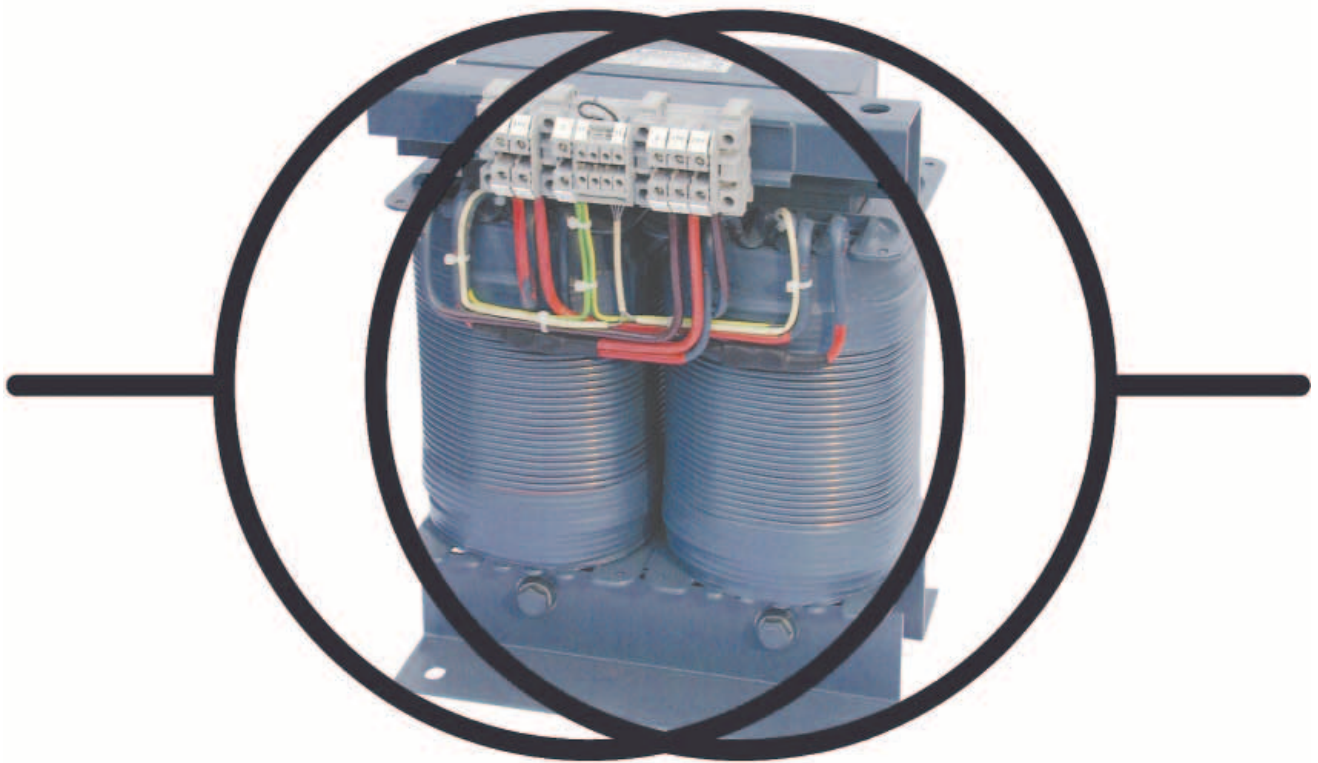


# Isolating transformer ES710



Single-phase isolating transformers for power supplies in medical locations according to: DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11, IEC 60364-7-710: 2002-11, DIN EN 61558-2-15 (VDE 0570 Part 2-15): 2001-11 and IEC 61558-2-15: 1999-02.

