

FOX

Rotary limit switch



Rotary limit switch used to control and measure the movement of industrial machines by reading the rotation angle and/or the number of revolutions of a shaft. Fox is used on wind turbines to control the position of the nacelle or the pitch angle of the blades.

FEATURES

- It consists of a gear motor that transfers movement to the cams and to the other movement detection devices through a primary input reduction stage (worm gear and helical toothed gear) and one or more secondary output stages (pairs of straight toothed gears).
- Accurate adjustment of cams by means of screws.
- Positive opening NC contacts for safety functions.
- Mechanical life of switches: up to 10 million operations.
- IP protection degree: Fox is classified IP 65 / IP 66 / IP 67 / IP 69K.
- NEMA protection degree: Fox is classified Type 4X (cULus marked versions).
- Extreme temperature resistance: -40°C to +80°C.
- It 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 technopolymer gears and driving bushes, technopolymer base and cover.
- All materials and components used are wear resistant and guarantee protection of the unit against water and dust.

OPTIONS

- Revolution ratios from 1:3 to 1:2870, achieved by combining different secondary output stages.
- Snap action switches with 1NO+1NC contacts or slow action switches with 1NC contact.
- It can be equipped with a cam set (with up to 5 switches) and potentiometers, encoders, Yankee absolute encoders.
- Dedicated cable glands or connectors.
- Available with anti-moisture plug fitted to the base by means of a lock nut, improving transpiration while maintaining protection against water.
- Available with flanges, pinion gears and couplings.
- Plates with universal adapters to replace existing systems.

CERTIFICATIONS

- CE marking and cULus* marking.
- Fox is available, upon request, with the SIL1 certification (Safety Integrity Level 1), according to Standard IEC 61508.
- Complying with accident prevention regulation BGV C 1 (only for Germany).
- HALT TEST (Highly Accelerated Life Test) passed, simulating conditions largely exceeding standard operating conditions.

Use the online configurator (<https://configuratore.terworld.com>) or fill in the "request form" for accurate product configuration.

* Not available on all versions.

POSSIBLE ASSEMBLIES

With flange



With anti-moisture plug



CERTIFICATIONS

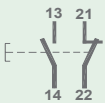
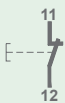
Conformity to Community Directives	2014/35/UE Low Voltage Directive
	2006/42/CE Machinery Directive
	EN 60204-1 Safety of machinery - Electrical equipment of machines
Conformity to CE Standards	EN 60204-32 Safety of machinery - Electrical equipment of machines - Requirements for hoisting machines
	EN 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
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
SIL1	IEC 61508:2010 Part 2-4-6-7 Functional safety of electrical / electronic / programmable electronic safety-related systems
BGV C 1	Regulations for the prevention of accidents BGV C 1 (only for Germany)
HALT TEST	Highly Accelerated Life Test, simulation of conditions largely exceeding the standard operating conditions (data available on request)
Markings and homologations	CE 

GENERAL TECHNICAL SPECIFICATIONS

Ambient temperature	Storage -40°C/+80°C
	Operational -40°C/+80°C
IP protection degree	IP 65 / IP 66 / IP 67 / IP 69K
NEMA protection degree	Type 4X (cULus versions)
Insulation category	Class II
Rotation speed	Revolution ratios $\geq 1:16$: max. 800 rpm
	Revolution ratios $< 1:16$: max. 200 rpm
	Revolution ratios = 1:50 and 1:100: max. 1500 rpm
Cable entry	Cable gland M20
	Cable gland M20+M16
	Cable gland M20+M20
Shafts	Stainless steel AISI 430F (non-cULus version)
	Stainless steel AISI 303

* Not available on all versions.

TECHNICAL SPECIFICATIONS OF THE SWITCHES

Code	PRSL0110XX	PRSL0111XX
Utilisation category	AC 15	
Rated operational voltage	250 Vac	
Rated operational current	3 A	
Rated thermal current	10 A	
Rated insulation voltage	300 Vac	
Mechanical life	10x10 ⁶ operations	
Connections	Screw-type terminals	
Wires	1x2.5 mm ² , 2x1.5 mm ² (UL (c)UL: use 60°C or 75°C copper (CU) conductors and stiff or flexible wire 14-22 AWG)	
Tightening torque	0.5 Nm	
Microswitch type	Double break. snap action	Double break. slow action
Contacts	1NO+1NC (All NC contacts are of the positive opening operation type )	1NC (All NC contacts are of the positive opening operation type )
Scheme		
Markings and homologations	CE 	

Switches PRSL0100XX available on request.

TECHNICAL SPECIFICATIONS OF THE POTENTIOMETERS

Code of potentiometer with support	PA020001	PA020002
Ohmic value	10 kΩ	10 kΩ mechanical stop
Resolution	Infinite	
Independant linearity	±1%	
Life time	10x10 ⁶ movements	
Power rating	Max. 1 W	
Operational ambient temperature	-55°C/+105°C	
Continuos rotation (without stop)	360°	
Continuos rotation (with stop)	333° ±5°	
Actual electrical angle	310° ±5°	
Ohmic value tolerance	±20%	

Code of potentiometer with support	PA020003	PA020004	PA020005
Ohmic value	10 kΩ	10 kΩ	5 kΩ
Connections	4 turrets	3 turrets	4 turrets
Independent linearity (ref. AEA -3°)	≤±1%	≤±0.35%	≤±1%
Power rating	Max. 0.3 W		
Life time	5x10 ⁶ 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

TECHNICAL SPECIFICATIONS OF THE ENCODERS

Code of encoder 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 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	Protection against reverse polarity and output short-circuit	

CERTIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Conformity to Community Directives	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
	2014/35/UE Low Voltage Directive (LVD)
Conformity to CE Standards	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements
	EN 60529 Degrees of protection provided by enclosures
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
Markings and homologations	CE cULus

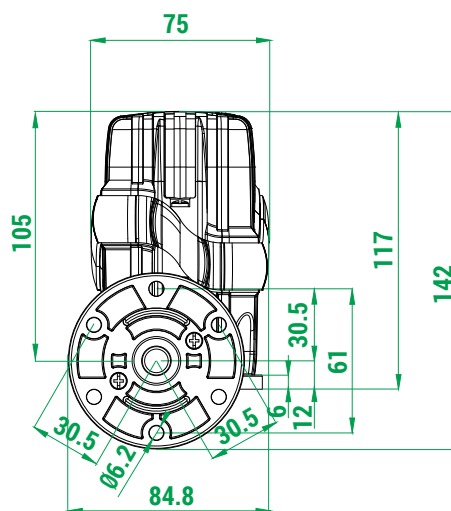
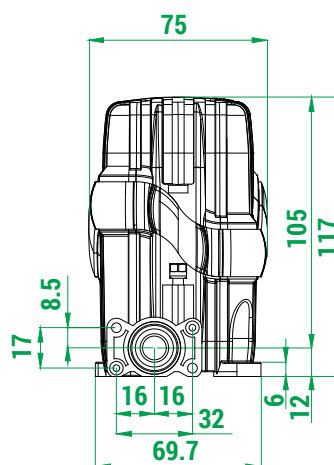
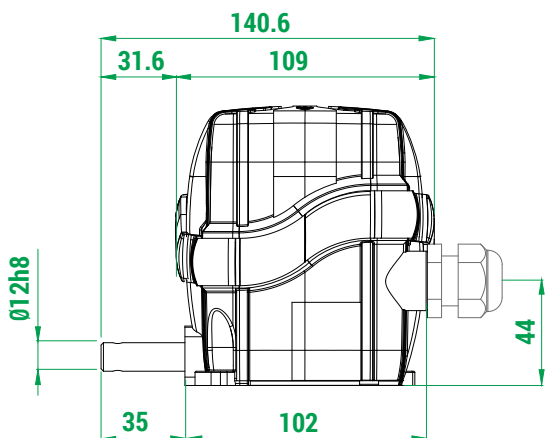
GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Ambient temperature	Storage -40°C/+80°C
	Operational -40°C/+80°C
IP protection degree	IP 20
Free rotation	360°
Rotation speed	Max. 800 rpm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Code	PA01AA01 / PA02AA01	PA01AB01	PA01AC01
Output	Current 4 ÷ 20 mA	Voltage 0 ÷ 10 V	PWM 0 ÷ 100 %
Power supply	12 ÷ 48 Vdc/12 ÷ 48 Vac		
Protection against reverse polarity	Yes		
Absorption	50 mA		
Resolution	10 bit		
Linearity	±0.5°		
Hysteresis	Max. 0.1°		
Zero Point setting	Through button/wire		
Signal increment direction	CW (standard) / CCW (on request)		
Connections	Terminal board		
Terminal wires	0.14 mm² - 1.5 mm²		
Terminal tightening torque	0.22 Nm - 0.25 Nm		

Standard

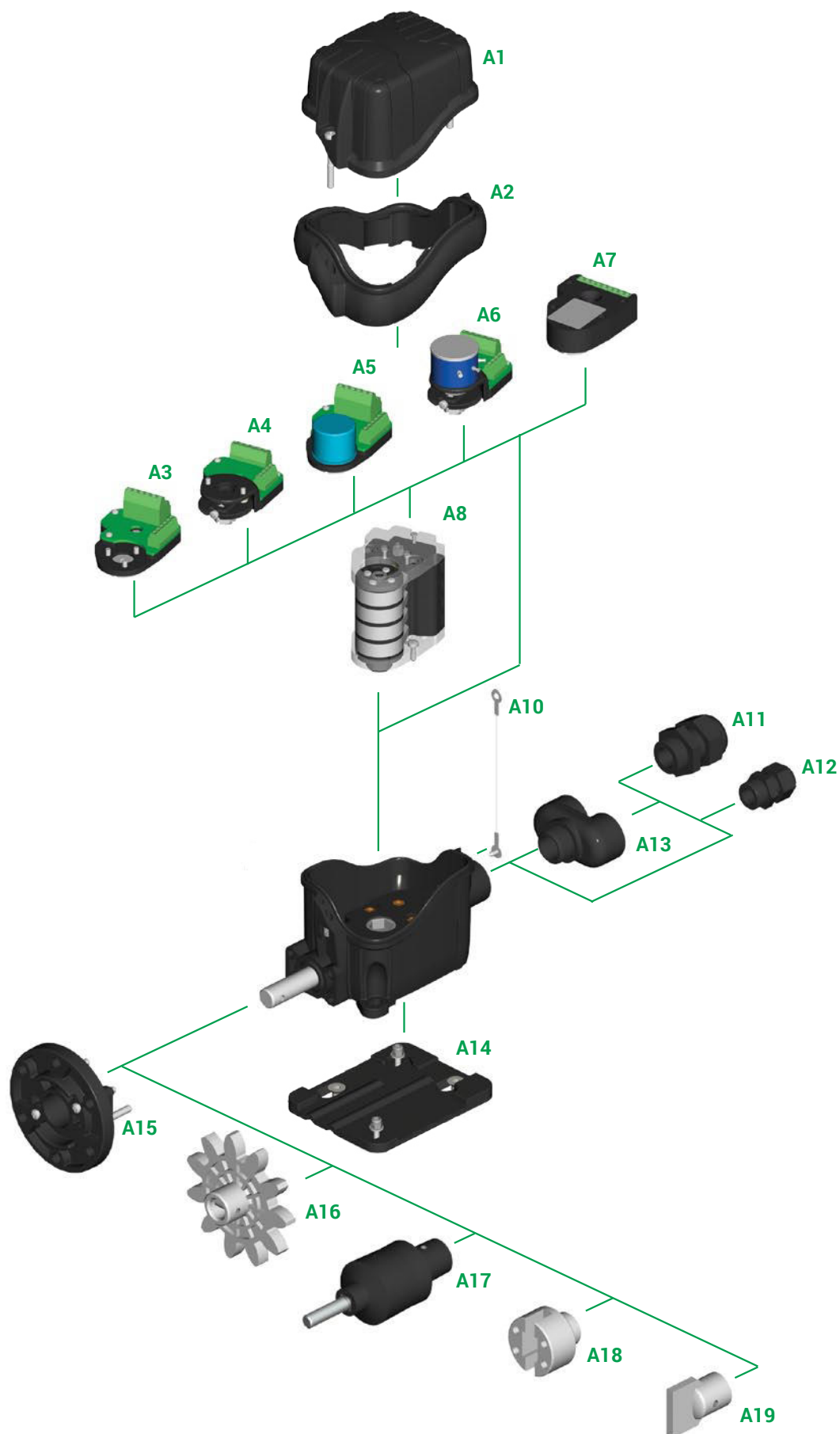


STANDARD LIMIT SWITCHES

Standard limit switches are equipped with cams PRSL7194PI  and shafts made of stainless steel AISI 430F.
Standard limit switches are not cULus certified.

Rated revolution ratio	Real revolution ratio	No. of cams and switches	Switches	
			PRSL0110XX 1NO+1NC	PRSL0111XX 1NC
				
			Code	Code
1:15	1:16	2	PFB9067L0016010	PFB9067L0016012
		3	PFB9067L0016011	PFB9067L0016013
		4	PFB9067L0016008	PFB9067L0016014
1:20	1:20.21	2	PFB9067L0020006	PFB9067L0020008
		3	PFB9067L0020007	PFB9067L0020009
		4	PFB9067L0020004	PFB9067L0020010
1:25	1:27.27	2	PFB9067L0027007	PFB9067L0027017
		3	PFB9067L0027016	PFB9067L0027018
		4	PFB9067L0027014	PFB9067L0027019
1:50	1:62	2	PFB9067L0062033	PFB9067L0062045
		3	PFB9067L0062044	PFB9067L0062046
		4	PFB9067L0062003	PFB9067L0062025
1:75	1:75.48	2	PFB9067L0075008	PFB9067L0075010
		3	PFB9067L0075009	PFB9067L0075004
		4	PFB9067L0075006	PFB9067L0075011
1:100	1:103.44	2	PFB9067L0103037	PFB9067L0103038
		3	PFB9067L0103049	PFB9067L0103027
		4	PFB9067L0103030	PFB9067L0103050
1:150	1:162.52	2	PFB9067L0162007	PFB9067L0162008
		3	PFB9067L0162006	PFB9067L0162009
		4	PFB9067L0162003	PFB9067L0162002
1:200	1:222.58	2	PFB9067L0222011	PFB9067L0222014
		3	PFB9067L0222013	PFB9067L0222015
		4	PFB9067L0222010	PFB9067L0222016
1:250	1:254.57	2	PFB9067L0254019	PFB9067L0254010
		3	PFB9067L0254020	PFB9067L0254021
		4	PFB9067L0254008	PFB9067L0254022

ASSEMBLY DRAWING



Refer to the following tables for descriptions of components: "Standard cam sets", "Potentiometers, encoders and sensors" and "Accessories".

COMPONENTS

Standard cam sets

Ref.	Drawing	No. and type of cams	No. and type of switches	Code
A8		2 cams A	2 PRSL0110XX switches	FCL20001
		2 cams A	2 PRSL0111XX switches	FCL20002
		Cams A+C	2 PRSL0110XX switches	FCL20003
		Cams A+C	2 PRSL0111XX switches	FCL20004
		2 cams C	2 PRSL0110XX switches	FCL20005
		2 cams C	2 PRSL0111XX switches	FCL20006
		Cams D+D+B+F	4 PRSL0110XX switches	FCL40001
		Cams D+D+B+F	4 PRSL0111XX switches	FCL40002
		4 cams A	4 PRSL0110XX switches	FCL40003
		4 cams A	4 PRSL0111XX switches	FCL40004
		Cams A+A+C+C	4 PRSL0110XX switches	FCL40005
		Cams A+A+C+C	4 PRSL0111XX switches	FCL40006
		4 cams C	4 PRSL0110XX switches	FCL40007
		4 cams C	4 PRSL0111XX switches	FCL40008
		Cams C+C+C+E	4 PRSL0110XX switches	FCL40009
		Cams C+C+C+E	4 PRSL0111XX switches	FCL40010
		Cams A+A+E+E	4 PRSL0110XX switches	FCL40011
		Cams A+A+E+E	4 PRSL0111XX switches	FCL40012

Other sets with 2/3/4 or 5 cams/switches are available on request.

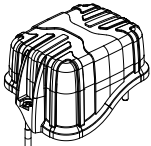
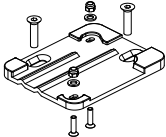
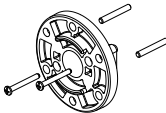
Cam reference chart

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° ±0.5°	PRSL7194PI	23.0° ±0.5°
B		10 points	PRSL7193PI	21.5° ±0.5°	PRSL7193PI	23.0° ±0.5°
C		60° sector	PRSL7195PI	82.0° ±0.5°	PRSL7195PI	86.0° ±0.5°
D		72° sector	PRSL7196PI	94.0° ±0.5°	PRSL7196PI	97.5° ±0.5°
E		180° sector	PRSL7191PI	204.5° ±0.5°	PRSL7191PI	203.0° ±0.5°
F		305° sector	PRSL7192PI	328.5° ±0.5°	PRSL7192PI	327.0° ±0.5°

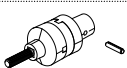
Potentiometers, encoders and sensors

Ref.	Drawing	Description	Code
A3		Support for encoder	PA030000
A4		Support for potentiometer	PA020000
A5		Encoder 36 pulses/rev. - with support	PA030001
		Encoder 150 pulses/rev. - with support	PA030002
A6		Potentiometer 10 kΩ - with support	PA020001
		Potentiometer 10 kΩ mechanical stop - with support	PA020002
		Potentiometer 10 kΩ ±10% 4 pins - with support	PA020003
		Potentiometer 10 kΩ ±10% 3 pins - with support	PA020004
		Potentiometer 5 kΩ ±10% - with support	PA020005
A7		Absolute encoder Yankee - current output	PA01AA01 / PA02AA01
		Absolute encoder Yankee - voltage output	PA01AB01
		Absolute encoder Yankee - PWM output	PA01AC01

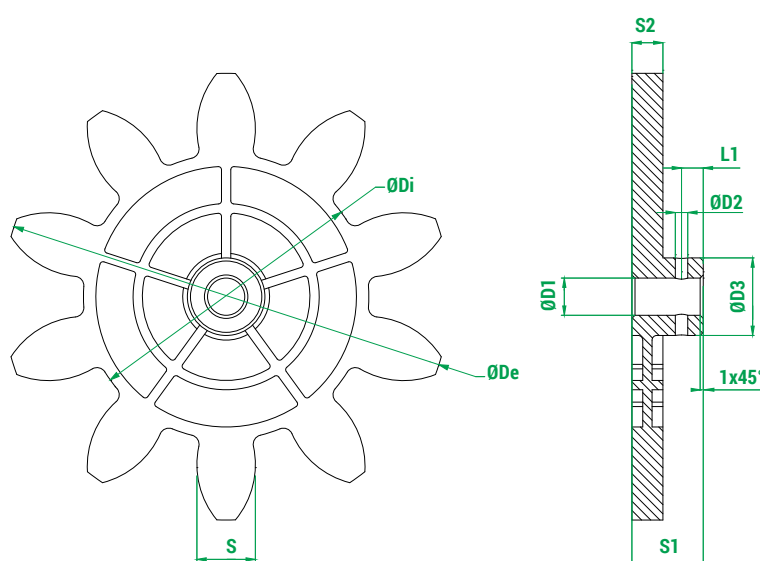
Accessories

Ref.	Drawing	Description	Code
A1		Cover with screws	PA090017
A2		Tightening rubber	PRGU1500PE
A10		Cover holding wire + screw (bag with 10 pieces)	PRSL0358PI
A11		Cable gland M20	PRPS0064PE
A12		Cable gland M16	PRPS0062PE
A13		Cable gland holder with 2 outputs M20	PRSL9051PI
		Cable gland holder with 2 outputs M20+M16	PRSL9052PI
A14		Fixing plate	PRSL0430PI
A15		Flange with screws and pins	PRSL0356PI

Accessories

Ref.	Drawing	Description	Code
A16		Pinion gear	See pinion gear tables
A17		Coupling with pin	PRSL0981PI
A18		Female coupling with pin	PRSL0920PI
A19		Male coupling with pin	PRSL0919PI

Moulded pinion gears



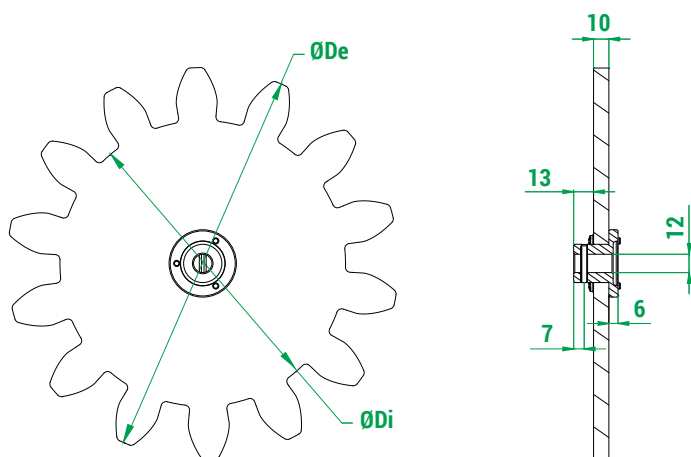
Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	S	Alpha	D1	D2	D3	S1	S2	L1
PRSL0915PI	8	20.00	160.00	200.00	113.20	20.00	23.40	31.41	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0912PI	10	12.00	120.00	144.00	92.00	12.00	14.00	18.85	20.00	12.00	4.00	25.00	23.00	10.00	7.00
PRSL0913PI	10	14.00	140.00	168.00	107.24	14.00	16.38	21.99	20.00	12.00	4.00	24.60	23.00	10.00	7.00
PRSL0914PI	10	16.00	160.00	192.00	122.67	16.00	18.67	25.13	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0917PI	11	6.00	66.00	78.00	51.96	6.00	7.02	9.42	20.00	12.00	4.00	19.00	23.00	8.00	7.00
PRSL0916PI	12	5.00	60.00	70.00	48.30	5.00	5.83	7.85	20.00	12.00	4.00	20.00	23.00	8.00	7.00
PRSL0918PI	12	8.00	96.00	112.00	77.28	8.00	9.36	12.56	20.00	12.00	4.00	21.50	23.50	10.00	7.00
PRSL0911PI	12	10.00	120.00	140.00	96.67	10.00	11.67	15.71	20.00	12.00	4.00	25.00	23.50	10.00	7.00
PRSL0944PI	12	12.00	144.00	168.00	116.00	12.00	14.00	18.85	20.00	12.00	4.00	24.00	23.00	10.00	7.00

Measuring unit: mm.

