



*New version 2014*

# OSCAR

## ROTARY LIMIT SWITCH

Oscar is a device used to control the movement of industrial machinery when in need of measuring the movement on the basis of the rotation angle and/or of the number of shaft revolutions. Oscar is made up by a gearmotor which transfers the movement to the cams and to the other movement detection devices placed inside it through a primary input reduction step (worm gear and helical toothed gear) and one or more secondary output steps (pairs of straight toothed gears).

Oscar is used on wind turbines to control the position of the nacelle or the pitch angle of the blades. The motor that controls the rotation of a wind turbine on the yaw axis (or of the blade around its longitudinal axis) transfers the movement to the limit switch. A rotary encoder reads the rotation of the shaft, and its pulses are sent to a PLC which controls the position of the nacelle or of the blade. The movement of the shaft is also transferred, through a gearmotor, to a series of cam switches: the appropriate setting of the actuating point of the cams can signal up to four critical positions of the movement of the nacelle or of the blade.

### FEATURES

Revolution ratios, ranging from 1:1 to 1:1550, result from the combination of different secondary output steps. Each output of the limit switch can be set with a different revolution

ratio to allow for a diversified control of the machinery to meet special requirements.

Each cam can be set with great accuracy thanks to the cam adjusting screws. The auxiliary switches are of a positive opening type, thus suitable for safety functions.

### OPTIONS

Oscar can be fitted with different combinations of actuators and motion detectors: sets of cams and microswitches (max. 12), potentiometers or encoders (max. 2), absolute encoder Yankee 1 for set of cams and microswitches (max. 2). It is possible to fit together sets of cams and microswitches, potentiometers and encoder, thus creating a device featuring redundancy and diversity.

The limit switch is available with a flange for direct coupling to the motor. Different labels and colors are also available.

### MATERIALS

Oscar features transmission and gear driving shafts made of stainless steel AISI 430F or AISI 303, worm gear transmission shaft rotating on ball bearings, self-lubricating techno-polymer gears and driving bushes, techno-polymer base and cover. All techno-polymers used for the enclosure are wear resistant and protect the equipment against water and dust.



INDUSTRIAL  
LIFTING



CONSTRUCTION  
LIFTING



INDUSTRIAL  
AUTOMATION



STAGE  
TECHNOLOGY



WIND  
ENERGY

## STANDARDS - MARKINGS - HOMOLOGATIONS

Conformity to Community Directives:

2006/95/CE: Low Voltage Directive

2006/42/CE: Machinery Directive

- Conformity to Standards:

EN 60204-1 Safety of machinery - Electrical equipment of machines

EN 60204-32 Safety of machinery - Electrical equipment of machines

- Requirements for hoisting machines

EN 60947-1 Low-voltage switchgear and controlgear

EN 60947-5-1 Low-voltage switchgear and controlgear - Control circuit devices and switching elements - Electromechanical control circuit devices

EN 60529 Degrees of protection provided by enclosures

- Regulations for the prevention of accidents BGV C 1 (only for Germany)

- Markings and homologations: **CE**

## GENERAL TECHNICAL SPECIFICATIONS

- Storage ambient temperature: -40°C/+80°C

- Operational ambient temperature: -40°C/+80°C

- Protection degree:

IP 66 / IP 67 / IP 69K

- Insulation category: Class II

- Maximum rotation speed: 800 rev./min.

- Cable entry: cable clamp M20 - M16 (max 8)

- HALT test (data available on request)

- Markings and homologations: **CE** **UL** **ERC** **SIL 1**

## TECHNICAL SPECIFICATIONS OF THE MICROSWITCHES

- Utilisation category:

AC 15 / 250 V / 3 A max.

DC 13 / 60 V / 0.5 A max.

- Rated thermal current: 10 A max.

- Rated insulation voltage: 300 Vac

- Mechanical life: 1.5x10<sup>6</sup> operations max.

