

OUTER SHEET

SPECIFICATION FOR
“ COMPLETELY ASSEMBLED TEMPERATURE SENSOR”
USED IN
3PH TRACTION MOTORS.
TYPE
6FRA6068 & 6FXA7059

APPROVED BY

CEE/TM

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SPECIFICATION FOR COMPLETELY
 ASSEMBLED TEMPERATURE SENSOR
 FOR 3-PHASE .T.M.TYPE 6FRA-6068 & 6FXA-
 7059

CHITTARANJAN LOCOMOTIVE WORKS
 WEST BENGAL , INDIA
NO. 4TMS.096.085 REV-2
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(Prepared &
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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. MARKING
8. PACKING
9. TESTING OF SAMPLE
10. DEVIATION
11. SPECIAL NOTE
12. INSPECTION PLAN

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1.0 GENERAL

This specification is for Completely Assembled Temperature Sensor for 3 phase Traction motors. The sensors are to be fitted in holes provided in the stator of the motors for monitoring 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. The schematic drawing of completely Assembled Temperature Sensor showing various items shown in assembly drawing (ref: ABB drg No. 3EHM311882.)

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 with stand 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 fully assembled condition. All the items are to be as per dimensions and details called for in the drawing . Details of fixing arrangement of sensor element with bolt are shown in **FIGURE-A** .

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	01 no.	4
iv	Resistance Element fixing with bolt type arrangement	02 nos.	FIG. "A"
v	Insulated spacer	01 no.	11
vi	Press Plug Connector 1.3X15.7	04 nos.	9
vii	Designation Strip SK 8	01 no.	8
viii	Adhesive Shrink Sleeve Dia 8/2 Length: 4x30mm	120 mm	10
ix	Shrink Sleeve 19X0.35 Colour Transparent	40 mm	16
x	Shrink sleeve 38.1X0.43 Colour: Yellow	30 mm	17
xi	Protective Layer Flex Tube 4X0.5-SI/GL 1 Length 460mm in two equal piece	02 nos.	18
xii	Cab 2 x 2x 0.5 SCR Length: CA.1650 mm	01 no.	21
xiii	Plug	01 no.	22
	Contact socket GR16 1mm ²	05 no.	23
	Dummy plug GR16BL	01 no.	24
xiv	Perform Shrink part GR18	01 no.	25
xv	Hex. HD. SCR. M6x40-8.8/ Phosphated to IS: 1364 (Part-II) '92	04 nos.	6
xvi	Spring Washer B6 (BBBB –Brand) to IS: 3063 Phosphated	04 nos.	7

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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 Spheroidal 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 from 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 A, 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.
Resistance Element with bolt fixing arrangement according enclosed **FIGURE-A**.

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,0.5mm² PTFE Insulation designation DIN/IEC 751 3.6

Qty /TM = 02 nos.

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5.5 INSULATED SPACER

This is to be made of glass filled reinforced polyamide to IS: 13463/1992 ; Glass content 30% (max). as per Fig C. Material should not be deformed in temp index (+)190 °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 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 mm². 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.

5.10 CONNECTOR

Item to form a Circular type connector. This connector has to be preferably procured from M/s ITT Cannon USA. If equivalent used, source of supply and comparison with ITT Cannon must be submitted by the supplier at the time of inspection as well as DYCEE/TMD for approval.

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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 completely Assembled temp sensor 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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7.0 MARKING

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

- Manufacturer or supplier's name, P.O. No.& date.
 - Make of Resistance Element; Batch No. & mfg. Date.
- Firm's identification must be engraved / stamped on the thermocouple housing & resistance element bolt (if possible.).

8.0 PACKING

The Complete Assembled 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.

9.0 TESTING OF SAMPLE

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.

10.0 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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11. 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 28mm 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.*
- 8. Lead length (white & red) of Temperature sensor element shall be kept 150 to 170 mm for easy maintenance in loco lowered condition .*

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12.0 INSPECTION PLAN:-

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

SN	Test Parameters	Specified Value	Test			Remarks
			Routine* (100%)	Acceptance (Bulk) 10%	Type (Proto)100%	
1.	Dimensions of all component as per relevant drgs.	As per relevant drgs	Yes	Yes	Dimensions of all component as per relevant drgs.	Before Assembly.
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)	During stage inspection (Before final assembly)
3.	Resistance measurement in Oil at 100 ⁰ C ,200 ⁰ C &250 ⁰ C (PT100 RTD Element)	As per IEC 751 Class “B”	100% at All temp but 5% at 250 ⁰ C	10% at All temp but 5% at 250 ⁰ C	Resistance measurement in Oil at 100 ⁰ C ,200 ⁰ C &250 ⁰ 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)	During stage inspection (Before final assembly)
7	Lead Pulling Test on 3kg after measurement of temperature at 200 ⁰ C on RTD Element (PT100)	No damage element	5%	5%	Lead Pulling Test on 3kg after measurement of temperature at 200 ⁰ C on RTD Element (PT100)	During stage inspection (Before final assembly)
8	Insulation Resistance Test by 500VDC Megger on complete assembly	100M ohm (Min)	Yes	Yes	Insulation Resistance Test by 500VDC Megger on complete assembly	After complete assembled Temp. sensor
9	Check Earthing between "E" point of connector & Thermo-couple housing	Less than 1.0 ohm	Yes	Yes	Check Earthing between "E" point of connector & Thermo-couple housing	After complete assembled Temp. sensor

