



TENDER SPECIFICATION

No: CLW/ES/3/0528

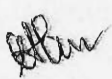

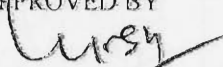
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SPECIFICATION FOR
HALL EFFECT ACTIVE SPEED SENSOR FOR TRACTION MOTOR OF
WAG-9 & WAP-5 ELECTRIC LOCOMOTIVES WITH IGBT BASED TRACTION CONVERTER.

ISSUED ON NOVEMBER, 2012

ISSUED BY :
DY.CHIEF ELECTRICAL ENGINEER/CON/TU-II
CENTRE FOR DESIGN AND DEVELOPMENT
CHITTARANJAN LOCOMOTIVE WORKS

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SPECIFICATION FOR HALL EFFECT ACTIVE SPEED SENSOR FOR TRACTION MOTOR OF WAG-9 & WAP-5 ELECTRIC LOCOMOTIVES WITH IGBT BASED TRACTION CONVERTER	DRN  SSE/D&D	CHKD/REV  AEE/D&D	D & D CENTRE CHITTARANJAN LOCOMOTIVE WORKS WEST BENGAL, INDIA NO: CLW/ES/3/0528			
	APPROVED BY  DY.CEE/CON/TU-II		A L T	A		



ALTERATION RECORD SHEET

Amendment in clause no.	Date of amendment	Page No	Alteration	Changes	Authority
12 and sub Cl. 4	07-11-2012	13	A	- Quantity for signal connector modified. - One no. power supply connector added	Dy.CEE/CON/TU-II

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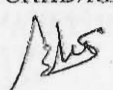
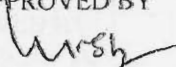
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1.0 FOREWARD

The TM speed sensors proposed to be procured against this specification is intended to be used in locomotive equipped with IGBT based Traction converters. The 3-phase locomotive uses the Traction Motor speed for calculation of the locomotive speed in order to activate the speed limits, for constant speed control and more importantly for the adhesion control during starting and braking. The effectiveness of slip control depends upon the accuracy of the speed sensor, especially at crawling speeds.

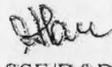

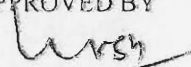
2.0 FUNCTION

The Hall effect active speed sensor is powered by the power supply from the IGBT based traction converter control electronics (8 to 32 VDC) and output pulse amplitude shall be maintained strong under very adverse conditions like ingress of grease, increase of air gap, misalignment of motor shaft etc. This hall effect active speed sensor can sense the speed close to zero speed and is used in all modern propulsion control. The hall effect active speed sensor measures the speed on the hall effect sensing principle and provides very accurate measurement almost till zero speed. The sensor shall be embedded in housing along with its electronics circuitry for pulse amplification and power circuit and signal conditioning. A tooth wheel having 120 teeth shall be attached to the motor shaft. The sensor shall provide output pulses of 120 pulses per revolution of motor shaft. The output pulses shall be open collector type so that it can be fed directly in to the IGBT based traction converter electronics.

3.0 OUTPUT

The number of sensor output pulses shall be proportional to the speed of the locomotive and the timing and amplitude shall match with the IGBT based Traction Converter electronics. The sensor shall provide 120 pulses for every rotation of the traction motor shaft. The output shall be protected against likely surges and transients, which may appear in the cable between the sensor and the converter electronics. Details of Speed sensor pulse patterns are provided in Annexure-1. The sensor shall be fully compatible to the existing IGBT based Traction Converter being fitted in 3-Ø locomotive in CLW. In case further details the supplier is advised to contact C-D&D/CLW.

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4.0 POWER SUPPLY

Power Supply for the speed sensor shall be from the electronics card of the IGBT based traction converter. Presently 2 (two) shielded cables, each having single twisted pair are used in the loco for speed sensor. One pair of those shall be used for power supply from the traction converter control electronics and other for signal sensor output to be fed to traction converter control electronics. Same arrangement of cable shall be retained.

