

**ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION**

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E-mail : erda@erda.org

Web : http://www.erda.org

**TEST REPORT**

SHEET 1 OF 9

NAME & ADDRESS OF CUSTOMER RAJASTHAN POWERGEN TRANSFORMER PVT. LTD. Karola-Bhinmal Road, Karola, Sanchoe, Dist. Jalore, Rajasthan (India), PIN-343041.	REPORT NO.: RP-1718-047684 DATE: 27.12.2017	
SAMPLE DESCRIPTION 100 kVA Distribution Transformer 11000/433Volts, 5.25/133.34Amp., Oil filled, Vector Group: Dyn-11, ENERGY EFFICIENCY LEVEL: 3 Further details as per sheet No. 3 of 9.	CUSTOMER REF. No.: NP/ERDA/TT/41/ 2017-18	DATED: 29.11.2017 DATE OF SAMPLE RECEIPT: 30.11.2017 DATE OF TESTING: 13.12.2017 to 26.12.2017
TEST DETAILS Short-circuit withstand test [Cl. No. (17 & 21.3 c)] ENCLOSURES: Number of oscillograms : Eleven Number of photograph : One Number of test circuit diagram : One Number of drawings : Three REMARKS: The sample conforms to the requirements of standard for short-circuit withstand test.	SAMPLE IDENTIFICATION ERDA SAMPLE CODE NO.: ERDA-00229058 SERIAL NO.: RPTPL/100KVA/2017-18/001 DRAWING NO.: RPTPL/100KVA/001 RPTPL/100KVA/002 RPTPL/100KVA/003 YEAR OF MFG.: 2017 TEST SPECIFICATIONS IS 1180 (Part 1): 2014 [Amendment No. 1 & 2]	
PREPARED BY	CHECKED BY	APPROVED BY K.B.PATEL

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REPORT NO.: RP-1718-047684

SHEET 2 OF 9

DATE: 27.12.2017

Contents	
1. Technical specifications of test object assigned by customer	Sheet No. 3 of 9
2. Routine test results before short circuit	Sheet No. 4 of 9 to 5 of 9
3. Short-circuit withstand test	Sheet No. 6 of 9 to 7 of 9
4. Routine test results after short circuit	Sheet No. 8 of 9 to 9 of 9
5. Oscillogram No.	1389/01 to 1389/11
6. Photograph No.	1718-014213/1262
7. Test circuit diagram No.	OLSC/DTC/01
8. Drawing No.	RPTPL/100KVA/001 RPTPL/100KVA/002 RPTPL/100KVA/003


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SHEET 3 OF 9

DATE: 27.12.2017

TECHNICAL SPECIFICATIONS OF TEST OBJECT ASSIGNED BY CUSTOMER

1. Name of manufacturer	: RAJASTHAN POWERGEN TRANSFORMER PVT. LTD.
2. Equipment	: 100 kVA Distribution Transformer
3. Standard No.	: [Cl. No. (17 & 21.3 c)] of IS 1180 (Part 1): 2014 [Amendment No. 1& 2]
4. Serial No.	: RPTPL/100KVA/2017-18/001
5. Energy efficiency level	: 3
6. Type	: Outdoor, Oil Cooled
7. kVA rating	: 100
8. Rated voltage H.V. (Volts)	: 11000
L.V. (Volts)	: 433
9. Rated current H.V. (Amp.)	: 5.25
L.V. (Amp.)	: 133.34
10. Number of phases	: 3
11. Connection H.V./L.V.	: Delta/Star
12. Frequency (Hz.)	: 50
13. Type of cooling	: ONAN
14. Temperature rise of oil/winding	: 35°C/40°C
15. Percentage Impedance	: 4.5%
16. Primary winding conductor	: DPC Aluminium wire, bare dia. 2.60mm
17. Secondary winding conductor	: DPC Aluminium strip, bare size (13.2mm x 4.1mm) x 3nos. in parallel
18. Quantity of oil (Litre)	: 238
19. Weight of oil (kg.)	: 195
20. Weight of core and winding (kg.)	: 475
21. Total weight (kg.)	: 835
22. Vector group	: Dyn-11
23. Year of manufacture	: 2017
24. Insulation level H.V.	: 28 kVrms
25. Insulation level L.V.	: 03 kVrms
26. Total losses at 75°C (Watts)	: 435 Max. (at 50 % load)
27. Total losses at 75°C (Watts)	: 1500Max. (at 100 % load)

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DATE: 27.12.2017

SHEET 4 OF 9

ROUTINE TEST RESULTS BEFORE SHORT CIRCUIT

a) MEASUREMENT OF WINDING RESISTANCE

Measurement at average oil temperature: 31.2°C					
LV Winding resistance (mΩ)			HV Winding Resistance (Ω)		
u - v	v - w	w - u	U - V	V - W	W - U
12.115	12.090	12.192	8.7370	8.7800	8.7545

b) MEASUREMENT OF VOLTAGE RATIO AND CHECK OF PHASE DISPLACEMENT

Vector group: Dyn-11 was verified.

Rated turns Ratio	Measured turns ratio between Terminals					
	U-V/u-n	Difference %	V-W/v-n	Difference %	W-U/w-n	Difference %
44.001	44.009	0.018	43.983	-0.041	44.016	0.034

c) MEASUREMENT OF SHORT-CIRCUIT IMPEDANCE AND LOAD LOSS(at 100 % load)

Average oil temp.: 30.3°C

Test current (Amp.) Iavg	Impedance voltage (V) Vavg.	Frequency (Hz.)	Load loss measured (Watts)	Impedance Voltage (%Z) at 50 Hz.	Load loss computed at 75°C (Watts)	%Z at 75°C
5.248	509.691	49.874	740.230	4.647	852	4.666

d) MEASUREMENT OF LOAD LOSS (at 50 % load)

Average oil temp.: 30.3°C

Test current (Amp.) Iavg.	Impedance voltage (V) Vavg.	Frequency (Hz.)	Load loss measured (Watts)	Load loss computed at 75°C (Watts)
2.625	254.484	49.847	185.050	213

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REPORT NO.: RP-1718-047684

SHEET 5 OF 9

DATE: 27.12.2017

e) MEASUREMENT OF NO-LOAD LOSS AND CURRENT

Average oil temp.: 30.3°C

Applied Voltage (V) Vavg.	Current (Amp.) Iavg.	Frequency (Hz.)	Losses Measured (Watts)
433.059	0.517	50.073	201

- Total losses at 75°C: 414 Watts (at 50 % load)

- Total losses at 75°C: 1053 Watts (at 100% load)

f) MEASUREMENT OF INSULATION RESISTANCE

Average oil temp.: 31.2°C, Measured at Voltage: 1000 V DC

	IR value (MΩ)
HV to LV winding	> 2000
HV winding to LV + EARTH	> 2000
LV winding to HV + EARTH	> 2000

g) INDUCED OVER-VOLTAGE WITHSTAND TEST

Sr. No.	Test	Applied voltage (V)	Applied Freq. (Hz.)	Duration (sec.)	Remarks
1.	Between LV windings with tank connected to earth.	866	100	60	Withstood

h) SEPARATE-SOURCE VOLTAGE WITHSTAND TEST

Sr. no.	Test	Applied voltage (kV)	Duration (sec.)	Remarks
1.	Between HV winding and LV winding connected to the tank and earth	28	60	Withstood
2.	Between LV winding and HV winding connected to the tank and earth	03	60	Withstood

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REPORT NO.: RP-1718-047684

SHEET 6 OF 9

DATE: 27.12.2017

SHORT-CIRCUIT WITHSTAND TEST:

The verification of the short-circuit withstand test was performed on the high voltage winding connected to three phase-balanced source and low voltage winding short circuited through current measuring instruments. Test conducted with pre set short circuit as per schematic circuit diagram No.: OLSC/DTC/01.

Condition of the equipment under test: As after routine tests.

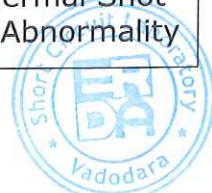
Supply Frequency: 50 Hz.

Test No.	Oscillogram No.	Applied voltage (kVrms)	Short circuit current on LV (A)			Duration (sec.)	Remarks
			Peak	RMS	Avg.		
1.	1389/01	-	- 4817 -	2241 2161 2168	2190	0.1	Calibration shot
2.	1389/02	11	- 6400 -	2934 2832 2838	2868	0.5	No Abnormality
3.	1389/03	11	- 6224 -	2863 2767 2770	2800	0.5	No Abnormality
4.	1389/04	11	- 6322 -	2862 2785 2768	2805	0.5	No Abnormality
5.	1389/05	11	6578 - -	2868 2759 2777	2801	0.5	No Abnormality
6.	1389/06	11	6580 - -	2869 2758 2780	2802	0.5	No Abnormality
7.	1389/07	11	6619 - -	2865 2759 2777	2800	0.5	No Abnormality
8.	1389/08	11	- - 5945	2864 2766 2771	2800	0.5	No Abnormality
9.	1389/09	11	- - 6076	2869 2767 2779	2805	0.5	No Abnormality
10.	1389/10	11	- - 6077	2851 2777 2772	2800	0.5	No Abnormality
11.	1389/11	11	- 6210 -	2859 2779 2772	2803	2.0	Thermal Shot No Abnormality

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REPORT NO.: RP-1718-047684

SHEET 7 OF 9

DATE: 27.12.2017

Measurement of the % reactance during the short circuit test

LV winding was short circuited. Three phase AC supply was connected to HV winding to pass test current. Before the short circuit test and after each shot, the percentage reactance was measured.

