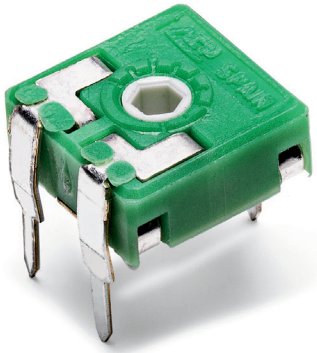
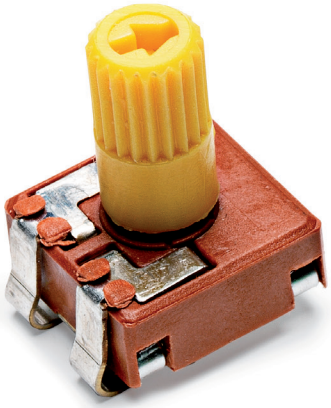
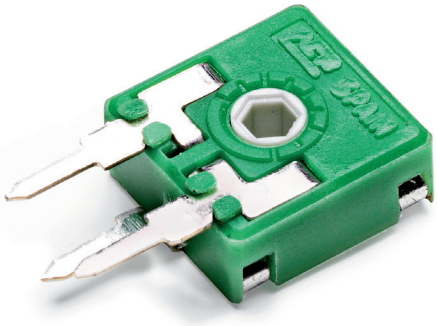
RS9

Rotary Sensor







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RS9

9mm Rotary Sensor appropriated for position sensing and control applications capable of withstanding high configurations of mechanical life.

- Standard: from 15.000 to 50.000 cycles
- Long life: up to 200.000 cycles. More cylcles available under request.

RS9 has plastic housing and Ingress Protection rating type IP 54 (high level of protection against dust and also against water splashing), according to IEC 60529. Plastic materials can be self-extinguishable according to UL 94 V-0 under request.

Through-hole and SMD configurations are available. Terminals and collector are manufactured in tinned brass, although versions with steel terminals are also available under request. Terminals for through-hole models can be provided straight or crimped, which helps hold the component to the PCB during soldering.

Standard taper is linear, with independent linearity of ±3%. ACP can study other special tapers (even cut tracks, step curves with areas of constant value, etc), as well as more strict linearity.

Thumbwheels and shafts can be provided either separately or already inserted in the sensor. Our RS9 can be manufactured in a wide range of possibilities regarding: resistance value, tolerance, tapers, pitch, positioning of the wiper, housing and rotor color.

Applications

- Household appliances: temperature control, position sensor.
- Automotive: position adjustment and sensing. Industrial controls.

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RS9 HOW TO ORDER

EXAMPLE: **RS9MH2,5-10KA2020 SNP PI WT-9005-BA**

Standard features								Extra features							Assembled accessory			
Series	Rotor	Model	Packg.	Ohm value	Taper	Tol.	Life	Track	Detents	Snap in	Housing	Rotor	Wiper	Lin.	Assembly	Ref #	Color	Flam.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16		
RS9	M	H2,5		- 10K	A	2020				SNP			PI		WT	-9005	-BA	-V0

Standard configuration:	**RS9 Through-hole**	**RS9 SMD**
Dimensions:	9mm	
Protection:	IP 54 (dust-proof) On request: Self-extinguishable, to meet UL 94 V-0	
Substrate:	Carbon technology	Carbon technology, special for high temperature
Color:	Green housing + white rotor	Brown housing + grey rotor
Packaging:	Bulk	
Wiper position:	at 50% ±15º	
Terminals:	Straight, without crimping.	
Marking:	Resistive value marked on housing. Others on request.	

Customized products: A drawing is requested when ordering a customized product. Series, rotor, model and total resistive value are indicated before the code that includes all special specifications. Example: CA9PH2,5-10K CODE C00111.

1 - Series

■ RS9

2 - Rotors

C D E J K M P R Y

3 - Model and pitch

H2,5 H3,8 HS3,8 H5 HSMD V7,5 V10 VK10 VR10 VSMD VSMD WT-9002

4 - Packaging	Trough-hole	SMD models
Bulk	(blank)...(1)	(blank)...(1)
T&R (Tape and 13" reel)	(N.A.)(2)	T&R
T&R (Tape and 15" reel)	(N.A.)(2)	T&R15

(1) If blank, bulk packaging is implied. (2) N.A., Not Applicable: Tape and Reel packaging is only available for SMD terminals.

5 - Resistance value

10K

The RS9 has 10K, linear taper and ±30% by default. Other resistive values, tolerances and tapers (log, antilog, cut tracks, constant value areas, etc.) can be studied on request. Please, enclose a drawing when ordering special tapers.

