

OUTER SHEET

**SPECIFICATION FOR**  
**“TEMPERATURE SENSOR ASSEMBLY (COMPLETE) ”**  
**USED IN**  
**3PH TRACTION MOTORS**  
**TYPE**  
**6FRA6068 & 6FXA7059**

**APPROVED BY**

**CEE/TM**

**RAJIV  
KUMAR  
BARNWAL**

Digitally signed by  
RAJIV KUMAR  
BARNWAL  
Date: 2022.11.22  
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SPECIFICATION FOR TEMPERATURE  
SENSOR ASSEMBLY (COMPLETE) FOR  
3-PHASE .T.M.TYPE 6FRA-6068 & 6FXA-7059

**CHITTARANJAN LOCOMOTIVE WORKS**  
**WEST BENGAL , INDIA**  
**NO. 4TMS.096.087 REV-1**  
 First Issued On: **20/11/2018**

(Prepared &  
checked by)

**GANESH  
TUDU**

Digitally signed by  
GANESH TUDU  
Date: 2022.10.28  
11:59:24 +05'30'

(Reviewed by)

Dy.CEE/ TMD

**RANJAN  
KUMAR  
PRAMANIK**

Digitally signed by  
RANJAN KUMAR  
PRAMANIK  
Date: 2022.11.12  
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Signature Not  
Verified

Digitally signed by  
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KABIRAJ  
Date: 2022.11.29  
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Reason: IREPS CRIS  
Location: New Delhi

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PRAMANIK**

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RANJAN KUMAR  
PRAMANIK  
Date: 2022.11.12  
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## Table of contents:-

1. GENERAL
2. SERVICE CONDITION
3. CONFIRMING STANDARDS
4. SCOPE OF SUPPLY
5. TECHNICAL DESCRIPTION
6. APPROVAL OF SAMPLE
7. SUBMISSION OF OFFER
8. MARKING
9. PACKING
10. TESTING
11. DEVIATION
12. TEST SCHEDULE
13. SPECIAL NOTE

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## 1.0 GENERAL

This specification is made in continuation of ABB doc. No. . 3EHM311882 Alt-4 for procurement of Temperature Sensor Assly. (Complete) for 3 phase Traction motors type 6FRA 6068 & 6FXA 7059.

The sensors are to be fitted in holes provided in the stator of the motor for recording the temperature of the motor during service. The temperature sensor assly. consists of two (02) nos. Resistance Temperature Detectors- PT100 (RTD) (Resistance Element ) with required cables, connectors and other mechanical items.

This specification is supplement to the above.

## 2.0 SERVICE CONDITIONS

Location of Temperature sensor assly	: Outer surface of Stator of Motors
Maximum Atmospheric Temperature	: +70°C (in sun) and +50°C (in shade)
Ambient Temperature (Operating)	: -20°C ..... + 70°C
Ambient Temperature (storage)	: -30°C ..... + 80°C
Normal Humidity	: 60%
Maximum Humidity	: 100% saturation during rainy season.
Altitude	: Nom 160 m.a.s.l. Range 0...1000 a.s.l
Rain fall	: Very heavy in certain areas. The Equipment should be designed in such a way as to withstand its running at 10 Km/h. in flood water level of 102 mm above rail level.
Atmosphere during hot weather	: Extremely dusty and desert terrain in certain Areas.
Coastal Areas	: Equipment will be designed to work even in coastal areas in humid and salty laden
Vibration	: The equipment sub-system and their mounting arrangement will be designed to withstand vibration and shock in countered in service as specified in correspondence unless otherwise prescribed.

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**3. CONFORMING STANDARDS**

The Temperature Sensor shall conform to the requirements as per IEC 751&721-3-5 or its latest updates/equivalents.

**4. SCOPE OF SUPPLY**

All the items mentioned below are in the scope of supply against this specification in semi assembled condition. All the items are to be as per dimensions and details called for in the drawing .

