3. TRANSFORMADOR DE MEDIDA DE 220KV

Kawara Trade S.A.

TRANSFORMADOR DE CORRIENTE

Kawara Trade S.A.

AUTORIZACIÓN DEL FABRICANTE

Kawara Trade S.A.

FORMULARIO N° 2

AUTORIZACIÓN DEL FABRICANTE, REPRESENTANTE O DISTRIBUIDOR

Fecha: 30 de agosto de 2022

ID No.: 414153

A: Administración Nacional de Electricidad (ANDE)
POR CUANTO

Nosotros **Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd.**, como fabricantes oficiales de **Transformadores de Medida**, con fábricas ubicadas en **No.5, West Huimin Road, Economic Development Zone, Rugao, Jiangsu,226572,China,** mediante el presente instrumento autorizamos a **KAWARA TRADE S.A.** con **dirección en Plaza Cagancha Nro. 1145 Piso 6, Montevideo – Uruguay** a presentar una oferta con el propósito de suministrar los siguientes bienes de fabricación nuestra, **Transformadores de Medida**, y a posteriormente firmar el contrato.

Cuando existan servicios conexos como parte del contrato, reconocemos que **KAWARA TRADE S.A.** cuenta con la capacidad para llevarlos a cabo.

Asimismo, confirmamos haber el leído las Condiciones Contractuales y expresamos nuestra conformidad con lo allí establecido en materia de avales, garantías, plazos y cualquier otro aspecto.

Por este medio extendemos nuestro aval y plena garantía, conforme a las bases y condiciones, respecto a los bienes ofrecidos por la firma antes mencionada.

Firma:

Nombre: **WENBIN NING**

Cargo: **Responsable Legal de Sieyuan en Paraguay**

Debidamente autorizado para firmar esta Autorización en nombre de: **KAWARA TRADE S.A.**

Fechado en el día 25 de agosto de 2022.

Kawara Trade S.A.

EXPERIENCIAS

Kawara Trade S.A.

elecnor

ORDEN DE PROCEDER

A: SIEYUAN ELECTRIC CO. , LTD.
DE: ELECNOR CHILE S.A.

FECHA: viernes 28 de junio de 2019.

ASUNTO: ORDEN DE PROCEDER SECCIONADORES, TRAFOS DE POTENCIAL, TRAFOS DE MEDIDA PARA LOS PROYECTOS DE GUARDIAMARINA, G1, G3.

Estimados señores,

Tenemos el agrado de comunicar a ustedes que hemos adjudicado a su empresa el suministro de Seccionadores, Transformadores de Potencial, Transformadores de Corriente para los proyectos de Guardiamarina, G1, G3.

Alcance:

Incluye de manera enunciativa más no limitativa las siguientes actividades descritas en su oferta Comercial --- 2018-00087963 智利CNE Decreto418 DAP 20190626 de fecha 26 de junio del 2019: Desarrollo de Ingeniería, pruebas en fabrica, suministro de equipos, repuestos y supervisión de montaje para los proyectos Guardiamarina, G1 y G3, todo de acuerdo con cumplimiento de las especificaciones técnica y hojas de datos que aplican a los proyectos; Guardiamarina, G1, G3.

Plazo:

El plazo de entrega del suministro será DAP en cada una de las Subestaciones de acuerdo a programa acordado entre Elecnor Chile S.A. y SIEYUAN ELECTRIC CO., LTD., salvo el suministro de las Subestaciones; Guardiamarina, Hualqui y La Pólvora, que deberá ser entregado en cada subestación mencionada, en mayo de 2020.

Precio y estados de pago:

El precio acordado por el suministro de: Seccionadores, Transformadores de Potencial y Corriente entrega DAP en cada una de las SS.EE. que son parte de este Contrato es

El pago de los servicios se efectuará al cumplimiento de hitos en su oferta Oferta Comercial --- 2018-00087963 智利CNE Decreto418 DAP 20190626 de fecha 26 de junio del 2019, solamente cumplido lo anterior podrá presentar la factura.

Kawara Trade S.A

elecnor

ORDEN DE PROCEDER

Orden de Proceder.

La orden tiene el carácter de orden de proceder con los trabajos detallados en el alcance y tiene vigencia a partir de esta Fecha. Esta Orden será complementada por un contrato que está en proceso de elaboración y que será definido por ambas partes con un plazo de firma para este contrato de 20 días hábiles a contar de esta fecha. Este contrato prevalecerá por sobre todos los otros documentos presentados.

Esta orden de proceder su validez queda condicionada a la aceptación de **SIEYUAN ELECTRIC CO., LTD.** como proveedor del cliente final, asociado a cada proyecto mencionado en esta Orden de Proceder.

Solicitamos a ustedes devolvernos una copia firmada de la presente carta, en señal de conformidad con lo establecida en esta.

Agradeciendo a **SIEYUAN ELECTRIC CO., LTD.**, su disposición para presentar oferta y negociar sus valores, saludan atentamente a ustedes,

CARLOS SANCHEZ

SIEYUAN ELECTRIC CO., LTD.

Elecnor Chile S.A.

Kawara Trade S.A

elecnor chile	D.E. 418/2017 OBRAS NUEVAS ZONALES GRUPO 3 LISTADO DE EQUIPOS EQUIPOS 220 kV y 66 kV EC-80.19-SE-G3-GE-L1-010	Mataquito transmisora de energía

ELECNOR S.A.

Decreto Exento 418/2017
Obras Nuevas Zonales Grupo 3.

Descripción:

LISTADO
EQUIPOS PRIMARIOS 220 kV y 66 kV

Documento N°:

EC-80.19-SE-G3-GE-LI-010

Revisión N°	A
Fecha	06.06.2019

REVISIONES DEL DOCUMENTO

Nº REVISIÓN	FECHA	MOTIVO DE LA REVISIÓN
A	06.06.2019	

VALIDACIONES DEL DOCUMENTO

EMITIDO POR: INGENIERO DE DISEÑO	REVISADO POR: RESPONSABLE DE AREA
ELECNOR CHILE S.A.	ELECNOR CHILE S.A.
APROBADO POR: JEFE DE PROYECTO	TOMA DE CONOCIMIENTO: FIRMA: FECHA:
ELECNOR CHILE S.A.	MATE

Kawara Trade S.A

NUEVA MATAQUITO	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	8
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	0
Transformadores de corriente	
245 kV	63
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	0
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	3
TRANSFORMADOR DE CORRIENTE ACOPLADOR DE BARRAS 72,5 kV	3

Kawara Trade S.A

NUEVA NIRIVILO	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	8
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	0
Transformadores de corriente	
245 kV	63
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 72,5 kV	0
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	3
TRANSFORMADOR DE CORRIENTE ACOPLADOR DE BARRAS 72,5 kV	3

Kawara Trade S.A

NUEVA DICHATO	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	14
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6
Transformadores de corriente	
245 kV	63
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	3

Kawara Trade S.A

NUEVA HUALQUI	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	14
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6
Transformadores de corriente	
245 kV	63
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	3
TRANSFORMADOR DE CORRIENTE ACOPLADOR DE BARRAS 72,5 kV	3

Kawara Trade S.A

NUEVA CAUQUENES	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	20
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	12
Transformadores de corriente	
245 kV	63
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	12
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	3
TRANSFORMADOR DE CORRIENTE ACOPLADOR DE BARRAS 72,5 kV	3

Kawara Trade S.A

AMPLIACIÓN CAUQUENES		
Seccionadores		
245 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV		
123 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV		
72,5 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2	Montaje Vertical
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	2	Montaje Horizontal
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV		
13,8 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV		
Transformadores de Potencial		
245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv		
123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV		
72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6	
Transformadores de corriente		
245 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV		
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV		
123 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV		
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV		
72,5 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV		

Kawara Trade S.A

AMPLIACIÓN CHIGUAYANTE		
Seccionadores		
245 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV		
123 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV		
72,5 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2	Montaje Vertical
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	2	Montaje Horizontal
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV		
13,8 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV		
Transformadores de Potencial		
245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv		
123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV		
72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6	
Transformadores de corriente		
245 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV		
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV		
123 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV		
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV		
72,5 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV		

Kawara Trade S.A

AMPLIACIÓN ITAHUE	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	0
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

Kawara Trade S.A

AMPLIACIÓN PARRAL	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	2
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

Kawara Trade S.A

AMPLIACIÓN TOMÉ		
Seccionadores		
245 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV		
123 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV		
72,5 kV		
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2	Montaje Vertical
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	2	Montaje Vertical
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV		
13,8 kV		
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV		
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV		
Transformadores de Potencial		
245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv		
123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV		
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV		
72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV		
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6	
Transformadores de corriente		
245 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV		
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV		
123 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV		
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV		
72,5 kV		
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV		
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV		

Kawara Trade S.A

elecnor chile

Mataquito transmisora de energía

TOTAL G3			
Seccionadores	**Cantidades**		
245 kV		**Repuestos**	**105**
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	20		20
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	85		85
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	0		0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 245 kV	0		0
123 kV			**0**
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	0		0
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	0		0
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	0		0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	0		0
72,5 kV			**103**
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	16		16
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	72		72
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	0		0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	15		15
13,8 kV			
DESCONECTADOR TRIPOLAR S.C.P.a T. 13,8 kV	0		0
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	0		0
Transformadores de Potencial			
245 kV			**128**
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	30	1	31
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	20	1	21
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	75	1	76
123 kV			**0**
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	0		0
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	0		0
72,5 kV			**80**
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	30	1	31
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	48	1	49
Transformadores de corriente			
245 kV			**318**
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 245 kV	60	1	61
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	15	1	16
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	240	1	241
123 kV			
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 123 kV	0		0
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	0		0
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	0		0
72,5 kV			**96**
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 72,5 kV	48	1	49
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE TRANSFORMADOR 220/66/13,8 kV	15		15
TRANSFORMADOR DE CORRIENTE, TRANSFERENCIA DE BARRAS 72,5 kV	15	1	16
TRANSFORMADOR DE CORRIENTE ACOPLADOR DE BARRAS 72,5 kV	15	1	16

Kawara Trade S.A

ELECNOR S.A.

Decreto Exento 418/2017
Obras Nuevas Zonales Grupo 1.

Descripción:

LISTADO
EQUIPOS PRIMARIOS 220 kV, 110 kV y 66 kV

Documento N°:

EC-80.17-SE-G1-GE-L1-010

Revisión N°	A
Fecha	06.06.2019

REVISIONES DEL DOCUMENTO

Nº REVISIÓN	FECHA	MOTIVO DE LA REVISIÓN
A	06.06.2019	

VALIDACIONES DEL DOCUMENTO

EMITIDO POR: INGENIERO DE DISEÑO	REVISADO POR: RESPONSABLE DE AREA
ELECNOR CHILE S.A.	ELECNOR CHILE S.A.
APROBADO POR: JEFE DE PROYECTO	TOMA DE CONOCIMIENTO: FIRMA: FECHA:
ELECNOR CHILE S.A.	CASTE

Kawara Trade S.A

NUEVA CASABLANCA	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	7
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	0
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	0
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	14
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	7
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3
13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	16
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 kV	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 72,5 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 72,5 kV	6
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, ACOPLADOR DE BARRAS 72,5 kV	3
TRANSFORMADOR DE CORRIENTE TRANSFERENCIA SECCIONADOR DE BARRAS 72,5 kV	3

Seis (6) para montaje vertical y diez (10) para montaje horizontal

Kawara Trade S.A

NUEVA LA PÓLVORA	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	4
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	17
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	7
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	8
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	32
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	7
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	3
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	16
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	4
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	15
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	6
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	24
72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 72,5 kV	
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 245 kV	12
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	48
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 123 kV	24
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3
TRANSFORMADOR DE CORRIENTE DE ACOPLE BARRAS 123 kV	3
TRANSFORMADOR DE CORRIENTE DE TRANSFERENCIA 123 kV	3
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LINEA 72,5 kV	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

Seis (6) para montaje vertical y diez (10) para montaje horizontal

Kawara Trade S.A

AMPLIACIÓN CASABLANCA	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	2
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 Kv	
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	6
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	6
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

Kawara Trade S.A

AMPLIACIÓN AGUA SANTA	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	2
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	6
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	0
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 kV	6
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 72,5 kV	
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	0
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	6
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

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AMPLIACIÓN ALTO MELIPILLA	
Seccionadores	
245 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	
123 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	
72,5 kV	
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	
13,8 kV	
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	
Transformadores de Potencial	
245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	0
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 kV	6
123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	
72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 72,5 kV	
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 72,5 kV	
Transformadores de corriente	
245 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	
123 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 123 kV	
72,5 kV	
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	
TRANSFORMADOR DE CORRIENTE, ACOPLADOR Y SECCIONADOR DE BARRAS 72,5 kV	

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elecnor chile

Casablanca
transmisora de energía

TOTAL G1			
Seccionadores	**Cantidades**		
245 kV	CANT.	Repuestos	**64**
DESCONECTADOR TRIPOLAR C.C.P.a T. 245 kV	10		10
DESCONECTADOR TRIPOLAR S.C.P.a T. 245 kV	40		40
DESCONECTADOR MONOPOLAR S.C.P.a T. 245 kV	14		14
123 kV			**50**
DESCONECTADOR TRIPOLAR C.C.P.a T. 123 kV	8		8
DESCONECTADOR TRIPOLAR S.C.P.a T. 123 kV	32		32
DESCONECTADOR MONOPOLAR S.C.P.a T. 123 kV	7		7
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 123 kV	3		3
72,5 kV			**30**
DESCONECTADOR TRIPOLAR C.C.P.a T. 72,5 kV	4		4
DESCONECTADOR TRIPOLAR S.C.P.a T. 72,5 kV	16		16
DESCONECTADOR MONOPOLAR S.C.P.a T. 72,5 kV	7		7
DESCONECTADOR MONOPOLAR S.C.P.a T. TIPO PANTOGRAFO 72,5 kV	3		3
13,8 kV			**32**
DESCONECTADOR MONOPOLAR S.C.P.a T. 13,8 kV	32		32
Transformadores de Potencial			
245 kV			**65**
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 245 kV	12	1	13
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 245 kV	8	1	9
TRANSFORMADOR DE POTENCIAL CAPACITIVO, DIAGONALES 245 kV	42	1	43
123 kV			**32**
TRANSFORMADOR DE POTENCIAL CAPACITIVO, BARRAS 123 kV	6	1	7
TRANSFORMADOR DE POTENCIAL CAPACITIVO, SALIDAS DE LÍNEA 123 kV	24	1	25
72,5 kV			**20**
TRANSFORMADOR DE POTENCIAL INDUCTIVO, BARRAS 72,5 kV	6	1	7
TRANSFORMADOR DE POTENCIAL INDUCTIVO, SALIDAS DE LÍNEA 72,5 kV	12	1	13
Transformadores de corriente			
245 kV			**135**
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 245 kV	24	1	25
TRANSFORMADOR DE CORRIENTE 245 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	6	1	7
TRANSFORMADOR DE CORRIENTE, BARRAS 245 kV	102	1	103
123 kV			**36**
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 123 kV	24	1	25
TRANSFORMADOR DE CORRIENTE 123 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3	1	4
TRANSFORMADOR DE CORRIENTE DE ACOPLE BARRAS 123 kV	3	1	4
TRANSFORMADOR DE CORRIENTE DE TRANSFERENCIA 123 kV	3		3
72,5 kV			**24**
TRANSFORMADOR DE CORRIENTE, SALIDA DE LÍNEA 72,5 kV	12	1	13
TRANSFORMADOR DE CORRIENTE 72,5 kV, SALIDA DE AUTOTRANSFORMADOR 220/110/13,8 kV	3	1	4
TRANSFORMADOR DE CORRIENTE, ACOPLADOR DE BARRAS 72,5 kV	3	1	4
TRANSFORMADOR DE CORRIENTE TRANSFERENCIA SECCIONADOR DE BARRAS 72,5 kV	3		3

Kawara Trade S.A

Sieyuan 思源电气股份有限公司
SIEYUAN ELECTRIC CO., LTD.
TEL: 86-21-61610909
FAX: 86-21-61610900
Web:www.syec.com.cn
中国上海市闵行区华宁路 3399 号 No.3399, Hua'ning Rd, Minhang Dist., Shanghai, 201108 P.R.C

关系证明

Certification

江苏思源赫兹互感器有限公司是致力于发展和制造各种电流，电压互感器的高新技术企业

Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd is a high& new-tech enterprise which is engaged in production of various high-voltage current and voltage transformer.

江苏思源赫兹互感器有限公司是思源电气的全资子公司，由思源电气股份有限公司全权管理其对于海外项目的投标和签约执行。

Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd is the wholly owned subsidiary of Sieyuan Electric Co., Ltd which is fully in charge of bidding, contracting and execution of its oversea projects.

Sieyuan Electric Co., Ltd.
思源电气股份有限公司
Legal Representative:
法人代表: 董增平

Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd
江苏思源赫兹互感器有限公司
Legal Representative:
法人代表: 陆却林
Kawara Trade S.A

NO.	Client Name	Client Name	Project Name	Project Name	Product	Model	Qty	Voltage Level	Signing Date	Dilivery Date	Country	Country	区域	Region	合同编号
8	ELECNOR CHILE S.A	ELECNOR CHILE S.A	ChileELECNOR Decreto 418 GStation Package1Package3 66kV/220kV AISProject-Grupo 3(export items)	智利ELECNOR Decreto418 G站包1包3 66kV/220kV AIS项目-Grupo 3（出口项目）	CT	LVB-220	318	220kV	28/06/2019	31/05/2020	Chile	智利	南美	South America	H2019-00080639-8004-192078-00
9	ELECNOR CHILE S.A	ELECNOR CHILE S.A	ChileELECNOR Decreto 418 GStation Package1Package3 66kV/220kV AISProject-Grupo 1(export items)	智利ELECNOR Decreto418 G站包1包3 66kV/220kV AIS项目-Grupo 1（出口项目）	CT	LVB-220	135	220kV	28/06/2019	31/05/2020	Chile	智利	南美	South America	H2019-00080639-8004-192079-00

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EXPERIENCIA EN 10 AÑOS

Kawara Trade S.A.

国家电网公司集中规模招标采购

220kV 蚌埠涂山变扩建蒋南间隔工程
（220kV/倒立/油浸式/电流互感器）

供　货　合　同

买方：安徽省电力公司物资公司

买方指定收货单位：蚌埠供电公司

卖方：江苏思源赫兹互感器有限公司

Kawara Trade S.A

合　同

合同编号：A1J2(蚌埠涂山变)2010-02-003

签字日期：2010-3-9

签字地点：合肥

安徽省电力公司物资公司（以下简称买方）作为一方，江苏思源赫兹互感器有限公司（以下简称卖方）为另一方，就220KV蚌埠涂山变扩建蒋南间隔工程，双方经友好协商于上述日期和地点达成协议如下：

合同条件

1.1 在此合同中按照说明解释下列术语：

a) “收货单位”指的是买方指定的、代表买方接收货物的单位。买方在此授权收货单位可以代表买方行使货物数量和外观以及质量验收、签发收货清单、提出质量异议、索赔请求或敦促卖方履行合同中有关义务的权利。

b)下列文件是本合同不可分割的一部分，与本合同具有同等法律效力。下列文件间有矛盾时，以生效者在后者为准。下列文件与协议正文有矛盾时，以协议正文为准

招标文件

a) 投标文件

b) 中标通知书

c) 合同附件一　供货范围及分项报价表

d) 合同附件二　履约保证金保函

e) 合同附件三　技术协议

f) 合同附件四　法定代表人授权书

f) 合同附件五　采购订单

g) 合同附件六　验收清单

供货产品及数量

详见“附件一 供货范围及分项报价表”。

合同价格和付款方式

本合同的合同总金额为人民币大写：壹拾柒万肆仟元，其构成详见本合同附件一

...vara Trade S.A

供货范围及分项报价表。

付款方式：电汇、汇票或支票。

合同价款支付比例：

见合同条款专用部分和合同条款通用部分 第 5.3 条。

交货时间和地点

本合同项下所供货物交货时间和地点详见“附件一 供货范围及分项报价表”。

收货单位

收货单位：蚌埠供电公司

联系人：顾猛

电话：13905520999

传真：

地址：

邮政编码：

合同结算单位

结算单位：安徽省电力公司物资公司

开票信息：发票抬头为安徽省电力公司物流服务中心

地址：合肥市芜湖路 415 号

邮编：230061

开户银行：工行稻香楼支行

帐号：1302010109022158540

税号：34011168083426X

Kawara Trade S.A

合同生效及其它

本合同由买卖双方法定代表人或其授权代表签字并加盖公章后生效。本合同正本 5 份，买方执 4 份，卖方执 1 份；副本_份（各执_____份）。

合同双方签字

	买方	卖方
单位名称：	安徽省电力公司物资公司	江苏思源赫兹互感器有限公司
法定代表人/授权代表签字：		
公章：		
地址：	芜湖路 415 号	如皋市经济开发区惠民西路 5 号
邮编：	230061	226572
联系人：	华梅珍	纪春
电话：	0551-3604413	0513-87515939
传真：	0551-3604413	0513-87514904

Kawara Trade S.A

第五章　合同附件

合同附件一

供货范围及分项报价表

订单编号：

买方确认（章）：　　CANTIDAD　　**卖方确认（章）：**

TTCC 220kV

序号	名称（规格、型号）	单价	数量	分项价	交货期	交货地点
1	**220kV/倒立/油浸式/电流互感器**	[redacted]	6	[redacted]	2010年6月10日 FECHA DE ENTREGA 2010-06	蚌埠涂山变
	ESPECIFICACION DEL EQUIPO					
总计				[redacted]		

备注：

1、本合同价格是卖方设备/材料运至买方指定的交货地点的价格。

2、全部设备/材料及附件的运输由卖方负责运至买方指定的交货地点。设备/材料及附件从出厂至交货地点期间的全部质量及安全责任由卖方负责。

3、图纸交付计划详见技术协议。

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合同附件二

履约保证金保函（格式）

开具日期：_____

致：_____买方_____

_____号合同履约保证金

本保函作为贵方与_____（以下简称卖方）于_____年____月____日就_____ 项目（以下简称项目）项下提供_____设备（以下简称设备）签订的_____号合同的履约保证金。

_____银行（以下简称银行）无条件地、不可撤销地具结保证本行、其继承人和受让人无追索地向贵方以_____（货币名称）支付总额不超过_____（货币数量），即相当于合同价格的 10%。并以此约定如下：

a. 卖方未能忠实地履行所有合同文件的规定和双方此后一致同意的修改、补充和变动，包括更换和/或修补贵方认为有缺陷的设备（以下简称“违约”），无论卖方有任何反对，本行将凭贵方关于卖方违约说明的书面通知，立即按贵方提出的累计金额不超过上述总额的款项和按贵方通知规定的方式付给贵方。

b. 本保函项下的任何支付应为免税和净值，对于现有或将来的税收、关税、收费、费用扣减或预提税款，不论这些款项是何种性质和由谁征收，都不应从本保函项下的支付中扣除。

c. 本保函的条款构成本行无条件的、不可撤消的直接责任。对即将履行的合同条款的任何变更、贵方在时间上的宽限、或由贵方采取的如果没有本款可能免除本行责任的任何其它行为，均不能解除或免除本行在本保函项下的责任。

d. 本保函在本合同规定的质量保证期期满后 30 天前完全有效。

谨启

出证行名称：_____

签　　字：（印刷姓名和职务）

公　　章：

Kawara Trade S.A

Licitación centralizada de State Grid

Ampliación de la subestación de 220KV de Bengbu Tushan Proyecto de intervalo de Jiangnan

(Transformador de corriente de 220KV/invertido/inmerso en aceite)

Contrato de suministro

Comprador: Anhui Electric Power Company Materials Company

Destinatario designado por el comprador: Bengbu Power Supply Company

Vendedor:Jiangsu Sieyuan Hertz Instrument Transformer Co.,Ltd.

Kawara Trade S.A

Anexo de Contrato

Anexo 1

Alcance de suministro y Lista de oferta detallada

No. De OC:

Reconocimiento del comprador (sello): Confirmación del vendedor (sello):

No.	Nombre(Especificación, Tipo)	Cantidad	Fecha de entrega	Lugar de entrega
1	Transformador de corriente de 220KV/invertido/inmerso en aceite	6	Fines de Junio de 2010	Estación de Bengbu Tushan

Nota:

1. **El precio del contrato es el precio de la entrega de los equipos/materiales del Vendedor en el lugar de entrega especificado por el Comprador.**
2. **El vendedor es responsable del transporte de todos los equipos, materiales y accesorios hasta el lugar de entrega especificado por el comprador. Toda la responsabilidad por la calidad y seguridad de los equipos/materiales y accesorios desde la fábrica hasta el lugar de entrega es responsabilidad del vendedor.**
3. **Consulte el Acuerdo Técnico para conocer los detalles del calendario de entrega de dibujos**

Kawara Trade S.A

NO.	Client Name	Project Name	Product	Qty	Voltage Level	Signing Date	Dilivery Date	Country	Region
1	Dongfang Electric Corporation	Vietnam Coast Defense Power Plant First Phase 2*300MW Thermal Power Generation Project	CT	36	220kV	09/11/2006	20/02/2007	Vietnam	Asia
5	Dongfang Electric Corporation	Vietnam Coast Defense Power Plant Second Phase 2*300MW Thermal Power Generation Project	CT	12	220kV	01/02/2007	30/04/2007	Vietnam	Asia
7	National Power Company	Philippine National Power Company	CT	12	220kV	08/10/2008	15/11/2008	Philippines	Asia
8	National Power Company	Philippine National Power Company	CT	3	220kV	21/10/2008	25/11/2008	Philippines	Asia
9	Shanghai Electric Power T&D Group	Sri Lanka PUTTALAM Coast Defense Power Plant First Phase 1*300MW Thermal Power Generation Project	CT	21	220kV	10/01/2009	18/05/2009	Sri Lanka	Asia
10	Shanghai Electric Power T&D Group	Sri Lanka PUTTALAM Coast Defense Power Plant First Phase 1*300MW Thermal Power Generation Project	CT	6	220kV	30/09/2009	15/11/2009	Sri Lanka	Asia
11	Shanghai Chenling Import and Export Trading Co., Ltd.	Export to the Philippines	CT	4	220kV	18/11/2009	05/01/2010	Philippines	Asia
13	Quartz Mechanical & Electrical Coproration	Vitenam 220kV Hadong Substation	CT	3	220kV	12/03/2010	10/05/2010	Vietnam	Asia
14	Shenyang, Northeast China Power Transmission Equipment Import & Export Co., Ltd.	Laos Hin Heup Substation	CT	18	220kV	17/05/2010	15/07/2010	Laos	Asia
15	Shenyang, Northeast China Power Transmission Equipment Import & Export Co., Ltd.	Laos Naxay thong Substation	CT	15	220kV	17/05/2010	15/07/2010	Laos	Asia
16	CHINA NATIONAL TECHNICAL IMP.&EXP. CORP.	Indonesia SUMATERA BARAT 2 × 112MW coal-fired power plant project(Export Project)	CT	24	220kV	21/05/2010	20/12/2010	Indonesia	Asia
18	CHINT Electrics Co., Ltd	Congo (DRC) Hituru copper mine 220kV power transmission and Distribution Engineering	CT	9	220kV	18/10/2010	19/12/2010	Congo(DRC)	Africa
21	China National Electric Engineering Co., Ltd	Philippines Mexico Substatio Substation	CT	15	220kV	19/04/2011	27/05/2011	Philippines	Asia
22	China National Electric Engineering Co., Ltd	Philippines Mexico Substatio Substation	CT	6	220kV	19/04/2011	10/06/2011	Philippines	Asia
23	China National Huachen Energy Group	Supply 150 kV Switchyard HV Equipment for PLTG Talang Duku, Palembang Indonesia	CT	11	220kV	26/05/2011	31/07/2011	Indonesia	Asia
25	Power Construction Corporation of China Ltd	Proyecto Jaguar 2*150MW Planta de energía Guatemala	CT	12	220kV	04/07/2011	25/06/2011	Guatemala	Central America
30	China HUADIAN Engineering Co.,Ltd	Cambodia Sihanouk 2×60MW (gross) Power Plant	CT	15	220kV	10/10/2011	20/03/2012	Cambodia	Asia
32	China HUADIAN Engineering Co.,Ltd	Cambodia Sihanouk 2×60MW (gross) Power Plant	CT	15	220kV	10/10/2011	20/03/2012	Cambodia	Asia
33	CHINA CAMC ENGINEERING CO.,LTD	Kenya Power Distribution Systen Modernization and Strengthening Project(Lot 1) Malindi Substation	CT	9	220kV	31/12/2011	05/04/2012	Kenya	Africa
35	CHINA CAMC ENGINEERING CO.,LTD	Kenya Power Distribution Systen Modernization and Strengthening Project(Lot 1) Garsen Substation	CT	12	220kV	31/12/2011	05/04/2012	Kenya	Africa
37	CHINA CAMC ENGINEERING CO.,LTD	Kenya Power Distribution Systen Modernization and Strengthening Project(Lot 1) Lamu Substation	CT	3	220kV	31/12/2011	05/04/2012	Kenya	Africa

Kawara Trade S.A

FORMULARIO Nº 13

Formulario de Experiencia y Capacidad en Suministros

Fecha: 20 de Agosto de 2022

[El siguiente formulario deberá ser completado por cada material o equipo indicado del apartado 8 de SUMINISTROS – Requisitos de Participación y Criterios de Calificación.]

Equipo/suministro: TRANSFORMADOR DE CORRIENTE TIPO LVB-220

Nombre del fabricante y país de procedencia: Sieyuan Electric Co. Ltd., China

N°	**Requisito**	**Documento de acreditación** *[especificar tipo de documento y fecha de emisión]*	**Emisor** *[especificar empresa o institución]*	**Folio de su oferta** *[indicar ubicación del documento en su oferta]*
1	Acreditar como mínimo *diez (10)* años la experiencia en la fabricación de bienes similares a los ofertados	CONTRATO COMERCIAL 2010-03-09	. Anhui Province Electric Power Materials Company Company	AIS\OFERTA TECNICA\TTCC\4. ANTECEDENTES\RESPALDO DE ANTECEDENTES DE 10 AÑOS\220 KV\TRANSFORMADOR DE CORRIENTE TIPO LVB-220, CONTRATO COMERCIAL 2, PAGINA 12

N°	**Requisito**	**Documento de acreditación** *[especificar tipo de documento y fecha de emisión]*	**Emisor** *[especificar empresa o institución]*	**Cantidad certificada**	**Plazo y fecha de entrega**	**Folio de su oferta** *[indicar ubicación del documento en su oferta]*
2	Acreditar haber fabricado bienes de similares características a los requeridos en el llamado, según descripción y las cantidades mínimas totales indicados en las columnas (b) y (c) de los cuadros indicados en el numeral 8. (para cada uno de los lotes 1, 2 y 3)	CONTRATO COMERCIAL 2019-06-28	ELECNOR CHILE S.A	453	2020-05-31	AIS\OFERTA TECNICA\TTCC\4. ANTECEDENTES, CONTRATO H2019-00080639.

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N°	Requisito	**Documento de acreditación** *[especificar tipo de documento y fecha de emisión]*	**Emisor** *[especificar empresa o institución]*	**Cantidad certificada**	**Plazo y fecha de entrega**	**Folio de su oferta** *[indicar ubicación del documento en su oferta]*
3	De las cantidades totales mínimas requeridas en el punto 2 anterior, por lo menos el cuarenta por ciento (40%) deberá corresponder a suministros realizados para clientes en América y la Unión Europea.	IGUAL QUE FORMULARIO PLANILLA NO.2	IGUAL QUE FORMULARIO PLANILLA NO.2	. IGUAL QUE FORMULARIO PLANILLA NO.2	IGUAL QUE FORMULARIO PLANILLA NO.2	IGUAL QUE FORMULARIO PLANILLA NO.2

Nota: Como todos los antecedentes anteriores son de Europa y América, los contenidos de Planilla 3 será lo mismo que los de Planilla 2.

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MANUAL

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USER MANUAL
用户手册
MANUAL DE USUARIO

LVB Transportation, Installation and Maintenance Manual
LVB 运输、安装、维护使用说明书
Manual de Transporte, Instalación y Mantenimiento de LVB

M020002022

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Lifting	吊装	Levantamiento
Installation	安装	Instalación
Operation and Maintenance	投运及维护	Operación y mantenimiento
Recovery and Disposal	回收处置	Recuperación y eliminación

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Application Scope/适用范围/Alcance de aplicación

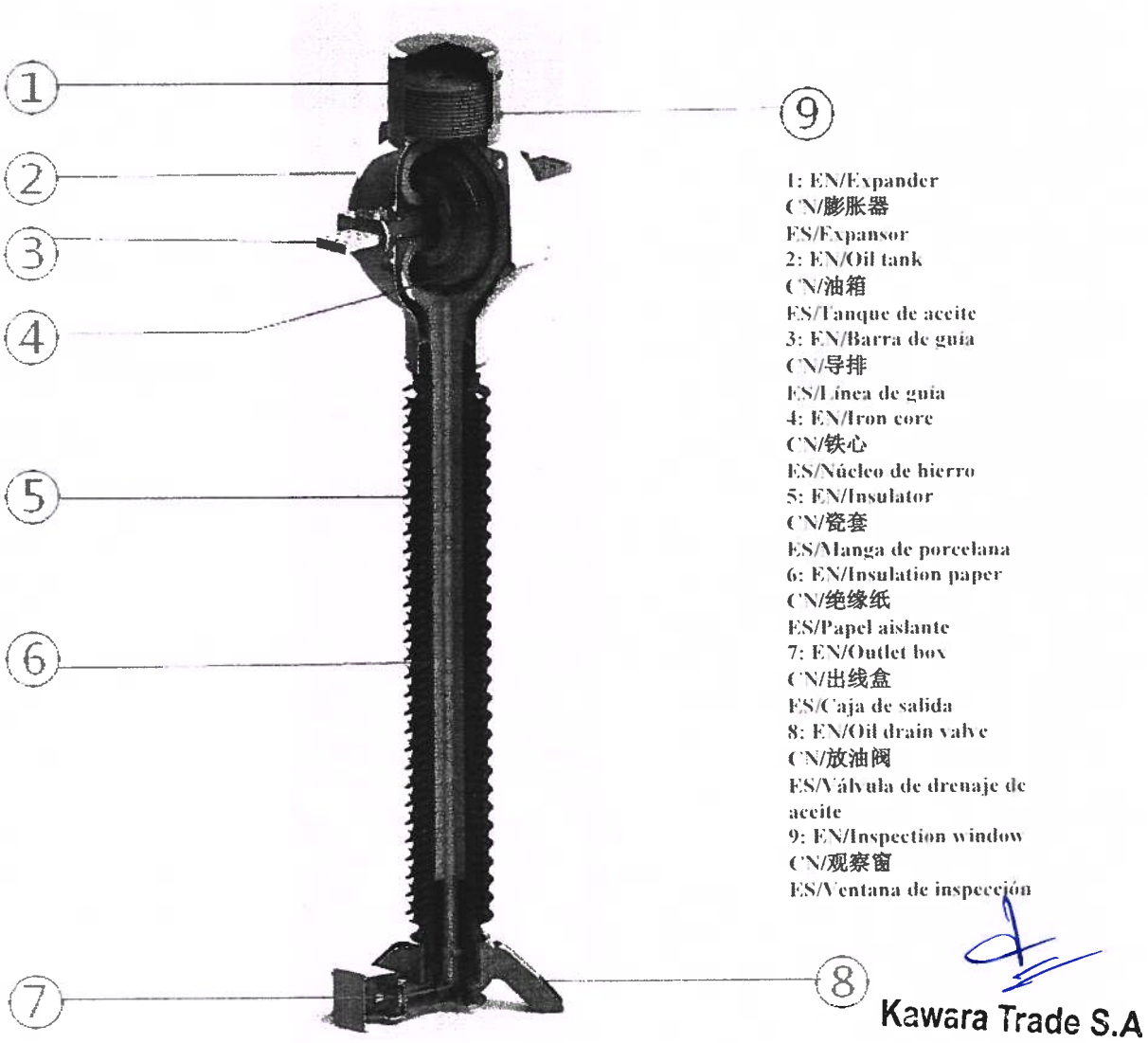
EN/ The Manual is applicable to transportation, installation, maintenance and other precautions of outdoor and oil-immersed inverted current transformer.