5.0 Signal & Power Supply Cables and interfaces

Signal cables and power supply cables shall be of shielded type, minimum $2 \times 1 \text{ mm}^2$, highly flexible EB irradiated and suitable for outdoor traction applications and length of the cable shall be approximately 270 cm. The cables shall be strain relieved at the connector using suitable heat shrinkable boots.

6.0 Ingress Protection

The sensors are to be used in very harsh outdoor traction environment and hence have to be well engineered to take care of the likely vibration, shock, high temperature, and humidity and dust conditions. The speed sensors shall have an ingress protection class of IP68 and shall be tested according to IEC-60529.

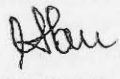

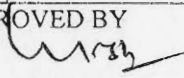
7.0 Cable Interface

The signal cables and power cables are interfaced to the locomotive circuits through corresponding male connectors provided at the sensor plate mounted in the under frame.

INFORMATION ONLY

8.0 Tooth Wheel

A suitable tooth wheel having 120 teeth shall be attached to the motor shaft. It must be possible to mount the tooth wheel in the presently allocated location in traction motor without any modification. The tooth has to be so designed as to give 120 pulses for every revolution of the traction motor shaft. Suitable surface treatment has to be done to avoid corrosion in service.

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9.0 TECHNICAL DATA:

9.1 Electrical:

Input to the sensor : 8 V32V DC protected against transient over voltage and wrong polarity.

Signal output : The outputs shall be of short circuit proof.

Number of pulses : 120 per revolution of motor shaft

9.2 Mechanical Dimension

: The mechanical dimension of the speed sensor and tooth wheel presently being used is provided in the drawing from fig.-1 to fig.-4 for reference. The supplier shall offer the speed sensor and tooth wheel with similar mechanical interface so that no changes are required on traction motor side.

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a) Mechanical Dimension :