6 - Resistance law / taper

Lin - Linear	A
- Special tapers have codes assigned:	CODE YXXXXX

7 - Tolerance

±30%

3030

8 - Operating Life (Cycles)

Standard: between 15.000-50.000 cycles	ex:LV15; LV50
Long life: LV+the number of cycles. ex: LV200 for 200.000 cycles. (others on request)	LVXXX:ex: LV200

9 - Cut Track – Open circuit.

Open circuit at beginning of track, fully CCW	PCI
Open circuit at end of track, fully CW	PCF
Pin in Paste option (Reflow Soldering)	PIP

10 - Detents (DT)

11 - Terminals

SNAP IN P	SNP
SNAP IN J	SNJ
Shorter tip of terminal, TPXX, where XX is tip length (under request)	TPXX, ex: TP25
Steel Terminals	SH

12 - Housing

Color: For colors other than standard: -See color chart below-	CJ-color, ex., red: CJ-RO

13 - Rotor

Color: For colors other than standard: -See color chart below-	RT-color; ex., blue: RT-AZ

*** Self-extinguishable property, V0, for housing and rotor:**	
By default, carbon is non self-extinguishable. Self-extinguishable property can be added. V0 means housing and rotor are V0.	(blank) V0
If only the housing needs to be V0, then CJ-V0.	CJ-V0, RT-V0
If only rotor: RT-V0	

14 - Wiper

Wiper position (Standard: 50% ± 15º)	(leave blank)
Initial or CCW	PI
Final or CW	PF
Others: following clock positions; at 3 hours: P3H	PXH, ex: P3H
Wiper torque (Standard: <2Ncm)	(leave blank)

Stronger or softer torque feeling is available on request.

15 - Linearity

Standard Independent Linearity	LN3%
Other Independent linearity below x%, for example, 4%: LN4% LNx%; ex:	LN4%
Absolute linearity controlled & below x% LAx%	LAx%

16 - Potentiometers with assembled accessories

Assembled from terminal side	WT
Assembled from collector side	WTI
Accessory Reference See list of shafts and thumbwheels available	-XXXXX Example: 9010
Color of shaft or thumbwheel	-YY Example, white: BA
Non self-extinguishable. Self-extinguishable according to standard UL 94 (-V0 in box 17 modifies only the accessory, please, note.)	(leave blank) -V0
For ordering spare accessories: Accessory reference - color- flammability. Ex. 9010-AZ-V0 is a blue self-extinguishable 9010 thumbwheel	XXXX-YY-V0

Color chart for rotor, housing and accessories

Black(1)	White	Neutral	Transp.	Red	Green	Yellow	Blue	Grey	Brown
NE	BA	IN	TA	RO	VE	AM	AZ	GS	MR

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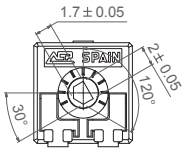
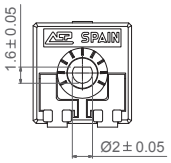
Rotors

Rotors are drawn in their standard positioning, 50% of rotation. Alternative delivery positioning can be requested. Accessories in this catalogue are designed for the M rotor, unless otherwise stated.

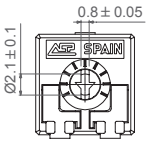
C



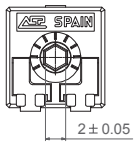
D



E



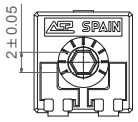
J



K

Standard color for K rotor is red

M



P

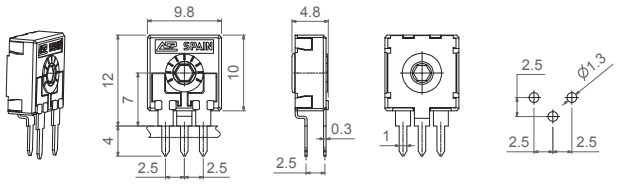
R

Y

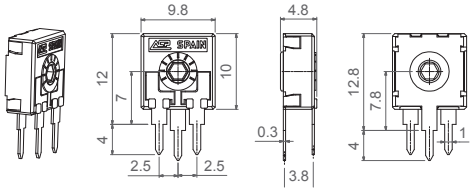
Models

All models shown here have the most common rotor for 9mm potentiometers: the M rotor. Different rotors are available from the menu above.

