

Specifcation No.-CLW/ES/3/0033/H TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER	Page 1 of 8
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**SPECIFICATION  
FOR  
TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER  
FOR  
WAG-9/WAP-7/WAP-5, 3-PHASE ELECTRIC  
LOCOMOTIVES**

**Specification No.-CLW/ES/3/0033/H**

Enclosure: Drawing No.-CLW/ES/3/SK-1/0033/H

**ISSUED BY**  
DY.CHIEF ELECTRICAL ENGINEER/D-I  
CHITTARANJAN LOCOMOTIVE WORKS  
CHITTARANJAN-713331  
Dist: BARDHAMAN (WEST)  
WEST BENGAL (INDIA)

Prepared By	Checked By	Issued By
ANIRBAN BASU 2025.04.09 17:37:02 +05'30' SSE-Design	SADDAM HUSSAIN 2025.04.09 17:50:08 +05'30' SEE-Design	RAVI YADAV 2025.04.09 17:58:10 +05'30' Dy.CEE/D-I

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**ALTERATION RECORD SHEET**

Amendment Number	Date of Amendment	Alteration	Descriptions	Authority
1.	12.02.02	A	Specification has been thoroughly revised.	Sd/-
2.	10.03.03	B	Fire retardant/ self-extinguishing clause included as a note.	Sd/
3.	12.04.05	C	Correction of ABB identification number.	Sd/
4.	18.11.05	D	Correction of inner Dia in the drawing No: CLW/ES/3/SK-5/0033 and Scope of supply listed in the drawing no: CLW/ES/3/SK-1/0033.	Sd/
5.	27.06.07	E	Cable screen must be connected to the connector body & sensor housing to ground at both ends.	Sd/
6.	16.01.10	F	Mounting Temperature Sensor deleted from scope of supply as it is procured from supplier of Set of Metallic Pipe.	Sd/
7.	03.05.12	G	Thickness of Copper Washer increased from 1.5 mm to 02mm.	Sd/-
8.	02.04.2025	H	i. Specification has been thoroughly revised. Test description elaborated. Drawing no-CLW/ES/3/SK-2, SK-3, SK-4 & SK-5/0033 removed. Existing drawing no-CLW/ES/3/SK-1/0033/G replaced by new modified drawing No-CLW/ES/3/SK-1/0033/H. ii. Dia. of cable has been deleted in drawing No-CLW/ES/3/SK-1/0033/H. iii. Test schedule has been amended in clause no. 8.0. iv. Quantity of copper washer has been revised in drawing no.- CLW/ES/3/SK-1/0033/H. v. Word 'Radox' has been deleted in clause no 6.7 and electron beam irradiated has been included. vi. Length of cable has been specified in clause no. 6.7.	Sd/-

**Note:** Specification has been digitized and all the alteration i.e addition, deletion, modification etc. has been incorporated in the digitized specification.

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<b>ANIRBAN BASU</b> ANIRBAN BASU 2025.04.09 17:38:43 +05'30' SSE-Design	<b>SADDAM HUSSAIN</b> SADDAM HUSSAIN 2025.04.09 17:51:35 +05'30' SEE-Design	<b>RAVI YADAV</b> RAVI YADAV 2025.04.09 18:00:36 +05'30' Dy.CEE/D-I

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ANIRBAN BASU SSE-Design ANIRBAN BASU 2025.04.09 17:39:20 +05'30'	SADDAM HUSSAIN SEE-Design SADDAM HUSSAIN 2025.04.09 17:52:13 +05'30'	RAVI YADAV Dy.CEE/D-I RAVI YADAV 2025.04.09 18:01:22 +05'30'

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**1.0 GENERAL**

TECHNICAL SPECIFICATION FOR TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER for 3-PHASE, WAG-9/WAP-7/WAP-5 ELECTRIC LOCOMOTIVES.

**2.0 SCOPE**

This specification covers the supply of Temperature Sensor Oil Circuit Transformer used in WAG-9, WAP-7, WAP- 5, 6000 HP, 3-phase, 50 Hz AC locomotives.

In addition to the general conditions of the supply and the requirement given below, the supplier has to comply with the dimensions and instruction given in the relevant drawing sheet. The successful tenderer can obtain any other relevant technical details/drawing for further clarification from CLW.