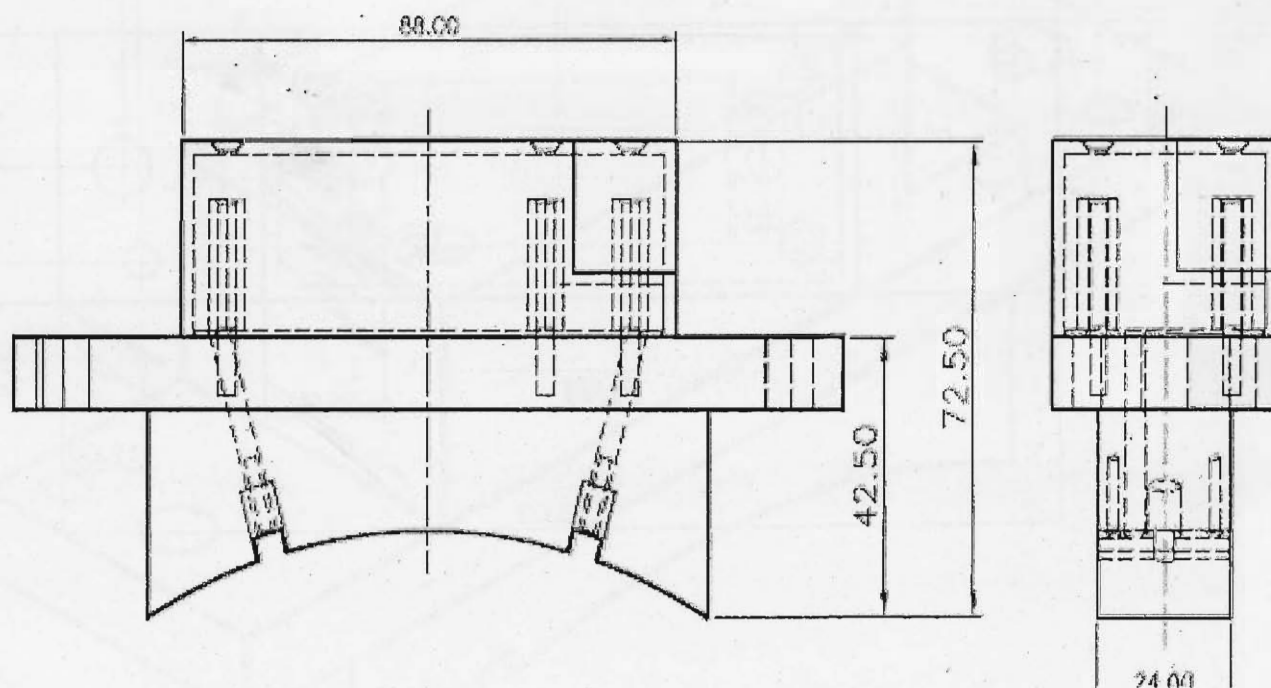


Fig-1 Dimension of the Speed sensor

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SPECIFICATION FOR HALL EFFECT ACTIVE SPEED SENSOR FOR TRACTION MOTOR OF WAG-9 & WAP-5 ELECTRIC LOCOMOTIVES WITH IGBT BASED TRACTION CONVERTER	DRN <i>[Signature]</i> SSE/D&D	CHKD/REV <i>[Signature]</i> AEE/D&D	D & D CENTRE CHITTARANJAN LOCOMOTIVE WORKS WEST BENGAL, INDIA NO: CLW/ES/3/0528									
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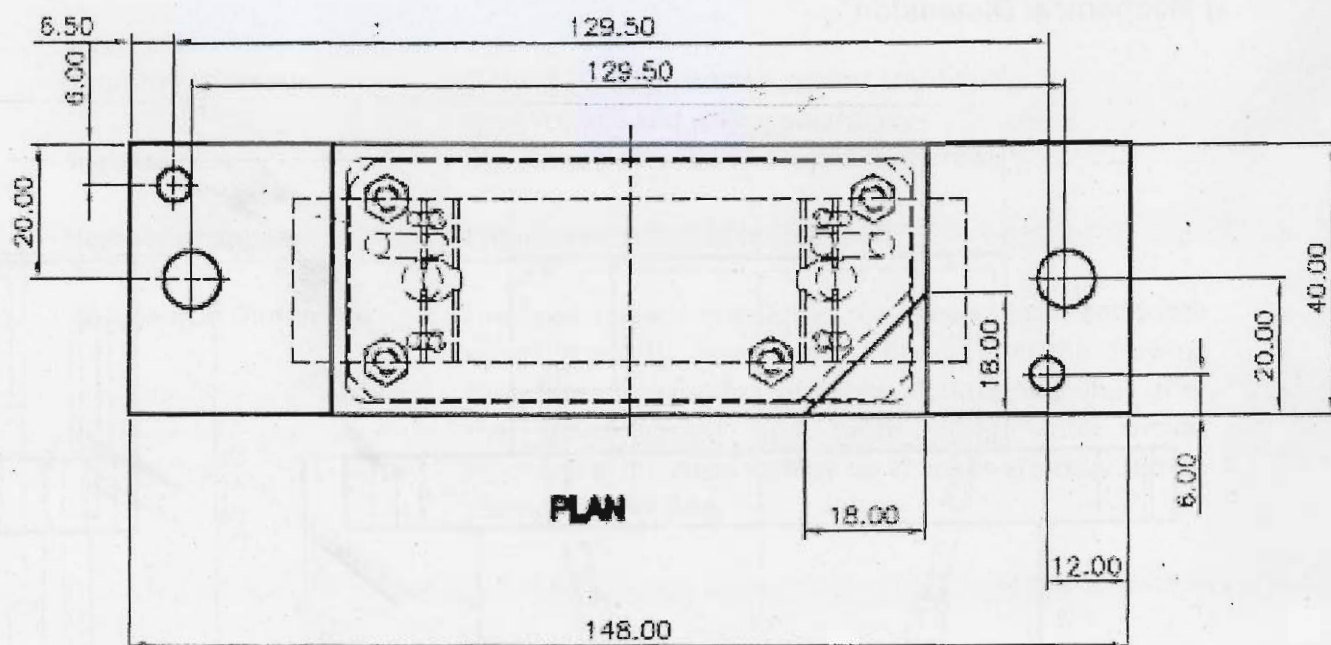
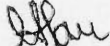