*** 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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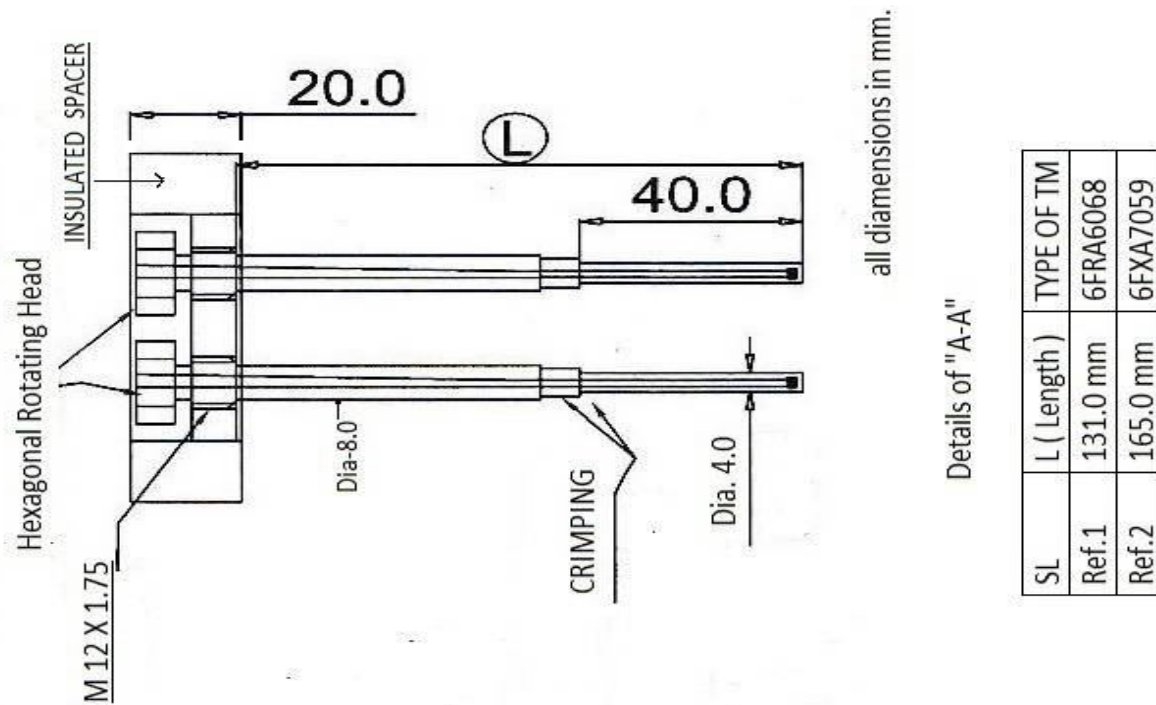
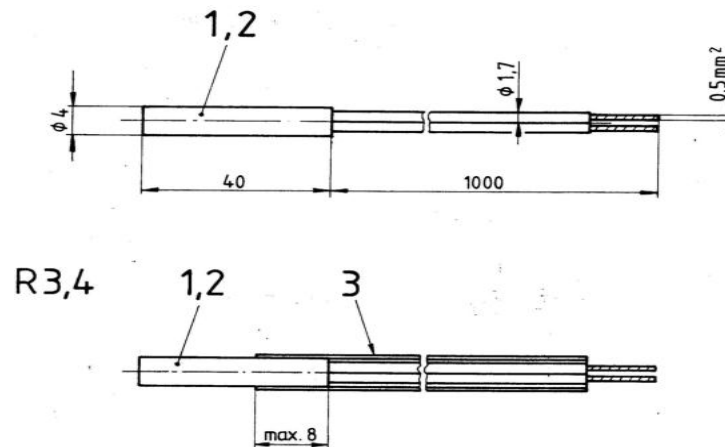
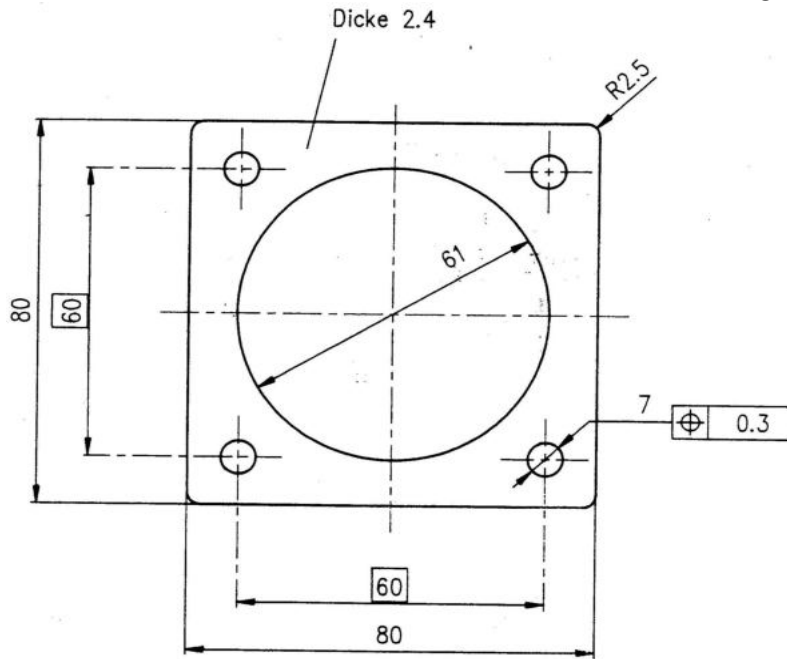


