

CURRENT TRANSFORMER CRF-36

OPERATION MANUAL



Outdoor Service



Rev.: 0

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Chapter 1. GOAL AND SCOPE

This manual is applicable for the ARTECHE Current Transformer model CRF-36 with an insulation class of 34.5kV per ANSI/IEEE C57 (36kV IEC). The goal of this Operation Manual is to provide general knowledge regarding the application, manufacturing, storing, installing and maintenance of this unit.

Chapter 2. TECHNICAL DESCRIPTION

2.1 MANUFACTURE AND DESIGN

Arteche Model CRE transformers are dry type outdoor service current transformers. The core is encapsulated with Type B epoxy resin which provides excellent internal dielectric properties and mechanical strength. The external layer of Cycloaliphatic Epoxy Resin (CEP) or optional Hydrocycloaliphatic Epoxy Resin (HCEP) provides resistance to ultraviolet rays and the effects of tracking and erosion on the exterior of the transformer ensuring a long mechanical and electrical life.



The core is built with high permeability grain oriented silicon steel laminations for low losses. The windings are copper wire with copper plate double isolation. The concentric distribution of the coils prevents magnetic flux leakage, achieving greater accuracy and higher capacity to withstand mechanical stresses in adverse operating conditions.

The Arteche Model CRF transformers are designed for mounting on poles or substation structures. They can be mounted in horizontal or vertical positions. The base plate is made of galvanized steel.

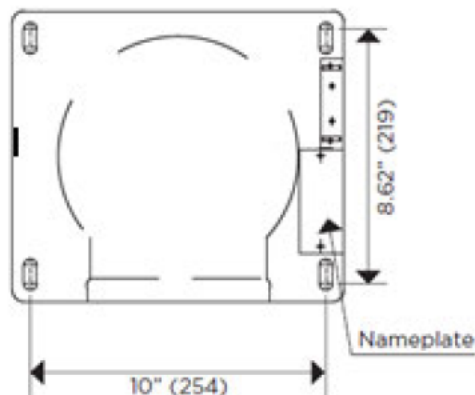
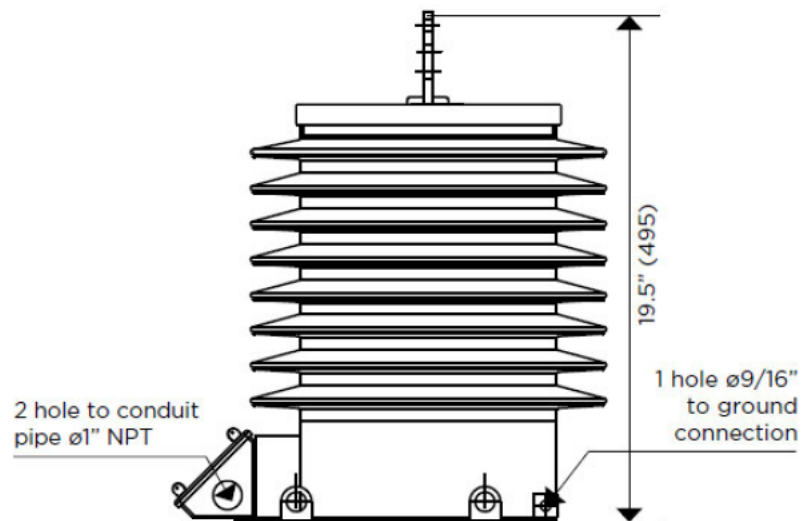
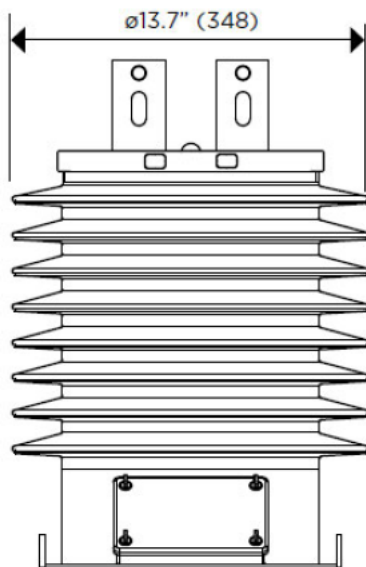
2.2 APPLICATION

The Artech Model CRF-36 instrument transformer is designed for metering outdoor service applications for systems with voltages of 34.5kV (IEEE C57.13-2008) at 60Hz.