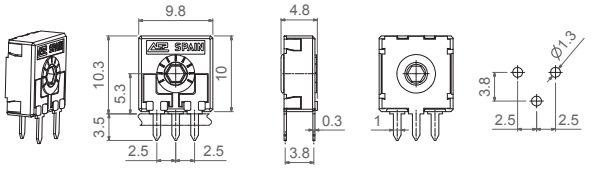
H2,5



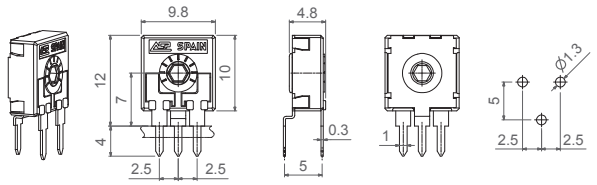
H3,8



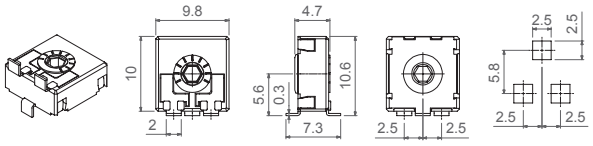
HS3,8



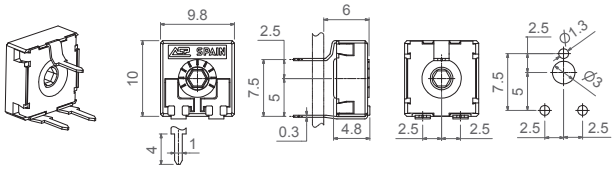
H5



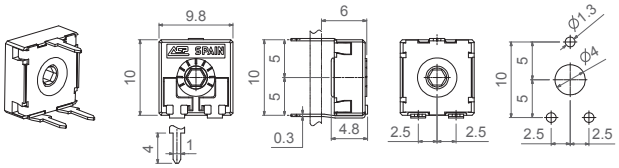
HSMD



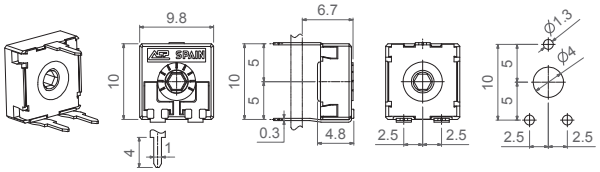
V7,5



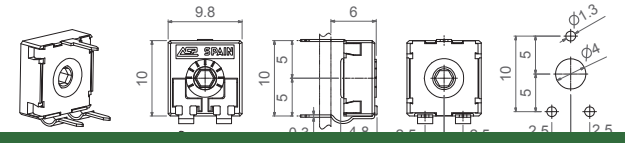
V10



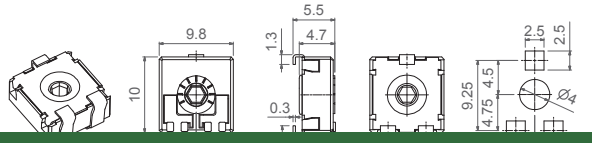
VK10



VR10



VSMD



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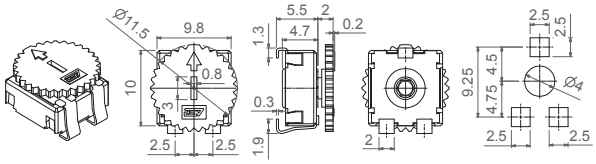
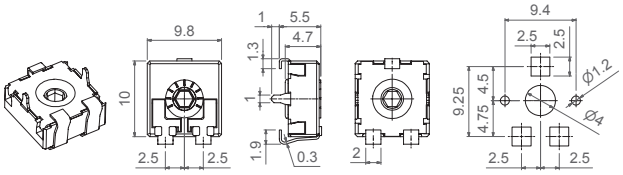
Models

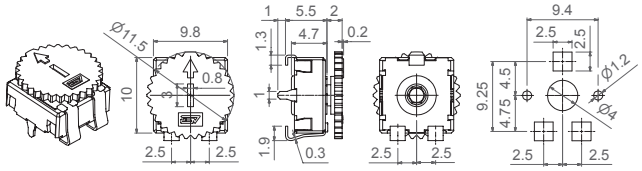
VSMD WT-9002



VSMD...CY



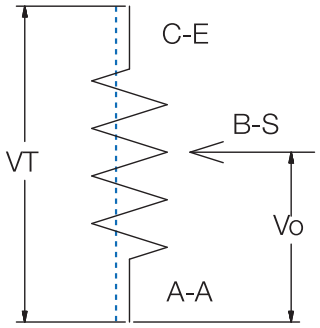
VSMD...CY WT-9002



Tapers

The standard taper is linear (A) and the standard ohm value is 10K, since a RS9 will normally be used as a voltage divider. For other tapers, please, inquire.

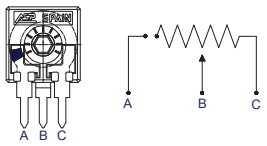
Voltage Divider



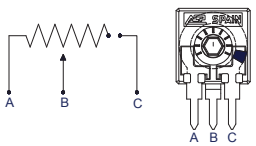
Potentiometers with cut track

The cut track is an area with very high resistive value, resulting in an open circuit. It is widely used in lighting applications.
Mechanical life with cut track needs to be confirmed.
PCI = Cut at initial position, when the potentiometer is turned fully counter clockwise.
PCF = Cut at final position, when the potentiometer is turned fully clockwise.
Other positions are available on request.