Sr. No.	Measurement performed		Measured value of % reactance at 50 Hz.			%Change in % reactance		
			U	V	W	U	V	W
1.	Before test		4.60	4.62	4.64	-	-	-
2.	After the test no.	2.	4.60	4.62	4.64	0.00	0.00	0.00
3.	After the test no.	3.	4.60	4.62	4.64	0.00	0.00	0.00
4.	After the test no.	4.	4.60	4.62	4.64	0.00	0.00	0.00
5.	After the test no.	5.	4.60	4.62	4.64	0.00	0.00	0.00
6.	After the test no.	6.	4.60	4.62	4.64	0.00	0.00	0.00
7.	After the test no.	7.	4.60	4.62	4.64	0.00	0.00	0.00
8.	After the test no.	8.	4.60	4.61	4.64	0.00	-0.22	0.00
9.	After the test no.	9.	4.60	4.62	4.64	0.00	0.00	0.00
10.	After the test no.	10.	4.60	4.62	4.64	0.00	0.00	0.00
11.	After the test no.	11.	4.60	4.62	4.64	0.00	0.00	0.00

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REPORT NO.: RP-1718-047684

SHEET 8 OF 9

DATE: 27.12.2017

ROUTINE TEST RESULTS AFTER SHORT CIRCUIT

a) MEASUREMENT OF WINDING RESISTANCE

Measurement at average oil temperature: 25.0°C					
LV Winding resistance (mΩ)			HV Winding Resistance (Ω)		
u - v	v - w	w - u	U - V	V - W	W - U
11.848	11.824	11.924	8.5415	8.5915	8.5610

b) MEASUREMENT OF VOLTAGE RATIO AND CHECK OF PHASE DISPLACEMENT

Vector group: Dyn-11 was verified.

Rated turns Ratio	Measured turns ratio between Terminals					
	U-V/u-n	Difference %	V-W/v-n	Difference %	W-U/w-n	Difference %
44.001	44.010	0.020	43.985	-0.036	44.014	0.030

c) MEASUREMENT OF SHORT-CIRCUIT IMPEDANCE AND LOAD LOSS(at 100 % load)

Average oil temp.: 25.1°C

Test current (Amp.) Iavg	Impedance voltage (V) Vavg.	Frequency (Hz.)	Load loss measured (Watts)	Impedance Voltage (%Z) at 50 Hz.	Load loss computed at 75°C (Watts)	%Z at 75°C
5.248	510.715	49.967	742.390	4.648	865	4.669

d) MEASUREMENT OF LOAD LOSS(at 50 % load)

Average oil temp.: 25.1°C

Test current (Amp.) Iavg.	Impedance voltage (V) Vavg.	Frequency (Hz.)	Load loss measured (Watts)	Load loss computed at 75°C (Watts)
2.624	254.998	49.975	185.400	216

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REPORT NO.: RP-1718-047684

SHEET 9 OF 9

DATE: 27.12.2017

e) MEASUREMENT OF NO-LOAD LOSS AND CURRENT

Average oil temp.: 25.1°C

Applied Voltage (V) Vavg.	Current (Amp.) Iavg.	Frequency (Hz.)	Losses Measured (Watts)
433.247	0.503	50.028	203

- Total losses at 75°C: 419 Watts (at 50 % load)
- Total losses at 75°C: 1068 Watts (at 100% load)

f) MEASUREMENT OF INSULATION RESISTANCE

Average oil temp.: 25.0°C, Measured at Voltage: 1000 V DC

	IR value (MΩ)
HV to LV winding	> 2000
HV winding to LV + EARTH	> 2000
LV winding to HV + EARTH	> 2000

g) INDUCED OVER-VOLTAGE WITHSTAND TEST

Sr. No.	Test	Applied voltage (V)	Applied Freq. (Hz.)	Duration (sec.)	Remarks
1.	Between LV windings with tank connected to earth	866	100	60	Withstood

h) SEPARATE-SOURCE VOLTAGE WITHSTAND TEST

Sr. No.	Test	Applied voltage (kV)	Duration (sec.)	Remarks
1.	Between HV winding and LV winding connected to the tank and earth	28	60	Withstood
2.	Between LV winding and HV winding connected to the tank and earth	03	60	Withstood

Observation after test: The transformer was untanked and inspected.

- Condition of conductor, core and clamping:
 - No visible damage, deformation or displacement.
- Condition of spacers : Intact
- Condition of oil : Clear

Results: 1) % Change in % reactance is within tolerance limits as per standard.

- The results of routine tests carried out before and after the short-circuit withstand test found within limits as per standard.