Waterjet cut pinion gears



Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	Alpha
PRSL0857PI	8	18.00	144.00	180.00	102.00	18.00	21.00	20.00
PRSL0855PI	8	24.00	192.00	240.00	136.00	24.00	28.00	20.00
PRSL0992PI	9	10.00	90.00	110.00	66.67	10.00	11.67	20.00
PRSL0879PI	9	16.00	144.00	176.00	106.67	16.00	18.67	20.00
PRSL0854PI	9	18.00	162.00	198.00	120.00	18.00	21.00	20.00
PRSL0871PI	9	20.00	180.00	220.00	133.33	20.00	23.33	20.00
PRSL0849PI	9	24.00	216.00	264.00	160.00	24.00	28.00	20.00
PRSL0846PI	10	10.00	100.00	120.00	76.67	10.00	11.67	20.00
PRSL0993PI	10	18.00	180.00	216.00	138.00	18.00	21.00	20.00
PRSL0970PI	10	22.00	220.00	264.00	168.52	22.00	25.74	20.00
PRSL0856PI	10	24.00	240.00	288.00	184.00	24.00	28.00	20.00
PRSL0861PI	11	12.00	132.00	156.00	104.00	12.00	14.00	20.00
PRSL0998PI	11	18.00	198.00	234.00	156.00	18.00	21.00	20.00
PRSL0997PI	11	20.00	220.00	260.00	173.36	20.00	23.32	20.00
PRSL0859PI	11	24.00	264.00	312.00	204.00	24.00	30.00	20.00
PRSL0863PI	12	14.00	168.00	196.00	133.00	14.00	17.50	20.00
PRSL0897PI	12	16.00	192.00	224.00	154.67	16.00	18.67	20.00
PRSL0972PI	12	18.00	216.00	252.00	173.88	18.00	21.06	20.00
PRSL0845PI	12	20.00	240.00	280.00	193.34	20.00	23.32	20.00
PRSL0878PI	12	24.00	288.00	336.00	232.00	24.00	28.00	20.00
PRSL0860PI	13	6.00	78.00	90.00	63.00	6.00	7.50	20.00
PRSL0853PI	13	12.00	156.00	178.59	126.00	11.29	15.00	20.00
PRSL0898PI	13	16.00	208.00	240.00	170.67	16.00	18.66	20.00
PRSL0862PI	14	10.00	140.00	169.00	125.00	15.00	7.50	20.00
PRSL0896PI	14	16.00	224.00	256.00	186.67	16.00	18.67	20.00
PRSL0999PI	14	18.00	252.00	288.00	210.00	18.00	21.00	20.00
PRSL0848PI	14	20.00	280.00	320.00	233.33	20.00	23.33	20.00
PRSL0858PI	15	18.00	270.00	306.00	228.00	18.00	21.00	20.00
PRSL0847PI	16	20.00	320.00	360.00	273.33	20.00	23.33	20.00
PRSL0973PI	17	10.00	170.00	190.00	145.00	10.00	12.50	22.89
PRSL0974PI	17	14.00	238.00	266.00	203.00	14.00	17.50	22.89
PRSL0851PI	20	6.00	120.00	132.00	105.00	6.00	7.50	22.89

Measuring unit: mm.

FOX - REQUEST FORM FOR NON STANDARD LIMIT SWITCH

Instructions

(See next page for list of components and legends)

- 1 Version:** tick the required version.
- 2 SIL 1 certified:** tick the box if you require SIL 1 certified units.
- 3 Revolution ratio:** write the required revolution ratio.
- 4 Standard cam set:** write the code of the cam set required, according to the legend.
- 5 Customized cam set:** for non standard cam sets, fill in the scheme choosing the cams and the switches required, according to the legends. It is possible to assemble sets with 2, 3, 4 or 5 cams/switches.

Customized cams are available on request.
- 6 Potentiometer. encoder. Yankee:** write the code of the potentiometer, encoder or Yankee required.

ATTENTION: it is possible to mount a potentiometer or an encoder alone or together with a set of 2 or 3 cams/switches. Potentiometers PA020001 and PA020002 can be combined only with sets of 2 cams/switches.

ATTENTION: Yankee may be mounted alone or together with a set of max. 4 cams/switches.
- 7 Cable gland:** tick the type of cable gland required.
- 8 Coupling, flange, pinion gear:** tick the appropriate box when coupling, flange or pinion gear are required.

When a standard pinion gear is required, write the code number listed in the pinion gear tables in the catalogue.

When a special pinion gear is required, write the number of teeth, the module and the primitive diameter.
- 9 Shaft:** tick the type of shaft required.

Customized shafts are available on request.
- 10 Cover holding wire:** tick when the cover holding wire is required.

Version

1

☐ Version **CE**
☐ Version **cULus CE**
☐ Version with anti-moisture plug **CE**

ATTENTION: Limit switches with shafts made of stainless steel AISI 430F are not cULus certified.

☐ **SIL1 certified**

2

Revolution ratio

3

- | | |
|--------------------------------|--|
| ☐ 1:15 | ☐ 1:150 |
| ☐ 1:20 | ☐ 1:200 |
| ☐ 1:25 | ☐ 1:250 |
| ☐ 1:50 | ☐ 1:300 |
| ☐ 1:75 | ☐ 1:450 |
| ☐ 1:100 | ☐ 1: <input type="text"/> |

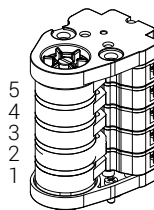
Standard cam set

4

Cam set code

Customized cam set

5



Cam code

Switch code

- | | | |
|---|----------------------|----------------------|
| 5 | <input type="text"/> | <input type="text"/> |
| 4 | <input type="text"/> | <input type="text"/> |
| 3 | <input type="text"/> | <input type="text"/> |
| 2 | <input type="text"/> | <input type="text"/> |
| 1 | <input type="text"/> | <input type="text"/> |

Potentiometer. encoder. Yankee

6

Code

Cable gland

7

☐ M20

☐ M20+M16

☐ M20+M20

☐ **Male coupling**
☐ **Coupling**

8

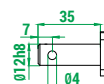
☐ **Female coupling**
☐ **Flange**
☐ **Pinion gear**
Pinion gear code

Customized pinion gear

No. of teeth Module Primitive diameter

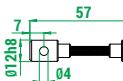
Standard shaft

9


☐ Stainless steel AISI 430F shaft

☐ High resistance stainless steel AISI 303 shaft

Flexible shaft


☐ Stainless steel AISI 430F shaft

☐ High resistance stainless steel AISI 303 shaft

Cover holding wire

10



4 Legend - Standard cam sets

No. & type of switches	No. & type of cams	Code
2 x PRSL0110XX	2 cams A	FCL20001
	Cams A+C	FCL20003
4 x PRSL0110XX	2 cams C	FCL20005
	Cams D+D+B+F	FCL40001
	4 cams A	FCL40003
	Cams A+A+C+C	FCL40005
	4 cams C	FCL40007
	Cams C+C+C+E	FCL40009
2 x PRSL0111XX	Cams A+A+E+E	FCL40011
	2 cams A	FCL20002
	Cams A+C	FCL20004
4 x PRSL0111XX	2 cams C	FCL20006
	Cams D+D+B+F	FCL40002
	4 cams A	FCL40004
	Cams A+A+C+C	FCL40006
	4 cams C	FCL40008
	Cams C+C+C+E	FCL40010
	Cams A+A+E+E	FCL40012

6 Legend - Potentiometers, encoders and Yankee

Description	Code
Potentiometer 10 kΩ - with support	PA020001
Potentiometer 10 kΩ mechanical stop - with support	PA020002
Potentiometer 10 kΩ ±10% 4 pins - with support	PA020003
Potentiometer 10 kΩ ±10% 3 pins - with support	PA020004
Potentiometer 5 kΩ ±10% - with support	PA020005
Encoder 36 pulses/rev. - with support	PA030001
Encoder 150 pulses/rev. - with support	PA030002
Yankee - current output	PA01AA01 / PA02AA01
Yankee - voltage output	PA01AB01
Yankee - PWM output	PA01AC01

5 Legend - Switches

PRSL0110XX	PRSL0111XX
1NO+1NC	1NC

5 Legend - Cams

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° ±0.5°	PRSL7194PI	23.0° ±0.5°
B		10 points	PRSL7193PI	21.5° ±0.5°	PRSL7193PI	23.0° ±0.5°
C		60° sector	PRSL7195PI	82.0° ±0.5°	PRSL7195PI	86.0° ±0.5°
D		72° sector	PRSL7196PI	94.0° ±0.5°	PRSL7196PI	97.5° ±0.5°
E		180° sector	PRSL7191PI	204.5° ±0.5°	PRSL7191PI	203.0° ±0.5°
F		305° sector	PRSL7192PI	328.5° ±0.5°	PRSL7192PI	327.0° ±0.5°

This image shows a single sheet of white paper with horizontal green ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

GF4C

Rotary limit switch



Rotary limit switch used to control and measure the movement of industrial machines or the position of the nacelle or pitch angle of wind turbines.

FEATURES

- It consists of a gear motor that transfers movement to the cams and the other movement detection devices through a primary input reduction stage (worm gear and helical toothed gear) and one or more secondary output stages.
- Accurate adjustment of cams by means of screws.
- Positive opening NC contacts for safety functions.
- Mechanical life of switches: up to 1 million operations.
- IP protection degree: GF4C is classified IP 65.
- Extreme temperature resistance: -25°C to +70°C.
- It features transmission and gear driving shafts made of stainless steel, self-lubricating technopolymer gears and driving bushes and sintered bronze bushes moulded into the base of the limit switch to prevent rubbing against plastic material.
- All materials and components used are wear resistant and guarantee protection of the unit against water and dust.

OPTIONS

- Revolution ratios from 1:1 to 1:969, achieved by combining different secondary output stages.
- Each of the two outputs can be set to a different revolution ratio to enable diversified control of the machine when special requirements need to be met.
- Snap actions switches with 1NO+1NC contacts or slow action switches with 1NC contact.
- It can be equipped with 2 cam sets (with up to 7 switches), potentiometers and encoders (alone or on top of cam sets with up to 2 switches) and Yankee absolute encoders (on top of cam sets with up to 2 switches).
- Available with flanges, pinion gears and couplings.
- Available with direct control switches to enable direct action on the motor.

CERTIFICATIONS

- CE marking and cULus* marking.

Fill in the "request form" for accurate product configuration.

* Not available on all versions.

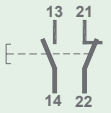
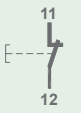
CERTIFICATIONS

Conformity to Community Directives	2014/35/UE Low Voltage Directive
	2006/42/CE Machinery Directive
Conformity to CE Standards	EN 60204-1 Safety of machinery - Electrical equipment of 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
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
Markings and homologations	CE cUL ^{us} *

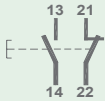
GENERAL TECHNICAL SPECIFICATIONS

Ambient temperature	Storage -40°C/+70°C
	Operational -25°C/+70°C
IP protection degree	IP 65
Insulation category	Class II
Cable entry	Cable gland M20
Shafts	Stainless steel AISI 303

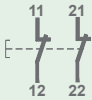
TECHNICAL SPECIFICATIONS OF THE SWITCHES FOR AUXILIARY CONTROL

Code	PRSL0036XX	PRSL0037XX
Utilisation category	AC 15	
Rated operational voltage	3 A	
Rated operational current	250 Vac	
Rated thermal current	10 A	
Rated insulation voltage	300 Vac	
Mechanical life	1x10 ⁶ operations	
Connections	Screw-type terminals	
Wires	1x2,5 mm ² , 2x1,5 mm ² (UL (c)UL: use 60°C or 75°C copper (CU) conductors and wire 16-18 AWG)	
Tightening torque	0,8 Nm	
Switch type	Double break, snap action	Double break, slow action
Contacts	1NO+1NC (All NC contacts are of the positive opening operation type )	1NC (All NC contacts are of the positive opening operation type )
Scheme		
Markings and homologations	CE cUL ^{us}	

* Not available on all versions.

Code	PRSL0110XX	PRSL0111XX
Utilisation category	AC 15	
Rated operational voltage	250 Vac	
Rated operational current	3 A	
Rated thermal current	10 A	
Rated insulation voltage	300 Vac	
Mechanical life	10x10 ⁶ operations	
Connections	Screw-type terminals	
Wires	1x2.5 mm ² , 2x1.5 mm ² (UL (c)UL: use 60°C or 75°C copper (CU) conductors and stiff or flexible wire 14-22 AWG)	
Tightening torque	0.5 Nm	
Switch type	Double break, snap action	Double break, slow action
Contacts	1NO+1NC (All NC contacts are of the positive opening operation type )	1NC (All NC contacts are of the positive opening operation type )
Scheme		
Markings and homologations	CE 	

TECHNICAL SPECIFICATIONS OF THE SWITCHES FOR DIRECT CONTROL

Code	PRSL0455PI
Utilisation category	AC 3
Rated operational current	400 Vac
Rated operational voltage	10 A
Rated thermal current	20 A
Rated insulation voltage	660 Vac
Mechanical life	1x10 ⁶ operations
Connections	Screw-type terminals
Wires	2x1.5 mm ² , 1x2.5 mm ²
Tightening torque	0.8 Nm
Switch type	Two-pole
Contacts	2NC
Scheme	
Markings and homologations	CE

TECHNICAL SPECIFICATIONS OF THE POTENTIOMETERS

Code of potentiometer with support	PA020001	PA020002
Ohmic value	10 k Ω	10 k Ω mechanical stop
Resolution	Infinite	
Independant linearity	$\pm 1\%$	
Life time	10x10 ⁶ movements	
Operational ambient temperature	-55°C/+105°C	
Continuos rotation (without stop)	360°	
Continuos rotation (with stop)	333° $\pm 5^\circ$	
Actual electrical angle	310° $\pm 5^\circ$	
Ohmic value tolerance	$\pm 20\%$	

Code of potentiometer with support	PA020006	PA020007	PA020008
Ohmic value	4.7 k Ω	10 k Ω	2.2 k Ω
Independant linearity (ref. AEA -3°)	$\pm 0,25\%$		
Life time	3x10 ⁶ movements		
Operational ambient temperature	-55°C/+125°C		
Mechanical angle	360° continuous		
Actual Electrical Angle (AEA)	355° $\pm 5^\circ$		
Ohmic value tolerance	$\pm 5\%$		
Temperature drift	< 50 PPM/°C		

Code of potentiometer with support	PA020003	PA020004	PA020005
Ohmic value	10 k Ω	10 k Ω	5 k Ω
Connections	4 turrets	3 turrets	4 turrets
Independant linearity (over AEA -3°)	$\leq \pm 1\%$	$\leq \pm 0.35\%$	$\leq \pm 1\%$
Life time	5x10 ⁶ movements		
Operational ambient temperature	-55°C/+125°C		
Mechanical angle	360° continuous		
Actual Electrical Angle (AEA)	340° $\pm 5^\circ$		
Ohmic value tolerance	Max $\pm 20\%$ at 20°C	Max $\pm 10\%$ at 20°C	Max $\pm 20\%$ at 20°C

Code of potentiometer with support	PA020009
Ohmic value	2 k Ω
Resolution	Better then 0.008°
Linearity	$\pm 0.075\%$
Independant linearity	$\pm 0.075\%$
Life time	100x10 ⁶ movements
Operational ambient temperature	-40°C/+100°C
Mechanical angle	360° continuous
Actual electrical travel	350° $\pm 2^\circ$
Ohmic value tolerance	$\pm 20\%$

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 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	Protection against reverse polarity and output short-circuit	

CERTIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Conformity to Community Directives	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
	2014/35/UE Low Voltage Directive (LVD)
Conformity to CE Standards	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements
	EN 60529 Degrees of protection provided by enclosures
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
Markings and homologations	CE cULus

GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

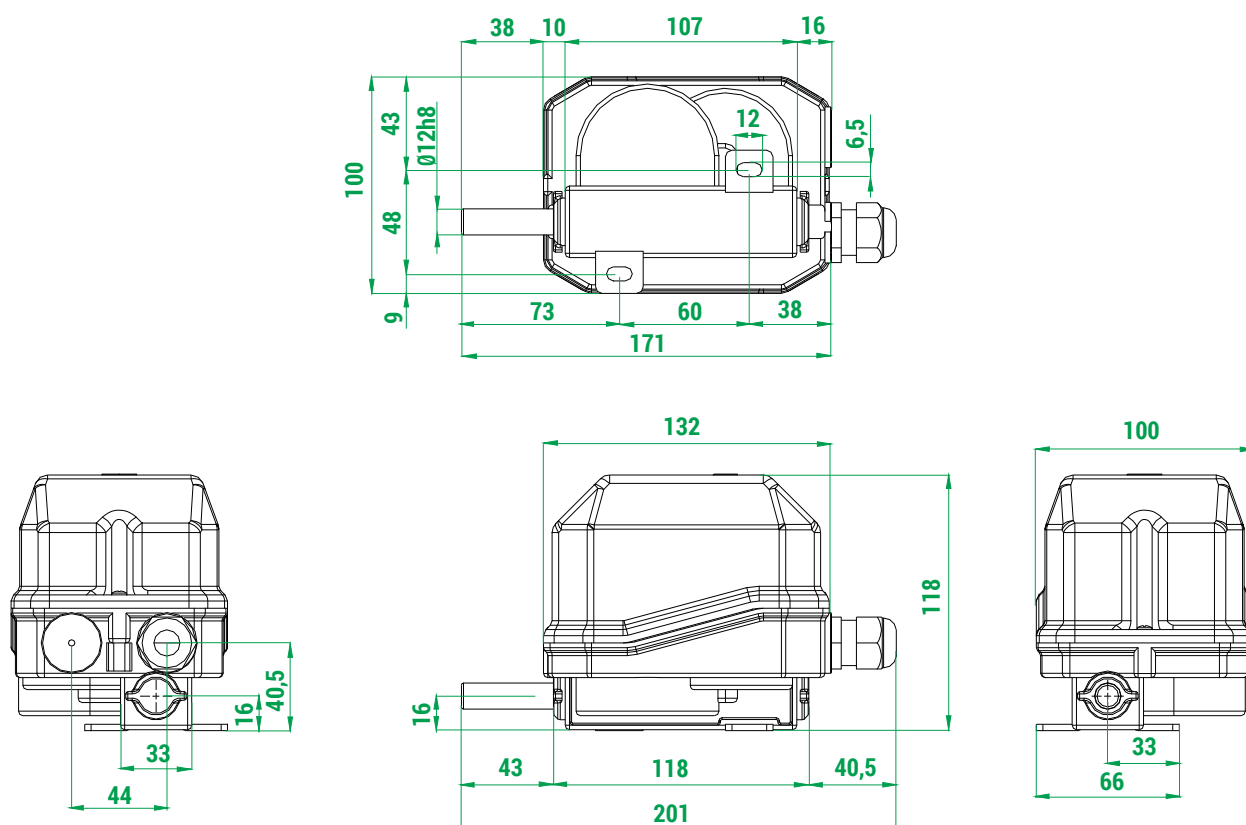
Ambient temperature	Storage -40°C/+80°C
	Operational -40°C/+80°C
IP protection degree	IP 20
Free rotation	360°
Maximum rotation speed	800 rpm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

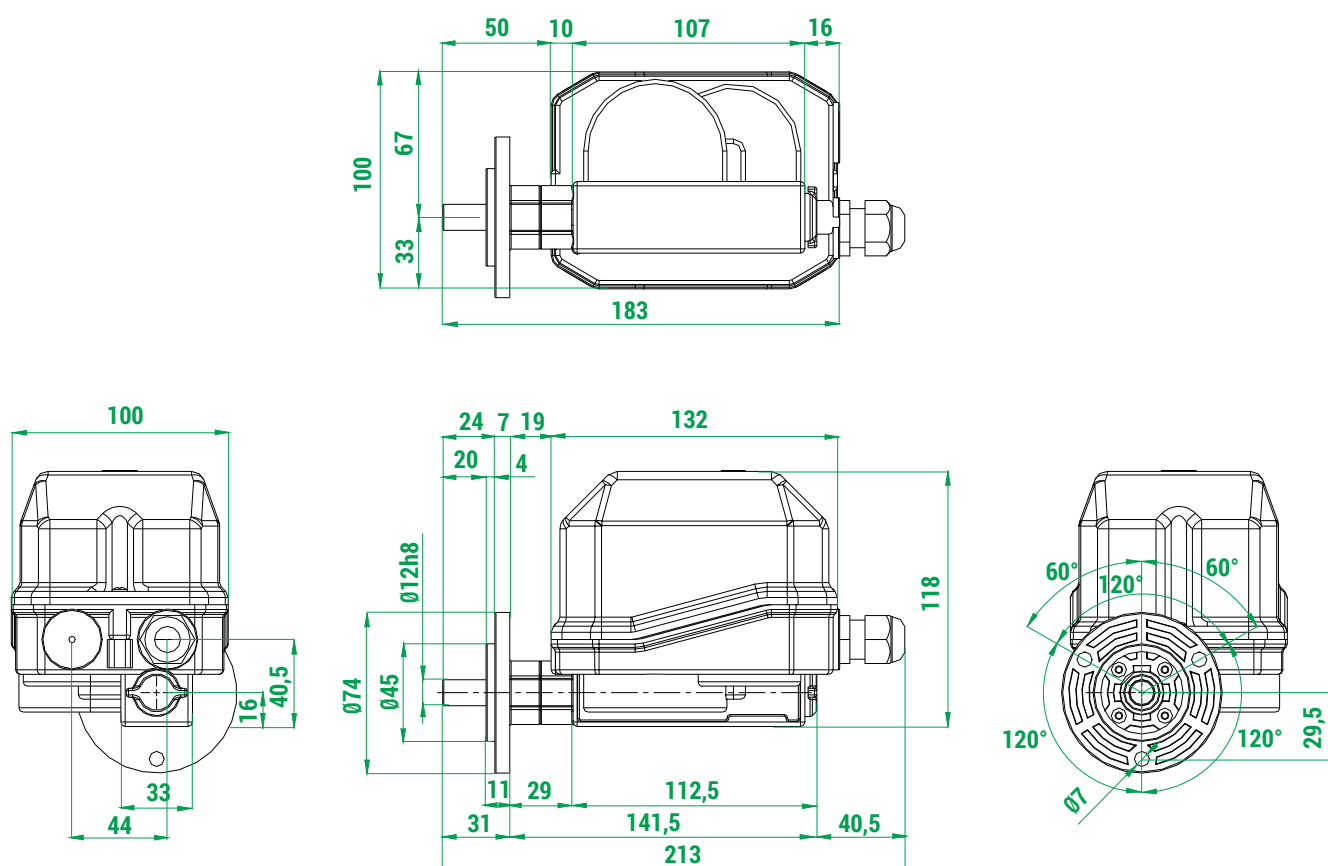
Code	PA01AA01 / PA02AA01	PA01AB01	PA01AC01
Analog output	Current 4 ÷ 20 mA	Voltage 0 ÷ 10 V	PWM 0 ÷ 100 %
Power supply	12 ÷ 48 Vdc/12 ÷ 48 Vac		
Protection against reverse polarity	Yes		
Absorption	50 mA		
Resolution	10 bit		
Linearity	±0.5°		
Max. hysteresis	0.1°		
Zero Point setting	Through button/wire		
Signal increment direction	CW (standard)/CCW (on request)		
Connections	Terminal board		
Terminal wires	0.14 mm² - 1.5 mm²		
Terminal tightening torque	0.22 Nm - 0.25 Nm		