# Isolating transformer ES710

Single-phase isolating transformers for power supplies in medical locations according to: DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11 and IEC 60364-7-710: 2002-11



ES710

## Features

- The isolating transformers meet the requirements of safety in compliance with:  
DIN EN 61558-2-15 (VDE 0570 Part 2-15): 2001-11, IEC 61558-2-15: 1999-02 with additions after:  
DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11, IEC 60364-7-710: 2002-11
- built-in temperature sensors according to DIN 44081 (120 °C)
- screen winding with brought-out insulated connection terminal
- isolated fixing angles
- Protection class IP 00 (construction type: open)
- Protection class IP 23 (enclosed type)
- Protection class I (Option: completely encapsulated version)
- Protection class II
- reinforced insulation
- Classification of insulation: ta 40/B
- Connections: screw terminals
- VDE ENEC mark for ES710/3150 ... ES710/10000



## Application and description

The transformers of the ES710 series have reinforced insulation and comply with the requirements of DIN EN 61558-1 (VDE 570 Part 1): 1998-07 and DIN EN 61558-2-15 (VDE 0570 Part 2-15): 2001-11.

In addition, the transformers comply with the requirements of DIN VDE 0100-710 (VDE 0100 Teil 710): 2002-11 for IT systems in rooms used for medical purposes. The windings are galvanically isolated. In order to minimize electrical interferences, an electrostatic screen is installed between the primary and secondary winding providing an isolated terminal suitable for connection to the equipotential bonding.

The fixing angles are isolated from the transformer core in order to guarantee an isolated installation to comply with the requirements of DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11, section 710.512.1, 6, 2).

The transformers are available for horizontal and vertical installation. Protection against corrosion is guaranteed by a complete resin impregnation.

The transformers are designed for use in dry locations.

Transformers of the SK2 series are completely encapsulated and fulfil the requirements of protection class II.

## Frequency / performance

The transformers are designed for rated frequencies of 50 ... 60 Hz. The values specified in the chapter „Technical data“ chapter refer to the conditions at a maximum ambient temperature of 40 °C and a rated frequency of 50 Hz.

## Temperature rise

Free air circulation must be ensured. If the ambient temperature exceeds 40 °C the rated power decreases. For temperature monitoring, a PTC thermistor is placed on each transformer leg and the leads are connected to the terminals.

## Enclosure

Appropriate steel sheet enclosures designed according to protection class IP 23 are available for all standard types of isolating transformers.

## Standards

The ES710 series complies with the requirements of the following standards and regulations for the erection of electrical equipment:

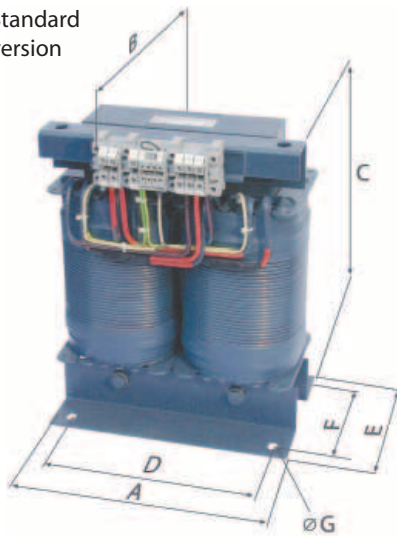
DIN EN 61558-1 (VDE 570 Part 1) 1998-07, IEC 61558-1: 1997-07  
DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11,  
DIN EN 61558-2-15 (VDE 0570 Part 2-15): 2001-11, IEC 61558-2-15: 1999-02  
and IEC 60364-7-710: 2002-11.

## Note

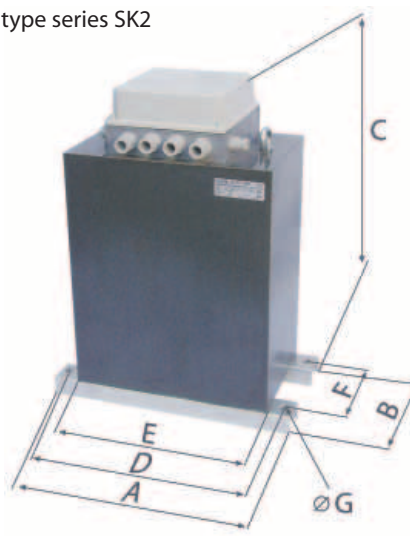
According to DIN VDE 0100-710 (VDE 0100 Part 710): 2002-11, the rated power of the transformer shall not be less than 3.15 kVA and shall not exceed 8 kVA.

