Precision Potentiometers

Hardware Reference

Document 1101062 - Edition June 2009

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COUDOINT

Tel.: +33 1 30 41 55 00 *Fax:* +33 1 30 41 55 62

Email: commercial@coudoint.com *Website:* www.coudoint.com

Address: 19, Avenue de la gare 78690 Les Essarts Le Roi FRANCE

1 Main Features

Design: These wirewound potentiometers are constructed with:

- a black anodized machined housing of light alloy, in 3 parts: front flange, skirt, rear flange
- a stainless steel shaft supported by 2 precision roller bearings (except for the "Economy" class)
- a precious metal double wiper
- a gold alloy slip ring
- a high-accuracy low-temperature coefficient winding

The modular structure allows the achievement of ganged models with several modules ganged on a common shaft. Clamping rings facilitate the angular setting after assembly.

Performances/Reliability: The carefully selected raw materials, the high accuracy part machining, and the demanding testing during production guarantee a high level of performance in the following areas:

- mechanical endurance and linearity
- noise level
- resistance to mechanical shocks, vibrations and corrosion

A high level of reliability is obtained through:

- the use of a wiper technology with a double triangular arm which, due to its stable position and controlled pressure on the resistive element, provides a reliable and durable contact while protecting the resistive coil against wear
- the duplication - on "Industrial" and "Precicison" classes - of every connecting wire with the resistive element or the wiper, every wire being varnished to secure its position and its electrical insulation

The selection guide on page 4 provides an overview of the performances of the different models.

Production testing:

Demanding tests are performed at various steps of production (visual checking, dielectric strength of sub-assemblies, slider contact pressure, ohmic values, etc.).

Before the final testing, the potentiometers undergo 15 hours to 1500 working cycles per hour for 15 hours, for a total of 22,500 cycles. The products are then disassembled, cleaned, oiled again (coil and wiper), and re-assembled. They are then submitted to the following test operations:

- measure the equivalent noise resistance value
- test the continuity between wiper and resistance element on the total travel
- test the linearity and draw the linearity curves
- dielectric strength check
- measure of the insulation resistance value

The test results are formalized in a final test report, and can be sent with the parts, if desired.

Marking: Manufacturer's name, model number, ohmic value and date-code are printed on the rear flange as a standard

Parameters for ordering a standard model:

- Ohmic value: each potentiometer is supplied at the required ohmic value in the range of feasible values
- Mounting mode: 3 clamps (not supplied) or 2 Ø M3 screws (not supplied)
- Single unit or multiple assemblies: number of modules
- Rotational stop: with or without
- Intermediary taps: with or without
- Electrical travel
- Terminal styles: waterproof glass insulated solder lugs or simply flexible wires

Optional features:

- Special electrical and/or mechanical travel
- Disconnection on specified angles
- Special design of intermediary taps: size and position – with ultra precision within one degree -
- Terminal wires special colors, cables, output wire positions, etc.
- Protection ring or protection cap at the front and/or at the rear, against dust and liquid projections
- Special shaft design: diameter, type, extended from front and/or from back of housing, flatted, slotted, pinned, etc.
- Special design of the flanges: locating peg, special mounting style, etc.
- Special ohmic value variation laws

2 Product Selection Guide

Reference Standard NFC-93265		Size 08 P = 1 watt	Size 15 P = 3 watts	Size 18 P = 6 watts
"PRECISION" Class	• Rotational life : **2 Millions shaft revolutions** • Linearity: ± 0.1% to± 0.05% • Operating temperature range: - 55 to + 155°C • Long term damp heat: 10 days • Dielectric strength: 750 V_{RMS} • Final test report delivered with the parts		**PR-15**	**PR-18**
"HEAVY INDUSTRY" Class	• Rotational life : **5 Millions shaft revolutions** • Linearity: ± 0.5% to± 0.1% • Operating temperature range: - 25 to + 125°C • Long term damp heat: 56 days • Dielectric strength: 1500 V_{RMS}	**082**	**152**	**182** **8018**
"LIGHT INDUSTRY" Class	• Rotational life : **1 Million shaft revolutions** • Linearity: ± 0.5% • Operating temperature range : - 10 to + 85°C • Long term damp heat : 4 days • Dielectric strength: 750 V_{RMS}		**SI-15**	**SI-18**
"ECONOMY" Class	• Rotational life: **500,000 shaft revolutions** • Linearity: ± 1% • Operating temperature range: - 10 to + 85°C • Long term damp heat: 4 days • Dielectric strength: 750 V_{RMS}		**SI-15 T** **SI-15 TC**	