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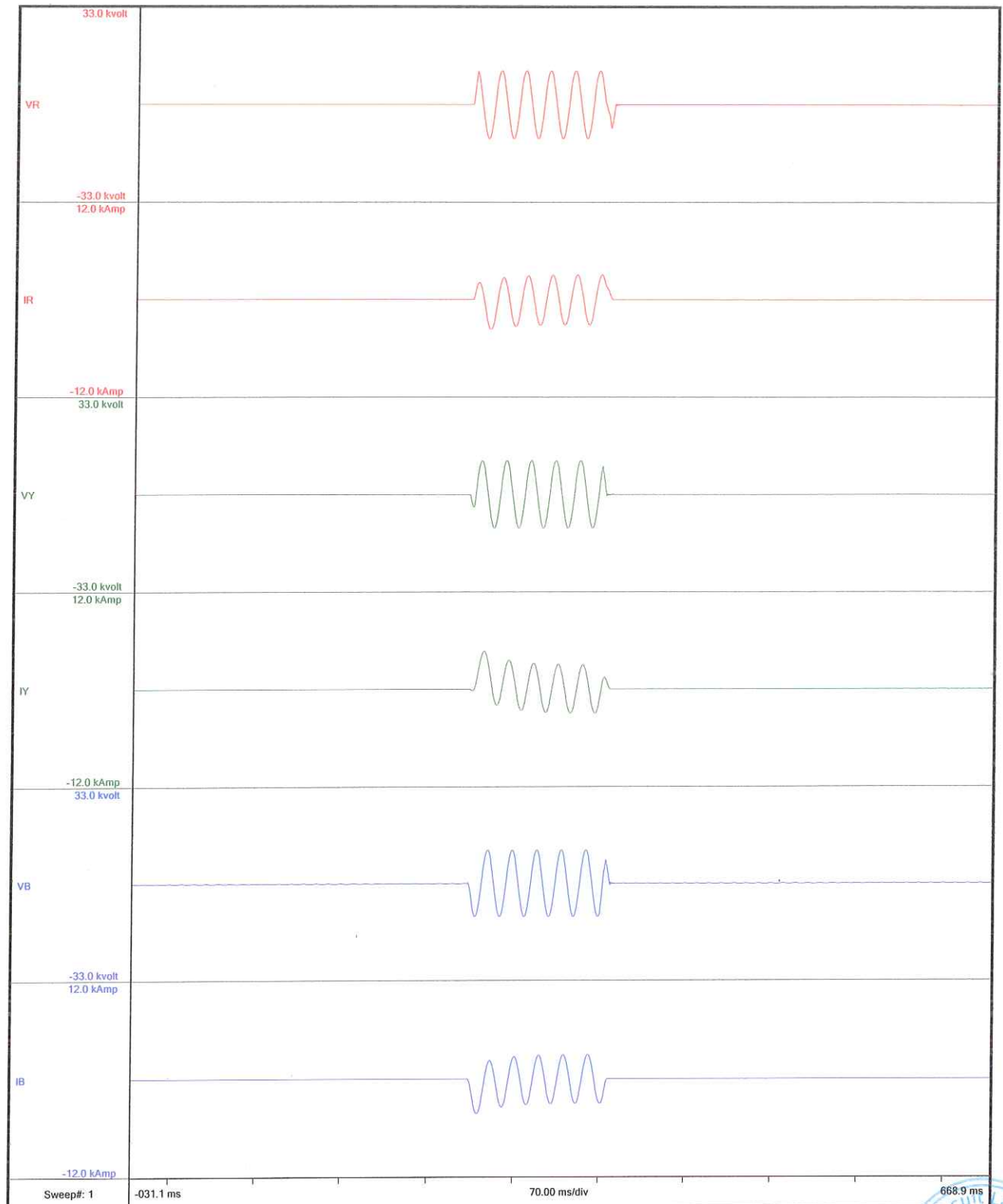
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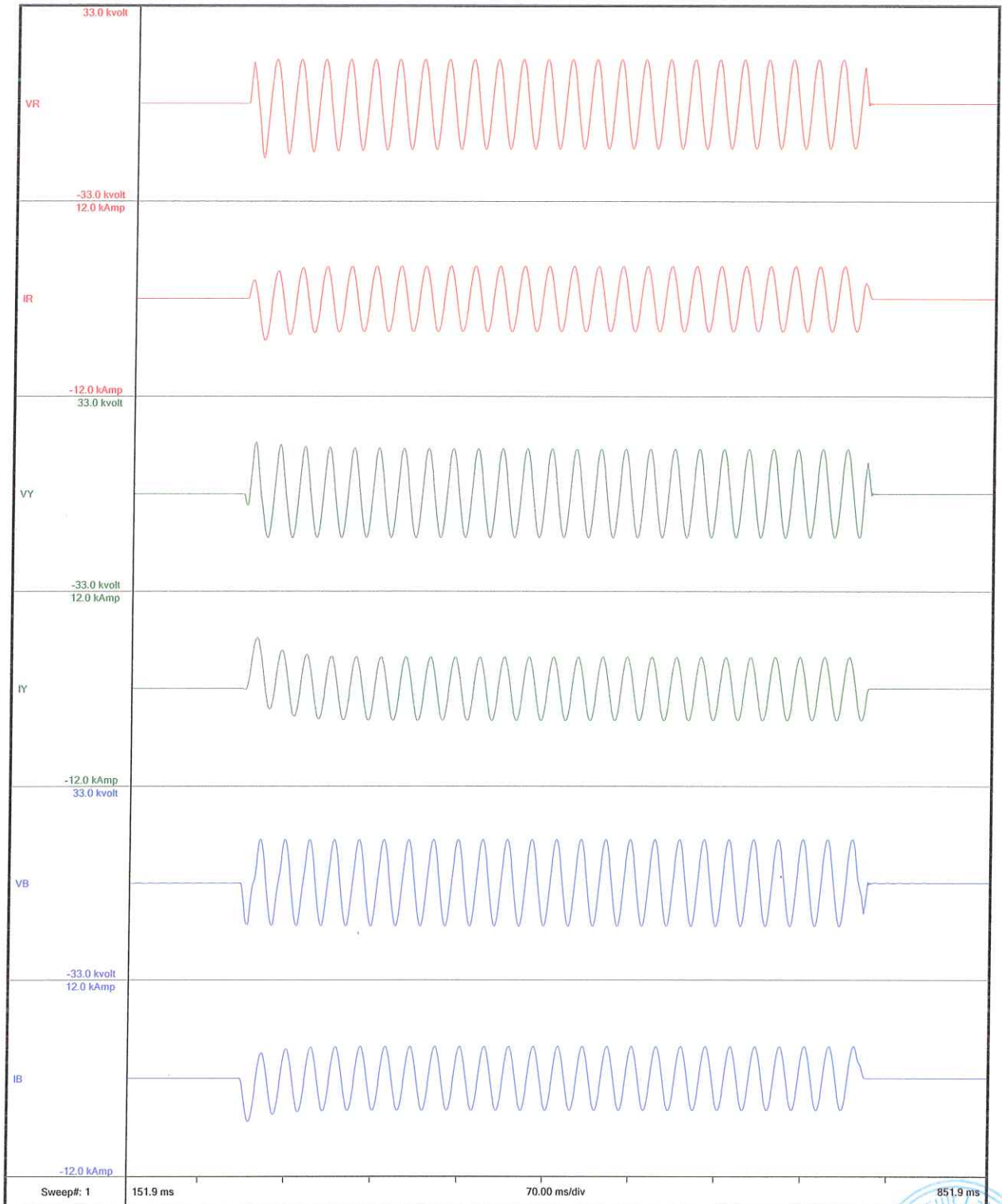
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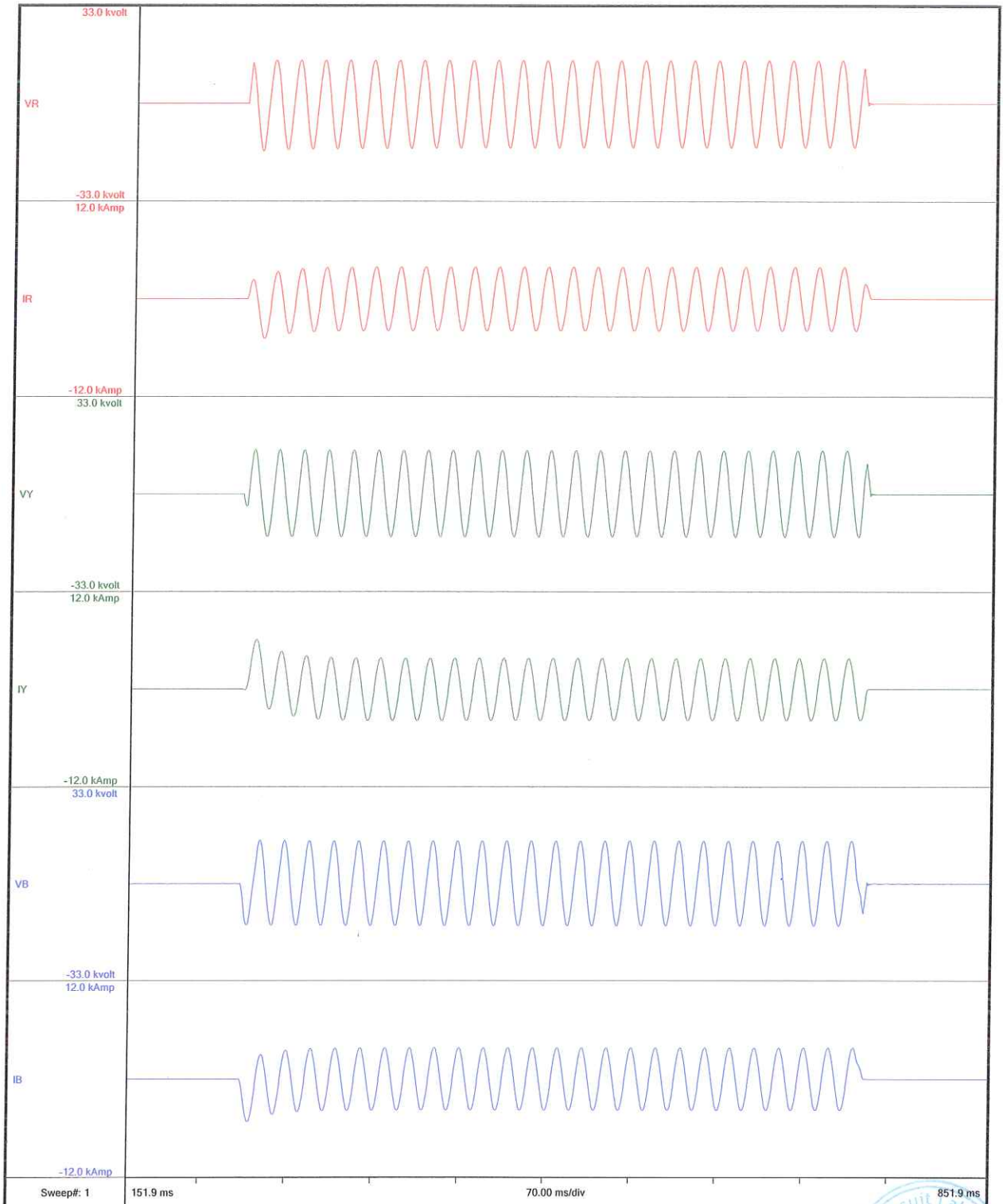
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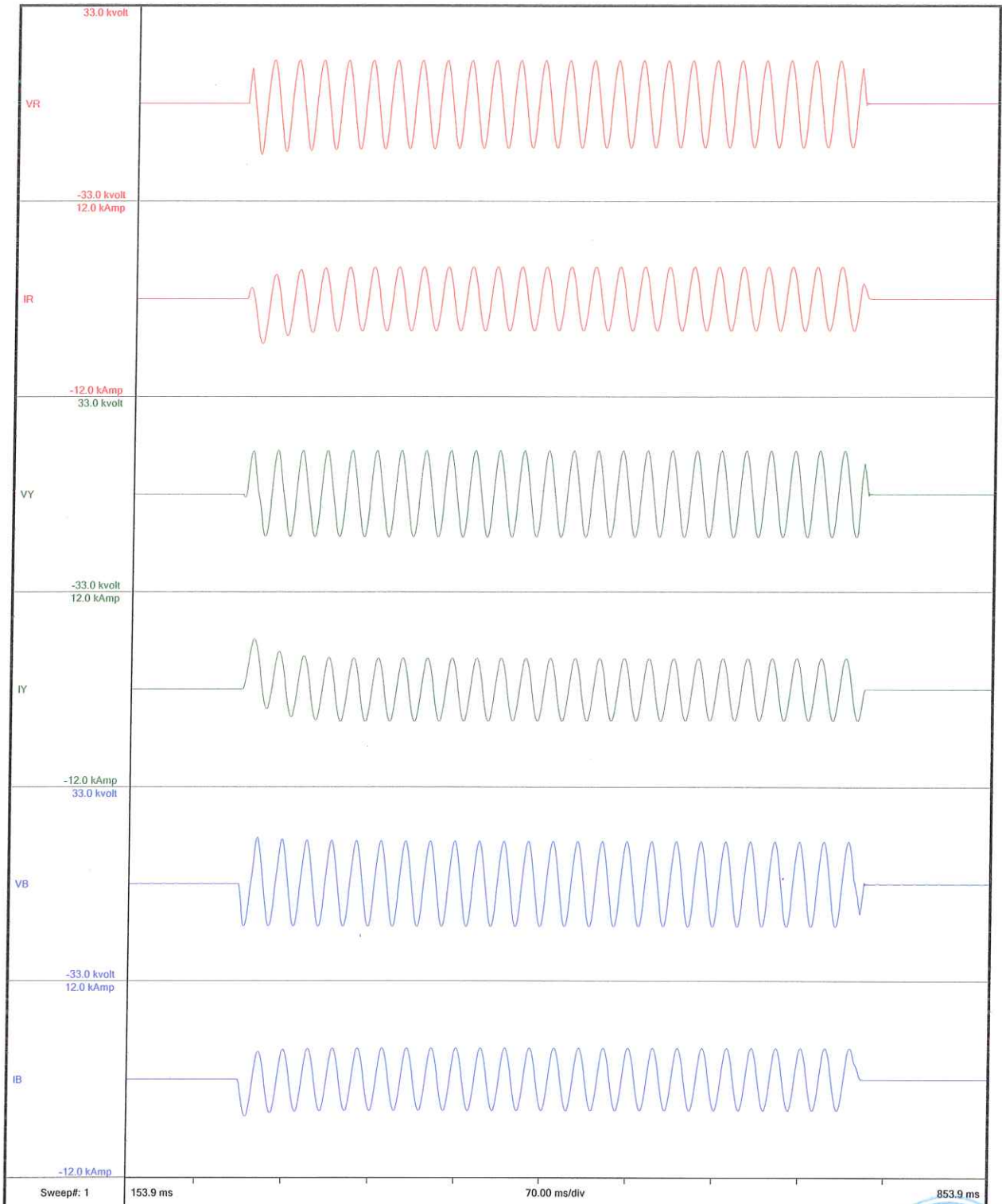