PCI



PCF



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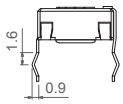
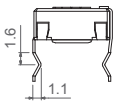
Terminals

By default, terminals are always straight, as shown on the “models” section. ACP can provide crimped terminals (with snap in, “SNP” or “SNJ”) to better hold the component to the PCB during the soldering operation.

SNP

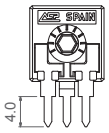


SNJ

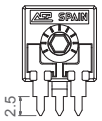


Also, there is an option of having shorter terminal tips:

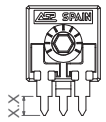
Standard Terminal



Shorter terminal, for H5 TP25



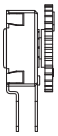
Shorter terminal, TPXX (under request)



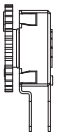
Possibilities for insertion of accessories

Accessories can be mounted on potentiometers through either the front side (WT) or the collector side (WTI). For the specific angular position of shafts with planes, a drawing with the exact position is requested.

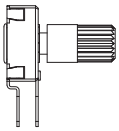
WT Front side



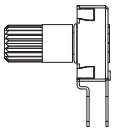
WTI Collector side



WT Front side



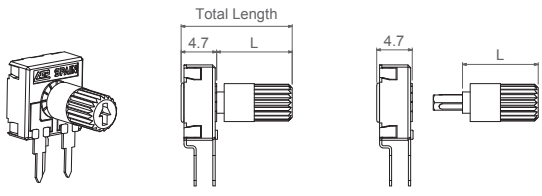
WTI Collector side



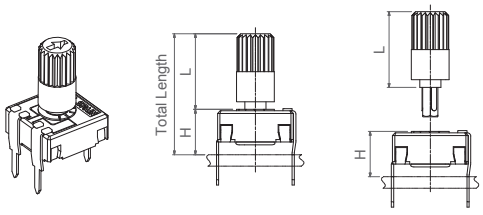
Shafts

Shafts are available in different colors (color chart in “how to order” section) and with self-extinguishable property, according to UL 94 V-0, under request. ACP can study special shaft designs.
Shafts can be sold separately or delivered already mounted on the potentiometer at ACP.
Unless otherwise stated, the arrow in the shafts is in line with the wiper and it points to 50% when assembled with M rotors.
When a shaft is mounted on a potentiometer, the distance from the top of the potentiometer to the top of the shaft is marked with “L” in the table below, as shown in the drawings:

H potentiometer + shaft

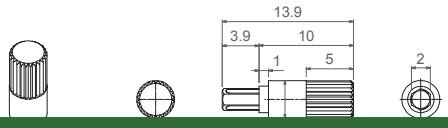


V potentiometer + shaft

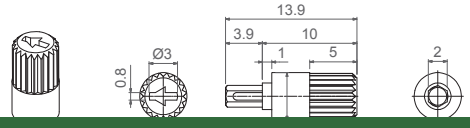


Shaft	9071	9067	9072	9054	9004	9005	9064	9055	9070	9053	9009	9059	9063	9010	9006	9019	9073	9020	9047
L Dimension	3.5	5.5	6.5	9.5	10	10	10	10.8	11.9	12.1	14.5	14.5	14.5	15	19.7	19.9	25.5	25.9	29.8