2.3 DIMENSIONS

Mechanical characteristics

Insulation Material	Color	Weight	Creepage distance	Strike distance
Resin	Gray	134.4 lbs	36.2 in	15 in



Dimensional Drawing Reference: 9448132

2.4 PARTS LIST

Below is a list of the most significant parts of the Arteche Model CRF-36 current transformer.



PARTS LIST

1. Primary terminal NEMA 2
2. Exterior insulation (Cycloaliphatic Resin)
3. Base plate
4. Secondary terminal junction box
5. Nameplate with technical characteristics
6. Ground connection terminal

2.5 TECHNICAL CHARACTERISTICS

Electrical characteristics										
Code * (CEP)	Current Ratio (Primary: Secondary) (A)	Continuous Thermal Current Rating Factor @ 30°C	Short-time Thermal Current (kA/1s)	Short-time Mechanical Current (kA _{peak})	IEEE Metering Accuracy	Relay Accuracy	Nominal Voltage System (kV)	BIL (kV)	Power-Frequency Withstand Voltage (1 min)	
									Primary & Secondary (kV _{rms})	Secondary Winding (kV _{rms})
756273001	5:5	3.0	0.5	1.25	0.3B-1.8	T100	34.5	200	70	2.5
756273002	10:5	3.0	1	2.5	0.3B-1.8	T100	34.5	200	70	2.5
756273003	15:5	3.0	1.5	3.75	0.3B-1.8	T100	34.5	200	70	2.5
756273004	20:5	3.0	2	5	0.3B-1.8	T100	34.5	200	70	2.5
756273005	25:5	3.0	2.5	6.25	0.3B-1.8	T100	34.5	200	70	2.5
756273006	30:5	3.0	3	7.5	0.3B-1.8	T100	34.5	200	70	2.5
756273008	40:5	3.0	4	10	0.3B-1.8	T100	34.5	200	70	2.5
756273010	50:5	3.0	5	12.5	0.3B-1.8	T100	34.5	200	70	2.5
756273015	75:5	3.0	7.5	18.75	0.3B-1.8	T100	34.5	200	70	2.5
756273020	100:5	3.0	10	25	0.3B-1.8	T100	34.5	200	70	2.5
756273030	150:5	3.0	15	37.5	0.3B-1.8	T100	34.5	200	70	2.5
756273040	200:5	3.0	20	50	0.3B-1.8	T100	34.5	200	70	2.5
756273060	300:5	3.0	30	75	0.3B-1.8	T100	34.5	200	70	2.5
756273080	400:5	3.0	40	100	0.3B-1.8	T100	34.5	200	70	2.5
756273120	600:5	2.0	60	150	0.3B-1.8	T100	34.5	200	70	2.5
756273160	800:5	1.5	60	150	0.3B-1.8	T100	34.5	200	70	2.5
756273200	1000:5	1.0	75	127.5	0.3B-1.8	T100	34.5	200	70	2.5
756273240	1200:5	1.0	90	162	0.3B-1.8	T100	34.5	200	70	2.5