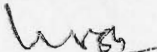
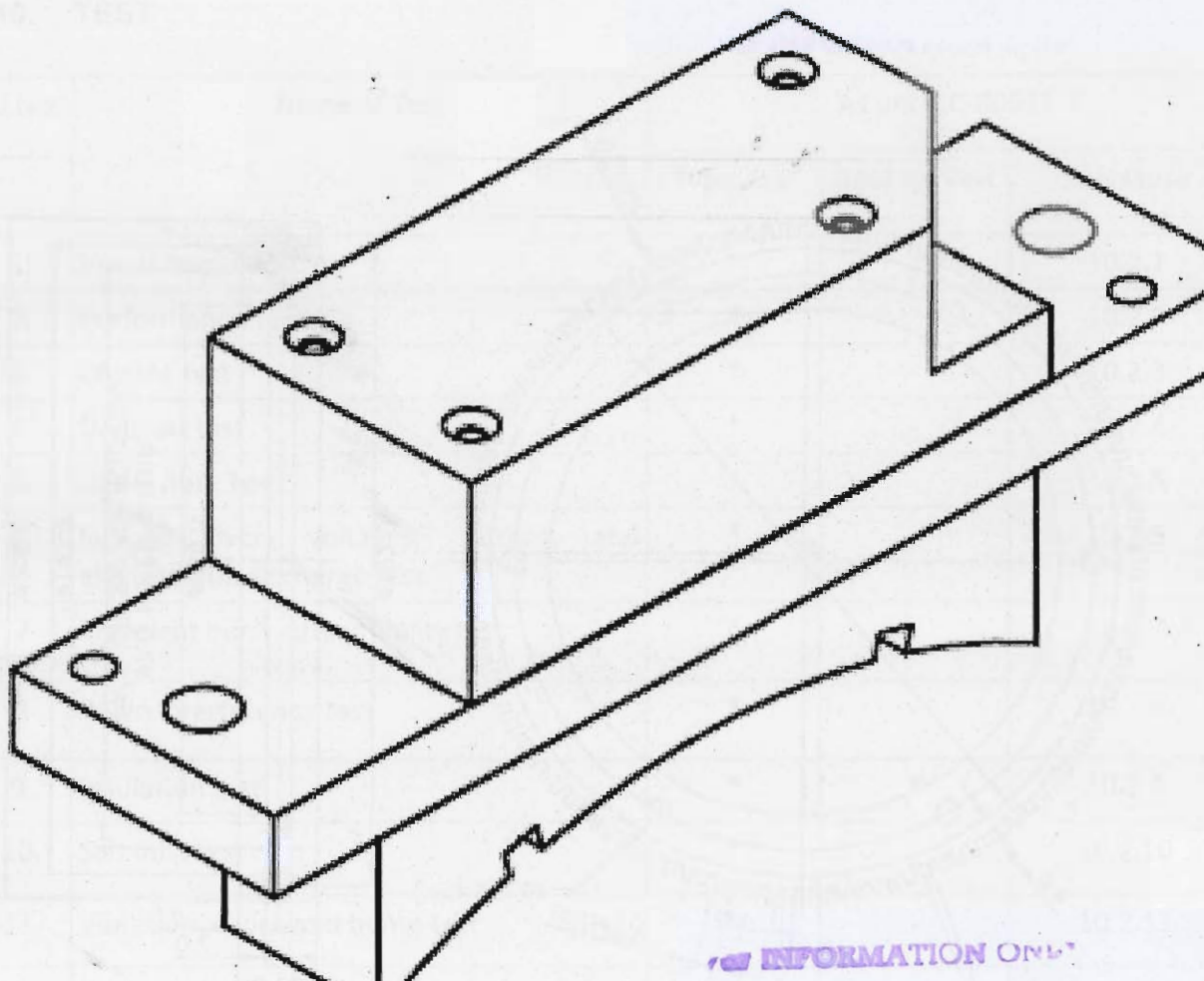


