

ADJUSTABLE TRANSFORMERS

GENERAL DESCRIPTION

The adjustable transformers are used for the continuous adjustment of single-phase and three-phase voltages.

They are used in electromechanical and electronic industries, in laboratories and schools.

Principally are used for:

- manual and automatic control of supplies in measurement switchboard
- speed control in rotating machines
- control of heating machines
- educational demonstrations in schools and colleges
- correctly regulate single-phase and three-phase voltages

In respect of thyristor regulators, the AC voltages control by using these adjustable transformers has the following advantages:

- don't cause frequency interferences
- the output voltage wave is perfectly sinusoidal
- high efficiency, low consumption

The adjustable transformers are available in two versions:

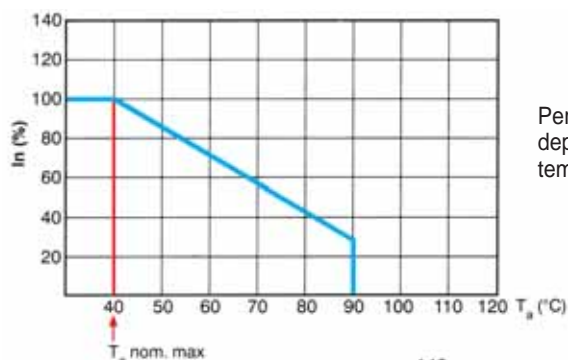
- protected by metallic case, usefull for the schools, laboratories, measurement tests
- open execution not protected to be mounted into electrical panels, control switchboards

Excluding the model HST which has the primary separate from the secondary winding, all the models are self-contained transformers.

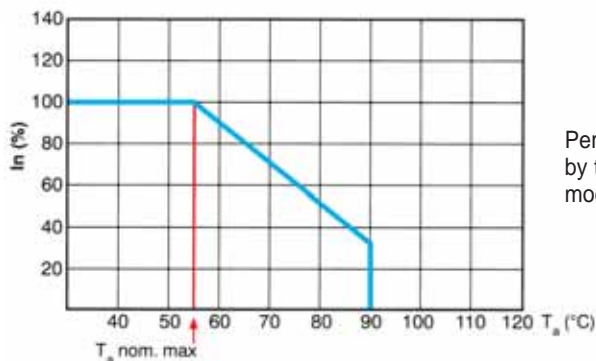
The adjustable transformers are made of high quality materials and manufactured using modern technology, so when the permissible load capacities are observed, no particular maintenance is required. With the standard version the cleaning of the slide surface only is required after long periods of use.

TECHNICAL CHARACTERISTICS

- The standard versions are supplied by 230V +10% input voltages. This voltage must never be higher than 6% of the nominal value to avoid possible increases of the temperature in the winding over the admitted limit. The secondary circuit conforms to standards VDE 0552/5.69, **must be protected against the short circuits by a fuse or thermic protection. The primary circuit must be protected by a time delayed fuse with proper range.**
- The standard working frequency is 50Hz. Models with frequency at 400Hz can be available on request; it should be understood however that the losses of the core caused by the magnetic hysteresis increases with the increase of the frequency.
- The nominal current load is permitted within the working temperatures from -15°C to $+40^{\circ}\text{C}$; in case of these limits are exceeded it is necessary to cool the transformer
- Test voltage is 2,5kV at 50Hz from the metallic parts and the points under voltage
- Protection degree: class I
- The protected models in metallic case (HSN and HTN) have the same technical characteristics of the open models; the only difference is in the working temperature that in this case is 30°C . In case of prolonged use (more than 4h continuous use) it is better to reduce the load of about 20% to avoid the overheating of the metallic case.
- In case of their use in presence of high temperatures, the maximum admissible current must be reduced of 15% every 10°C exceedent the max ambient temperature (40°C)

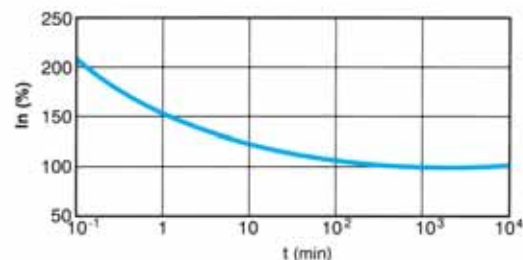


Permissible permanent load, depending by the environmental temperature



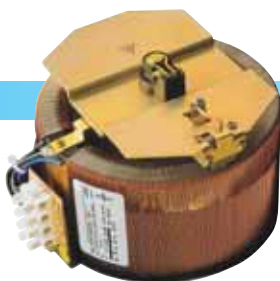
Permissible permanent load, depending by the environmental temperature in models with silver circuit