OVERALL DIMENSIONS (mm)

Standard



With flange

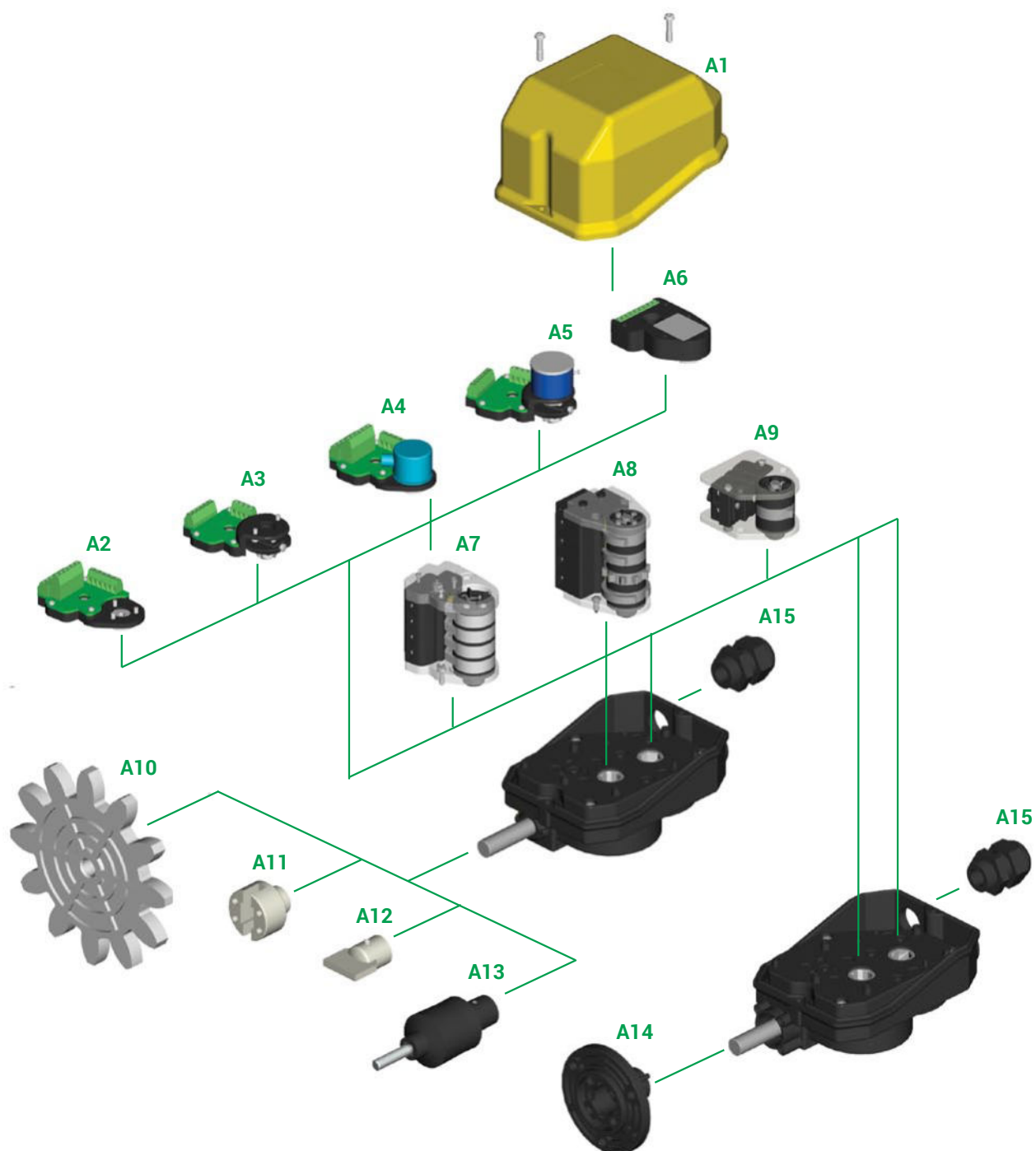


STANDARD LIMIT SWITCHES

Standard limit switches are equipped with cams PRSL7140PI .

Rated revolution ratio	No. of cams and switches	Switches	
		PRSL0036XX 1NO+1NC	PRSL0037XX 1NC
			
		Code	Code
1:1	2	PF090300010003	PF090300010004
	3	PF090300010002	PF090300010005
	4	PF090300010001	PF090300010006
1:5	2	PF090300050002	PF090300050004
	3	PF090300050003	PF090300050005
	4	PF090300050001	PF090300050006
1:10	2	PF090300100003	PF090300100005
	3	PF090300100004	PF090300100006
	4	PF090300100002	PF090300100007
1:15	2	PF090300150004	PF090300150007
	3	PF090300150003	PF090300150008
	4	PF090300150002	PF090300150001
1:20	2	PF090300200002	PF090300200004
	3	PF090300200003	PF090300200005
	4	PF090300200001	PF090300200006
1:25	2	PF090300250006	PF090300250007
	3	PF090300250003	PF090300250008
	4	PF090300250001	PF090300250002
1:50	2	PF090300500002	PF090300500028
	3	PF090300500003	PF090300500017
	4	PF090300500006	PF090300500007
1:75	2	PF090300750007	PF090300750009
	3	PF090300750008	PF090300750010
	4	PF090300750004	PF090300750006
1:100	2	PF090301000002	PF090301000001
	3	PF090301000006	PF090301000013
	4	PF090301000003	PF090301000004
1:150	2	PF090301500002	PF090301500001
	3	PF090301500011	PF090301500009
	4	PF090301500008	PF090301500003
1:200	2	PF090302000006	PF090302000007
	3	PF090302000002	PF090302000004
	4	PF090302000003	PF090302000008
1:250	2	PF090302500003	PF090302500009
	3	PF090302500007	PF090302500010
	4	PF090302500008	PF090302500011
1:300	2	PF090303000004	PF090303000008
	3	PF090303000006	PF090303000009
	4	PF090303000007	PF090303000010

ASSEMBLY DRAWING



Refer to the following tables for descriptions of components: "Standard cam sets", "Potentiometers, encoders and sensors" and "Accessories".

COMPONENTS

Standard cam sets

Ref.	Drawing	No. and type of cams	No. and type of switches	Code
A7		2 cams A	2 switches PRSL0110XX	FCL20001
		2 cams A	2 switches PRSL0111XX	FCL20002
		Cams A+C	2 switches PRSL0110XX	FCL20003
		Cams A+C	2 switches PRSL0111XX	FCL20004
		2 cams C	2 switches PRSL0110XX	FCL20005
		2 cams C	2 switches PRSL0111XX	FCL20006
		Cams D+D+B+F	4 switches PRSL0110XX	FCL40001
		Cams D+D+B+F	4 switches PRSL0111XX	FCL40002
		4 cams A	4 switches PRSL0110XX	FCL40003
		4 cams A	4 switches PRSL0111XX	FCL40004
		Cams A+A+C+C	4 switches PRSL0110XX	FCL40005
		Cams A+A+C+C	4 switches PRSL0111XX	FCL40006
		4 cams C	4 switches PRSL0110XX	FCL40007
		4 cams C	4 switches PRSL0111XX	FCL40008
		Cams C+C+C+E	4 switches PRSL0110XX	FCL40009
		Cams C+C+C+E	4 switches PRSL0111XX	FCL40010
		Cams A+A+E+E	4 switches PRSL0110XX	FCL40011
		Cams A+A+E+E	4 switches PRSL0111XX	FCL40012
A8		2 cams A	2 switches PRSL0036XX	PRFC0010PE
		2 cams A	2 switches PRSL0037XX	PRFC0011PE
		2 cams C	2 switches PRSL0036XX	PRFC0012PE
		2 cams C	2 switches PRSL0037XX	PRFC0013PE
		3 cams A	3 switches PRSL0036XX	PRFC0020PE
		3 cams A	3 switches PRSL0037XX	PRFC0021PE
		3 cams C	3 switches PRSL0036XX	PRFC0022PE
		3 cams C	3 switches PRSL0037XX	PRFC0024PE
		4 cams A	4 switches PRSL0036XX	PRFC0030PE
		4 cams A	4 switches PRSL0037XX	PRFC0031PE
		4 cams C	4 switches PRSL0036XX	PRFC0032PE
		4 cams C	4 switches PRSL0037XX	PRFC0034PE
A9		1 cam A	1 interruttore PRSL0455PI	PRFC0101PE
		2 cam A	2 switches PRSL0455PI	PRFC0103PE

Other sets with 2/3/4 switches PRSL0036XX/PRSL0037XX/PRSL0110XX/PRSL0111XX or with 1 or 2 switches PRSL0455PI are available on request.

Cam reference chart for sets with switches PRSL0110XX and PRSL0111XX

Cam			Code	Switching angle with PRSL0110XX	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21,5° ±0,5°	23,0° ±0,5°
B		10 points	PRSL7193PI	21,5° ±0,5°	23,0° ±0,5°
C		60° sector	PRSL7195PI	82,0° ±0,5°	86,0° ±0,5°
D		72° sector	PRSL7196PI	94,0° ±0,5°	97,5° ±0,5°
E		180° sector	PRSL7191PI	204,5° ±0,5°	203,0° ±0,5°
F		305° sector	PRSL7192PI	328,5° ±0,5°	327,0° ±0,5°

Cam reference chart for sets with switches PRSL0036XX, PRSL0037XX and PRSL0455PI

Cam			Code	Switching angle with PRSL036XX	Switching angle with PRSL037XX
A		1 point	PRSL7140PI	21,0° ±0,5°	25,0° ±0,5°
B		10 points	PRSL7142PI	16,5° ±0,5°	21,5° ±0,5°
C		60° sector	PRSL7141PI	80,0° ±0,5°	86,0° ±0,5°
E		180° sector	PRSL7144PI	199,5° ±0,5°	205,5° ±0,5°
H		335° sector	PRSL7143PI	343,5° ±0,5°	349,0° ±0,5°

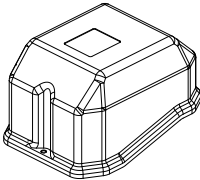
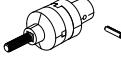
Potentiometers, encoders and sensors

Ref.	Drawing	Description	Code
A2		Support for encoder	PA030000
A3		Support for potentiometer	PA020000
A4		Encoder 36 pulses./rev. with support	PA030001
		Encoder 150 pulses./rev. with support	PA030002
A5		Potentiometer 10 kΩ with support	PA020001
		Potentiometer 10 kΩ mechanical stop with support	PA020002
		Potentiometer 10 kΩ ±10% 4 pins with support	PA020003
		Potentiometer 10 kΩ ±10% 3 pins with support	PA020004
		Potentiometer 5 kΩ ±10% with support	PA020005
		Potentiometer 4.7 kΩ with support	PA020006
		Potentiometer 10 kΩ with support	PA020007
		Potentiometer 2.2 kΩ with support	PA020008
		Potentiometer 2KΩ with support	PA020009

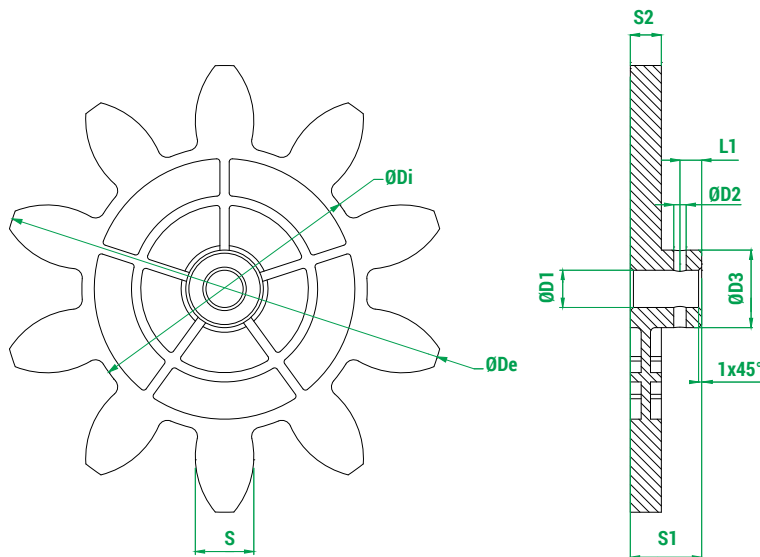
Potentiometers, encoders and sensors

A6		Absolute encoder Yankee - current output	PA01AA01 / PA02AA01
		Absolute encoder Yankee - voltage output	PA01AB01
		Absolute encoder Yankee - PWM output	PA01AC01

Accessories

Ref.	Drawing	Description	Code
A1		Cover with tightening rubber	SL000096
A10		Pinion gear	See pinion gear tables
A11		Female coupling with pin	PRSL0920PI
A12		Male coupling with pin	PRSL0919PI
A13		Coupling with pin	PRSL0981PI
A14		Flange with pin	PRSL0947PI
A15		Cable gland M20	PRPS0064PE

Moulded pinion gears



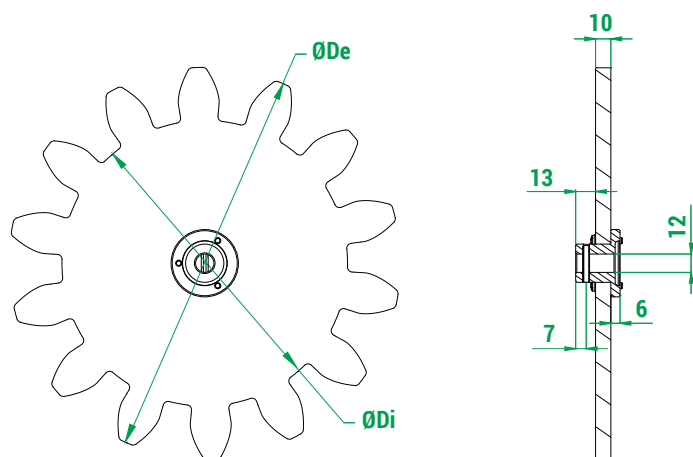
Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	S	Alpha	D1	D2	D3	S1	S2	L1
PRSL0915PI	8	20.00	160.00	200.00	113.20	20.00	23.40	31.41	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0912PI	10	12.00	120.00	144.00	92.00	12.00	14.00	18.85	20.00	12.00	4.00	25.00	23.00	10.00	7.00
PRSL0913PI	10	14.00	140.00	168.00	107.24	14.00	16.38	21.99	20.00	12.00	4.00	24.60	23.00	10.00	7.00
PRSL0914PI	10	16.00	160.00	192.00	122.67	16.00	18.67	25.13	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0917PI	11	6.00	66.00	78.00	51.96	6.00	7.02	9.42	20.00	12.00	4.00	19.00	23.00	8.00	7.00
PRSL0916PI	12	5.00	60.00	70.00	48.30	5.00	5.83	7.85	20.00	12.00	4.00	20.00	23.00	8.00	7.00
PRSL0918PI	12	8.00	96.00	112.00	77.28	8.00	9.36	12.56	20.00	12.00	3.90	21.50	23.50	10.00	7.00
PRSL0911PI	12	10.00	120.00	140.00	96.67	10.00	11.67	15.71	20.00	12.00	4.00	25.00	23.50	10.00	7.00
PRSL0944PI	12	12.00	144.00	168.00	116.00	12.00	14.00	18.85	20.00	12.00	4.00	24.00	23.00	10.00	7.00

Measuring unit: mm.

Waterjet cut pinion gears



Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	Alpha
PRSL0857PI	8	18.00	144.00	180.00	102.00	18.00	21.00	20.00
PRSL0855PI	8	24.00	192.00	240.00	136.00	24.00	28.00	20.00
PRSL0992PI	9	10.00	90.00	110.00	66.67	10.00	11.67	20.00
PRSL0879PI	9	16.00	144.00	176.00	106.67	16.00	18.67	20.00
PRSL0854PI	9	18.00	162.00	198.00	120.00	18.00	21.00	20.00
PRSL0871PI	9	20.00	180.00	220.00	133.33	20.00	23.33	20.00
PRSL0849PI	9	24.00	216.00	264.00	160.00	24.00	28.00	20.00
PRSL0846PI	10	10.00	100.00	120.00	76.67	10.00	11.67	20.00
PRSL0993PI	10	18.00	180.00	216.00	138.00	18.00	21.00	20.00
PRSL0970PI	10	22.00	220.00	264.00	168.52	22.00	25.74	20.00
PRSL0856PI	10	24.00	240.00	288.00	184.00	24.00	28.00	20.00
PRSL0861PI	11	12.00	132.00	156.00	104.00	12.00	14.00	20.00
PRSL0998PI	11	18.00	198.00	234.00	156.00	18.00	21.00	20.00
PRSL0997PI	11	20.00	220.00	260.00	173.36	20.00	23.32	20.00
PRSL0859PI	11	24.00	264.00	312.00	204.00	24.00	30.00	20.00
PRSL0863PI	12	14.00	168.00	196.00	133.00	14.00	17.50	20.00
PRSL0897PI	12	16.00	192.00	224.00	154.67	16.00	18.67	20.00
PRSL0972PI	12	18.00	216.00	252.00	173.88	18.00	21.06	20.00
PRSL0845PI	12	20.00	240.00	280.00	193.34	20.00	23.32	20.00
PRSL0878PI	12	24.00	288.00	336.00	232.00	24.00	28.00	20.00
PRSL0860PI	13	6.00	78.00	90.00	63.00	6.00	7.50	20.00
PRSL0853PI	13	12.00	156.00	178.59	126.00	11.29	15.00	20.00
PRSL0898PI	13	16.00	208.00	240.00	170.67	16.00	18.66	20.00
PRSL0862PI	14	10.00	140.00	169.00	125.00	15.00	7.50	20.00
PRSL0896PI	14	16.00	224.00	256.00	186.67	16.00	18.67	20.00
PRSL0999PI	14	18.00	252.00	288.00	210.00	18.00	21.00	20.00
PRSL0848PI	14	20.00	280.00	320.00	233.33	20.00	23.33	20.00
PRSL0858PI	15	18.00	270.00	306.00	228.00	18.00	21.00	20.00
PRSL0847PI	16	20.00	320.00	360.00	273.33	20.00	23.33	20.00
PRSL0973PI	17	10.00	170.00	190.00	145.00	10.00	12.50	22.89
PRSL0974PI	17	14.00	238.00	266.00	203.00	14.00	17.50	22.89
PRSL0851PI	20	6.00	120.00	132.00	105.00	6.00	7.50	22.89

Measuring unit: mm.

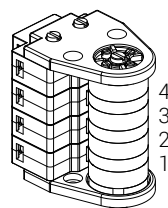
GF4C - REQUEST FORM FOR NON STANDARD LIMIT SWITCH

Instructions

(See next pages for list of components and legends)

- 1 Version:** tick the required version.
- 2 Revolution ratio:** write the required revolution ratio for each output.
- 3 Standard cam sets:** write the code of the cam set required for each output.
 ATTENTION: refer to table "Configurations with sets of cams/switches" for possible configurations.
- 4 Customized cam sets:** for non standard cam sets, fill in the scheme choosing the cams and the switches required.
 ATTENTION: refer to table "Configurations with sets of cams/switches" for possible configurations.
 Customized cams are available on request.
- 5 Potentiometers, encoders, Yankee:** write the code of the potentiometer, encoder or Yankee required. Refer to table "Configurations with potentiometers, encoders and Yankee" for possible configurations.
- 6 Cable glands:** choose the number of cable glands required.
- 7 Coupling, flange, pinion gear:** tick the box when coupling, flange or pinion gear are required.
 When a standard pinion gear is required, write the code number listed in the pinion gear table in the catalogue.
 When a special pinion gear is required, write the number of teeth, the module and the primitive diameter.
- 8 Shaft:** tick the shaft type required.
 Customized shafts are available on request.