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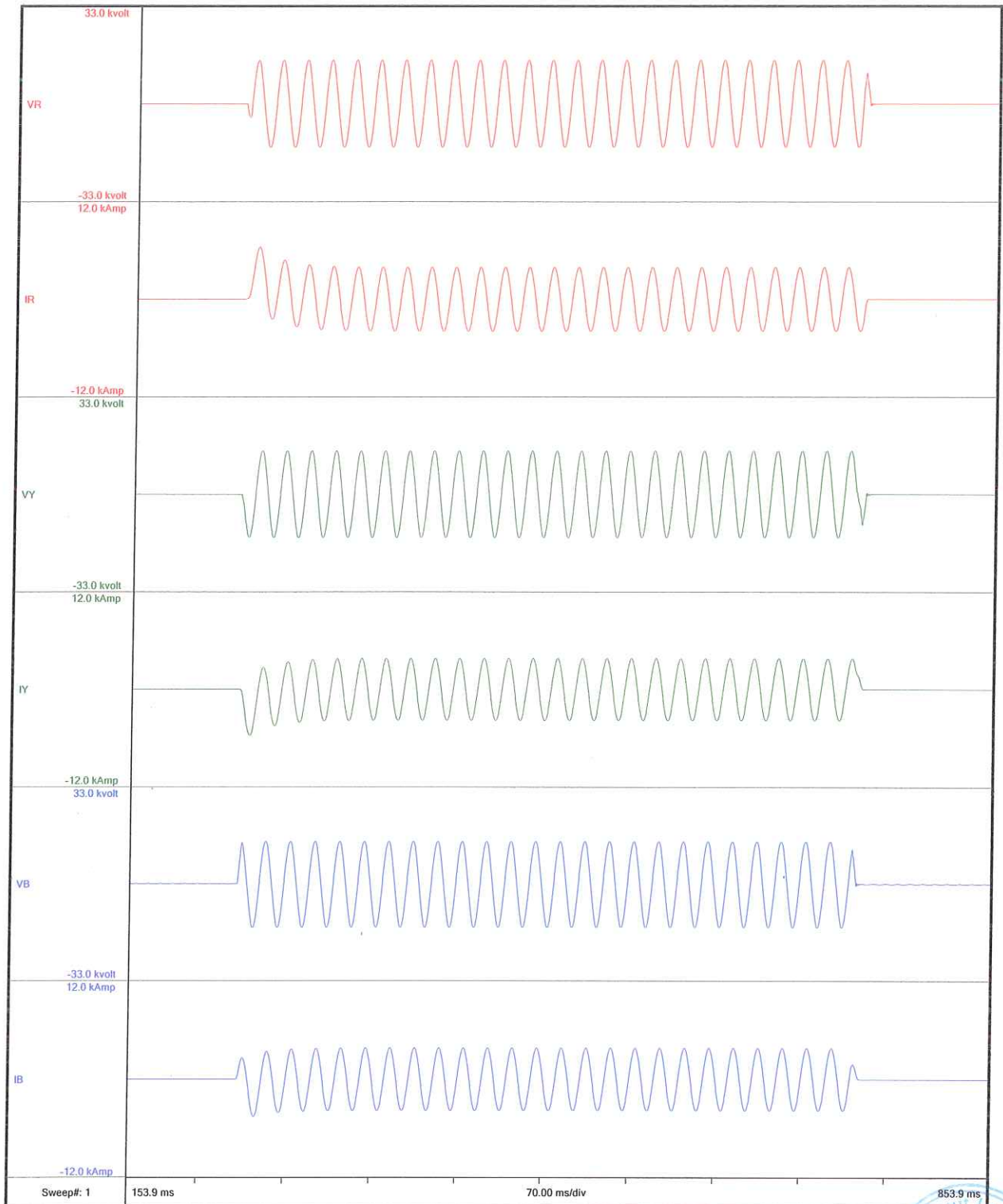
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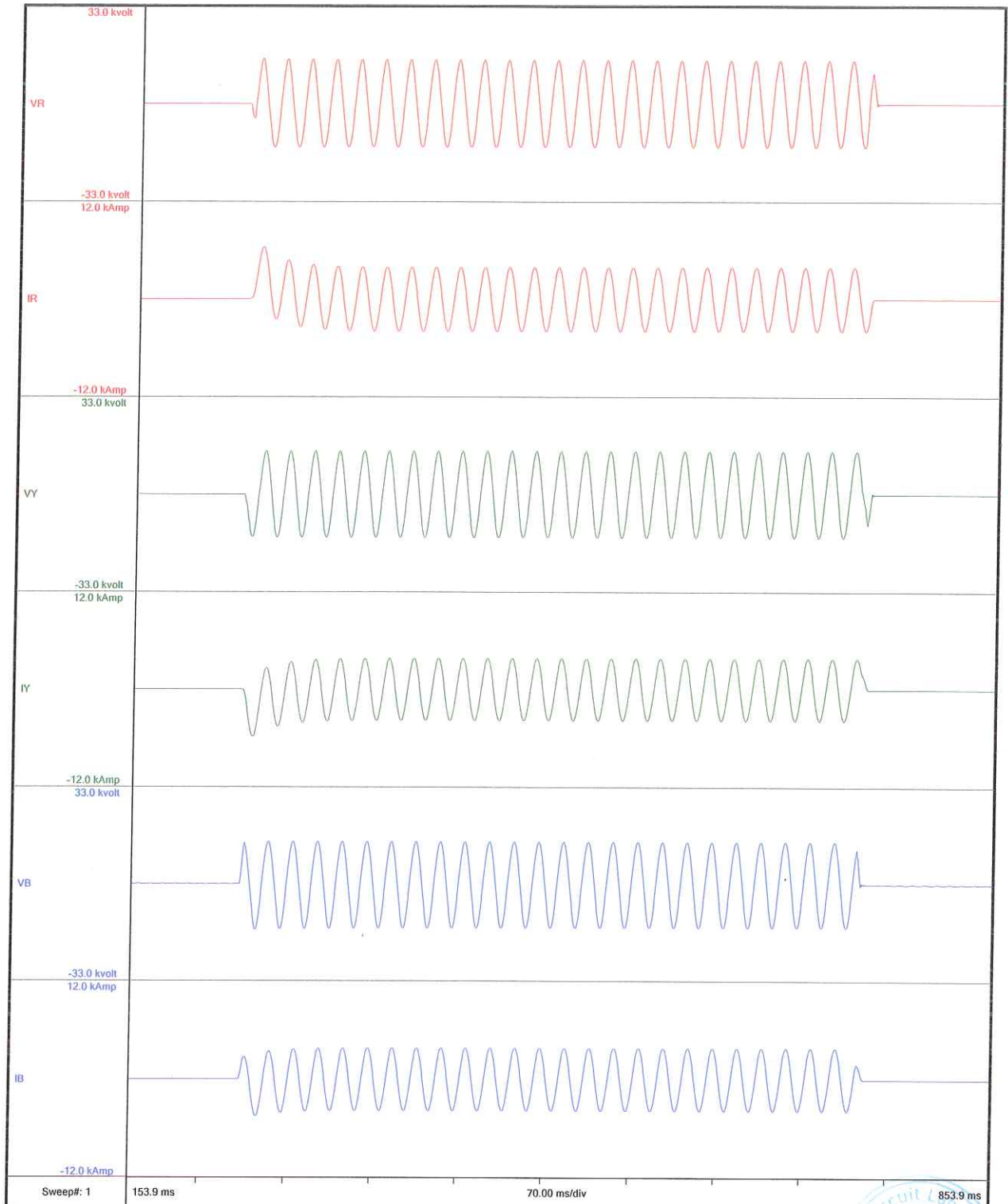
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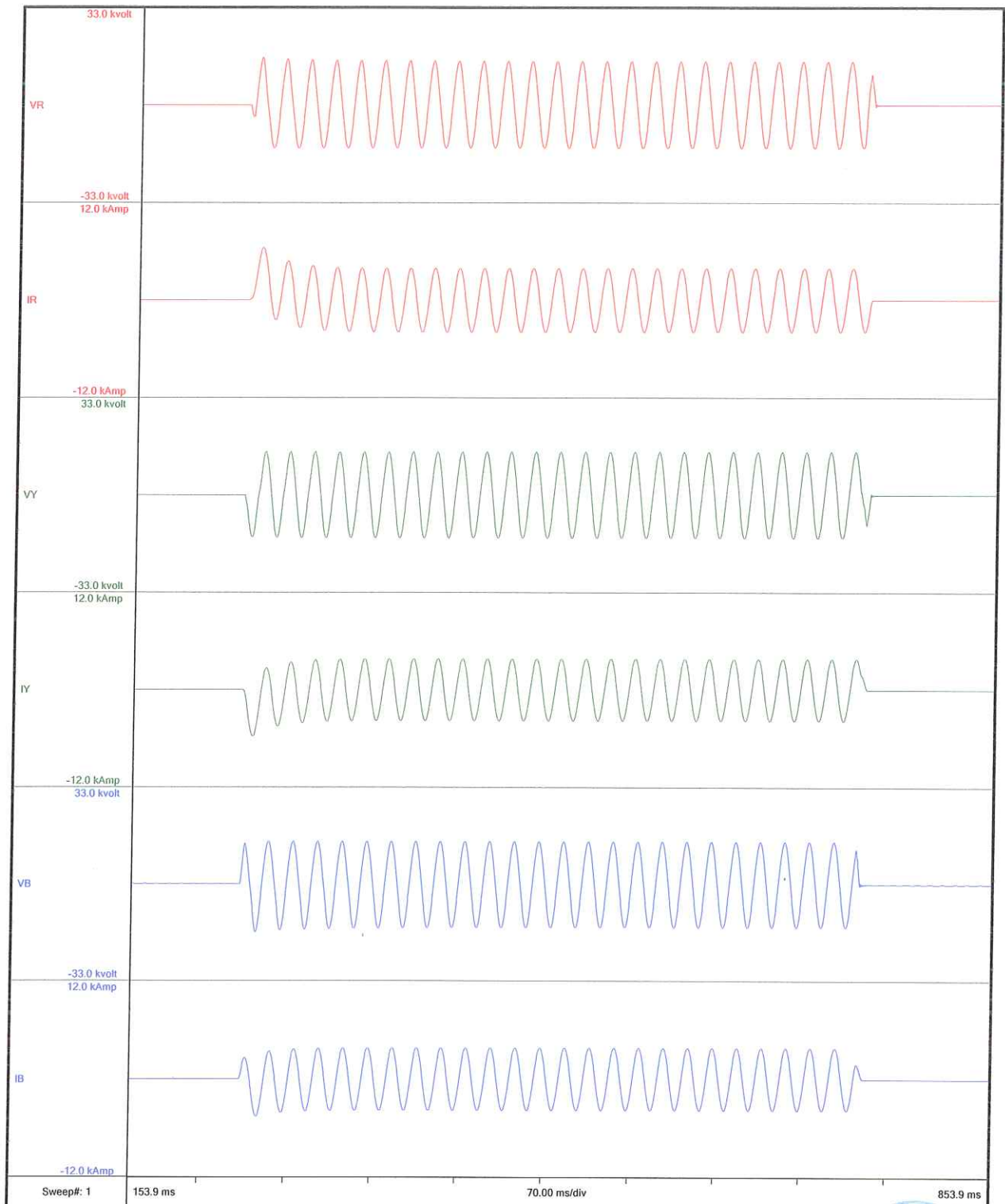
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REPORT NO.: RP-1718-047684