FIGURE-A
Resistance Element fixed in special Bolt arrangement.
(Item no.iv)



5(iv) --RESISTANCE ELEMENT

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

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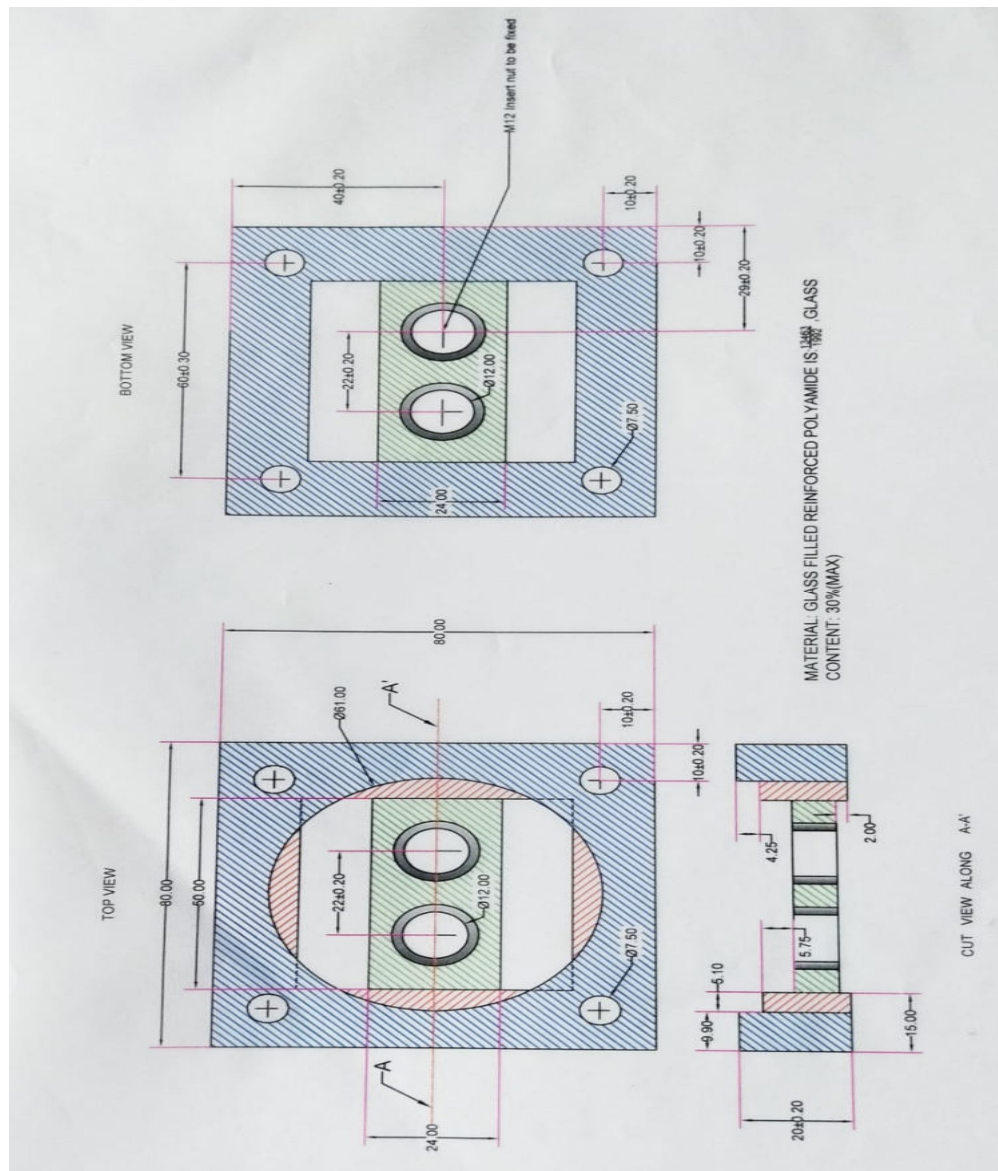


