

Isolating transformer ES710

Single-phase isolating transformers
for the design of medical IT systems



ES710

Device features

- Built-in temperature sensors according to DIN 44081 (120 °C)
- Screen winding with brought-out insulated connection terminal
- Insulated mounting angles
- Degree of protection IP 00 (construction type: open)
- Degree of protection IP 23 (enclosure included)
- Protection class I
- Protection class II (option: completely encapsulated version)
- Reinforced insulation
- Classification of insulation: t_a40/B
- Connections: screw terminals
- Noise level < 35 dB (A)(no-load and nominal load)
- Vector group: liO
- VDE ENEC mark for the ES710/3150... ES710/10000 series



Application and description

The transformers of the ES710 series have reinforced insulation and comply with the requirements of IEC 61558-1 / DIN EN 61558-1 (VDE 0570-1) and IEC 61558-2-15 / DIN EN 61558-2-15 (VDE 0570-2-15).

In addition, the transformers comply with the requirements of IEC 60364-7-710 / DIN VDE 0100-710 (VDE 0100-710) for IT systems in medical locations. The windings are galvanically isolated. In order to minimize electrical interferences, an electrostatic screen is installed between the primary and secondary winding the lead out of which is connected to an insulated terminal 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 0100-710), para. 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 / ratings

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

Temperature rise

Free air circulation must be ensured. An ambient temperature exceeding 40 °C will reduce the rated power. 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, degree of protection IP 23, are available for all standard types of isolating transformers.

Rated power

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

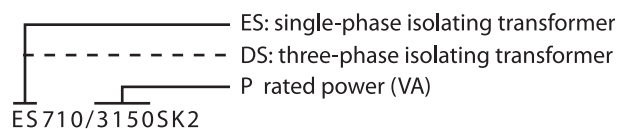
Overload protection

When isolating transformers are used to form a medical IT system in accordance with para. 710.512.1.6.2 of DIN VDE 0100-710 (VDE 0100-710), **overload protection is not permitted**. In this case, short-circuit protection is required. That means, emphasis is focused on the availability of the power supply; it is therefore essential to avoid disconnection on the occurrence of transient overload. The protection of isolating transformers against overload and overtemperature can be realized by using monitoring devices in accordance with para. 710.531.3.1. The appropriate fuses for short-circuit protection can be selected from the table "Technical data".

Standards

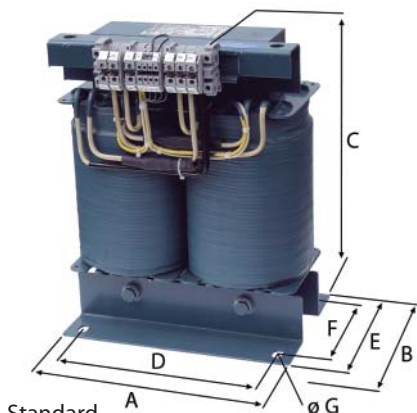
The ES710 series complies with the requirements of the following standards and regulations for the erection of electrical equipment: IEC 61558-1 / DIN EN 61558-1 (VDE 0570-1), IEC 61558-2-15 / DIN EN 61558-2-15 (VDE 0570-2-15), IEC 60364-7-710 / DIN VDE 0100-710 (VDE 0100-710).

Nameplate



- Type series without = standard
- K = terminals on top
- LG = horizontal position
- SK2 = encapsulation according to protection class II
- S = terminals on top side end