DATE: 27.12.2017



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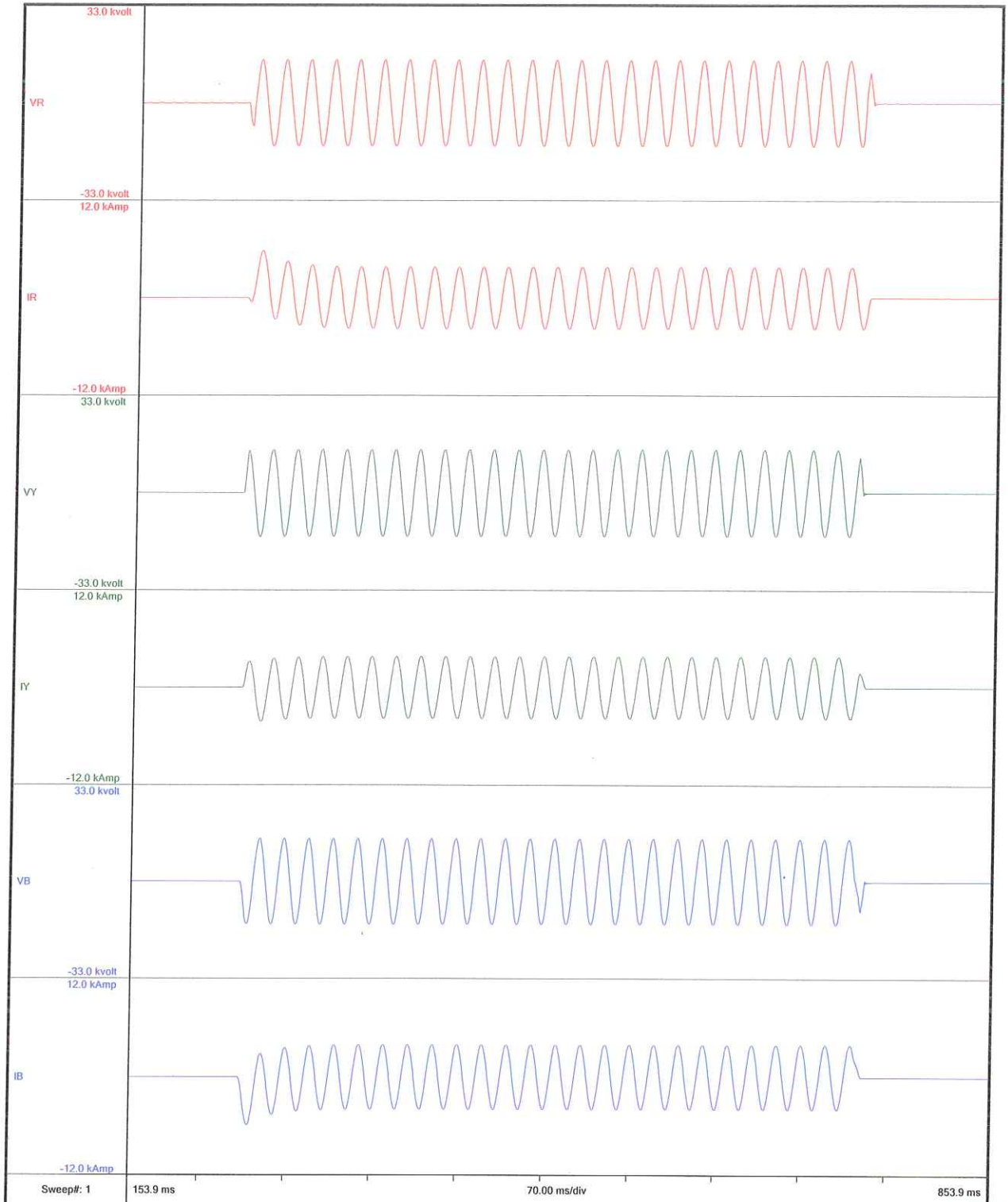
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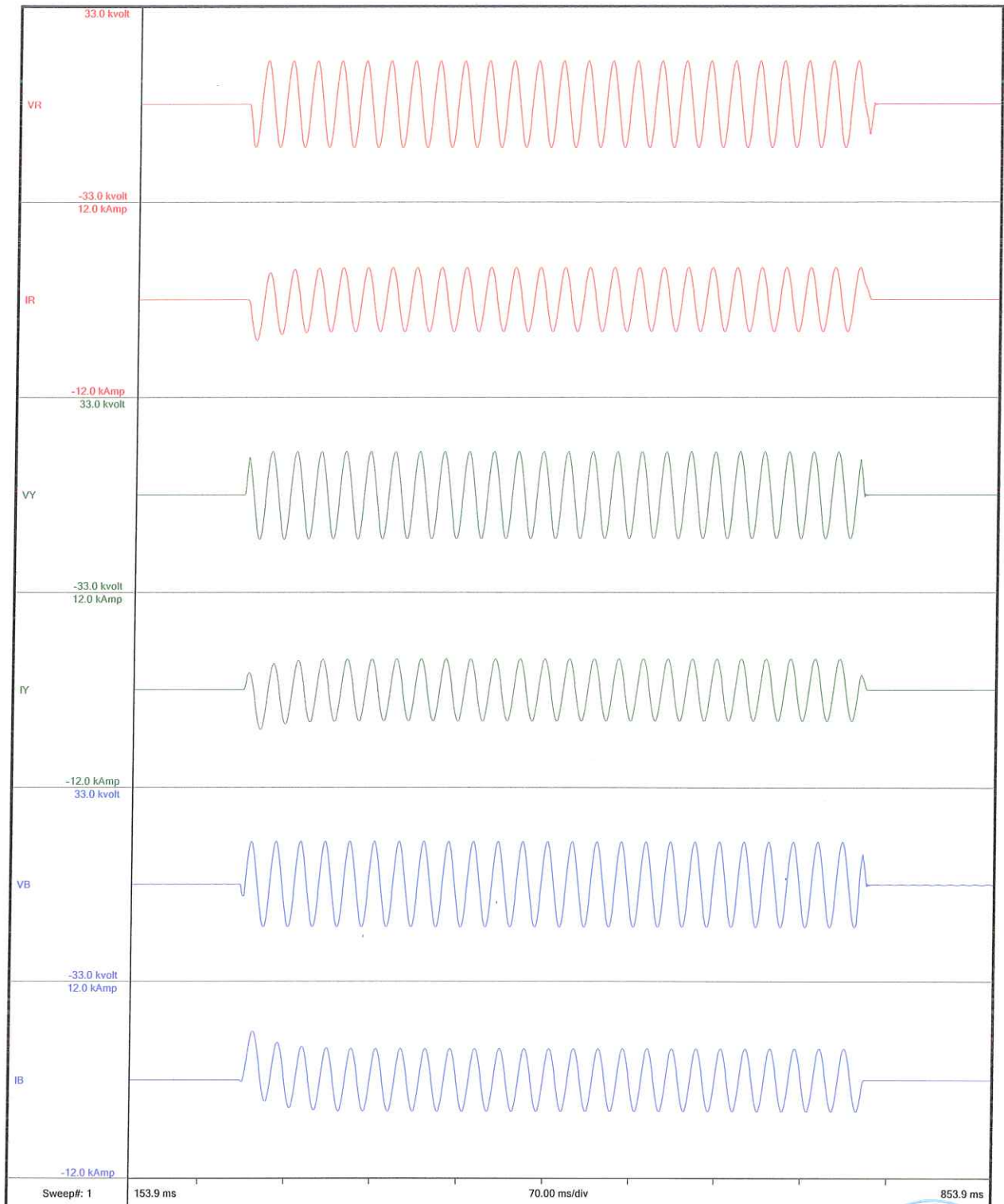
E-mail : erda@erda.org

Web : http://www.erda.org



REPORT NO.: RP-1718-047684

DATE: 27.12.2017



OSCILLOGRAM NO. : 1389/09



TC 2405328



Certificate No. : TC-5389

ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

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ERDA Road, Makarpura Industrial Estate, Vadodara-390 010, India.