CN/本使用说明书适用于户外型、油浸倒立式电流互感器产品的运输、安装、维护及注意事项等要求。

ES/ El Manual es aplicable al transporte, instalación, mantenimiento y otras precauciones de transformadores de corriente invertido sumergidos en aceite para exteriores.

Product Introduction /产品说明/ Introducción de producto

EN/ Introduction to Product Structure
CN/产品结构简介
ES/ Introducción a la estructura del producto



EN/Fig. 2.1 Schematic Diagram of Product Structure

CN/图 2.1 产品结构示意图
ES/Fig. 2.1 Diagrama esquemático de la estructura del producto

Operation conditions / 工作条件 / Condiciones de operación

EN/ Environmental Conditions

Maximum temperature : 40 ℃

Daily average temperature no more than: 35℃

Minimum Temperature: -40 ℃

Monthly average maximum relative humidity: 95% (25℃)

he above temperatures are normal service temperature grades, when the service temperature on the Manual is inconsistent with the technical specification, the signed technical specification shall prevail.

CN/环境条件

最高气温：40 ℃

日平均气温不超过：35 ℃

最低温度：-40 ℃

月平均最大相对湿度：95 %（25℃）

以上温度为常规使用温度等级，当该说明书上的使用温度与技术规范不一致时，以签订的技术规范为准。

ES/ Condiciones ambientales

Temperatura máxima: 40 ° C.

Temperatura promedio diaria no más de: 35 ° C

Temperatura mínima: -40 ° C

Humedad relativa máxima promedio mensual: 95% (25 ° C)

TLas temperaturas anteriores son grados normales de temperatura de servicio, cuando la temperatura de servicio en el Manual es inconsistente con la especificación técnica, prevalecerá la especificación técnica firmada.

EN/ Altitude

The actual application altitude of the transformer is shown in the nameplate on the transformer.

When the altitude of the installation location exceeds 1000m, the insulation level of the external insulation shall be modified according to IEC 60071.

Without the permission of our company, it is not allowed to divert the transformer to other high-altitude areas (higher than the altitude on the nameplate of the transformer).

CN/海拔高度

互感器实际应用海拔详见产互感器上的铭牌。

安装处海拔超过 1000m 时，其外绝缘的绝缘水平按 IEC 60071 进行修正。

未经我公司允许，不得将互感器挪用到其他高海拔地区（超过互感器铭牌上的海拔）。

ES/ Altitud

La altitud de aplicación real del transformador se muestra en la placa de identificación del transformador.

Cuando la altitud de la ubicación de la instalación exceda los 1000 m, el nivel de aislamiento del aislamiento externo se modificará de acuerdo con IEC 60071.

Sin el permiso de nuestra compañía, no está permitido desviar el transformador a otras áreas de gran altitud (más alta que la altitud en la placa de identificación del transformador).

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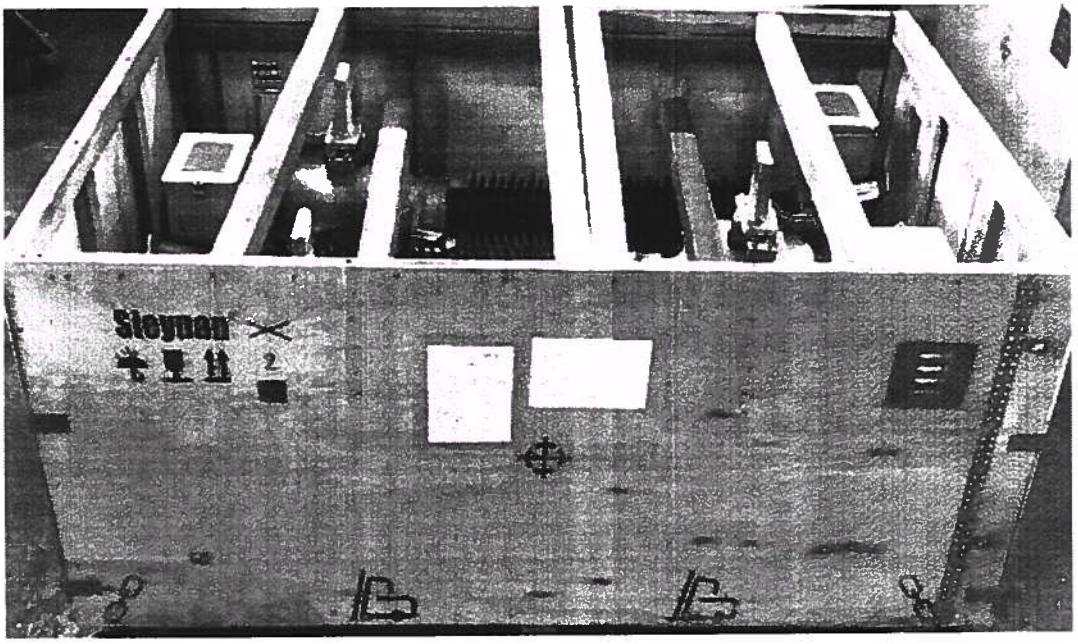
EN/ The transformer shall be transported together with the packing box during long-distance transportation. During transportation, it shall be in horizontal state, and it is not allowed to be transported without packaging or in upright way, as shown in Fig. 4.1.

CN/长距离运输时，互感器需要带有包装箱一同运输。运输过程中，需要处于卧倒水平状态，不允许不带包装或直立运输，如图 4.1 所示。

ES/ El transformador se debe transportar junto con la caja de embalaje durante el transporte a larga distancia, durante el transporte, debe estar en estado horizontal y no se puede transportar sin embalaje o en posición vertical, como se muestra en la Fig. 4.1.



EN/Fig. 4.1 Schematic Diagram of Transformer Package
CN/图 4.1 互感器包装示意图
ES/Fig. 4.1 Diagrama esquemático del embalaje del transformador

EN/Front view of the packing box:
CN/包装箱正面：
ES/Vista frontal de la caja de embalaje:

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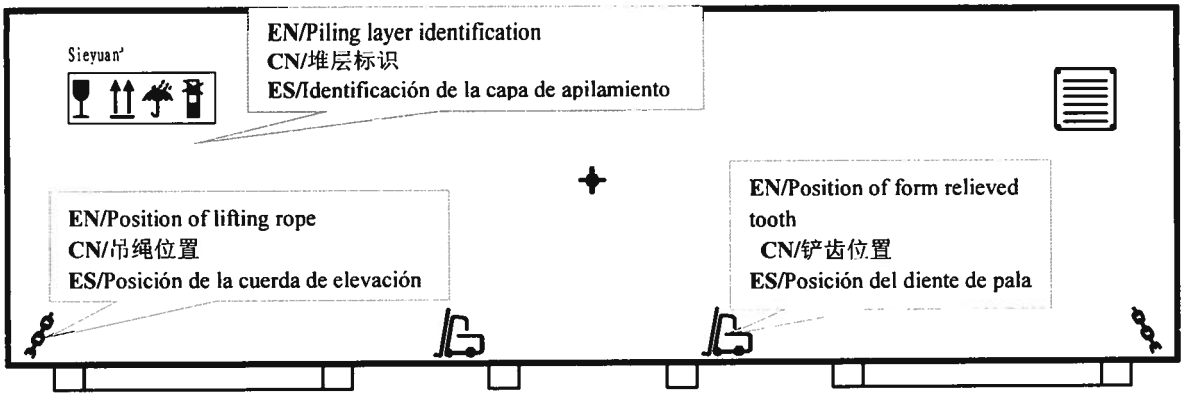
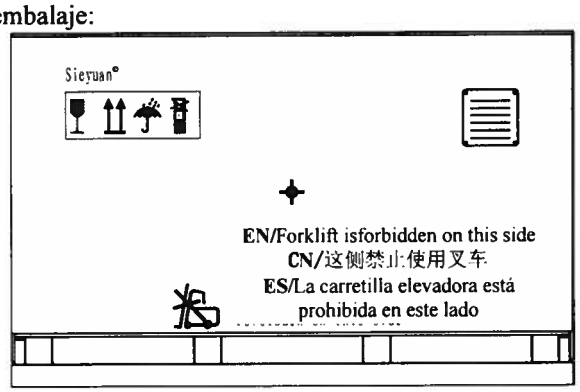


EN/Side view of packing box:
CN/包装箱侧面：
ES/Vista lateral de la caja de embalaje:



EN/Fig. 4.2 Packing Box Transportation and Shoveling Identification
CN/图 4. 2 包装箱运输、铲运标识示意图
ES/Fig. 4.2 Identificación de transporte y traspaleo de la caja de embalaje

EN/ Transportation and shoveling shall be carried out according to identifications on packing box. When hoisting the packing box, bearable weight of lifting rope should be 2 times above the weight of the packing box (including transformer). When shoveling packing box, length of form relieved tooth shall be larger than the width size at the side of packing box (see Fig. 4.2).

CN/运输和铲运时，按照包装箱上的标识运输、铲运流转。包装箱吊装时，使用的吊绳承受重量应大于包装箱（含互感器）重量 2 倍以上；包装箱铲运时，铲齿长度应大于包装箱侧面宽度尺寸（见图 4.2）。

ES/El transporte y el traspaleo se realizarán de acuerdo con las identificaciones en la caja de embalaje. Al izar la caja de embalaje, el peso soportable de la cuerda de elevación debe ser 2 veces superior al peso de la caja de embalaje (incluido el transformador). Al palear la caja de embalaje, la longitud del diente de pala debe ser mayor que el ancho del lado de la caja de embalaje (ver Fig. 4.2).

Storage /存储/ Almacenamiento

EN/ The transformer shall be packed in the original form and stored in a dry, ventilated and non-corrosive environment. It is not allowed to be stored in the open air and moisture-proof measures shall be adopted. The stacking of transformers shall not exceed the stacking marking requirements on the surface of packing box.

Before the transformer is transferred again, the

appearance of the packing box should be checked for corrosion. If the container is corroded, bitten by insects or damped due to improper storage, it should be reinforced before transportation.

CN/互感器按原有包装形式，储存在干燥通风，无腐蚀的环境中，不允许露天存放，且应做好防潮措施；互感器堆放不允许超过包装箱表面堆层标识要求。

互感器存储再次转运前，应检查包装箱外表有无腐蚀现象；若因存储不当，遭虫食或潮湿，造成包装箱腐蚀，转运前需加固。

ES/El transformador debe empacarse en su forma original y almacenarse en un ambiente seco, ventilado y no corrosivo. No está permitido almacenarlo al aire libre y se adoptarán medidas a prueba de humedad. El apilamiento de transformadores no debe exceder los requisitos de marcado de apilamiento en la superficie de la caja de embalaje.

Antes de volver a transferir el transformador, se debe verificar la corrosión en la apariencia de la caja de embalaje. Si el contenedor está corroído, mordido por insectos o humedecido debido a un almacenamiento inadecuado, debe reforzarse antes del transporte.

Receiving and Unpacking Inspection /签收及拆箱检查/ Recepción y desembalaje de inspección

EN/ (1)Before receiving the transformer, check whether the quantity of products and accessories is consistent with the order;

(2) Check the appearance of the packing box to ensure there is no damage, oil stains and other abnormalities;

(3) Before unpacking and lifting the transformer, check whether the transformer is bumped, damaged or leaking oil.

CN/(1)互感器签收前，核实产品及配件数量是否与订货一致；

(2) 检查包装箱外观是否有损坏、油渍等异常；

(3) 互感器开箱吊装前，检查互感器外观有无磕碰、损坏或漏油等异常。

ES/(1) Antes de recibir el transformador, verifique si la cantidad de productos y accesorios es consistente con el pedido;

(2) Verifique la apariencia de la caja de embalaje para asegurarse de que no haya daños, manchas de aceite y otras anormalidades;

(3) Antes de desempacar y levantar el transformador, verifique si el transformador está golpeado, dañado o tiene fugas de aceite.

Lifting /吊装/ Levantamiento

EN/ Before lifting, the bearable weight of lifting rope selected shall be two times larger than the weight of transformer (see the nameplate of transformer). During horizontal lifting, the length of the rope should be 3 times of the height of the product, and the position of the rope should be adjusted to maintain the balance of the center of gravity of the product. Moreover, the rope should be free from damages.

During lifting, the length of cable shall be noted and the center of gravity of the transformer shall be kept balanced. When the transformer is placed horizontally, wood blocks should be placed on the

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bottom of the transformer to prevent the guide bar from bumping. As shown in Fig. 7.1

When the product is lifted vertically, the joint hinge of oil storage tank at the head of the transformer should be used for lifting, and flexible lifting tools should be used. The length of the single sling should not be less than the height of the product. Please pay attention to the position of the centroid of the product when lifting. As shown in Fig. 7.2.

CN/起吊前，选择吊绳的承受重量应大于互感器重量（见互感器铭牌）的 2 倍以上；水平起吊时，吊绳长度应为产品高度的 3 倍以上，且应调整吊绳位置，保持产品重心平衡，且吊绳应无破损。

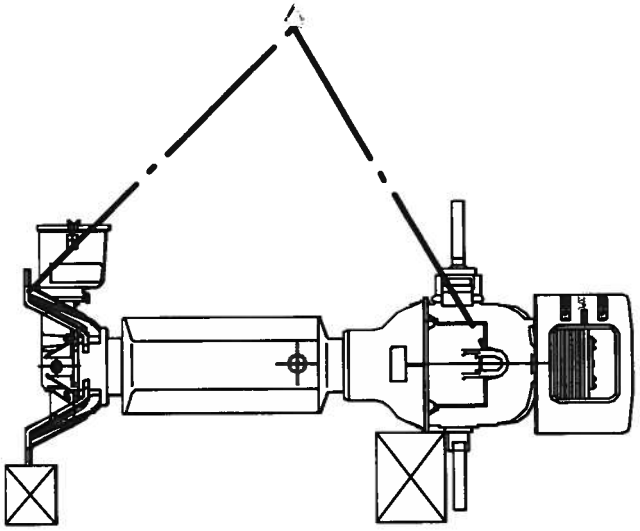
起吊时，注意绳子的长度，保持互感器重心平衡。互感器水平放置时，注意在互感器底部垫上木块，以防导排磕碰。如图 7.1 所示

产品立起垂直吊运时，利用互感器头部储油柜吊攀，使用柔性软吊具，单根吊带长度不小于产品高度，起吊时注意产品重心位置。如图 7.2 所示。

ES/ Antes de levantar, el peso soportable de la cuerda de elevación seleccionada debe ser dos veces mayor que el peso del transformador (consulte la placa de identificación del transformador). Durante la elevación horizontal, la longitud de la cuerda debe ser 3 veces la altura del producto, y la posición de la cuerda debe ajustarse para mantener el equilibrio del centro de gravedad del producto. Además, la cuerda debe estar libre de daños.

Durante la elevación, se debe observar la longitud del cable y el centro de gravedad del transformador se debe mantener equilibrado. Cuando el transformador se coloca horizontalmente, los bloques de madera se deben colocar en la parte inferior del transformador para evitar que la barra guía se golpee. Como se muestra en la Fig. 7.1

Cuando el producto se levanta verticalmente, el ojo de elevación del tanque de almacenamiento de aceite en la cabeza del transformador se debe usar para levantar, y se deben usar herramientas de elevación flexibles. La longitud de la eslinga individual no debe ser inferior a la altura del producto. Por favor, preste atención a la posición del centroide del producto al levantarlo. Como se muestra en la Fig. 7.2.



CN/图 7.1 水平吊运方式
EN/Fig. 7.1 Horizontal Lifting Mode
ES/Fig. 7.1 Modo de elevación horizontal

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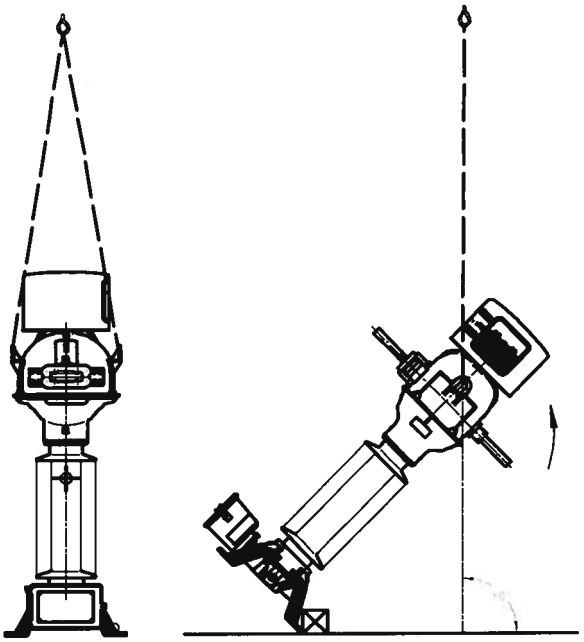

CN/图 7.2 垂直吊运方式
EN/Fig. 7.2 Vertical Lifting Mode
ES/Fig. 7.2 Modo de elevación vertical

Installation /安装/ Instalación

EN/ Before installing the transformer, the protective paper plate and transportation protective cushion block on the inner side of the outer cover of the expander shall be removed (as shown in Fig. 8.1 and 8.2);

CN/互感器安装前，应拆除膨胀器外罩内侧的防护纸版和运输防护垫块；（如图 8.1 和 8.2 所示）

ES/ Antes de instalar el transformador, la placa protectora de papel y el bloque de cojín protector de transporte en el lado interno de la cubierta externa del expansor deben retirarse (como se muestra en las Fig. 8.1 y 8.2);

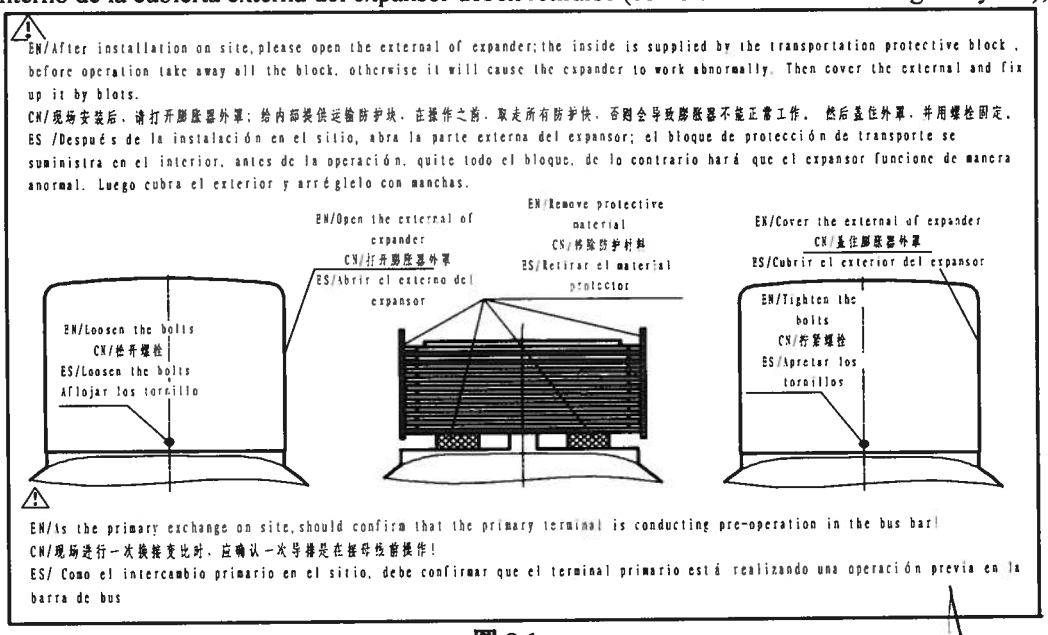

图 8.1
Fig. 8.1
Fig. 8.1

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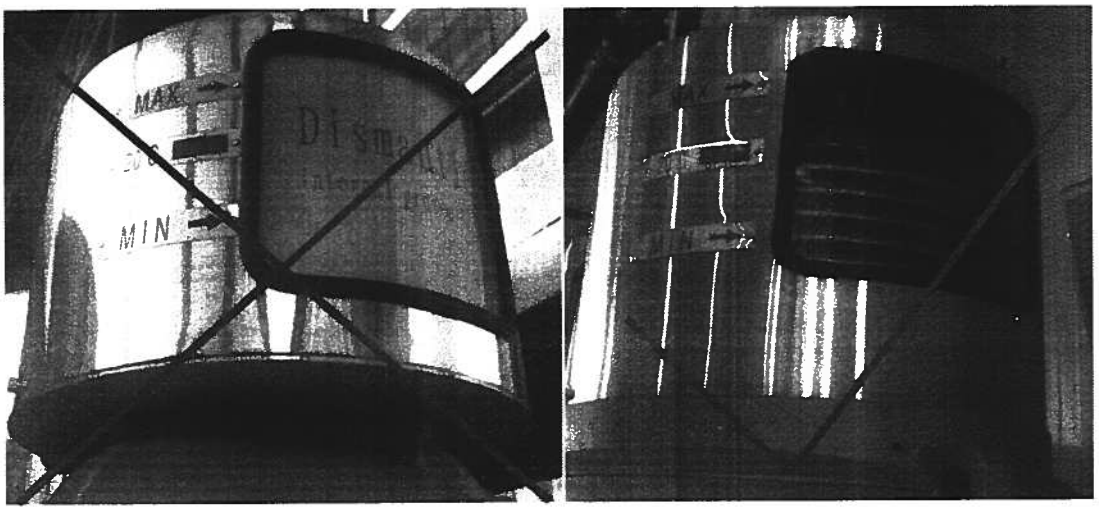


图 8. 2
Fig. 8.2
Fig. 8.2

EN/ Transformer Installation and Fixation

Adopt lifting tools with appropriate length to lift the transformer to the plane bracket. After the transformer is in place, fasten it firmly with the mounting bracket with bolts. Connect the base of the transformer to the bracket at equal potential with the grounding bar (as shown in Fig. 8.3).

After the product is installed and fixed, the lifting tool can be removed.

CN/互感器安装固定

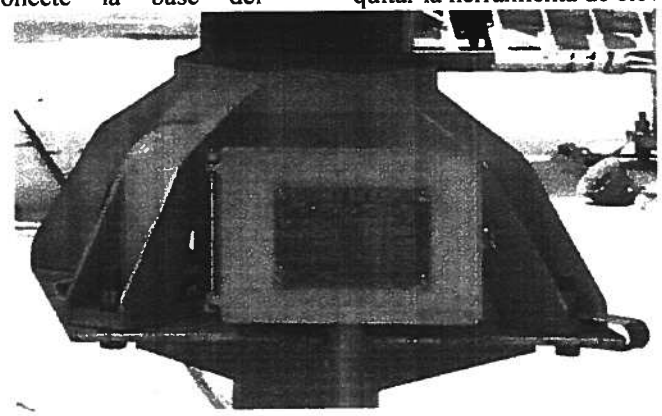
采用合适长度的吊具，将互感器吊到平面支架上，互感器就位后，用螺栓与安装支架固定牢靠，并用接地排将互感器底座与支架等电位连接（如图 8. 3 所示）。

产品安装固定后，才可拆除吊具。

ES/ Instalación y fijación de transformadores

Adopte herramientas de elevación con la longitud adecuada para elevar el transformador al soporte plano. Después de que el transformador esté en su lugar, fíjelo firmemente con el soporte de montaje con pernos. Conecte la base del transformador al soporte con el mismo potencial que la barra de conexión a tierra (como se muestra en la Fig. 8.3).

Después de instalar y fijar el producto, se puede quitar la herramienta de elevación.



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EN/Fig. 8.3 Connection between Product and Foundation
CN/图 8.3 产品与基础连接
ES/Fig. 8.3 Conexión entre Producto y Fundación

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EN/ Primary Wiring Terminal Exchange

Clean the contact surface before the connection of the primary wiring terminal, so as to ensure that there is no rust and oxidation on the contact surface; the contact surface can be coated with an appropriate amount of conductive paste. Connect the fasteners to ensure the long-term effective contact pressure.

If primary serial-parallel connection is required, the fixing mode of connection plate at P1/P2 side shall be changed according to the primary current, and the tightening torque of the connection bolt is 60N·m. Refer to the exchange indication plate on the housing of the transformer expander, and see Fig. 8.4 and 8.5.

CN/一次接线端子换接

一次端子连接前，对接触面进行清理，保证接触面无锈蚀氧化现象；接触面可涂适量导电膏。连接紧固件，保证长期有效的接触压力。

如需一次串并联换接，根据一次电流改变P1/P2侧连接板的固定方式，连接螺栓的拧紧力矩为60N·m。参照互感器膨胀器外罩上的换接说明牌，换接示意见图8.4和8.5。

ES/ Intercambio de terminales de cableado primario

Limpie la superficie de contacto antes de la conexión del terminal de cableado primario, para asegurarse de que no haya óxido ni oxidación en la superficie de contacto; La superficie de contacto puede recubrirse con una cantidad apropiada de pasta conductora. Conecte los sujetadores para garantizar una presión de contacto efectiva a largo plazo.

Si se requiere un intercambio serial-paralelo primaria, el modo de fijación de la placa de conexión en el lado P1 / P2 se cambiará de acuerdo con la corriente primaria, y el par de apriete del perno de conexión es 60N • m. Consulte la placa de indicación de intercambio en la carcasa del expansor del transformador y vea las Fig. 8.4 y 8.5.

EN/(1)Two-turn structure
CN/(1)两匝结构
ES/(1)Estructura de dos vueltas

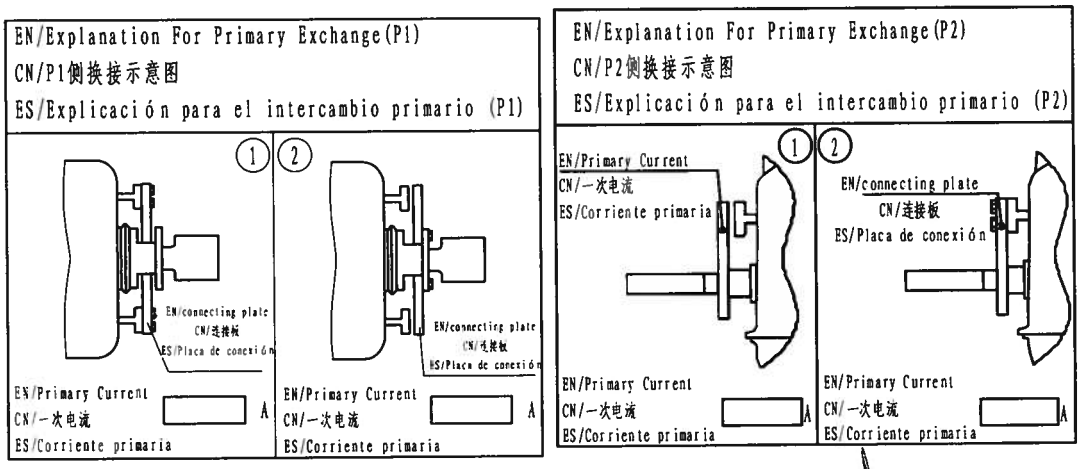

图 8.4
Fig. 8.4
Fig. 8.4

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EN/(2)Four-turn structure

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CN/(2)四匝结构

ES/(2)Estructura de cuatro vueltas

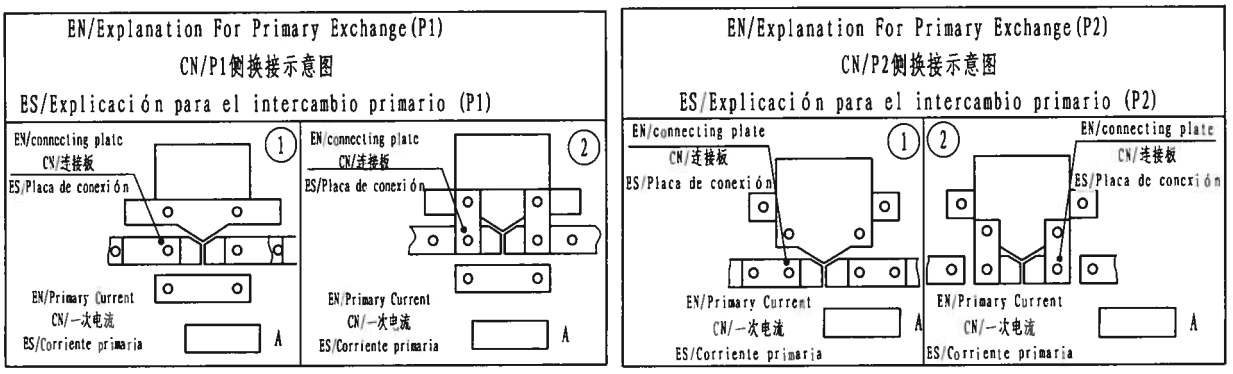

图 8.5
Fig. 8.5
Fig. 8.5

EN/ Secondary Terminal Connection

Make sure that the system is not energized, and pay attention to the free electromagnetic field caused by the nearby operating electric equipment before connecting the secondary terminal.

(1) Connect the secondary terminal according to the schematic diagram of the transformer nameplate or instruction plate, and check whether it is loose.

(2) Secondary winding is not allowed to be opened, and unused secondary terminal should be shorted. If one winding has more than transformer ratios, the terminal corresponding to the maximum transformer ratios should be shorted.

(3) Supplied secondary terminal may be different from the description in the Manual, and the real object shall prevail.

(4) Keep grounded when CT end-plane screen terminal is in normal operation.

CN/二次端子连接

在连接二次端子前，应确保系统处于未通电状态，同时注意由附近运行的电气设备所引起的游离电磁场。

(1) 按照互感器铭牌或说明牌的示意图进行二次端子的连接，检查是否松动。

(2) 二次绕组不允许开路，未用到的二次端子应短接。如一个绕组具有多个变比，应短接最大变比对应的接线端子。

(3) 实际供货产品二次端子可能与本说明书不同，以实物为准。

(4) CT 末屏端子正常运行时，保持接地。

ES/ Conexión de terminal secundaria

Asegúrese de que el sistema no esté energizado y preste atención al campo electromagnético libre causado por el equipo eléctrico en funcionamiento cercano antes de conectar el terminal secundario.

(1)Conecte el terminal secundario de acuerdo con el diagrama esquemático de la placa de identificación del transformador o la placa de instrucciones, y verifique si está flojo.

(2)No se permite abrir el devanado secundario, y el terminal secundario no utilizado debe estar en cortocircuito. Si un devanado tiene más de relaciones de transformador, el terminal correspondiente a las relaciones máximas de transformador debe estar en cortocircuito.

(3)El terminal secundario suministrado puede ser diferente de la descripción en el Manual, y prevalecerá el objeto real.

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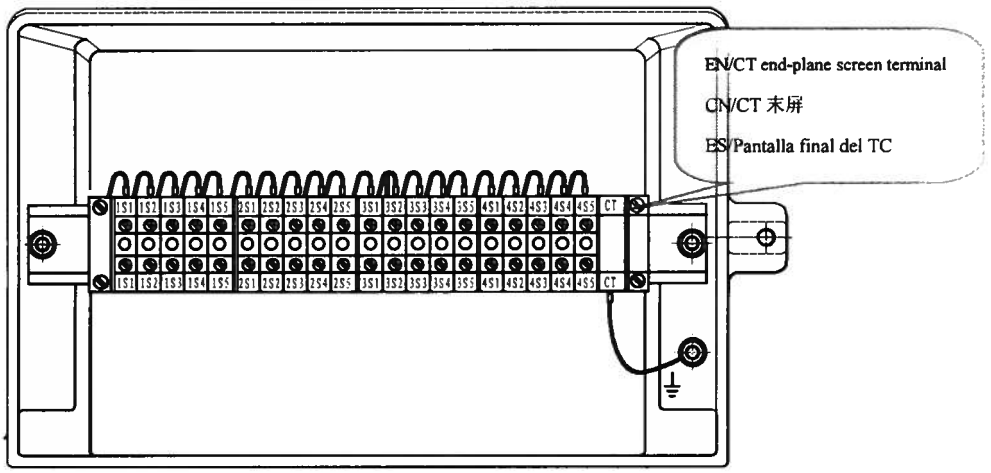
(4)Manténgase conectado a tierra cuando el terminal de pantalla final del TC esté en funcionamiento normal.



EN/Fig. 8.6 Schematic Diagram of Secondary Terminals
CN/图 8.6 二次端子示意图
ES/Fig. 8.6 Diagrama esquemático de terminales secundarias

EN/ Grounding Terminal Connection

The grounding terminal of the transformer is located under the base of the transformer and is of flat plate structure. The grounding point should be reliably connected to the ground grid of the power station. The grounding wire shall be able to withstand the system short-circuit current (on the nameplate of the transformer).