- Terminal referencing: according to EN 50013

- Connections: screw-type terminals

- Markings and homologations:


PRSL0100XX: **CE** **VDE** **CCC** **UL** **US** (general purpose)

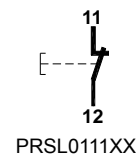
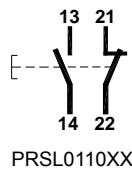
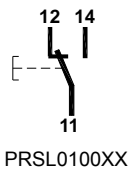
PRSL0110XX-PRSL0111XX: **CE** **UL** **ERC**

- The snap action switch PRSL0100XX has 1 NO + 1 NC change over contacts.

- The snap action switch PRSL0110XX has 1 NO + 1 NC change over contacts, double break.

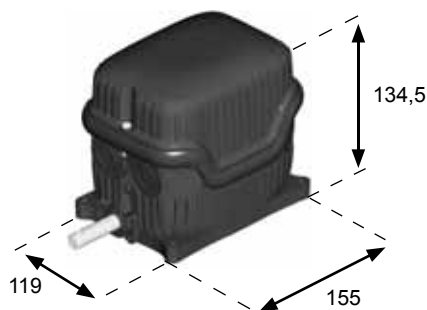
- The slow action switch PRSL0111XX has 1 NC contact, double break.

All NC contacts are of the positive opening operation type . The switches have the following reference for internal wiring.

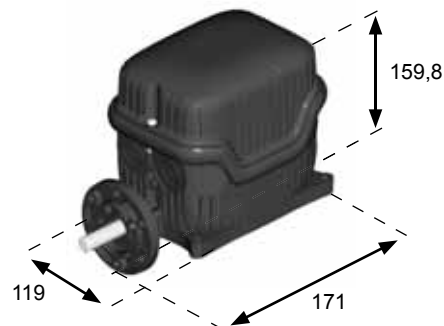


## OVERALL DIMENSIONS (MM)

Standard



With flange

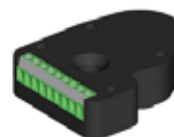


## POSSIBLE ASSEMBLIES




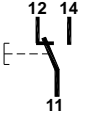
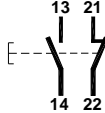
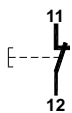


With set of cams, encoder and Yankee 1 absolute encoder



Yankee 1 absolute encoder



## TECHNICAL SPECIFICATIONS OF THE MICROSWITCHES

| Code                       | PRSL0100XX   | PRSL0110XX   | PRSL0111XX   |
|----------------------------|--|--|--|
| Utilisation category       | AC 15<br>DC13  | AC 15  |  |
| Rated operational voltage  | 125 V / AC 15<br>230 V / AC 15<br>60 V / DC 13   | 250 V  |  |
| Rated operational current  | 2 A / 125 V / AC 15<br>1 A / 230 V / AC 15<br>0,5 A / 60 V / DC 13   | 3 A  |  |
| Rated thermal current      | 6 A  | 10 A   |  |
| Rated insulation voltage   | 250 V~   | 300 V~   |  |
| Mechanical life            | 1,5x10 <sup>6</sup> operations   | 1x10 <sup>6</sup> operations   |  |
| Terminal referencing       | According to EN 50013  | According to EN 50013  |  |
| Connections                | screw-type terminals with self-lifting pads  | screw-type terminals with self-lifting pads  |  |
| Wires                      | 0,25 mm <sup>2</sup> - 1,5 mm <sup>2</sup>   | 1x2.5 mm <sup>2</sup> , 2x1.5 mm <sup>2</sup><br>(UL: copper conductor (CU) 60°C or 75°C with soft or stiff wire 14-16 AWG)  |  |
| Tightening torque          | 0,5 Nm - 0,6 Nm  | 0,5 Nm   |  |
| Switch type                | Single break, snap action  | Double break, snap action  | Double break, slow action  |
| Contacts                   | 1NO + 1NC change over<br>(All NC contacts are of the positive opening operation type  ) | 1NO + 1NC change over<br>(All NC contacts are of the positive opening operation type  ) | 1NC<br>(All NC contacts are of the positive opening operation type  ) |
| Scheme                     |    |   |    |
| Markings and homologations | <br>(general purpose)   |   |  |