Permissible, depending on the operating time



SINGLE-PHASE

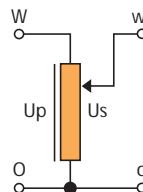
OPEN EXECUTION



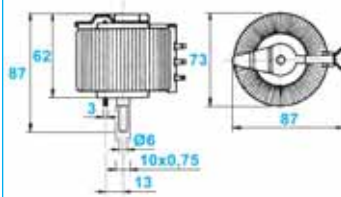
- 7HSG0011/48
- 7HSG0011/230

Up (V)	Us (V)	Is (A)	P (VA)	Weight (Kg)
48	0.....48	5	240	1,2
230	0.....230	0,8	180	1,1

Connection diagram



Dimensions in mm

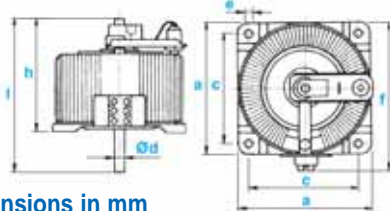
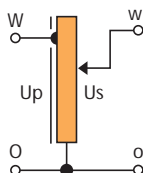


- 7HSG0022
- 7HSG0052
- 7HSG0102
- 7HSG0202
- 7HSG0302

Up (V)	Us (V)	Is (A)	P (VA)	Weight (Kg)
230	0.....250	1,2	300	2,1
230	0.....250	2,5	620	3,5
230	0.....250	5	1250	5
230	0.....260	8	2080	7,4
230	0.....260	13	3380	10,5

h	l	Ød	a	c	e	f
102	130	8	97	80	5,4	118
105	135	8	130	110	8,3	151
123	153	8	130	110	8,3	151
123	153	8	155	127	8,3	175
123	158	8	210	165	8,3	233

Connection diagram



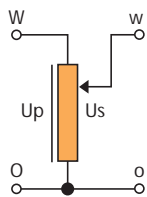
Dimensions in mm

- 7HSG230/1
- 7HSG230/1,25
- 7HSG230/1,6
- 7HSG230/2
- 7HSG230/2,5
- 7HSG230/3
- 7HSG230/4
- 7HSG230/4,5
- 7HSG230/6
- 7HSG230/8
- 7HSG230/10
- 7HSG230/12
- 7HSG230/18
- 7HSG230/23
- 7HSG230/32

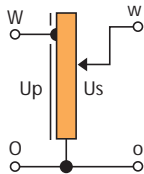
Up (V)	Us (V)	I (A)	P (VA)
230	0.....230	1,0	230
230	0.....230	1,25	287
230	0.....230	1,6	368
230	0.....230	2,0	460
230	0.....230	2,5	575
230	0.....230	3,0	690
230	0.....230	4,0	920
230	0.....230	4,5	1035
230	0.....230	6,0	1380
230	0.....230	8,0	1840
230	0.....230	10,0	2300
230	0.....230	12,0	2760
230	0.....230	18,0	4140
230	0.....230	23,0	5290
230	0.....230	32,0	7360

- 7HSG260/0,8
- 7HSG260/1
- 7HSG260/1,4
- 7HSG260/1,6
- 7HSG260/2
- 7HSG260/2,5
- 7HSG260/3
- 7HSG260/3,5
- 7HSG260/4,5
- 7HSG260/6,3
- 7HSG260/8
- 7HSG260/10
- 7HSG260/15
- 7HSG260/20
- 7HSG260/30

Up (V)	Us (V)	I (A)	P (VA)	Weight (Kg)	Model
230	0.....260	0,8	208	1,4	M15
230	0.....260	1,0	260	1,4	M15
230	0.....260	1,4	364	2,4	M30
230	0.....260	1,6	416	2,4	M30
230	0.....260	2,0	520	2,4	M30
230	0.....260	2,5	650	3,5	M50
230	0.....260	3,0	780	3,5	M50
230	0.....260	3,5	910	4,6	M100
230	0.....260	4,5	1170	4,6	M100
230	0.....260	6,3	1638	7,0	M200
230	0.....260	8,0	2080	7,0	M200
230	0.....260	10,0	2600	9,2	M250
230	0.....260	15,0	3900	13,3	M300
230	0.....260	20,0	5200	14,0	M400
230	0.....260	30,0	7800	20,5	M500