Customized cam sets 4



Output 1	Cam code	Switch code
4	_____	_____
3	_____	_____
2	_____	_____
1	_____	_____

Output 2	Cam code	Switch code
4	_____	_____
3	_____	_____
2	_____	_____
1	_____	_____

Potentiometers, encoders, Yankee 5

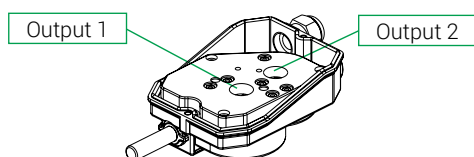
	Output 1	Output 2
Code	_____	_____

Cable glands 6

- ☐ No. 1 cable gland M20
- ☐ No. 2 cable glands M20

Version 1

- ☐ Version IP 00 (without cover)
- ☐ Version IP 65



Revolution ratio 2

Output 1	Output 2
☐ 1:1 ☐ 1:25 ☐ 1:200	1:
☐ 1:5 ☐ 1:50 ☐ 1:250	Not all revolution ratios are available
☐ 1:10 ☐ 1:70 ☐ 1:300	
☐ 1:15 ☐ 1:100 ☐ 1:450	
☐ 1:20 ☐ 1:150 ☐ 1:	

Standard cam sets 3

Cam set code	Output 1	Output 2
_____	_____	_____
_____	_____	_____

- ☐ Male coupling ☐ Coupling 7
- ☐ Female coupling ☐ Flange
- ☐ Pinion gear

Pinion gear code _____

Customized pinion gear

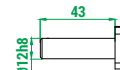
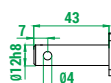
No. of teeth _____

Module _____

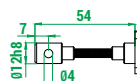
Primitive diameter _____

8

- ☐ Standard shaft ☐ Standard shaft without hole



- ☐ Flexible shaft



3 Legend - Standard cam sets

No. & type of switches	No. & type of cams	Code
2 x PRSL0036XX	2 cams A	PRFC0010PE
	2 cams C	PRFC0012PE
2 x PRSL0037XX	2 cams A	PRFC0011PE
	2 cams C	PRFC0013PE
3 x PRSL0036XX	3 cams A	PRFC0020PE
	3 cams C	PRFC0022PE
3 x PRSL0037XX	3 cams A	PRFC0021PE
	3 cams C	PRFC0024PE
4 x PRSL0036XX	4 cams A	PRFC0030PE
	4 cams C	PRFC0032PE
4 x PRSL0037XX	4 cams A	PRFC0031PE
	4 cams C	PRFC0034PE
2 x PRSL0110XX	2 cams A	FCL20001
	Cams A+C	FCL20003
	2 cams C	FCL20005
4 x PRSL0110XX	Cams D+D+B+F	FCL40001
	4 cams A	FCL40003
	Cams A+A+C+C	FCL40005
	4 cams C	FCL40007
	Cams C+C+C+E	FCL40009
	Cams A+A+E+E	FCL40011
2 x PRSL0111XX	2 cams A	FCL20002
	Cams A+C	FCL20004
	2 cams C	FCL20006
4 x PRSL0111XX	Cams D+D+B+F	FCL40002
	4 cams A	FCL40004
	Cams A+A+C+C	FCL40006
	4 cams C	FCL40008
	Cams C+C+C+E	FCL40010
	Cams A+A+E+E	FCL40012
1 x PRSL0455XPI	1 cam A	PRFC0101PE
2 x PRSL0455XPI	2 cams A	PRFC0103PE

7 Legend - Potentiometers, encoders and Yankee

Description	Code
Potentiometer 10 kΩ with support	PA020001
Potentiometer 10 kΩ mechanical stop with support	PA020002
Potentiometer 10 kΩ ±10% 4 pins with support	PA020003
Potentiometer 10 kΩ ±10% 3 pins with support	PA020004
Potentiometer 5 kΩ ±10% with support	PA020005
Potentiometer 4,7 kΩ with support	PA020006
Potentiometer 10 kΩ with support	PA020007
Potentiometer 2,2 kΩ with support	PA020008
Potentiometer 2KΩ with support	PA020009
Encoder 36 pulses/rev. with support	PA030001
Encoder 150 pulses/rev. with support	PA030002
Yankee - current output	PA01AA01 / PA02AA01
Yankee - voltage output	PA01AB01
Yankee - PWM output	PA01AC01

4 Legend - Switches

Auxiliary control			
PRSL0036XX	PRSL0037XX	PRSL0110XX	PRSL0111XX
1NO+1NC	1NC	1NO+1NC	1NC
Direct control			
PRSL0455PI			
2NC			

4 Legend - Standard cams

Cam			Code for switches PRSL0036XX, PRSL0037XX, PRFC0455PI	Switching angle with PRSL0036XX	Switching angle with PRSL0037XX	Code for switches PRSL0110XX, PRSL0111XX	Switching angle with PRSL0110XX	Switching angle with PRSL0111XX
A		1 point	PRSL7140PI	21,0° ±0,5°	25,0° ±0,5°	PRSL7194PI	21,5° ±0,5°	23,0° ±0,5°
B		10 points	PRSL7142PI	16,5° ±0,5°	21,5° ±0,5°	PRSL7193PI	21,5° ±0,5°	23,0° ±0,5°
C		60° sector	PRSL7141PI	80,0° ±0,5°	86,0° ±0,5°	PRSL7195PI	82,0° ±0,5°	86,0° ±0,5°
D		72° sector	/	/	/	PRSL7196PI	94,0° ±0,5°	97,5° ±0,5°
E		180° sector	PRSL7144PI	199,5° ±0,5°	205,5° ±0,5°	PRSL7191PI	204,5° ±0,5°	203,0° ±0,5°
F		305° sector	/	/	/	PRSL7192PI	328,5° ±0,5°	327,0° ±0,5°
H		335° sector	PRSL7143PI	343,5° ±0,5°	349,0° ±0,5°	/	/	/

4 Table - Configurations with sets of cams/switches

Sets of cams with switches PRSL0036XX and PRSL0037XX

When using sets of cams with switches PRSL0036XX and PRSL0037XX:

- it is possible to mount up to 4 switches on output 2
- it is possible to mount up to 3 switches on output 1.

It is possible to mount 4 switches on output 1 only when output 2 is left empty.

Sets of cams with switches PRSL0110XX and PRSL0111XX

When using sets of cams with switches PRSL0110XX and PRSL0111XX, it is possible to mount up to 4 switches on each output.

Sets of cams with switches PRSL0455PI

When using sets of cams with switches PRSL0455PI, it is possible to mount only 1 switch on each output.

It is possible to mount 2 switches on output 1 only when output 2 is left empty.

5 Table - Configurations with potentiometers, encoders and Yankee

With sets of cams/switches PRSL0036XX and PRSL0037XX

When using sets of cams with switches PRSL0036XX and PRSL0037XX, it is possible to mount potentiometers, encoders and Yankee only on the output where there is no set of cams/switches. It is not possible to mount potentiometers, encoders nor Yankee on top of a set of cams/switches.

* Potentiometers marked with * can be mounted on output 1 or on output 2, but the other output must be left empty.

With sets of cams/switches PRSL0110XX and PRSL0111XX

Potentiometers, encoders and Yankee can be mounted on output 1 and 2 alone (No. of switches = 0), or on top of a set of cams with switches PRSL0110XX and PRSL0111XX according to the possible configurations shown in the following table.

* Potentiometers marked with * can be mounted on output 1 or on output 2, but the other output must be left empty.

Potentiometers, encoders and Yankee	Output 1					Output 2				
	No. of switches PRSL0110XX-PRSL0111XX					No. of switches PRSL0110XX-PRSL0111XX				
	0	1	2	3	4	0	1	2	3	4
PA020001	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO
PA020002	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO
PA020003	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA020004	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA020005	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA020006*	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO
PA020007*	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO
PA020008*	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO
PA020009*	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO
PA030001	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA030002	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA01AA01	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA01AB01	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO
PA01AC01	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO

OSCAR

Rotary limit switch



Rotary limit switch used to control and measure the movement of industrial machines or the position of the nacelle or pitch angle of wind turbines. Oscar features two different outputs with different revolution ratios and it can be equipped with different movement detection devices.

FEATURES

- It consists of a gear motor that transfers movement to the cams and the to other movement detection devices through a primary input reduction stage (worm gear and helical toothed gear) and one or more secondary output stages.
- Accurate adjustment of cams by means of screws.
- Positive opening NC contacts for safety functions.
- Mechanical life of switches: up to 10 million operations.
- IP protection degree: Oscar is classified IP 65 / IP 66 / IP 67 / IP 69K.
- NEMA protection degree: Oscar is classified Type 4X (cULus marked versions).
- Extreme temperature resistance: -53°C to +80°C.
- It 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 technopolymer gears and driving bushes, technopolymer base and cover.
- All materials and components used are wear resistant and guarantee protection of the unit against water and dust.

OPTIONS

- Revolution ratios from 1:1 to 1:1550, achieved by combining different secondary output stages.
- Each of the two outputs can be set to a different revolution ratio to enable diversified control of the machine when special requirements need to be met.
- Snap action switches with 1NO+1NC contacts or slow action switches with 1 NC contact.
- It can be equipped with 2 cam sets (with up to 10 switches), potentiometers and encoders (alone or on top of cam sets with up to 3 switches), Egon 36-AL absolute encoders (alone or on top of cam sets with up to 2 switches) and Yankee absolute encoders (on top of cam sets with up to 4 switches).
- Available with cover rise for XL version with 2 cam sets (with

- up to 12 switches), potentiometers and encoders (alone or on top of cam sets with up to 5 switches), Egon 36-AL absolute encoders (alone or on top of cam sets with up to 4 switches) and Yankee absolute encoders (on top of cam sets with up to 6 switches).
- Dedicated cable glands or connectors.
- Available with anti-moisture plug fitted to the base by means of a lock nut, improving transpiration while maintaining protection against water.
- Available with flanges, pinion gears and couplings.
- Plates with universal adapters to replace existing systems.

INCREASED SAFETY SYSTEM "LIMA"

- Lima is designed to be integrated in equipment complying with the standard ISO 13849 on control system safety rules.
- Lima can be connected to a control unit or to a PLC to control the rotation of the limit switch shaft (thus of the equipments connected to it).
- Lima has two separate detection systems, without direct contact, using different technologies to ensure control redundancy.
- Lima allows the two detection systems to be wired by using two separate cables, through an 8-pin terminal board.

CERTIFICATIONS

- CE marking and cULus* marking.
- Complying with accident prevention regulation BGV C 1 (only for Germany).
- HALT TEST (Highly Accelerated Life Test) passed, simulating conditions largely exceeding standard operating conditions.

Use the online configurator (<https://configuratore.terworld.com>) or fill in the "request form" for accurate product configuration.

* Not available on all versions.

POSSIBLE ASSEMBLIES

Oscar XL with cover rise



With anti-moisture plug



CERTIFICATIONS

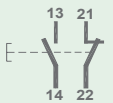
Conformity to Community Directives	2014/35/UE Low Voltage Directive
	2006/42/CE Machinery Directive
Conformity to CE Standards	EN 60204-1 Safety of machinery - Electrical equipment of machines
	EN 60204-32 Safety of machinery - Electrical equipment of machines - Requirements for hoisting machines
	EN 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
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
BGV C 1	Regulations for the prevention of accidents BGV C 1 (only for Germany)
HALT TEST	Highly Accelerated Life Test, simulation of conditions largely exceeding the standard operating conditions (data available on request)
Markings and homologations	CE 

GENERAL TECHNICAL SPECIFICATIONS

Ambient temperature	Storage -53°C/+80°C
	Operational -53°C/+80°C
IP protection degree	IP 65 / IP 66 / IP 67 / IP 69K
	IP 65 / IP 66 / IP 67 (version with cover rise)
NEMA protection degree	Type 4X (cULus versions)
Insulation category	Class II
Rotation speed	Max. 800 rpm (Output 1 >1:22, Output 2 >1:22 or =1:1)
	Max. 200 rpm (Output 1 ≤1:22, Output 2 ≤1:22 or =1:1)
Cable entry	Cable gland M20 - M16 (8 max)
Shafts	Stainless steel AISI 430F (non-cULus version)
	Stainless steel AISI 303

* Not available on all versions.

TECHNICAL SPECIFICATIONS OF THE SWITCHES

Code	PRSL0110XX	PRSL0111XX
Utilisation category	AC 15	
Rated operational voltage	250 Vac	
Rated operational current	3 A	
Rated thermal current	10 A	
Rated insulation voltage	300 Vac	
Mechanical life	10x10 ⁶ operations	
Connections	Screw-type terminals	
Wires	1x2.5 mm ² , 2x1.5 mm ² (UL (c)UL: use 60°C or 75°C copper (CU) conductors and stiff or flexible wire 14-22 AWG)	
Tightening torque	0.5 Nm	
Microswitch type	Double break, snap action	Double break, slow action
Contacts	1NO+1NC (All NC contacts are of the positive opening operation type )	1NC (All NC contacts are of the positive opening operation type )
Scheme		
Markings and homologations	 	

Switches PRSL0100XX available on request.

TECHNICAL SPECIFICATIONS OF THE POTENTIOMETERS

Code of potentiometer with support	PA020001	PA020002
Ohmic value	10 kΩ	10 kΩ mechanical stop
Resolution	Infinite	
Independant linearity	±1%	
Life time	10x10 ⁶ movements	
Power rating	Max. 1 W	
Operational ambient temperature	-55°C/+105°C	
Continuos rotation (without stop)	360°	
Continuos rotation (with stop)	333° ±5°	
Actual electrical angle	310° ±5°	
Ohmic value tolerance	±20%	

Code of potentiometer with support	PA020003	PA020004	PA020005
Ohmic value	10 kΩ	10 kΩ	5 kΩ
Connections	4 turrets	3 turrets	4 turrets
Indipendent linearity (ref. AEA -3°)	≤±1%	≤±0.35%	≤±1%
Power rating	Max. 0.3 W		
Life time	5x10 ⁶ 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 of potentiometer with support	PA020006	PA020007	PA020008
Ohmic value	4.7 kΩ	10 kΩ	2.2 kΩ
Independant linearity (ref. AEA -3°)	±0.25%		
Power rating	Max. 4 W		
Life time	3x10 ⁶ movements		
Operational ambient temperature	-55°C/+125°C		
Mechanical angle	360° continuous		
Actual Electrical Angle (AEA)	355°±5°		
Ohmic value tolerance	± 5%		
Temperature drift	< 50 PPM/°C		

Code of potentiometer with support	PA020009
Ohmic value	2 kΩ
Resolution	Better then 0.008°
Linearity	±0.075%
Independant linearity	±0.075%
Power rating	Max. 0.4 W
Life time	100x10 ⁶ 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 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	Protection against reverse polarity and output short-circuit	

CERTIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Conformity to Community Directives	2014/35/UE Low Voltage Directive (LVD)
	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
Conformity to CE Standards	EN 60204-1 Safety of machinery - Electrical equipment of machines
	EN 60529 Degrees of protection provided by enclosures
	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements - General requirements
	EN 61326-2-3 Electrical equipment for measurement, control and laboratory use - EMC requirements - Particular requirements - Test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning
	EN 61326-3-1 Electrical equipment for measurement, control and laboratory use - EMC requirements – Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications
Markings and homologations	CE

GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Ambient temperature	Storage -25°C/+85°C
	Operational -25°C/+85°C
IP protection degree	IP 42
Shaft diameter	6 mm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Power supply	12...30 Vdc
	Current 4...20 mA
Analog output	Voltage 1...5 V
	Voltage 2...10 V
Consumption	35 mA simple version
	55 mA redundant version
Single-turn resolution	12 bit (4096 points for revolution)
Protection against input/output over-current	Yes
Protection against input/output over-voltage	Yes
Accuracy	± 0.5%
Linearity	± 0.25%
Redundancy	2 complementary outputs (analog)

CERTIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Conformity to Community Directives	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
	2014/35/UE Low Voltage Directive (LVD)
Conformity to CE Standards	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements
	EN 60529 Degrees of protection provided by enclosures
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
Markings and homologations	CE 

GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Ambient temperature	Storage -40°C/+80°C
	Operational -40°C/+80°C
IP protection degree	IP 20
Free rotation	360°
Rotation speed	Max. 800 rpm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Code	PA01AA01 / PA02AA01	PA01AB01	PA01AC01
Output	Current 4 ÷ 20 mA	Voltage 0 ÷ 10 V	PWM 0 ÷ 100 %
Power supply	12 ÷ 48 Vdc/12 ÷ 48 Vac		
Protection against reverse polarity	Yes		
Absorption	50 mA		
Resolution	10 bit		
Linearity	± 0.5°		
Hysteresis	Max. 0.1°		
Zero Point setting	Through button/wire		
Signal increment direction	CW (standard) / CCW (on request)		
Connections	Terminal board		
Terminal wires	0.14 mm ² - 1.5 mm ²		
Terminal tightening torque	0.22 Nm - 0.25 Nm		

CERTIFICATIONS OF OSCAR WITH INCREASED SAFETY SYSTEM “LIMA”

Conformity to Community Directives	2014/35/UE Low Voltage Directive
	2006/42/CE Machinery Directive
Conformity to CE 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
Markings and homologations	CE  (pending)

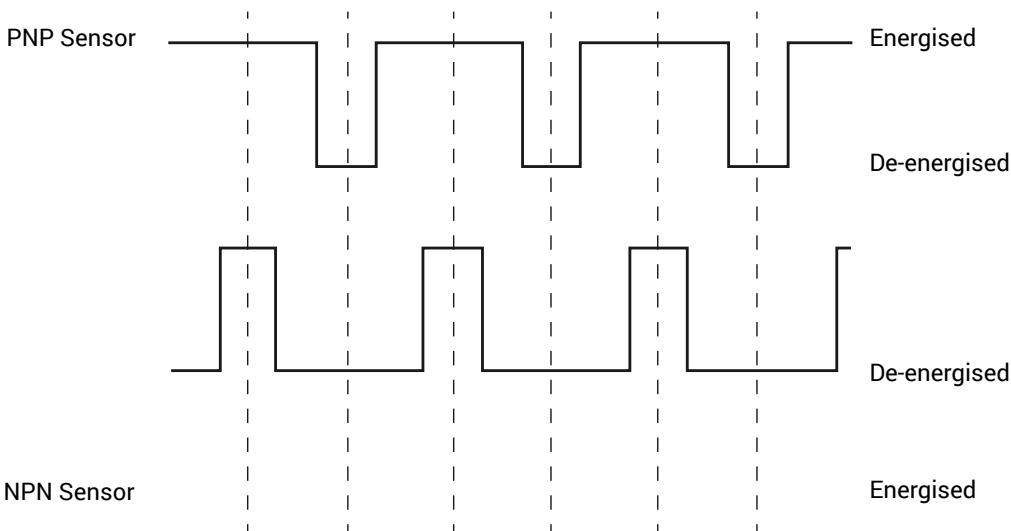
GENERAL TECHNICAL SPECIFICATIONS OF OSCAR WITH LIMA

Ambient temperature	Storage -25°C/+75°C
	Operational -25°C/+75°C
IP protection degree	IP 65 / IP 66 / IP 67 / IP 69K
	IP 65 / IP 66 / IP 67 (version with cover rise)
Insulation category	Class II
Rotation speed	Max. 800 rpm (Output 1 >1:22, Output 2 >1:22 or =1:1)
	Max. 200 rpm (Output 1 ≤1:22, Output 2 ≤1:22 or =1:1)
Cable entry	Cable gland M20 - M16 (max. 8)
Sensor connection	Self-lifting screw terminal board - 8 PIN (4 for each sensor)

OUTPUT TECHNICAL SPECIFICATIONS OF OSCAR WITH LIMA

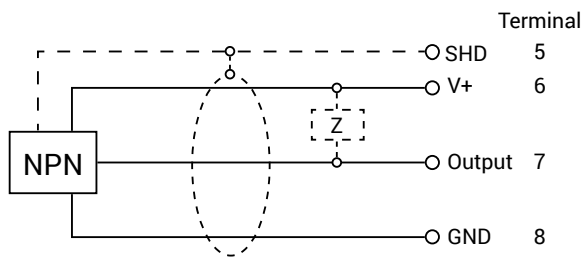
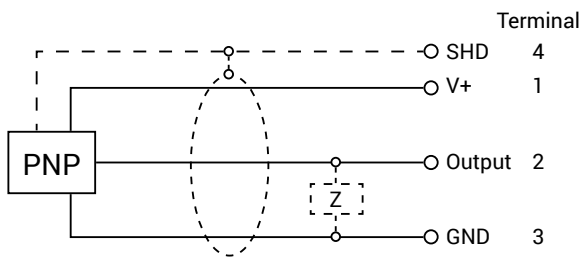
Resolution signal	5 pulses/rev.
Supply amplitude range	10-30 Vdc
Switching frequency	Max. 66.6 Hz
Current consumption (no load)	Max. 12 mA (for each sensor)
Voltage drop	< 2 Vdc
Output current	< 100 mA (for each sensor)
Short circuit protection	Yes
Reverse polarity protection	Yes
MTTF(d) PNP sensor	533 years
MTTF(d) NPN sensor	626 years

OUTPUT SIGNAL OF OSCAR WITH LIMA

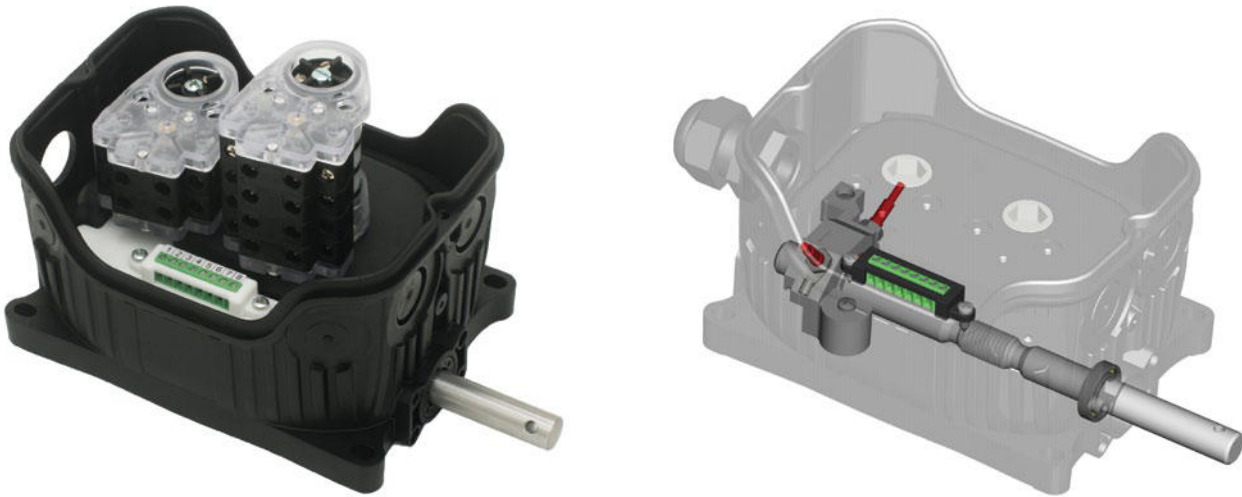


CONNECTION DIAGRAM OF LIMA

Sensor	Terminal	Function	Value
PNP	1	V+ sensor	10-30 Vdc
	2	Output sensor	PNP
	3	GND sensor	-
	4	SHD sensor	-
NPN	5	SHD sensor	-
	6	V+ sensor	10-30 Vdc
	7	Output sensor	NPN
	8	GND sensor	-



EXAMPLE OF USE OF OSCAR LIMIT SWITCH WITH INCREASED SAFETY SYSTEM "LIMA"



Oscar limit switch equipped with Lima can be used, just like standard limit switches, for material handling in construction plants (e.g. to control up/down lifting of winches), with the additional possibility to control the limit switch shaft rotation when using Lima connected to a special control unit designed to manage the following functions:

- **Load drop**

Type of function: inhibition.

Trigger event: the control system verifies that the limit switch shaft speed does not exceed the selected set point speed.

Reaction: brake prompt closure, preventing load to drop free.

Safety function: Lima generates a signal depending on the limit switch shaft speed; the control unit compares the measured speed with the selected set point value. If the measured speed exceeds the set-point value by a selected threshold, the control unit stops the motor and activates the brake.

- **Standstill shaft**

Type of function: inhibition.

Trigger event: the limit switch shaft speed is greater than 0, but no valid speed command has been entered.

Reaction: brake prompt closure.

Safety function: the control system verifies that the limit switches shaft speed is equal to 0 when a valid speed set-point is not entered.

- **Shaft in motion**

Type of function: inhibition.

Trigger event: the measured limit switch shaft speed is 0, but a valid speed command has been entered.

Reaction: brake prompt closure.