## TECHNICAL SPECIFICATIONS OF THE POTENTIOMETERS

| Code with support                  | PA020001                     | PA020002              |
|------------------------------------|------------------------------|-----------------------|
| Ohmic value                        | 10 kΩ                        | 10 kΩ mechanical stop |
| Resolution                         | Infinite                     |                       |
| Independent linearity              | ± 1%                         |                       |
| Life time                          | 10x10 <sup>6</sup> movements |                       |
| Operational ambient temperature    | -55°C / +105°C               |                       |
| Continuous rotation (without stop) | 360°                         |                       |
| Continuous rotation (with stop)    | 333° ± 5°                    |                       |
| Actual electrical angle            | 310° ± 5°                    |                       |
| Ohmic value tolerance              | ± 20%                        |                       |

| Code with support                    | PA020003                    | PA020004           | PA020005           |
|--------------------------------------|-----------------------------|--------------------|--------------------|
| Ohmic value                          | 5 kΩ                        | 10 kΩ              | 10 kΩ              |
| Connections                          | 4 turrets                   | 3 turrets          | 4 turrets          |
| Independent linearity (over AEA -3°) | ≤ ± 1 %                     | ≤ ± 0,35 %         | ≤ ± 1 %            |
| Life time                            | 5x10 <sup>6</sup> movements |                    |                    |
| Operational ambient temperature      | -55°C / +125°C              |                    |                    |
| Mechanical angle                     | 360° continuous             |                    |                    |
| Actual Electrical Angle (AEA)        | 340° ± 5°                   |                    |                    |
| Ohmic value tolerance                | max ± 20 % at 20°C          | max ± 10 % at 20°C | max ± 20 % at 20°C |

| Code with support               | PA020006            | PA020007 | PA020008 |
|---------------------------------|---------------------|----------|----------|
| Ohmic value                     | 4.7 kΩ              | 10 kΩ    | 2.2 kΩ   |
| Independant linearity           | ± 0.25%             |          |          |
| Life time                       | 3 000 000 movements |          |          |
| Operational ambient temperature | -55°C / +125°C      |          |          |
| Mechanical angle                | 360° continuous     |          |          |
| Actual electrical angle         | 355°±5°             |          |          |
| Ohmic value tolerance           | ± 5%                |          |          |
| Temperature drift               | < 50 PPM/°C         |          |          |

| Code with support               | PA020009                      |
|---------------------------------|-------------------------------|
| Ohmic value                     | 2 kΩ                          |
| Resolution                      | better then 0.008°            |
| Linearity                       | ±0.075%                       |
| Independant linearity           | ±0.075 %                      |
| Life time                       | 100x10 <sup>6</sup> movements |
| Operational ambient temperature | -40°C / +100°C                |
| Mechanical angle                | 360° continuous               |
| Actual electrical travel        | 350° ±2°                      |
| Ohmic value tolerance           | ±20%                          |