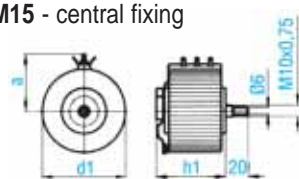


Connection diagram

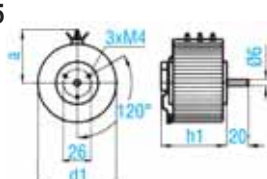


Connection diagram

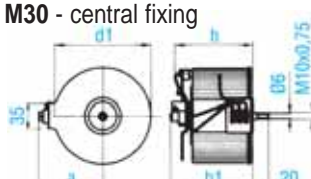
M15 - central fixing



M15



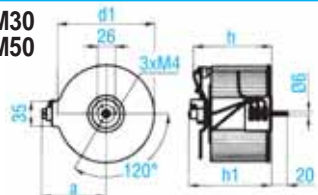
M30 - central fixing



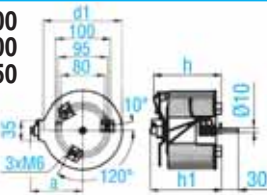
	d1	h	h1	a
M15	80	-	68	49
M15	80	-	71	49
M30	100	98	100	74
M50	117	98	100	83
M100	125	120	121	86
M200	153	120	121	100
M250	174	120	121	110
M300	226	116	117	149
M400	230	110	120	156
M500	270	125	135	175

Dimensions in mm

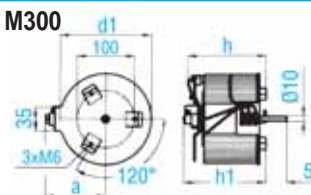
M30
M50



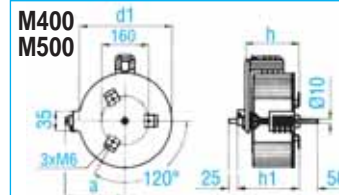
M100
M200
M250



M300



M400
M500



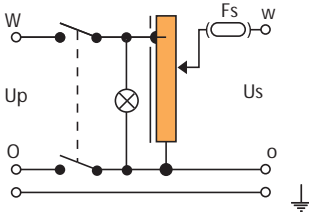
METALLIC CASE EXECUTION



- 7HSN0103
- 7HSN0203
- 7HSN0303
- 7HSN260/4,5
- 7HSN260/8
- 7HSN260/10
- 7HSN260/15
- 7HSN260/20
- 7HSN260/30

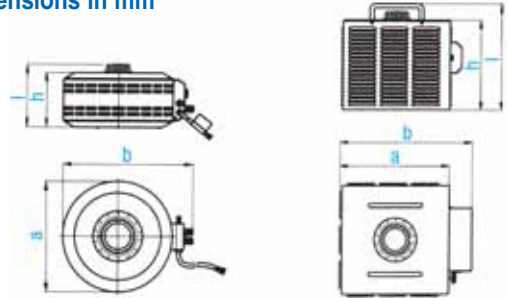
	Up (V)	Us (V)	I (A)	P (VA)	Weight (Kg)	Model
	230	0.....250	5,0	1250	6,0	-
	230	0.....260	7,0	1820	8,5	-
	230	0.....260	13,0	3380	12,0	-
	230	0.....260	4,5	1170	4,4	M100
	230	0.....260	8,0	2080	8,1	M200
	230	0.....260	10,0	2600	11,5	M250
	230	0.....260	15,0	3900	20,8	M300
	230	0.....260	20,0	5200	22,4	M400
	230	0.....260	30,0	7800	32	M500

Connection diagram



Dimensions in mm

	a	b	h	l
7HSN0103	170	206	136	157
7HSN0203	202	240	136	157
7HSN0303	268	305	134	157
M100	170	220	135	155
M200	203	253	135	155
M250	270	320	135	155
M300	258	315	178	228
M400	318	348	178	228
M500	357	387	178	228