**Dimension diagrams**

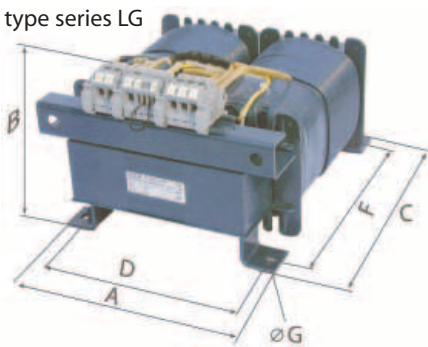
Standard version



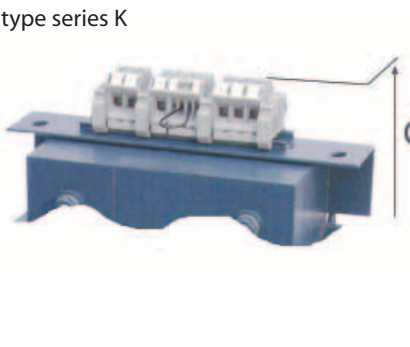
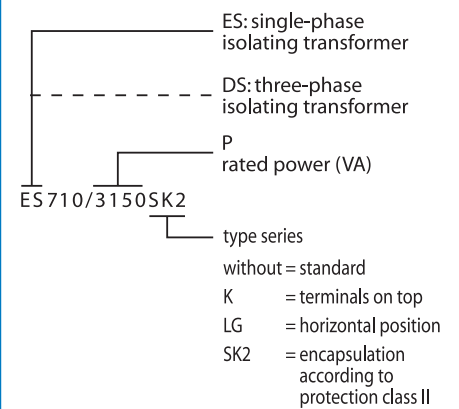
type series SK2



