for use with the RCDT:

- (a) E525 Cypher Transducer Monitor. The DCT input board is required, modified to S.O.12.
- (b) E308 Transducer Indicator.
- (c) Translog 500. The E512 PD1249 Scanner will interface with up to eight RCDTs.
- (d) The S7CT is specifically designed to work with RCDT transducers.
- (e) The 611 module requires modification PD1474.
- (f) E725 DC1.

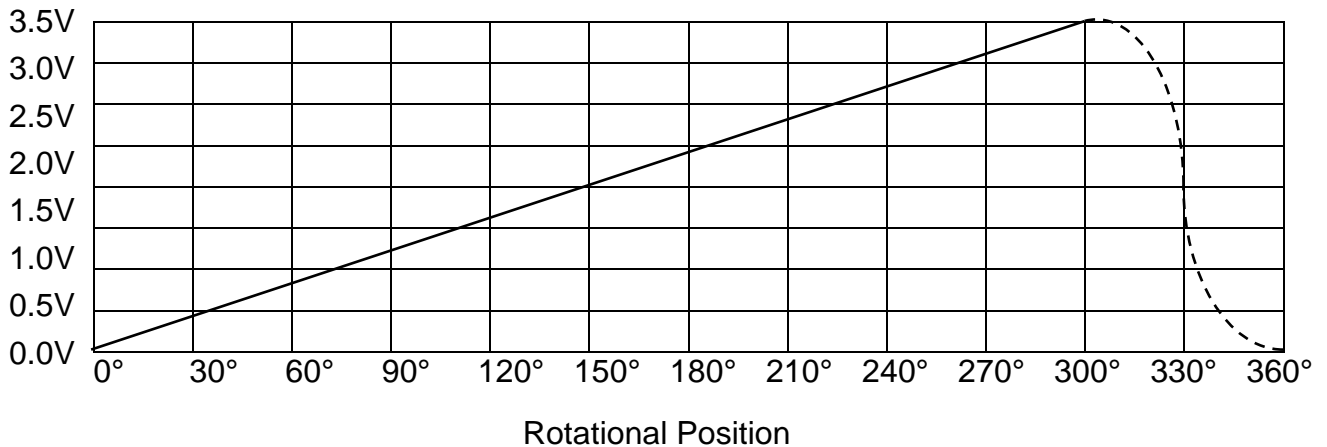
5 OUTPUT CURVE

The output (yellow) is nominally 0.5 to 3.5V, with respect to output common (black), for an angular movement of 0 to 300°. Between 300° and 360° the output signal returns to 0.5 volts.

The actual output at null (0°) for a particular unit is given on the calibration sheet for that unit.

The 'dashed' portion of the curve indicates a region, which is not linear and should not be used for measurement.