CN/接地端子连接

互感器的接地端子位于互感器底座下方，平板结构，该接地点应与电站地网可靠连接。接地线应能承受系统短路电流（互感器铭牌上）。

ES/ Conexión de terminal a tierra

El terminal de tierra del transformador está ubicado debajo de la base del transformador y es de estructura de placa plana. El punto de conexión a tierra debe estar conectado de manera confiable a la red de tierra de la estación de energía. El cable de tierra debe ser capaz de soportar la corriente de cortocircuito del sistema (en la placa de identificación del transformador).

Operation and Maintenance /投运及维护/ Operación y mantenimiento

EN/ Inspection before Operation

(1) After the transformer is installed and fixed, it should be kept stand still for at least 24h before being put into operation;

(2) Confirm the oil level of the three-phase transformer is consistent;

(3) Check whether the transformer is leaking oil;

(4) Make sure that secondary winding and CT end plane is connected reliably.

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CN/投运前检查

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(1) 互感器安装固定后，至少静置 24h 后再投运；

(2) 确认三相互感器油位高度一致；

(3) 检查互感器有无漏油异常。

(4) 确认二次绕组及 CT 末屏连接可靠。

ES/ Inspección antes de la operación

(1) Después de instalar y fijar el transformador, debe mantenerse quieto durante al menos 24 horas antes de ponerlo en funcionamiento;

(2) Confirme que el nivel de aceite del transformador trifásico sea consistente;

(3) Compruebe si el transformador tiene fugas de aceite;

(4) Asegúrese de que el devanado secundario y la pantalla final del CT estén conectados de manera confiable

---

EN/ Routine Inspection Items

CN/日常巡查项目

ES/Ítems de inspección de rutina

序号 No. No.	EN/Patrol inspectionitems CN/巡检项目 ES/Ítems de inspección	EN/Inspection content CN/巡检内容 ES/Contenido de inspección	EN/Quality criteria CN/质量标准 ES/Criterios de calidad	CN/巡查时间 EN/Inspection time ES/Tiempo de inspección
1	EN/Protector CN/保护物 ES/Protector	EN/Check whether the protector (insulating paper, foam pad) in the product expander is removed. CN /检查产品膨胀器内的保护物（绝缘纸、泡沫垫块）是否取掉。 ES/Compruebe si se ha quitado el protector (papel aislante, almohadilla de espuma) en el expansor del producto. 	EN/There is no insulating paper, foam and other protectors in the product expander, and the oil level indication can be clearly seen. CN /产品膨胀器内无绝缘纸、泡沫等保护物，能清晰看到油位指示。 ES/No hay papel aislante, espuma y otros protectores en el expansor del producto, y la indicación del nivel de aceite se puede ver claramente. 	EN/During acceptance Before operation CN/验收时投运前 ES/Durante la aceptación Antes de la operación
2	CN/油位指示器 EN/Oil level indicator ES/Indicador de nivel de aceite	EN/1.Check whether the oil level indicator height of three-phase transformer expander is consistent; 2.Check the red marker line of the oil level indicator. CN /1、检查三相互感器膨胀器油位指针高度是否一致； 2、油位指示红色标识线位置。	EN /The indicated height of the red oil level of the three-phase transformer shall be basically consistent; 2.The red mark line of the oil level shall be between MAX and MIN, and be clearly visible.	EN/During the operation CN/运行期间 ES/During the operation

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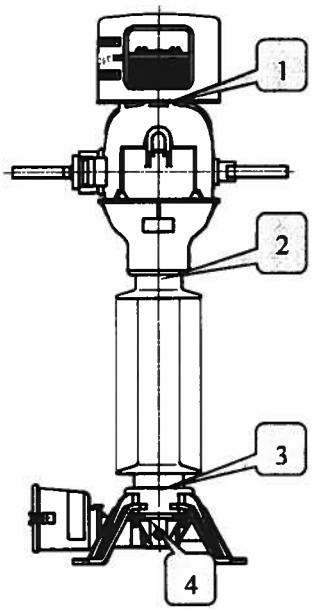
		ES/1.Verifique si la altura del indicador de nivel de aceite del expansor del transformador trifásico es consistente; 2.Verifique la línea roja del marcador del indicador de nivel de aceite.	CN/1、三相互感器的红色油位指示高度基本一致； 2、油位红色标识线在 MAX 与 MIN 之间，并且清晰可见。 ES/1.La altura indicada del nivel de aceite rojo del transformador trifásico será básicamente consistente; 2.La línea de la marca roja del nivel de aceite debe estar entre MAX y MIN, y debe ser claramente visible.	
3	CN /连接部位/油阀口 EN/Connecting position/oil valve inlet ES/Posición de conexión / entrada de la válvula de aceite		EN /There shall be no oil stain on the four positions. CN /四个位置无油迹。 ES/No habrá manchas de aceite en las cuatro posiciones.	EN/During the operation CN/运行期间 ES/During the operation
4	EN/Primary wiring terminal CN/一次接线端子 ES/Terminal de cableado primario	EN/Check whether there is distortion for the connection of the primary terminal, and whether the bolts in primary parallel and serious connection are fastened and discolored. CN/一次接线端子连接有无扭曲变形，一次串、并联螺栓拧紧、有无变色。 ES/Compruebe si hay distorsión en la conexión del terminal primario y si los pernos en la conexión primaria paralela y serial están abrochados y descoloridos.	EN/There is no distortion for the connection of the primary terminal, and the bolts in primary series and parallel connection are fastened and not discolored. CN/一次接线端子连接无扭曲变形，一次串、并联螺栓拧紧、螺栓颜色没有变黑。 ES/No hay distorsión para la conexión del terminal primario, los pernos en la conexión primaria paralela y serial no están abrochados y descoloridos.	CN/验收时 投运前 运行中 EN/During acceptance Before operation During operation ES/Durante la aceptación Antes de la operación During the operation
5	EN/Insulator CN/瓷套 ES/Manga de porcelana	EN/Check where there are damage, cracks, serious oil stains, electric discharging trace and other abnormal conditions for the insulator skirt. CN/瓷套伞裙有无破损、裂纹、严重油污、放电痕迹及其它异常情况。 ES/Verifique si hay daños, grietas, manchas graves de aceite, trazas de	EN/There is no damage, cracks, serious oil stains, electric discharging trace or other abnormal conditions for the insulator skirt CN/瓷套伞裙无破损、裂纹，无严重油污，无放电痕迹及其它异常情况 ES/No hay daños, grietas, manchas	EN/During the operation CN/运行期间 ES/During the operation

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		descarga eléctrica y otras condiciones anormales para el faldón de manga de porcelana.	graves de aceite, trazas de descarga eléctrica u otras condiciones anormales para la falda de manga de porcelana.	

Recovery and Disposal /回收处置/ Recuperación y eliminación

EN/The main components of the product include copper, iron, aluminum, transformer oil and ceramics. Under normal working conditions, the service life of the transformer is 30 years. When the transformer is scrapped or no longer in use, the copper, iron, aluminum, transformer oil and ceramics shall be collectively handed over to the qualified unit for recycling and processing, so as to avoid the pollution and impact on the environment.

CN/此产品主要组成材料成分包含：金属铜、铁、铝，变压器油及陶瓷；在正常工况条件下，互感器使用寿命为 30 年。互感器到期报废或不再使用后，金属铜、铁、铝，变压器油及陶瓷应集中交给具有资质的单位回收处理，以避免对环境的污染影响。

ES/Los componentes principales del producto incluyen cobre, hierro, aluminio, aceite para transformadores y cerámica. En condiciones normales de trabajo, la vida útil del transformador es de 30 años. Cuando el transformador se desecha o ya no se usa, el cobre, el hierro, el aluminio, el aceite para transformadores y la cerámica se entregarán colectivamente a la unidad calificada para su reciclaje y procesamiento, a fin de evitar la contaminación y el impacto en el medio ambiente.

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CATÁLOGO TÉCNICO

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COMPANY VISION&COMMISION

[illegible] and services to global customers and help them [illegible] power safely, reliably and efficiently.

[illegible] more reliable and more efficient.

Jiangsu Sieyuan Hefei Instrument Transformer Co., Ltd.
Address: Economic Development Area of Rugao City, Jiangsu
Tel: [illegible]
Telephone: [illegible], +86-0513-87303515
Fax: +86-0513-87303660, +86-0513-87303603
Mail: [illegible]
Website: [illegible]
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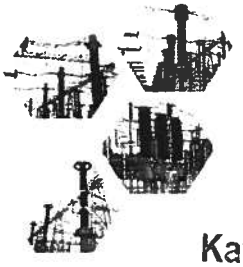
Sieyuan®

TRANSFORMER PRODUCTS

Current transformer/Voltage transformer/GIS VT/Optical transformer



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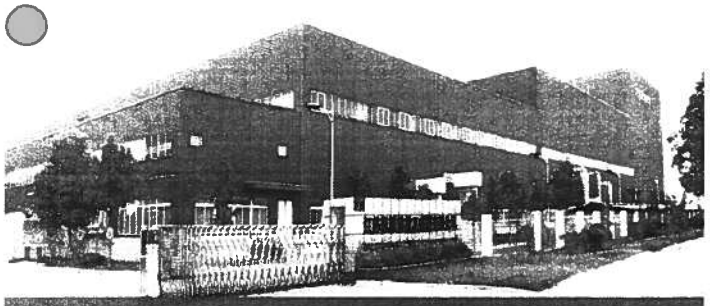

COMPANY PROFILE

Jiangsu Siyuan Hertz Instrument Transformer Co., Ltd is a high-tech enterprise of Jiangsu Province. It is a manufacturing enterprise of new type transformers in Jiangsu Rugao Economic Development Area (Longevity town) joint-ventured by Shanghai Siyuan Electric Co., Ltd.

The Company mainly produces all kinds of high-voltage current and voltage transformers(35-1000kV) now it has more than 500 employees, and 40% engineers and technicians.

The company is engaged in the production of various high voltage current and voltage transformers which are widely used in electric power metallurgy petrochemical mechanical and traffic departments.

Jiangsu Siyuan Hertz Instrument TransformerCo.,Ltd is a high & new-tech enterprise in Jiangsu Province also a new type of transformer manufacturing enterprise established in Jiangsu Rugao Economic Development Zone by Siyuan Electric Co.,Ltd (a listed company in Shenzhen Stock Exchange stock (600028)and Hongkong Hertz Investment company.

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PRODUCTS & EXTENT

Meet GB/IEC/IEEE standards
Meet the requirement of lower temperature -55°C~+50°C
Meet the requirement of high altitude 1000/2000/3000 meters
Meet the requirement of high humidity and corrosion along the coast
Meet customer demand for customized products

- 35-500kV Current Transformer (CT)

Oil Immersed&Live Tank Type Current Transformer

SF6 Gas&Live Tank Type Current Transformer

Oil Immersed&Dead Tank Type Current Transformer

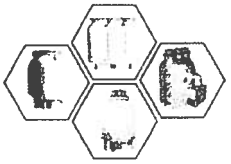
- 35-1000kV Voltage Transformer (VT)

Oil Immersed&Capacitive Voltage Transformer

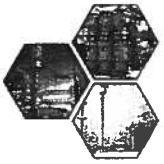
SF6 Gas&Inductive Voltage Transformer

Oil Immersed&Inductive Voltage Transformer

- 35-1000kV GIS VT/CT
- 35-1100kV OCT/EVT/ECT



SF6 Gas&Inductive Voltage Transformer for GIS



Optical Current Transformer

Electronic Transformer

Kawara Trade S.A

Sieyuan®

PRODUCT CERTIFICATION

All the products produced by Sieyuan Hertz have passed the certification of the international or domestic testing authorities.

CNAS

KEMA

Salt-Fog Special Test

CERTIFICATE OF REGISTRATION

OHSAS18001:2007

ISO14001:2004

ISO9001:2008

INVENTION PATENTS

Based on technological innovation, Sieyuan Hertz has established the technology development system with fully independent intellectual property rights, obtained many technical invention patents and owned many state-level key new products.

MARKET QUALIFICATION

The company has passed the Russia, Kazakhstan, Turkey, Kuwait, Mexico, Brazil, UK, Italy and many other overseas market qualification.

Measurement Certificate of Russia

Measurement Certificate of Kazakhstan

Venezuela national grid certificate

Qualified supplier certificate of Italy ENEL

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Sieyuan®

PRODUCTION EQUIPMENT

Automatic winding machine for capacitor winding

Automatic arc for second winding

Automatic cutting machine for insulating paper

Coiling machine for capacitance eurom bushing

Full automatic winding machine for capacitor unit

Capacitor unit fully automatic packing robot

Full automatic manual winding high voltage coil winding machine

Automatic and fast arc welding

Full automatic aluminum foil vacuum cutting machine

Main insulated winding machine

Germany KUKA automatic welding robot

LEYBOLD automatic vacuum drying system

German B&H automatic voltage winding machine

Tool platform for assembly and semi-finished products

Brazing and welding assembly equipment

Germany Leybold vacuum pump for oil production

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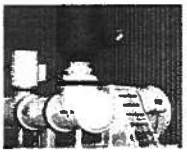
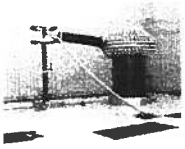
THE MAIN TEST EQUIPMENT

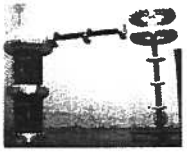
GTU-5X complete test equipment



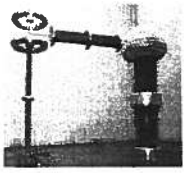
GTU-800 complete test equipment



5X4V Power frequency test transformer



600kV Power frequency test transformer



1000kV Power frequency test transformer

3000kV Impact test generator

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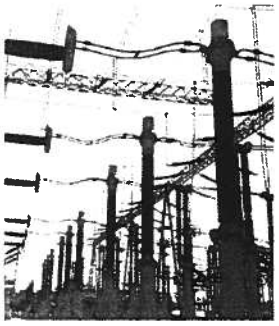
LVB OIL IMMERSED INVERTED CURRENT TRANSFORMER



Model specification

L V B (T) - □ □

- Antipollution class (W2、W3)
- Voltage grade,kV
- Transient Based Protection
- Protective winding
- Inverted
- Current transformer

Product Brief

Voltage level：27.5、35、66、110、145、220、330、420、500kV
Rated primary current：50~5000A
Accuracy class：0.1、0.2、0.5、0.2S、0.5S、5P、10P、TPY、TPS…

Product features

Primary coil has a through-type conducting rod structure with good dynamic and thermal stability,its maximum thermal current can be up to 63kA/3s.

The measurement precision can be up to 0.2S and 0.1;

Secondary coil is fixed in an aluminum shielded-case by casting organic materials. Secondary measurement and protection circuits can be safer and reliable;

Partial discharge test is carried out under power frequency test voltage, the result is better than the requirements of IEC.

Use the automatic vacuum drying treatment system produced by LEYBOLD in Germany. The dielectric dissipation factor of complete product tan δ is less than 0.3%.

The outer insulation is made of high strength porcelain bushing, and the optimized design is combined with the field strength along the surface and the lower internal casing field strength, so that the porcelain sleeve is free from explosion;

The secondary terminal box is overall Aluminum Alloy casting molding, sealing structure of dustproof and waterproof and breathable.

The connection between the outer shell of the product is made by argon arc welding, and the whole body is assembled and charged with high pressure nitrogen leak detection, which fundamentally solves the oil leakage problem of the oil immersed product;

The Aluminum Alloy casting shell, base, junction box, stainless steel nameplate expander, all parts will never rust;

The product is free- maintenance.

Brief introduction of bridge differential current transformer

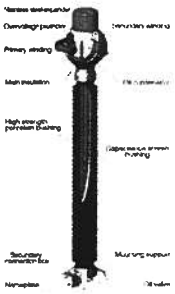
Voltage level：66、110、220、330kV
Rated primary current：0.5、1、2、5、below 10A
Accuracy class：0.5、10P

Application

It is suitable for unbalanced protection of AC filter capacitor tower in 50Hz/60Hz ultra high voltage direct current transmission system.

Product features

1、The primary winding adopts multi turn structure and it surrounds the product head, the conductor tube and the oil conservator.
2、The primary winding is arranged around a protective metal protective cover, in order to improve the outdoor life. The primary winding is fixed with resin pouring, in order to improve the thermal stability of products; protective cover and storage cabinets are connected by bolts to further strengthen the capacity of product dynamic stability current.
3、A metal Zinc Oxide arrester is installed between the P1 and P2 conductive lines to prevent the product from being subjected to lightning overvoltage impact.



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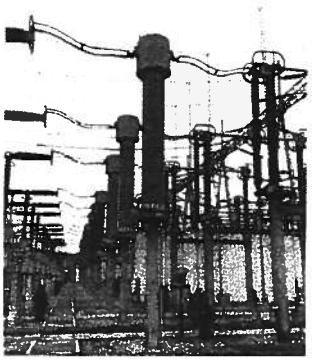
Sieyuan

GAS-INSULATED INVERTED CURRENT TRANSFORMER



Model specification

L V G B (T) - □ □

- Antipollution class (W2、W3)
- Voltage grade,kV
- Transient Based Protection
- Protective winding
- SF_6 gas insulation
- Inverted
- Current transformer

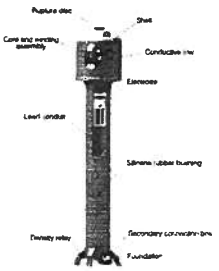
Product Brief

Voltage level: 66、110、220、330、420、500kV

Rated primary current: 50~5000A

Accuracy class: 0.1、0.2、0.5、0.2S、0.5S、5P、10P、TPY、TPS…

Product features



LVGB series current transformer is SF_6 gas insulated and inverted structure

Primary coil has a through-type conducting rod structure with good dynamic and thermal stability its maximum thermal current can be up to 63kA/3s;

The measurement precision can be up to 0.2S and 0.1;

The upper shell is made of aluminum alloy casting and the top is equipped with metal explosion proof piece. When the gas pressure exceeds 0.8MPa, the explosion rupture piece releases the pressure and improves the safety of the product.

Secondary coil is fixed in an aluminum shielded case by casting organic materials. Secondary moisture-proof and protection cannot can be safer and reliable.

The electrode shielding structure is optimized to improve the internal and external electric field distribution and the insulation performance is excellent. The local discharge test is carried out under the power frequency test voltage.

There are two types of outer insulation sleeve for users to choose, silicone rubber reinforced bushing and high strength porcelain bushing.

The secondary terminal box is overall Aluminum Alloy casting molding, sealing structure of dustproof and waterproof and breathable.

The sealing ring adopts imported fluorine silicone rubber material. It is suitable for the high and low temperature change and the harsh environment temperature over. The annual air leakage rate is less than 0.5%.

High strength aluminum alloy casting shell, flange, junction box, stainless steel fasteners, nameplates and other components, to ensure that never rust.

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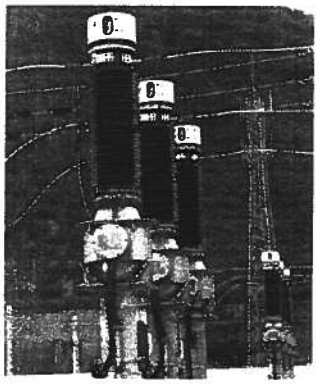
OIL IMMERSED CURRENT TRANSFORMER



Model specification

L B 6 - □ □

- Anti-pollution class (W2、W3)
- Voltage grade kV
- Design Serial Number
- Protective winding
- Current transformer

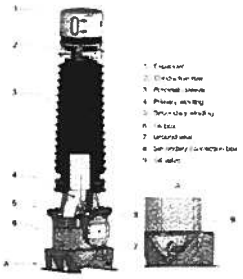
Product Brief

Voltage level：27.5、35、66、110、132kV

Rated primary current：below2500A

Accuracy class：0.1、0.2、0.5、0.2S、0.5S、5P、10P、TPY、TPS

Product features



LB 3 pe current transformer is oil immersed sealed type insulation structure, winding for a "U" type, the body is fixed at the bottom of the [illegible] the main insulation for capacitor type insulation, high pressure cable paper wrapped around a winding, which is provided with a [illegible] of conductive screen, the inside of the screen is connected with the high voltage, external reliable grounding screen

A porcelain sleeve is arranged on the oil tank, and the first terminal is on the top of the porcelain sleeve, and can be connected to [illegible] and in parallel in the outer of the porcelain sleeve

The stainless steel expander is used as the oil compensation device to ensure the quality of the oil. The oil level indication of the product is indicated by the obvious indication of the window at the upper end of the expander

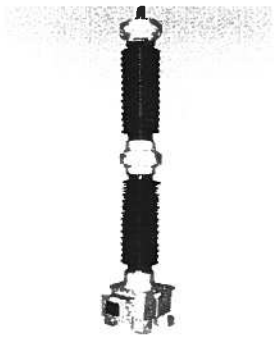
The product adopts external hot galvanizing or stainless steel standard parts such as new technologies and new materials, make the [illegible] without rust

The [illegible] is taken out separately, which is convenient for testing and maintenance

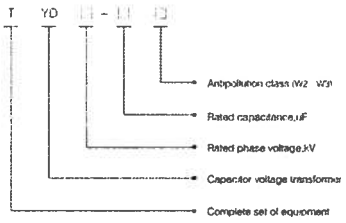
Kawara Trade S.A

Sieyuan®

TYD CAPACITOR VOLTAGE TRANSFORMER



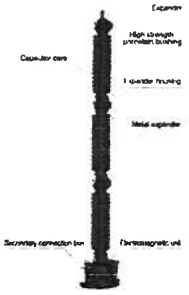
Model specification



Product Brief

Voltage level: 35、66、110、132、220、330、420、500、750、1000kV
Rated frequency: 50/60Hz
Accuracy class: 0.2、0.5、3P、6P

Product features



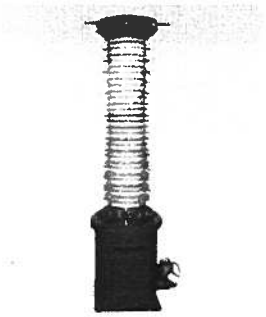
Capacitor voltage transformer series products are suitable for current, electric energy measurement and relay protection in a system with effectively earthed neutral with rated voltage 35~1000kV and rated frequency 50/60Hz. It can also be used for carrier wave communication concurrently.

This product consists of capacitor voltage divider and electromagnetic unit. the medium voltage terminal and low voltage terminal of capacitor voltage divider are lead out into an oil tank equipped with electromagnetic unit. The electromagnetic unit consists of middle transformer, a compensation reactor and a damper.The capacitor voltage divider consists of a bushing, a core and a metal expander. The core of capacitor is combined by several film–paper composite media and serial parts which are made by coiling aluminum foils. It is carried out vacuum dipping treatment, the porcelain bushing is filled with transformer oil and it is equipped with the metal expander to compensate the change of oil volume at different temperatures.

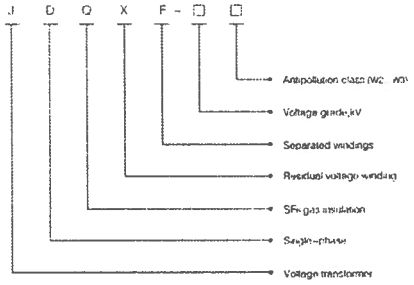
Kawara Trade S.A

Sieyuan®

JDQXF SF6 INDUCTIVE VOLTAGE TRANSFORMER



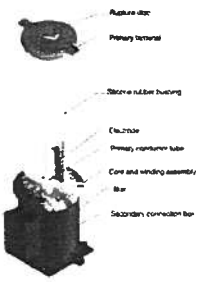
Model specification



Product Brief

Voltage level: 66, 110, 132, 220kV
Rated frequency: 50/60Hz
Accuracy class: 0.2, 0.5, 3P, 6P

Product features



The bottom of the product is a transformer box, and the inner part is provided with a body, wherein the middle part is a silicon rubber composite insulating sleeve or a high strength porcelain bushing, and the two sides of the top of the product are the primary terminal.

The transformer box is equipped with SF6 gas density controller, online monitoring of SF6 gas pressure. The top is equipped with a pressure release device, the blasting (release) pressure is 1.0MPa, no oil, no explosion hazard, maintenance free.

The shell of the product is hot-dip galvanized or made of cast aluminum alloy, stainless steel fasteners, nameplates and other components. It is running outdoors for a long time without corrosion.

The dustproof and waterproof performance of the outlet box meets the requirements of IP55. The terminals for the user's wiring use the [illegible] terminal, such as plug in, pull out, wiring and so on, so they are more convenient and quick.

The sealing ring adopts imported fluorine silicone rubber material. It is suitable for high and cold areas, and the annual air leakage rate is less than 0.5%.

The overall design is reasonable and capacitive at a certain voltage.

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Sieyuan®

JDT/JDCF/JDC OIL IMMERSED INDUCTIVE VOLTAGE TRANSFORMER

Model specification

J D X 6 - □ □

- Antipollution class (W2, W3)
- Voltage grade,kV
- Design Serial Number
- Cascade type with residual voltage winding
- Single-phase
- Voltage transformer

型号说明 Model specification

J D C F - □ □

- Antipollution class (W2, W3)
- Voltage grade,kV
- Separated windings
- Cascade type with residual voltage winding
- Single-phase
- Voltage transformer

Product Brief

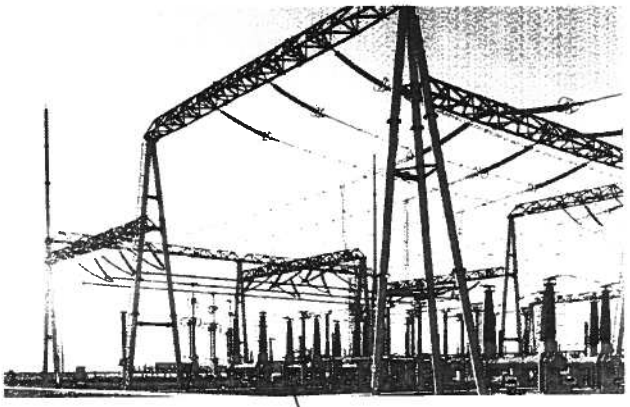
Voltage level: 27.5, 35, 66, 110, 220, 420kV
Rated frequency: 50/60Hz
Accuracy class: 0.2, 0.5, 3P, 6P

Product features

JDT, JDX, JDCF type voltage transformer is an electromagnetic type voltage transformer for oil paper insulation and oil-filled hermetically sealed structure.

This product design is reliable, low magnetic density, can avoid the circuit resonance over-voltage, the secondary winding is two separate metering and protection, measurement accuracy can reach 0.2, to meet the different demands of high accuracy measurement and the electric power department user requirements.

This product uses stainless steel metal expander, adopts advanced vacuum drying and vacuum oiling process, with little dielectric loss and low volume, ensuring the safe and reliable operation of the product.



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Sieyuan®

INDUCTIVE VOLTAGE TRANSFORMER FOR GIS

◆ Model specification

J D(S) O X F H 1000

- Nominal system voltage,kV
- VT is used in GIS
- Measuring windings and protection windings are separate
- Surplus winding
- SF6 Gas insulated
- Single-phase or Three-phase
- Inductive voltage transformer

◆ Product description

The voltage transformer is used for GIS, it' s widely applied to the nominal system voltage is 66~1000 kV and 50/60 Hz frequency in power system, for the secondary measurement apparatus, protection and control device provide voltage signal.

◆ Introduction to product

1、GIS VT without ID

The product has three-phase co-[illegible] and three-phase sub-box two kinds of structure usually under the basin [order 1] and inflatable valve [sequence 6] by the GIS manufacturer specify the size or directly as a guest supply, the remaining size, Customer installation requirements of the case by the VT manufacturers to design their own. The enclosure has two options for welded and casing aluminum

1. Epoxy insulating insulator(Spacer), Provided by GIS manufacturer or purchase from customer-specified suppliers
2. Gas charging valve, Provided by GIS manufacturer or purchase from customer-specified suppliers
3. Enclosure, Aluminum welding / casting shell
4. Terminal Box position can be changed according to customer's requirement
5. Explosion-proof device
6. Pressure release valve, According to customer demand selective installation
7. Conductor size and winding [illegible] casing process
8. Terminal Box position can be changed according to customer's requirement
9. Minimum line

2. GIS VT with ID

In order to facilitate the GIS customer substation [illegible] handover test, the company developed with the isolated fracture of the GIS VT product, GIS body frequency withstand voltage through the [illegible] directly to the VT and GIS isolation, without [illegible] disassembly VT, to enhance the efficiency of field acceptance test.

1. Movable contact, epoxy resin casting shell, can be moved up and down
2. Static contact, using spring compression the contact to ensure connection reliable
3. Terminal Box, The box of three phase product placed at the bottom and single-phase product placed at the side, can be achieved both manually and electricity operation mode
4. Open and close indicator, using the [illegible] consistent with the GIS
5. Insulation support, use epoxy resin casting structure

[illegible]Vara Trade S.A

Sieyuan

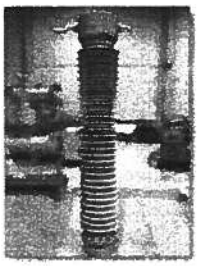
OPTICAL TRANSFORMER

- For smart grid GIS/DCB matching

OCT for 220kV GIS

OCT for 220kV DCB

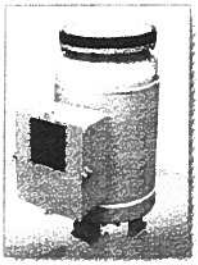
- AIS instrument transformer



110/220kV AIS OCT

ELECTRONIC INSTRUMENT TRANSFORMER

- Smart grid applications



EVTfor GIS

ETVECT for GIS

Independent electronic voltage transformer

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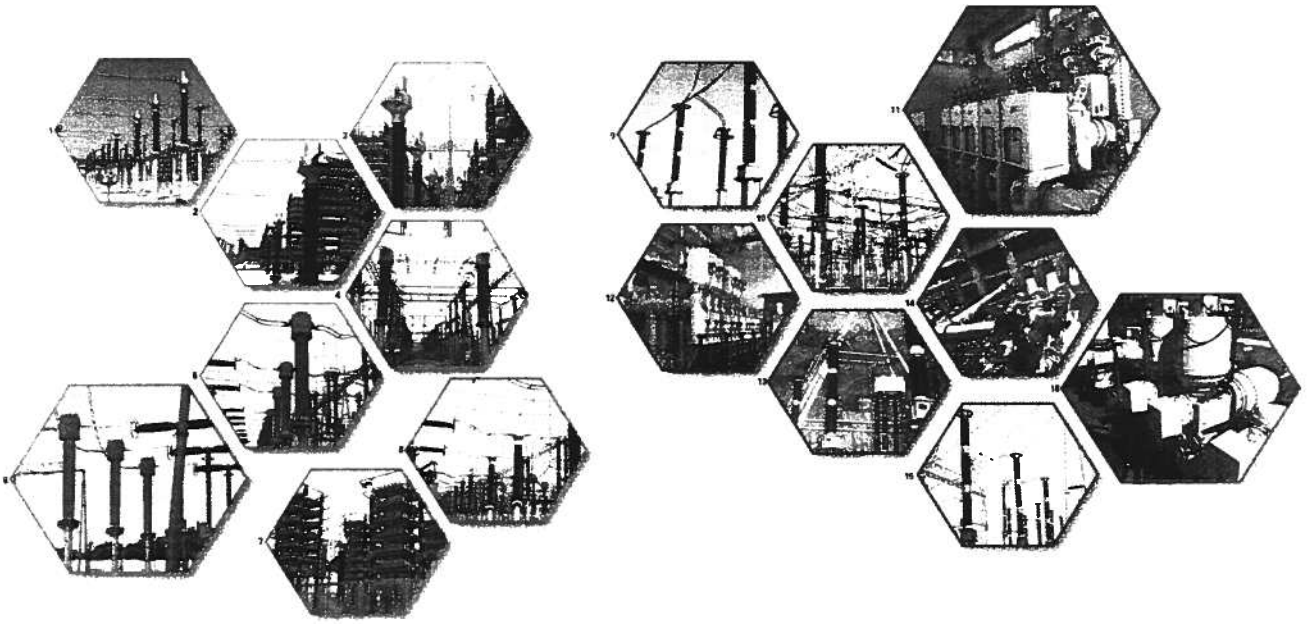
Sieyuan

DEMONSTRATION PROJECT



1. LVDB-[illegible] for China Southern Network CHV Kaoshu - [illegible] project
2. LVDB-[illegible] for China Southern Network [illegible] substation
3. LVDB-[illegible] for CHV Gaoxin back to back converter station
4. LVDB-[illegible] for Three Gorge Dam substation, Nanjing, Jiangsu
5. [illegible] transmission project Zhaoqing converter station
6. Guangdong 500kV - power flexible return DC transmission power Qinghua [illegible] station
7. LVDB-[illegible] for 400kV Guiyang Xifang substation
8. 21 units LVBT-[illegible] for Huaneng power plant in [illegible]
9. T-D-[illegible] for Huaneng Anhui Pingshan power plant
10. Lanyang River Hydropower Station
11. 2 x 660MW environmental protection construction project of China Chongqing power plant
12. Single phase 400/500kV GIS VT for Xiamen ABB high voltage switch Co. Ltd
13. Three phase [illegible] for Hyundai Heavy Industries
14. T-D-[illegible] expansion project of Chongqing Guide power plant
15. Single phase 220kV GIS VT for Shanghai Siyuan high voltage switch Co. Ltd
16. Single phase 400kV GIS CT with isolated terminal for 2 [illegible] ABB high voltage switch Co. Ltd

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ISO

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环境管理体系 - ISO 14001:2015

兹证明：

江苏思源赫兹互感器有限公司
91320682762825033L
中国
江苏省
如皋
经济开发区
惠民西路5号
邮编：226572

Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd.
No.5, West Huimin Road
Economic Development Zone
Rugao
Jiangsu
226572
China

持有证书：**EMS 661555**

并运行符合 ISO 14001:2015 要求的环境管理体系，认证范围如下：

800kV及以下电流互感器和1000kV及以下电压互感器的设计与制造。
The design and manufacture of current transformers (below and include 800kV) and voltage transformers (below and include 1000kV).

BSI代表：

Chris Cheung，亚太地区 合规风险主管

首次发证日期：2016-11-07
最新发证日期：2019-10-16

生效日期：2019-11-07
有效期至：2022-11-06

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质量管理体系 - ISO 9001:2015

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如皋
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惠民西路5号
邮编：226572

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No.5, West Huimin Road
Economic Development Zone
Rugao
Jiangsu
226572
China

持有证书： **FM 661556**

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邮编：226572

Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd.
No.5, West Huimin Road
Economic Development Zone
Rugao
Jiangsu
226572
China

持有证书： **OHS 661557**

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BSI集团公司成员

TEST REPORT

Kawara Trade S.A.