9004



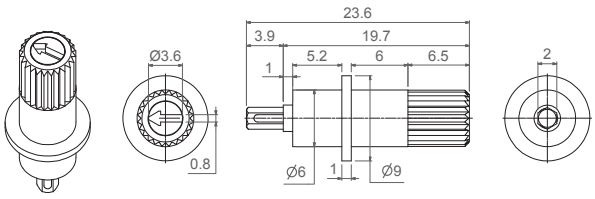
9005



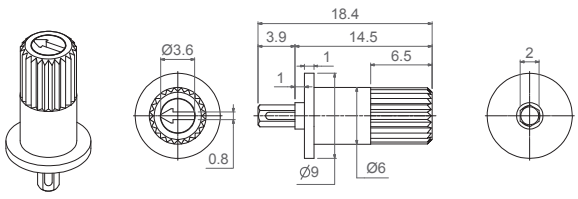
RS9

Shafts

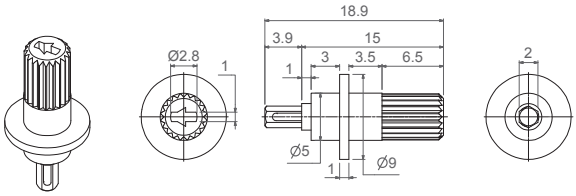
9006



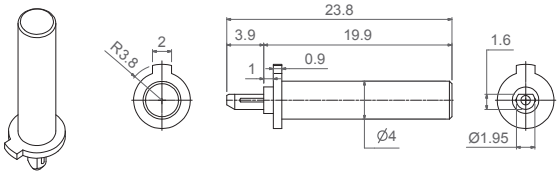
9009



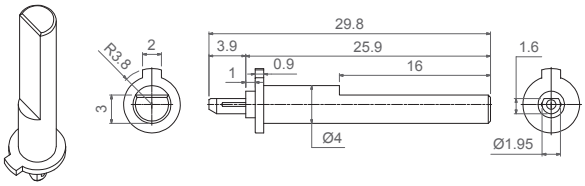
9010



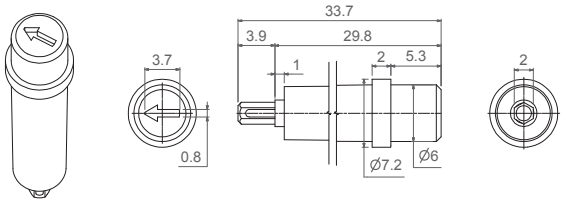
9019 (Designed for D rotor)



9020 (Designed for D rotor)



9047



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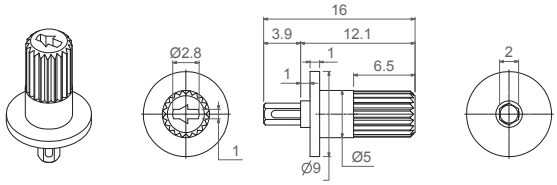
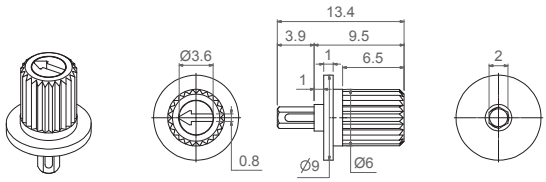


9054



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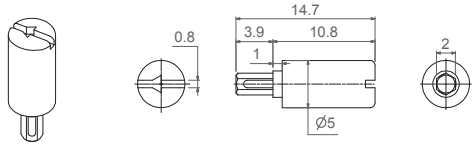
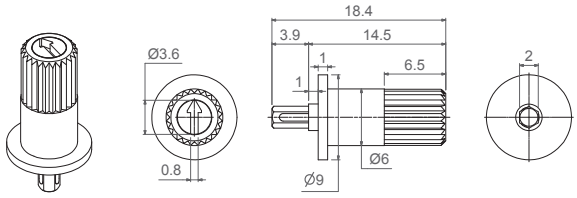
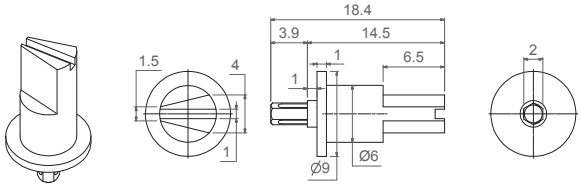


9059

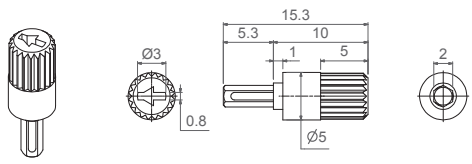


The arrow is in line with the wiper when potentiometer has rotor J (with M rotor, there is a 30° difference).

9063



9064



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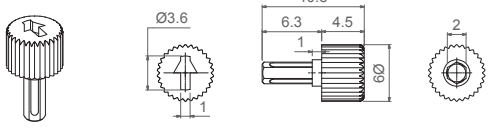
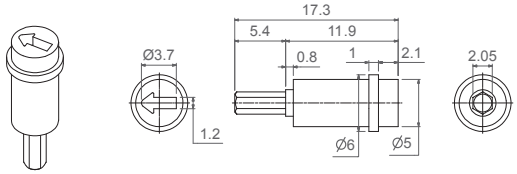


The arrow is in line with the wiper when potentiometer has rotor J (with M rotor, there is a 30° difference).