**3.0 SERVICE CONDITIONS**

Sl. No.	Description	Remarks
1.	Maximum atmospheric temperatures	Under Sun : +70°C. In shade : +50°C.
2.	Ambient Temperature(operating)	-20°C . . . +70°C
3.	Ambient Temperature (Storage)	-30°C to +80°C
4.	Normal Humidity	60%.
5.	Maximum Humidity	100% saturation during rainy season.
6.	Altitude	1776 m above mean sea level against USBRL project condition.
7.	Rainfall	Very heavy in certain areas. The locomotive will be designed to permit it's running at 10 kilometer per hour in flood water level of 200 millimeter above rail level.
8.	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas.
9.	Coastal areas	Locomotive and equipment will be designed to work in coastal areas in humid and salt laden atmosphere.
10.	Vibration	The equipment, subsystem and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as specified in corresponding IEC: 61373 or latest publications unless otherwise prescribed.

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#### 4.0 CONFORMING STANDARDS

The Temperature Sensor shall conform to the requirements as per IEC 60571 and IEC 60721-3-5 or latest updates/ equivalents.

#### 5.0 SCOPE OF SUPPLY

Temperature Sensor consists of two items-1) Sensor Assembly and 2) Copper Washer.

Sl.No.	Description	ABB Identification No	CLW Drawing No.
1.	SENSOR	3EHN424142R3000	CLW/ES/3/SK-1/0033/H

#### 6.0 TECHNICAL DESCRIPTION

##### SENSOR

**6.1 DESCRIPTION:** The sensor consists of 2 nos. PT 100 platinum resistance thermometers in one body.

**6.2 CONNECTION:** Each thermometer is connected to the control electronics in the two wire configuration.

##### 6.3 THERMOMETER REQUIREMENTS

Sl. No.	Description	Characteristics
6.3.1	Operating Temperature	-45°C to +125°C
6.3.2	Sensor tip environment	-45°C to +125°C
6.3.3	Accuracy	<0.5K in the temperature range as per IEC60571
6.3.4	Test voltage	1000VAC 60sec.

##### 6.4 INSTALLATION

To installed in pipes with an outer diameter from 76.1 to 114.3mm

The sensor tip should be approximately in the middle of the pipe.

##### 6.5 ENVIRONMENTAL RESISTANCE

Description	Characteristics
Climatic Environmental Resistance	5K2
Biological Environmental Resistance	5B1
Chemical Environmental Resistance	5C1
Mechanical Active Substances	5S1

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<b>ANIRBAN BASU</b> ANIRBAN BASU 2025.04.09 17:40:28 +05'30' SSE-Design	<b>SADDAM HUSSAIN</b> SADDAM HUSSAIN 2025.04.09 17:53:34 +05'30' SEE-Design	<b>RAVI YADAV</b> RAVI YADAV 2025.04.09 18:02:38 +05'30' Dy.CEE/D-I

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**6.6 MECHANICAL CONDITIONS**

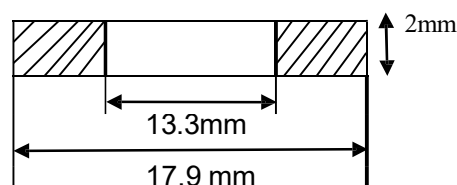
Operating Environment : Insulating Oil.

**6.7 CABLE**

Cable Type	Electron beam irradiated cable GKW/RW/EMV 2x2x0.5mm
Construction	Cores 0.5mm <sup>2</sup>
Conductor	Stranded tin plated copper
Insulation	GKW/RW
Length	03 meters

**6.8 SENSOR COVER**

Material : Stainless Steel

**6.9 COPPER WASHER:** The copper sealing washer belongs to the delivery.**6.10 CONNECTOR:-** Connectors must be 5 Pin circular type of ITT CANNON make or CLW/BLW/RDSO approved Source.**6.11** Cable screen must be connected to the connector body & sensor housing to ground at both ends.**7.0 APPROVAL OF SAMPLE****7.1** The offers from the OEM or its authorized agent for identical type of Temperature Sensor shall be verified based on the original test certificates from the OEM, the invoice particulars, which shall contain the Batch No./ SL.No, etc. and approval shall be given according to this data.**7.2** For offers other than the original type, the supplier shall make available at least two prototypes of the Temperature Sensor proposed to be supplied for inspection and tests at his works and request CLW/BLW when such sample is ready.**7.3** The prototype testing facilities must be arranged by the supplier at his own cost. Tests shall be carried out as per relevant IEC standard mentioned above.**7.4** After the prototype tests as mentioned above, if it is considered necessary by CLW/BLW's representative to carry out any further tests or trials of the prototype at CLW/BLW, The supplier shall arrange for the same by the quickest means at his own cost.**7.5** Series supply shall commence only after the prototypes are approved and cleared.**7.6** Routine tests on 100% of the items shall be carried out by the authorized representative of CLW/BLW according to the relevant IEC standard mentioned above. Necessary facilities for carrying out the routine tests shall be arranged by the supplier free of cost.