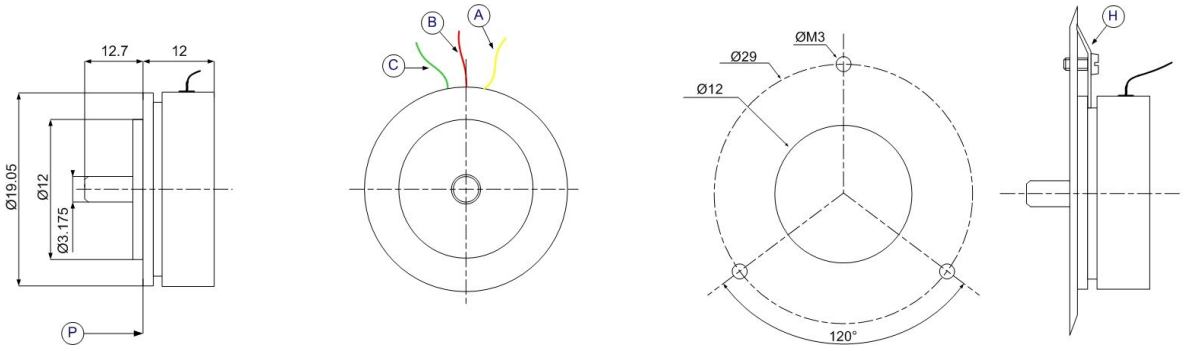
3 1-watt Series: Model 082

- **Range of achievable (total) ohmic values:** **500 Ω to 10 kΩ**

- **Features**:

		Model
Features	**Units**	**082**
Power dissipation at 85 °C	W	1
Ohmic value tolerance	%	± 5
Average linearity tolerance	%	± 0.5
Electrical travel	degree	354 ± 2
Maximum operating voltage	V	70
Dielectric strength (50 Hz / 1 mn)	V	1,500
Operating temperature range	degree C	-25 to +125
Long term damp heat (93% RH)	days	56
Insulation resistance (under 500 V_{DC})	MΩ	10^3
Positional tolerance on intermediary taps	degree	± 1
Rotational life (shaft revolutions)		5,000,000
Average weight of the first module	g	12
Average weight by additional module	g	5
Starting torque	Nm	5.10^{-4}
Standard shaft diameter	mm	3.175

Dimensions and mounting:



Dimensions (mm) *Mounting by clamps*

- Terminal wires:
  - **A** (yellow wire): beginning of stroke
  - **B** (red wire): slider
  - **C** (green wire): end of stroke

  While the shaft is rotating clockwise (seen from shaft end), the ohmic value between A and B varies from its minimum value to its maximum value (= ohmic value between A and C).
- Panel mounting:
  - panel cut-out Ø 12 mm
  - mounting against the **P** face
  - by 3 clamps **H** with Ø M3 screws spaced 120 degrees apart (clamps and screws not supplied)

Particular features of the model:

- No possibility of protection ring or protection cap or multiple units
- Mounting by clamps only
- Flexible output wires only (waterproof bass end with ceramic insulation not feasible)
- Mechanical stop not feasible

Parameters for ordering a standard model:

- Ohmic value (between 500 ohms and 10,000 ohms)
- Intermediary tap(s)
- Electrical angle

A (close-to-) zero ohmic value may be done to use this model as a tap switch.