9070



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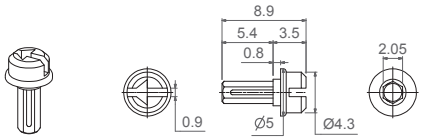
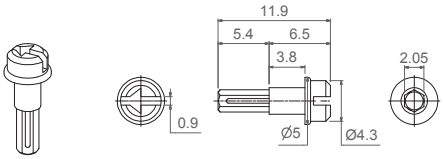
Shafts

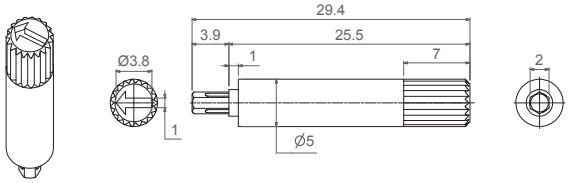
9071



9072



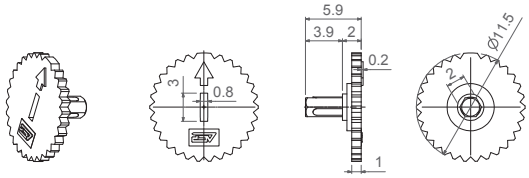
9073



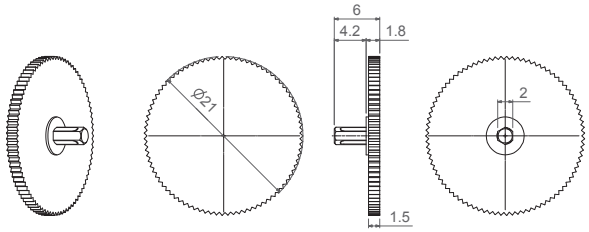
Thumbwheel

Thumbwheels are available in different colors (color chart in “how to order” section) and with self-extinguishable property according to UL 94 V-0, under request.
Thumbwheels can be mounted on the potentiometers at ACP or sold separately. ACP can study special thumbwheel designs.

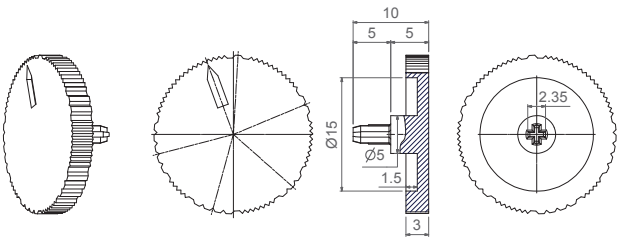
9002



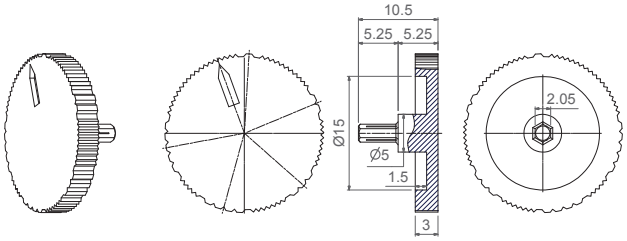
9041



9060 (Designed for R rotor)

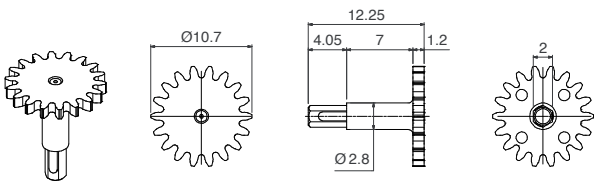


9061



Gear Wheels

In addition to the range of shafts and thumbwheels we can provide gear wheels under study according to customer´s requirements.The below model is already available for prototyping purposes. It can be supplied loose or already mounted on the RS9 series



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Packaging

Bulk packaging:

Potentiometer model	With shaft or thumbwheel inserted?	Pieces per small box (150 x 100 x 70)	Pieces per bigger box (250 x 150 x 70, CG on description)
H2,5 - H3,8 - HS3,8 - H5 HSMD - V7,5 - V10 VK10 - VR10 - VSMD	None, only potentiometers.	500	1.500
	9002	250	1.000
	9004, 9005, 9006, 9009, 9010, 9041, 9047, 9053, 9054, 9055, 9059, 9060, 9061, 9063, 9064, 9067, 9070.	200	1.000 in general
	9071, 9072	400	1.250

Tape & Reel packaging:

	With thumbwheel inserted?	13” Reel (Standard), with 24mm width tape	15” Reel, with 24mm width tape
VSMD	None, only potentiometers.	900 pcs per reel, 12mm step between cavities.	1.250 pcs per reel, 12mm step between cavities.
	9002	700 pcs per reel, 12mm step between cavities.	To be determined.
VSMD…CY	None, only potentiometers.	750 pcs per reel, 12 mm step between cavities	1000 pcs per reel, 12 mm step between cavities
	9002	To be determined	To be determined
HSMD		350 pcs per reel, 16 mm step between cavities	475 pcs per reel, 16 mm step between cavities
H2,5…PIP TP25 - H5…PIP TP25 - HS3,8... PIP	None, only potentiometers or 9002	250	350
V7,5...PIP - V10...PIP - V10…PIP TP25 - VR10...PIP		250	400

The 13” reel is the standard. For the 15” reel, T&R15 is added to the description.

