NETWORK AUTOTRANSFORMERS







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INTRODUCTION

LOW-VOLTAGE NETWORK AUTOTRANSFORMERS

DESCRIPTION

Low-voltage network autotransformers are specific electrical devices used for voltage transformation in low-voltage distribution networks. They differ from standard transformers in that they do not provide galvanic isolation between the secondary and primary electrical circuits. They feature a single common winding, from which the name "autotransformer" is derived.

By replacing two separate windings with a single one, they are significantly more cost-effective than conventional transformers, depending on the transformation ratio; for this reason, they are also referred to as economy-connected transformers.

They are manufactured using the highest-quality magnetic core laminations and copper windings. They are designed as dry-type, epoxy-resin impregnated transformers in insulation class "F" (maximum permissible temperature rise on the transformer is 110°C at a maximum ambient temperature of 40°C). The transformation ratio of the autotransformers can be up to 1 kV across all variants.

MAIN APPLICATIONS AND PURPOSE

- **Improving Voltage Profiles in Three-Phase and Single-Phase Networks:**

  They are utilized on long low-voltage lines experiencing significant voltage drops due to the distance between consumers and the substation (e.g., in rural areas). Under such conditions, end consumers typically do not receive adequate voltage suitable for powering household appliances, electric motors, water pumps, and other equipment with sensitive motor drives. To resolve these issues, a three-phase "step-up" autotransformer rated at 3x400V / 3x900V can be installed. This steps up the voltage to 3x900V, resulting in a 2.25 times lower grid current and consequently a proportionally reduced voltage drop compared to a network without an autotransformer. At the end of the line, just upstream of the consumers, a second "step-down" autotransformer rated at 3x900V / 3x400V is installed, ensuring that consumers receive a high-quality supply voltage.

  In single-phase networks, a "step-up" autotransformer with a 230/520V transformation ratio can be installed at the grid inlet, while a "step-down" autotransformer with a 520/230V transformation ratio is placed inline at the end of the grid. The effect of improving the voltage profile is identical to that in three-phase networks.

  Deploying these autotransformers on a low-voltage network provides:

  - Improvement of the LV line voltage profile;
  - Quality of the delivered energy;
  - Significantly lower investment compared to standard transformers (less material is used);
  - Avoidance of capital expenditure for a new substation, a new 10 kV line, or upgrading the LV line;
  - Flexibility to be installed at various points along the LV line and across individual phases;
  - Fast and simple installation that does not require specialized heavy machinery.

- **Grid Voltage Adaptation:**
  They are used to adapt the voltage to specific requirements of industrial equipment or imported devices from the standard 400/230V to 110V, 120V, or other voltage ratings specified on the equipment.
- **Voltage Regulation:**
  They can frequently be applied to power devices requiring different voltage levels; therefore, they can be manufactured with multiple voltage regulation taps (for manual or automatic control) or utilized for electric motor starting.

DESIGN

To improve voltage profiles in low-voltage networks, we manufacture standard single-phase autotransformers designated as AMTES- (ranging from 5 to 20 kVA), and three-phase autotransformers designated as ATTES- (ranging from 10 to 50 kVA).
For the specified transformation ratio and power rating, the price of a conventional transformer is approximately 25% higher than that of an autotransformer.

Both autotransformer types can be manufactured as **enclosed or open types**, depending on the installation requirements.

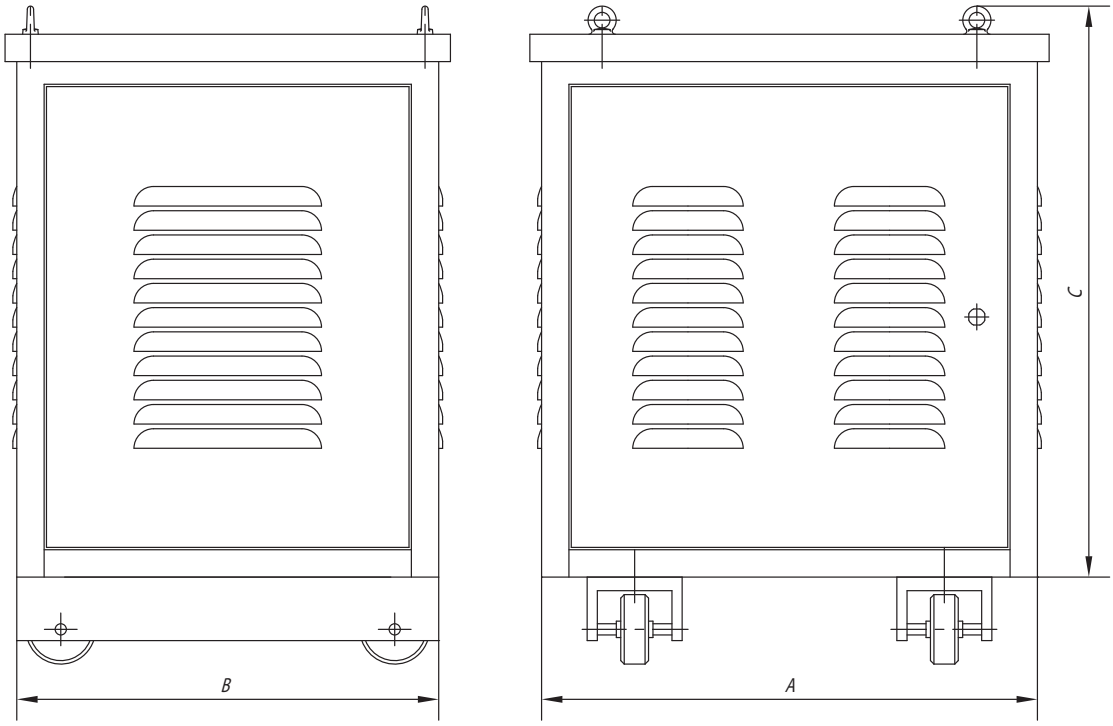
In addition to the autotransformer, **the enclosure houses auxiliary control and protection equipment:**