## TECHNICAL SPECIFICATIONS OF THE ENCODERS

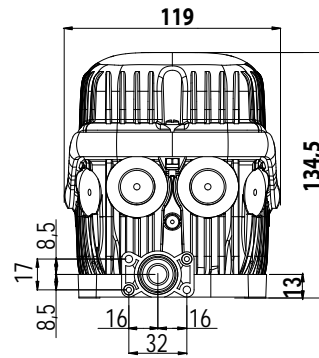
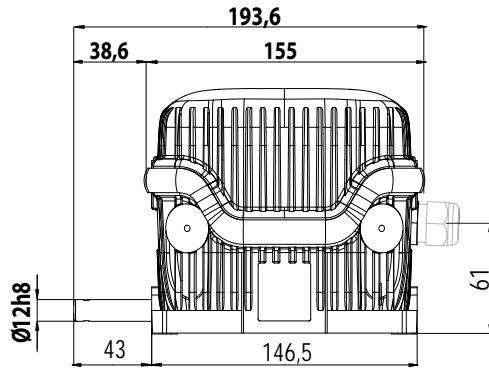
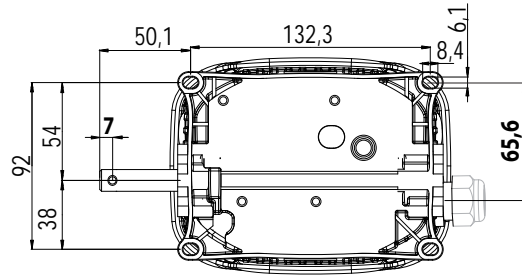
| Code with support               | PA030001   | PA030002        |
|---------------------------------|--|-----------------|
| Resolution                      | 36 pulses/rev.   | 150 pulses/rev. |
| Operational ambient temperature | -40°C / +85°C  |                 |
| Code                            | Incremental  |                 |
| Supply voltage                  | 4,5 Vdc min. to 30 Vdc max. (35 mA max. - no load)                             |                 |
| Output voltage                  | Low: 500 mV max. at 10 mA<br>High: (Vin - 0,6) at -10 mA (Vin - 1,3) at -25 mA |                 |
| Output current                  | 25 mA max. load per output channel   |                 |
| Output format                   | Two channel (A, B) quadrature with Index (Z)                                   |                 |
| Phase sense                     | A leads B clockwise (CW) from the mounting end of the encoder                  |                 |
| Accuracy                        | +/- 0,8 arc-min.   |                 |
| Outputs                         | Push pull  |                 |
| Electrical protection           | Reverse polarity and output short circuit protected                            |                 |

## TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE 1

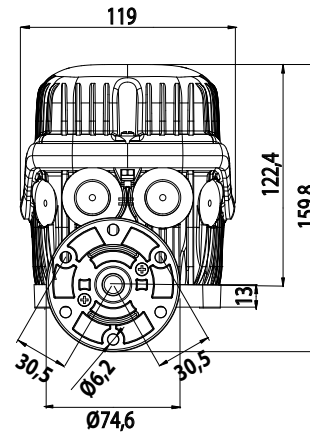
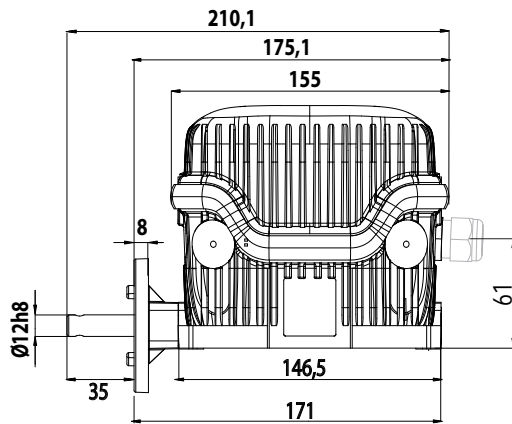
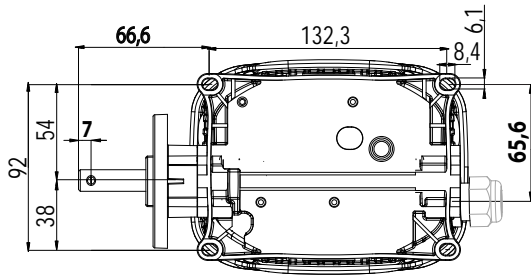
| Code                                  | PA01AA01                         | PA01AB01      | PA01AC01   |
|---------------------------------------|----------------------------------|---------------|------------|
| Analog Output                         | Current 4÷20mA                   | Voltage 0÷10V | PWM 0÷100% |
| Operational ambient temperature       | -40°C / +80°C                    |               |            |
| Power supply                          | 12 ÷ 48 VDC / 12 ÷ 48 Vac        |               |            |
| Protection against polarity inversion | yes                              |               |            |
| Absorption                            | 50 mA                            |               |            |
| Resolution                            | 12 bit                           |               |            |
| Linearity                             | +/- 0,5°                         |               |            |
| Max. hysteresis                       | 0,1°                             |               |            |
| Setting Zero Point                    | through button/wire              |               |            |
| Signal increment direction            | CW (standard) / CCW (on request) |               |            |
| Connections                           | terminal board                   |               |            |