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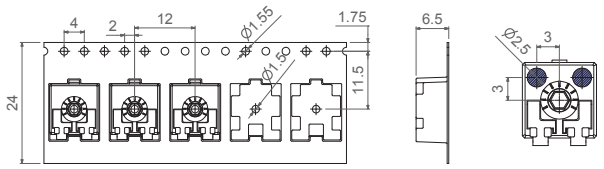
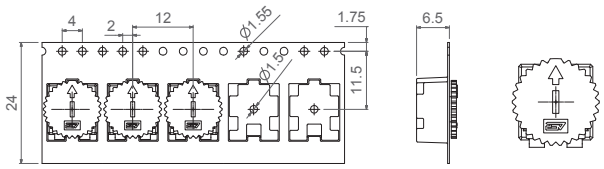
Packaging

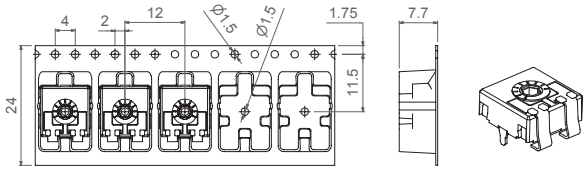
VSMD-T&R



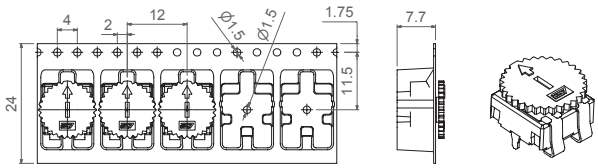
VSMD-T&R…WT-9002



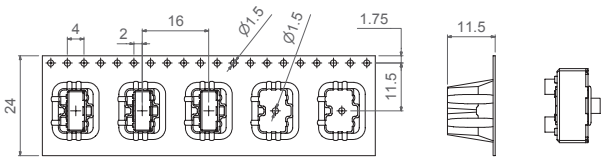
VSMD-T&R ...CY



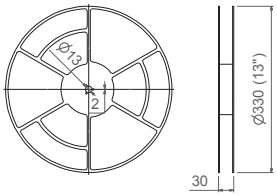
VSMD-T&R...CY WT-9002



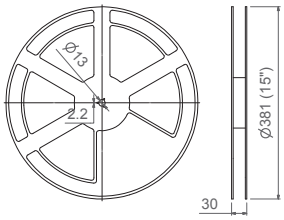
HSMD-T&R



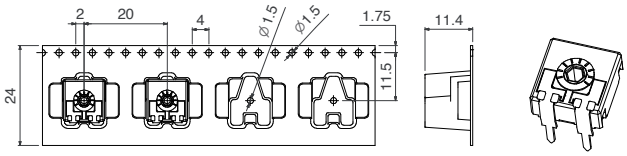
13”Reel



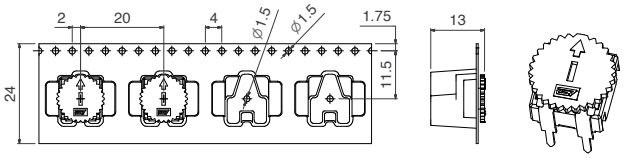
15”Reel



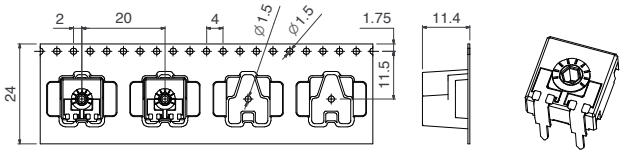
V7,5-T&R...PIP



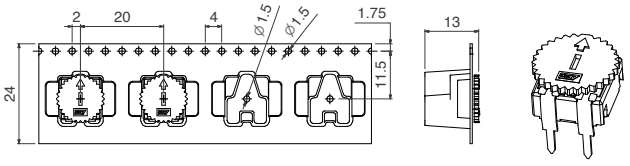
V7,5-T&R… PIP WT-9002



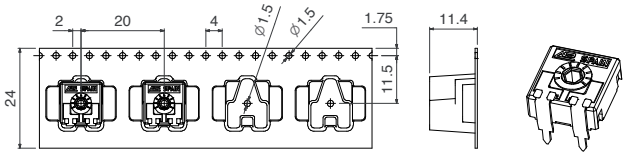
V10-T&R... PIP



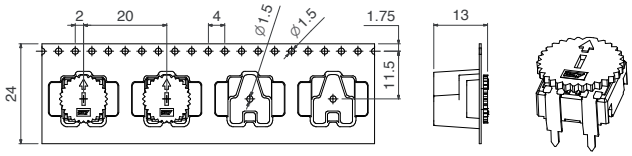
V10-T&R…PIP WT-9002



V10-T&R…PIP TP25



V10-T&R…PIP TP25 WT-9002



RS9

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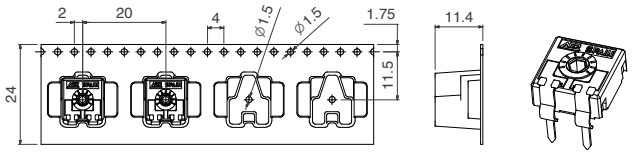
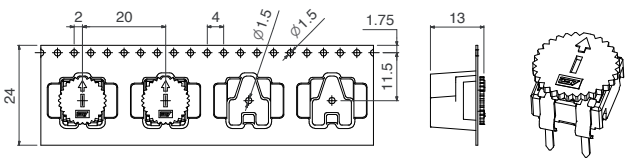
Packaging

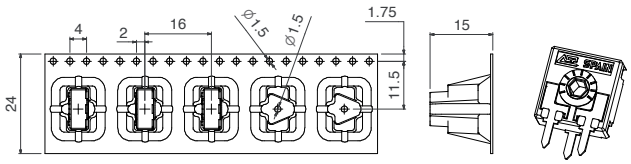
VR10-T&R...PIP



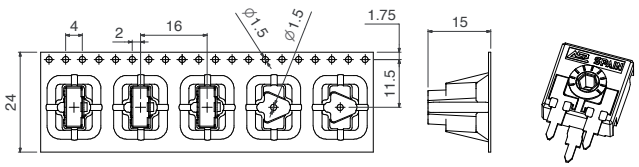
VR10-T&R... PIP WT-9002



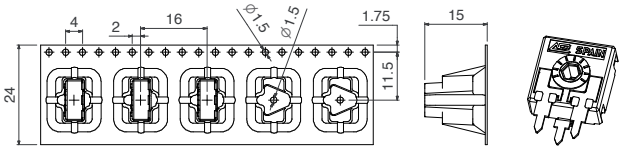
HS3,8-T&R... PIP



H5-T&R...PIP TP25



H2,5-T&R...PIP TP25



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Electric Specifications

These are standard features; other specifications and out of range values can be studied on request.

	RS9 Through-hole and SMD	
Range of resistance values* Lin (A)	Standard value is 10K, as voltage divider use is supposed	
Tolerance*	±30%	
Variation laws	Lin (A). Other tapers available on request	
Residual resistance	Minimum value 2Ω	