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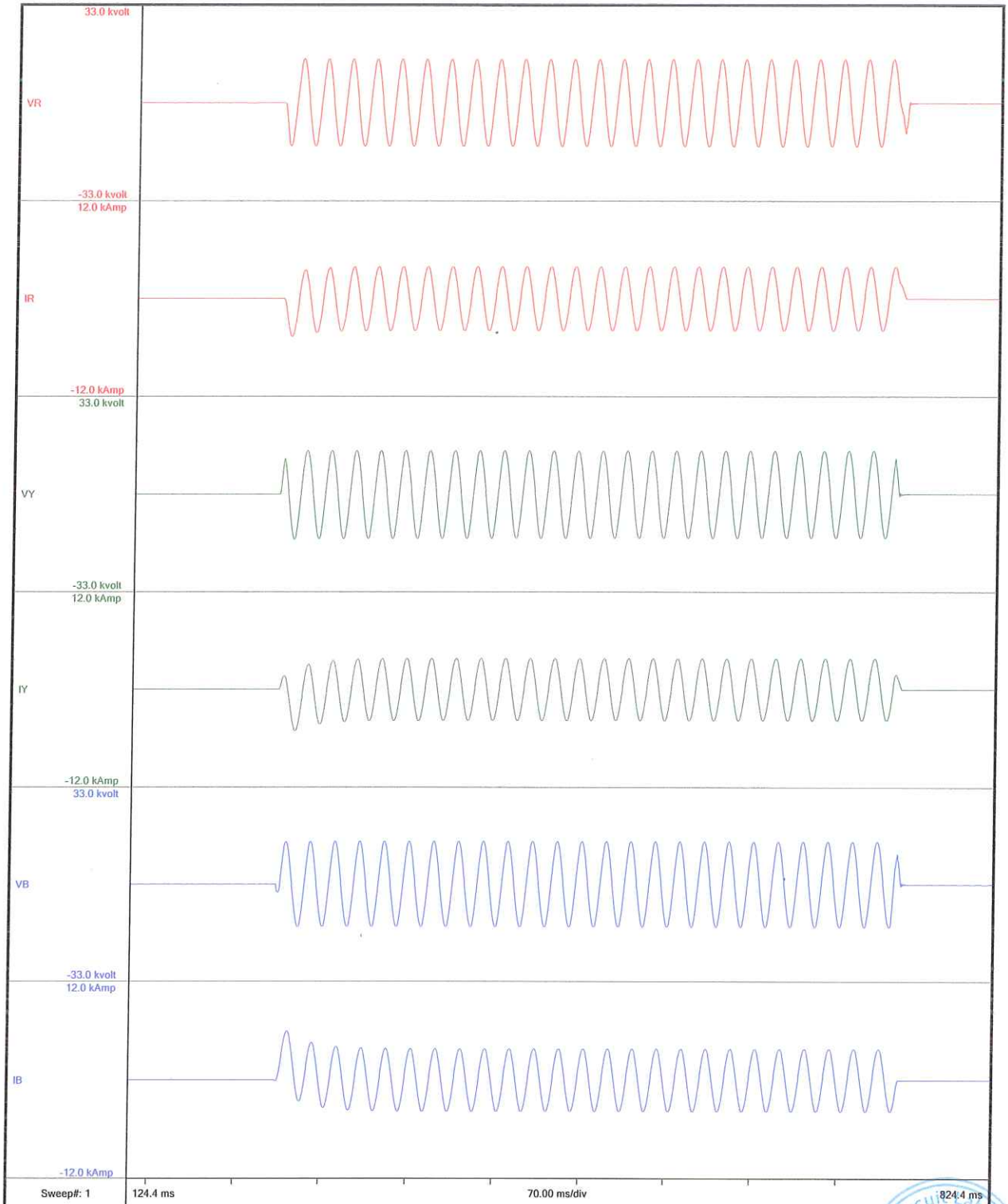
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OSCILLOGRAM NO. : 1389/10



TC 2405327



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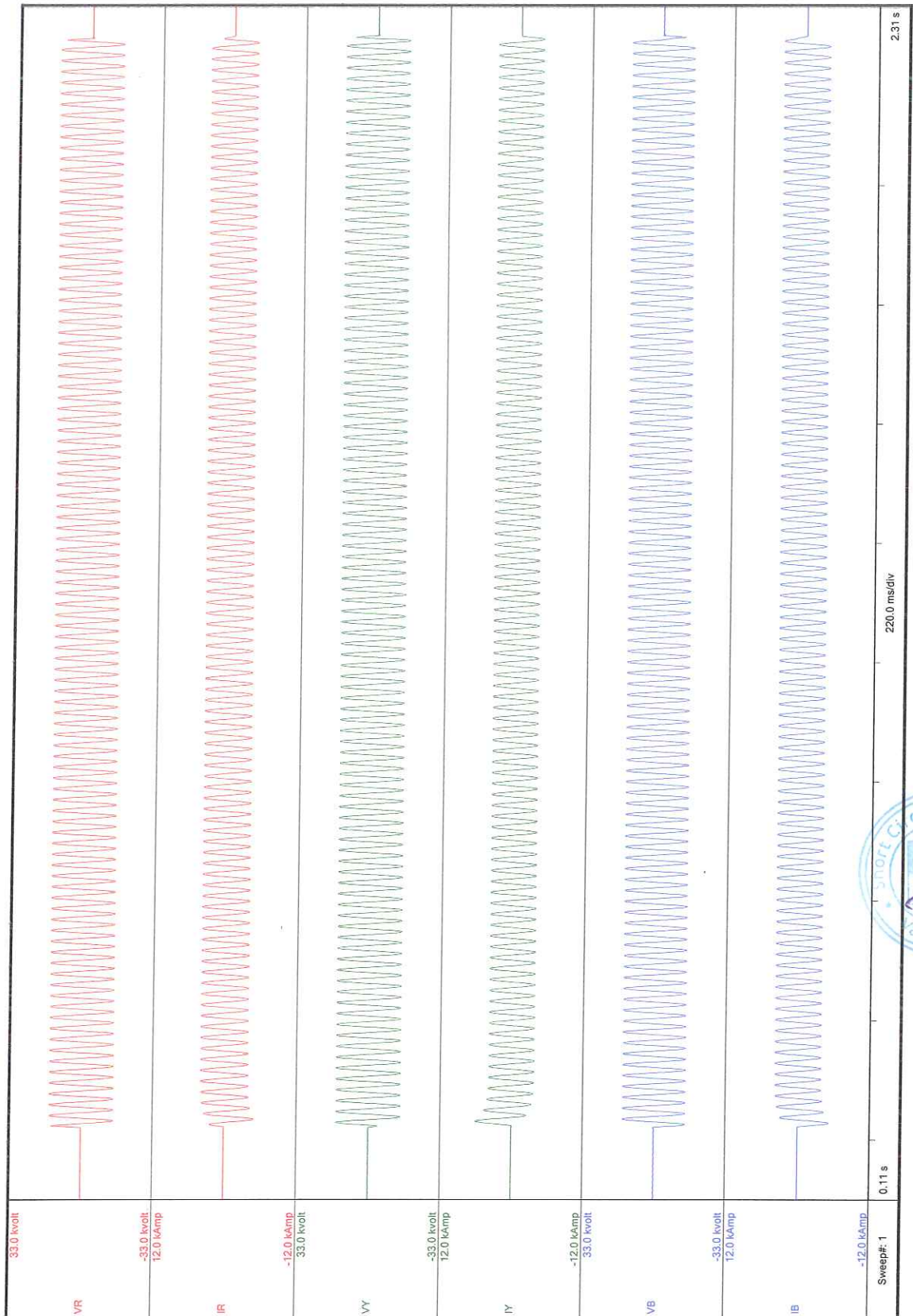
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REPORT NO.: RP-1718-047684