type series LG

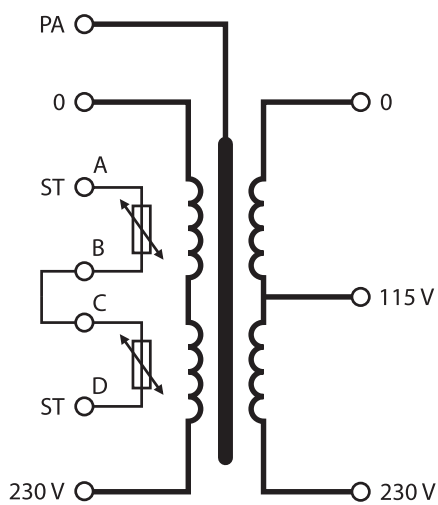


type series K

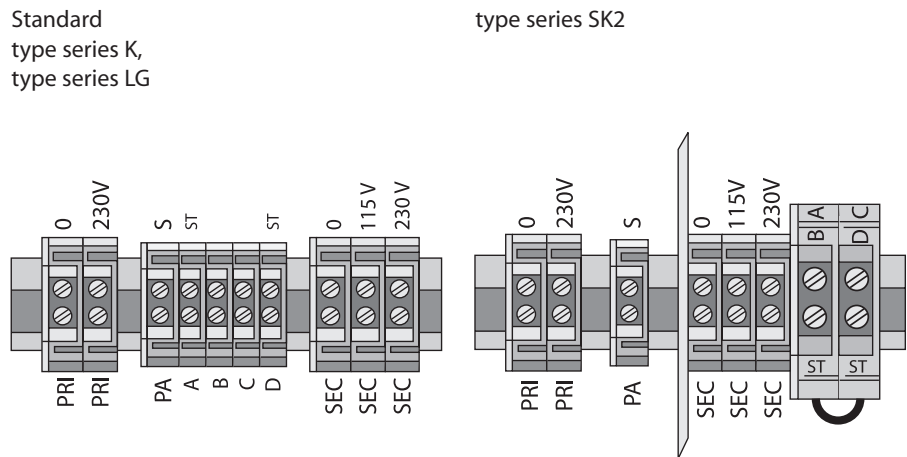

**Type code**

**Ordering details, Dimensions, Weights**

Type	A	B	C	D	E	F	G	Cu-weight	Weight	Art. No.
ES710/3150	240 mm	230 mm	325 mm	200 mm	200 mm	160 mm	11 mm	15 kg	47 kg	B 924 211
ES710/4000	280 mm	220 mm	370 mm	240 mm	190 mm	150 mm	11 mm	24 kg	59 kg	B 924 212
ES710/5000	280 mm	230 mm	370 mm	240 mm	200 mm	160 mm	11 mm	25 kg	63 kg	B 924 213
ES710/6300	280 mm	245 mm	370 mm	240 mm	215 mm	175 mm	11 mm	26 kg	66 kg	B 924 214
ES710/8000	280 mm	260 mm	370 mm	240 mm	230 mm	190 mm	11 mm	27 kg	75 kg	B 924 215
ES710/10000	320 mm	280 mm	420 mm	270 mm	233 mm	193 mm	13 mm	39 kg	85 kg	B 924 216
ES710/3150K	240 mm		360 mm	200 mm	200 mm	160 mm	11 mm	15 kg	47 kg	B 924 221
ES710/4000K	280 mm		420 mm	240 mm	190 mm	150 mm	11 mm	24 kg	59 kg	B 924 222
ES710/5000K	280 mm		420 mm	240 mm	200 mm	160 mm	11 mm	25 kg	63 kg	B 924 223
ES710/6300K	280 mm		420 mm	240 mm	215 mm	175 mm	11 mm	26 kg	66 kg	B 924 224
ES710/8000K	280 mm		420 mm	240 mm	230 mm	190 mm	11 mm	27 kg	75 kg	B 924 225
ES710/10000K	320 mm		480 mm	270 mm	222 mm	193 mm	13 mm	39 kg	85 kg	B 924 226
ES710/3150LG	230 mm	235 mm	320 mm	204 mm		240 mm	9 mm	15 kg	47 kg	B 924 231
ES710/4000LG	260 mm	210 mm	365 mm	234 mm		280 mm	9 mm	24 kg	59 kg	B 924 232
ES710/5000LG	260 mm	220 mm	365 mm	234 mm		280 mm	9 mm	25 kg	63 kg	B 924 233
ES710/6300LG	260 mm	235 mm	365 mm	234 mm		280 mm	9 mm	26 kg	66 kg	B 924 234
ES710/8000LG	260 mm	250 mm	365 mm	234 mm		280 mm	9 mm	27 kg	75 kg	B 924 235
ES710/10000LG	294 mm	240 mm	410 mm	264 mm		320 mm	12 mm	39 kg	85 kg	B 924 236
ES710/3150SK2	380 mm	200 mm	450 mm	350 mm	270 mm	150 mm	11 mm	15 kg	70 kg	B 924 241
ES710/4000SK2	380 mm	190 mm	500 mm	350 mm	310 mm	150 mm	11 mm	24 kg	73 kg	B 924 242
ES710/5000SK2	380 mm	200 mm	500 mm	350 mm	310 mm	160 mm	11 mm	25 kg	78 kg	B 924 243
ES710/6300SK2	380 mm	215 mm	500 mm	350 mm	310 mm	175 mm	11 mm	26 kg	86 kg	B 924 244
ES710/8000SK2	380 mm	230 mm	500 mm	350 mm	310 mm	190 mm	11 mm	27 kg	92 kg	B 924 245
ES710/10000SK2	410 mm	240 mm	560 mm	380 mm	350 mm	200 mm	13 mm	39 kg	105 kg	B 924 246