DNV·GL

KEMA INSPECTION REPORT

3115-16

Object	A single-phase current transformer		
Type	LVB-245W3	**Serial No.**	11162818
	220 kV – 2400 / 1200 / 600 / 1 A – 40 / 100 kA - 50 Hz		
Client	Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd., Rugao, China		
Manufacturer	Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd., Rugao, China		
Inspected by	DNV GL Netherlands B.V., Arnhem, The Netherlands		
Test location	STRI-CTQC, Shenyang, China		
Date of tests	20 to 29 September 2016		
Test specification	The tests have been carried out in accordance with client's instruction. Test procedure and test parameters were based on IEC 61869-1 (2007), IEC 61869-2 (2011) and IEC 60044-6 (1999).		
Conclusion and Summary	The object passed the tests.		

This report applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the Manufacturer.

This report consists of 72 pages in total.

Kawara Trade S.A

DNV GL Netherlands B.V.

J.P. Fonteijne
Executive Vice President
KEMA Laboratories

Arnhem, 21 November 2016

KEMA Laboratories

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1 IDENTIFICATION OF THE OBJECT TESTED

1.1 Ratings/characteristics of the object tested

Highest voltage for equipment	245 kV
Rated insulation level	245/460/1050 kV
Rated current	2400/1200/600/1 A
Rated continuous thermal current	2880/1440/720 A
Thermal short-time current	40 kA/3 s
Dynamic short-time current	100 kA
Temperature class of insulation	A
Pollution class	IV
Frequency	50 Hz
Temperature category	-40/50 °C

1.2 Description of the object tested

Manufacturer	Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd., Rugao, China				
Type	LVB-245W3				
Design	Oil immerged for outdoor use				
Transformer ratio (A)	600/1	600/1	600/1	600/1	600/1
Terminal marking	1S1-1S2	2S1-2S2	3S1-2S2	4S1-4S2	5S1-5S2
Rated burden (VA)	15	60	30	30	30
Accuracy class	0,2/FS5	5P20/TPS	5P20/TPS	5P20/TPS	5P20/TPS
Transformer ratio (A)	1200/1	1200/1	1200/1	1200/1	1200/1
Terminal marking	1S1-1S3	2S1-2S3	3S1-2S3	4S1-4S3	5S1-5S3
Rated burden (VA)	30	120	60	60	60
Accuracy class	0,2/FS5	5P20/TPS	5P20/TPS	5P20/TPS	5P20/TPS
Transformer ratio (A)	2400/1	2400/1	2400/1	2400/1	2400/1
Terminal marking	1S1-1S4	2S1-2S4	3S1-2S4	4S1-4S4	5S1-5S4
Rated burden (VA)	60	240	120	120	120
Accuracy class	0,2/FS5	5P20/TPS	5P20/TPS	5P20/TPS	5P20/TPS

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Sec. terminal	2S1-2S2	2S1-2S3	2S1-2S4	3S1-3S2 4S1-4S2 5S1-5S2	3S1-3S3 4S1-4S3 5S1-5S3	3S1-3S4 4S1-4S4 5S1-5S4
I_{pr} (A)	600	1200	2400	600	1200	2400
I_{sr} (A)	1	1	1	1	1	1
E_k (V)	-	-	1600	-	-	1000
R_{ct} (Ω)	-	-	27	-	-	27
K_{ssc}	-	-	20	-	-	20
R_b (Ω)	-	-	50	-	-	20
K	-	-	1	-	-	1
I_e (mA)	-	-	66	-	-	75

Note: The primary winding was connected in parallel

1.3 List of drawings

The manufacturer has guaranteed that the object submitted for tests has been manufactured in accordance with the following drawings and/or documents. KEMA has verified that these drawings and/or documents adequately represent the object tested. The manufacturer is responsible for the correctness of these drawings and/or documents and the technical data presented.

The following drawings and/or documents have been included in this report:

Drawing no./document no.	Revision
0SY.4001	0
8S027443	0
0SY.4004	0

Kawara Trade S.A

2 GENERAL INFORMATION

2.1 Persons attending the inspection

Name	Company
Zheng Xu Li Zhongxuan	Jiangsu Sieyuan Hertz Instrument Transformer Co., Ltd., Rugao, China
Kazi Mir Ahmad Muhammad Nawaz	(GSO) NTDCL, Lahore/Peshawar, Pakistan
Zhou Jingwei	STRI-CTQC, Shenyang, China

2.2 The inspection was carried out by

Name	Company
Li Song	DNV GL Netherlands B.V., Arnhem, The Netherlands

2.3 Purpose of test

Purpose of the test was to verify whether the material complies with the specified requirements.

2.4 Inspection of the test set-up

The tests were carried out at the laboratory of STRI-CTQC, Shenyang, China. The results of the inspection activities are based on the witnessed tests and information about measuring devices and the test set-up as provided STRI-CTQC, Shenyang, China. The measuring devices, the test set-up and the provided calibration reports were verified by KEMA Laboratories.

Result
The inspection did not give rise to remarks.

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3 ROUTINE TESTS BEFORE TYPE TESTS

3.1 Power-frequency voltage withstand tests on primary terminals

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.1
Test date	20 September 2016

Environmental conditions

Ambient temperature	20	°C	Ambient air pressure	1016	hPa
Humidity	59	%			

Procedure

The insulation between the primary winding and the secondary windings, screen and frame connected to earth, were tested with a test voltage of 460 kV, 50 Hz for 1 minute.

Characteristic test data

AC test voltage	460 kV (50 Hz)
Duration	1 min

Requirements

No break-down of the voltage shall occur.

Result

The test object passed the tests.

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3.2 Partial discharge measurement

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.2
Test date	20 September 2016

Environmental conditions

Ambient temperature	20	°C	Ambient air pressure	1016	hPa
Humidity	59	%			

Procedure

During the increase and the decrease of the test voltage, the transformer was examined for partial discharges in accordance with IEC 60270. The partial discharges were measured at U_m and 1,2 $U_m/\sqrt{3}$.

Characteristic test data

Voltage (kV)	Measured partial discharge (pC)
245	< 4
169,7	< 3

Requirements

- Partial discharge test voltage 1,2 $U_m/\sqrt{3}$ 169,7 kV < 5 pC.
- Partial discharge test voltage U_m 245 kV <10 pC.

Result

The test object passed the tests.

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3.3 Power-frequency voltage withstand tests on secondary terminals

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.4
Test date	20 September 2016

Environmental conditions

Ambient temperature	20	°C	Ambient air pressure	1016	hPa
Humidity	59	%			

Procedure

The insulation between the short-circuited terminals of each secondary winding section and between each secondary winding and earth was subjected to an applied voltage of 3 kV, 50 Hz for 60 s.

Characteristic test data

AC test voltage	
Secondary windings	3 kV (50 Hz)
Earth screen	5 kV (50 Hz)
Duration	1 min

Requirements

No break-down of the voltage shall occur.

Result

The test object passed the tests.

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3.4 Inter-turn overvoltage test

Standard and date

Standard IEC 61869-2, subclause 7.3.204

Test date 21 September 2016

Environmental conditions

Ambient temperature	20	°C	Ambient air pressure	1012	hPa
Humidity	22	%			

Procedure

The primary winding of the current transformer was excited for 60 s with the secondary winding open circuited with 1,2 times the rated current at 50 Hz. The applied current is limited if the test voltage of 4,5 kV peak is obtained before reaching the required current.

Characteristic test data

Winding marking	Applied primary current (A)	Peak voltage of the secondary open-circuit winding (V)	Duration (s)
1S1-1S4	408	4500	60
2S1-2S4	14,4	4500	60
3S1-3S4	40,8	4500	60
4S1-4S4	40,8	4500	60
5S1-5S4	43,2	4500	60

Requirements

At the 1,2 times rated current or the test voltage of 4,5 kV peak no break- down of voltage or current should occur.

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Result

The test object passed the tests.

3.5 Test for accuracy

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.3.5

Test date 21 September 2016

Environmental conditions

Ambient temperature 20 °C

Procedure

The current errors and the phase displacements of the current transformer were determined by the Standard Transformer Comparison Method. The errors of the standard current transformer are known and were considered at the measurement.

Characteristic test data

Primary winding is connected is parallel.

Winding	Accuracy class	Current ratio (A)	I/Ir (%)	cos ø	Burden (VA)	Current error (%)	Phase displacement (')
1S1-1S2	0,2	600/1	120	0,8	15	0,0322	-0,196
			100			0,0320	-0,274
			20			-0,1399	3,10
			5			-0,231	13,89
			120		3,75	0,0910	0,800
			100			0,0851	1,014
			20			0,0484	4,397
			5			0,063	6,63
1S1-1S3	0,2	1200/1	120	0,8	30	0,0714	0,927
			100			0,0720	1,003
			20			0,0803	1,517
			5			0,0829	1,844
			120		7,5	0,0718	0,935
			100			0,0723	1,030
			20			0,0806	1,491
			5			0,0830	1,847
1S1-1S4	0,2	2400/1	120	0,8	60	0,0354	0,414
			100			0,0354	0,424
			20			0,0403	0,656
			5			0,0451	0,739
			120		15	0,0346	0,361
			100			0,0348	0,387
			20			0,0401	0,658
			5			0,0452	0,730

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Winding	Accuracy class	Current ratio (A)	I/Ir (%)	cos ø	Burden (VA)	Current error (%)	Phase displacement (')
2S1-2S2	5P	600/1	100	0,8	60	-0,414	0,68
2S1-2S3	5P	1200/1	100	0,8	120	-0,0259	1,384
2S1-2S4	5P	2400/1	100	0,8	240	-0,0122	0,680
3S1-3S2	5P	600/1	100	0,8	30	-0,440	1,64
3S1-3S3	5P	1200/1	100	0,8	60	-0,0291	1,347
3S1-3S4	5P	2400/1	100	0,8	120	-0,0139	0,632
4S1-4S2	5P	600/1	100	0,8	30	-0,437	1,56
4S1-4S3	5P	1200/1	100	0,8	60	-0,0276	1,286
4S1-4S4	5P	2400/1	100	0,8	120	-0,0123	0,572
5S1-5S2	5P	600/1	100	0,8	30	-0,440	1,48
5S1-5S3	5P	1200/1	100	0,8	60	-0,0292	1,323
5S1-5S4	5P	2400/1	100	0,8	120	-0,0146	0,580

Requirements

The requirements are the maximum allowable errors and phase displacements as mentioned in the standard.

Result

The test object passed the tests.

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3.6 Turn ratio error

Standard and date

Standard IEC 60044-6, subclause 7.2.1
Test date 21 September 2016

Environmental conditions

Ambient temperature 20 °C

Procedure

The test was performed according to IEC 60044-6, Annex E.

Characteristic test data

Primary winding is connected is parallel.

Winding marking	Accuracy class	Current ratio (A)	I/Ir (%)	Secondary burden (Ω)	Current deviation (%)	Turns ratio error (%)
2S1-2S2	TPS	600/1	100	0	-0,0512	0,0446
			50	2,8	-0,147	
2S1-2S3	TPS	1200/1	100	0	-0,0305	0,0203
			50	8,75	-0,0813	
2S1-2S4	TPS	2400/1	100	0	-0,0130	-0,0087
			50	21	-0,0173	
3S1-3S2	TPS	600/1	100	0	-0,0578	0,00054
			50	2,45	-0,121	
3S1-3S3	TPS	1200/1	100	0	-0,0312	0,0249
			50	7,25	-0,0873	
3S1-3S4	TPS	2400/1	100	0	-0,0141	-0,0091
			50	17,55	-0,0191	
4S1-4S2	TPS	600/1	100	0	-0,0563	0,0124
			50	2,45	-0,125	
4S1-4S3	TPS	1200/1	100	0	-0,0290	0,026
			50	7,25	-0,0840	
4S1-4S4	TPS	2400/1	100	0	-0,0125	-0,0073
			50	17,25	-0,0177	
5S1-5S2	TPS	600/1	100	0	-0,0560	0,012
			50	2,45	-0,124	
5S1-5S3	TPS	1200/1	100	0	-0,0311	0,0234
			50	7,25	-0,0856	
5S1-5S4	TPS	2400/1	100	0	-0,0147	-0,0092
			50	17,55	-0,0202	

Requirements

The turn ratio error shall not exceed ±0,25%.

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Result

The test object passed the tests.

4 TYPE TESTS

4.1 Temperature-rise test

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.2.2

Test date 25 to 26 September 2016

Procedure

Before the temperature-rise test the cold resistances of the secondary windings were measured including the ambient temperature.

The rated continuous thermal current was flowing through the primary winding. The secondary windings were connected to burdens of unity power factor and rated output.

The temperatures of the ambient (3X), the top-oil and the primary terminals were measured. After a steady state was reached, the current was switched off and the cool down curves of the primary and secondary windings were measured for 14 minutes.

The resistances at t=o were calculated, after which the temperatures could be calculated.

Characteristic test data

Measurement results

Winding	Measurement of resistance (Ω)		Ambient temperature (°C)		Contact temperature (°C)		
marking	Cold R	Hot R	Cold	Hot	P1	P2	Top oil
1S1-1S4	8,567	9,340	21,5	21,8	51,0	57,5	37,5
2S1-2S4	17,29	18,72	-	-	-	-	-
3S1-3S4	14,48	15,74	-	-	-	-	-
4S1-4S4	14,27	15,54	-	-	-	-	-
5S1-5S4	14,52	15,79	-	-	-	-	-

Calculated temperature rises

Out surface temperature (K)		Winding marking	Temperature-rise (K)
P1	29,2	1S1-1S4	22,8
P2	35,7	2S1-2S4	20,9
Top oil	15,7	3S1-3S4	22,0
		4S1-4S4	22,5
		5S1-5S4	22,1

Requirements

The specified maximum temperature-rise according to IEC 61869-1, table 5 for class A of insulation shall not be exceeded.

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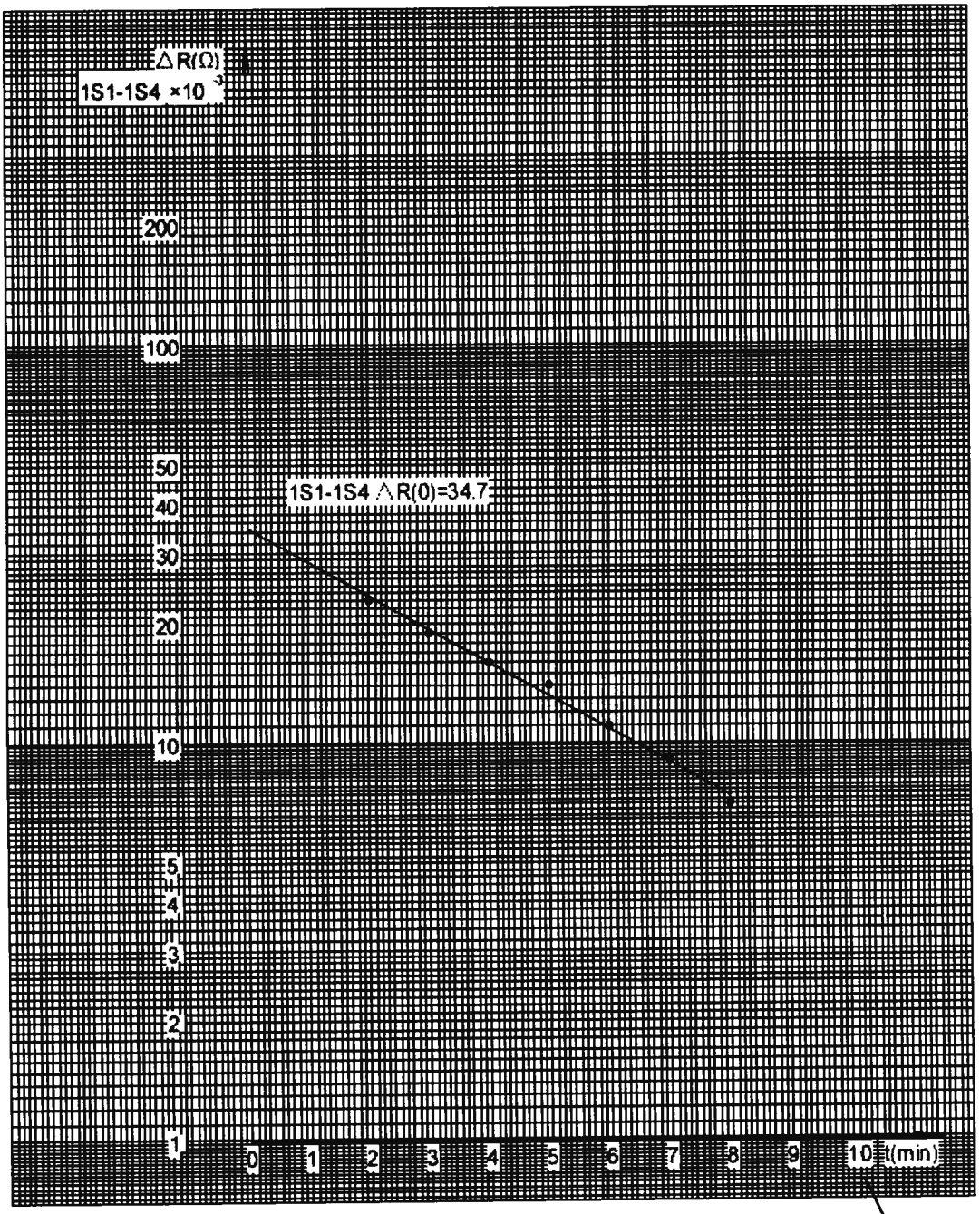
Result

The test object passed the tests.



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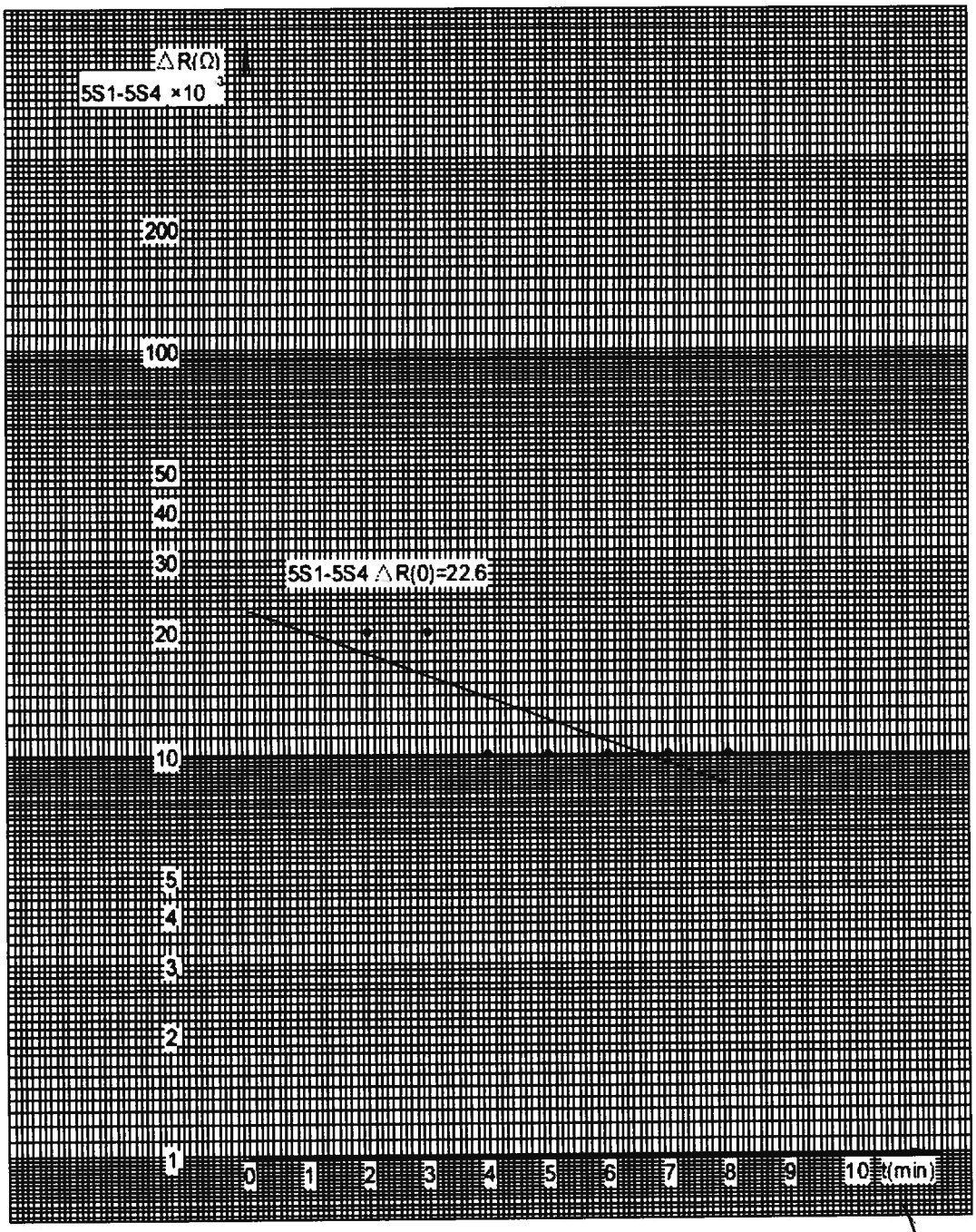

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4.2 Lightning impulse voltage test on primary terminals

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.2.3
Test date	22 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1019	hPa
Humidity	72	%			

Procedure

The impulse test shall be performed in accordance with IEC 60060-1. The frame and the secondary terminals are connected to earth. The primary terminals of the current transformer are connected together and are subjected to a lightning impulse voltage tests.

Characteristic test data

See oscillogrammes.

Requirements

Fifteen positive and negative lightning impulses with a peak voltage of 1050 kV shall be applied. No collapse or break-down shall occur.

Result

The test object passed the tests.

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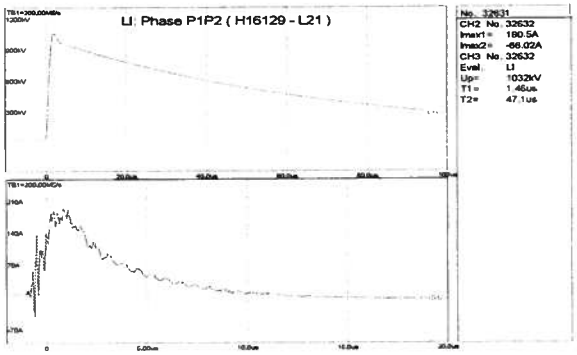
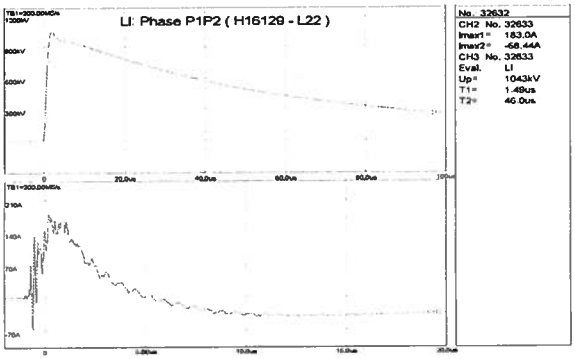
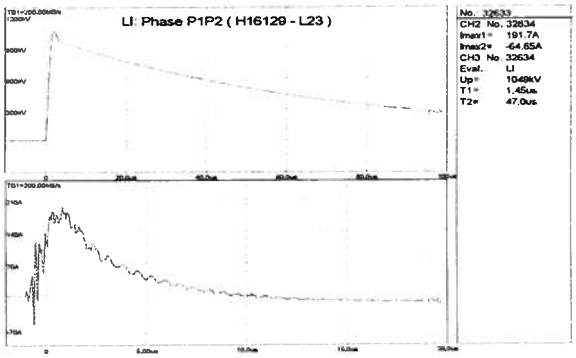
Lightning impulse test with positive voltage



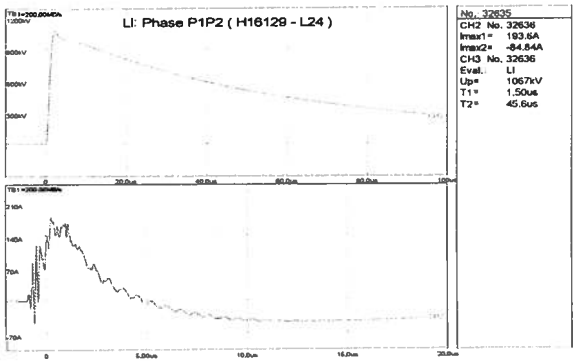
1st positive impulse (1050 kV)



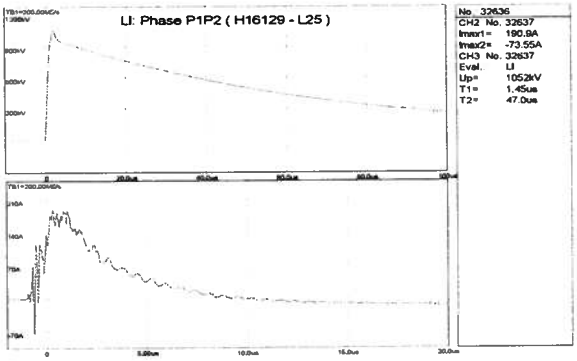
2nd positive impulse (1050 kV)



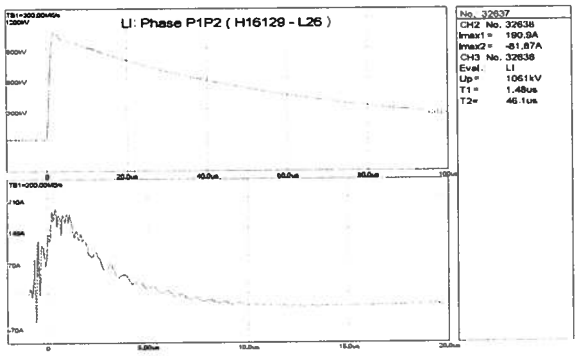
3th positive impulse (1050 kV)



4th positive impulse (1050 kV)



5th positive impulse (1050 kV)



6th positive impulse (1050 kV)

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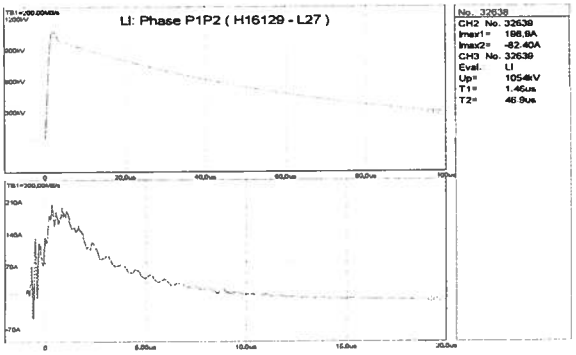
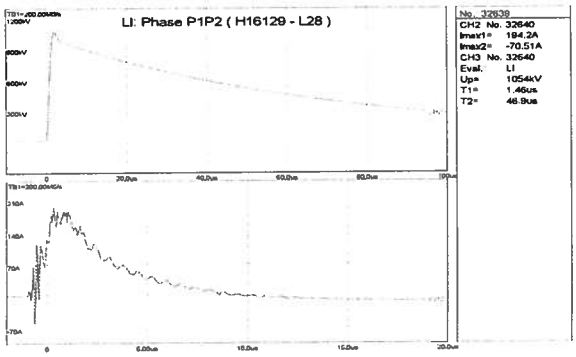
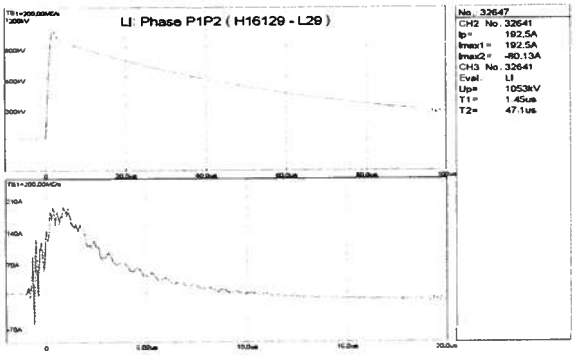


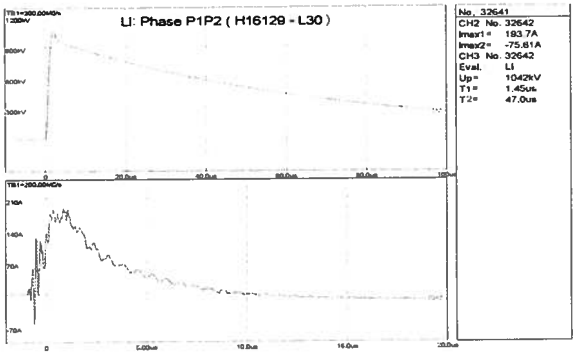
7th positive impulse (1050 kV)



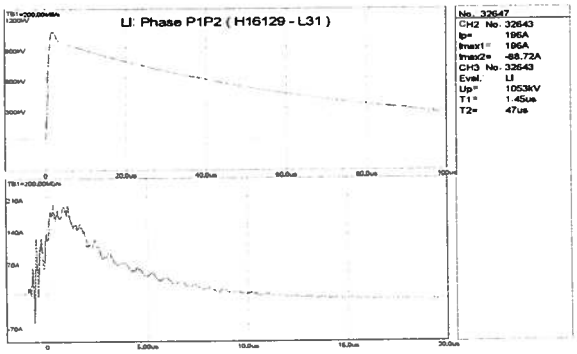
8th positive impulse (1050 kV)



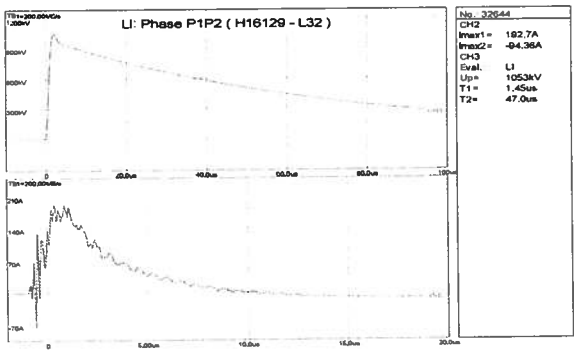
9th positive impulse (1050 kV)



10th positive impulse (1050 kV)



11th positive impulse (1050 kV)



12th positive impulse (1050 kV)

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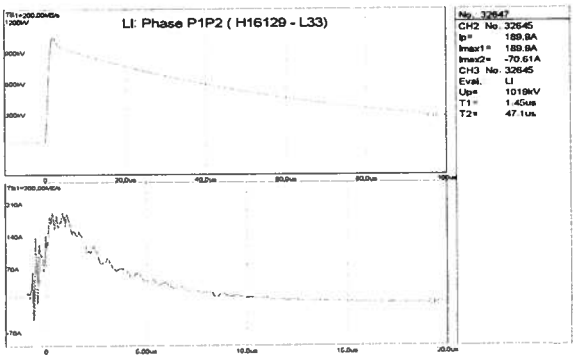
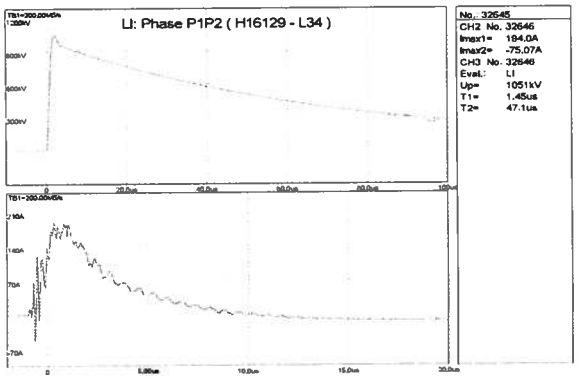
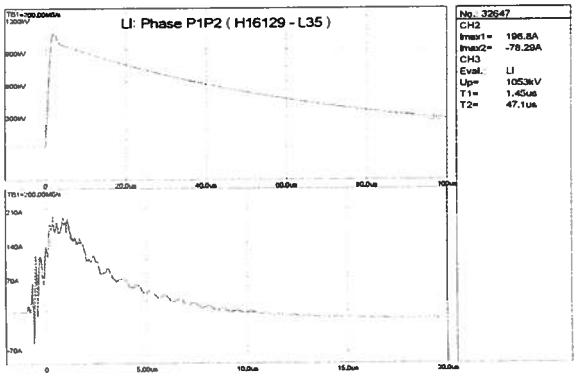


13th positive impulse (1050 kV)



14th positive impulse (1050 kV)



15th positive impulse (1050 kV)

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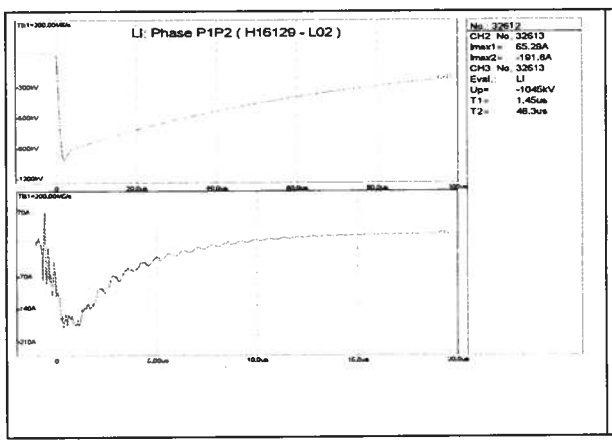
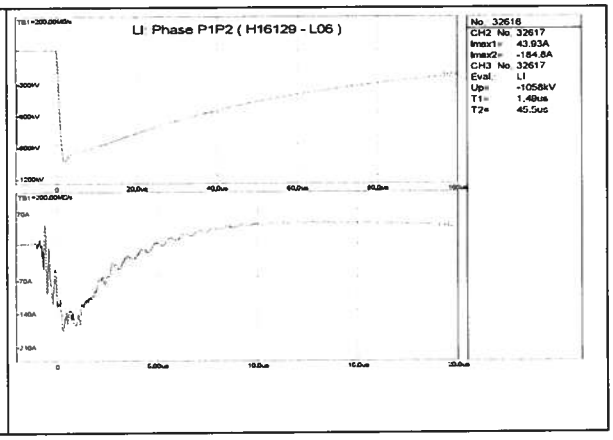
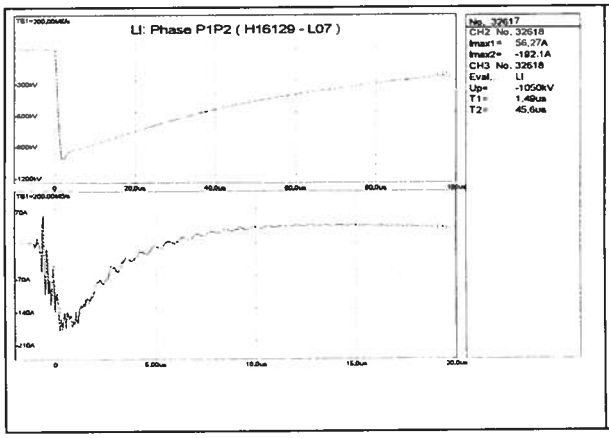
Lightning impulse test with negative voltage