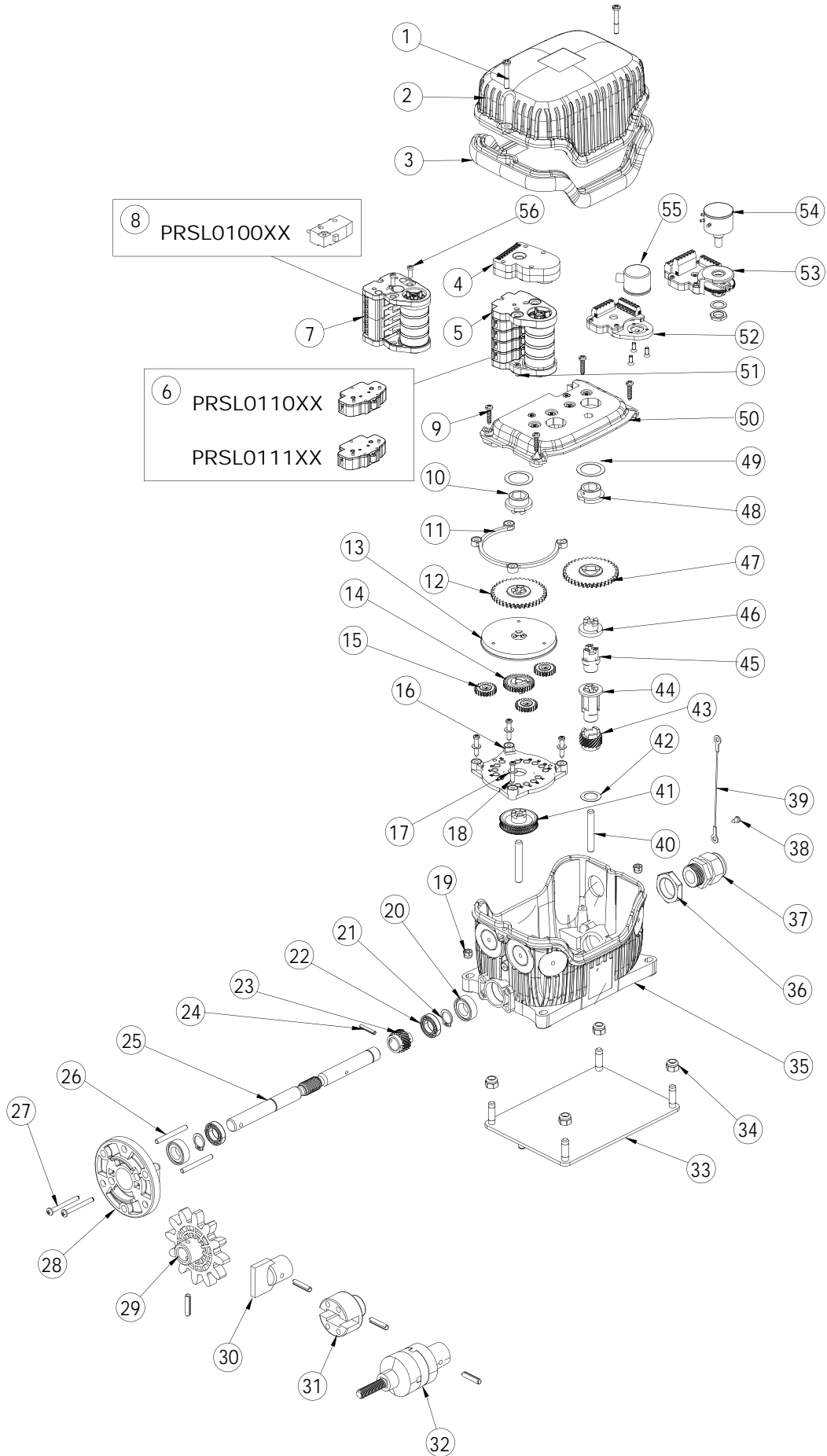
**OVERALL DIMENSIONS (MM)**

**STANDARD**



**WITH FLANGE**





# COMPONENTS

## SWITCHES







| REF | DRAWING | DESCRIPTION                                 | SCHEME | CODE       |
|-----|---------|---|--------|------------|
| 6   |         | 1NO+1NC switch<br>double break, snap action |        | PRSL0110XX |
|     |         | 1NC switch<br>double break, slow action     |        | PRSL0111XX |
| 8   |         | 1NO+1NC switch<br>single break, snap action |        | PRSL0100XX |