**Wiring diagram**



**Terminal diagram**



**Connection details**

Type	Input terminals	Screen winding	Control terminals	Control terminals for protection class II	Output terminals
	flexible / rigid (AWG)	flexible / rigid (AWG)	flexible / rigid (AWG)	flexible / rigid (AWG)	flexible / rigid (AWG)
ES710 / 3150	10 / 16 mm <sup>2</sup> (6)	10 / 16 mm <sup>2</sup> (6)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	10 / 16 mm <sup>2</sup> (6)
ES710 / 4000	16 / 25 mm <sup>2</sup> (4)	16 / 25 mm <sup>2</sup> (4)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	16 / 25 mm <sup>2</sup> (4)
ES710 / 5000	16 / 25 mm <sup>2</sup> (4)	16 / 25 mm <sup>2</sup> (4)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	16 / 25 mm <sup>2</sup> (4)
ES710 / 6300	16 / 25 mm <sup>2</sup> (4)	16 / 25 mm <sup>2</sup> (4)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	16 / 25 mm <sup>2</sup> (4)
ES710 / 8000	16 / 25 mm <sup>2</sup> (4)	16 / 25 mm <sup>2</sup> (4)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	16 / 25 mm <sup>2</sup> (4)
ES710 / 10000	35 / 35 mm <sup>2</sup> (2)	35 / 35 mm <sup>2</sup> (2)	4 / 6 mm <sup>2</sup> (10)	2,5 / 4 mm <sup>2</sup> (12)	35 / 35 mm <sup>2</sup> (2)