**5. TECHNICAL DESCRIPTION :**

Sn	Technical Description	Qty/ Equipment	Drg. Code No.
i	Thermo-Couple Housing (Machined)	01 no.	2
ii	Cable Fitting PG16 Earth	01 no.	3
iii	Gasket 2.4X80X80 (Fig:B)	01 no.	4
iv	Resistance Element (Fig:A)	02 nos.	5
v	Lower Foamed Gasket. (Fig:C)	01 no.	6
vi	Upper Foamed Gasket. (Fig:C)	01nos.	7
vii	Press Plug Connector 1.3X15.7	06 no.	9
Viii	Adhesive Shrink Sleeve Dia 8/2 Length: 4x30mm	120 mm	10
ix	Designation Strip SK 8	01 no	15
x	Shrink Sleeve 19X0.35 Colour Transparent	40 mm	16
xi	Shrink sleeve 38.1X0.43 Colour: Yellow	30 mm	17
xii	Protective Layer Flex Tube 4X0.5-SI/GL 1 Length 460mm in two equal piece	02 no.	18
xiii	Cab 2 x 2x 0.5 SCR Length: CA.1650 mm	01 no.	21
xiv	Plug	01 no.	22
	Contact socket GR16 1mm <sup>2</sup>	05 no.	23
	Dummy plug GR16BL	01 no.	24
xv	Perform Shrink part GR18	01 no.	25
xvi	Hex. HD. SCR. M6x16-8.8/ ZN to IS: 1364 (Part-II) '92	04 nos.	50
xvii	Spring Washer B6 (BBBB –Brand) to IS: 3063 Phosphated	04 nos.	60

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### 5.1 Thermo-Couple Housing

This item is to be manufactured as per Drawing no. 3TWD.096.076 Alt1 (or latest),  
Material : carbon Steel casting Gr.230-450 to IS: 1030'89 or Spherodial graphite Casting to IS: 1865'91.

### 5.2 CABLE FITTING PG-16 EARTHS

This is a cable gland made of brass, machined with good finish and nickel plated. The gland is provided with PG-16 thread (as per DIN 40430) for mounting.

### 5.3 GASKETS

This gasket should be made of silicon rubber. Dimension mentioned in Fig. B.

### 5.4 RESISTANCE ELEMENT

The resistance element to be TRT-PT100/B/2.acc. DIN / IEC751Cl.B with accuracy tolerance **Class "B"** which to be housed in side a solid stainless steel bar (Not tube).The operating temperature range 250°C (max).

The connections of RTD is through PTFE insulated cable of length as per drawing. The exit point of stainless steel housing to be crimped to hold tightly the PTFE cables.

The RTD elements should be imported from OEM (M/S AG Allmetra AG, M/s UST Germany ).The TC,GC or OEM's invoice ,Bill of entry & tracking no. to be submitted by the supplier at the time of inspection and as & when asked by competent authority.

Type: Antimagnetic

Type: TRT P 100/B/2acc/DIN/IEC751 Cl. B

Operating Temperature Range: 250° C

Sensor socket: Stainless steel

Cu-Strand: **Silver** Plated,0.5mm<sup>2</sup> PTFE Insulation designation DIN/IEC 751 3.6

**Qty /TM = 02 nos.**

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**5.5 FOAMED GASKET (Lower & Upper)**

These gasket to be made of silicon rubber, compressible by hand . Material should not be deformed in temperature index in temperature index (-) 40 °C. (+) 200 °C.

**5.6 PRESS PLUG**

This item is like standard ferrule used for crimped connection. This item to be made of copper with **Tin** plating.

**5.7 ADHESIVE SHRINK SLEEVE**

This is heat shrinkable sleeve with a shrink ratio of 1:4 or 1:3. This item to be procured from reputed\_source.

**5.8 PROTECTIVE LAYER TUBE**

This is a silicon rubber impregnated glass tube to be used as covering over the resistance element and\_crimped joints.

**5.9 CONNECTOR**

Items to form a **Circular** type connector. This connector has to be preferably procured from Ms ITT Cannon USA. If equivalent used, source of supply and comparison with ITT Cannon must be submitted by the supplier for obtaining prior approval from competent authority.

**5.10 CABLE**

This is a 4 core cable with PTFE insulation with a temperature withstanding capacity of minimum 120°C. The cable to be procured from reputed source (i.e. OEM is M/s Huber +SUHNER) only. Length 1650mm.**CAB** 2 X 2 X 0.5 SCR or RADOX TENUIS TW/S EMC 2 X 2 X 0.5 mm <sup>2</sup>. This cable to be procured from standard source (OEM is M/s Huber +SUHNER) or from their authorized dealer only. Firm should mention the source of cable sheath documentary evidence to be produce at the time of inspection / tender quotation submission with a copy to DYCEE/TMD.