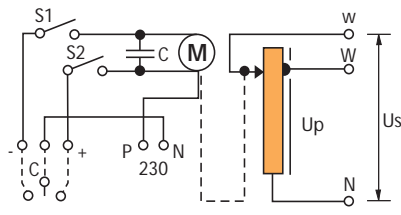
M100, M200, M250
7HSN0103, 7HSN0203, 7HSN0303

M300, M400, M500

MOTORISED EXECUTION

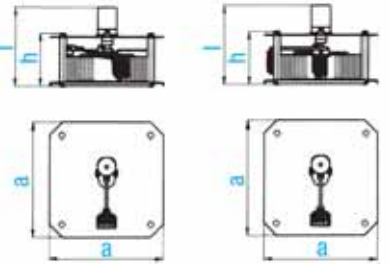


Connection diagram



Dimensions in mm

	a	h	l
M300	275	170	238
M400	310	170	238
M500	350	180	248



M300

M400, M500

	Up (V)	Us (V)	I (A)	P (VA)		Up (V)	Us (V)	I (A)	P (VA)	Weight (Kg)	Model
■ 7HSM230/18	230	0.....230	18,0	4140	■ 7HSM260/15	230	0.....260	15,0	3900	16,7	M300
■ 7HSM230/23	230	0.....230	23,0	5290	■ 7HSM260/20	230	0.....260	20,0	5200	18,1	M400
■ 7HSM230/32	230	0.....230	32,0	7360	■ 7HSM260/30	230	0.....260	30,0	7800	25,0	M500

MOTORISATION

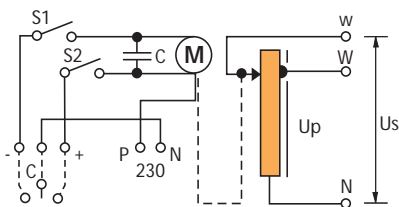
- The auxiliary power supply of the motor is 230VAC
- The travel time of the brushes to make one complete round is about 23 seconds
- Other transformers can be motorised using the correct motor choosing it between the following models



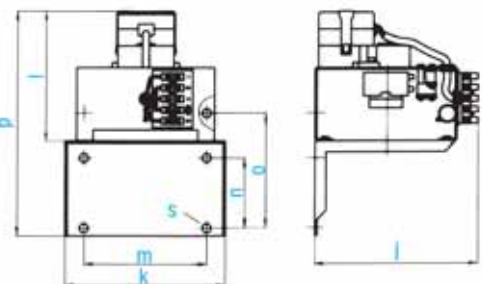
	Suitable for the models	Weight (Kg)
■ 7HMA M50	M50	1,2
■ 7HMA M100	M100	1,7
■ 7HMA M200	M200	1,7
■ 7HMA M250	M250	1,7

j	k	l	m	n	o	p	s
147	128	97	100	-	100	181	4,5
176	180	107	150	90	-	237	9
176	180	107	150	90	-	237	9
176	180	107	150	90	-	237	9

Connection diagram



Dimensions in mm



THREE-PHASE

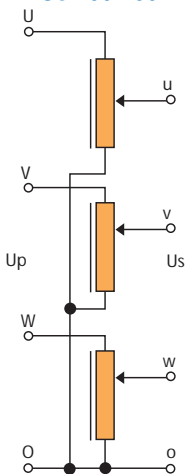
OPEN EXECUTION

	Up (V)	Us (V)	Is (A)	P (VA)	Weight (Kg)	h	l	d	a	c	g	f	M
■ 7HTO0152	400 Y	0.....430	2,5	1900	11,5	343	403	8	130	110	18	155	8
■ 7HTO0302	400 Y	0.....430	5,0 (6,5)	3700 (4800)	16,0	407	487	8	130	110	18	155	8
■ 7HTO0702	400 Y	0.....450	8,0 (9,5)	6240 (7410)	23,5	407	487	8	155	127	18	181	8
■ 7HTO0902	400 Y	0.....450	13,0 (16,0)	10140 (12480)	34,0	422	494	8	210	165	20	233	8