Optional features:

- Special electrical and/or mechanical travel
- Disconnection on specified angles
- Special design of intermediary taps: size and position – with ultra precision within one degree-
- Terminal wires: special colors, cables, output wires positions, etc.
- Special shaft design: diameter, type, extended from front and/or from back of housing, flatted, slotted, pinned, etc.
- Special design of the flanges: locating peg, special mounting mode, etc.

4 3-watts Series

4.1 Models PR-15, 152, SI-15

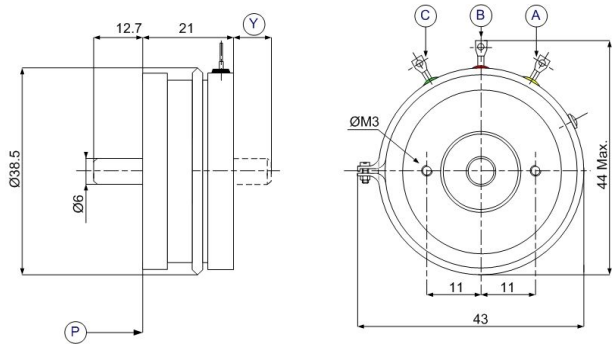
- **Range of achievable (total) ohmic values:** **200 Ω to 50 kΩ**

- **Features**:

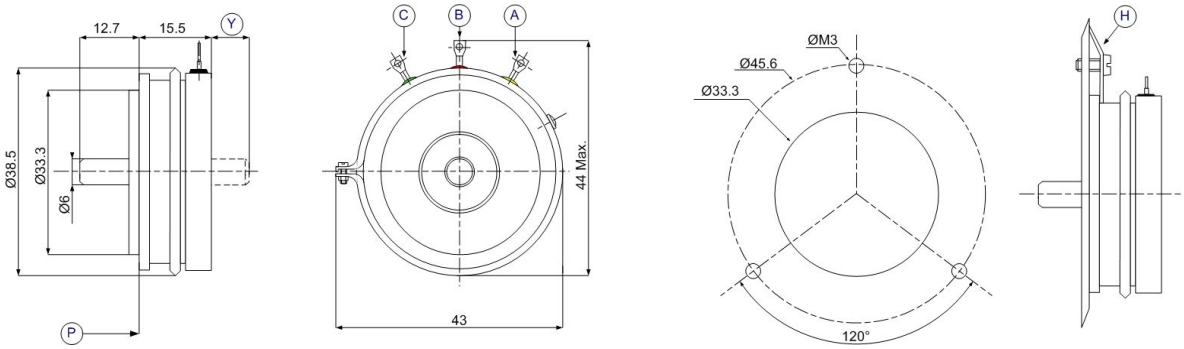
		Models		
Features	**Units**	**PR-15**	**152**	**SI-15**
Power dissipation at 85 °C	W	3	3	3
Ohmic value tolerance	%	± 5	± 5	± 10
Average linearity tolerance	%	± 0.1	± 0.5	± 1
Electrical travel	degree	354 ± 1	354 ± 1	354 ± 1
Maximum operating voltage	V	300	300	300
Dielectric strength (50 Hz / 1 mn)	V	750	1,500	750
Operating temperature range	degree C	-55 to +155	-25 to +125	-10 to +85
Long term damp heat (93% RH)	days	10	56	4
Insulation resistance (under 500 V_{DC})	MΩ	10^3	10^3	10^3
Positional tolerance on intermediary taps	degree	± 1	± 1	± 1,5
Rotational life (shaft revolutions)		2,000,000	5,000,000	1,000,000
Average weight of the first element	g	40	40	40
Average weight by additional element	g	15	15	15
Starting torque	Nm	8.10^{-4}	8.10^{-4}	8.10^{-4}
Standard shaft diameter	mm	6	6	6

Dimensions and mounting:

- Two different possibilities:
  - front flange with two threaded holes (3 mm deep) for mounting with Ø M3 screws (not supplied) :



  - front flange without mounting holes: Panel mounting with Ø 12 mm cut-out, against the **P** face, by 3 clamps **H** with Ø M3 screws spaced 120 degrees apart (clamps and screws not supplied)



- Terminal wires:
  - **A** (yellow wire): beginning of stroke
  - **B** (red wire): slider
  - **C** (green wire): end of stroke

  While the shaft is rotating clockwise (seen from shaft end), the ohmic value between A and B varies from its minimum value to its maximum value (= ohmic value between A and C).

Parameters for ordering a standard model:

- Ohmic value (between 200 and 50,000 Ω)
- Mounting mode: 3 clamps (not supplied) or 2 Ø M3 screws (not supplied)
- Single unit or multiple assemblies : number of modules
- Rotational stop : with or without
- Intermediary taps : with or without
- Electrical angle
- Terminal styles: waterproof, glass insulated solder lugs or simply flexible wires

Optional features:

- Special electrical and/or mechanical travel
- Disconnection on specified angles
- Special design of intermediary taps: size and position – with ultra precision within one degree-
- Terminal wires: special colors, cables, output wires positions, etc.
- Protection ring or protection cap at the front and/or at the rear, against dust and liquid projections
- Special shaft design: diameter, type, extended from front and/or from back of housing, flatted, slotted, pinned, etc.
- Special design of the flanges: locating peg, special mounting mode, etc.

4.2 Models SI-15 T, SI-15 TC (Economy class)

Model SI-15T

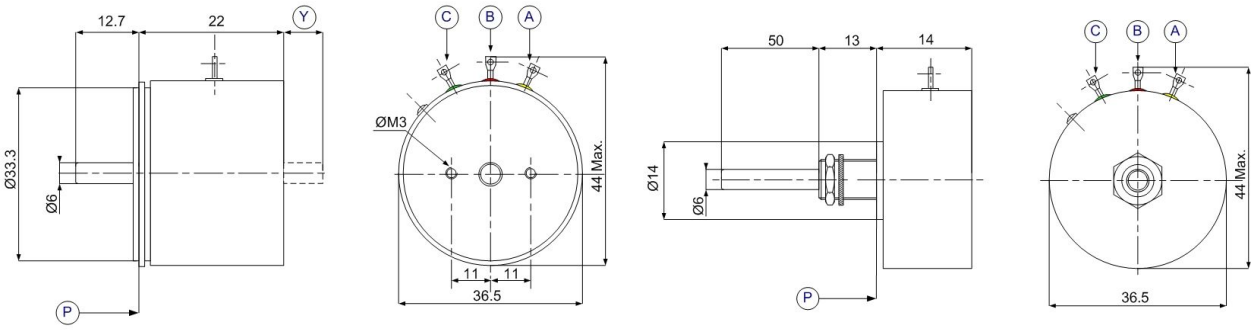
Model SI-15TC

- **Range of achievable (total) ohmic values:** **200 Ω to 50 kΩ**

- **Features**:

		Models	
Features	**Units**	**SI-15 T**	**SI-15 TC**
Power dissipation at 85 °C	W	3	3
Ohmic value tolerance	%	± 10	± 10
Average linearity tolerance	%	± 1	± 1
Electrical travel	degree	300 ± 2	300 ± 2
Maximum operating voltage	V	300	300
Dielectric strength (50 Hz / 1 mn)	V	750	750
Operating temperature range	degree C	-10 to +85	-10 to +85
Long term damp heat (93% RH)	days	4	4
Insulation resistance (under 500 V_{DC})	MΩ	10^3	10^3
Positional tolerance on intermediary taps	degree	± 2	± 2
Rotational life (shaft revolutions)		500,000	500,000
Average weight of the first element	g	80	40
Average weight by additional element	g	—	—
Starting torque	Nm	30.10^{-4}	50.10^{-4}
Standard shaft diameter	mm	6	6

Dimensions and mounting:



Dimensions and mounting of model SI15-T *Dimensions and mounting of model SI15-TC*

- Terminal lugs:
  - **A** (yellow mark): beginning of stroke
  - **B** (red mark): slider
  - **C** (green mark): end of stroke

  While the shaft is rotating clockwise (seen from shaft end), the ohmic value between A and B varies from its minimum value to its maximum value (= ohmic value between A and C).