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### 5.11 HARDWARE

All the hardware items should be procure form any one of the following make.

1. Precision Fasteners Ltd.,
2. Lakshmi Precision(LPS)
3. Sundaram Fasteners(TVS) and all spring washer of M/s Forbes & Co. Ltd, Mumbai make or any other make subject to prior approval of DYCEE / TMD.

All the non metallic parts of Temperature sensor should be fire retardant/self extinguishing type as per IS:11731 or any other equivalent DIN,IEC standard.

### 6.0 APPROVAL OF SAMPLE

- 6.1 The offers from the OEM or its authorized agent for identical type of temp. sensor and temp. sensor mounting shall be verified based on original test certificates from OEM, the invoice particular, which shall contain the batch no./SL. NO etc and approval shall be given according to this data.
- 6.2 For offers other than the original type, the supplier shall make available at least three (03) motor set prototype of the Temperature sensor Assly. proposed to be supplied, for inspection and tests at his works and advise the Dy.CEE/TMD/CRJ.
- 6.3 The prototype testing facilities must be arranged by the supplier at his own cost. Tests shall be carried out as per relevant IEC/IS standard mentioned above. The tender shall clearly indicate in the offer, his preparedness for carrying of the prototype tests adequacy of facilities to carry out the type/routine test at his premises.
- 6.4 After the prototype tests as mentioned above, if it is considered necessary by CLW's representative to carry out any further tests or trial of the prototypes at CRJ, the supplier shall arrange the same by the quicker means at his own cost.
- 6.5 Series/bulk supply shall commence only after the prototype are approved cleared by the competent authority.

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KUMAR  
PRAMANIK**

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PRAMANIK  
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## 7.0 SUBMISSION OF OFFER

All tender documents including the quotation shall be submitted in duplicate including any corresponding till a contract is finalized

In case of offers from other than the original equipment manufacturer (OEM) documentary evidence shall be submitted to prove that he is authorized to offer the item on behalf of OEM .The suppliers also liable to produce the original invoice from OEM if warranted later ;

Quotation shall not be considered unless all information is furnished

## 8.0 MARKING

The cable shall be marked on adhesive labels on the reels. The adhesive sticker must contain the following details.

- i) Manufacturer or supplier's name    ii) P.O. No.& date.
- iii) Make of Resistance Element    iv) Batch No. & mfg. Date.
- v) Firm's identification must be engraved / stamped on the thermocouple housing & resistance

## 9.0 PACKING


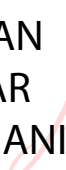
Temperature Sensor Assly must be packed so that, they are covered and stored correctly with adequate protection against damages, contamination on the absorption of moisture/dust or any liquid.

## 10.0 TESTING OF SAMPLE

All Testing shall be carried out at Firm's premises by authorized representative of CLW or RDSO / Zonal railways or as mentioned in the P.O. If any test required to be carried out from outside agency , necessary permission to be taken from CLW & the cost such testing must be bearded by the supplier.

## 11.0 DEVIATIONS

While submitting the offer, the tenderer shall furnish a list of deviation, if any, from this specification. Even if tenderer has no particular in their offered NIL statement shall be submitted.

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**SPECIAL NOTE:**

*The following steps to be followed during manufacturing (Ref.: MS No. RDSO/2015/EL/MS/0437, Rev. '0' Dated 06.01.2015)*

- To ensure the pin E is earthed, Check the continuity between pin E and connector ( male /female body)*
- 1. Insert wrapped shielding wire into one end of 1 sq. mm 2cm long copper tube butt connector and crimp the wrapped wire.*
  - 2. Take wrapped shielding wire of 1 sq.mm and adequate length separately whose one end reach up to female/male pin of connector and put other end into copper tube butt connector inside approximately 1 cm and crimped the wrapped wire at copper tube butt connector.*
  - 3. Crimp other end of taken wrapped shielding wire per 2 above on male or pin or both as the case may be.*
  - 4. Insert the 1.2 mm dia. heat shrinkable sleeve approximate 28 mm length for covering the wrapped shielding Shrink the sleeve with the help of heat gun.*
  - 5. Insert the pin in to E' position of the male/female connector.*
  - 6. Close the end bell.*
  - 7. Cover the female/male connector with heat shrinkable sleeve "perform shrink part GR18" Shrink the sleeve with the help of heat gun.*