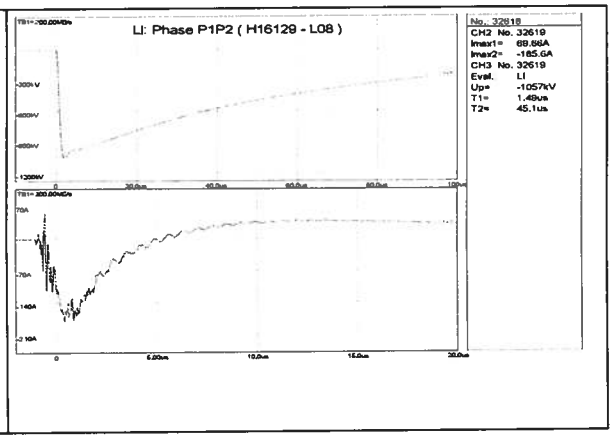
1st negative impulse (1050 kV)



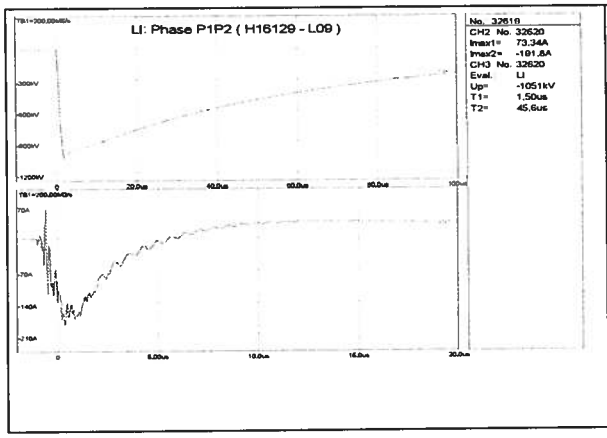
2nd negative impulse (1050 kV)



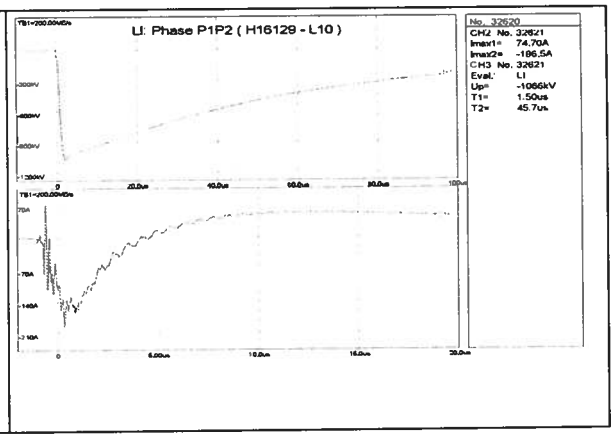
3th negative impulse (1050 kV)



4th negative impulse (1050 kV)



5th negative impulse (1050 kV)



6th negative impulse (1050 kV)

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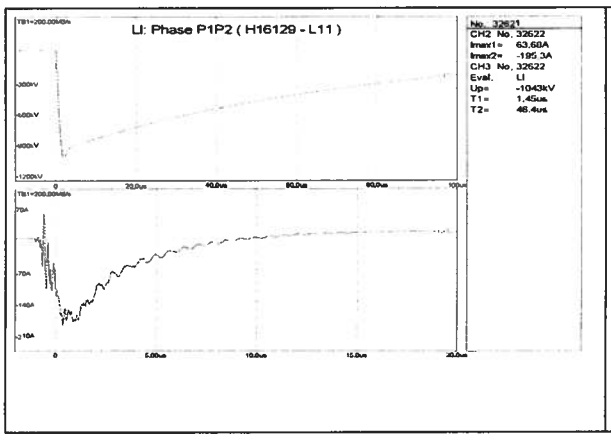
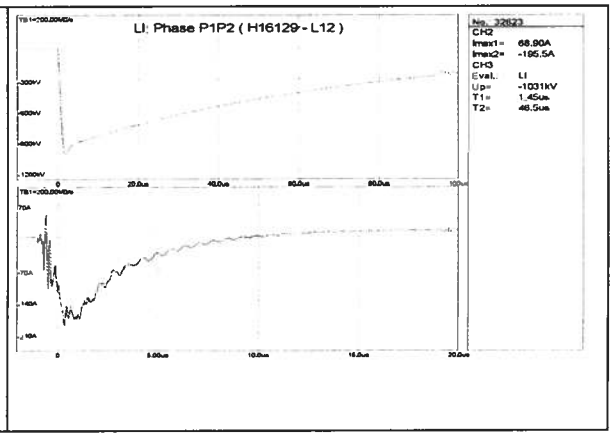
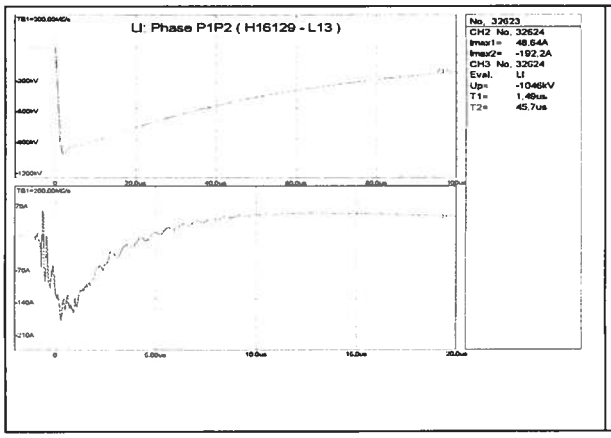


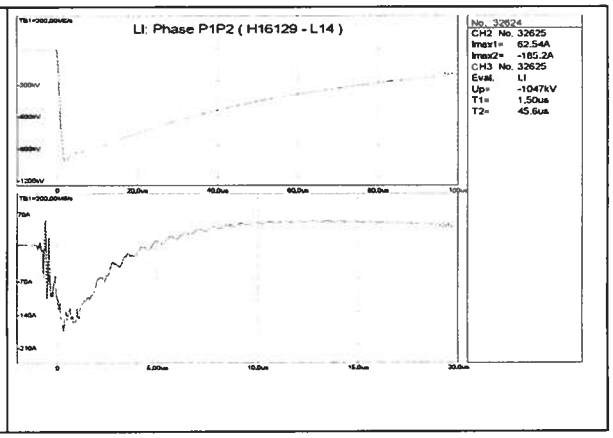
7th negative impulse (1050 kV)



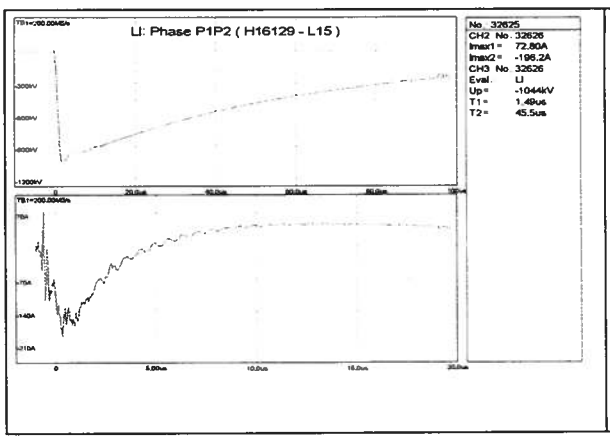
8th negative impulse (1050 kV)



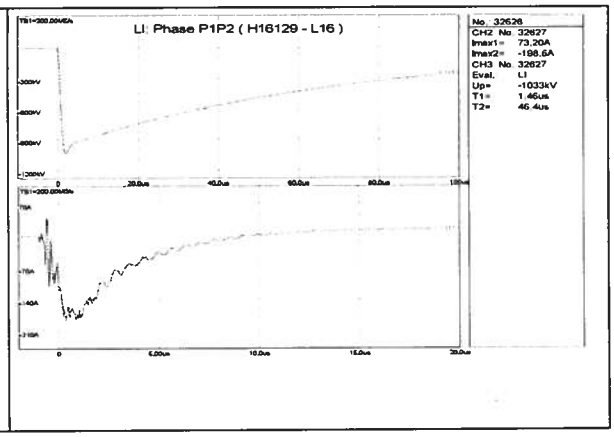
9th negative impulse (1050 kV)



10th negative impulse (1050 kV)



11th negative impulse (1050 kV)



12th negative impulse (1050 kV)

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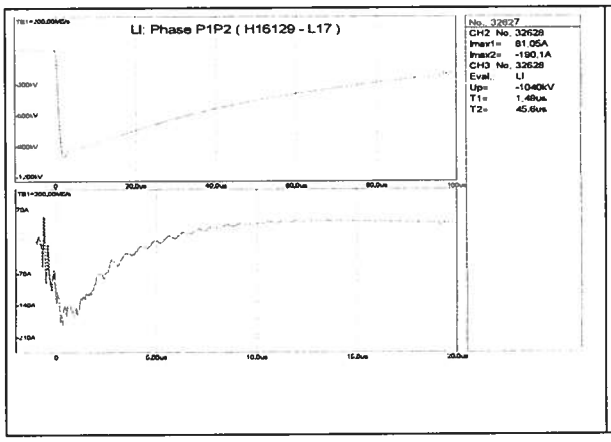
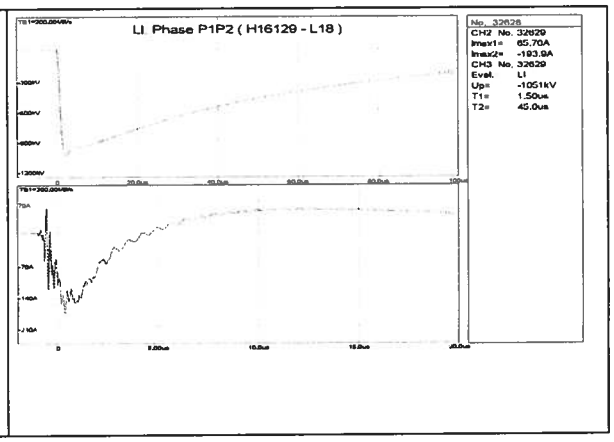
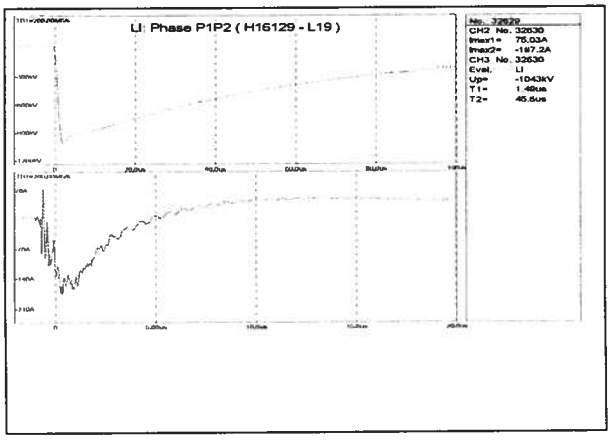


13th negative impulse (1050 kV)



14th negative impulse (1050 kV)



15th negative impulse (1050 kV)

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4.3 Wet test for outdoor type transformers

Standard and date

Standard IEC 61869-1 an IEC 61869-2, subclause 7.2.4

Test date 28 September 2016

Environmental conditions

Ambient temperature	18	°C	Ambient air pressure	1026	hPa
Humidity	49	%			

Procedure

The rain is calibrated in horizontal and vertical direction according IEC 60060-1. The primary winding and the secondary windings, screen and frame are connected to earth. Before the test artificial rain was sprayed over the transformer for 15 minutes. This rain continued during energizing the current transformer with 460 kV, 50 Hz for 1 minute.

Characteristic test data

	Average precipitation rate	
	Measured	Required
Vertical component	1,3 mm/min	1,0 to 2,0 mm/min
Horizontal component	1,2 mm/min	1,0 to 2,0 mm/min
Temperature of water	15 °C	-
Resistivity of water	109 Ωm	100 (± 15) Ωm

Requirement

Neither breakdown nor flash-over shall occur.

Result

The test object passed the tests.

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4.4 RIV test

Standard and date

Standard	IEC 61869-1, subclause 7.2.5.1
Test date	26 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1000	hPa
Humidity	72	%			

Procedure

The cleaned current transformer is connected and the primary connections are connected in such a way no spurious discharges will occur. The test set-up was calibrated with a frequency of 1 MHz.
The current transformer is pre-stressed with a voltage of 1,5 $U_m/\sqrt{3}$ for 30 s, after which the voltage is decreased to 1,1 $U_m/\sqrt{3}$ and maintained at this level for 30 s before the radio interference voltage was measured.

Characteristic test data

Difference between calibration and background was 18,5 dB.
After the pre-stress voltage of 126 kV during 30 seconds the result at 155,6 kV after 30 seconds was 17 dB.
From these result the calculated RIV was 750 µV.

Requirements

The RIV level should be lower than 2500 µV.

Result

The test object passed the tests.

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4.5 Test for accuracy

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.2.6.202 and 7.2.6.203

Test date 23 September 2016

Environmental conditions

Ambient temperature 20 °C

Procedure

The rated accuracy limit primary current is passed through the primary winding, which is connected in parallel, while the secondary winding is connected to a burden with rated load and an inductive power factor of 0,8. The composite error between the standard transformer and the sample should be less than 10% while more than 20 times rated current is flowing.

Also the composite error was measured for the measuring winding applying the suitable current to the primary winding, belonging to the instrument security factor. In this case the error is measured while less than 5 times the rated current is flowing.

The current errors and the phase displacements of the current transformer were determined by the Standard Transformer Comparison Method. The errors of the standard current transformer are known and were considered at the measurement.

Characteristic test data

Primary winding is connected in parallel.

Winding	Rated current (A)	Burden (VA)	Measured current (kA)	Composite error (%)
1S1-1S2	600	15	2,89	52,39
1S1-1S3	1200	30	5,29	45,80
1S1-1S4	2400	60	10,68	46,29
2S1-2S2	600	60	12,41	1,45
2S1-2S3	1200	120	24,65	1,02
2S1-2S4	2400	240	49,22	0,68
3S1-3S2	600	30	12,47	1,49
3S1-3S3	1200	60	24,74	1,16
3S1-3S4	2400	120	49,73	1,25
4S1-4S2	600	30	12,47	1,49
4S1-4S3	1200	60	24,77	1,26
4S1-4S4	2400	120	49,18	1,12
5S1-5S2	600	30	12,44	1,35
5S1-5S3	1200	60	24,82	1,02
5S1-5S4	2400	120	49,51	1,07

Requirement

For the measuring core the composite error at less than 5 times the rated current shall be more than 10%.

For the protection core the composite error at more than 20 times the rated current shall be less than 10%.

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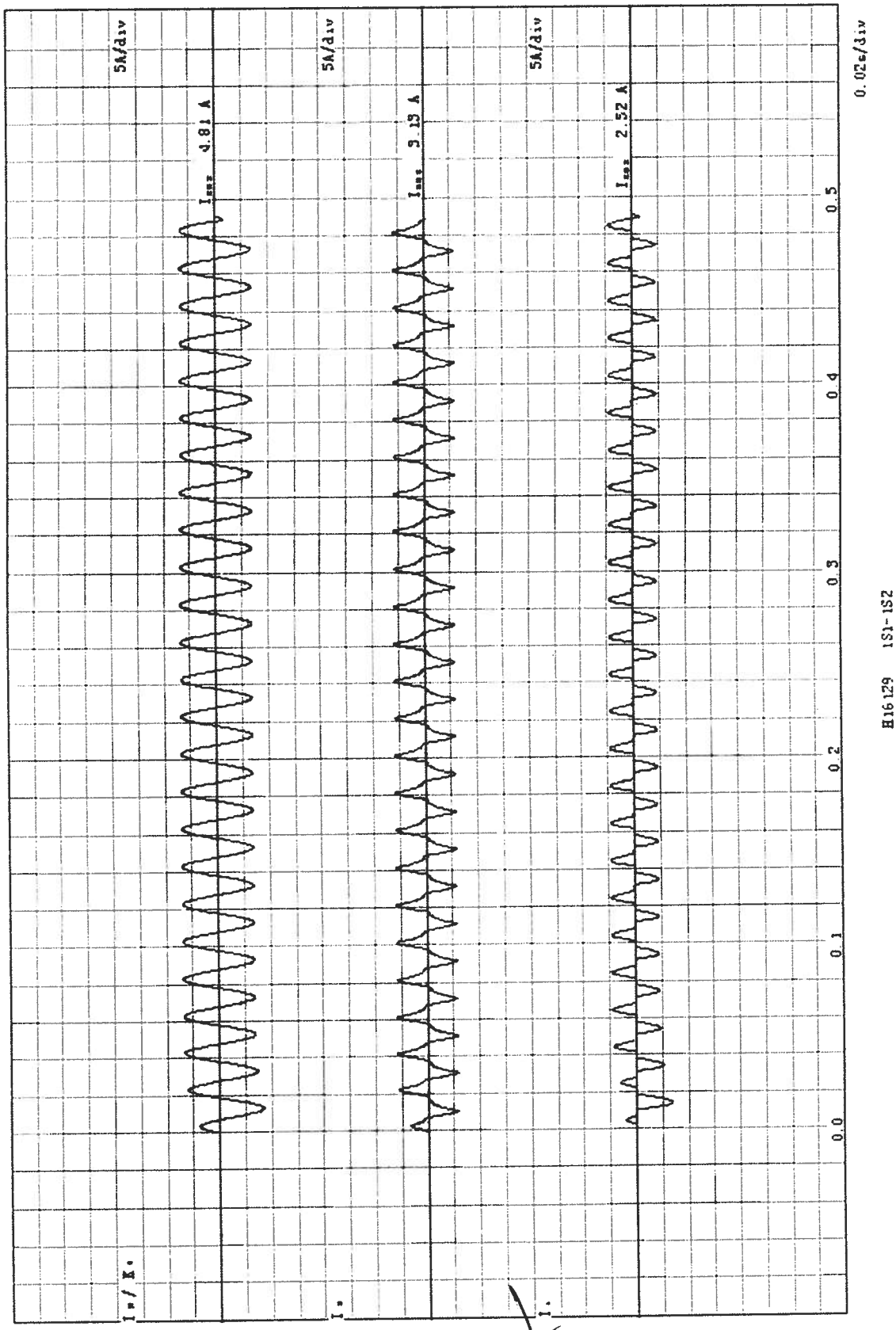
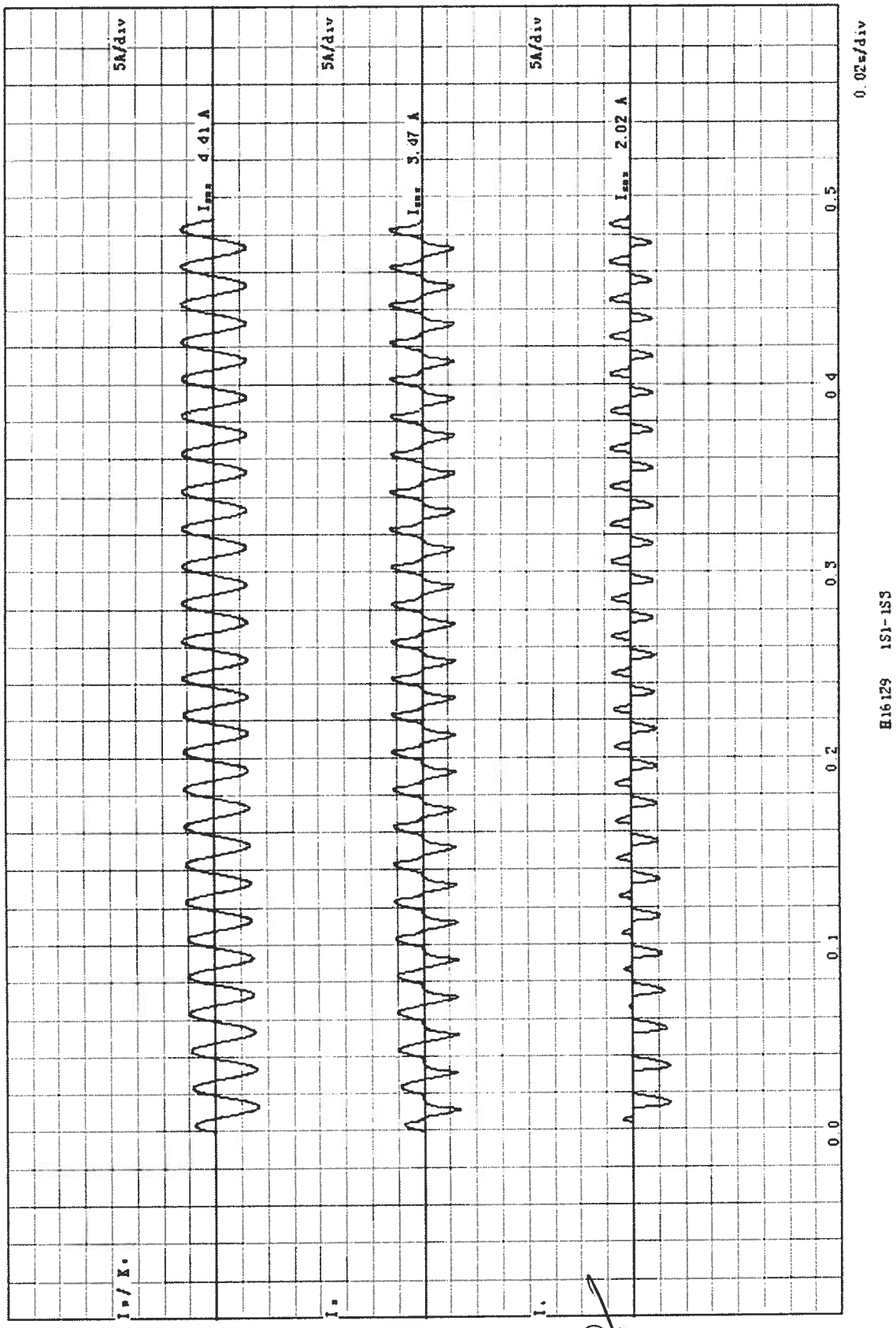
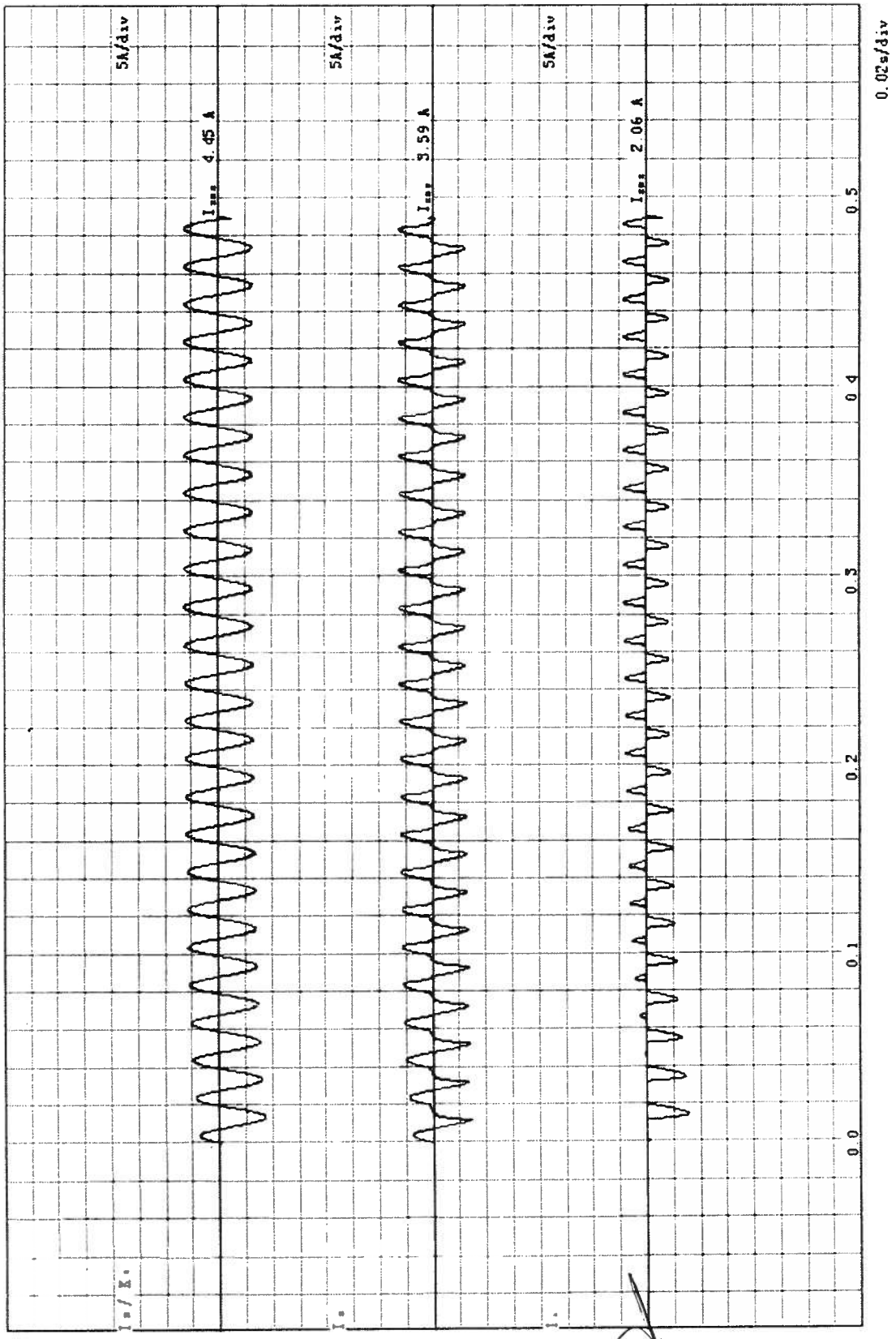
Result



Kawara Trade S.A



Kawara Trade S.A



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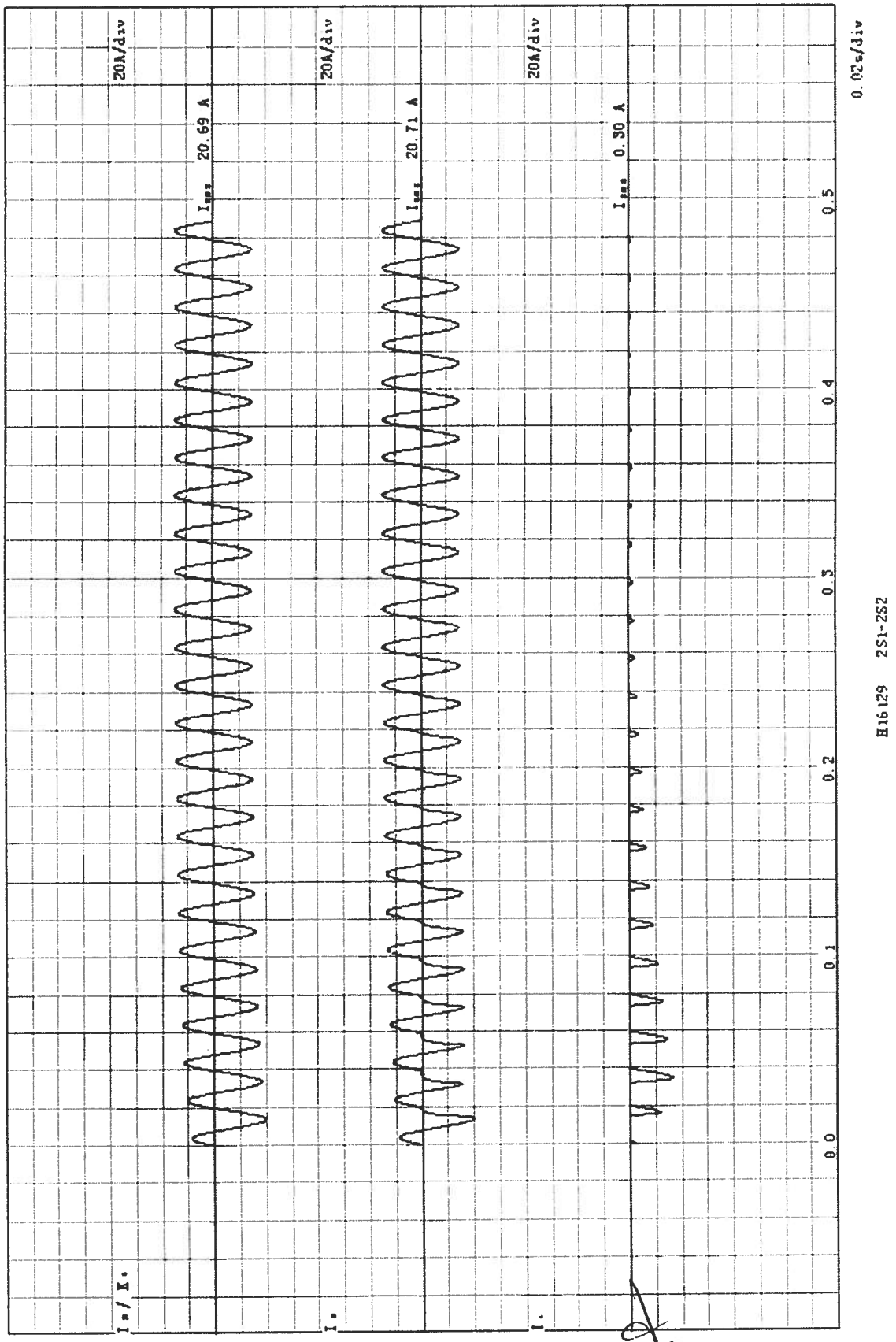

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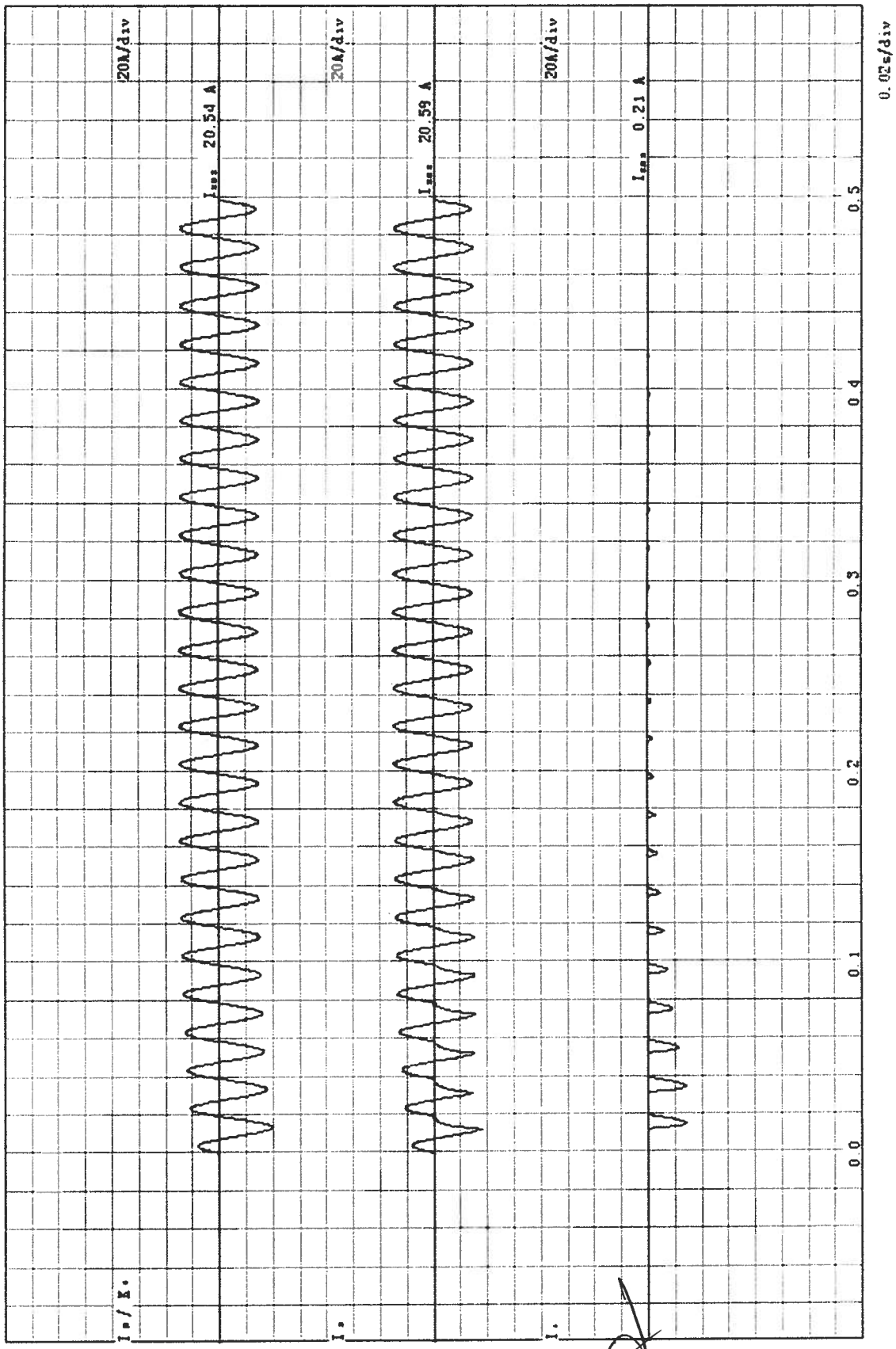
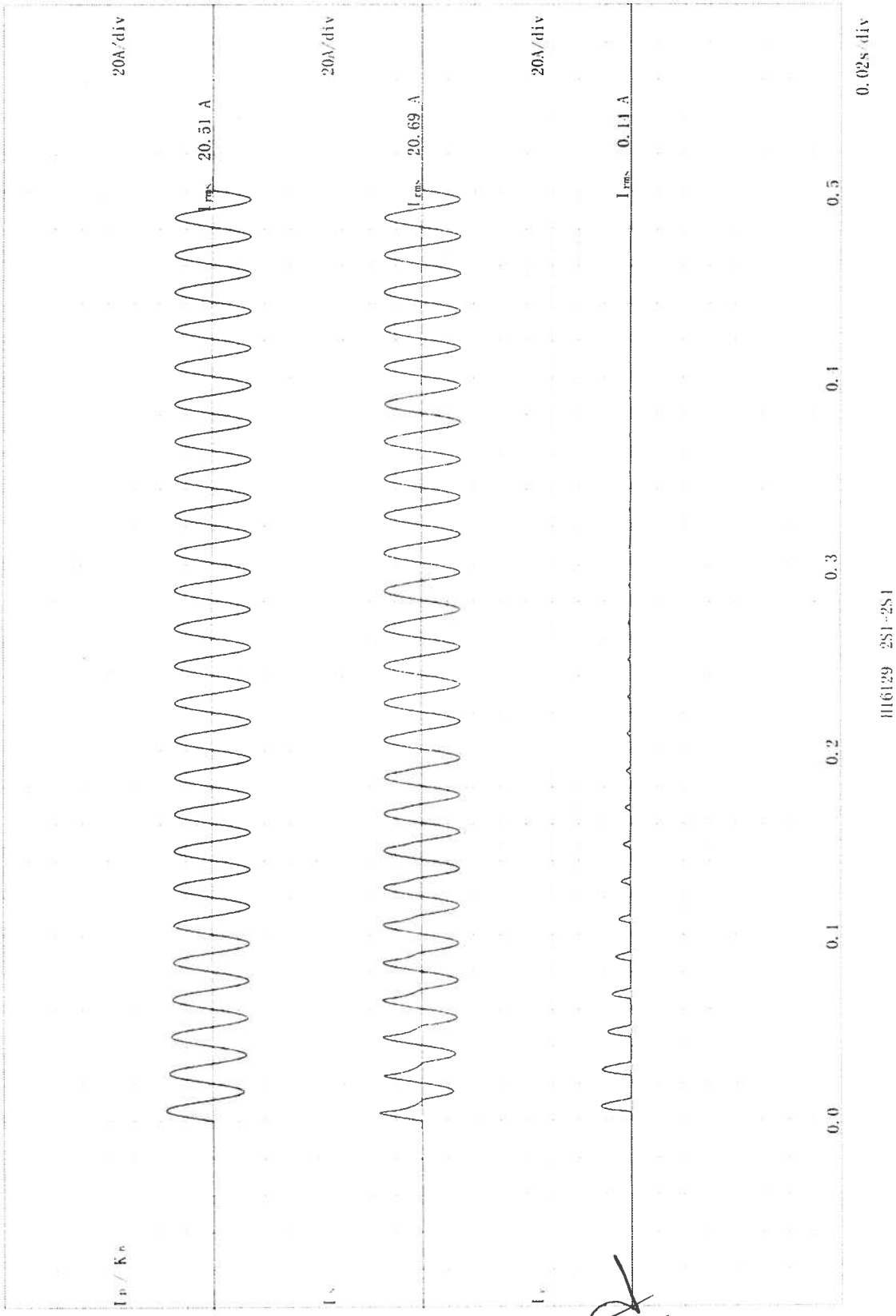