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OSCILLOGRAM NO.:1389/11

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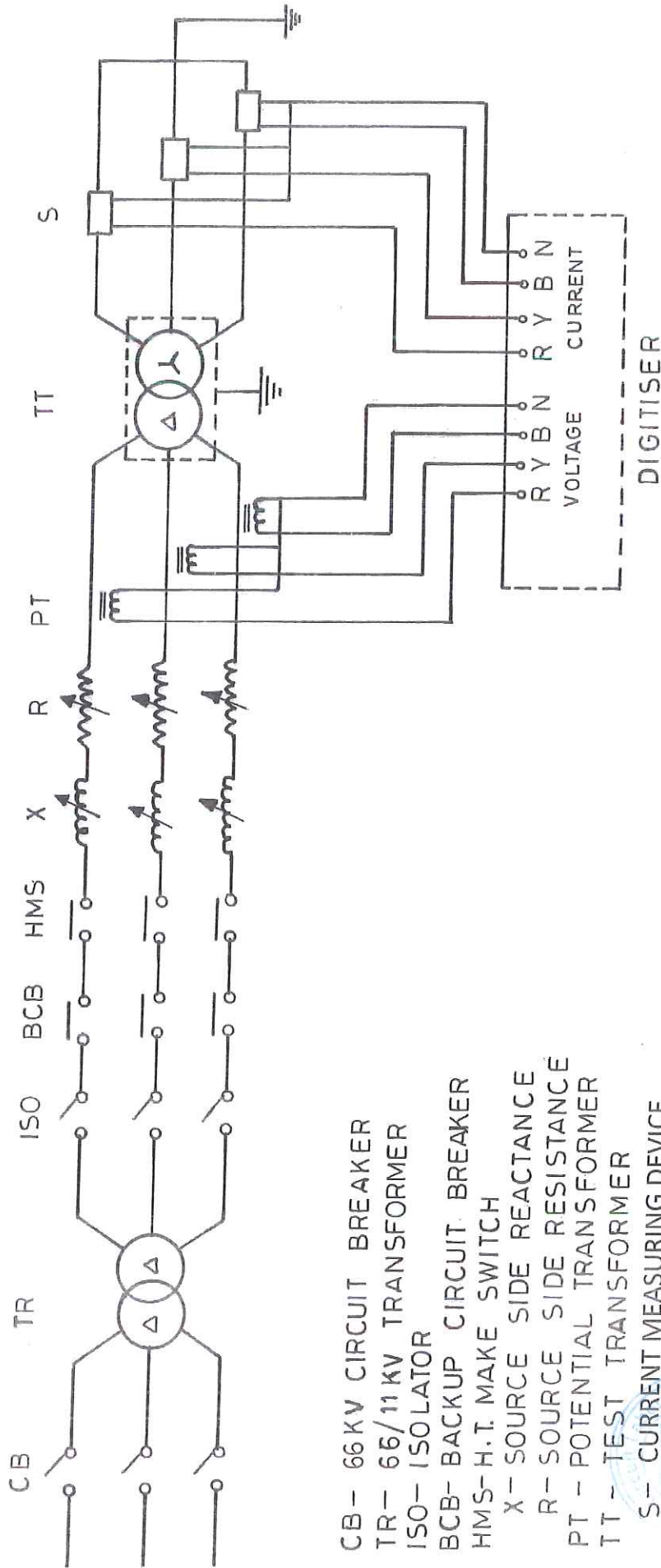
DATE: 27.12.2017



DISTRIBUTION TRANSFORMER			
RAJASTHAN POWERGEN TRANSFORMER PVT. LTD.		IS 1180	
Karela-Bhimtal Road, Karela, Sanchari-343 041		PART 1	
Dist : Rajasthan INDIA		CML-8400010105	
PHASE TRANSFORMER		ENERGY EFFICIENCY LEVEL	
STANDARD IS-1180(PART-1)/2014		3	
KVA	100	MAX. TOTAL LOSSES	
VOLTS AT NO LOAD	HV 11000 LV 433	AT 50% LOAD W	435
BIL	HV LI-5AC28 LV LI-1AC3	MAX. TOTAL LOSSES	
AMPERES	HV 5.25 LV 133.34	AT 100% LOAD W	1500
FREQUENCY	Hz 50	TYPE OF COOLING	ONAN
VECTOR GROUP REF	Dyn11	TEMP RISE	OIL 35 °C WDG 40 °C
IMPEDANCE VOLT %	4.5	MASS OF OIL	Kg 195
TAPPING	NA	TOTAL MASS	Kg 835
CUSTOMER		VOLUME OF OIL LTRS	238
ORDER NO.		MONTH & YEAR OF MFG.	2017
		SERIAL NO	PTA 1718/047684
MADE IN INDIA			



TC 2415701



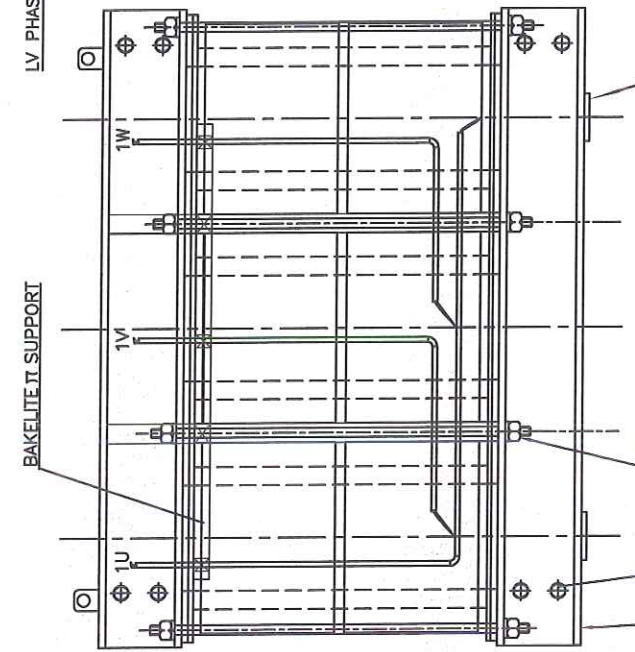
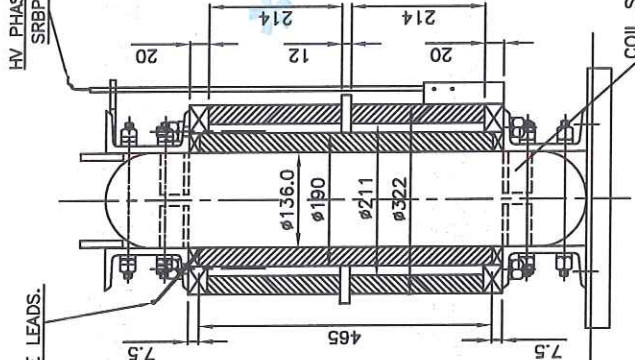
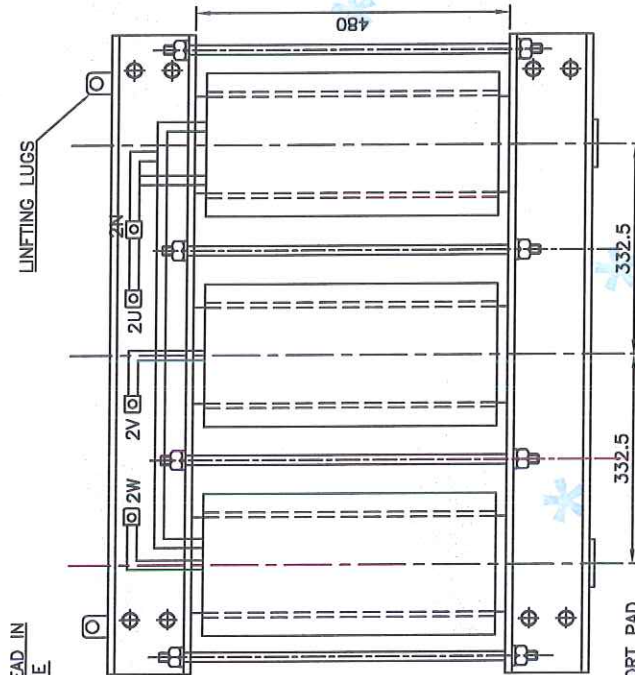
CB - 66 KV CIRCUIT BREAKER
 TR - 66/11 KV TRANSFORMER
 ISO - ISOLATOR
 BCB - BACKUP CIRCUIT BREAKER
 HMS - H.T. MAKE SWITCH
 X - SOURCE SIDE REACTANCE
 R - SOURCE SIDE RESISTANCE
 PT - POTENTIAL TRANSFORMER
 TT - TEST TRANSFORMER
 S - CURRENT MEASURING DEVICE

ELECTRICAL RESEARCH AND
DEVELOPMENT ASSOCIATION

SCHEMATIC CIRCUIT DIAGRAM

DRN. BY	CKD.	DATE	DRG. NO.
S.B.S.	M.B.M	27-1-98	OLSC/DTC/01

REPORT NO.: RP-1718-049684
 DATE: 27.12.17



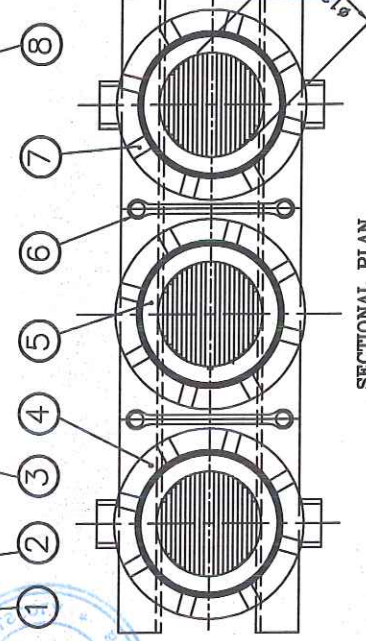
SECTIONAL SIDE VIEW

DELTA CONNECTION

STAR CONNECTION

ITEM No.	DESCRIPTIONS	QTY.
8.	BOTTOM FOOT PLATE (50X6)MM	2
7.	P. B. DOVETAIL SPACERS.	8
6.	P. B. SEPERATORS	2
5.	LV COIL/LIMB 1 No.	3
4.	H.V. COIL / LIMB 2 Nos.	6
3.	M.S.TIE ROD (12Ø mm)	8
2.	M. S. CORE BOLT (12Ø mm)	8
1.	M.S. CORE CHANNEL 100X50	4