- **Moulded Case Circuit Breakers** (MCCBs), connected to the voltage side with a rated voltage of 400V. In addition to switching the device on and off, they feature overcurrent protection elements adjustable from (0.8–1) x In, as well as short-circuit protection.
- **Surge arresters** designed to protect the transformer and consumers from atmospheric discharges (lightning strikes).



ENCLOSED THREE-PHASE AUTOTRANSFORMER WITH INTEGRATED OVERLOAD, SHORT-CIRCUIT, EARTH-FAULT, AND SURGE PROTECTION

CONTENTS



Enclosure dimensions for single-phase **AMTES*** autotransformers

Type of autotransformer	Rated power (kVA)	Voltage ratio (V/V)	A (mm)	B (mm)	C (mm)	Mass (kg)
AMTES-5	5	"step-up" 230±5%//520(550) "step-down" 520(550)//230±5%	550	400	500	50
AMTES-6.3	6.3		550	400	500	54
AMTES-8	8		550	400	500	65
AMTES-10	10		600	400	550	75
AMTES-12.5	12.5		600	400	550	90
AMTES-16	16		700	450	630	112
AMTES-20	20		700	450	630	131

NOTE: Custom power ratings and voltage ratios are available upon request

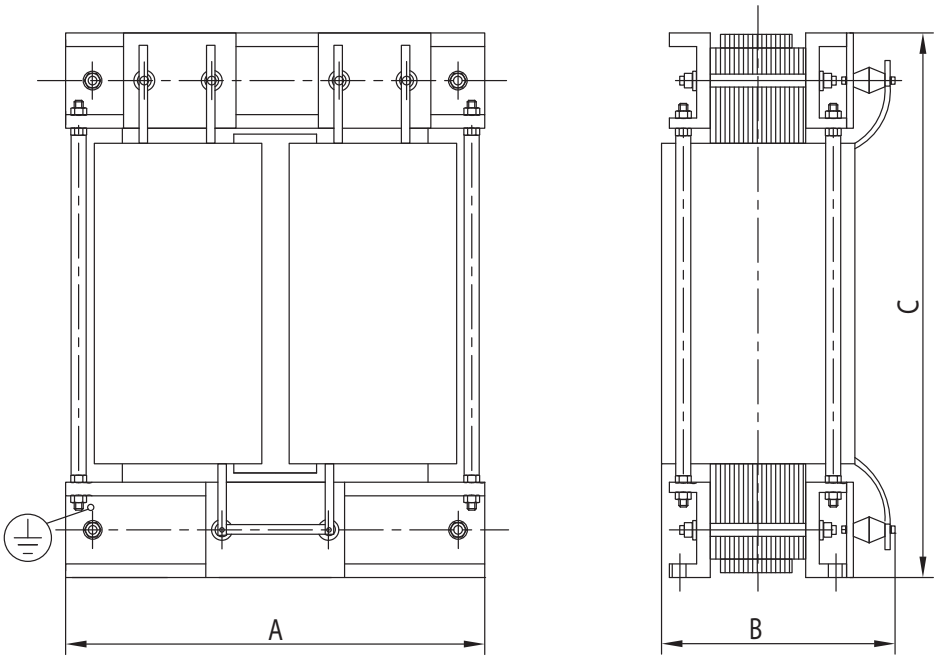
Enclosure dimensions for three-phase **ATTES*** autotransformers

Type of autotransformer	Rated power (kVA)	Voltage ratio (V/V)	A (mm)	B (mm)	C (mm)	Mass (kg)
ATTES-10	10	"step-up" 3x400±5%//3x900(950) "step-down" 3x900(950)//3x400±5%	700	450	630	73
ATTES-12.5	12.5		700	450	630	85
ATTES-16	16		750	450	680	103
ATTES-20	20		750	450	680	121
ATTES-25	25		800	460	750	140
ATTES-31.5	31.5		800	460	750	169
ATTES-40	40		800	460	750	198
ATTES-50	50		800	500	800	257