Particular features of the SI-15T and SI15-TC models

- No possibility of protection ring or protection cap or multiple units
- Panel mounting
  - Model SI-15T: only by 2 screws Ø M3
  - Model SI-15TC: bushing mount only - Ø M10 - 0,75 mm steps
- Stainless steel shaft supported by self-lubricating bearings
- No possible shaft extension from back of housing for the SI15-TC

Parameters for ordering a standard model:

- Ohmic value (between 200 and 50,000 Ω)
- Rotational stop: with or without
- Intermediary taps: with or without
- Electrical travel
- Terminal styles : waterproof, glass insulated solder lugs or simply flexible wires

Optional features:

- Special electrical and/or mechanical travel
- Disconnection on specified angles
- Special design of intermediary taps: size and position - with ultra precision within one degree-
- Terminal wires : special colors, special cables, special output wires positions, etc.
- Protection ring or protection cap at the front and/or at the rear, against dust and liquid projections
- Special shaft design: diameter, type, extended from front and/or from back of housing, flatted, slotted, pinned, etc.
- Special design of the flanges : locating peg, special mounting mode, etc.

5 6-watts Series

5.1 Models PR-18, 182, SI-18

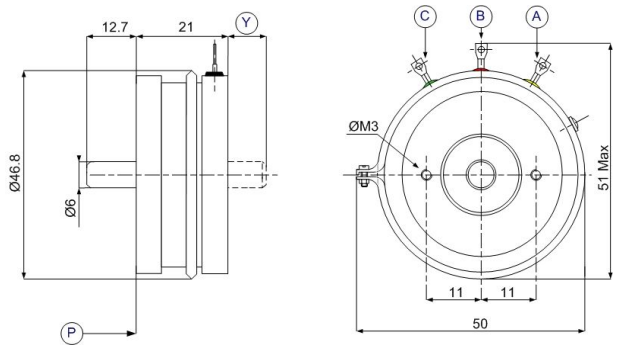
- **Range of achievable (total) ohmic values:** **200 Ω to 108 kΩ**

- **Features**:

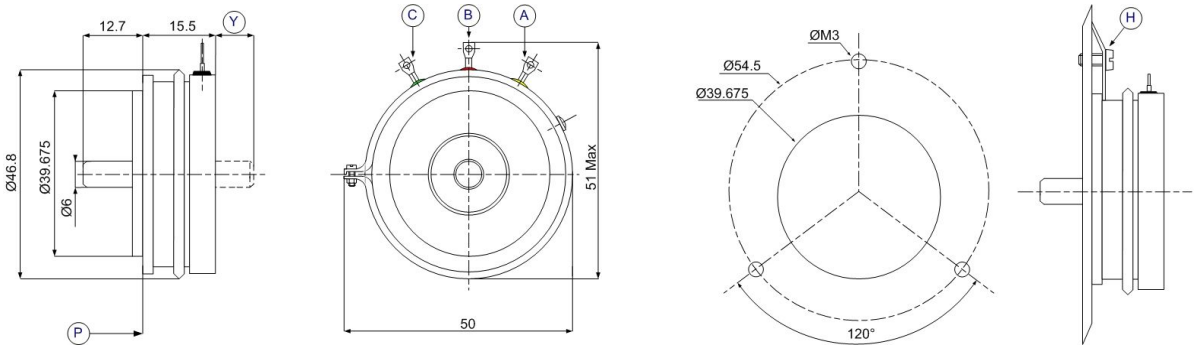
		Models		
Features	**Units**	**PR-18**	**182**	**SI-18**
Power dissipation at 85 °C	W	6	6	6
Ohmic value tolerance	%	± 5	± 5	± 10
Average linearity tolerance	%	± 0.1	± 0.5	± 1
Electrical travel	degree	356 ± 1	356 ± 1	356 ± 1
Maximum operating voltage	V	300	300	300
Dielectric strength (50 Hz / 1 mn)	V	750	1500	750
Operating temperature range	degree C	-55 to +155	-25 to +125	-10 to +85
Long term damp heat (93% RH)	days	10	56	4
Insulation resistance (under 500 V_{DC})	MΩ	10^3	10^3	10^3
Positional tolerance on intermediary taps	degree	± 1	± 1	± 1,5
Rotational life (shaft revolutions)		2,000,000	5,000,000	1,000,000
Average weight of the first element	g	75	75	75
Average weight by additional element	g	40	40	40
Starting torque	Nm	10.10^{-4}	10.10^{-4}	10.10^{-4}
Standard shaft diameter	mm	6	6	6