## STANDARD CAM SETS






| REF                | DRAWING            | NO. AND TYPE OF CAMS  | NO. AND TYPE OF SWITCH | SET CODE              |          |
|--------------------|--------------------|-----------------------|------------------------|-----------------------|----------|
| 5                  |                    | 2 cams D              | 2 PRSL0110XX switches  | FCL20001              |          |
|                    |                    | 2 cams D              | 2 PRSL0111XX switches  | FCL20002              |          |
|                    |                    | Cams D+E              | 2 PRSL0110XX switches  | FCL20003              |          |
|                    |                    | Cams D+E              | 2 PRSL0111XX switches  | FCL20004              |          |
|                    |                    | 2 cams E              | 2 PRSL0110XX switches  | FCL20005              |          |
|                    |                    | 2 cams E              | 2 PRSL0111XX switches  | FCL20006              |          |
|                    |                    | Cams F + F + C + B    | 4 PRSL0110XX switches  | FCL40001              |          |
|                    |                    | Cams F + F + C + B    | 4 PRSL0111XX switches  | FCL40002              |          |
|                    |                    | 4 cams D              | 4 PRSL0110XX switches  | FCL40003              |          |
|                    |                    | 4 cams D              | 4 PRSL0111XX switches  | FCL40004              |          |
|                    |                    | Cams D + D + E + E    | 4 PRSL0110XX switches  | FCL40005              |          |
|                    |                    | Cams D + D + E + E    | 4 PRSL0111XX switches  | FCL40006              |          |
|                    |                    | 4 cams E              | 4 PRSL0110XX switches  | FCL40007              |          |
|                    |                    | 4 cams E              | 4 PRSL0111XX switches  | FCL40008              |          |
|                    | 7                  |                       | Cams E + E + E + A     | 4 PRSL0110XX switches | FCL40009 |
|                    |                    |                       | Cams E + E + E + A     | 4 PRSL0111XX switches | FCL40010 |
| Cams D + D + A + A |                    |                       | 4 PRSL0110XX switches  | FCL40011              |          |
|                    |                    | Cams D + D + A + A    | 4 PRSL0111XX switches  | FCL40012              |          |
|                    |                    | 2 cams D              | 2 PRSL0100XX switches  | FCN20001              |          |
|                    |                    | Cams D+E              | 2 PRSL0100XX switches  | FCN20002              |          |
|                    |                    | 2 cams E              | 2 PRSL0100XX switches  | FCN20003              |          |
|                    |                    | Cams F + F + C + B    | 4 PRSL0100XX switches  | FCN40001              |          |
|                    |                    | 4 cams D              | 4 PRSL0100XX switches  | FCN40002              |          |
|                    |                    | Cams D + D + E + E    | 4 PRSL0100XX switches  | FCN40003              |          |
|                    | 4 cams E           | 4 PRSL0100XX switches | FCN40004               |                       |          |
|                    | Cams E + E + E + A | 4 PRSL0100XX switches | FCN40005               |                       |          |
|                    | Cams D + D + A + A | 4 PRSL0100XX switches | FCN40006               |                       |          |

Other sets with 2-3-4-5 or 6 cams/switches available on request.  
PRSLSL0100XX only for 2 or 4 cam sets.