20A/div
20A/div
20A/div
0.02s/div
I_{rms} 20.54 A
I_{rms} 20.59 A
I_{rms} 0.21 A
0.0
0.1
0.2
0.3
0.4
0.5
I_a / A
I_b
I_c
H16129 2S1-2S3



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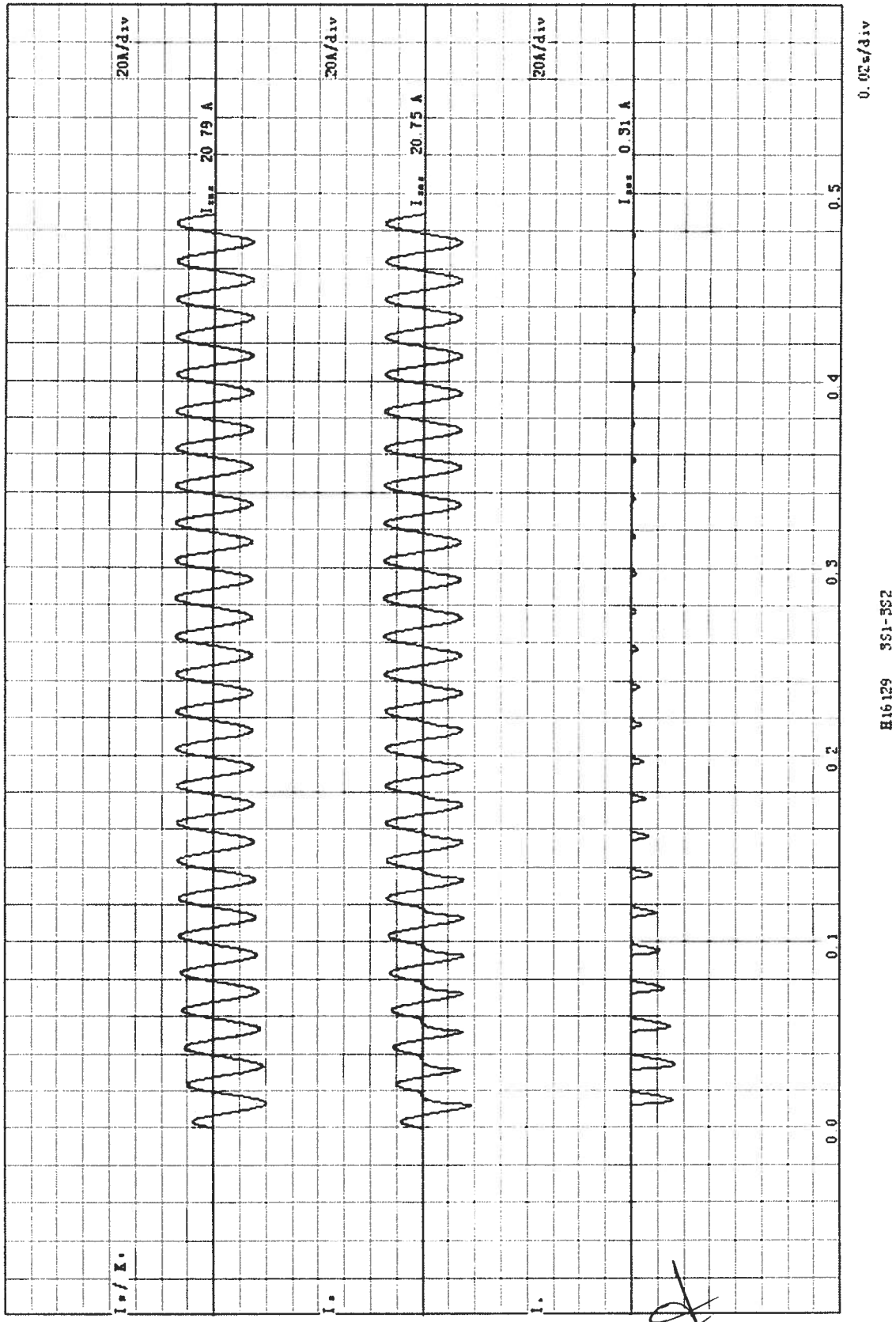

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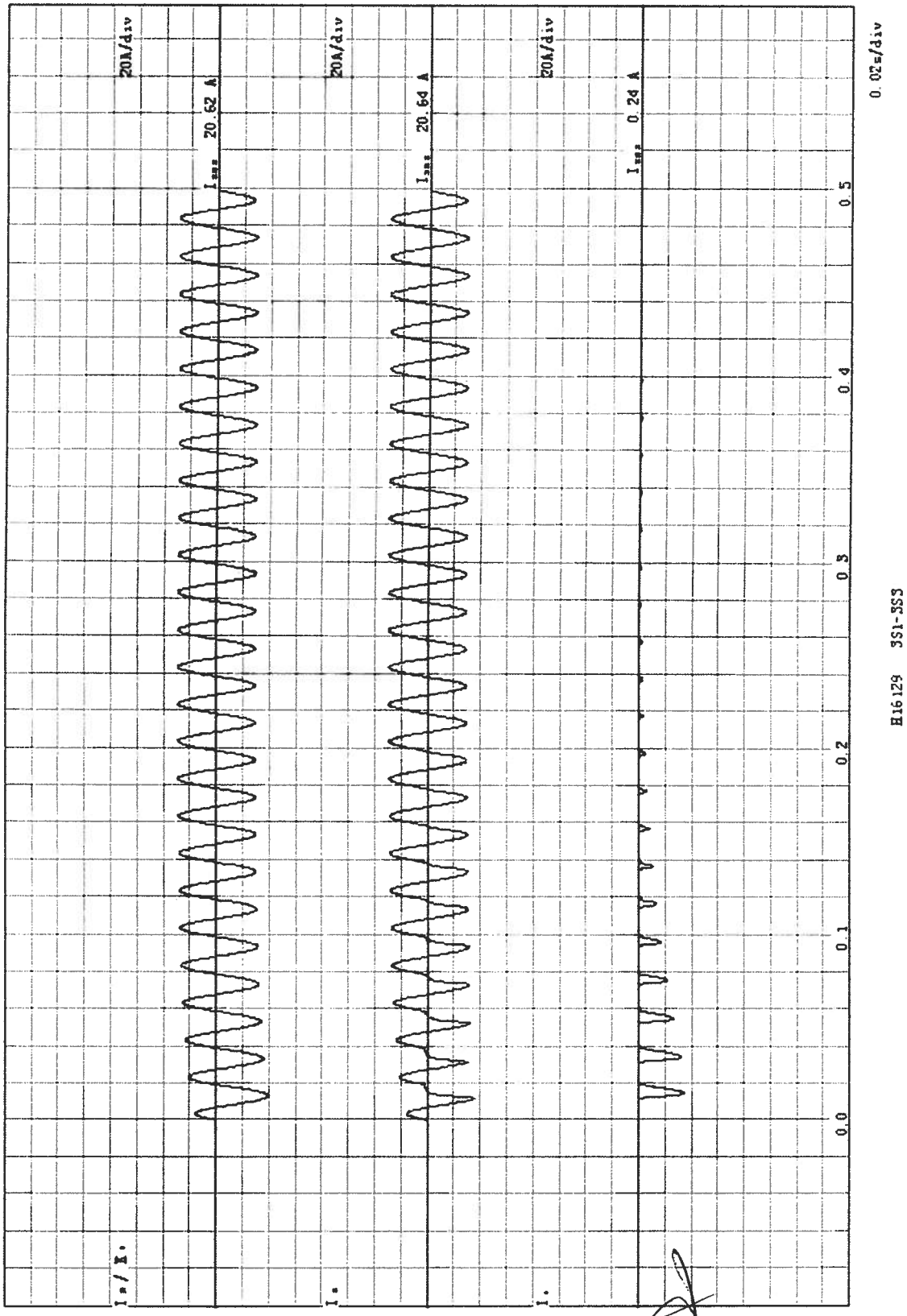

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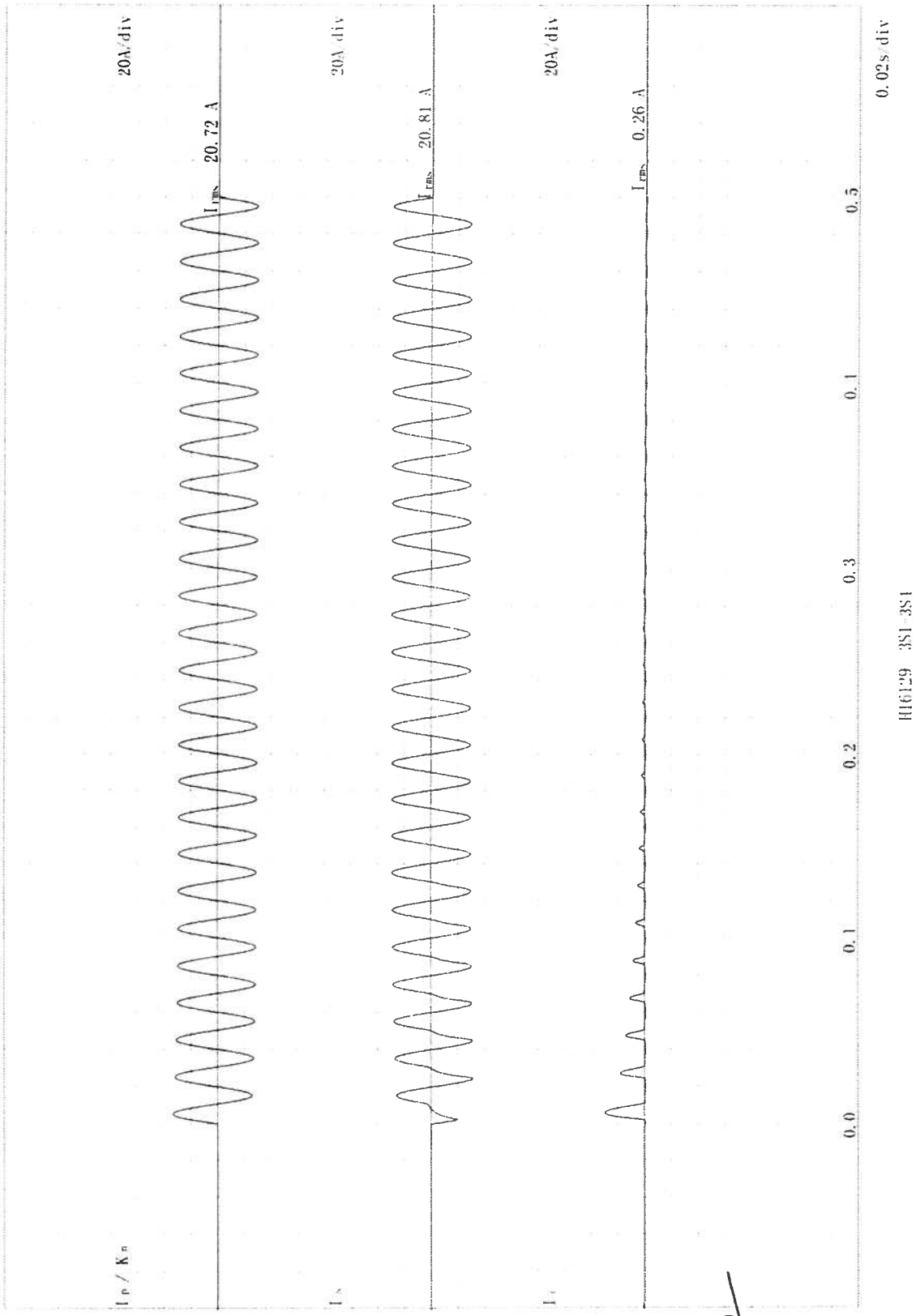

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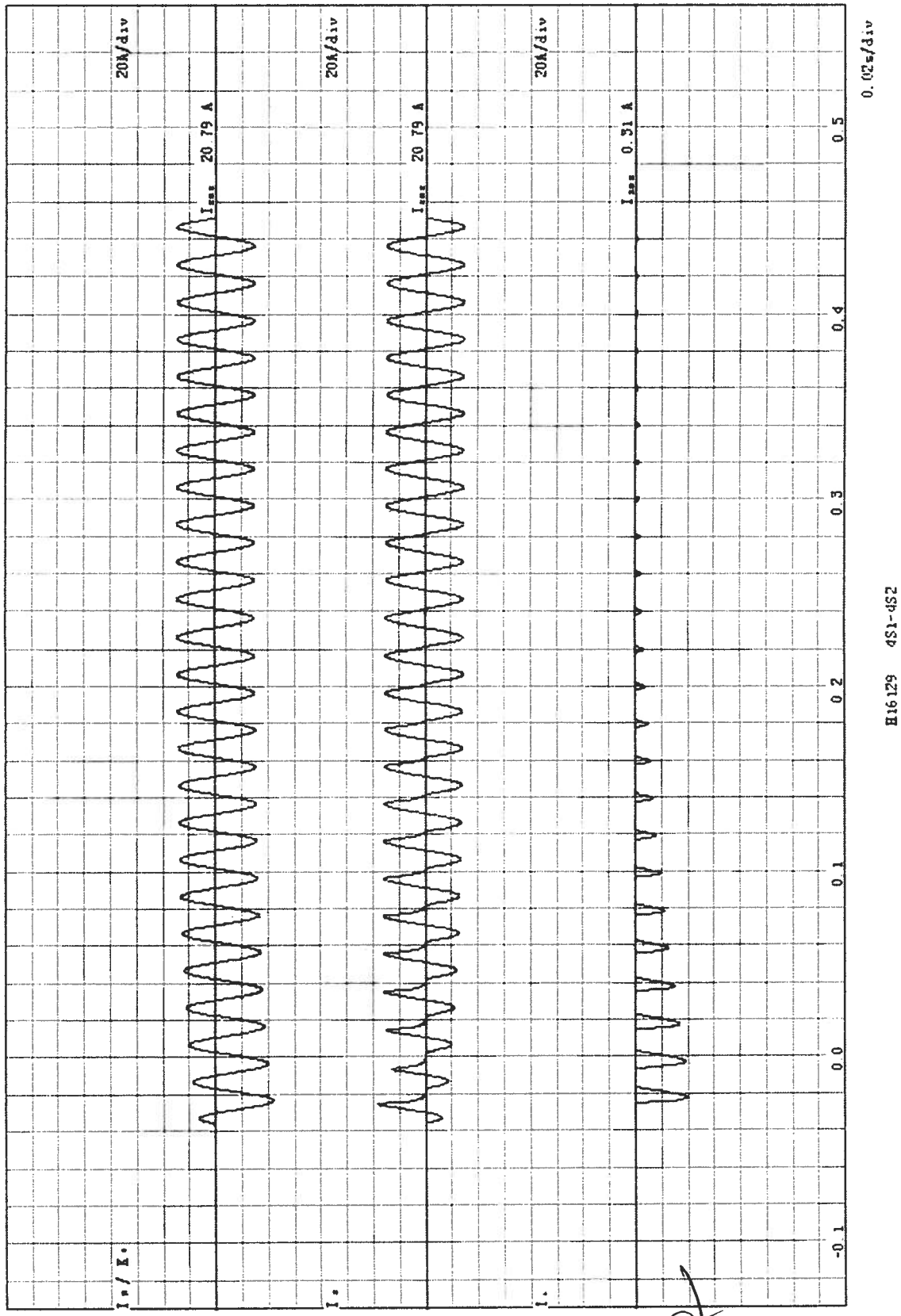

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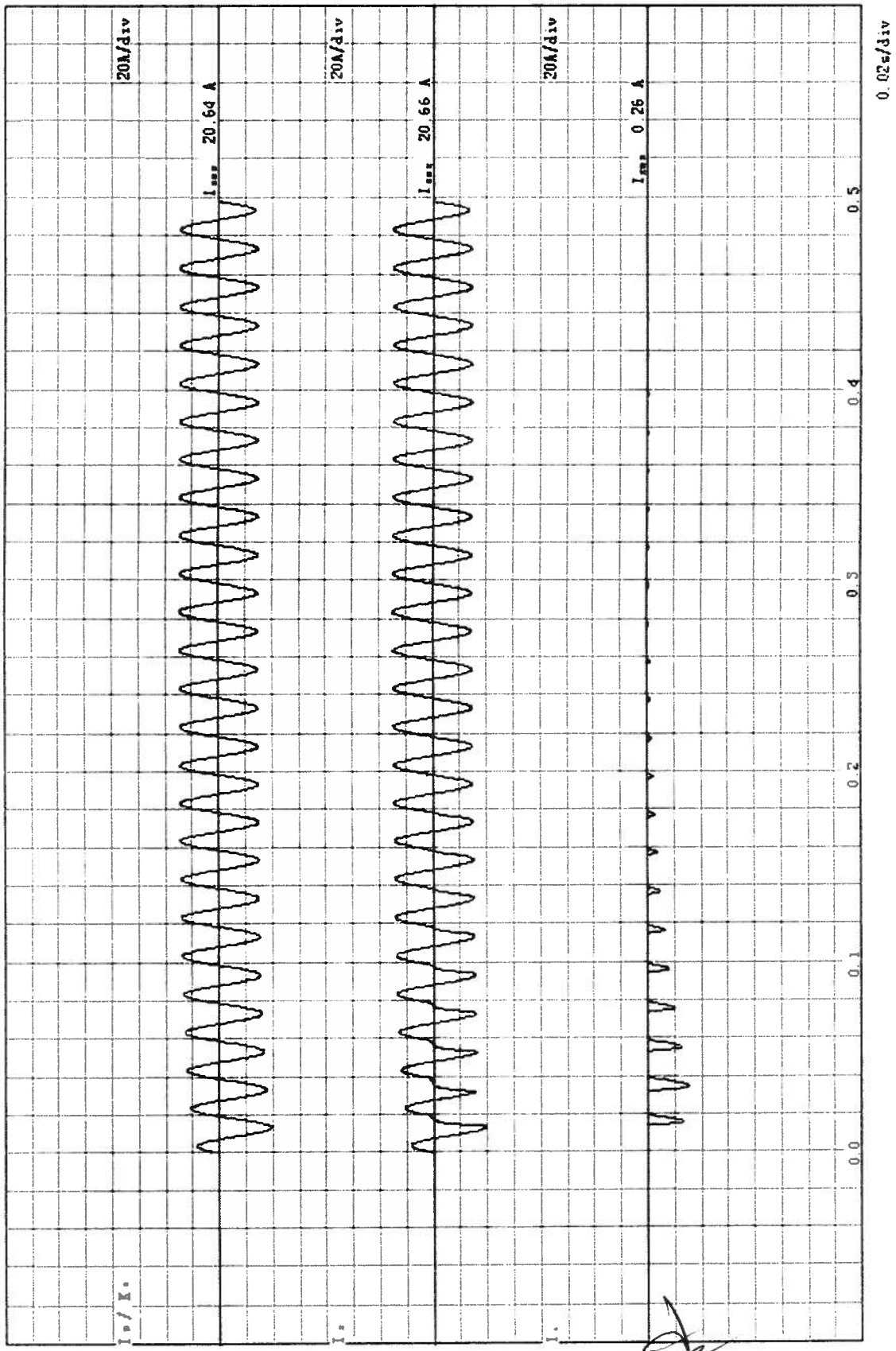
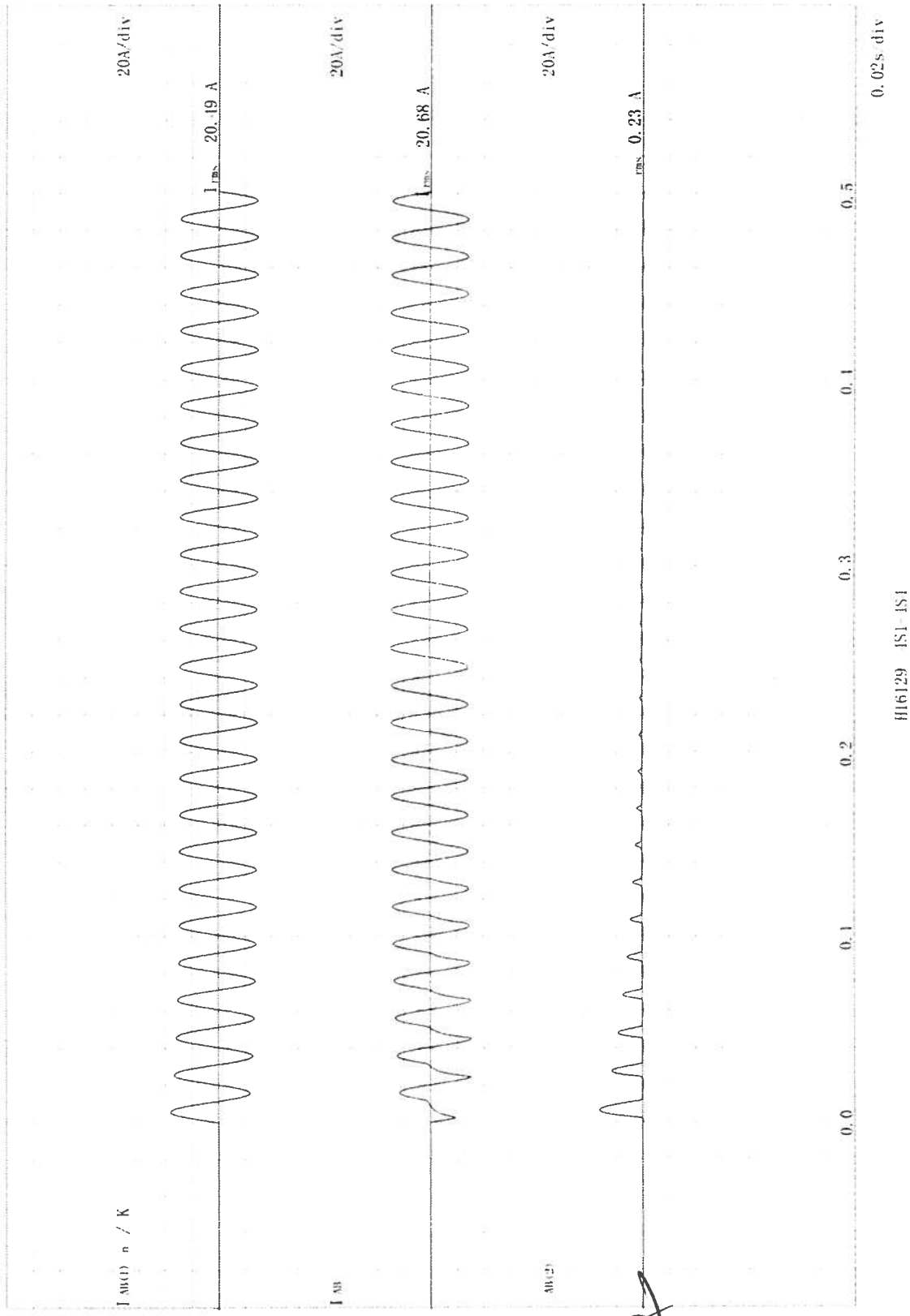


Kawera Trade S.A



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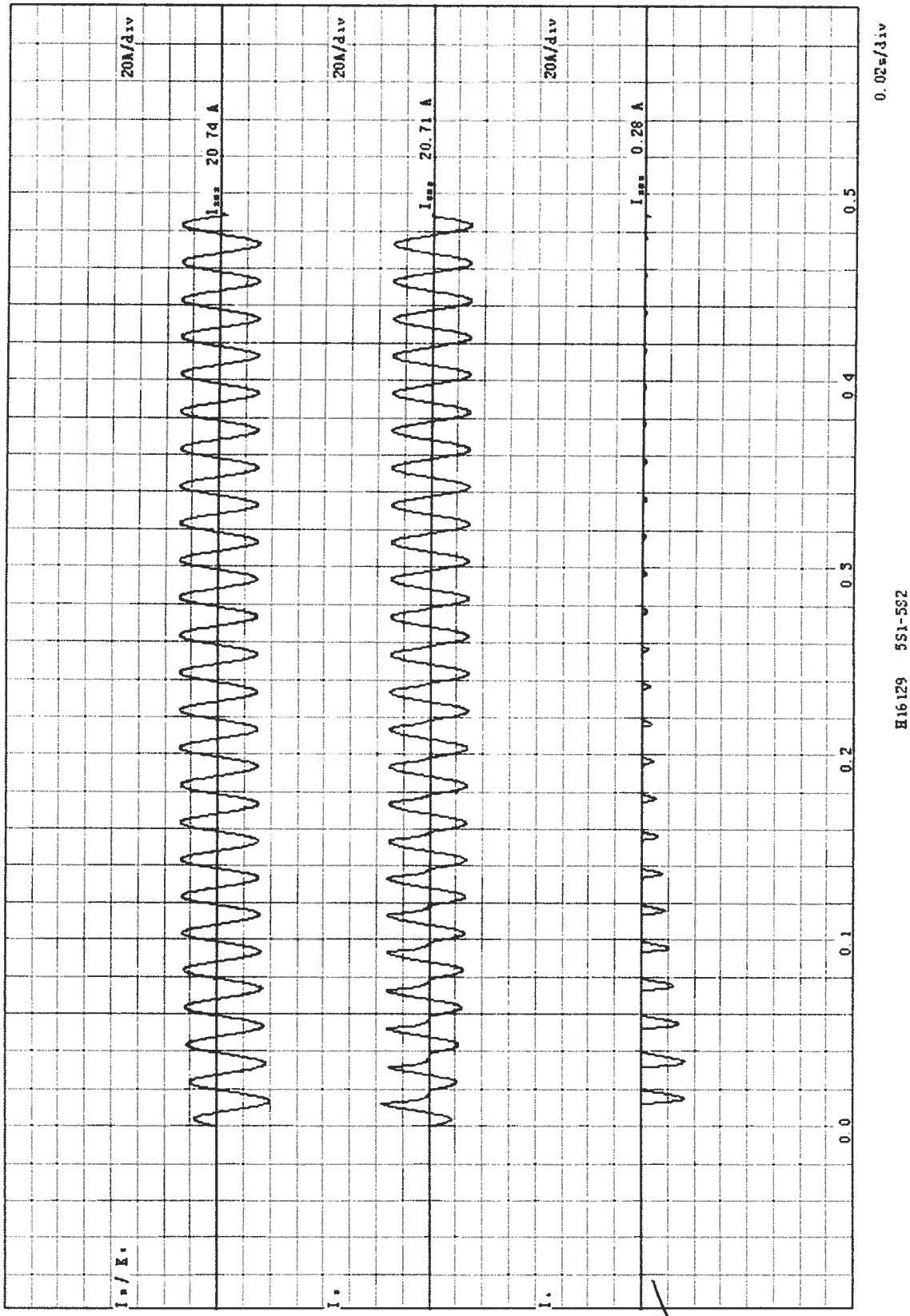

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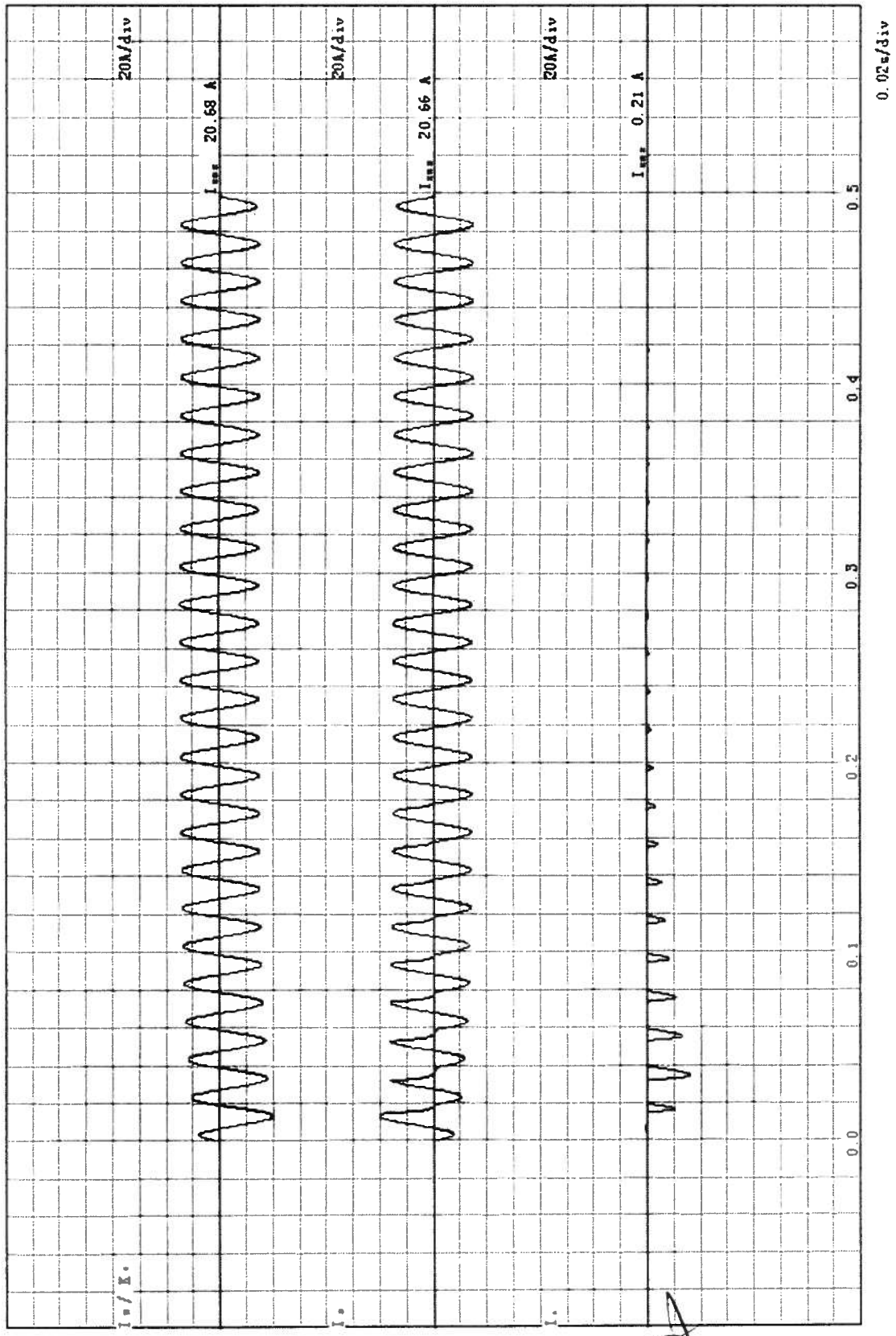

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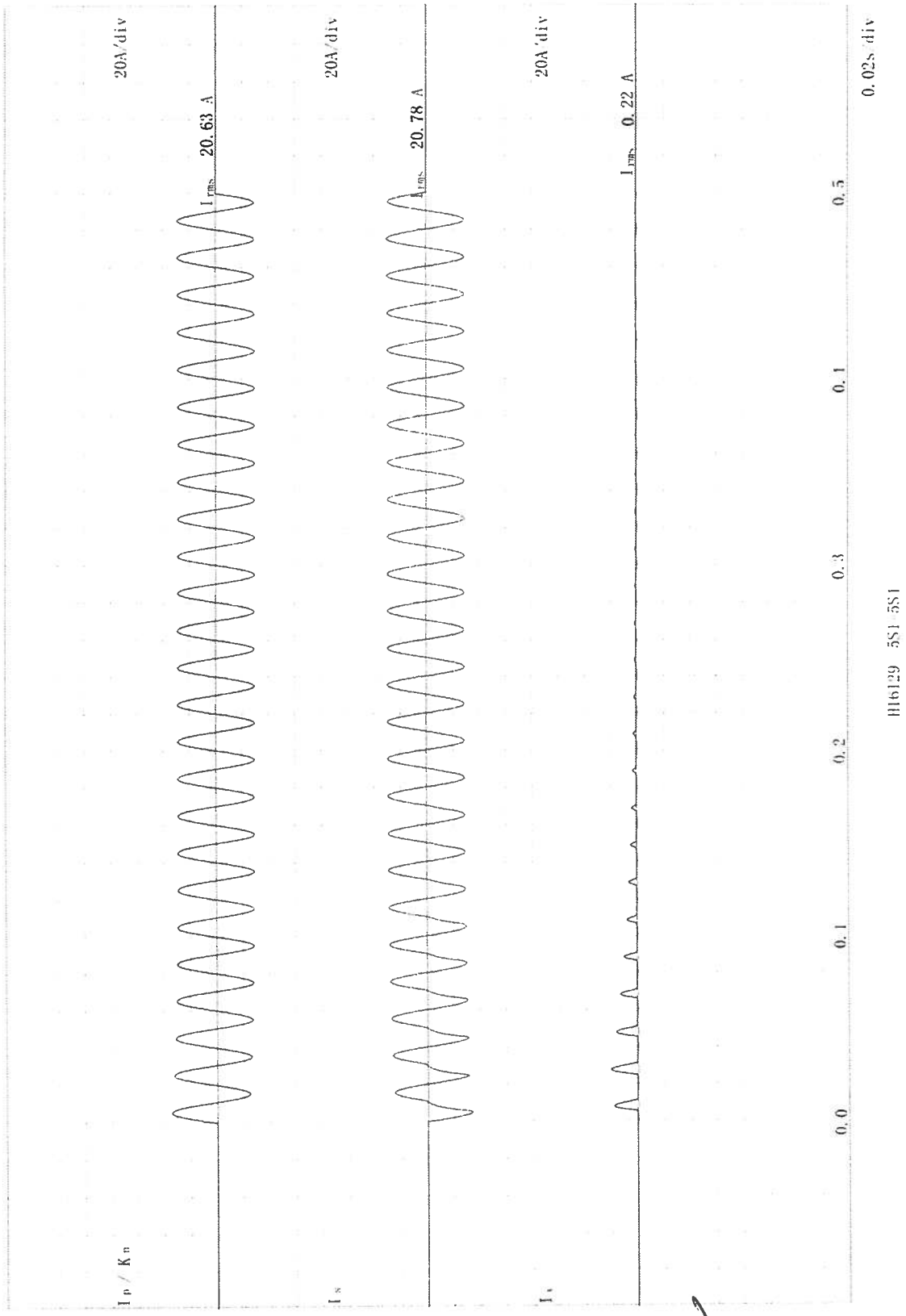

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4.6 Short-circuit withstand capability test

Standard and date

Standard	IEC 61869-2, subclause 7.2.201
Test date	23 September 2016

Environmental conditions

Ambient temperature	20 °C

Procedure

The specified dynamic and thermal currents were injected on the primary side. The secondary windings were subsequently short-circuited for 3 s.