Electrical characteristics										
Code * (CEP)	Current Ratio (Primary: Secondary) (A)	Continuous Thermal Current Rating Factor @ 30°C	Short-time Thermal Current (kA/1s)	Short-time Mechanical Current (kA _{peak})	IEEE Metering Accuracy	Relay Accuracy	Nominal Voltage System (kV)	BIL (kV)	Power-Frequency Withstand Voltage (1 min)	
									Primary & Secondary (kV _{rms})	Secondary Winding (kV _{rms})
756271001	5:5	1.5	0.5	0.95	0.3B-1.8	T200	34.5	200	70	2.5
756271002	10:5	1.5	1	1.9	0.3B-1.8	T200	34.5	200	70	2.5
756271003	15:5	1.5	1.5	2.85	0.3B-1.8	T200	34.5	200	70	2.5
756271004	20:5	1.5	2	3.8	0.3B-1.8	T200	34.5	200	70	2.5
756271005	25:5	1.5	2.5	4.75	0.3B-1.8	T200	34.5	200	70	2.5
756271006	30:5	1.5	3	5.7	0.3B-1.8	T200	34.5	200	70	2.5
756271008	40:5	1.5	4	7.6	0.3B-1.8	T200	34.5	200	70	2.5
756271010	50:5	1.5	5	9.5	0.3B-1.8	T200	34.5	200	70	2.5
756271012	60:5	1.5	6	11.4	0.3B-1.8	T200	34.5	200	70	2.5
756271015	75:5	1.5	7.5	14.25	0.3B-1.8	T200	34.5	200	70	2.5
756271020	100:5	1.5	10	19	0.3B-1.8	T200	34.5	200	70	2.5
756271040	200:5	1.5	20	38	0.3B-1.8	T200	34.5	200	70	2.5
756271060	300:5	1.5	30	57	0.3B-1.8	T200	34.5	200	70	2.5
756271080	400:5	1.5	40	76	0.3B-1.8	T200	34.5	200	70	2.5
756271100	500:5	1.5	50	9.5	0.3B-1.8	T200	34.5	200	70	2.5
756271120	600:5	1.2	60	86.7	0.3B-1.8	T200	34.5	200	70	2.5
756271160	800:5	1.0	60	114	0.3B-1.8	T200	34.5	200	70	2.5
756271200	1000:5	1.0	75	142.5	0.3B-1.8	T200	34.5	200	70	2.5
756271240	1200:5	1.0	90	171	0.3B-1.8	T200	34.5	200	70	2.5
756272002	10/20:5	2.0/1.5	2	3.8	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272005	25/50:5	2.0/1.7	5	9.5	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272006	30/60:5	2.0/1.8	6	11.4	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272010	50/100:5	2.0/1.9	10	19	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272015	75/150:5	2.0/1.9	15	28.5	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272020	100/200:5	2.0/1.10	20	38	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5

Electrical characteristics										
Code * (CEP)	Current Ratio (Primary: Secondary) (A)	Continuous Thermal Current Rating Factor @ 30°C	Short-time Thermal Current (kA/1s)	Short-time Mechanical Current (kA _{peak})	IEEE Metering Accuracy	Relay Accuracy	Nominal Voltage System (kV)	BIL (kV)	Power-Frequency Withstand Voltage (1 min)	
									Primary & Secondary (kV _{rms})	Secondary Winding (kV _{rms})
756272030	150/300:5	2.0/1.10	30	57	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272040	200/400:5	2.0/1.11	40	76	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272060	300/600:5	2.0/1.12	60	86.7	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272080	400/800:5	1.2/1.2	60	114	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272100	500/1000:5	1.0/1.0	75	142.5	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756272120	600/1200:5	1.0/1.0	90	171	0.3B-0.9/0.3B-1.8	T100/T200	34.5	200	70	2.5
756279001	5:5	1.5	0.5	0.95	0.15B-0.9	-	34.5	200	70	2.5
756279002	10:5	1.5	1	1.9	0.15B-0.9	-	34.5	200	70	2.5
756279010	50:5	1.5	5	9.5	0.15B-0.9	-	34.5	200	70	2.5
756279015	75:5	1.5	7.5	14.25	0.15B-0.9	-	34.5	200	70	2.5
756279020	100:5	1.5	10	19	0.15B-0.9	-	34.5	200	70	2.5
756279120	600:5	1.2	60	86.7	0.15B-0.9	-	34.5	200	70	2.5
756279160	800:5	1.0	60	114	0.15B-0.9	-	34.5	200	70	2.5
756279240	1200:5	1.0	90	171	0.15B-0.9	-	34.5	200	70	2.5

Electrical characteristics										
Code * (CEP)	Current Ratio (Primary: Secondary) (A)	Continuous Thermal Current Rating Factor @ 30°C	Short-time Thermal Current (kA/1s)	Short-time Mechanical Current (kA _{peak})	IEEE Metering Accuracy	Relay Accuracy	Nominal Voltage System (kV)	BIL (kV)	Power-Frequency Withstand Voltage (1 min)	
									Primary & Secondary (kV _{rms})	Secondary Winding (kV _{rms})
756278001	5/10:5	2.0/1.5	1	1.9	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756278002	10/20:5	2.0/1.5	2	3.8	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756278060	300/600:5	2.0/1.5	60	86.7	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756278080	400/800:5	1.2/1.2	60	114	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756278100	500/1000:5	1.0/1.0	75	142.5	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756278120	600/1200:5	1.0/1.0	90	171	0.15B-0.5/B-0.9	-	34.5	200	70	2.5
756276040	200:5	2	20	50	0.15 B-1.8**	-	34.5	200	70	2.5
756276120	600:5	1.5	60	150	0.15 B-1.8**	-	34.5	200	70	2.5
756276200	1000:5	1.5	75	127.5	0.15 B-1.8**	-	34.5	200	70	2.5
756276240	1200:5	1.2	90	162	0.15 B-1.8**	-	34.5	200	70	2.5

* For HCEP Option add (-H) to the end of the code number.