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ANIRBAN BASU	ANIRBAN BASU 2025.04.09 17:41:22 +05'30'	SADDAM HUSSAIN	SADDAM HUSSAIN 2025.04.09 17:54:10 +05'30'	RAVI YADAV	RAVI YADAV 2025.04.09 18:03:57 +05'30'
SSE-Design		SEE-Design		Dy.CEE/D-I	

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**8.0 TESTS:-****FOLLOWING TESTS SHOULD BE CARRIED OUT ON TEMPERATURE SENSOR**

Sl. No.	Test Description	Specified value / standard	Test			Remarks
			Routine* 100%	Acceptance (bulk) 10%	Type (Proto) 100%	
				Inspection as per PO.		After complete assembled Temp. Sensor.
8.1	Physical verification, Quality of workmanship and Dimensional measurement.	As per relevant Drg.	Yes	Yes	Yes	
8.2	Di electric test at 1000V AC.	Withstand	Yes	Yes	Yes	
8.3	Insulation resistance Measurement by 500V DC Meggar (PT100 RTD Element) .	100M ohm	Yes	Yes	Yes	
8.4	Earth checking.	Less than 1 ohm	Yes	Yes	Yes	
8.5	Measurement of resistance at ambient temperature	-	Yes	Yes	Yes	
8.6	Measurement of resistance at -45°C and +125°C (PT100 RTD Element)	As per IEC:60751	No	No	Yes	
8.7	Measurement of resistance in oil at 50°C, 100°C (PT100 RTD Element)	As per IEC:60751	Yes	10% at all temp.	Yes	
8.8	Damp heat test	As per IEC:60571	No	No	Yes	
8.9	Dry heat test	As per IEC:60571	No	No	Yes	
8.10	Ingress protection test (Level- IP-64 ).	As per IEC:60529	No	No	Yes	
8.11	Shock and vibration test	As per IEC:61373	No	No	Yes	
8.12	Drop test	As per IS: 2848'86	5%	5%	Yes	
8.13	Verification of OEM documents as per approved Bill of Material.	As per relevant document.	Yes	Yes	Yes	
8.14	Marking and Lebeling	As per specification clause no-10.0	Yes	Yes	Yes	

\* Routine test to be carried treated as firm's internal inspection which is is to be submitted by firm during acceptance test (bulk/ regular inspection) as well as type test (prototype).

All Type test & Routine test will be carried out according to the International Standard (IEC-60571) and shall be finalized jointly with the firm.

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<b>ANIRBAN BASU</b>	ANIRBAN BASU 2025.04.09 17:41:59 +05'30' SSE-Design	<b>SADDAM HUSSAIN</b>	SADDAM HUSSAIN 2025.04.09 17:54:52 +05'30' SEE-Design	<b>RAVI YADAV</b>	RAVI YADAV 2025.04.09 18:04:28 +05'30' Dy.CEE/D-I

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**9.0 HARDWARE**

Standard hardware and fasteners of CLW/BLW approved source only to be used.

**10.0 LABELING/MARKING: -**

Products should be marked with the following :-

- i) Type no. of each product should be provided for identification.
- ii) Month/Year of manufacture.
- iii) Name of manufacturer with trademark, code no. & batch no.