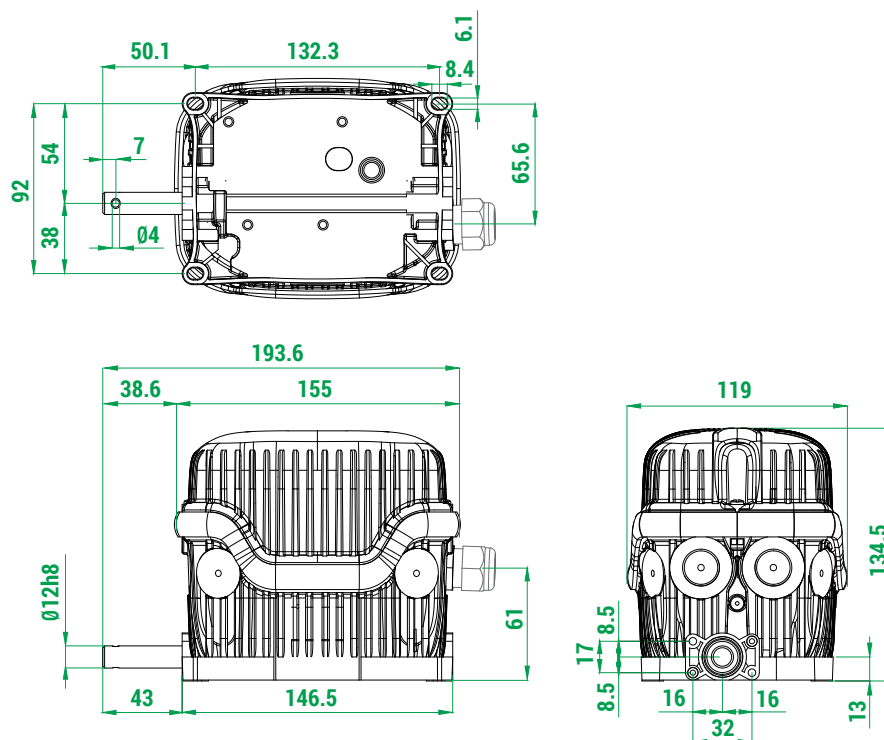
Safety function: the control system verifies that the limit switches shaft speed is greater than 0 when a valid speed set-point is entered.

This function is used to check that the limit switch shaft is coupled to the gear unit, therefore detecting any shaft or limit switch connection system break.

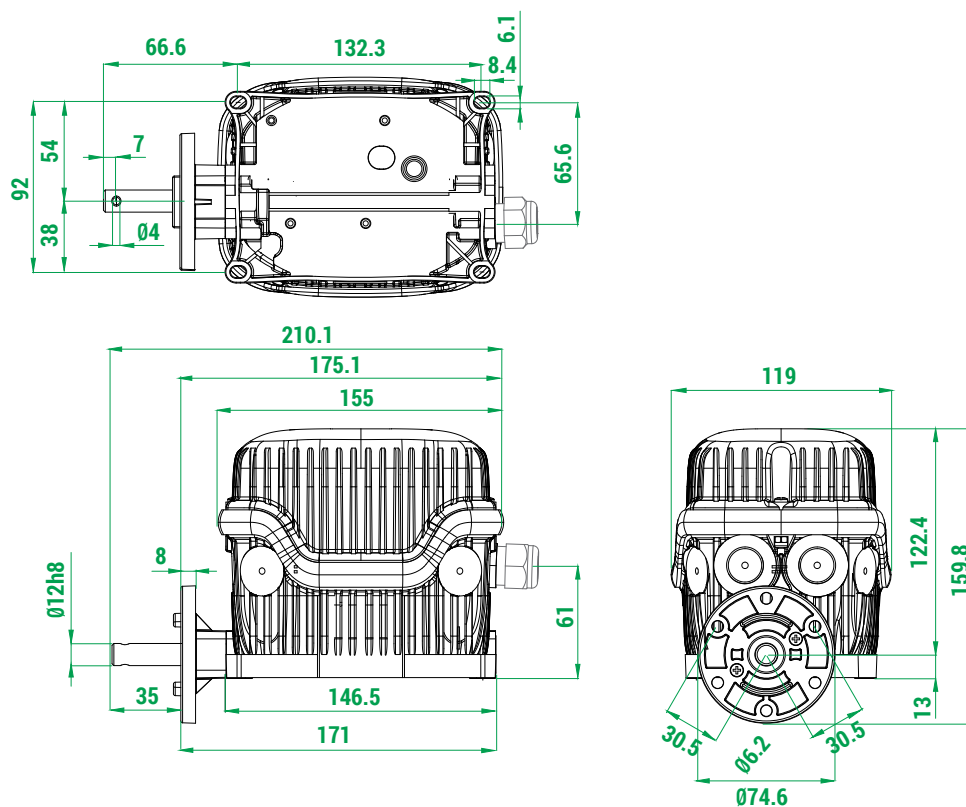
NOTE: The function of Lima is that of providing a signal depending on the limit switch shaft speed. The example above is intended to describe a possible application of the limit switch Oscar equipped with Lima.

OVERALL DIMENSIONS (mm)

Standard



With flange





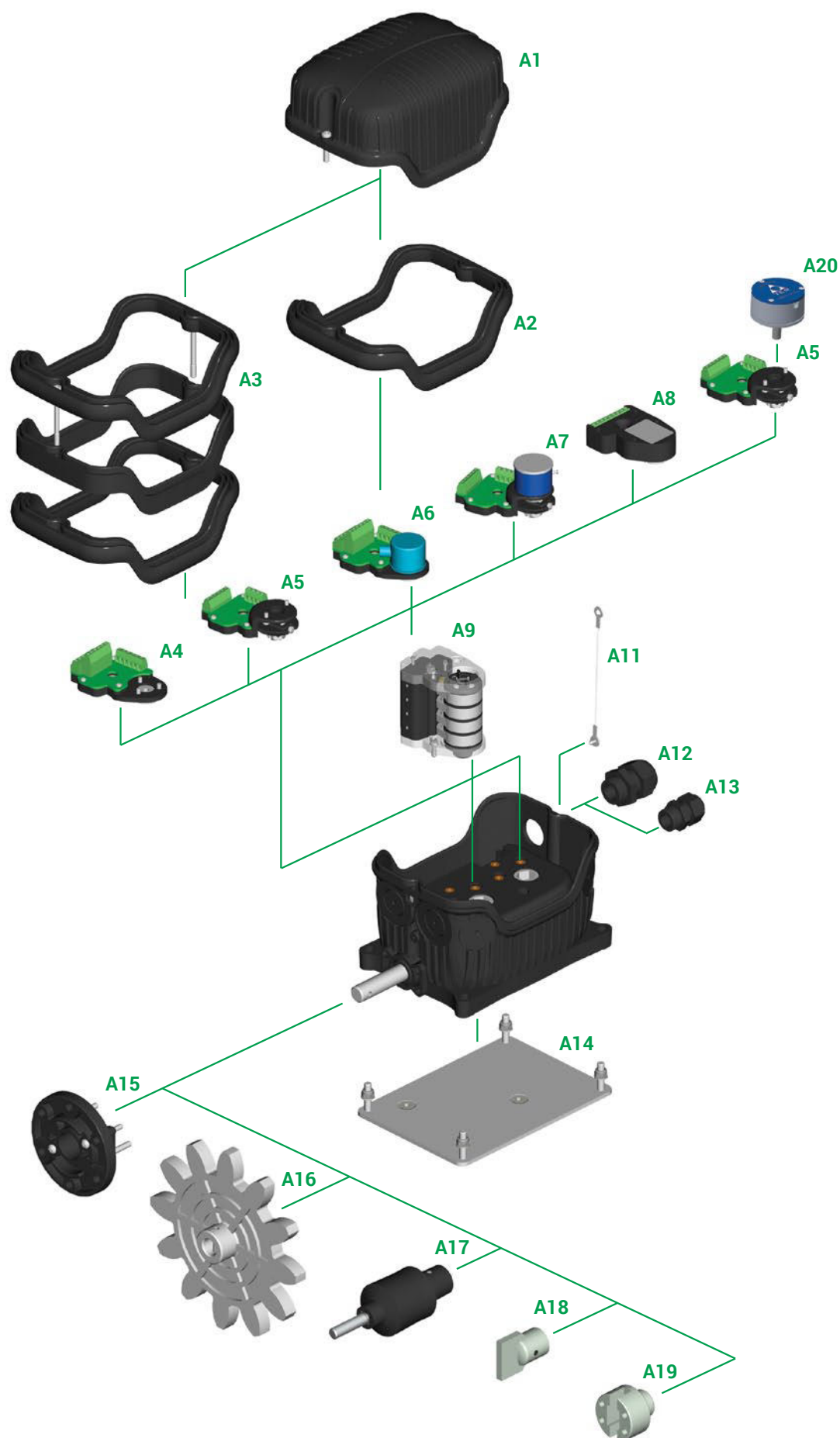
STANDARD LIMIT SWITCHES

Standard limit switches are equipped with cams PRSL7194PI  and shafts made of stainless steel AISI 430F. Standard limit switches are not cULus certified.

Output 1 rated revolution ratio	Real revolution ratio	Output 2 rated revolution ratio	No. of cams and switches	Switches	
				PRSL0110XX 1NO+1NC 	PRSL0111XX 1NC 
				Code	Code
1:1	1:1	1:1	2	PFC9067L0001007	PFC9067L0001013
		1:1	4	PFC9067L0001008	PFC9067L0001012
		1:1	4+2	PFC9067L0001010	PFC9067L0001014
		1:1	4+4	PFC9067L0001011	PFC9067L0001015
1:5	1:5.83	1:5	2	PFC9067L0005007	PFC9067L0005008
		1:1	2	PFC9067L0005009	PFC9067L0005010
		1:5	4	PFC9067L0005011	PFC9067L0005012
		1:1	4	PFC9067L0005013	PFC9067L0005014
		1:5	4+2	PFC9067L0005015	PFC9067L0005016
		1:5	4+4	PFC9067L0005017	PFC9067L0005018
1:10	1:11.66	1:10	2	PFC9067L0011002	PFC9067L0011003
		1:1	2	PFC9067L0011004	PFC9067L0011005
		1:10	4	PFC9067L0011006	PFC9067L0011007
		1:1	4	PFC9067L0011008	PFC9067L0011009
		1:10	4+2	PFC9067L0011010	PFC9067L0011011
		1:10	4+4	PFC9067L0011012	PFC9067L0011013
1:15	1:17	1:15	2	PFC9067L0017005	PFC9067L0017006
		1:1	2	PFC9067L0017007	PFC9067L0017008
		1:15	4	PFC9067L0017009	PFC9067L0017010
		1:1	4	PFC9067L0017011	PFC9067L0017012
		1:15	4+2	PFC9067L0017013	PFC9067L0017014
		1:15	4+4	PFC9067L0017015	PFC9067L0017016
1:20	1:22.15	1:20	2	PFC9067L0022018	PFC9067L0022019
		1:1	2	PFC9067L0022020	PFC9067L0022022
		1:20	4	PFC9067L0022023	PFC9067L0022024
		1:1	4	PFC9067L0022026	PFC9067L0022021
		1:20	4+2	PFC9067L0022027	PFC9067L0022028
		1:20	4+4	PFC9067L0022029	PFC9067L0022030
1:25	1:31.00	1:25	2	PFC9067L0031032	PFC9067L0031033
		1:1	2	PFC9067L0031034	PFC9067L0031035
		1:25	4	PFC9067L0031031	PFC9067L0031036
		1:1	4	PFC9067L0031037	PFC9067L0031038
		1:25	4+2	PFC9067L0031039	PFC9067L0031040
		1:25	4+4	PFC9067L0031041	PFC9067L0031042
1:50	1:62	1:50	2	PFC9067L0062004	PFC9067L0062014
		1:1	2	PFC9067L0062012	PFC9067L0062015
		1:50	4	PFC9067L0062005	PFC9067L0062016
		1:1	4	PFC9067L0062013	PFC9067L0062017
		1:50	4+2	PFC9067L0062006	PFC9067L0062021
		1:50	4+4	PFC9067L0062007	PFC9067L0062022

Output 1 rated revolution ratio	Real revolution ratio	Output 2 rated revolution ratio	No. of cams and switches	Switches	
				PRSL0110XX 1NO+1NC	PRSL0111XX 1NC
					
				Code	Code
1:70	1:73.63	1:70	2	PFC9067L0073004	PFC9067L0073009
		1:1	2	PFC9067L0073005	PFC9067L0073010
		1:70	4	PFC9067L0073003	PFC9067L0073011
		1:1	4	PFC9067L0073006	PFC9067L0073012
		1:70	4+2	PFC9067L0073007	PFC9067L0073013
		1:70	4+4	PFC9067L0073008	PFC9067L0073014
1:100	1:107	1:100	2	PFC9067L0107014	PFC9067L0107025
		1:1	2	PFC9067L0107019	PFC9067L0107026
		1:100	4	PFC9067L0107015	PFC9067L0107004
		1:1	4	PFC9067L0107020	PFC9067L0107018
		1:100	4+2	PFC9067L0107016	PFC9067L0107027
		1:100	4+4	PFC9067L0107017	PFC9067L0107028
1:150	1:156.50	1:150	2	PFC9067L0156004	PFC9067L0156011
		1:1	2	PFC9067L0156007	PFC9067L0156012
		1:150	4	PFC9067L0156005	PFC9067L0156013
		1:1	4	PFC9067L0156008	PFC9067L0156014
		1:150	4+2	PFC9067L0156006	PFC9067L0156015
		1:150	4+4	PFC9067L0156009	PFC9067L0156016
1:200	1:214.20	1:200	2	PFC9067L0214004	PFC9067L0214010
		1:1	2	PFC9067L0214006	PFC9067L0214011
		1:200	4	PFC9067L0214005	PFC9067L0214002
		1:1	4	PFC9067L0214007	PFC9067L0214012
		1:200	4+2	PFC9067L0214008	PFC9067L0214013
		1:200	4+4	PFC9067L0214009	PFC9067L0214014
1:250	1:254.30	1:250	2	PFC9067L0254004	PFC9067L0254014
		1:1	2	PFC9067L0254007	PFC9067L0254015
		1:250	4	PFC9067L0254005	PFC9067L0254016
		1:1	4	PFC9067L0254008	PFC9067L0254017
		1:250	4+2	PFC9067L0254009	PFC9067L0254018
		1:250	4+4	PFC9067L0254010	PFC9067L0254019
1:300	1:313	1:300	2	PFC9067L0313023	PFC9067L0313030
		1:1	2	PFC9067L0313025	PFC9067L0313031
		1:300	4	PFC9067L0313024	PFC9067L0313032
		1:1	4	PFC9067L0313026	PFC9067L0313033
		1:300	4+2	PFC9067L0313027	PFC9067L0313034
		1:300	4+4	PFC9067L0313028	PFC9067L0313035
1:450	1:471.20	1:450	2	PFC9067L0471002	PFC9067L0471008
		1:1	2	PFC9067L0471003	PFC9067L0471009
		1:450	4	PFC9067L0471004	PFC9067L0471001
		1:1	4	PFC9067L0471005	PFC9067L0471010
		1:450	4+2	PFC9067L0471006	PFC9067L0471011
		1:450	4+4	PFC9067L0471007	PFC9067L0471012

ASSEMBLY DRAWING



Refer to the following tables for descriptions of components: "Standard cam sets", "Potentiometers and encoders" and "Accessories".

COMPONENTS

Standard cam sets

Ref.	Drawing	No. and type of cams	No. and type of switches	Code
A9		2 cams A	2 PRSL0110XX switches	FCL20001
		2 cams A	2 PRSL0111XX switches	FCL20002
		Cams A+C	2 PRSL0110XX switches	FCL20003
		Cams A+C	2 PRSL0111XX switches	FCL20004
		2 cams C	2 PRSL0110XX switches	FCL20005
		2 cams C	2 PRSL0111XX switches	FCL20006
		Cams D+D+B+F	4 PRSL0110XX switches	FCL40001
		Cams D+D+B+F	4 PRSL0111XX switches	FCL40002
		4 cams A	4 PRSL0110XX switches	FCL40003
		4 cams A	4 PRSL0111XX switches	FCL40004
		Cams A+A+C+C	4 PRSL0110XX switches	FCL40005
		Cams A+A+C+C	4 PRSL0111XX switches	FCL40006
		4 cams C	4 PRSL0110XX switches	FCL40007
		4 cams C	4 PRSL0111XX switches	FCL40008
		Cams C+C+C+E	4 PRSL0110XX switches	FCL40009
		Cams C+C+C+E	4 PRSL0111XX switches	FCL40010
		Cams A+A+E+E	4 PRSL0110XX switches	FCL40011
		Cams A+A+E+E	4 PRSL0111XX switches	FCL40012
		5 cams A	5 PRSL0110XX switches	FCL50006
		5 cams A	5 PRSL0111XX switches	FCL50005
		5 cams C	5 PRSL0110XX switches	FCL50001
		5 cams C	5 PRSL0111XX switches	FCL50010
		6 cams A	6 PRSL0110XX switches	FCL60003
		6 cams A	6 PRSL0111XX switches	FCL60006
		6 cams C	6 PRSL0110XX switches	FCL60001
		6 cams C	6 PRSL0111XX switches	FCL60010

Other sets with 2/3/4/5 or 6 cams/switches are available on request.

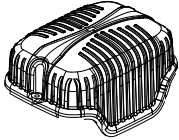
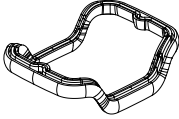
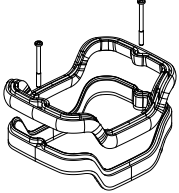
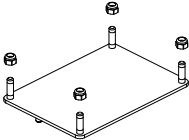
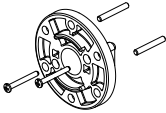
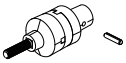
Cam reference chart

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° ±0.5°	PRSL7194PI	23.0° ±0.5°
B		10 points	PRSL7193PI	21.5° ±0.5°	PRSL7193PI	23.0° ±0.5°
C		60° sector	PRSL7195PI	82.0° ±0.5°	PRSL7195PI	86.0° ±0.5°
D		72° sector	PRSL7196PI	94.0° ±0.5°	PRSL7196PI	97.5° ±0.5°
E		180° sector	PRSL7191PI	204.5° ±0.5°	PRSL7191PI	203.0° ±0.5°
F		305° sector	PRSL7192PI	328.5° ±0.5°	PRSL7192PI	327.0° ±0.5°

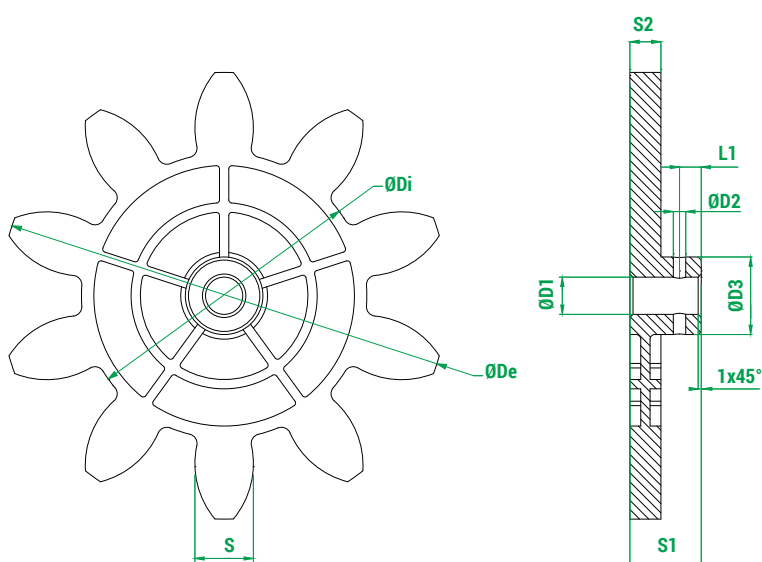
Potentiometers and encoders

Ref.	Drawing	Description	Code
A4		Support for encoder	PA030000
A5		Support for potentiometer	PA020000
A6		Encoder 36 pulses/rev. - with support	PA030001
		Encoder 150 pulses/rev. - with support	PA030002
		Potentiometer 10 kΩ - with support	PA020001
		Potentiometer 10 kΩ mechanical stop - with support	PA020002
		Potentiometer 10 kΩ ±10% 4 pins - with support	PA020003
A7		Potentiometer 10 kΩ ±10% 3 pins - with support	PA020004
		Potentiometer 5 kΩ ±10% - with support	PA020005
		Potentiometer 4.7 kΩ - with support	PA020006
		Potentiometer 10 kΩ - with support	PA020007
		Potentiometer 2.2 kΩ - with support	PA020008
		Potentiometer 2KΩ - with support	PA020009
		Absolute encoder Yankee - current output	PA01AA01 / PA02AA01
A8		Absolute encoder Yankee - voltage output	PA01AB01
		Absolute encoder Yankee - PWM output	PA01AC01
A20		Absolute encoder Egon 36-AL	F19XXXXXXX (Use the form on page 23 to generate codes)

Accessories

Ref.	Drawing	Description	Code
A1		Cover with screws	PA090016
A2		Tightening rubber	PRGU1510PE
A3		Cover rise with tightening rubber and screws	PRSL0703PI
A11		Cover holding wire + screw (bag with 10 pieces)	PRSL0358PI
A12		Cable gland M20x1.5	PRPS0063PE
A13		Cable gland M16	PRPS0062PE
A14		Fixing plate	PRSL0729PI
A15		Flange with screws and pins	PRSL0356PI
A16		Pinion gear	See pinion gear tables
A17		Coupling with pin	PRSL0981PI
A18		Male coupling with pin	PRSL0919PI
A19		Female coupling with pin	PRSL0920PI

Moulded pinion gears



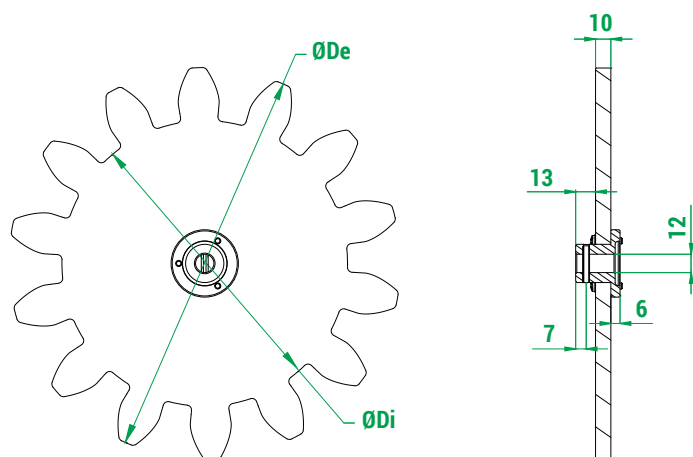
Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	S	Alpha	D1	D2	D3	S1	S2	L1
PRSL0915PI	8	20.00	160.00	200.00	113.20	20.00	23.40	31.41	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0912PI	10	12.00	120.00	144.00	92.00	12.00	14.00	18.85	20.00	12.00	4.00	25.00	23.00	10.00	7.00
PRSL0913PI	10	14.00	140.00	168.00	107.24	14.00	16.38	21.99	20.00	12.00	4.00	24.60	23.00	10.00	7.00
PRSL0914PI	10	16.00	160.00	192.00	122.67	16.00	18.67	25.13	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0917PI	11	6.00	66.00	78.00	51.96	6.00	7.02	9.42	20.00	12.00	4.00	19.00	23.00	8.00	7.00
PRSL0916PI	12	5.00	60.00	70.00	48.30	5.00	5.83	7.85	20.00	12.00	4.00	20.00	23.00	8.00	7.00
PRSL0918PI	12	8.00	96.00	112.00	77.28	8.00	9.36	12.56	20.00	12.00	4.00	21.50	23.50	10.00	7.00
PRSL0911PI	12	10.00	120.00	140.00	96.67	10.00	11.67	15.71	20.00	12.00	4.00	25.00	23.50	10.00	7.00
PRSL0944PI	12	12.00	144.00	168.00	116.00	12.00	14.00	18.85	20.00	12.00	4.00	24.00	23.00	10.00	7.00

Measuring unit: mm.