** Accuracy range from: 1% "Nominal Current" to Rating Factor
Additional ratings available upon request.

Chapter 3: INSTALLATION INSTRUCTIONS

3.1 SECURITY DURING INSTALLATION

IMPORTANT: BEFORE INSTALLING AND ENERGIZING THE TRANSFORMER, it is important to carry out a visual inspection of the transformer and associated equipment looking for any damage that may have occurred during the transportation of the unit. Please contact your local Arteche representative if any issue is found upon inspection.

The installation and wiring of the CRF instrument transformer must be carried out by qualified trained personnel. This manual is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in the safety procedures for this device. Errors in mounting and connecting the unit can result in poor operation or complete failure of the transformer.

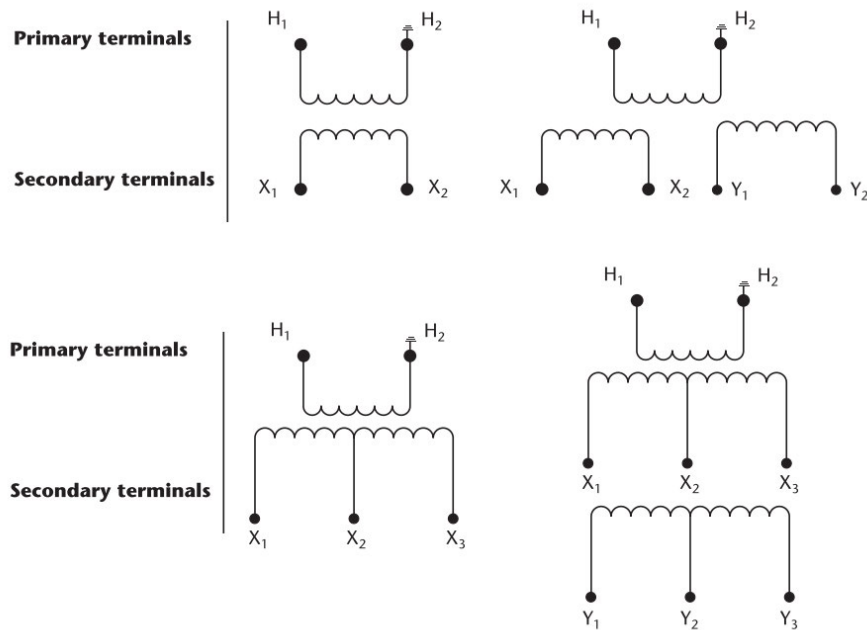


- a) The ground terminal of the transformer must be solidly connected to ground.
- b) The secondary windings, must be connected through one of their terminals. In case of having a central tap, the common terminal must be grounded.
- c) Verify that the primary and secondary terminal connections are clean and correctly tightened.
- d) Verify the correct external wiring. Terminal polarity must also be verified.
- e) **DANGER!** Any current transformer secondary energized with no burden connected (X1-X2) must be shortcircuited. An open circuit on the secondary side of a current transformer can cause failure of the unit.



3.2 CONNECTION SCHEMATICS

Primary and secondary windings must be connected according to the polarity markings indicated on the characteristics schematic nameplate. The secondary marking is engraved over the resin on the transformers housing.



For the secondary terminals, the transformer is supplied with a plastic box with threaded holes suitable for $\varnothing 1''$ NPT interconnections.

3.3 FIELD TESTS.

All the Arteche transformers are individually factory tested in accordance with the latest revision of the following applicable standards: IEEE C57.13-2008; IEC 61869-1; IEC 61869-2, 61869-3, CAN/CSA, as well as customer specifications and requirements. All these tests are undertaken within an ISO 9001 certified factory quality system.