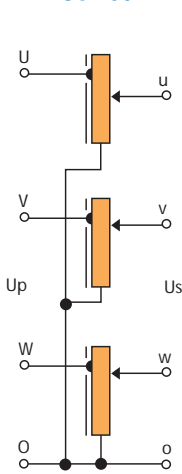
() = With cooling in oil



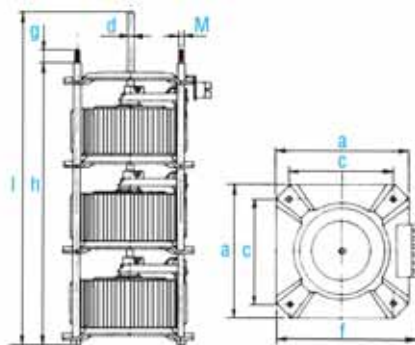
Connection diagram for Us 400-430 V



Connection diagram for Us 450 V

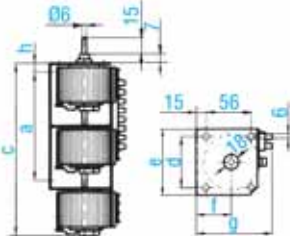


Dimensions in mm

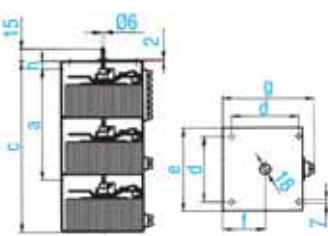


	Up (V)	Us (V)	I (A)	P (VA)		Up (V)	Us (V)	I (A)	P (VA)	Weight (Kg)	Model
■ 7HTG400/1	400	0.....400	1,0	690	■ 7HTG450/0,8	400	0.....450	0,8	624	4,9	3/M15
■ 7HTG400/1,25	400	0.....400	1,25	861	■ 7HTG450/1	400	0.....450	1,0	780	4,9	3/M15
■ 7HTG400/1,6	400	0.....400	1,6	1104	■ 7HTG450/1,4	400	0.....450	1,4	1092	8,1	3/M30
■ 7HTG400/2	400	0.....400	2,0	1380	■ 7HTG450/1,6	400	0.....450	1,6	1248	8,1	3/M30
■ 7HTG400/2,5	400	0.....400	2,5	1725	■ 7HTG450/2	400	0.....450	2,0	1560	8,1	3/M30
■ 7HTG400/3	400	0.....400	3,0	2070	■ 7HTG450/2,5	400	0.....450	2,5	1950	11,9	3/M50
■ 7HTG400/4	400	0.....400	4,0	2760	■ 7HTG450/3	400	0.....450	3,0	2340	11,9	3/M50
■ 7HTG400/4,5	400	0.....400	4,5	3105	■ 7HTG450/3,5	400	0.....450	3,5	2730	15,1	3/M100
■ 7HTG400/6	400	0.....400	6,0	4140	■ 7HTG450/4,5	400	0.....450	4,5	3510	15,1	3/M100
■ 7HTG400/8	400	0.....400	8,0	5520	■ 7HTG450/6,3	400	0.....450	6,3	4914	23,6	3/M200
■ 7HTG400/10	400	0.....400	10,0	6900	■ 7HTG450/8	400	0.....450	8,0	6240	23,6	3/M200
■ 7HTG400/12	400	0.....400	12,0	8280	■ 7HTG450/10	400	0.....450	10,0	7800	29,8	3/M250
■ 7HTG400/18	400	0.....400	18,0	12420	■ 7HTG450/15	400	0.....450	15,0	11700	45,5	3/M300
■ 7HTG400/23	400	0.....400	23,0	15870	■ 7HTG450/20	400	0.....450	20,0	15600	48,0	3/M400
■ 7HTG400/32	400	0.....400	32,0	22080	■ 7HTG450/30	400	0.....450	30,0	23400	70,5	3/M500

3/M15

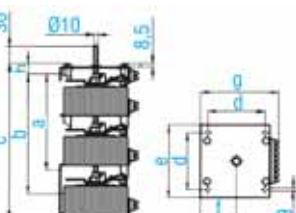


3/M30, 3/M50

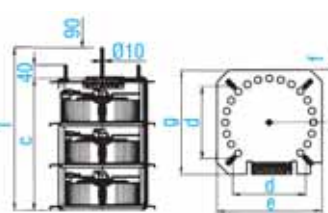


	a	b	c	d	e	f	g	h	l
3/M15	154	-	246	80	100	48	87	15	-
3/M30	234	-	323	80	100	55	110	15	-
3/M50	243	-	323	110	124	64	128	18	-
3/M100	243	284	370	110	130	67	134	21	-
3/M200	243	284	370	160	178	90	180	21	-
3/M250	243	284	370	160	178	90	180	21	-
3/M300	-	-	402	178	275	138	275	-	492
3/M400	-	-	402	249	310	155	310	-	492
3/M500	-	-	466	249	350	175	350	-	492