Waterjet cut pinion gears



Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	Alpha
PRSL0857PI	8	18.00	144.00	180.00	102.00	18.00	21.00	20.00
PRSL0855PI	8	24.00	192.00	240.00	136.00	24.00	28.00	20.00
PRSL0992PI	9	10.00	90.00	110.00	66.67	10.00	11.67	20.00
PRSL0879PI	9	16.00	144.00	176.00	106.67	16.00	18.67	20.00
PRSL0854PI	9	18.00	162.00	198.00	120.00	18.00	21.00	20.00
PRSL0871PI	9	20.00	180.00	220.00	133.33	20.00	23.33	20.00
PRSL0849PI	9	24.00	216.00	264.00	160.00	24.00	28.00	20.00
PRSL0846PI	10	10.00	100.00	120.00	76.67	10.00	11.67	20.00
PRSL0993PI	10	18.00	180.00	216.00	138.00	18.00	21.00	20.00
PRSL0970PI	10	22.00	220.00	264.00	168.52	22.00	25.74	20.00
PRSL0856PI	10	24.00	240.00	288.00	184.00	24.00	28.00	20.00
PRSL0861PI	11	12.00	132.00	156.00	104.00	12.00	14.00	20.00
PRSL0998PI	11	18.00	198.00	234.00	156.00	18.00	21.00	20.00
PRSL0997PI	11	20.00	220.00	260.00	173.36	20.00	23.32	20.00
PRSL0859PI	11	24.00	264.00	312.00	204.00	24.00	30.00	20.00
PRSL0863PI	12	14.00	168.00	196.00	133.00	14.00	17.50	20.00
PRSL0897PI	12	16.00	192.00	224.00	154.67	16.00	18.67	20.00
PRSL0972PI	12	18.00	216.00	252.00	173.88	18.00	21.06	20.00
PRSL0845PI	12	20.00	240.00	280.00	193.34	20.00	23.32	20.00
PRSL0878PI	12	24.00	288.00	336.00	232.00	24.00	28.00	20.00
PRSL0860PI	13	6.00	78.00	90.00	63.00	6.00	7.50	20.00
PRSL0853PI	13	12.00	156.00	178.59	126.00	11.29	15.00	20.00
PRSL0898PI	13	16.00	208.00	240.00	170.67	16.00	18.66	20.00
PRSL0862PI	14	10.00	140.00	169.00	125.00	15.00	7.50	20.00
PRSL0896PI	14	16.00	224.00	256.00	186.67	16.00	18.67	20.00
PRSL0999PI	14	18.00	252.00	288.00	210.00	18.00	21.00	20.00
PRSL0848PI	14	20.00	280.00	320.00	233.33	20.00	23.33	20.00
PRSL0858PI	15	18.00	270.00	306.00	228.00	18.00	21.00	20.00
PRSL0847PI	16	20.00	320.00	360.00	273.33	20.00	23.33	20.00
PRSL0973PI	17	10.00	170.00	190.00	145.00	10.00	12.50	22.89
PRSL0974PI	17	14.00	238.00	266.00	203.00	14.00	17.50	22.89
PRSL0851PI	20	6.00	120.00	132.00	105.00	6.00	7.50	22.89

Measuring unit: mm.

OSCAR - REQUEST FORM FOR NON STANDARD LIMIT SWITCH

Instructions

(See next pages for list of components and legends)

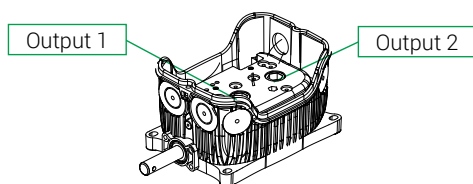
- 1 Version:** tick the required version.
- 2 Lima:** tick the box if you require Lima system.
- 3 Revolution ratio:** write the required revolution ratio for each output.
- 4 Standard cam sets:** write the code of the cam set required for each output, according to the legend.
- 5 Customized cam sets:** for non standard cam sets, fill in the scheme choosing the cams and the switches required, according to the legend. It is possible to assemble sets with 2, 3, 4, 5 or 6 cams/switches.
Customized cams are available on request.
- 6 Potentiometers, encoders, Egon 36-AL, Yankee:** write the code of the potentiometer, encoder, Egon 36-AL or Yankee required, according to the legend.
ATTENTION: potentiometer PA020009 can be mounted only alone, i.e. with no sets of cams/switches.
Please refer to the table on the next pages for all other possible configurations.
To generate Egon 36-AL codes, use the form on the next pages.
- 7 Coupling, flange, pinion gear:** tick the appropriate box when coupling, flange or pinion gear are required.
When a standard pinion gear is required, write the code number listed in the pinion gear tables in the catalogue.
When a special pinion gear is required, write the number of teeth, the module and the primitive diameter.
- 8 Shaft:** tick the type of shaft required. Limit switches with Lima are available only with shafts made of high resistance stainless steel AISI 303
- Customized shafts are available on request.
- 9 Cable glands:** tick type and position of the cable glands (max. 8).

Version 1

- ☐ Version 
- ☐ Version  
- ☐ Version with anti-moisture plug 

ATTENTION: Limit switches with Lima are only CE marked.
ATTENTION: Limit switches with shafts made of stainless steel AISI 430F are not cULus certified.

Lima 2



Revolution ratio 3

- | | |
|---|---|
| Output 1 | Output 2 |
| ☐ 1:1 ☐ 1:25 ☐ 1:200 | ☐ 1:1 |
| ☐ 1:5 ☐ 1:50 ☐ 1:250 | ☐ Revolution ratio equal to output 1 |
| ☐ 1:10 ☐ 1:70 ☐ 1:300 | |
| ☐ 1:15 ☐ 1:100 ☐ 1:450 | |
| ☐ 1:20 ☐ 1:150 ☐ 1: <input type="text"/> | |

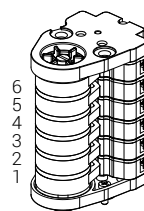
Standard cam sets 4

Cam set code _____

Output 1 _____

Output 2 _____

Customized cam sets 5



Output 1	Cam code	Switch code
6	_____	_____
5	_____	_____
4	_____	_____
3	_____	_____
2	_____	_____
1	_____	_____
Output 2	Cam code	Switch code
6	_____	_____
5	_____	_____
4	_____	_____
3	_____	_____
2	_____	_____
1	_____	_____

Potentiometers, encoders, Egon 36-AL, Yankee 6

Output 1 Output 2

Code _____

- | | |
|--|-------------------------------------|
| ☐ Male coupling | ☐ Coupling 7 |
| ☐ Female coupling | ☐ Flange |
| ☐ Pinion gear | |

Pinion gear code _____

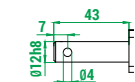
Customized pinion gear

No. of teeth _____

Module _____

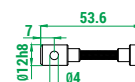
Primitive diameter _____

Standard shaft 8



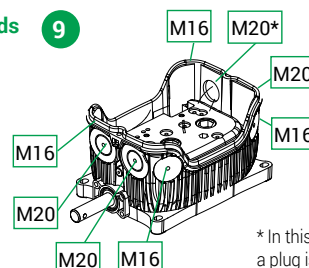
- ☐ Stainless steel AISI 430F shaft
- ☐ High resistance stainless steel AISI 303 shaft

Flexible shaft



- ☐ Stainless steel AISI 430F shaft
- ☐ High resistance stainless steel AISI 303 shaft

Cable glands 9



* In this position an M20 cable gland or a plug is mandatory.

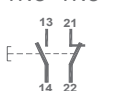
4 Legend - Standard cam sets

No. & type of switches	No. & type of cams	Code
2 x PRSL0110XX	2 cams A	FCL20001
	Cams A+C	FCL20003
	2 cams C	FCL20005
4 x PRSL0110XX	Cams D+D+B+F	FCL40001
	4 cams A	FCL40003
	Cams A+A+C+C	FCL40005
	4 cams C	FCL40007
	Cams C+C+C+E	FCL40009
	Cams A+A+E+E	FCL40011
5 x PRSL0110XX	5 camme A	FCL50006
	5 camme C	FCL50001
6 x PRSL0110XX	6 camme A	FCL60003
	6 camme C	FCL60001
2 x PRSL0111XX	2 cams A	FCL20002
	Cams A+C	FCL20004
	2 cams C	FCL20006
4 x PRSL0111XX	Cams D+D+B+F	FCL40002
	4 cams A	FCL40004
	Cams A+A+C+C	FCL40006
	4 cams C	FCL40008
	Cams C+C+C+E	FCL40010
	Cams A+A+E+E	FCL40012
5 x PRSL0111XX	5 camme A	FCL50005
	5 camme C	FCL50010
6x PRSL0111XX	6 camme A	FCL60006
	6 camme C	FCL60010

6 Legend - Potentiometers, encoders and Yankee

Description	Code
Potentiometer 10 k Ω - with support	PA020001
Potentiometer 10 k Ω mechanical stop - with support	PA020002
Potentiometer 10 k Ω $\pm$ 10% 4 pins - with support	PA020003
Potentiometer 10 k Ω $\pm$ 10% 3 pins - with support	PA020004
Potentiometer 5 k Ω $\pm$ 10% - with support	PA020005
Potentiometer 4.7 k Ω - with support	PA020006
Potentiometer 10 k Ω - with support	PA020007
Potentiometer 2.2 k Ω - with support	PA020008
Potentiometer 2K Ω - with support	PA020009
Encoder 36 pulses/rev. - with support	PA030001
Encoder 150 pulses/rev. - with support	PA030002
Yankee - current output	PA01AA01 / PA02AA01
Yankee - voltage output	PA01AB01
Yankee - PWM output	PA01AC01

5 Legend - Switches

PRSL0110XX	PRSL0111XX
1NO+1NC	1NC
	

5 Legend - Cams

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° $\pm$ 0.5°	PRSL7194PI	23.0° $\pm$ 0.5°
B		10 points	PRSL7193PI	21.5° $\pm$ 0.5°	PRSL7193PI	23.0° $\pm$ 0.5°
C		60° sector	PRSL7195PI	82.0° $\pm$ 0.5°	PRSL7195PI	86.0° $\pm$ 0.5°
D		72° sector	PRSL7196PI	94.0° $\pm$ 0.5°	PRSL7196PI	97.5° $\pm$ 0.5°
E		180° sector	PRSL7191PI	204.5° $\pm$ 0.5°	PRSL7191PI	203.0° $\pm$ 0.5°
F		305° sector	PRSL7192PI	328.5° $\pm$ 0.5°	PRSL7192PI	327.0° $\pm$ 0.5°

6 Configuration table

The following table shows possible configurations of Oscar and Oscar XL.

When it is not possible to mount a set of cams together with a potentiometer/encoder, the table shows «Not available».

When the standard cover PA090008 is not high enough to hold the elements mounted inside the limit switch, it is possible to use the cover rise PRSL0703PI (the table shows «Oscar XL»).

In all other cases it is possible to mount the sets of cams and potentiometer/encoder with the standard cover PA090008 (the table shows «Oscar»).

	Set of cams with 2 switches	Set of cams with 3 switches	Set of cams with 4 switches	Set of cams with 5 switches	Set of cams with 6 switches
Set of cams only	Oscar	Oscar	Oscar	Oscar	Oscar XL
Set of cams + Egon 36-AL	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + Yankee	Oscar	Oscar	Oscar	Oscar XL	Oscar XL
Set of cams + PA020001	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + PA020002	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + PA020003	Oscar	Oscar	Oscar XL	Oscar XL	Not available
Set of cams + PA020004	Oscar	Oscar	Oscar XL	Oscar XL	Not available
Set of cams + PA020005	Oscar	Oscar	Oscar XL	Oscar XL	Not available
Set of cams + PA020006	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + PA020007	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + PA020008	Oscar	Oscar XL	Oscar XL	Not available	Not available
Set of cams + PA030001	Oscar	Oscar	Oscar XL	Oscar XL	Not available
Set of cams + PA030002	Oscar	Oscar	Oscar XL	Oscar XL	Not available

6 Configuration form for Egon 36-AL

To generate the encoder code, fill in the boxes with the characters corresponding to the specifications required, as shown in the example. Enter the code in the space provided at point 6 (Potentiometers, encoders, Egon 36-AL, Yankee) of the «Request form for non standard limit switch».

F19 R A 1 1 0 X X X

F19 [] A [] [] 0 X X X

S = normal
R = redundant

A = analog

Output 1
1 = 4...20 mA
2 = 1...5 V
3 = 2...10 V

Output 2
(only for EGON 36-AL redundant version)*
1 = 4...20 mA
2 = 1...5 V
3 = 2...10 V

* Fill in "0" for Egon36-AL normal version.
ATTENTION: if required, Output 2 must be the same as Output 1.

Characters for sequential numbers

This image shows a single sheet of white paper with horizontal green ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

TOP

Rotary limit switch



Rotary limit switch used to control and measure the movement of industrial machines or the position of the nacelle or pitch angle of wind turbines. Salt mist resistant and rich in options, Top is designed to meet the most demanding requirements.

FEATURES

- It consists of a gear motor that transfers movement to the cams and to the other movement detection devices through a primary input reduction stage (worm gear and helical toothed gear) and one or more secondary output stages (pairs of straight toothed gears).
- Accurate adjustment of cams by means of screws.
- Positive opening NC contacts for safety functions.
- Mechanical life of switches: up to 10 million operations.
- IP protection degree: Top is classified IP 65 / IP 66 / IP 67 / IP 69K.
- NEMA protection degree: Top is classified Type 4X (cULus marked versions).
- Extreme temperature resistance: -40°C to +80°C.
- Salt mist resistant.
- It features base and cover made of electrostatic varnished die-cast aluminum, transmission and gear driving shafts made of stainless steel AISI 303, worm gear transmission shaft rotating on ball bearings, self-lubricating technopolymer gears and driving bushes.
- All materials and components used are wear resistant and guarantee protection of the unit against water and dust.

OPTIONS

- Revolution ratios from 1:1 to 1:8100, achieved by combining different secondary output stages.
- Each of the three outputs can be set to a different revolution ratio to enable diversified control of the machine when special requirements need to be met.
- Snap action switches with 1NO+1NC contacts or slow action switches with 1 NC contact.
- It can be equipped with 3 cam sets (with up to 15 switches), potentiometers and encoders (alone or on top of cam sets

- with up to 2 switches), Egon 36-AL absolute encoders (alone or on top of cam sets with up to 2 switches) and Yankee absolute encoders (on top of cam sets with up to 4 switches).
- Available with cover rise for XL version with 3 cam sets (with up to 18 switches), potentiometers and encoders (alone or on top of cam sets with up to 5 switches), Egon 36-AL absolute encoders (alone or on top of cam sets with up to 4 switches) and Yankee absolute encoders (on top of cam sets with up to 6 switches).
- Dedicated cable glands or connectors.
- Available with anti-moisture plug fitted to the base by means of a lock nut, improving transpiration while maintaining protection against water.
- Available with flanges, pinion gears and couplings.
- Plates with universal adapters to replace existing systems.

SPEED CONTROL SYSTEM

- Top can be equipped with a "Speed Control System", a speed detection system with 4 different relays (3 manually programmable for speed threshold settings, 1 used for self-diagnosis).

CERTIFICATIONS

- CE marking and cULus* marking.
- Top is available, upon request, with the SIL1* certification (Safety Integrity Level 1), according to Standard IEC 61508.
- Complying with accident prevention regulation BGV C 1 (only for Germany).

Use the online configurator (<https://configuratore.terworld.com>) or fill in the "request form" for accurate product configuration.

* Not available on all versions.

POSSIBLE ASSEMBLIES

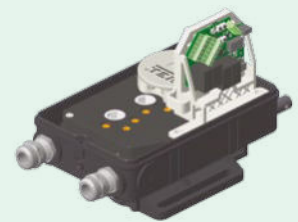
Top XL with cover rise



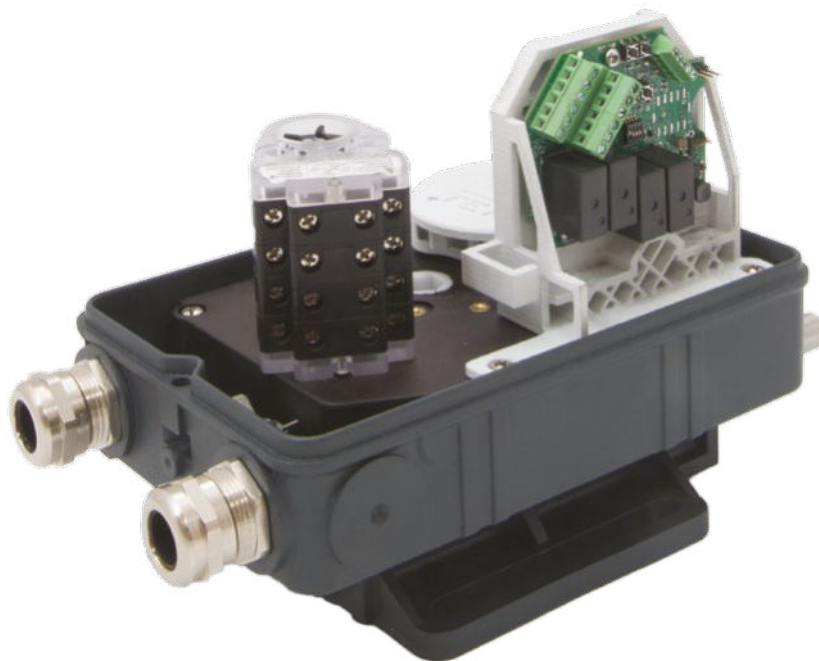
With anti-moisture plug



With "Speed Control System"



TOP WITH "SPEED CONTROL SYSTEM"



The limit switch with Speed Control System is used to monitor the speed of the motor shaft or rotary movements and it consists of an absolute magnetic encoder and of an electronic board that processes the analogue input coming from the encoder.

The system is able to detect when the speed threshold is exceeded, both in the acceleration phase (overspeed) and in the deceleration phase (underspeed). Each of the 3 dedicated relays can be associated with a pair of speed values that delimit the range within which the monitoring system will not activate any protection by keeping the relevant contact closed.

If the rotation speed, at any time, is higher than the maximum threshold or lower than the minimum threshold set for a given relay, the latter will be opened and kept in this state until the protection reset procedure is performed.

The system is configured by means of 4 function keys located on the electronic board and a dedicated procedure.

CERTIFICATIONS

Conformity to Community Directives	2014/35/UE Low Voltage Directive
	2006/42/CE Machinery Directive
	2014/30/UE Electromagnetic Compatibility (EMC) Directive (only for Top with "Speed Control System")
Conformity to CE 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
	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements - General requirements (only for Top with "Speed Control System")
Conformity to cULus Standards	EN 61326-2-3 Electrical equipment for measurement, control and laboratory use - EMC requirements - Particular requirements - Test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning (only for Top with "Speed Control System")
	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
SIL1*	IEC 61508:2010 Part 2-4-6-7 Functional safety of electrical/electronic/programmable electronic safety-related systems
BGV C 1	Regulations for the prevention of accidents BGV C 1 (only for Germany)
Markings and homologations	CE cULus*

GENERAL TECHNICAL SPECIFICATIONS

Ambient temperature	Storage -40°C/+85°C**
	Operational -40°C/+85°C**
IP protection degree	IP 65 / IP 66 / IP 67 / IP 69K
NEMA protection degree	Type 4X (cULus versions)
Insulation category	Class I
Rotation speed	Max. 800 rpm
Cable entry	Cable gland M20
Shafts	Stainless steel AISI 303

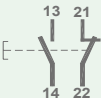
TOP WITH "SPEED CONTROL SYSTEM" - ELECTRICAL SPECIFICATIONS

Power supply	24 Vdc ±15%
	48 Vdc ±15%
Consumption	80 mA max
Resolution	12 bit (4096 points), for internal process use
Accuracy	± 0.5%
Linearity	± 0.25%
Reverse polarity and short-circuit protection	Yes
Relays	4 configurable relays 24/250 Vac, 3/5 A, NC or NO
Speed	Min. 4 rpm - Max. 200 rpm

* Not available on all versions.

** Sets of cams/switches with components suitable for temperature up to +100°C are available on request. Attention: sets with 6 cams/switches always use components suitable for temperatures -40°C / +100°C.

TECHNICAL SPECIFICATIONS OF THE SWITCHES

Code	PRSL0110XX	PRSL0111XX
Utilisation category	AC 15	
Rated operational voltage	250 Vac	
Rated operational current	3 A	
Rated thermal current	10 A	
Rated insulation voltage	300 Vac	
Mechanical life	10x10 ⁶ operations	
Connections	Screw-type terminals	
Wires	1x2.5 mm ² , 2x1.5 mm ² (UL (c)UL: use 60°C or 75°C copper (CU) conductors and stiff or flexible wire 14-22 AWG)	
Tightening torque	0.5 Nm	
Switch type	Double break, snap action	Double break, slow action
Contacts	1NO+1NC (All NC contacts are of the positive opening operation type )	1NC (All NC contacts are of the positive opening operation type )
Scheme		
Markings and homologations	CE 	

Switches PRSL0100XX available on request.