As such no additional field testing for the CRF-36 is required, since every unit is individually tested (routine tests) in the factory. However, if an end user elects to perform additional field testing before energizing, then the following tests are recommended:

- Check the wiring and connections. Ensure that the connections are tight and have continuity.
- Check the polarity markings on the transformers.
- Polarity check.
- Ratio check (with a TTR)

IMPORTANT: Be aware that conducting field dielectric tests with direct current can saturate the core of the transformer leading to erroneous test results. Likewise, resistance insulation testing is not necessarily an accurate representation of the quality of the transformer's insulation system.

3.4 MOUNTING

The Arteche Model CRF-36 current transformer can be mounted horizontally or vertically. The transformers are fixed with four screws and washers fitting the hole's sizes provided by the unit's base plate. The transformer must be mounted onto a flat surface.

Chapter 4. SERVICE CONDITIONS

The Arteche Model CRF-36 current transformer is designed for outdoor service conditions that include dust, smoke, salts or other corrosive agents to a maximum temperature of 55°C. The transformer is designed to operate between an outdoor temperature range of -50 °C to +40 °C. The average ambient temperature measured in a 24 hour period should not exceed 30 °C. In normal service this unit should not be installed at an altitude exceeding 2500 meters over the sea level.

Consult Arteche engineering for other environmental conditions or altitudes greater than 2,500 meters (8,202 ft) prior to installation.

The transformer's technical performance values are listed on the transformer nameplate and should not be exceeded in order to ensure the expected performance of the unit.

Chapter 5. MAINTENANCE

Arteche instrument transformers are hermetically sealed dry type units that are designed and manufactured to be maintenance free during their life cycle. However, the following maintenance practices can be carried out to help ensure trouble free service:

- Verify the transformers are de-energized. Verify that the primary and the secondary terminals are in good condition and properly torqued
- Verify the transformers are de-energized. Periodically clean the insulated surface of the transformer to preserve the creepage distance.
- Verify the transformers are de-energized. Visually inspect the units for evidence of cracks, peeling or separating external insulation resin. If found contact your local Arteche representative as replacement of the affected unit is required.
- Verify the transformers are de-energized. Cover the primary terminal and secondary with silicon grease to avoid future cracking and rust.

It is recommended to carry out the above practices at least every six months to each one of the transformers.

Chapter 6. Troubleshooting

Issue	Possible Cause	Correction
The unit DOES NOT provide readings in the secondary	Inverted Polarity	Change burden terminals X1, X2, X3 / Y1, Y2, Y3
	Defective connection in the secondary winding	Check continuity between terminal and burden's conductor. Tighten terminals on secondary winding.
	False contact in the primary winding	Review that connection between terminal and primary bar is correct. Tighten primary connector.
	Error in tap connection in the secondary winding	Verify the connection between the terminals as indicated in the nameplate.
DOES NOT complies with nominal accuracy	Operating voltage out of the limits of Nominal voltage	Verify that the line voltage is within the nominal range of the transformer's application.
	Unit is permanently saturated	Contact ARTECHE
Buzzing sound around the transformer	Operating voltage outside the limit of the Nominal Voltage	Verify that the line voltage is within the nominal range of the transformer's application.
	Ionization of the environment and insulators	Clean the insulator's surfaces. If the problem remains contact ARTECHE.

Chapter 7. UNPACKING AND HANDLING

The transformers are shipped in wooden crates and placed in a vertical position.

Every crate is marked and fully identified with the known international symbols of transport.



The Arteche Model CRF-36 current transformer can be stored inside the crate. If it has been unpacked, it can always be stored with their wooden base.

When a unit is received an inspection should immediately be made to verify that the shipping crates do not show any signs of shipping damage. Any noted shipping damage should be reported to the carrier and fully document on the receiving paperwork and reported to your local Arteche representative. Please add pictures, or any useful evidence to describe the shipping damage. Unless duly noted at the time of receipt of the unit Arteche will consider the unit to have been delivered in good condition.



For appropriate unpacking the upper cover must be removed first and then removing the side walls. The unit will be fixed to the wooden base of the crate.

The Arteche Model CRF-36 current transformer can be manipulated carrying it with hooks that can be attached to their lifting eyes on the base plate, do not use the primary bushings as lifting points.

Chapter 8. CONTACT INFORMATION

ARTECHE
USA Inc.



HEADQUARTERS

18503 Pines Blvd. Suite 313 Pembroke Pines, FL 33029

Arteche
Transformadores y Tecnología S.A de C.V.