Nominal RCDT Output over 0 to 360°



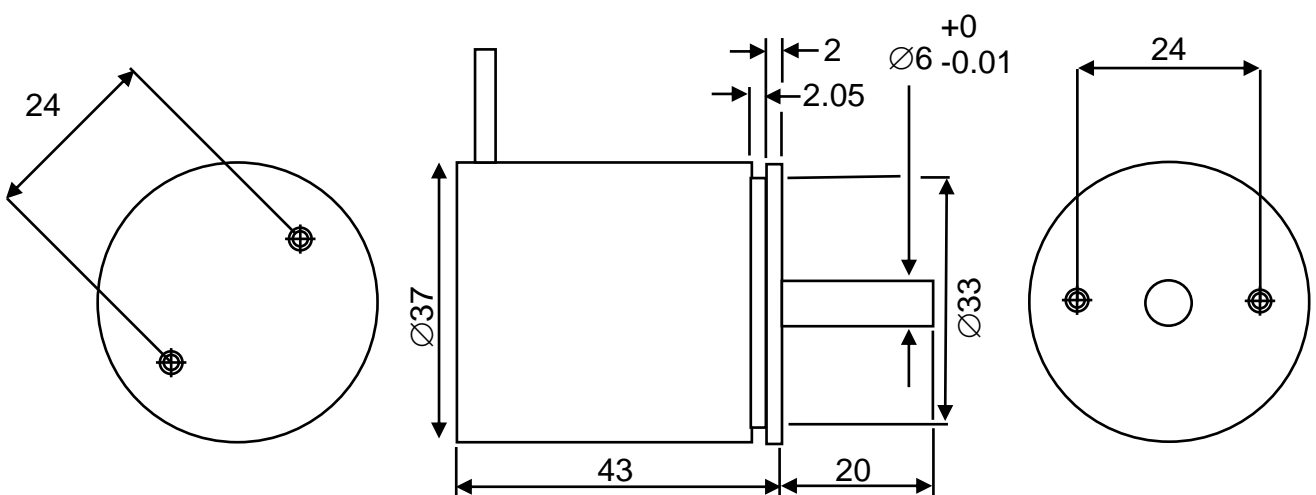
6 DUAL (GANGED) VERSION

For applications where it is necessary to have dual outputs or single redundancy, two units may be "ganged" together as a factory option. The rotor shaft is common but all electrical circuits are completely separate.

7 SPECIFICATION

Angular Range	0 to 300 degrees
Supply	15V $\pm 10\%$ at 6mA
Output	0.5 to 3.5V O/P common floats at 7.25V with 15V supply
Output Load	10k ohm minimum (100k ohm used when calibrated)
Output Connection Precaution	Only ground common if supply is fully floating
Linearity Error	$\pm 1\%$ F.S.
Repeatability	Better than 0.05% F.S.
Resolution	Limited by elec. noise o/p (Typically 0.01% F.S.)
Output Ripple	(Noise) 5mV rms (10kHz to 30kHz) 0.1mV averaged dc
Slew Rate	6000 rpm
Temperature Coefficient	$\pm 0.01\%$ F.S./ $^{\circ}\text{C}$
Operating Temperature	-25 to +75 $^{\circ}\text{C}$
Storage Temperature	-40 to +100 $^{\circ}\text{C}$
Maximum Starting Torque	0.42mNm (milli-Newton metres)
Inertia	15 gcm ²
Weight without cable	102 grams
Weight with cable	140 grams
Electrical Termination	2m screened cable
Environmental protection	IP50
Mounting threads (both ends)	2 off M3 x 0.5 at 24mm centre

8 DIMENSIONS



Due to our policy of continual product development, we reserve the right to alter dimensions and specifications with notice. Dimensions are in mm.

9 WARRANTY AND SERVICE

WARRANTY.

R.D.P. Electronics products are warranted against defects in materials or workmanship. This warranty applies for one year from the date of delivery. We will repair or replace products that prove to be defective during the warranty period provided they are returned to R.D.P. Electronics.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of fitness for a particular purpose to the original purchaser or to any other person. R.D.P. Electronics shall not be liable for consequential damages of any kind.

If the instrument is to be returned to R.D.P. Electronics for repair under warranty, it is essential that the type and serial number be quoted, together with full details of any fault.

SERVICE.

We maintain comprehensive after-sales facilities and the instrument can, if necessary be returned to our factory for servicing.

Equipment returned to us for servicing, other than under warranty, must be accompanied by an official order as all repairs and investigations are subject to at least the minimum charge prevailing at the date of return.

The type and serial number of the instrument should always be quoted, together with full details of any fault and services required.

IMPORTANT NOTES.

1. No service work should be undertaken by the customer while the unit is under warranty except with the authorisation of RDP Electronics.
2. If the instrument is to be returned to R.D.P. Electronics for repair, (including repair under warranty) it is essential that it is suitably packed and that carriage is insured and prepaid. R.D.P. Electronics can accept no liability whatsoever for damage sustained during transit.
3. It is regretted that the above warranty only covers repairs carried out at our factory. Should the instrument have been incorporated into other equipment that requires our engineers to perform the repair on site, a charge will be made for the engineer's time to and from the site, plus any expenses incurred.

The aforementioned provisions do not extend the original warranty period of any product that has been either repaired or replaced by R.D.P. Electronics.

**THIS WARRANTY MAY BE NULL AND VOID SHOULD
THE CUSTOMER FAIL TO MEET OUR TERMS OF PAYMENT.**