Dimension diagram/type of construction

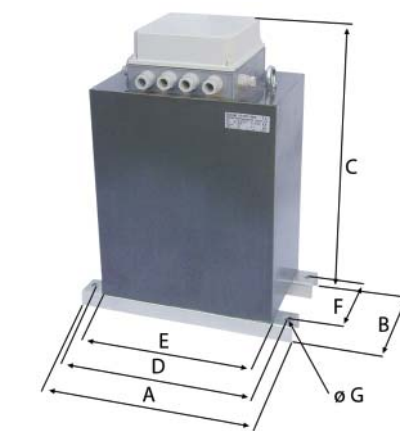


Standard
Dimension B is the depth incl. terminals

K series

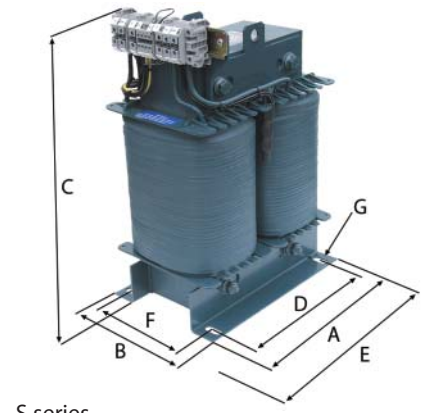
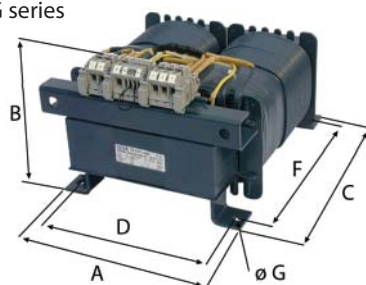


All other dimensions correspond to the standard dimensions.



SK2 series

LG series

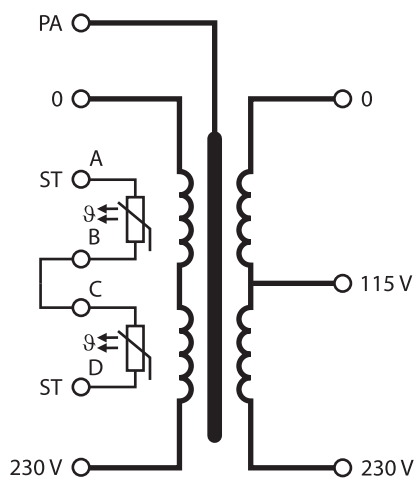


S series

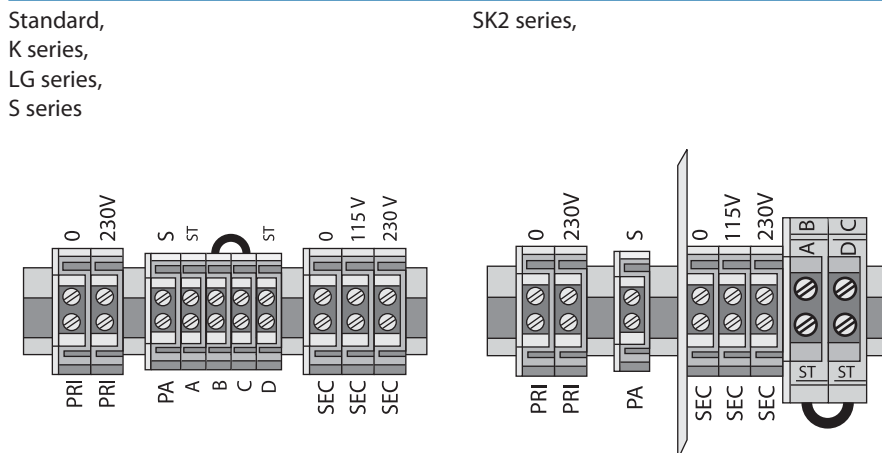
Dimension E is the depth incl. terminals