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PRAMANIK**

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**12.0 INSPECTION PLAN:-**

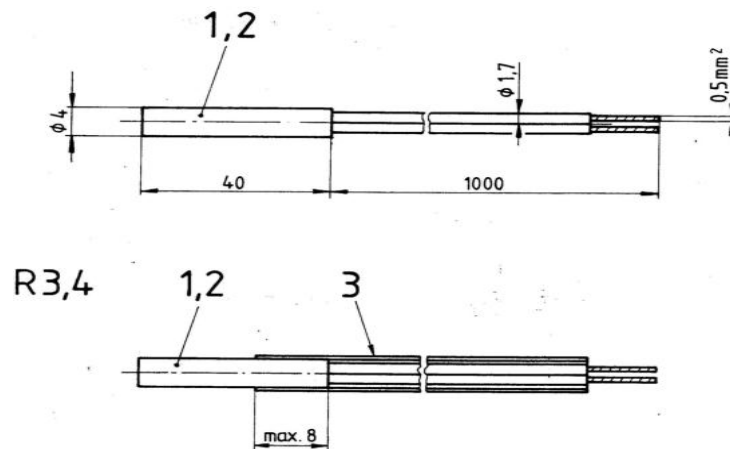
Temperature Sensor Assly (Complete) to be tested as per test schedule given below:

SN	Test Parameters	Specified Value	Test		
			Routine* (100%)	Acceptance (Bulk) 10%	Type (Proto)100%
			By CLW's Inspectors or as per P.O.		
1.	Dimensions	As per relevant drgs	Yes	Yes	Dimensions of all component as per relevant drgs.
2.	Resistance measurement at Room Temperature (PT100 RTD Element)	As per IEC 751 Class "B"	Yes	Yes	Resistance measurement at Room temperature (PT100 RTD Element)
3.	Short time Resistance measurement in Oil at 100°C, 200°C & 250°C (PT100 RTD Element)	As per IEC 751 Class "B"	100% at All temp but 5% at 250°C	10% at All temp but 5% at 250°C	Resistance measurement in Oil at 100°C, 200°C & 250°C (PT100 RTD Element)
4.	High Voltage Test at 1.5KV, 50Hz for 1min (PT100 RTD Element)	withstand	Yes	Yes	High Voltage Test at 1.5KV, 50Hz for 1min (PT100 RTD Element)
5.	Drop Test as per IS:2848'86 (PT100 RTD Element)	As per 2848'86	5%	5%	Drop Test as per IS:2848'86 (PT100 RTD Element)
6.	Insulation Resistance Test by 500VDC Megger (PT100 RTD Element)	100M ohm	Yes	Yes	Insulation Resistance Test by 500VDC Megger (PT100 RTD Element)
7.	Lead Pulling Test on 3kg after measurement of temperature at 200°C on RTD Element (PT100)	No damage element	5%	5%	Lead Pulling Test on 3kg after measurement of temperature at 200°C on RTD Element (PT100)
8.	Insulation Resistance Test by 500VDC Megger	100M ohm (Min)	Yes	Yes	Insulation Resistance Test by 500VDC Megger on cable with connector
9.	Check the continuity of all connector pins and E pin with connector body & cable shielding	---	Yes	Yes	To be checked by multimeter.