After the short-time current tests the routine tests will be repeated and the transformer is examined carefully for damage on the outside surface and terminals.

Characteristic test data

Dynamic current in P1-P2	106,39 kA
Short-circuit thermal current in P1-P2	40,50 kA
Duration	3,01 s
I^2t	4937 10^6 J
Cross-section of primary winding	4775,94 mm^2
Current density of aluminium primary winding	14,69 A/mm^2

Requirements

- Dynamic current: >100 kA.
- Thermal current: 40 kA for 3 s.
- I^2t: >4800. 10^6 J.
- No visible damage or deterioration of insulation shall occur.
- The examination is not required if the current density in the primary winding corresponding to reated short-time thermal current shall not exceed 120/ A/mm^2.
- Repetition of the dielectrical routine test with 90% of test voltages with good results.
- Errors after demagnetization do not differ more than half the limits of the specified accuracy classes recorded before the short time current test.

Result

The test object passed the tests.

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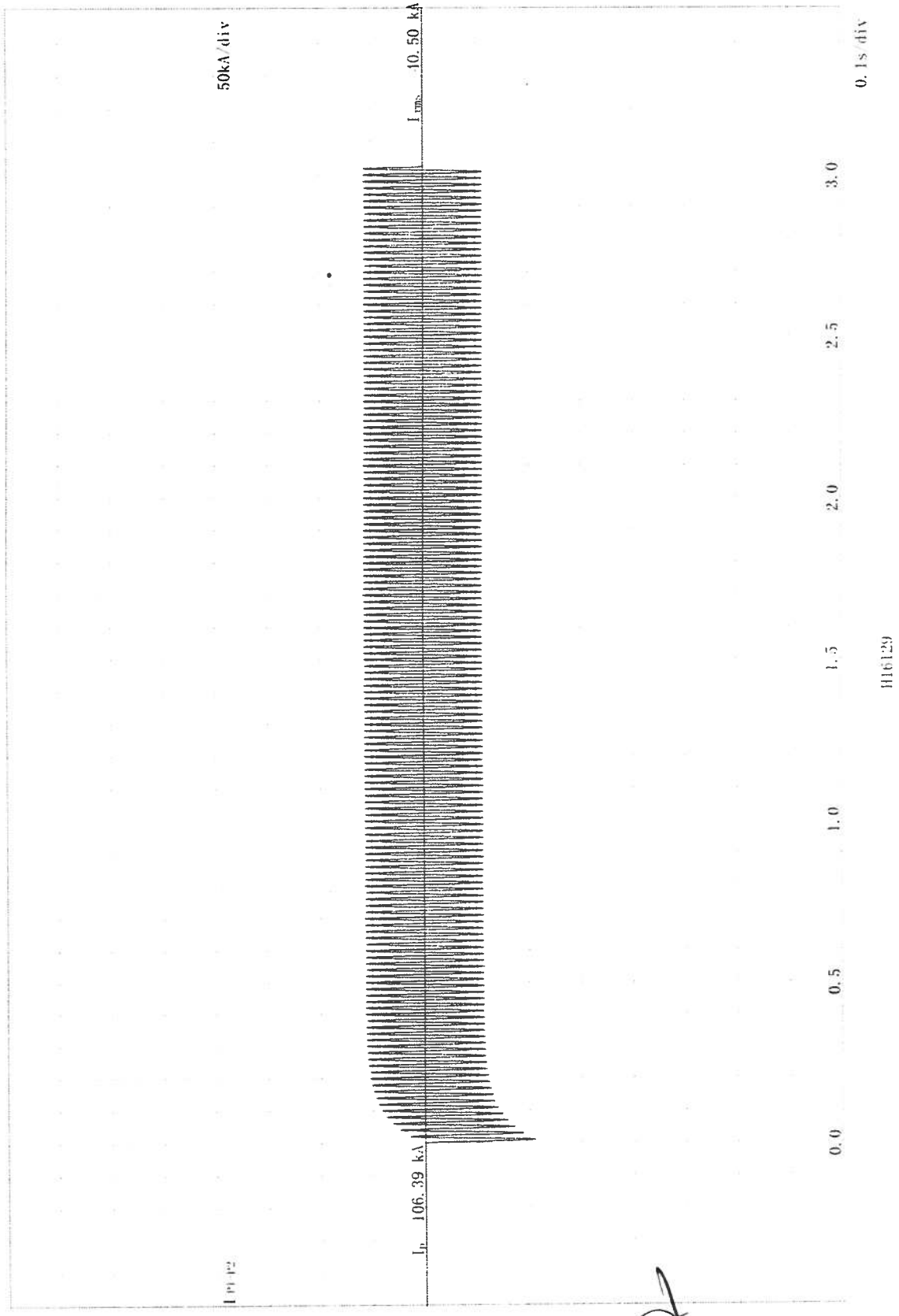

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4.7 Verification of the IP coding on secondary box

Standard and date

Standard IEC 61869-1 subclause 7.2.7.1

Test date 27 and 29 September 2016

Procedure

The tests included Test for protection against access to hazardous parts indicated by the first characteristic numeral which was performed in accordance with subclause 12.2 of IEC 60529, Test for protection against solid foreign objects indicated by the first characteristic numeral which was performed in accordance with subclause 13.4 and 13.5 of IEC 60529 and Test for protection against water indicated by the second characteristic numeral which was performed in accordance with subclause 14.2.5 of IEC 60529. The IP protection degree specified by the client was IP55 in accordance with subclause 5 and 6 of IEC 60529. The test was performed on a separate secondary box which was identical with on the current transformer.

Characteristic test data

First characteristic numeral 5	Required	Observation
The amount of talcum, kg	2/m^3	2/m^3
Duration of the test, h	8	8
Protected against access to hazardous parts with a wire	The access probe of Φ1,0 shall not penetrate	No
Dust-protected	Ingress of dust shall not penetrate	No

Second characteristic numeral 5	Required	Observation
The diameter of the nozzle, mm	6,3	6,3
Distance, m	2,5 to 3	2,5
Water flow rate, l/min	12,5 ± 5%	12,5
Duration, min	1 min/m^2, at lease 3	3
Temperature of the water, °C	-	18,0

Requirement

See Characteristic test data.

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Result

The test object passed the tests.

4.8 Mechanical impact test on secondary box

Standard and date

Standard	IEC 61869-1 subclause 7.2.7.2
Test date	28 September 2016

Procedure

In accordance with the requirements specified in 6.10.6, secondary box was subjected to an impact test. Three blows are applied to points of the enclosure that are likely to be the weakest points.

Characteristic test data

IK code	IK10
Impact energy	20 J
Impact test apparatus	Pendulum hammer
Number of impacts	3 times
Impact position	door and two side walls

Requirement

After the test, the secondary box shall show no breaks, the deformation of the secondary box shall not affect the normal function of the instrument transformer, and shall not reduce the specified degree of protection. Superficial damage, such as removal of paint, breaking of cooling ribs or similar parts, or minor indentations can be ignored.

Result

The test object passed the tests.

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4.9 Determination of secondary windings resistance (R_{ct})

Standard and date

Standard IEC 60044-6, subclause 7.2.3

Test date 21 September 2016

Procedure

The cold resistances of the windings were measured including the ambient temperature. The winding resistance were corrected to 75 °C.

Characteristic test data

Ambient temperature: 19,7 °C

Winding marking	Measurement of resistance , (Ω)	R_{ct}, (Ω)	
		Corrected to 75°C	Specified value
2S1-2S2	2,331	2,837	-
2S1-2S3	7,15	8,702	-
2S1-2S4	17,20	20,93	<27
3S1-3S2	1,978	2,407	-
3S1-3S3	6,003	7,306	-
3S1-3S4	14,41	17,537	<27
4S1-4S2	1,973	2,401	-
4S1-4S3	5,924	7,210	-
4S1-4S4	14,20	17,281	<27
5S1-5S2	1,973	2,401	-
5S1-5S3	5,987	7,286	-
5S1-5S4	14,45	17,586	<27

Requirements

The specified R_{ct} values see characteristic test data.

Result

The test object passed the tests.

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4.10 Determination of secondary excitation characteristic

Standard and date

Standard IEC 60044-6, subclause 7.2.4

Test date 29 September 2016

Procedure

The secondary excitation characteristics were measured at ambient temperature.

Characteristic test data

Ambient temperature: 18,0 °C

Winding marking	E_k (V)	Applied voltage (V)	Exciting current (mA)	Specified value (mA)
2S1-2S4	1600	5140	10,5	≤ 66
3S1-3S4	1000	2500	13,5	≤ 75
4S1-4S4	1000	2503	12,5	≤ 75
5S1-5S4	1000	2460	12,5	≤ 75

Requirements

- The e.m.f. was increased by 10% and the exciting current did not increase by more than 100%.
- The specified exciting current see characteristic test data.

Result

The test object passed the tests.

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5 SPECIAL TESTS

5.1 Chopped impulse test

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.4.1
Test date	23 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1019	hPa
Humidity	72	%			

Procedure

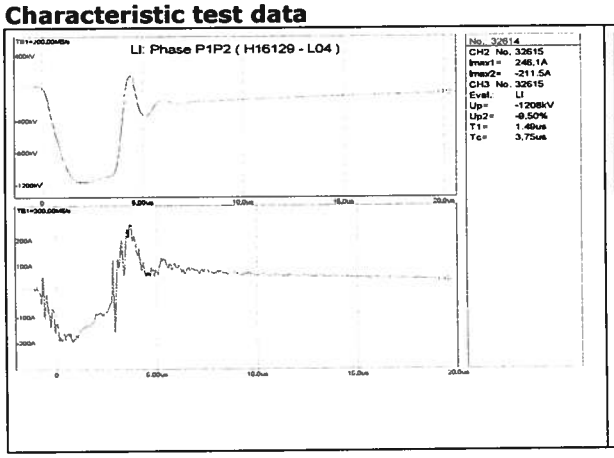
During the lightning impulse test, the transformer was subjected to a chopped lightning impulse test on the primary connections.

The test was carried out with negative polarity.

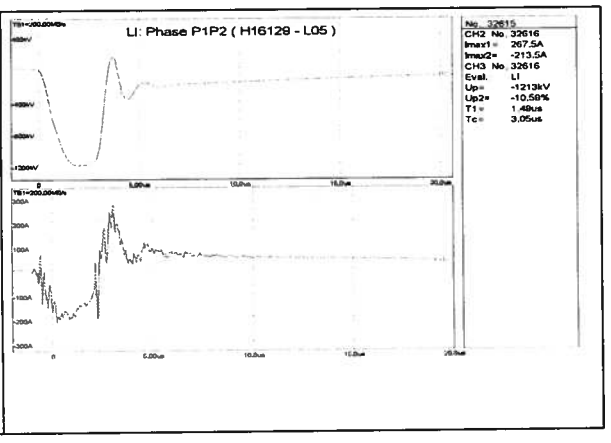
First the transformer was tested with a full impulse. Then the transformer was tested with two chopped impulses. The impulse was chopped after 2 to 5 µs.

Hereafter the lightning impulse test was continued.

Characteristic test data



1st negative impulse (1208 kV)



2nd negative impulse (1208 kV)

Requirements

- Two negative chopped impulses of 1207,5 kV.
- Chopping time: 2< t <5 µs.
- No break-down of the voltage

Result

The test object passed the tests.

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5.2 Measurement of capacitance and dielectric dissipation factor

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.4.3
Test date	26 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1000	hPa
Humidity	72	%			

Procedure

After AC test on primary winding, the test voltage was applied between the short-circuited primary terminals and earth. The short-circuited secondary windings, screen, and insulated metal casing were connected to the measuring bridge.

Characteristic test data

Applied voltage	Capacitance (pF)	Dielectric dissipation factor (%)
10	1259	0,171
141,5	1259	0,171

Requirement

The dielectric dissipation factor ≤ 0,5% at 10 kV and $U_m/\sqrt{3}$.

Result

The test object passed the tests.

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5.3 Transmitted overvoltage test

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.4.4

Test date 26 September 2016

Environmental conditions

Ambient temperature 23 °C

Characteristic test data

Winding	U_1 (V)	U_2 (mV)	$U_s=U_2/U_1xU_p$
1S1-1S4	100	146	467,3
2S1-2S4	100	244	781,0
3S1-3S4	100	226	723,4
4S1-4S4	100	298	953,9
5S1-5S4	100	270	864,3

Procedure

The current transformer is connected to the test equipment as described in the standard.
For each terminal of a secondary winding the voltage is measured, while impulses will be applied to one of the primary terminals and earth. The secondary windings not under test are put to earth.
The impulse characteristics are according to type A.

Requirement

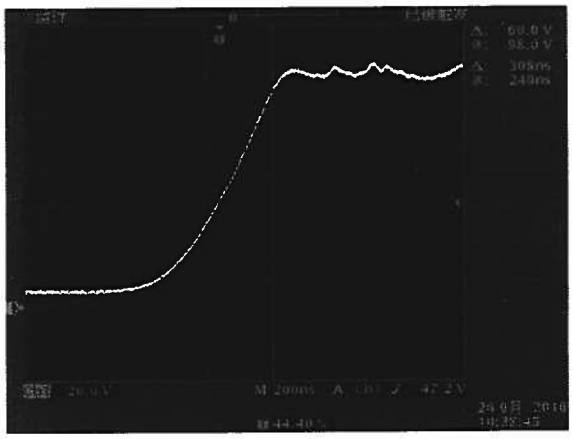
$U_p=1,6x\sqrt{2}/\sqrt{3}x245=320,1$ kV

The transmitted overvoltage should be lower than 1600 V.

Result

The test object passed the tests.

Kawara Trade S.A



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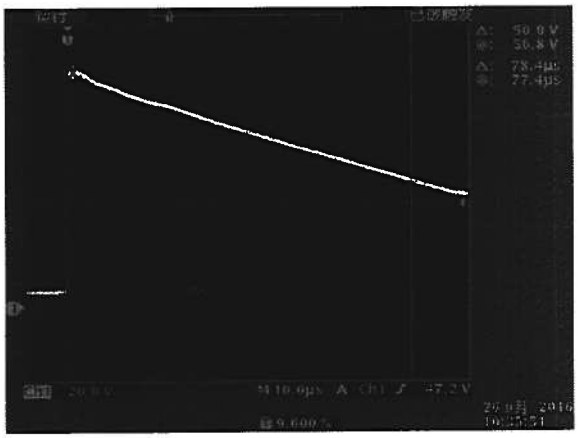
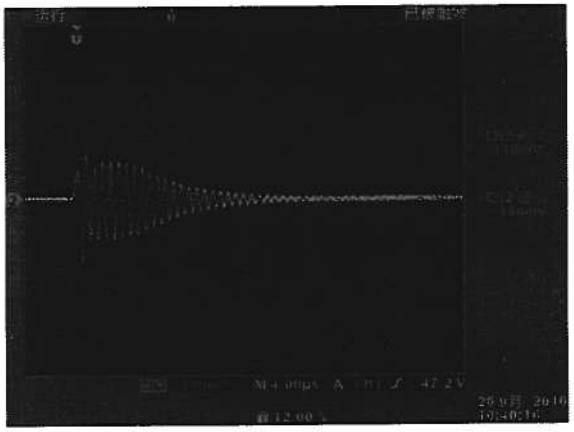


T_2



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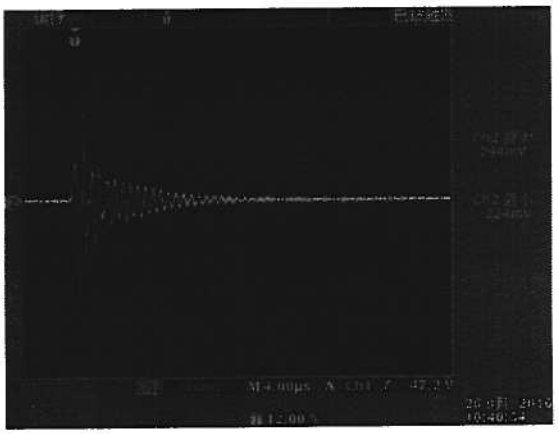

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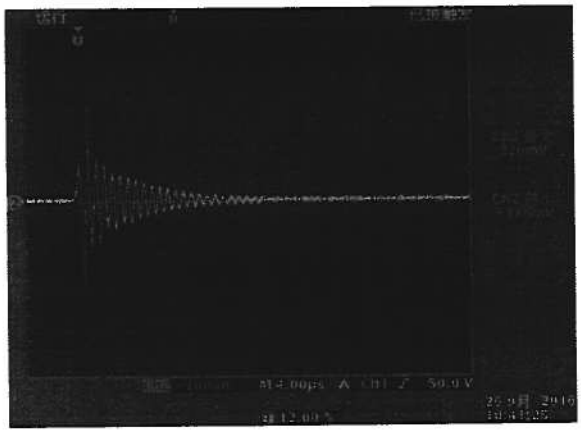
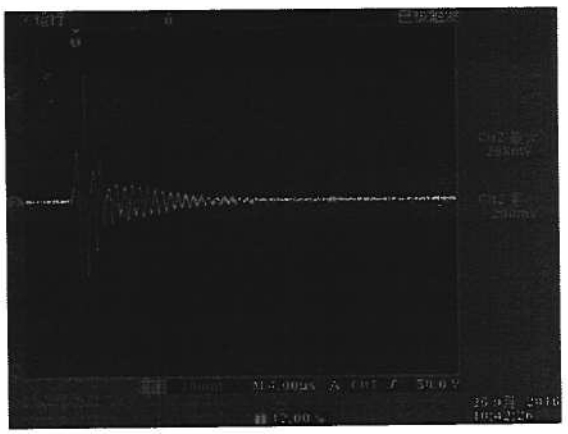


3S



4S

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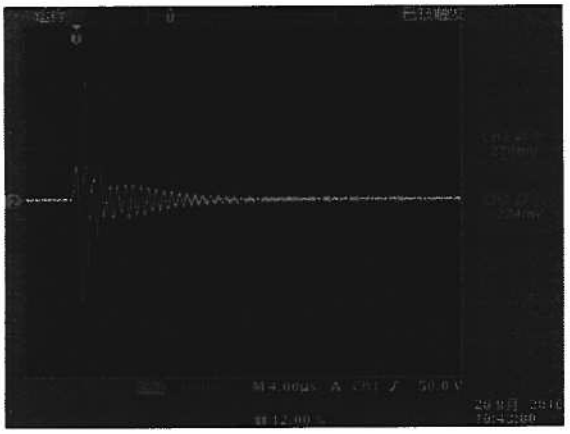

5S 2S

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5.4 Mechanical tests

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.4.5

Test date 1 June 2016

Procedure

After installing the current transformer in a vertical position with the frame fixed rigidly, both the terminals were subjected to a force each in three directions. The maximum deflection is measured and after releasing the force the residual deflection is measured.

Characteristic test data

Direction	Force (N)	Time (s)	Deflection at load		Deflection no load	
			P1	P2	P1	P2
X	4000	60	7	4	1	0
Y	4000	60	4	5	0	0
Z	4000	60	5	6	0	0

Requirement

There should be no evidence of damage or leakage

Result

The test object passed the tests.

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6 ROUTINE TESTS AFTER TYPE TESTS

6.1 Power-frequency voltage withstand tests on primary terminals

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.1
Test date	26 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1000	hPa
Humidity	72	%			

Procedure

The insulation between the primary winding and the secondary windings, screen and frame connected to earth, were tested with 90% of test voltage of 460 kV.

Characteristic test data

AC test voltage	414 kV (50 Hz)
Duration	1 min

Requirements

No break-down of the voltage shall occur.

Result

The test object passed the tests.

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6.2 Partial discharge measurement

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.2
Test date	26 September 2016

Environmental conditions

Ambient temperature	23	°C	Ambient air pressure	1000	hPa
Humidity	72	%			

Procedure

During the increase and the decrease of the test voltage, the transformer was examined for partial discharges in accordance with IEC 60270. The partial discharges were measured at U_m and 1,2 $U_m/\sqrt{3}$.

Characteristic test data

Voltage (kV)	Measured partial discharge (pC)
245	< 4
169,7	< 3

Requirements

- Partial discharge test voltage 1,2 $U_m/\sqrt{3}$ 100,5 kV < 5 pC.
- Partial discharge test voltage U_m 245 kV < 10 pC.

Result

The test object passed the tests.

Kawara Trade S.A

6.3 Power-frequency voltage withstand tests on secondary terminals

Standard and date

Standard	IEC 61869-1 and IEC 61869-2, subclause 7.3.4
Test date	29 September 2016

Environmental conditions

Ambient temperature	16	°C	Ambient air pressure	1021	hPa
Humidity	19	%			

Procedure

The insulation between the short-circuited terminals of each secondary winding section and between each secondary winding and earth was subjected to an applied voltage of 90% of test voltage of 3 kV.

Characteristic test data

AC test voltage	
Secondary windings	2,7 kV (50 Hz)
Earth screen	4,5 kV (50 Hz)
Duration	1 min

Requirements

No break-down of the voltage shall occur.

Result

The test object passed the tests.

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6.4 Inter-turn overvoltage test

Standard and date

Standard IEC 61869-2, subclause 7.3.204
Test date 29 September 2016

Environmental conditions

Ambient temperature	16	°C	Ambient air pressure	1021	hPa
Humidity	19	%			

Procedure

The primary winding of the current transformer was applied for 60 s with the secondary winding open circuited with 90% of 1,2 times the rated current at 50 Hz. The applied current was limited if the test voltage of 90% of 4,5 kV peak was obtained before reaching the required current.

Characteristic test data

Winding marking	Applied primary current (A)	Peak voltage of the secondary open-circuit winding (V)	Duration (s)
1S1-1S4	345,6	4050	60
2S1-2S4	12	4050	60
3S1-3S4	28,8	4050	60
4S1-4S4	28,8	4050	60
5S1-5S4	28,8	4050	60

Requirements

Ninety percent of the 1,2 times rated current will be limited if the test voltage of ninety percent of 4,5 kV peak is obtained before reaching the required current.

Result

The test object passed the tests.

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6.5 Test for accuracy

Standard and date

Standard IEC 61869-1 and IEC 61869-2, subclause 7.3.5
IEC 60044-6, subclause 7.2.1

Test date 29 September 2016

Environmental conditions

Ambient temperature 16 °C

Procedure

The current errors and the phase displacements of the current transformer were determined by the Standard Transformer Comparison Method. The errors of the standard current transformer are known and were considered at the measurement.

Characteristic test data

Primary winding is connected is parallel

Winding	Accuracy class	Current ratio (A)	I/Ir (%)	cos ø	Burden (VA)	Current error (%)	Phase displacement (')
1S1-1S2	0,2	600/1	120	0,8	15	0,0342	-0,213
			100			0,0260	-0,321
			20			-0,142	3,49
			5			-0,227	13,64
			120		3,75	0,0919	0,782
			100			0,0862	0,972
			20			0,0505	4,387
			5			0,063	6,39
1S1-1S3	0,2	1200/1	120	0,8	30	0,0146	0,041
			100			0,0119	-0,088
			20			-0,0727	1,937
			5			-0,109	6,67
			120		7,5	0,0461	0,506
			100			0,0434	0,637
			20			0,0281	2,362
			5			0,0306	3,281
1S1-1S4	0,2	2400/1	120	0,8	60	-0,0001	0,418
			100			-0,0016	0,446
			20			-0,0430	1,836
			5			-0,0602	3,971
			120		15	0,0183	0,660
			100			0,0174	0,763
			20			0,0150	1,455
			5			0,0121	1,776

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Winding	Accuracy class	Current ratio (A)	I/Ir (%)	cos ø	Burden (VA)	Current error (%)	Phase displacement (')
2S1-2S2	5P	600/1	100	0,8	60	-0,416	0,61
2S1-2S3	5P	1200/1	100	0,8	120	-0,207	0,46
2S1-2S4	5P	2400/1	100	0,8	240	-0,100	-0,029
3S1-3S2	5P	600/1	100	0,8	30	-0,438	1,51
3S1-3S3	5P	1200/1	100	0,8	60	-0,221	1,03
3S1-3S4	5P	2400/1	100	0,8	120	-0,1102	0,381
4S1-4S2	5P	600/1	100	0,8	30	-0,433	1,42
4S1-4S3	5P	1200/1	100	0,8	60	-0,218	0,97
4S1-4S4	5P	2400/1	100	0,8	120	-0,1078	0,364
5S1-5S2	5P	600/1	100	0,8	30	-0,434	1,34
5S1-5S3	5P	1200/1	100	0,8	60	-0,219	0,95
5S1-5S4	5P	2400/1	100	0,8	120	-0,1092	0,366

Requirements

The requirements are the maximum allowable errors and phase displacements as mentioned in the standard.

Result

The test object passed the tests.

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6.6 Turn ratio error

Standard and date

Standard IEC 60044-6, subclause 7.2.1

Test date 29 September 2016

Environmental conditions

Ambient temperature 16 °C

Procedure

The test was performed according to IEC 60044-6, Annex E.

Characteristic test data

Primary winding is connected is parallel.

Winding marking	Accuracy class	Current ratio (A)	I/Ir (%)	Secondary burden (Ω)	Current deviation (%)	Turns ratio error (%)
2S1-2S2	TPS	600/1	100	0	-0,0501	0,0078
			50	2,8	-0,108	
2S1-2S3	TPS	1200/1	100	0	-0,0280	0,0072
			50	8,75	-0,0632	
2S1-2S4	TPS	2400/1	100	0	-0,0136	0,0059
			50	21	-0,0331	
3S1-3S2	TPS	600/1	100	0	-0,0568	0,0064
			50	2,45	-0,120	
3S1-3S3	TPS	1200/1	100	0	-0,0305	0,026
			50	7,25	-0,087	
3S1-3S4	TPS	2400/1	100	0	-0,0148	0,0081
			50	17,55	-0,0377	
4S1-4S2	TPS	600/1	100	0	-0,0547	0,0086
			50	2,45	-0,118	
4S1-4S3	TPS	1200/1	100	0	-0,0289	0,0262
			50	7,25	-0,084	
4S1-4S4	TPS	2400/1	100	0	-0,0131	0,0086
			50	17,25	-0,0348	
5S1-5S2	TPS	600/1	100	0	-0,0557	0,0086
			50	2,45	-0,120	
5S1-5S3	TPS	1200/1	100	0	-0,0307	0,0256
			50	7,25	-0,087	
5S1-5S4	TPS	2400/1	100	0	-0,0154	0,0064
			50	17,55	-0,0372	

Requirements

The turn ratio error shall not exceed ±0,25%.

Kawara Trade S.A

Result

The test object passed the tests.

6.7 Verification of markings and pollution class

Standard and date

Standard IEC 61869-1, subclause 7.3.6, 6.6.1
Test date 29 September

Procedure

The terminal marking were inspected and compared with the requirements of the standard.
The measured creepage distance and the arc distances were compared with the requirements of the specified pollution class.

Characteristic test data

	Required	Observation
Terminal marking		ok
Pollution conditions	IV	-
Minimum creepage distance (mm)	31 x U_m=7595	8235
Arcing distance (mm)	-	2230
Ratio creepage distance/arcing distance	<4	3,70
External insulation	Brown porcelain	ok

Requirement

See Characteristic test data.

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Result

The test object passed the tests.

6.8 Resistance measurement of secondary windings

Standard and date

Standard Client's instruction

Test date 29 September 2016

Procedure

The cold resistances of the secondary windings were measured including the ambient temperature.

Characteristic test data

Measurement results

Winding marking	Measurement of resistance, (Ω)	Ambient temperature, (°C)
1S1-1S4	8,490	18,3
2S1-2S4	17,15	-
3S1-3S4	14,36	-
4S1-4S4	14,15	-
5S1-5S4	14,40	-

Requirements

No requirements.

Result

The test object passed the tests.

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6.9 Enclosure tightness check at ambient temperature

Standard and date

Standard	Client's instruction
Test date	29 September 2016

Procedure

The current transformer was assembled as in the service condition with all its accessories and filled with oil, and was checked after all tests finished.

Requirements

No leakage shall occur.

Result

The test object passed the tests.