**Technical data**

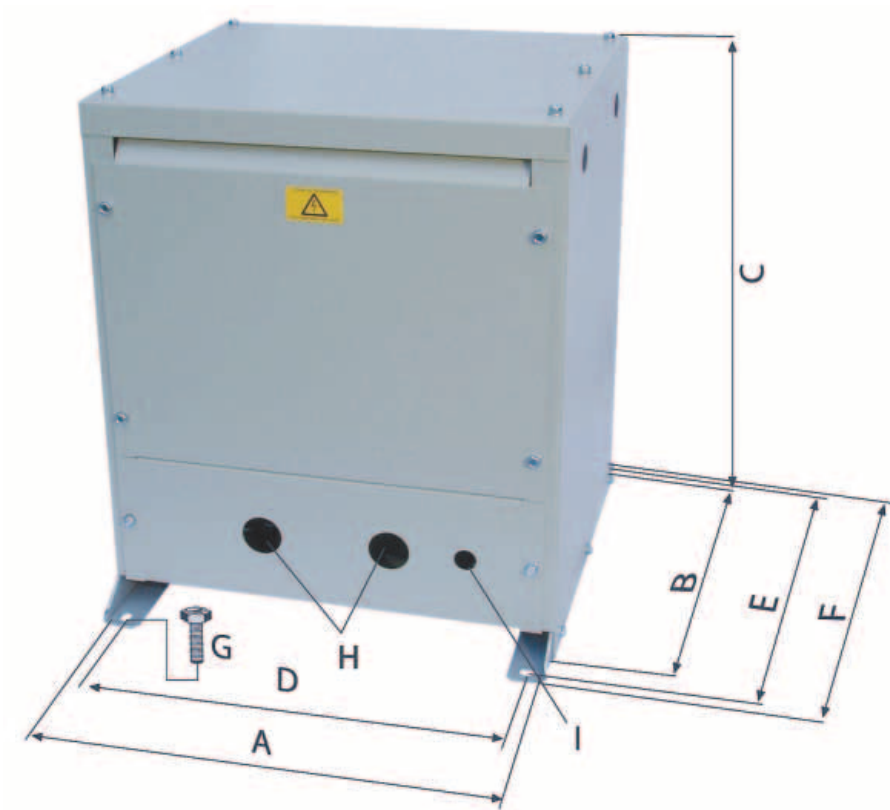
Type	ES710 / 3150	ES710 / 4000	ES710 / 5000	ES710 / 6300	ES710 / 8000	ES710 / 10000
Rated power	3150 VA	4000 VA	5000 VA	6300 VA	8000 VA	10000 VA
Rated frequency	50 ... 60 Hz	50 ... 60 Hz	50 ... 60 Hz	50 ... 60 Hz	50 ... 60 Hz	50 ... 60 Hz
Rated input voltage	230 V	230 V	230 V	230 V	230 V	230 V
Rated output voltage	230 / 115 V	230 / 115 V	230 / 115 V	230 / 115 V	230 / 115 V	230 / 115 V
Rated Input current $I_n$	14,2 A	18 A	22,5 A	28,5 A	36 A	45,3 A
Rated Output current	13,7 A	17,4 A	21,7 A	27,4 A	34,7 A	43,5 A
Inrush current $I_E$	$< 12 \times \hat{I}_n$	$< 12 \times \hat{I}_n$	$< 12 \times \hat{I}_n$	$< 12 \times \hat{I}_n$	$< 12 \times \hat{I}_n$	$< 12 \times \hat{I}_n$
leakage current	$< 0,5 \text{ mA}$	$< 0,5 \text{ mA}$	$< 0,5 \text{ mA}$	$< 0,5 \text{ mA}$	$< 0,5 \text{ mA}$	$< 0,5 \text{ mA}$
Fuse	35 A gL / gG	35 A gL / gG	35 A gL / gG	63 A gL / gG	63 A gL / gG	80 A gL / gG
No-load input current $i_0$	$< 2,8 \%$	$< 2,8 \%$	$< 2,8 \%$	$< 2,8 \%$	$< 2,5 \%$	$< 3,0 \%$
No-load output voltage $U_0$	236 V	235 V	235 V	235 V	234 V	235 V
Short-circuit voltage $U_K$	2,9 %	2,8 %	2,6 %	2,8 %	2,5 %	3 %
Induction	0,9 T	0,95 T	1 T	1 T	1 T	1,14 T
$R_{\text{primary}}$	0,245 $\Omega$	0,14 $\Omega$	0,1 $\Omega$	0,08 $\Omega$	0,065 $\Omega$	0,04 $\Omega$
$R_{\text{secondary}}$	0,23 $\Omega$	0,11 $\Omega$	0,09 $\Omega$	0,07 $\Omega$	0,056 $\Omega$	0,06 $\Omega$
Efficiency	95 %	96 %	96 %	96 %	96 %	97 %
FE loss	55 W	56 W	80 W	100 W	110 W	125 W
Cu loss	120 W	100 W	125 W	170 W	220 W	263 W
Ambient temperature max.	40 °C	40 °C	40 °C	40 °C	40 °C	40 °C
No-load temperature rise	22 °C	22 °C	26 °C	30 °C	30 °C	21 °C
Full-load temperature rise	69 °C	60 °C	68 °C	70 °C	75 °C	75 °C

**ESDS0107-1**

Sheet steel enclosure in vertical position for single-phase transformers of the type ES710 / 3150 to ES710 / 10000.

**Enclosure**

- Sheet steel, varnished in RAL 7032
- Protection class IP 23
- Bore holes for cable entry
- The enclosures of our transformers (standard version), transformer sizes of 3,15 ... 10 kVA, are provided with fixing holes intended for easy retrofitting at any time.



**Dimensions of the enclosure**

	A	B	C	D	E	F	G	H	I	Weight	Art. No.
ESDS710-1	430	380	500	385	420	450	M10	ø 37,5	ø 20,5	16 kg	B 924 673

**Dipl.-Ing. W. Bender GmbH & Co. KG**

Postfach 1161 · 35301 Grünberg · Germany

Londorfer Straße 65 · 35305 Grünberg · Germany

Tel.: +49 (0) 6401 / 807-0 · Fax: 807 259

E-Mail: [info@bender-de.com](mailto:info@bender-de.com) · [www.bender-de.com](http://www.bender-de.com)