FIG "C"

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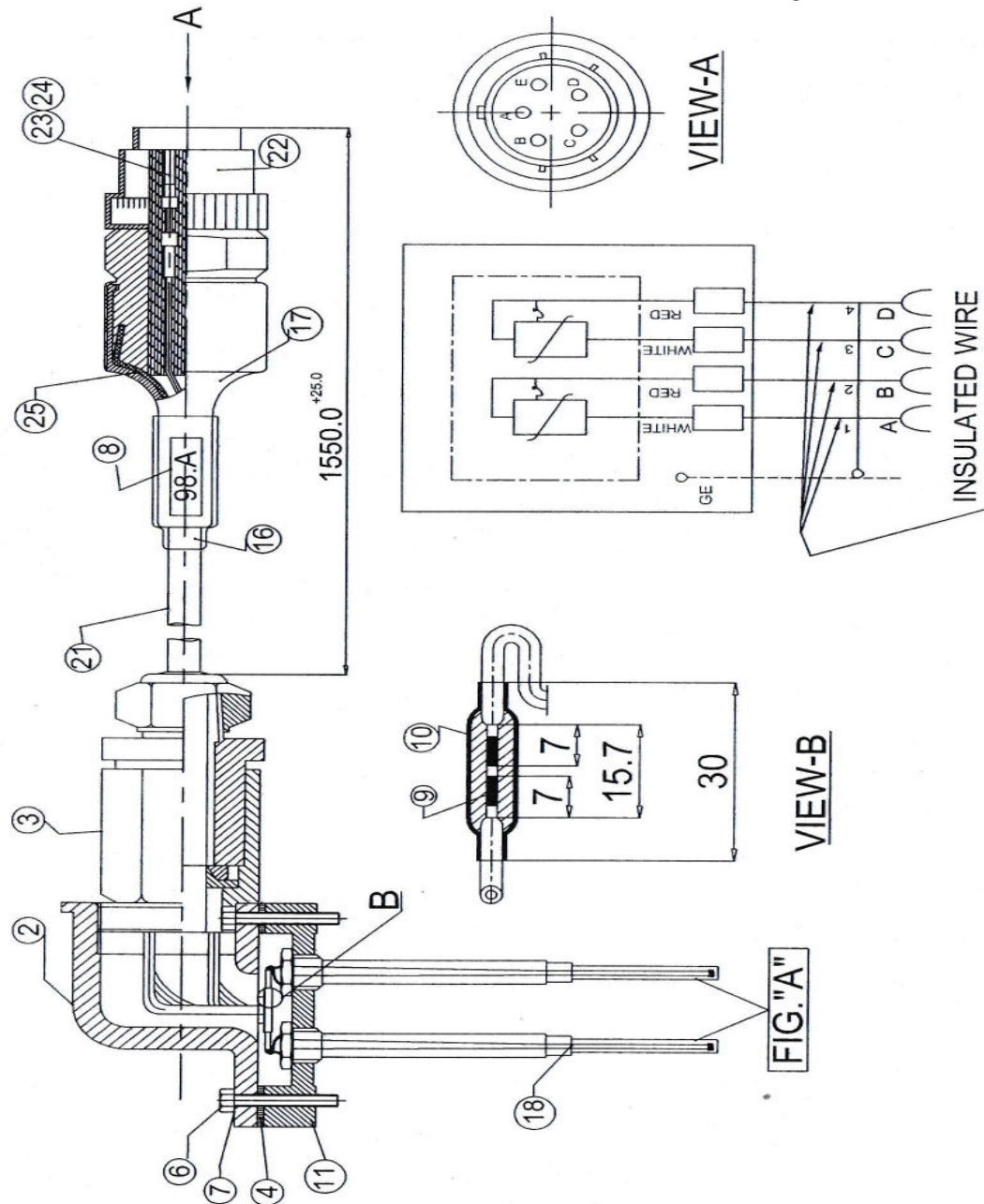
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ASSEMBLY DRAWING

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