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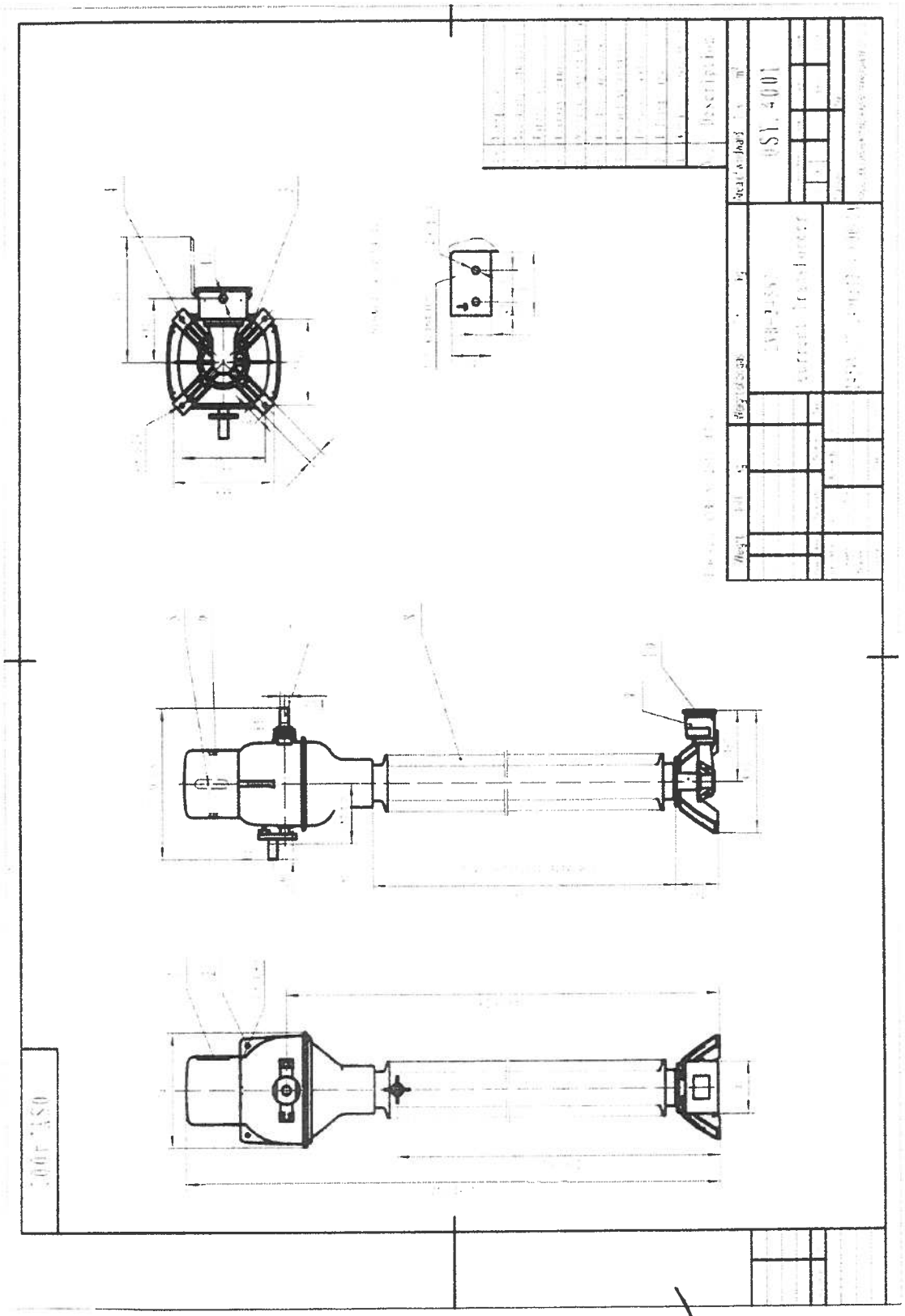
7 DRAWINGS



Outline drawing

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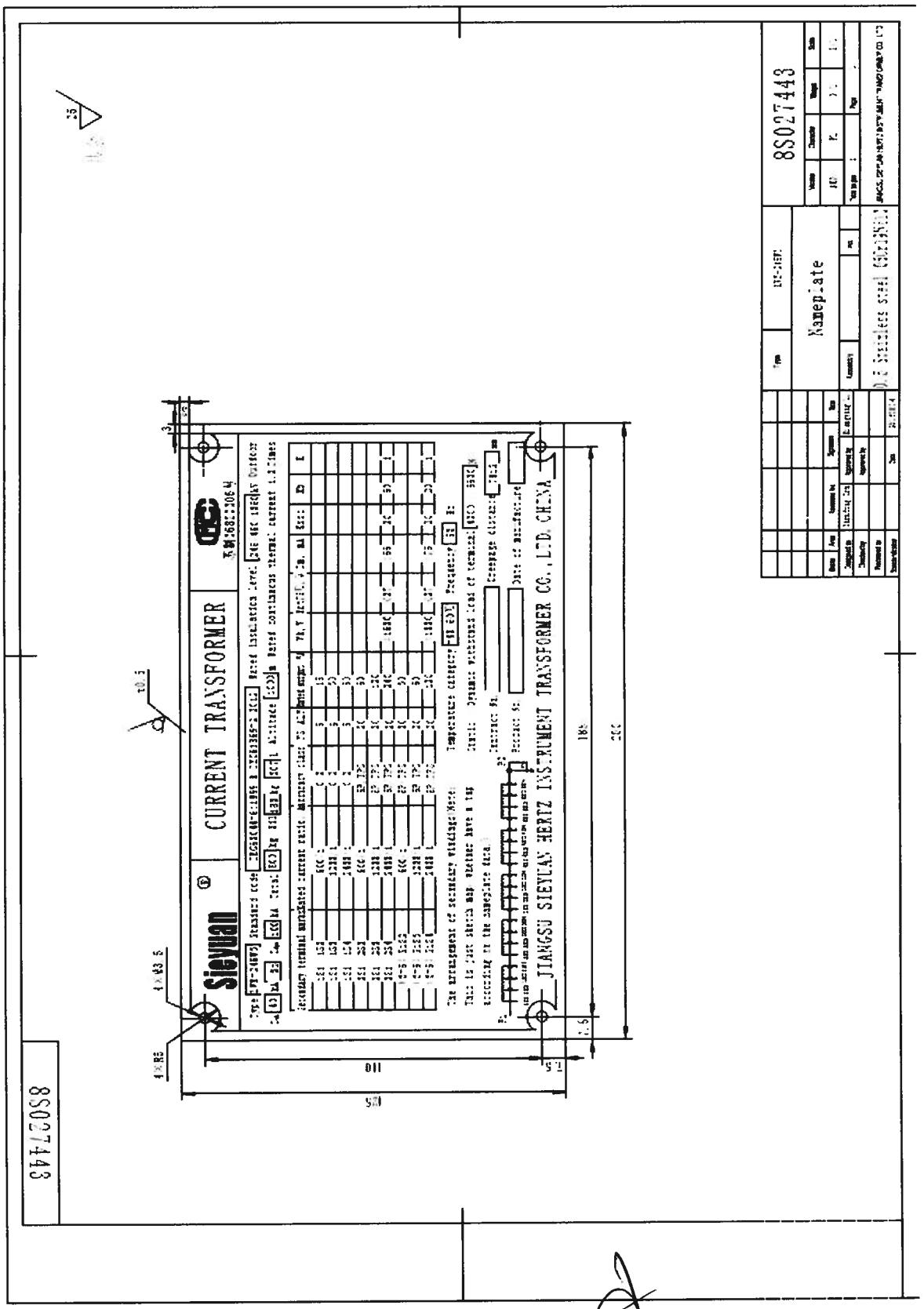

Rating plate drawing

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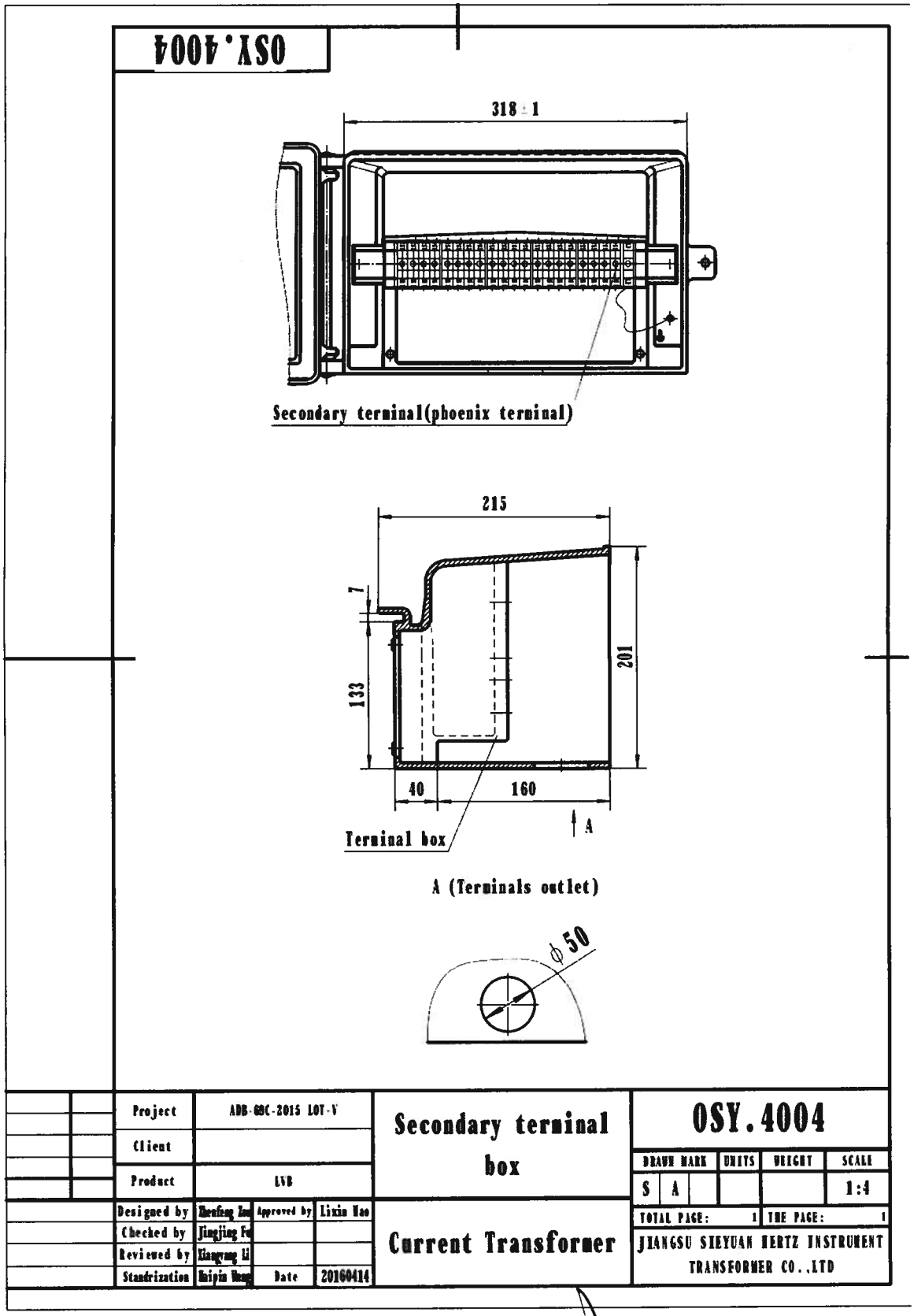

Connection box drawing

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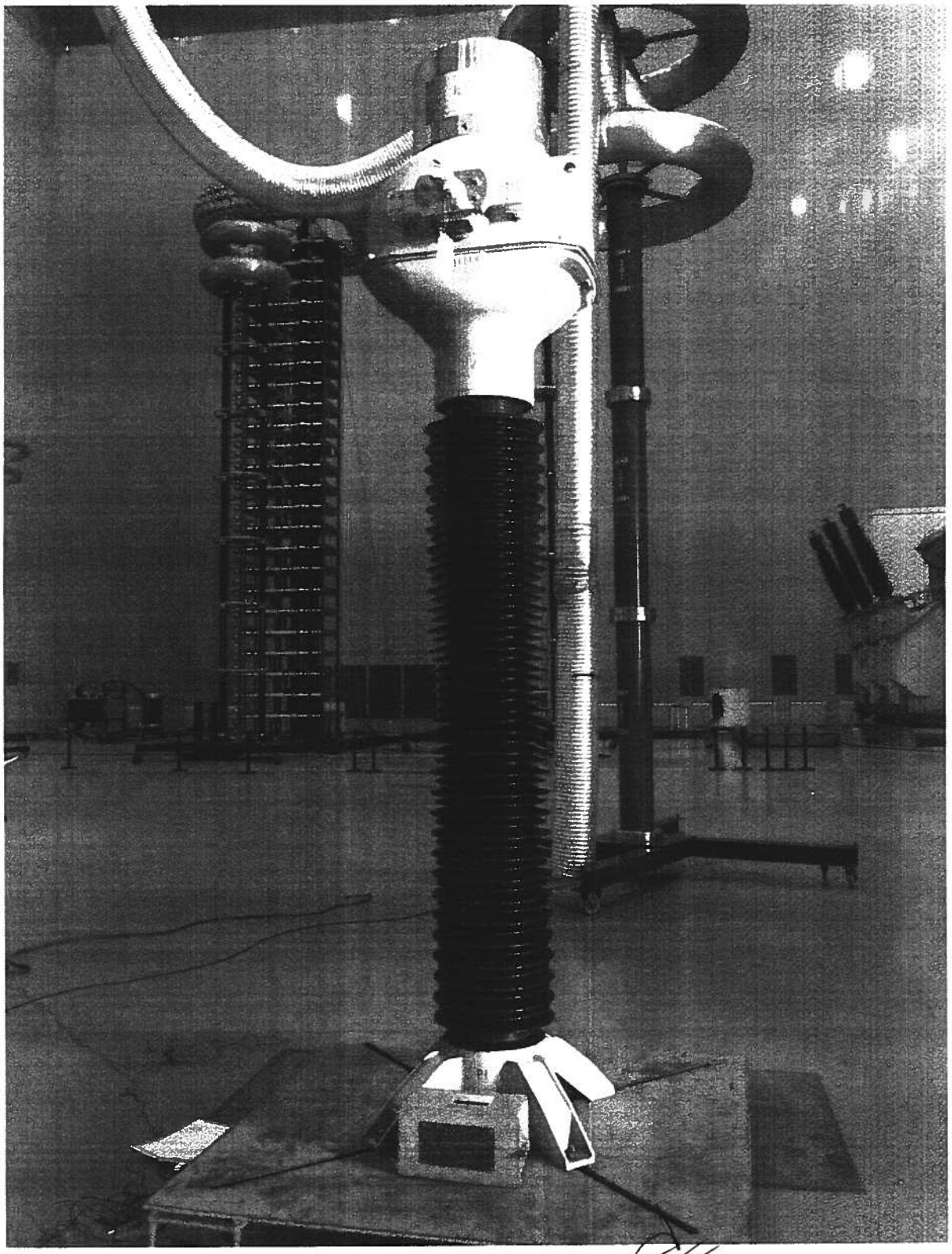
8 PHOTOGRAPHS OF TEST OBJECT



Current transformer

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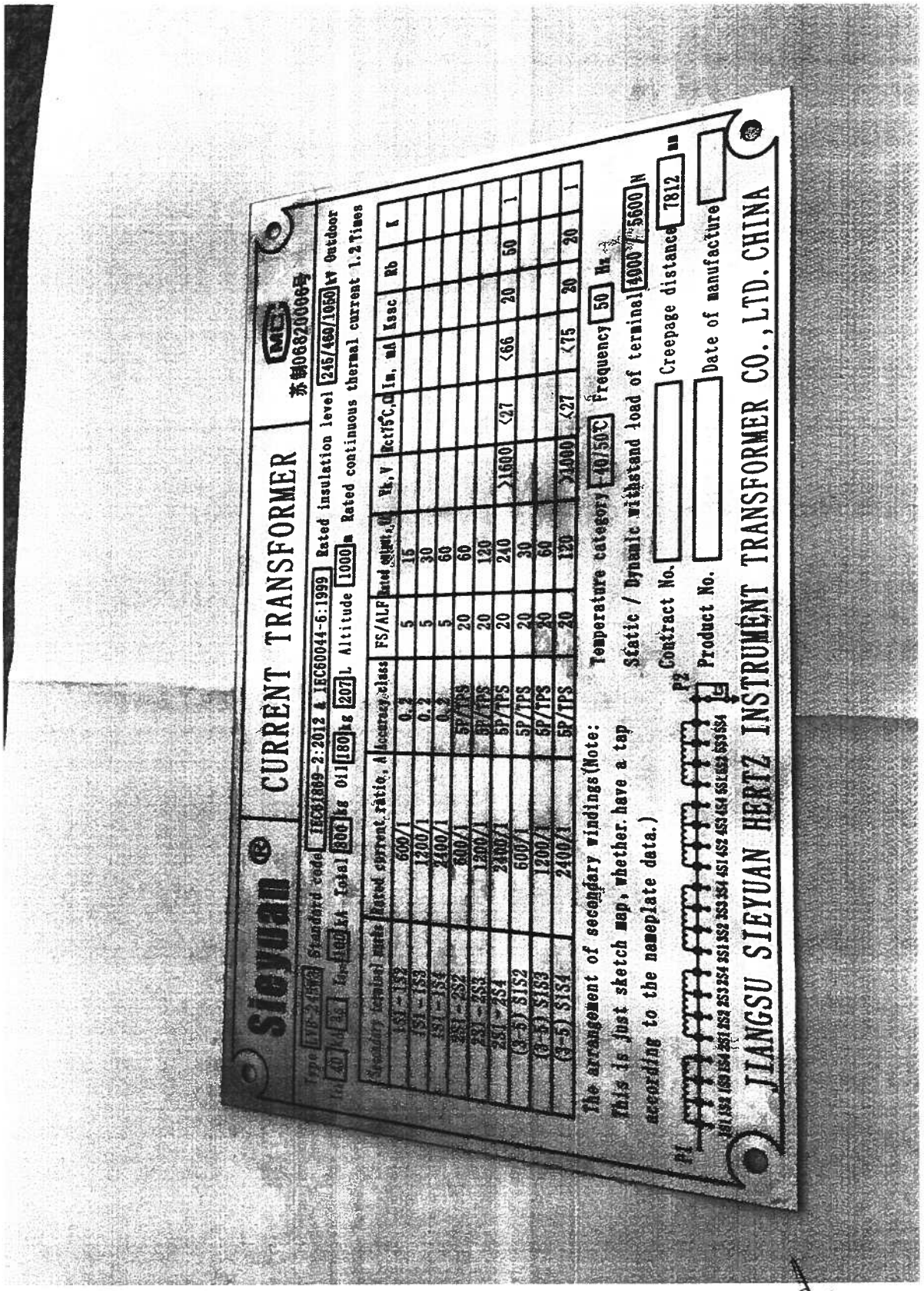

Siteyuan ®

CURRENT TRANSFORMER

苏制068200009号

Type LVB-24 Standard code IEC61869-2:2012 & IEC60044-6:1999 Rated insulation level 245/460/1050 kV Outdoor

Ur 40 kV Ur 36 kV Total 800 kg Oil 180 kg 207 L Altitude 1000 m Rated continuous thermal current 1.2 Times

Secondary terminal mark	Rated current ratio, A	Accuracy class	FS/ALF	Rated output, VA	Ub, V	Rct75°C, Ω	Im, mA	Ksac	Rb	K
1S1 - 1S2	600/1	0.2	5	15						
1S1 - 1S3	1200/1	0.2	5	30						
1S1 - 1S4	2400/1	0.2	5	60						
2S1 - 2S2	600/1	5P/TPS	20	60						
2S1 - 2S3	1200/1	5P/TPS	20	120						
2S1 - 2S4	2400/1	5P/TPS	20	240	>1600	<27	<66	20	50	1
(3-5) S1S2	600/1	5P/TPS	20	30						
(3-5) S1S3	1200/1	5P/TPS	20	60						
(3-5) S1S4	2400/1	5P/TPS	20	120	>4000	<27	<75	20	20	1

The arrangement of secondary windings(Note: This is just sketch map, whether have a tap according to the nameplate data.)

Temperature category -40/50℃ Frequency 50 Hz

Static / Dynamic withstand load of terminal 4900 / 5600 N

Contract No. Creepage distance 7812 mm

Product No. Date of manufacture

P1 P2

JIANGSU SIEYUAN HERTZ INSTRUMENT TRANSFORMER CO., LTD. CHINA

Rating plate

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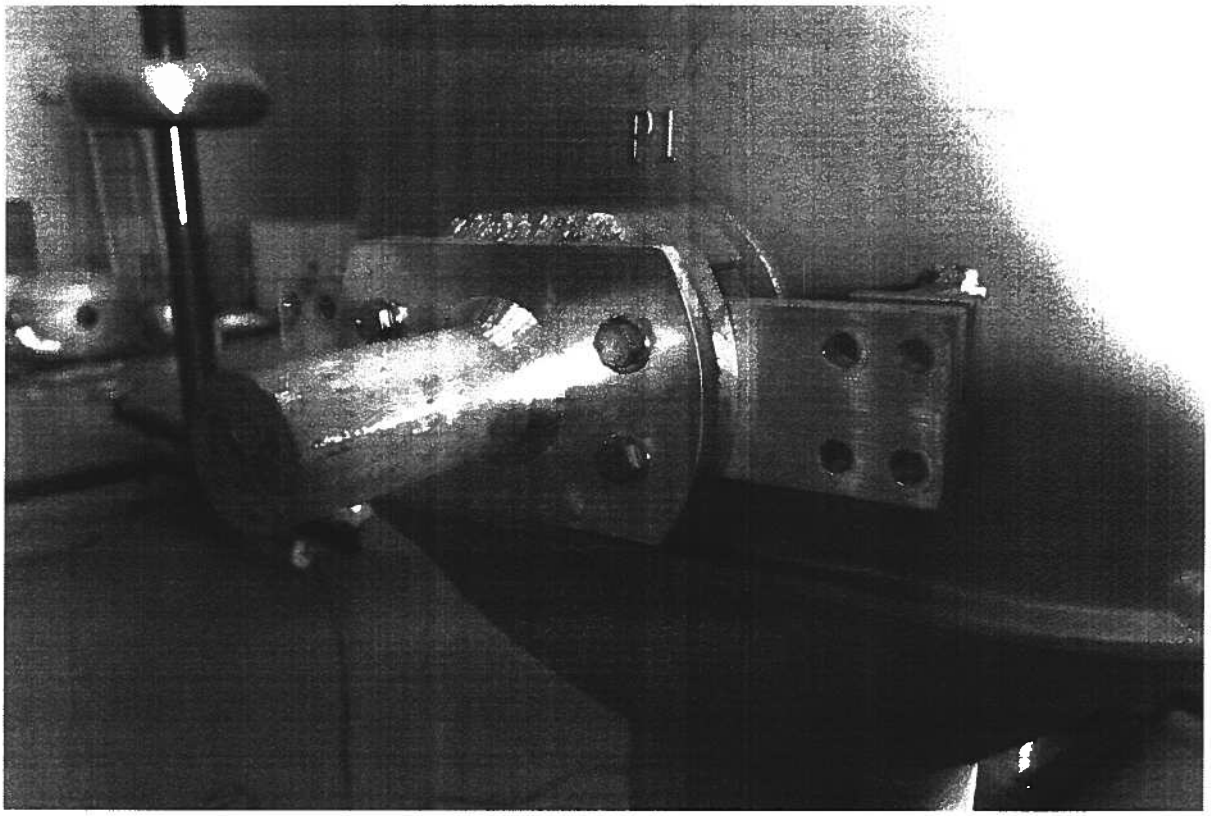
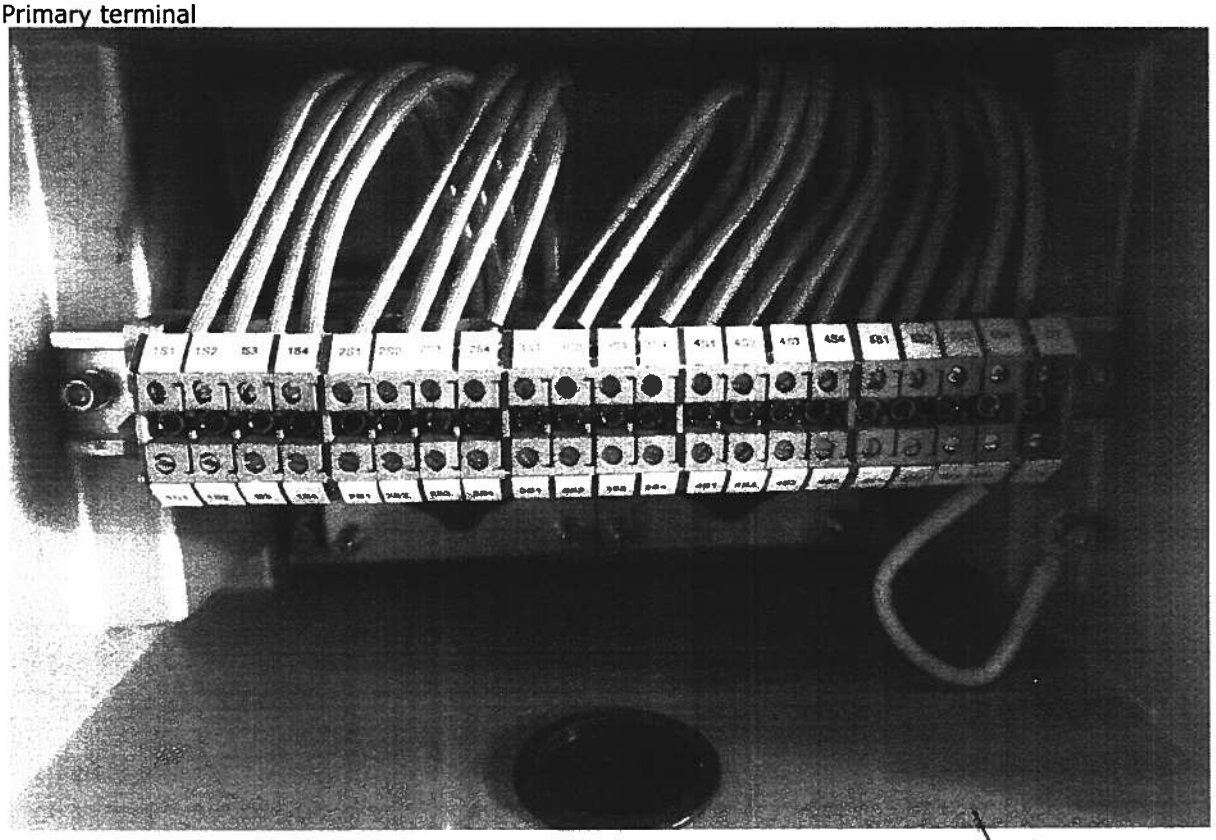
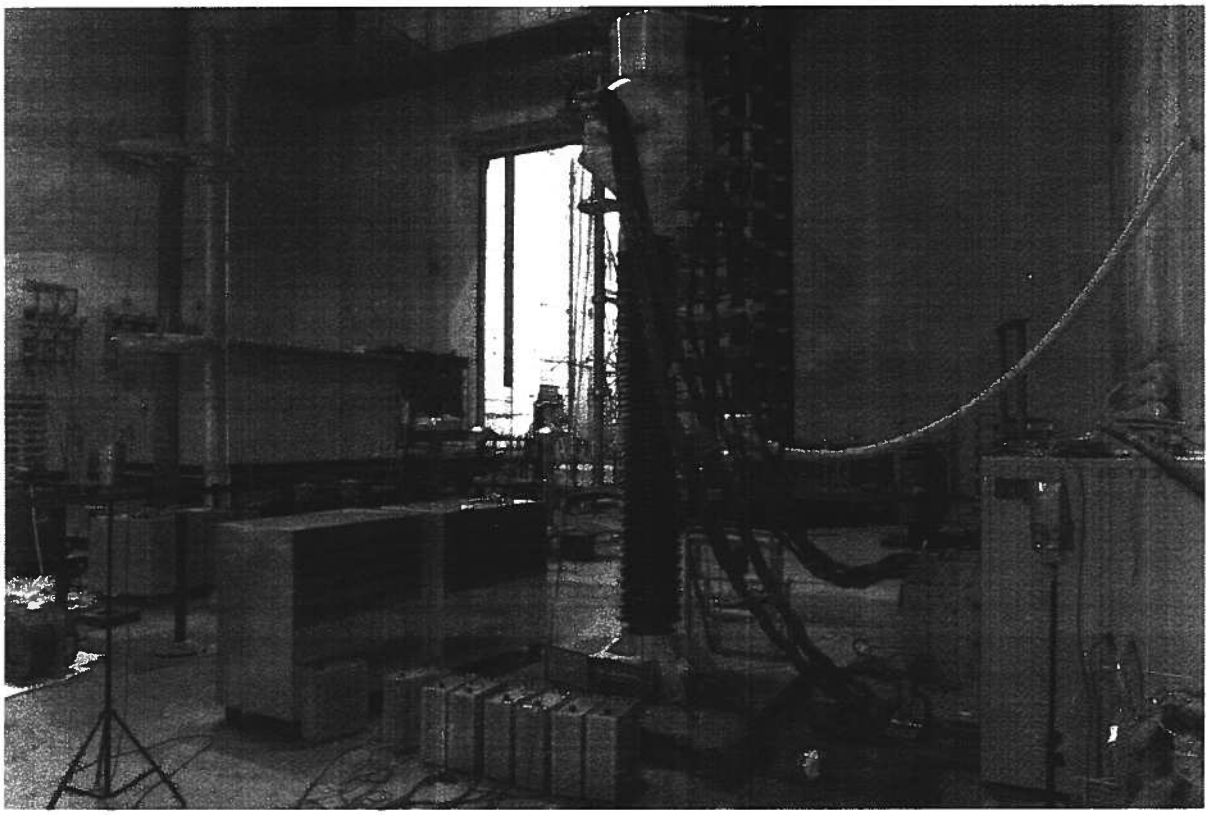


Primary terminal



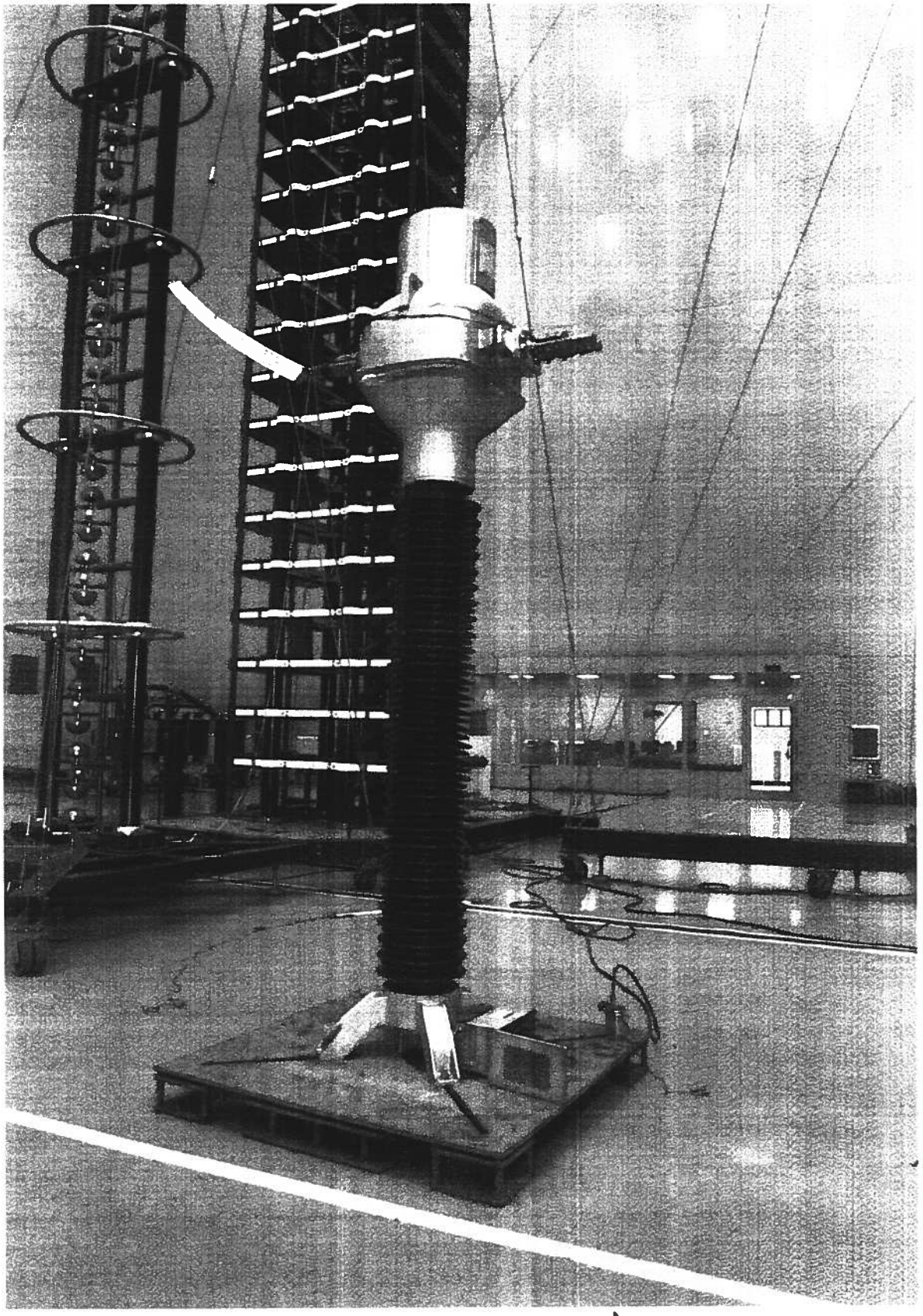
Connection box

Kawara Trade S.A



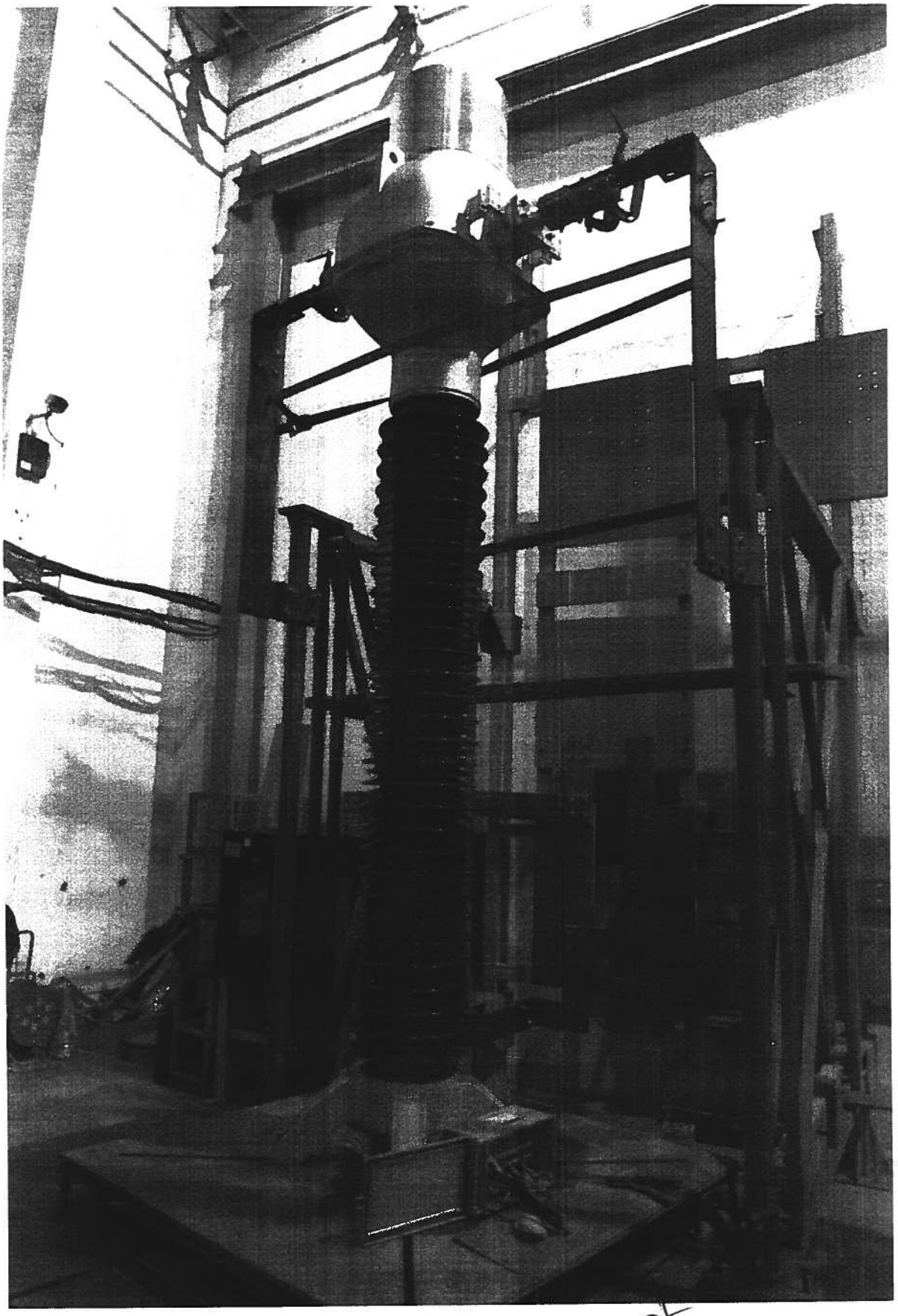
Temperature rise test

Kawara Trade S.A



Lightning impulse voltage test

Nawara Trade S.A



Short time current test

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