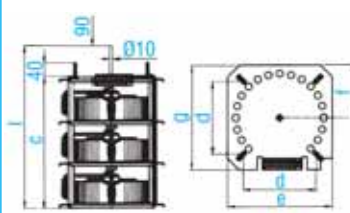
3/M100, 3/M200, 3/M250



3/M300



3/M400, 3/M500



Dimensions in mm

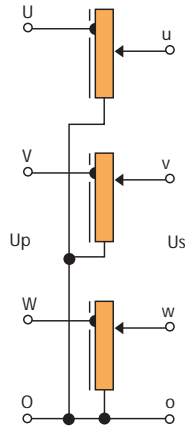
EXECUTION IN METALLIC CASE



- 7HTN0703
- 7HTN0903
- 7HTN450/8
- 7HTN450/10
- 7HTN450/15
- 7HTN450/20
- 7HTN450/30

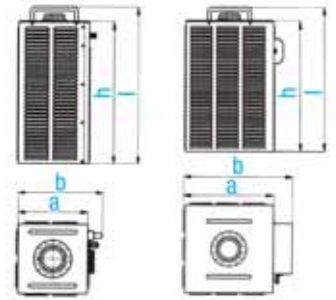
	Up (V)	Us (V)	I (A)	P (VA)	Peso (Kg)	Modello
	400 Y	0.....450	7,0	5460	30,5	-
	400 Y	0.....450	13,0	10140	41,0	-
	400 Y	0.....450	8,0	6240	28,6	3/M200
	400 Y	0.....450	10,0	7800	35,2	3/M250
	400 Y	0.....450	15,0	11700	51,7	3/M300
	400 Y	0.....450	20,0	15600	54,8	3/M400
	400 Y	0.....450	30,0	23400	79,0	3/M500

Connection diagram



Dimensions in mm

	a	b	h	l
7HTN0703	185	200	468	506
7HTN0903	265	286	478	525
3/M200	240	285	380	420
3/M250	240	285	380	420
3/M300	285	315	480	520
3/M400	318	348	480	520
3/M500	357	387	540	590



3/M200, 3/M250
7HTN0703, 7HTN0903

3/M300, 3/M400
3/M500

MOTORISATION

- The auxiliary power supply of the motor is 230VAC
- The travel time of the brushes to make one complete round is about 23 seconds
- Other transformers can be motorised using the correct motor choosing it between the following models

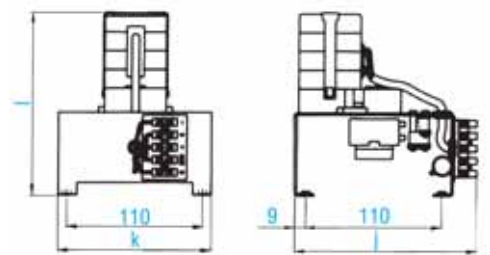


- 7HMA 3/M50
- 7HMA 3/M100
- 7HMA 3/M200
- 7HMA 3/M250
- 7HMA 3/M300
- 7HMA 3/M400
- 7HMA 3/M500

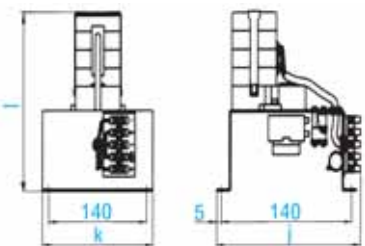
Suitable for the models:	Weight (Kg)
3/M50	1,0
3/M100	1,0
3/M200	1,0
3/M250	1,0
3/M300	1,4
3/M400	1,4
3/M500	1,4

j	k	l
147	124	124
147	124	148
147	124	148
147	124	148
147	150	166
147	194	209
147	194	209

Dimensions in mm



3/M50, 3/M100, 3/M200, 3/M250



3/M300, 3/M400, 3/M500

Connection diagram