NOTE: Custom power ratings and voltage ratios are available upon request

OPEN-TYPE SINGLE-PHASE AUTOTRANSFORMER AMTES*





Dimensions of single-phase autotransformer **AMTES***

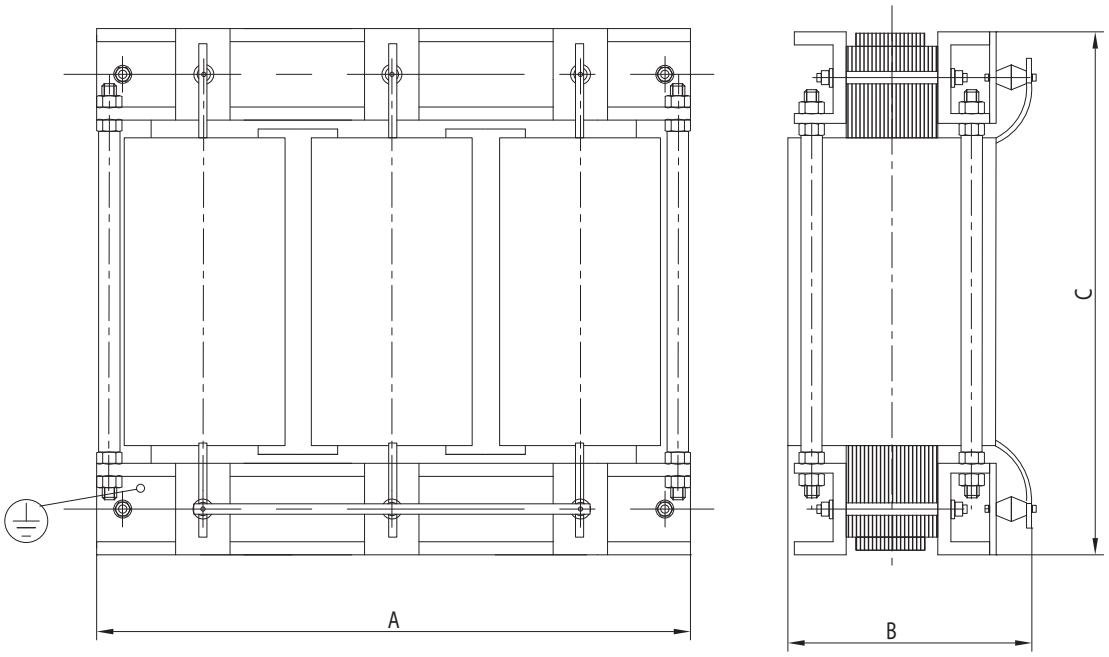
Type of autotransformer	Rated power (kVA)	Voltage ratio (V/V)	A (mm)	B (mm)	C (mm)	Mass (kg)
AMTES-5	5	"step-up" 230±5%//520(550) "step-down" 520(550)//230±5%	250	186	285	33
AMTES-6.3	6.3		250	196	285	37
AMTES-8	8		260	200	285	41
AMTES-10	10		260	230	315	53
AMTES-12.5	12.5		260	250	335	61
AMTES-16	16		310	240	385	78
AMTES-20	20		340	250	425	93

NOTE: Custom power ratings and voltage ratios are available upon request

CONTENTS

OPEN-TYPE THREE-PHASE AUTOTRANSFORMER ATTES*





Dimensions of three-phase autotransfomer **ATTES***

Type of autotransformer	Rated power (kVA)	Voltage ratio (V/V)	A (mm)	B (mm)	C (mm)	Mass (kg)
ATTES-10	10	"step-up" 3x400±5%//3x900(950) "step-down" 3x900(950)//3x400±5%	370	166	315	58
ATTES-12.5	12.5		370	172	320	64
ATTES-16	16		420	188	360	80
ATTES-20	20		420	198	360	93
ATTES-25	25		450	208	410	108
ATTES-31.5	31.5		460	218	420	130
ATTES-40	40		460	232	420	145
ATTES-50	50		540	495	590	198

NOTE: Custom power ratings and voltage ratios are available upon request

FMT - Factory of measuring transformers d.o.o.
Zajecar 19000, Strazilovska 57, Serbia

Central phones: +381 19 3413 122; +381 19 3413 222; +381 19 3413 111
General manager: +381 19 31 5555 1
Sales: +381 19 31 5555 5; +381 19 31 5555 6;
+381 19 31 5555 8; +381 19 3413 111
komercijala@fmt.rs
Supply: +381 19 31 5555 7
Development: +381 19 31 5555 3
Finance: +381 19 31 5555 2
www.fmt.rs • office@fmt.rs

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ZAJEČAR

FMT

MINEL FEPO d.o.o.
Zeleznicka 3
23101 Zrenjanin, Serbia
tel: +381 23 544 902
tel: +381 23 545 529
office@minelfepo.com