Dimensions and mounting :

- Two different possibilities :
  - front flange with two threaded holes (3 mm deep) for mounting with Ø M3 screws (not supplied) :



  - front flange without mounting holes: Panel mounting with Ø 12 mm cut-out, against the **P** face, by 3 clamps **H** with Ø M3 screws spaced 120 degrees apart (clamps and screws not supplied)



- Terminal wires:
  - **A** (yellow wire): beginning of stroke
  - **B** (red wire): slider
  - **C** (green wire): end of stroke

  While the shaft is rotating clockwise (seen from shaft end), the ohmic value between A and B varies from its minimum value to its maximum value (= ohmic value between A and C).

Parameters for ordering a standard model:

- Ohmic value (between 200 and 108,000 Ω)
- Mounting mode : 3 clamps (not supplied) or 2 Ø M3 screws (not supplied)
- Single unit or multiple assemblies : number of modules
- Rotational stop: with or without
- Intermediary taps: with or without
- Electrical angle
- Terminal styles: waterproof, glass insulated solder lugs or simply flexible wires

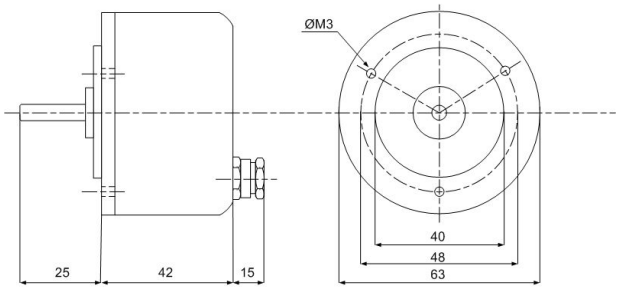
Optional features:

- Special electrical and/or mechanical travel
- Disconnection on specified angles
- Special design of intermediary taps: size and position – with ultra precision within one degree-
- Terminal wires : special colors, cables, output wires positions, etc.
- Protection ring or protection cap at the front and/or at the rear, against dust and liquid projections
- Special shaft design: diameter, type, extended from front and/or from back of housing, flatted, slotted, pinned, etc.
- Special design of the flanges: locating peg, special mounting mode, etc.