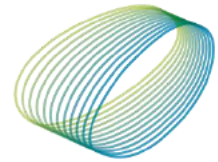


FACTORY

Km. 73.54 Ant. Carretera México-Querétaro
42850 Tepeji del Río de Ocampo – Estado de Hidalgo

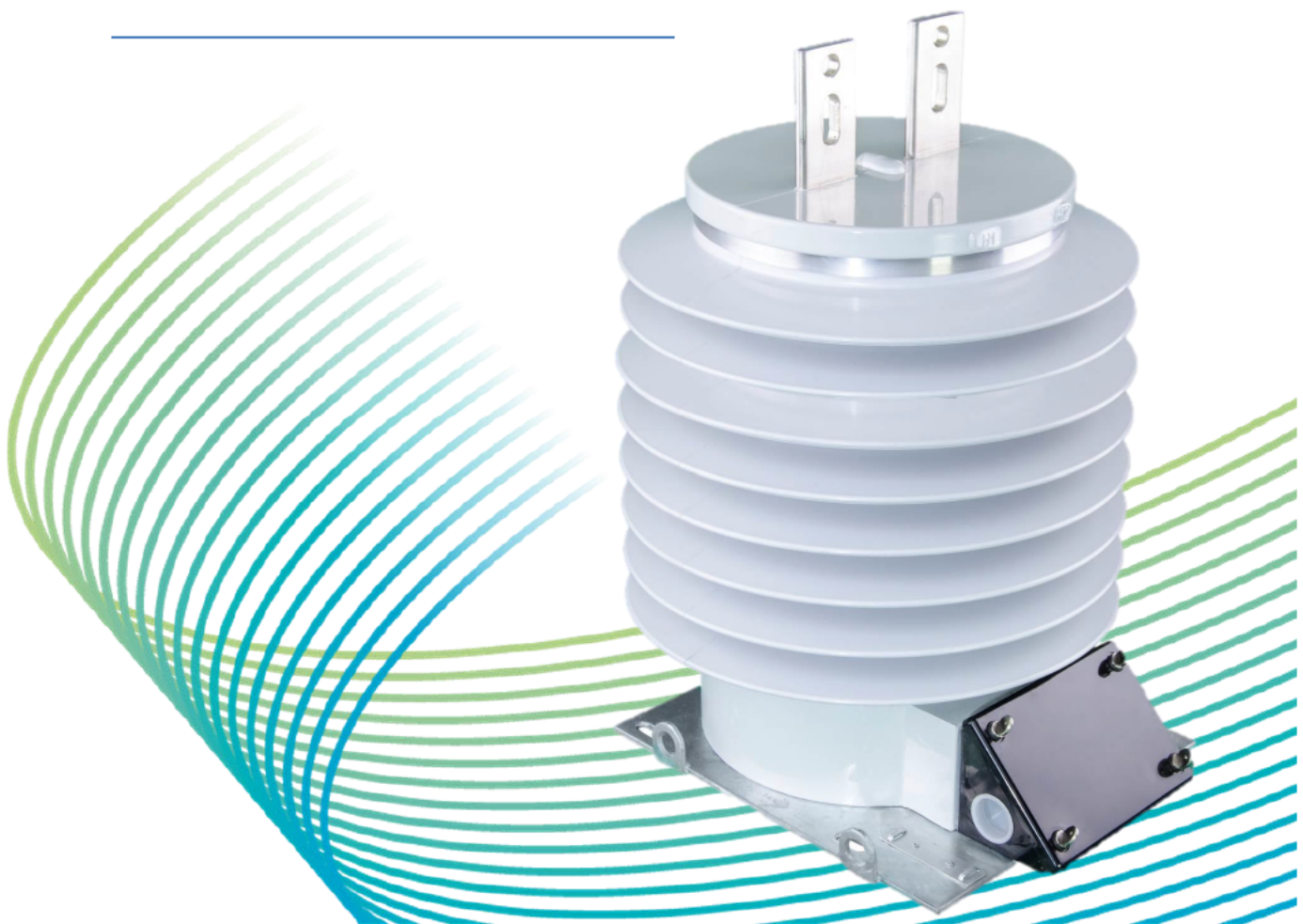
CURRENT TRANSFORMER

CRF-36



arteche
Moving together

NOTES:



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