Test Report No. *RP-1718-049684*
 Date *27/12/19*
 Product *100KVA DT*
 Verified by *[Signature]*
 Verification of this drawing by ERDA is limited to relevant dimensional checks only. Verified dimensions are marked with *✓*



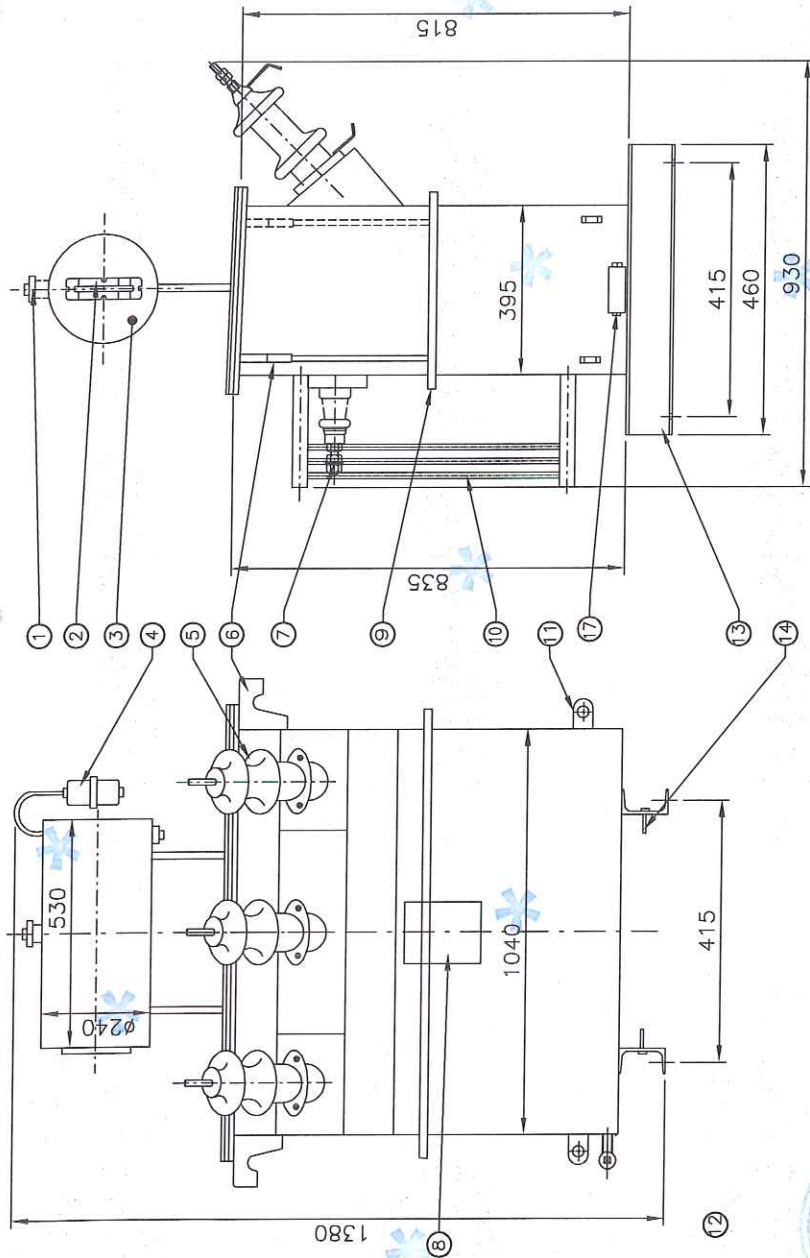
SECTIONAL PLAN

TITLE:— INTERNAL DRAWING OF 100KVA,11/0.433KV ALUMINIUM WOUND ENERGY EFFICIENCY LEVEL-3 TRANSFORMER

CUSTOMER	---
T.S.No.	RPTPL/17-18/100KVA/001
SCALE	N T S
DRG. No.	RPTPL/100KVA/001

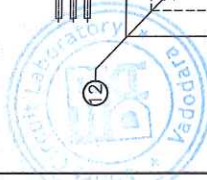
NOTES:—

- ALL DIMENSIONS ARE IN MM .
- LV CONDUCTOR SIZE : (13.2X4.1) mm X3Nos. DPC ALUMINIUM STRIP
- HV CONDUCTOR SIZE : 2.60 mm DIA. DPC ALUMINIUM WIRE
- TOLERANCES IN OVERALL DIMENSION & WEIGHT ARE +/- 10%



NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCES ON OVERALL DIMENSION & WEIGHT ARE $\pm 10\%$



Test Report No. **DP-17/15-042684**
 Date: **29.12.17**
 Product: **100KVA/001**
 Verified by: **[Signature]**
 Verification of this drawing by ERDA is limited to relevant dimensional checks only. Verified dimensions are marked with star.

WEIGHT CHART	
1. CORE & WINDING	475 Kgs.
2. TANK & FITTING	165 Kgs.
3. WEIGHT OF OIL	195 Kgs.
4. TOTAL WEIGHT	835 Kgs.
5. VOLUME OF OIL	238 Ltrs.

MIN ELECTRICAL CLEARANCE IN AIR		SHEET THICKNESS	
PH. TO PH.	PH. TO EARTH	SIDE	3.15mm
HV	255	TOP	5.0mm
LV	75	BOTTOM	5.0mm

S.No.	DESCRIPTION	QTY.
17.	DRAIN CUM SAMPLING VALVE	1
16.	TANK COVER LIFTING LUGS	2
15.	AIR RELEASE PLUG	1
14.	EARTHING TERMINALS	2
13.	UNDER BASE CHANNELS (75mm x 40 mm)	2
12.	THERMOMETER POCKET	1
11.	PULLING LUGS 8 mm THICK	4
10.	RADIATOR (500 C/C x 226) 3 FINS	2
9.	STIFFENER	1
8.	NAME RATING & DIAGRAM PLATE	1
7.	L.V. BUSHING	4
6.	TRANSFORMER LIFTING LUGS 8 mm THICK	2
5.	H.V. BUSHING	3
4.	SILICAGEL BREATHER 500 gm.	1
3.	OIL CONSERVATOR WITH DRAIN PLUG	1
2.	PLAIN OIL LEVEL INDICATORS PLAIN	1
1.	OIL FILLING HOLE WITH CAP	1

RAJASTHAN POWERGEN TRANSFORMER PVT. LTD
KAROLA BHINMAL ROAD, KAROLA, SANCHORE
RAJASTHAN - 343041

Title:- **OUTLINE GENERAL ARRANGEMENT DRAWING OF 100KVA,11/0.433KV ENERGY EFFICIENCY LEVEL-3 TRANSFORMER**

CUSTOMER	
T.S. No.	RPTPL/17-18/100KVA/001
SCALE	N T S
DWG. No.	RPTPL/100KVA/002

105
95

DISTRIBUTION TRANSFORMER

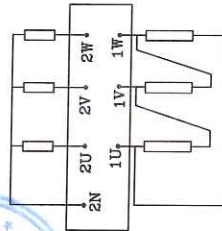
RAJASTHAN POWERGEN TRANSFORMER PVT. LTD
KAROLA-BHINMAL ROAD, KAROLA, SANCHORE
RAJASTHAN (INDIA)



IS:1180(Part 1)
CM/L-84000030105

3	PHASE TRANSFORMER	ENERGY LEVEL	3
STANDARD IS:1180(PART-1)/2014		MAX. TOTAL LOSS W	435
KVA	100	MAX. TOTAL LOSS W	1500
VOLTS AT	HV 11000	TYPE OF COOLING	ONAN
NO LOAD	LV 433	TEMP. RISE	35° C
BIL	HV 1105/AC28	WDG.	40° C
AMPERES	LV 11-AC3	MASS OF OIL(KG)	195
FREQUENCY HZ	50	TOTAL MASS (KG)	835
VECTOR GROUP	Dyn11	VOLUME OF OIL LTRS	238
IMPEDANCE VOLT %	4.5	MONTH & YEAR OF MFG	2017
TAPPING	NA	S.N.O.	RPTPL/100KVA/2017-19/001
CUSTOMER			
ORDER NO.			

MADE IN INDIA

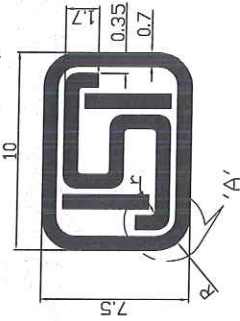


3.0

MADE IN INDIA

Test Report No. RR1716042689
Date 29.12.19
Product 100KVA
Verified by [Signature]
Verification of this drawing by ERDA is limited to relevant dimensional checks only. Verified dimensions are marked with **

IS:1180(Part 1)



DETAIL - 'A'

CM/L-84000030105

RAJASTHAN POWERGEN TRANSFORMER PVT. LTD
KAROLA-BHINMAL ROAD, KAROLA, SANCHORE
RAJASTHAN - 343041

TITLE: - NAME PLATE DRAWING OF 100KVA, 11/0.433KV ALUMINIUM WOUND ENERGY EFFICIENCY LEVEL-3 TRANSFORMER

CUSTOMER	---
T.S.No.	RPTPL/17-18/100KVA/001
SCALE	N T S
DRG. No.	RPTPL/100KVA/003