TECHNICAL SPECIFICATIONS OF THE POTENTIOMETERS

Code of potentiometer with support	PA020001	PA020002
Ohmic value	10 kΩ	10 kΩ mechanical stop
Resolution	Infinite	
Independant linearity	±1%	
Life time	10x10 ⁶ movements	
Power rating	Max. 1 W	
Operational ambient temperature	-55°C/+105°C	
Continuos rotation (without stop)	360°	
Continuos rotation (with stop)	333° ±5°	
Actual electrical angle	310° ±5°	
Ohmic value tolerance	±20%	

Code of potentiometer with support	PA020003	PA020004	PA020005
Ohmic value	10 kΩ	10 kΩ	5 kΩ
Connections	4 turrets	3 turrets	4 turrets
Independent linearity (ref. AEA -3°)	≤±1%	≤±0.35%	≤±1%
Power rating	Max. 0.3 W		
Life time	5x10 ⁶ 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 of potentiometer with support	PA020006	PA020007	PA020008
Ohmic value	4,7 kΩ	10 kΩ	2.2 kΩ
Independant linearity (ref. AEA -3°)	±0.25%		
Power rating	Max. 4 W		
Life time	3x10 ⁶ movements		
Operational ambient temperature	-55°C/+125°C		
Mechanical angle	360° continuous		
Actual Electrical Angle (AEA)	355°±5°		
Ohmic value tolerance	±5%		
Temperature drift	< 50 PPM/°C		

Code of potentiometer with support	PA020009
Ohmic value	2 kΩ
Resolution	Better than 0.008°
Linearity	±0.075%
Independant linearity	±0.075%
Power rating	Max. 0.4 W
Life time	100x10 ⁶ 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 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	Protection against reverse polarity and output short-circuit	

CERTIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Conformity to Community Directives	2014/35/UE Low Voltage Directive (LVD)
	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
Conformity to CE Standards	EN 60204-1 Safety of machinery - Electrical equipment of machines
	EN 60529 Degrees of protection provided by enclosures
	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements - General requirements
	EN 61326-2-3 Electrical equipment for measurement, control and laboratory use - EMC requirements - Particular requirements - Test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning
Markings and homologations	EN 61326-3-1 Electrical equipment for measurement, control and laboratory use - EMC requirements – Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications
	CE

GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Ambient temperature	Storage -25°C/+85°C
	Operational -25°C/+85°C
IP protection degree	IP 42
Shaft diameter	6 mm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER EGON 36-AL

Power supply	12...30 Vdc
	Current 4...20 mA
Analogue output	Voltage 1...5 V
	Voltage 2...10 V
Consumption	35 mA simple version
	55 mA redundant version
Single-turn resolution	12 bit (4096 points for revolution)
Protection against input/output over-current	Yes
Protection against input/output over-voltage	Yes
Accuracy	± 0.5%
Linearity	± 0.25%
Redundancy	2 complementary outputs (analogue)

CERTIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

Conformity to Community Directives	2014/30/UE Electromagnetic Compatibility (EMC) Directive
	2006/42/CE Machinery Directive
	2014/35/UE Low Voltage Directive (LVD)
Conformity to CE Standards	EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements
	EN 60529 Degrees of protection provided by enclosures
Conformity to cULus Standards	CSA-C22.2 No 14-13 Industrial Control Equipment
	UL 508 Industrial Control Equipment
Markings and homologations	CE 

GENERAL TECHNICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

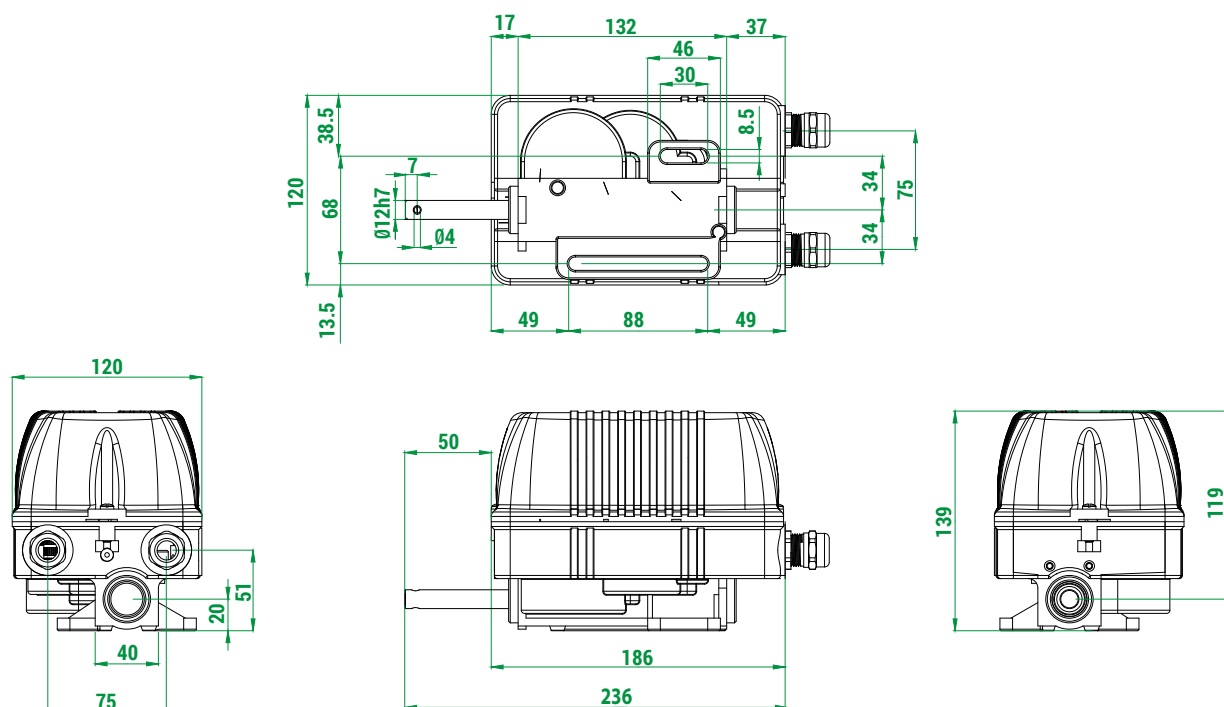
Ambient temperature	Storage -40°C/+80°C
	Operational -40°C/+80°C
IP protection degree	IP 20
Free rotation	360°
Rotation speed	Max. 800 rpm

ELECTRICAL SPECIFICATIONS OF THE ABSOLUTE ENCODER YANKEE

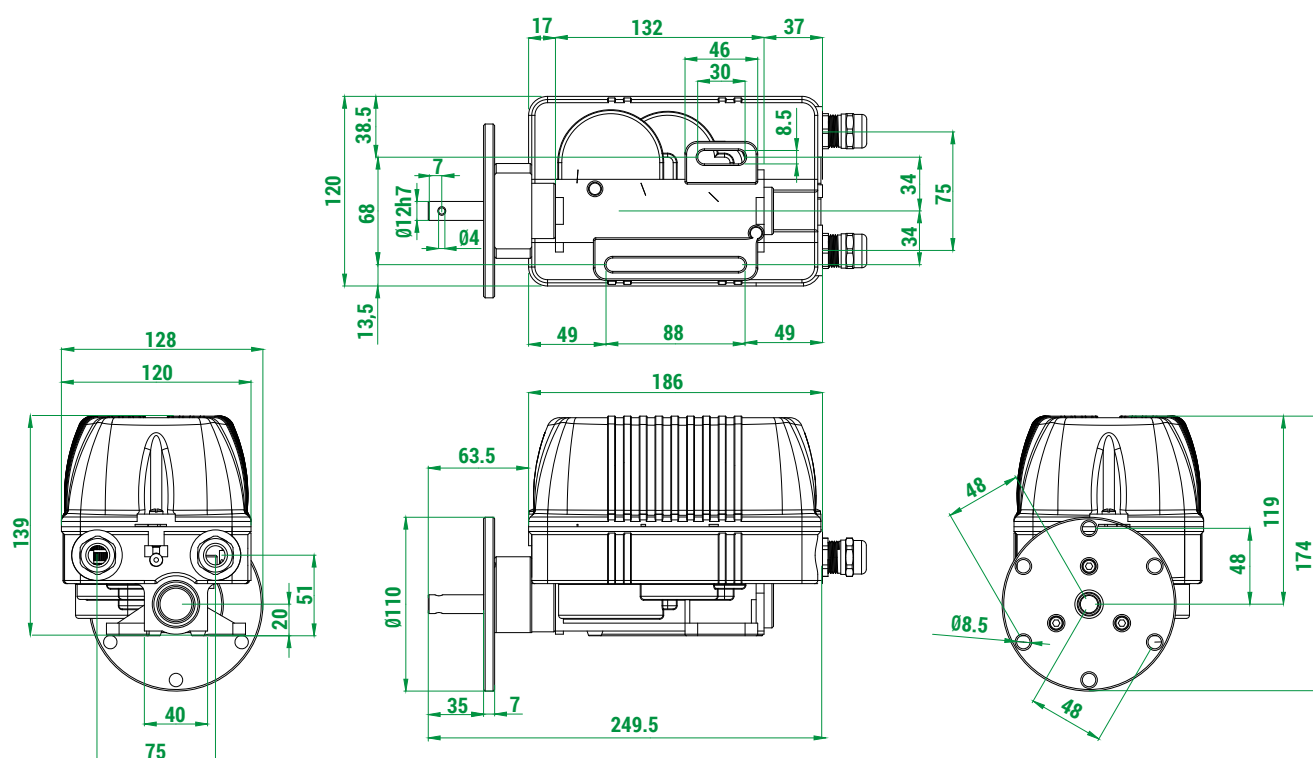
Code	PA01AA01 / PA02AA01	PA01AB01	PA01AC01
Output	Current 4 ÷ 20 mA	Voltage 0 ÷ 10 V	PWM 0 ÷ 100 %
Power supply	12 ÷ 48 Vdc/12 ÷ 48 Vac		
Protection against reverse polarity	Yes		
Absorption	50 mA		
Resolution	10 bit		
Linearity	± 0.5°		
Hysteresis	Max. 0.1°		
Zero Point setting	Through button/wire		
Signal increment direction	CW (standard) / CCW (on request)		
Connections	Terminal board		
Terminal wires	0.14 mm ² - 1.5 mm ²		
Terminal tightening torque	0.22 Nm - 0.25 Nm		

OVERALL DIMENSIONS (mm)

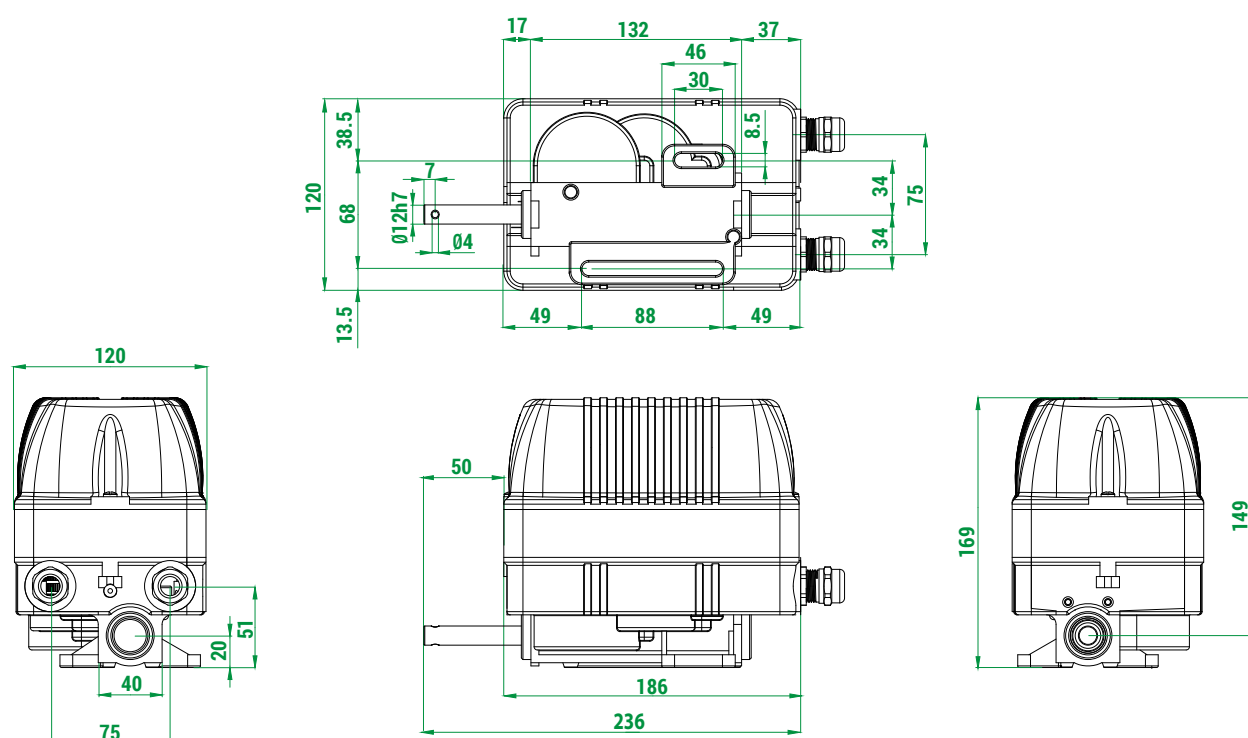
Standard



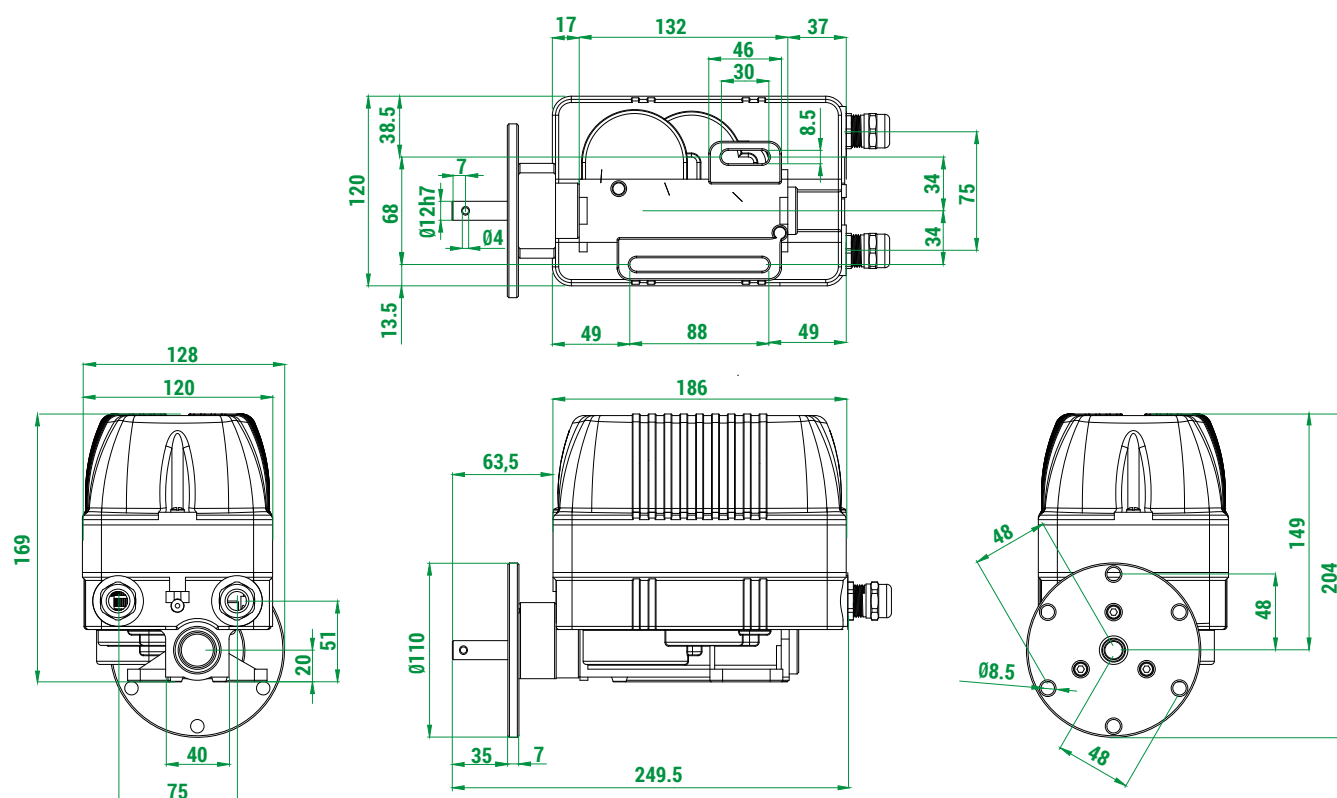
With flange



Top XL with cover rise and Top with “Speed Control System”



Top XL with cover rise and flange, Top with “Speed Control System” and flange



STANDARD LIMIT SWITCHES

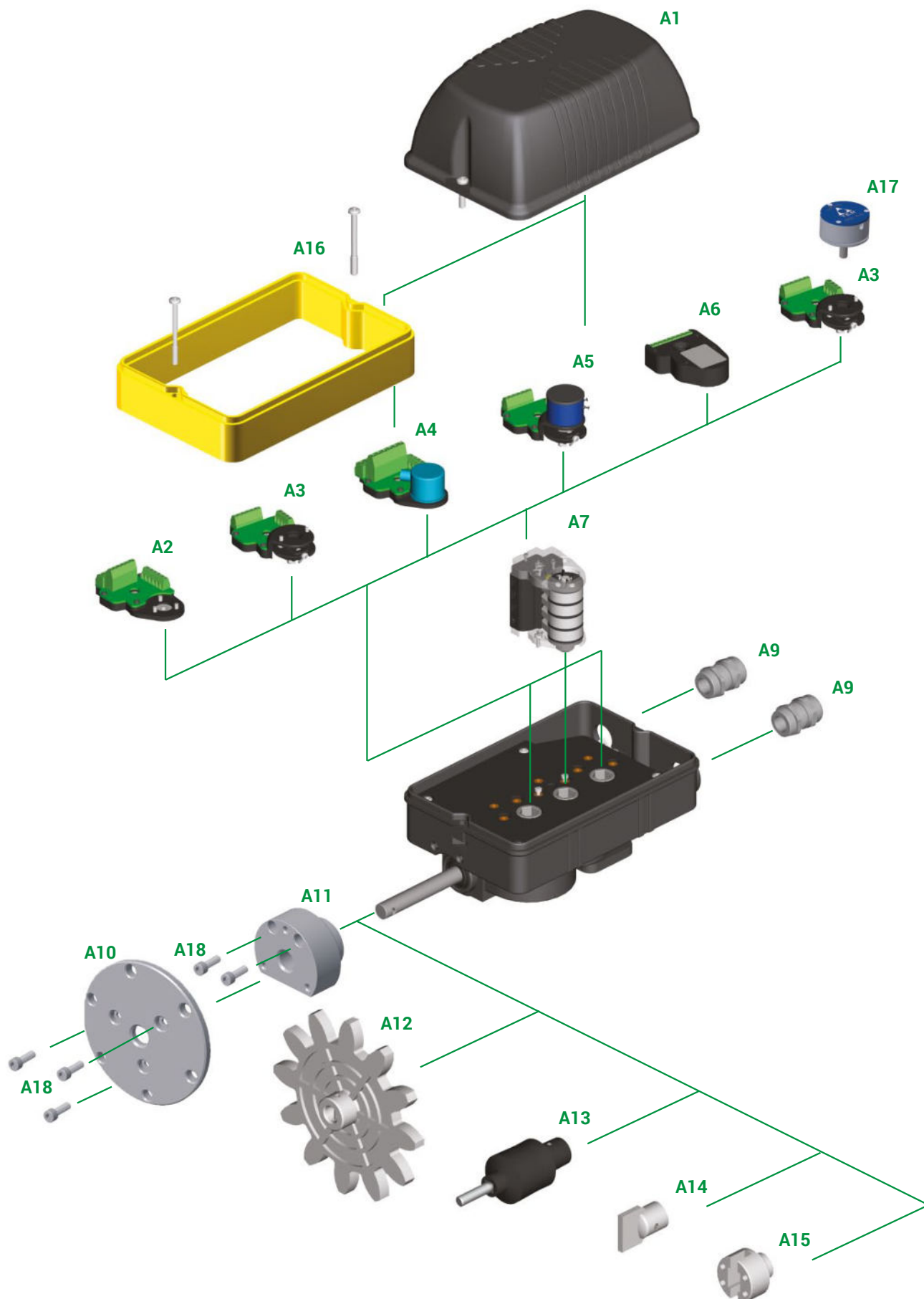
Standard limit switches are equipped with cams PRSL7194PI .

Standard limit switches are not cULus certified.