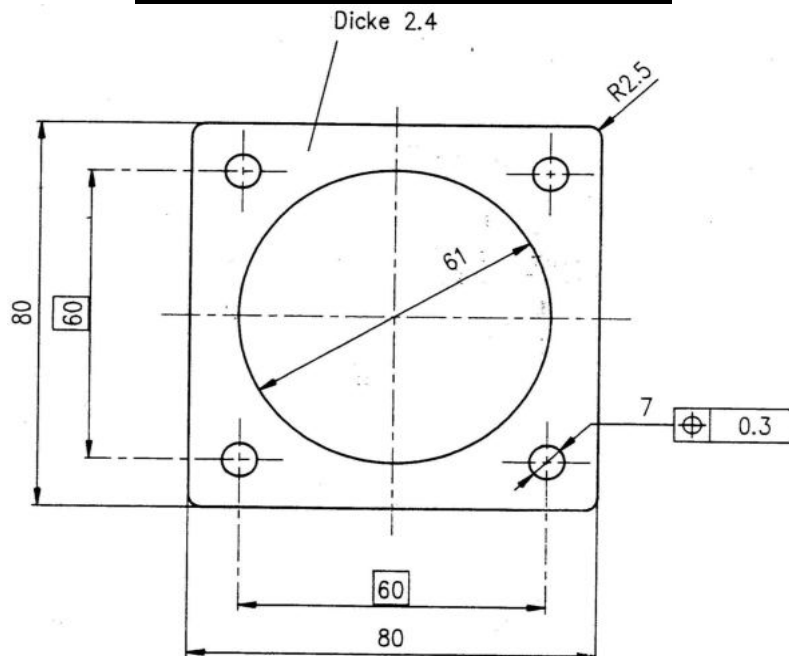
**\* Routine Test to be treated as Firm's Internal Inspection which to be submitted by Firm during Acceptance Test (Bulk/Regular inspection) as well as Type Test (Prototype).**

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### 5(iv) --RESISTANCE ELEMENT



**FIG-B / GASKET- (Item - III)**

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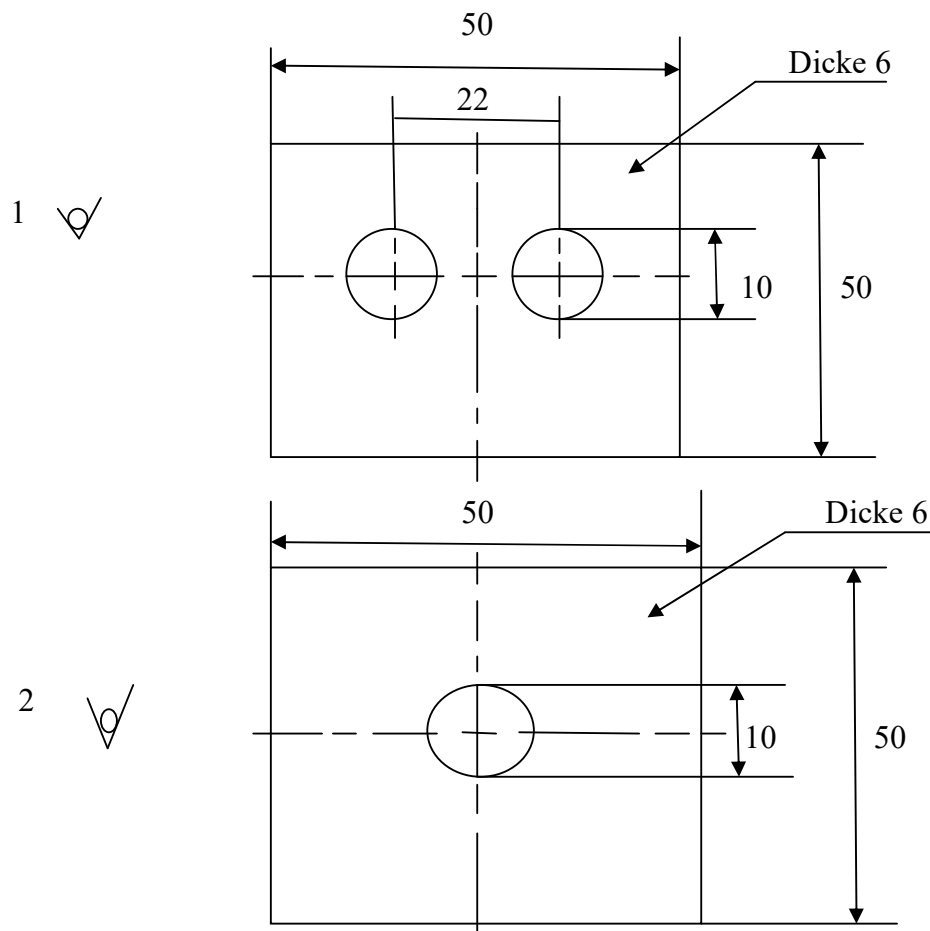
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(Fig: C ) (5.v) FOME GASKET (LOWER & UPPER)

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