Ordering information, 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	49 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	61 kg	B 924 213
ES710/6300	280 mm	245 mm	370 mm	240 mm	215 mm	175 mm	11 mm	26 kg	65 kg	B 924 214
ES710/8000	280 mm	260 mm	370 mm	240 mm	230 mm	190 mm	11 mm	27 kg	74 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	49 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	61 kg	B 924 223
ES710/6300K	280 mm		420 mm	240 mm	215 mm	175 mm	11 mm	26 kg	65 kg	B 924 224
ES710/8000K	280 mm		420 mm	240 mm	230 mm	190 mm	11 mm	27 kg	74 kg	B 924 225
ES710/10000K	320 mm		480 mm	270 mm	270 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	49 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	61 kg	B 924 233
ES710/6300LG	260 mm	235 mm	365 mm	234 mm		280 mm	9 mm	26 kg	65 kg	B 924 234
ES710/8000LG	260 mm	250 mm	365 mm	234 mm		280 mm	9 mm	27 kg	74 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	69 kg	B 924 241
ES710/4000SK2	380 mm	190 mm	500 mm	350 mm	310 mm	150 mm	11 mm	24 kg	75 kg	B 924 242
ES710/5000SK2	380 mm	200 mm	500 mm	350 mm	310 mm	160 mm	11 mm	25 kg	77 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	90 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
ES710/3150S	280 mm	180 mm	370 mm	240 mm	290 mm	145 mm	11 x 25 mm	15 kg	49 kg	B 924 261
ES710/4000S	280 mm	150 mm	420 mm	240 mm	290 mm	115 mm	11 x 25 mm	24 kg	59 kg	B 924 262
ES710/5000S	280 mm	160 mm	420 mm	240 mm	290 mm	125 mm	11 x 25 mm	25 kg	61 kg	B 924 263
ES710/6300S	280 mm	175 mm	420 mm	240 mm	290 mm	140 mm	11 x 25 mm	26 kg	65 kg	B 924 264
ES710/8000S	280 mm	190 mm	420 mm	240 mm	290 mm	155 mm	11 x 25 mm	27 kg	74 kg	B 924 265
ES710/10000S	320 mm	233 mm	440 mm	270 mm	330 mm	193 mm	13 x 18 mm	39 kg	85 kg	B 924 266

Wiring diagram



Terminal diagram



Cross sectional area of connecting cable					
Type	Input terminals flexible/rigid	Screen winding flexible/rigid	Control terminals flexible/rigid	Control terminals for SK2 flexible/rigid	Output terminals flexible/rigid
ES710/3150	10/16 mm ²	10/16 mm ²	4/6 mm ²	2.5/4 mm ²	10/16 mm ²
ES710/4000	16/25 mm ²	16/25 mm ²	4/6 mm ²	2.5/4 mm ²	16/25 mm ²
ES710/5000	16/25 mm ²	16/25 mm ²	4/6 mm ²	2.5/4 mm ²	16/25 mm ²
ES710/6300	16/25 mm ²	16/25 mm ²	4/6 mm ²	2.5/4 mm ²	16/25 mm ²
ES710/8000	16/25 mm ²	16/25 mm ²	4/6 mm ²	2.5/4 mm ²	16/25 mm ²
ES710/10000	35/35 mm ²	35/35 mm ²	4/6 mm ²	2,5/4 mm ²	35/35 mm ²

Technical data isolating transformer ES710

Type	ES710/3150	ES710/4000	ES710/5000	ES710/6300	ES710/8000	ES710/10000
Insulation classification	ta40/B	ta40/B	ta40/B	ta40/B	ta40/B	ta40/B
Degree of protection	IP 00	IP 00	IP 00	IP 00	IP 00	IP 00
Protection class	I/II*	I/II*	I/II*	I/II*	I/II*	I/II*
Power/voltage/currents						
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	AC 230 V	AC 230 V	AC 230 V	AC 230 V	AC 230 V	AC 230 V
Rated input current I_n	14,2 A	18 A	22,5 A	28,5 A	36 A	45,3 A
Rated output voltage	AC 230/115 V	AC 230/115 V	AC 230/115 V	AC 230/115 V	AC 230/115 V	AC 230/115 V
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	$\leq 0,5$ mA	$\leq 0,5$ mA	$\leq 0,5$ mA	$\leq 0,5$ mA	$\leq 0,5$ mA	$\leq 0,5$ mA
No-load input current i_0	≤ 3 %	≤ 3 %	≤ 3 %	≤ 3 %	$\leq 2,8$ %	≤ 3 %
No-load output voltage U_0	≤ 236 V	≤ 233 V	≤ 234 V	≤ 235 V	≤ 233 V	≤ 233 V
Short-circuit voltage U_k	$\leq 2,9$ %	$\leq 2,8$ %	$\leq 2,6$ %	$\leq 2,1$ %	$\leq 2,2$ %	≤ 3 %
General data						
Fuse	25 A gL/gG	35 A gL/gG	50 A gL/gG	50 A gL/gG	63 A gL/gG	80 A gL/gG
Induction	0,86 T	0,94 T	1 T	1,05 T	1 T	1,1 T
$R_{primary}$	0,245 Ω	0,133 Ω	0,099 Ω	0,08 Ω	0,064 Ω	0,055 Ω
$R_{secondary}$	0,228 Ω	0,108 Ω	0,095 Ω	0,07 Ω	0,056 Ω	0,033 Ω
FE loss	55 W	56 W	77 W	107 W	105 W	150 W
Cu loss	120 W	105 W	125 W	170 W	200 W	230 W
Efficiency	95 %	96 %	96 %	96 %	96 %	96 %
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	≤ 31 °C	≤ 33 °C	≤ 36 °C
Full-load temperature rise	≤ 55 °C	≤ 53 °C	≤ 62 °C	≤ 67 °C	≤ 76 °C	≤ 65 °C
Noise level (no load and full load)	≤ 35 dB(A)	≤ 35 dB(A)	≤ 35 dB(A)	≤ 35 dB(A)	≤ 35 dB(A)	≤ 35 dB(A)