Fig-2 Dimension of the Speed sensor

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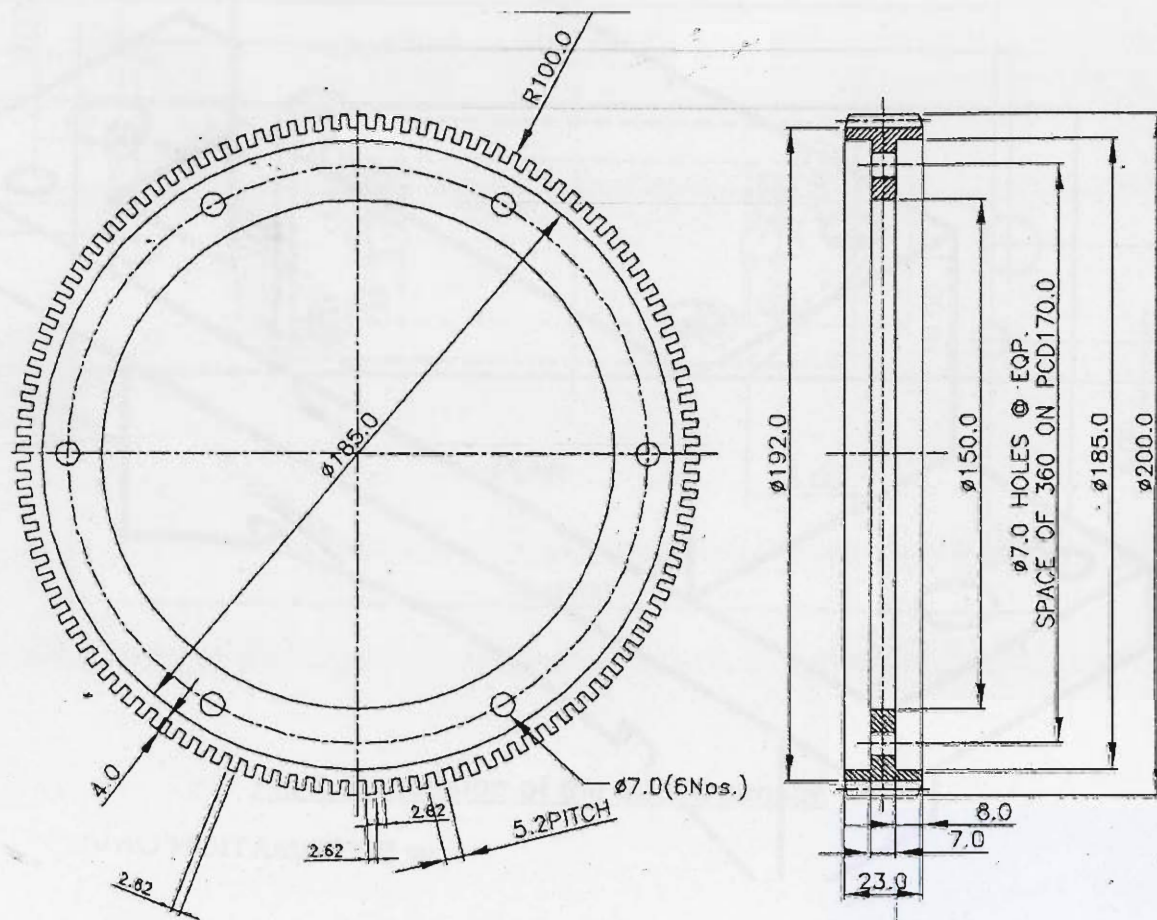
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Fig-3, Isometric view of the sensor is for reference purpose only – tenderers to give the actual arrangement which they offer

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WHEEL WITH 120 No. OF TEETH

Fig-4- Tooth Wheel

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10. TEST



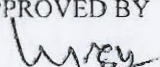
INFORMATION SHEET

Sl.No.	Name of Test	As per IEC-60571		
		Type Test	Routine Test	Subclause
1.	Visual Inspection	*	*	10.2.1
2.	Performance Test	*	*	10.2.2
3.	Cooling test	*	-	10.2.3
4.	Dry heat test	*	-	10.2.4
5.	Damp heat Test	*	-	10.2.5
6.	Supply over voltages, Surges and electrostatic discharge test.	*	-	10.2.6
7	Transient burst susceptibility test	*	-	10.2.7
8	Radio interference test	*	-	10.2.8
9.	Insulation test	*	*	10.2.9
10.	Salt mist test	*	-	10.2.10
11.	Vibration, shock and bump test	*	-	10.2.11
12.	Water tightness test	*	-	10.2.12

Note - Test marked " * " is Mandatory & Test marked " - " is subjected to contact agreement between the user and the manufacturer.