**CAM REFERENCE CHART**

| CAM | MECHANICAL ANGLE   | CODE FOR PRSL0110XX PRSL0111XX SWITCHES | CODE FOR PRSL0100XX SWITCHES | CAM | MECHANICAL ANGLE  | CODE FOR PRSL0110XX PRSL0111XX SWITCHES | CODE FOR PRSL0100XX SWITCHES |
|-----|--|---|------------------------------|-----|---|---|------------------------------|
| A   |  180° | PRSL7191PI                              | PRSL7121PI                   | D   |  -   | PRSL7194PI                              | PRSL7124PI                   |
| B   |  320° | PRSL7192PI                              | PRSL7122PI                   | E   |  60° | PRSL7195PI                              | PRSL7125PI                   |
| C   |  -    | PRSL7193PI                              | PRSL7123PI                   | F   |  72° | PRSL7196PI                              | PRSL7126PI                   |

**SENSORS, POTENTIOMETERS AND ENCODERS**

| REF   | DRAWING   | DESCRIPTION   | CODE     |
|-------|---|---|----------|
| 4     |    | Yankee 1 - current output                             | PA01AA01 |
|       |   | Yankee 1 - voltage output                             | PA01AB01 |
|       |   | Yankee 1 - PWM output                                 | PA01AC01 |
| 54+53 |    | Potentiometer MCB 10 kΩ with support                  | PA020001 |
|       |   | Potentiometer MCB 10 kΩ mechanical stop with support  | PA020002 |
|       |   | Potentiometer Sfernice 10 kΩ ±10% 4 pins with support | PA020003 |
|       |   | Potentiometer Sfernice 10 kΩ ±10% 3 pins with support | PA020004 |
|       |   | Potentiometer Sfernice 5 kΩ ±10% with support         | PA020005 |
|       |   | Potentiometer Megatron 4.7 kΩ with support            | PA020006 |
|       |   | Potentiometer Megatron 10 kΩ with support             | PA020007 |
|       |   | Potentiometer Megatron 2.2 kΩ with support            | PA020008 |
|       |   | Potentiometer Novoteknik 2KΩ with support             | PA020009 |
| 53    |   | Support for potentiometer                             | PA020000 |
| 55+52 |  | Encoder 36 pulses./rev. with support                  | PA030001 |
|       |   | Encoder 150 pulses./rev. with support                 | PA030002 |
| 52    |  | Support for encoder                                   | PA030000 |

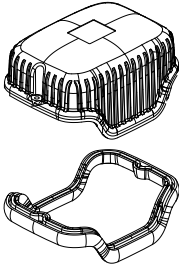

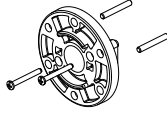


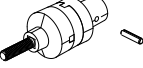
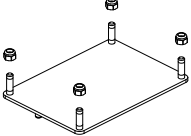

**PINION GEARS**

| REF | DRAWING   | DESCRIPTION                  | CODE       |
|-----|---|------------------------------|------------|
| 29  |  | Pinion gear M10 Z12 with pin | PRSL0911PI |
|     |   | Pinion gear M12 Z10 with pin | PRSL0912PI |
|     |   | Pinion gear M14 Z10 with pin | PRSL0913PI |
|     |   | Pinion gear M16 Z10 with pin | PRSL0914PI |
|     |   | Pinion gear M20 Z8 with pin  | PRSL0915PI |
|     |   | Pinion gear M5 Z12 with pin  | PRSL0916PI |
|     |   | Pinion gear M6 Z11 with pin  | PRSL0917PI |
|     |   | Pinion gear M8 Z12 with pin  | PRSL0918PI |
|     |   | Pinion gear M12 Z12 with pin | PRSL0944PI |

Other pinion gears available: see "Gears and pinion gears" catalog



**ACCESSORIES**

| REF      | DRAWING   | DESCRIPTION                  | CODE       |
|----------|---|------------------------------|------------|
| 2+3      |    | Cover with tightening rubber | PA090008   |
| 39       |    | Cover holding wire           | PRVV9140PE |
| 28+27+26 |    | Flange with screws and pins  | PRSL0356PI |
| 30       |    | Innesto maschio con spina    | PRSL0919PI |
| 31       |    | Female coupling with pin     | PRSL0920PI |
| 32       |    | Coupling with pin            | PRSL0981PI |
| 33+34    |   | Fixing plate                 | PRSL0725PI |
| 37       |  | Cable clamp M16              | PRPS0062PE |
|          |   | Cable clamp M20x1.5          | PRPS0063PE |

**REMARKS**

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