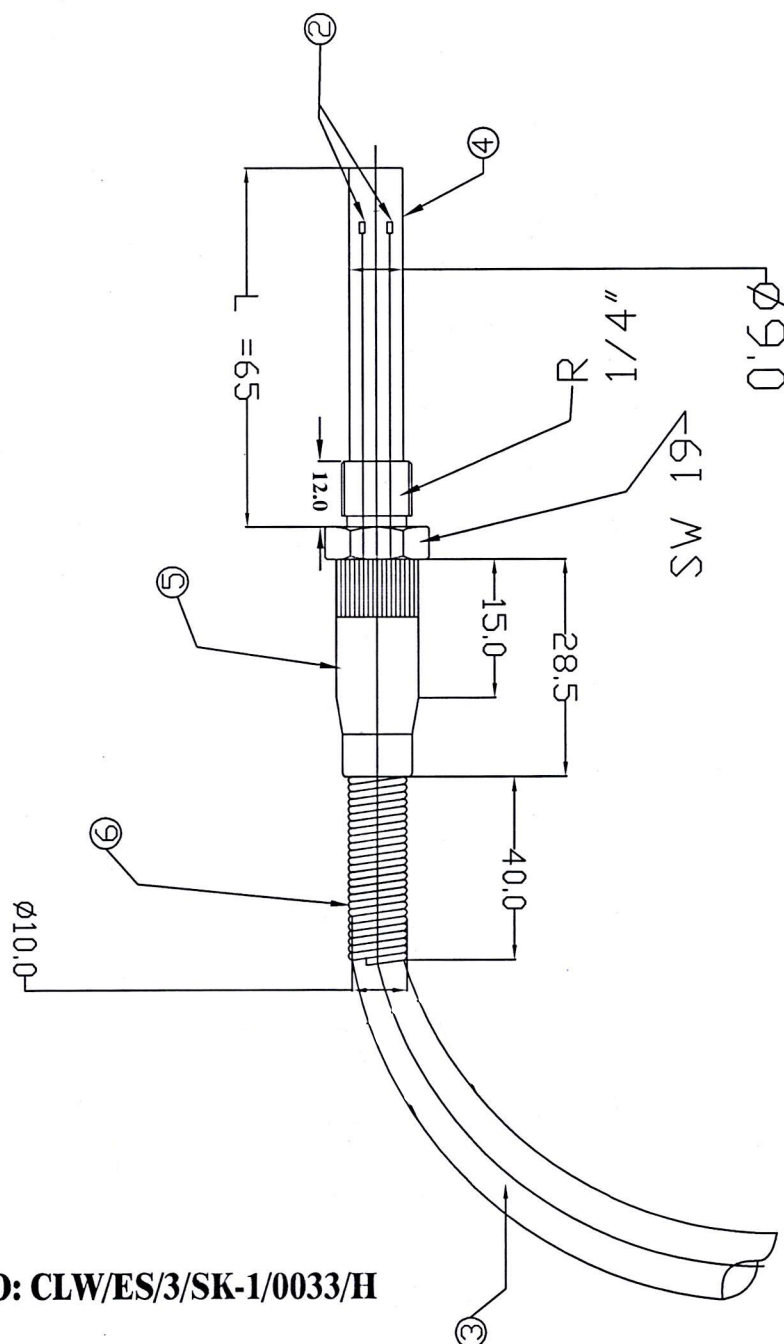
**11.0 QUANTITY/LOCO**

Sl.No.	Description	ABB Identification No	CLW Drawing No.	QTY/LOCO
01.	TEMPERATURE SENSOR	3EHN424142R3000	CLW/ES/3/SK-1/0033/H	02

**12.0 NOTE:** The non metallic part of sensor should be fire retardant and self extinguishing type as per IEC 11731 or any other relevant DIN/IEC standard.

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<b>ANIRBAN BASU</b> ANIRBAN BASU 2025.04.09 17:42:48 +05'30' SSE-Design	<b>SADDAM HUSSAIN</b> SADDAM HUSSAIN 2025.04.09 17:55:35 +05'30' SEE-Design	<b>RAVI YADAV</b> RAVI YADAV 2025.04.09 18:05:07 +05'30' Dy.CEE/D-I



**Specification No. CLW/ES/3/0033/H****TEMPERATURE SENSOR OIL CIRCUIT TRANSFORMER****DRG. NO: CLW/ES/3/SK-1/0033/H****NOTES:**

1. ALL DIMENSION ARE IN MM &amp; TOLERANCE AS PER IS 2102

SL.NO.	DESCRIPTION	ITEM DETAILS
1.	5 PIN CONNECTOR (Circular type)	As per clause no-6.10
2.	PT-100 ELEMENT	2 nos PT100 PLATINUM RESISTANCE TRERMOMETER IN ONE BODY
3.	CABLE 4 CORE(PTFE)	Electron beam irradiated cable GKW/RW/EMV 2x2x0.5mm
4.	SS HOUSING	SS 304
5.	SS PROTECTION COVER	SS 304
6.	SS PROTECTION SPRING	SS 304
7.	COPPER WASHER (01 Nos.)	AS PER DRAWING AT PAGE-6 TO BE LOOSE SUPPLY

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ANIRBAN BASU SSE- Design	SADDAM HUSSAIN SEE - Design	RAVI YADAV Dy. CEE/D-I
ANIRBAN BASU 2025.04.09 17:43:26 +05'30'	SADDAM HUSSAIN 2025.04.09 17:56:16 +05'30'	RAVI YADAV 2025.04.09 18:06:09 +05'30'