- The speed sensor protection class shall be as per IP68 and Ingress test shall be done as per IEC-60529. This shall be a type test.

- **Burn in test** – The fully assembled speed sensor shall be subjected to burn-in 80 hours as per the temperature cycle. The sensor shall be kept energized and functional during the test. The functional test of the card shall be carried out after the burn-in test.

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

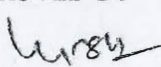


11. APPLICABLE NORMATIVE STANDARD

The offered system shall generally confirm to the following normative standards

IEC 60529	for IP68
EN 50155	Railway applications electronics equipment used on rolling stock
EN 50121-2	EMC: Emissions to external environments
IEC60077	Rules for equipment for onboard rail vehicles
IEC 60571	Rules for electronic equipment onboard rail vehicles
IEC-61373	Electric Railway Equipment-Rolling Stock-Shock & Vibrations requirements

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12. SCOPE OF SUPPLY

Following items shall be the deliverables with one set of equipment.

SL No	Item	Quantity
1	Hall effect Active speed sensor with existing mechanical interface	01nos.
2	Tooth wheel for Traction motor	01 nos.
3	Cable (Type: -H+S – 12583003,RADOX-TENUIS-TW/S, EMC-SC, 1000Volt, 2X1mm ² (18AWG) or equivalent. - Shielded cables, each having single twisted pair	02 nos.
4	Connector for Interfacing 1) Signal Connector – 5 pin circular connector (Type –ITTC - 1031 KPSE6E14) or(KPSE06PG20A-6S-PG16D). 2) Power Supply – 3 pin circular connector (Type –ITTC - 1032 KPSE6E12)	01 no. 01 No.
5	The sensor plate (The drawings of the plate shall be supplied by CLW).	01 nos.
6	Fixing bolt for sensor & impulse ring Type- M8 x 25 hex screws. (For fixing the sensor) Type- M6 x 16 LN screws. (For fixing the ring)	02 nos. 06 nos.

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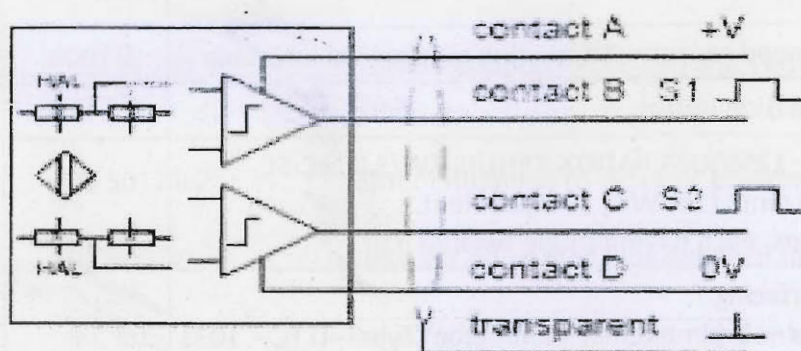
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ANNEXURE-1

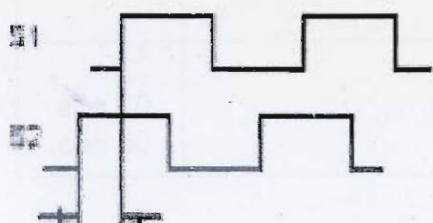
SCHEMATIC DIAGRAM:

schematic diagram

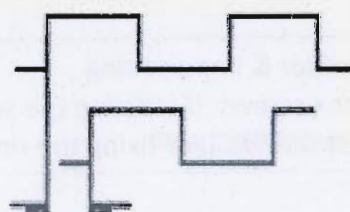


PULSE DIAGRAM:

Direction of rotation A



Direction of rotation B



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