CRV - Contact Resistance Variation (dynamic)	Lin (A) Electrical Angle 220º±20º ≤ 3%Rn. Other tapers, please inquire	
CRV - Contact Resistance Variation (static)	Lin (A) Electrical Angle 220º±20º ≤ 5%Rn. Other tapers, please inquire	
Maximum power dissipation** Lin (A)	at 50ºC 0.15W	
Maximum voltage Lin (A)	200VDC	
Operating temperature	-25ºC … +70ºC (+85ºC on request)	
Temperature coefficient 100Ω ≤ Rn ≤ 10KΩ 10KΩ < Rn ≤ 5MΩ	 +200/ -300 ppm +200/ -500 ppm	 +200/ -500 ppm +200/ -1000 ppm

* Out of range ohm values and tolerances are available on request, please, inquire.
** Dissipation of special tapers will vary, please, inquire.

Mechanical Specifications

	RS9 Through-hole and SMD
Resistive element	Carbon technology
Angle of rotation (mechanical)	240º ± 5º
Angle of rotation (electrical)	220º ± 20º
Wiper standard delivery position	50% ± 15º
Max. stop torque	5 Ncm
Max. push/pull on rotor	40 N
Wiper torque*	<2 Ncm
Mechanical life	Standard: between 15.000 and 50.000cycles. Long life: up to 200.000cycles (more available on request, please, inquire)

* Stronger or softer torque feeling is available on request.

Test results

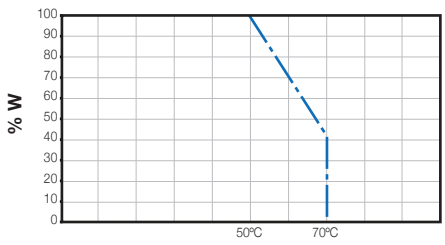
The following typical test results are given at 23ºC ±2ºC and 50% ±25% RH.

RS9 Through-hole and SMD

	Test conditions	Typical variation of nominal resistance
Damp heat	500 h. at 40°C and 95% RH	±20%
Thermal cycles	16 h at 85ºC, plus 2 h at –25ºC	±20%
Load life	1.000 h. at 50°C	±20%
Mechanical life	1.000 cycles at 10 c.p.m. and at 23°C ± 2°C	±20%

Power derating curve:

RS9 Through-hole and SMD



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