5.2 Model 8018

- **Features**:
  - Model 8018 is constructed with a continuous rotation model 182 in a housing
  - The housing is made of anodized light alloy with a sealing gland
  - Mounting is done by 3 Ø M3 screws (not supplied) spaced 120 degrees apart
  - Average total weight of the product is 220 g.
  - All other mechanical and electrical features are identical to those of the model 182

- **Dimensions**:



6 Product Identification Code

SI18	C	1	S	N	S	3R27

Model:

"082"
"152"
"182"
"SI15"
"SI18"
"PR18"
"PR15"
"SI15T"
"SI15TC"

Total ohmic value:

nnnRddd for nnn,ddd Ω

Ex.: 3R27 for 3.27 ohms

Electrical travel:

"S" : 356°
"C" : 300°
"P" : special design

Type of front flange:

"S": standard mounting by clamps
"C": mounting by 2 Ø M3 screws
"P": special design
(empty) for SI-15T and SI-15TC models

Intermediary tap:

"N": without
"T": center tap (0,5 °)
"U": center tap (3 °)
"P": special design

Number of modules:

"1", "2", "3",
"4" or "5"

Rotational stop:

"S": without rotational stop
"C": with rotational stop (300°)
"P": special design

This identification above code is followed:
– when ordering from the list of the optional features which are not described in the code,
– Internally, from a special code if the product cannot be considered as a standard model.

7 Replacement of Past Models

The current - black - models can be used to replace former corresponding Coudoint models. Some of the former models had housings in a special color, the color of the rear flange depending on the class of the potentiometer:

- brown for the “Precision” class,
- purple for the “Heavy Industry” class,
- green for the “Light Industry” class and for the “Economy” class.

Examples of past models:

Model SI-15 (1 module)

Model 152 (2 modules)

Model SI-15TC

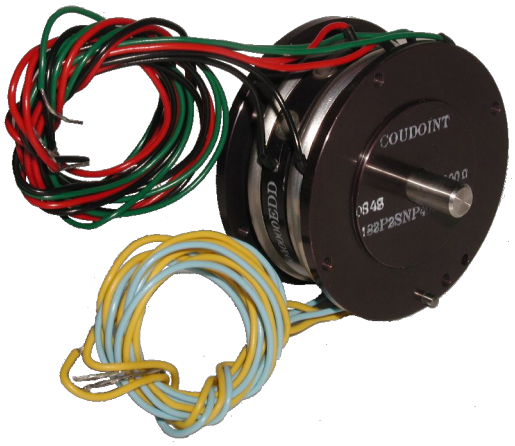
Model PR-18

Model 182

8 Examples of Special Designs

8.1 Dual Module Potentiometer

- 2 modules of 200 Ω
- 2 special additional wired terminals per track
- Electrical travel : 158.5° ±1°
- Disconnection on 18° before and after the electrical travel
- Special ohmic value vs. angle variation law
- Duplicated connecting wires with the resistive element or the wiper
- Special design of the front and rear flanges
- Locating peg and slotted shaft for marking the zero position
- Mounting by 4 M2.5 screws
- Special color of the cables
- Special length of the shaft, extending from the back of the housing
- Special marking on the front flange and on the skirt



Model 182P2SNP400M594

8.2 Triple Module Potentiometer

- 3 modules of 5 kΩ/10 kΩ/10 kΩ
- 4 wired terminals per track, making a total of 12 wires
- Electrical travel: 55°/100°/110°
- Duplicated connecting wires with the resistive element or the wiper
- Pin point center taps on each track
- Zero position marked on the shaft and on the front flange.
- Special shaft design
- Special markings

Model 182S3SPP5KM542

8.3 Dual Module Potentiometer with Special Housing

- 2 modules of 1100 Ω each
- Power rating: 8 W for a temperature increase of 85°C
- Housing diameter: 76.25 mm
- Electrical travel: 220° ± 1°
- Duplicated connecting wires with the resistive element or the wiper
- Zero position marked on the shaft and on the front flange.
- Extended shaft: 10 mm on the front end, 2 mm from the back of the housing
- Special terminal wires
- Difference of ohmic value between the two tracks for any position of the wiper : ± 1%
- Special markings

Model PR30S2SNT1100RM520

COUDOINT

Tel.: +33 1 30 41 55 00 *Fax:* +33 1 30 41 55 62

Email: commercial@coudoint.com *Website:* www.coudoint.com

Address: 19, Avenue de la gare 78690 Les Essarts Le Roi FRANCE