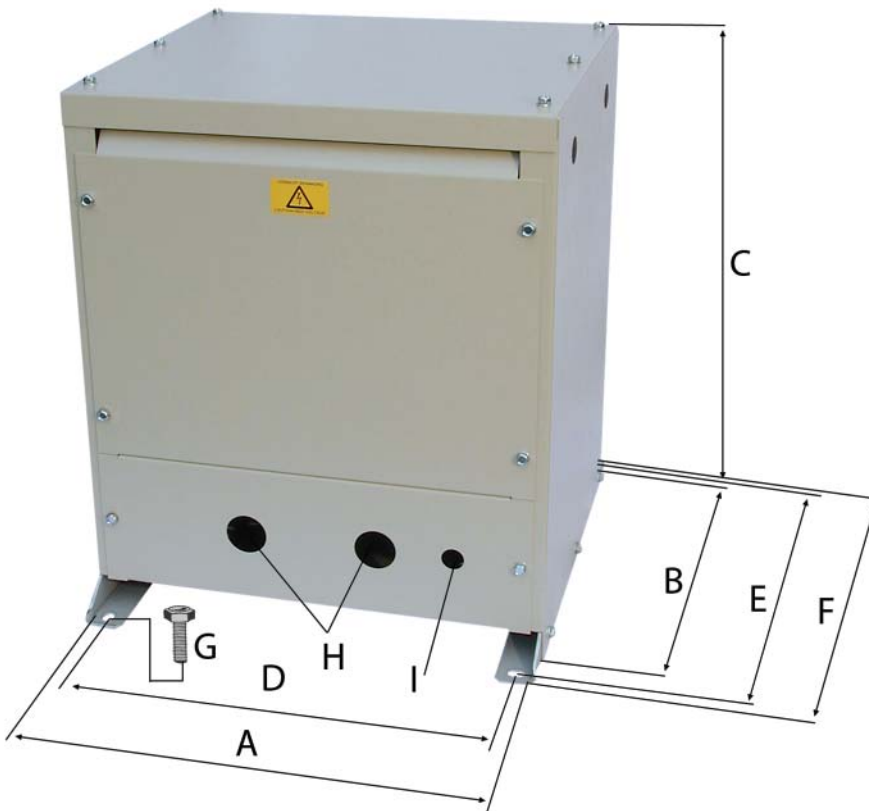
* Option: type series SK2

ESDS0107

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

Enclosure

- Sheet steel, varnished in RAL 7032
- Degree of protection 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.



Ordering information, dimensions (in mm), weight											
	A	B	C	D	E	F	G	H	I	Weight	Art. No.
ESDS0107	430	380	500	385	420	450	M10	ø 37.5	ø 20.5	16 kg	B 924 673