Rated revolution ratio	Real revolution ratio	No. of cams and switches	Switches	
			PRSL0110XX 1NO+1NC	PRSL0111XX 1NC
			 Code	 Code
1:1	1:1	2	PFD9067L0001002	PFD9067L0001008
		4	PFD9067L0001003	PFD9067L0001009
		4+2	PFD9067L0001004	PFD9067L0001010
		4+4	PFD9067L0001005	PFD9067L0001011
		4+4+2	PFD9067L0001006	PFD9067L0001012
		4+4+4	PFD9067L0001007	PFD9067L0001013
1:5	1:5	2	PFD9067L0005004	PFD9067L0005008
		4	PFD9067L0005005	PFD9067L0005009
		4+2	PFD9067L0005006	PFD9067L0005010
		4+4	PFD9067L0005002	PFD9067L0005011
		4+4+2	PFD9067L0005007	PFD9067L0005012
		4+4+4	PFD9067L0005003	PFD9067L0005013
1:10	1:10	2	PFD9067L0010008	PFD9067L0010012
		4	PFD9067L0010005	PFD9067L0010013
		4+2	PFD9067L0010004	PFD9067L0010014
		4+4	PFD9067L0010009	PFD9067L0010015
		4+4+2	PFD9067L0010010	PFD9067L0010016
		4+4+4	PFD9067L0010011	PFD9067L0010017
1:15	1:15.92	2	PFD9067L0015003	PFD9067L0015009
		4	PFD9067L0015004	PFD9067L0015010
		4+2	PFD9067L0015005	PFD9067L0015011
		4+4	PFD9067L0015006	PFD9067L0015012
		4+4+2	PFD9067L0015007	PFD9067L0015013
		4+4+4	PFD9067L0015008	PFD9067L0015014
1:20	1:20	2	PFD9067L0020006	PFD9067L0020009
		4	PFD9067L0020002	PFD9067L0020010
		4+2	PFD9067L0020003	PFD9067L0020011
		4+4	PFD9067L0020007	PFD9067L0020012
		4+4+2	PFD9067L0020004	PFD9067L0020013
		4+4+4	PFD9067L0020008	PFD9067L0020014
1:25	1:25	2	PFD9067L0025009	PFD9067L0025012
		4	PFD9067L0025004	PFD9067L0025013
		4+2	PFD9067L0025005	PFD9067L0025014
		4+4	PFD9067L0025010	PFD9067L0025015
		4+4+2	PFD9067L0025006	PFD9067L0025016
		4+4+4	PFD9067L0025011	PFD9067L0025017
1:50	1:50	2	PFD9067L0050009	PFD9067L0050013
		4	PFD9067L0050010	PFD9067L0050016
		4+2	PFD9067L0050011	PFD9067L0050017
		4+4	PFD9067L0050012	PFD9067L0050018
		4+4+2	PFD9067L0050014	PFD9067L0050019
		4+4+4	PFD9067L0050015	PFD9067L0050020

Rated revolution ratio	Real revolution ratio	No. of cams and switches	Switches	
			PRSL0110XX 1NO+1NC	PRSL0111XX 1NC
				
			Code	Code
1:75	1:75	2	PFD9067L0075002	PFD9067L0075009
		4	PFD9067L0075004	PFD9067L0075003
		4+2	PFD9067L0075005	PFD9067L0075010
		4+4	PFD9067L0075006	PFD9067L0075011
		4+4+2	PFD9067L0075007	PFD9067L0075012
		4+4+4	PFD9067L0075008	PFD9067L0075013
1:100	1:100	2	PFD9067L0100013	PFD9067L0100020
		4	PFD9067L0100015	PFD9067L0100021
		4+2	PFD9067L0100016	PFD9067L0100022
		4+4	PFD9067L0100017	PFD9067L0100023
		4+4+2	PFD9067L0100018	PFD9067L0100024
		4+4+4	PFD9067L0100019	PFD9067L0100025
1:150	1:150	2	PFD9067L0150007	PFD9067L0150012
		4	PFD9067L0150005	PFD9067L0150013
		4+2	PFD9067L0150008	PFD9067L0150014
		4+4	PFD9067L0150009	PFD9067L0150015
		4+4+2	PFD9067L0150010	PFD9067L0150016
		4+4+4	PFD9067L0150011	PFD9067L0150017
1:200	1:200	2	PFD9067L0200004	PFD9067L0200009
		4	PFD9067L0200005	PFD9067L0200010
		4+2	PFD9067L0200006	PFD9067L0200011
		4+4	PFD9067L0200002	PFD9067L0200012
		4+4+2	PFD9067L0200007	PFD9067L0200013
		4+4+4	PFD9067L0200008	PFD9067L0200014
1:250	1:250	2	PFD9067L0250012	PFD9067L0250016
		4	PFD9067L0250013	PFD9067L0250010
		4+2	PFD9067L0250009	PFD9067L0250017
		4+4	PFD9067L0250001	PFD9067L0250028
		4+4+2	PFD9067L0250014	PFD9067L0250019
		4+4+4	PFD9067L0250015	PFD9067L0250011
1:300	1:300	2	PFD9067L0300004	PFD9067L0300010
		4	PFD9067L0300005	PFD9067L0300011
		4+2	PFD9067L0300006	PFD9067L0300012
		4+4	PFD9067L0300007	PFD9067L0300013
		4+4+2	PFD9067L0300008	PFD9067L0300014
		4+4+4	PFD9067L0300009	PFD9067L0300015
1:450	1:450	2	PFD9067L0450001	PFD9067L0450008
		4	PFD9067L0450003	PFD9067L0450002
		4+2	PFD9067L0450004	PFD9067L0450009
		4+4	PFD9067L0450005	PFD9067L0450010
		4+4+2	PFD9067L0450006	PFD9067L0450011
		4+4+4	PFD9067L0450007	PFD9067L0450012

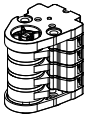
ASSEMBLY DRAWING



Refer to the following tables for descriptions of components: "Standard cam sets", "Potentiometers and encoders" and "Accessories".

COMPONENTS

Standard cam sets

Ref.	Drawing	No. and type of cams	No. and type of switches	Code
A7		2 cams A	2 PRSL0110XX switches	FCL20001
		2 cams A	2 PRSL0111XX switches	FCL20002
		Cams A+C	2 PRSL0110XX switches	FCL20003
		Cams A+C	2 PRSL0111XX switches	FCL20004
		2 cams C	2 PRSL0110XX switches	FCL20005
		2 cams C	2 PRSL0111XX switches	FCL20006
		Cams D+D+B+F	4 PRSL0110XX switches	FCL40001
		Cams D+D+B+F	4 PRSL0111XX switches	FCL40002
		4 cams A	4 PRSL0110XX switches	FCL40003
		4 cams A	4 PRSL0111XX switches	FCL40004
		Cams A+A+C+C	4 PRSL0110XX switches	FCL40005
		Cams A+A+C+C	4 PRSL0111XX switches	FCL40006
		4 cams C	4 PRSL0110XX switches	FCL40007
		4 cams C	4 PRSL0111XX switches	FCL40008
		Cams C+C+C+E	4 PRSL0110XX switches	FCL40009
		Cams C+C+C+E	4 PRSL0111XX switches	FCL40010
		Cams A+A+E+E	4 PRSL0110XX switches	FCL40011
		Cams A+A+E+E	4 PRSL0111XX switches	FCL40012

Other sets with 2/3/4/5 or 6 cams/switches are available on request.

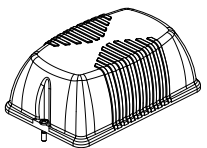
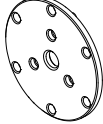
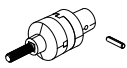
Cam reference chart

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° ±0.5°	PRSL7194PI	23.0° ±0.5°
B		10 points	PRSL7193PI	21.5° ±0.5°	PRSL7193PI	23.0° ±0.5°
C		60° sector	PRSL7195PI	82.0° ±0.5°	PRSL7195PI	86.0° ±0.5°
D		72° sector	PRSL7196PI	94.0° ±0.5°	PRSL7196PI	97.5° ±0.5°
E		180° sector	PRSL7191PI	204.5° ±0.5°	PRSL7191PI	203.0° ±0.5°
F		305° sector	PRSL7192PI	328.5° ±0.5°	PRSL7192PI	327.0° ±0.5°

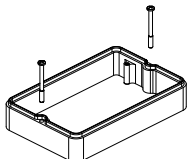
Potentiometers and encoders

Ref.	Drawing	Description	Code
A2		Support for encoder	PA030000
A3		Support for potentiometer	PA020000
A4		Encoder 36 pulses/rev. - with support	PA030001
		Encoder 150 pulses/rev. - with support	PA030002
A5		Potentiometer 10 kΩ - with support	PA020001
		Potentiometer 10 kΩ mechanical stop - with support	PA020002
		Potentiometer 10 kΩ ±10% 4 pins- with support	PA020003
		Potentiometer 10 kΩ ±10% 3 pins - with support	PA020004
		Potentiometer 5 kΩ ±10% - with support	PA020005
		Potentiometer 4.7 kΩ - with support	PA020006
		Potentiometer 10 kΩ - with support	PA020007
		Potentiometer 2.2 kΩ - with support	PA020008
		Potentiometer 2KΩ - with support	PA020009
A6		Absolute encoder Yankee - current output	PA01AA01 / PA02AA01
		Absolute encoder Yankee - voltage output	PA01AB01
		Absolute encoder Yankee - PWM output	PA01AC01
A17		Absolute encoder Egon 36-AL	F19XXXXXXX (Use form on page 21 to generate codes)

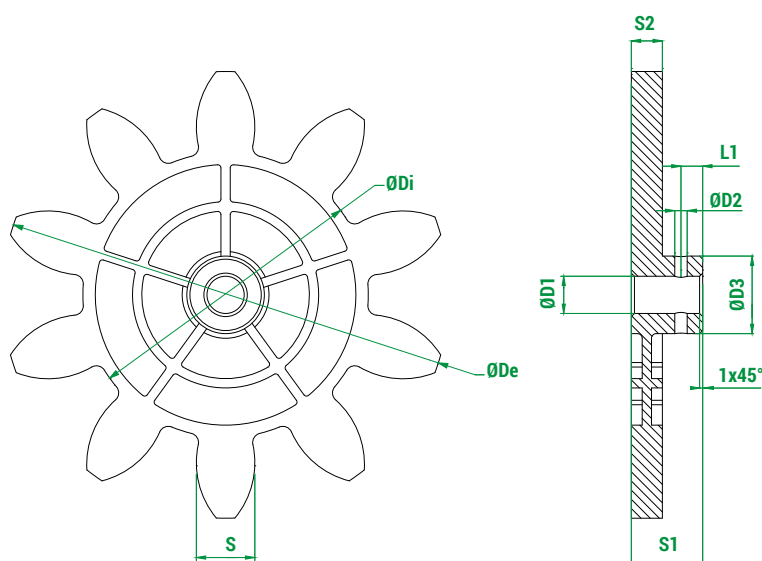
Accessories

Ref.	Drawing	Description	Code
A1		Cover with gasket, screws and earth cable	PA090018
A9		Cable gland M20x1.5	PRPS1075PE
A10		Flange	PRTR1300PE
A11		Flange support	PRTO3018PE
A18		Screw for flange fastening and flange support	PRVI0223PE
A12		Pinion gear	See pinion gear tables
A13		Coupling with pin	PRSL0981PI

Accessories

Ref.	Drawing	Description	Code
A14		Male coupling with pin	PRSL0919PI
A15		Female coupling with pin	PRSL0920PI
A16		Cover rise with gasket, screws and earth cable	PRSL0707PI

Moulded pinion gears



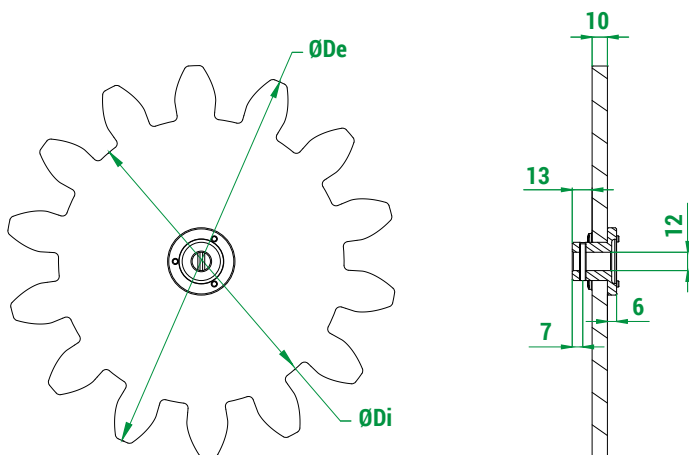
Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	S	Alpha	D1	D2	D3	S1	S2	L1
PRSL0915PI	8	20.00	160.00	200.00	113.20	20.00	23.40	31.41	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0912PI	10	12.00	120.00	144.00	92.00	12.00	14.00	18.85	20.00	12.00	4.00	25.00	23.00	10.00	7.00
PRSL0913PI	10	14.00	140.00	168.00	107.24	14.00	16.38	21.99	20.00	12.00	4.00	24.60	23.00	10.00	7.00
PRSL0914PI	10	16.00	160.00	192.00	122.67	16.00	18.67	25.13	20.00	12.00	4.00	24.00	23.00	10.00	7.00
PRSL0917PI	11	6.00	66.00	78.00	51.96	6.00	7.02	9.42	20.00	12.00	4.00	19.00	23.00	8.00	7.00
PRSL0916PI	12	5.00	60.00	70.00	48.30	5.00	5.83	7.85	20.00	12.00	4.00	20.00	23.00	8.00	7.00
PRSL0918PI	12	8.00	96.00	112.00	77.28	8.00	9.36	12.56	20.00	12.00	4.00	21.50	23.50	10.00	7.00
PRSL0911PI	12	10.00	120.00	140.00	96.67	10.00	11.67	15.71	20.00	12.00	4.00	25.00	23.50	10.00	7.00
PRSL0944PI	12	12.00	144.00	168.00	116.00	12.00	14.00	18.85	20.00	12.00	4.00	24.00	23.00	10.00	7.00

Measuring unit: mm.

Waterjet cut pinion gears



Legend

Z	Number of teeth
M	Module
Dp	Primitive diameter
De	External diameter
Di	Internal diameter
a	Addendum
d	Dedendum
Alpha	Pressure angle

Code	Z	M	Dp	De	Di	a	d	Alpha
PRSL0857PI	8	18.00	144.00	180.00	102.00	18.00	21.00	20.00
PRSL0855PI	8	24.00	192.00	240.00	136.00	24.00	28.00	20.00
PRSL0992PI	9	10.00	90.00	110.00	66.67	10.00	11.67	20.00
PRSL0879PI	9	16.00	144.00	176.00	106.67	16.00	18.67	20.00
PRSL0854PI	9	18.00	162.00	198.00	120.00	18.00	21.00	20.00
PRSL0871PI	9	20.00	180.00	220.00	133.33	20.00	23.33	20.00
PRSL0849PI	9	24.00	216.00	264.00	160.00	24.00	28.00	20.00
PRSL0846PI	10	10.00	100.00	120.00	76.67	10.00	11.67	20.00
PRSL0993PI	10	18.00	180.00	216.00	138.00	18.00	21.00	20.00
PRSL0970PI	10	22.00	220.00	264.00	168.52	22.00	25.74	20.00
PRSL0856PI	10	24.00	240.00	288.00	184.00	24.00	28.00	20.00
PRSL0861PI	11	12.00	132.00	156.00	104.00	12.00	14.00	20.00
PRSL0998PI	11	18.00	198.00	234.00	156.00	18.00	21.00	20.00
PRSL0997PI	11	20.00	220.00	260.00	173.36	20.00	23.32	20.00
PRSL0859PI	11	24.00	264.00	312.00	204.00	24.00	30.00	20.00
PRSL0863PI	12	14.00	168.00	196.00	133.00	14.00	17.50	20.00
PRSL0897PI	12	16.00	192.00	224.00	154.67	16.00	18.67	20.00
PRSL0972PI	12	18.00	216.00	252.00	173.88	18.00	21.06	20.00
PRSL0845PI	12	20.00	240.00	280.00	193.34	20.00	23.32	20.00
PRSL0878PI	12	24.00	288.00	336.00	232.00	24.00	28.00	20.00
PRSL0860PI	13	6.00	78.00	90.00	63.00	6.00	7.50	20.00
PRSL0853PI	13	12.00	156.00	178.59	126.00	11.29	15.00	20.00
PRSL0898PI	13	16.00	208.00	240.00	170.67	16.00	18.66	20.00
PRSL0862PI	14	10.00	140.00	169.00	125.00	15.00	7.50	20.00
PRSL0896PI	14	16.00	224.00	256.00	186.67	16.00	18.67	20.00
PRSL0999PI	14	18.00	252.00	288.00	210.00	18.00	21.00	20.00
PRSL0848PI	14	20.00	280.00	320.00	233.33	20.00	23.33	20.00
PRSL0858PI	15	18.00	270.00	306.00	228.00	18.00	21.00	20.00
PRSL0847PI	16	20.00	320.00	360.00	273.33	20.00	23.33	20.00
PRSL0973PI	17	10.00	170.00	190.00	145.00	10.00	12.50	22.89
PRSL0974PI	17	14.00	238.00	266.00	203.00	14.00	17.50	22.89
PRSL0851PI	20	6.00	120.00	132.00	105.00	6.00	7.50	22.89

Measuring unit: mm.

TOP - REQUEST FORM FOR NON STANDARD LIMIT SWITCH

Instructions

(See next pages for list of components and legends)

- 1 Version:** tick the required version.
- 2 SIL 1 certified:** tick the box if you require SIL 1 certified units.
- 3 Revolution ratio:** write the required revolution ratio for each output.
- 4 Standard cam sets:** write the code of the cam set required for each output, according to the legend.
- 5 Customized cam sets:** for non standard cam sets, fill in the scheme choosing the cams and the switches required, according to the legend. It is possible to assemble sets with 2, 3, 4, 5 or 6 cams/switches.
Customized cams are available on request.
- 6 Potentiometers, encoders, Egon 36-AL, Yankee:** write the code of the potentiometer, encoder, Egon 36-AL or Yankee required, according to the legend.
ATTENTION: potentiometer PA020009 can be mounted only alone, i.e. with no sets of cams.
Please refer to the table on the next pages for all other possible configurations.
To generate Egon 36-AL codes, use the form on the next pages.
- 7 Shaft:** tick the type of shaft required.
Customized shafts are available on request.
- 8 Coupling, flange, pinion gear:** tick the appropriate box when coupling, flange or pinion gear are required.
When a standard pinion gear is required, write the code number listed in the pinion gear tables in the catalogue.
When a special pinion gear is required, write the number of teeth, the module and the primitive diameter.

Version 1

☐ Version

☐ Version

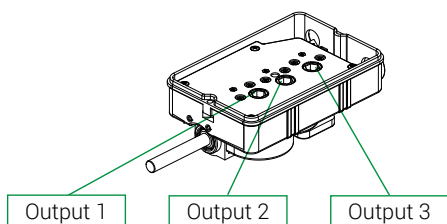
☐ Version with anti-moisture plug

ATTENTION: Top XL with cover rise are not cULus certified.

☐ For ambient temperature -40° C / +100°C

☐ **SIL 1 certified** 2

ATTENTION: Top XL with cover rise are not SIL1 certified.



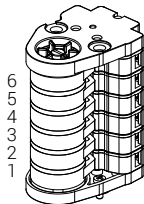
Revolution ratio 3

Output 1			Output 2			Output 3		
1	2	3	1	2	3	1	2	3
☐	☐	☐	☐	☐	☐	☐	☐	☐
1:1			1:50			1:300		
☐			☐			☐		
1:5			1:75			1:450		
☐			☐			☐		
1:10			1:100			1:		
☐			☐			☐		
1:15			1:150			1:		
☐			☐			☐		
1:20			1:200			1:		
☐			☐			☐		
1:25			1:250					
☐			☐					

Standard cam sets 4

Cam set code _____ Output 1
 _____ Output 2
 _____ Output 3

Customized cam sets 5



Output 1
 Cam code _____ Switch code _____
 6 _____
 5 _____
 4 _____
 3 _____
 2 _____
 1 _____

Output 2
 Cam code _____ Switch code _____
 6 _____
 5 _____
 4 _____
 3 _____
 2 _____
 1 _____

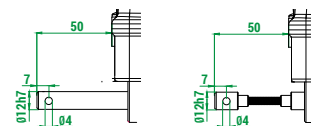
Output 3
 Cam code _____ Switch code _____
 6 _____
 5 _____
 4 _____
 3 _____
 2 _____
 1 _____

Potentiometers, encoders, Egon 36-AL, Yankee 6

Output 1 Output 2 Output 3
 Code _____

☐ **Standard shaft** 7

☐ **Flexible shaft**



☐ **Male coupling** ☐ **Coupling** 8

☐ **Female coupling** ☐ **Flange**

☐ **Pinion gear**

Pinion gear code _____

Customized pinion gear

No. of teeth _____

Module _____

Primitive diameter _____

TOP - REQUEST FORM FOR LIMIT SWITCH WITH "SPEED CONTROL SYSTEM"

Instructions

(See next pages for list of components and legends)

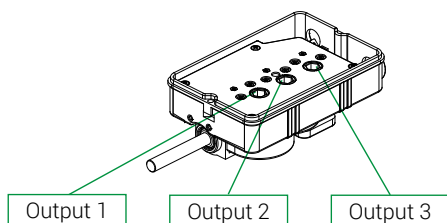
- 1 Power supply:** tick the required power supply value.
- 2 Version:** tick the required version.
- 3 Revolution ratio:** write the required revolution ratio for output 3.
- Standard cam sets:** write the code of the cam set required for output 3, according to the legend.
- 4 Customized cam sets:** for non standard cam sets, fill in the scheme choosing the cams and the switches required, according to the legend. It is possible to assemble sets with 2, 3, 4, 5 or 6 cams/switches.
Customized cams are available on request.
- 6 Potentiometers, encoders, Egon 36-AL, Yankee:** write the code of the potentiometer, encoder, Egon 36-AL or Yankee required, according to the legend.
ATTENTION: potentiometer PA020009 can be mounted only alone, i.e. with no sets of cams.
Please refer to the table on the next pages for all other possible configurations.
To generate Egon 36-AL codes, use the form on the next pages.
- 7 Shaft:** tick the type of shaft required.
Customized shafts are available on request.
- 8 Coupling, flange, pinion gear:** tick the appropriate box when coupling, flange or pinion gear are required.
When a standard pinion gear is required, write the code number listed in the pinion gear tables in the catalogue.
When a special pinion gear is required, write the number of teeth, the module and the primitive diameter.

Power supply

- ☐ 24 Vdc
☐ 48 Vdc

Version

- ☐ Standard
☐ Safety



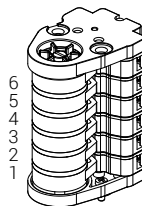
Revolution ratio

Output 1	Output 2	Output 3
1:1	Empty	☐ 1:1 ☐ 1:25 ☐ 1:200 ☐ 1:5 ☐ 1:50 ☐ 1:250 ☐ 1:10 ☐ 1:70 ☐ 1:300 ☐ 1:15 ☐ 1:100 ☐ 1:450 ☐ 1:20 ☐ 1:150 ☐ 1:

Standard cam sets

Cam set code _____ Output 3

Customized cam sets



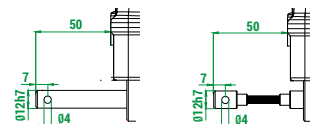
Output 3	Cam code	Switch code
6	_____	_____
5	_____	_____
4	_____	_____
3	_____	_____
2	_____	_____
1	_____	_____

Potentiometers, encoders, Egon 36-AL, Yankee

Output 3
Code _____

Standard shaft

Flexible shaft



Male coupling

Female coupling

Pinion gear

Coupling

Flange

Pinion gear code _____

Customized pinion gear

No. of teeth _____

Module _____

Primitive diameter _____

Remarks

4 Legend - Standard cam sets

No. & type of switches	No. & type of cams	Code
2 x PRSL0110XX	2 cams A	FCL20001
	Cams A+C	FCL20003
	2 cams C	FCL20005
4 x PRSL0110XX	Cams D+D+B+F	FCL40001
	4 cams A	FCL40003
	Cams A+A+C+C	FCL40005
	4 cams C	FCL40007
	Cams C+C+C+E	FCL40009
	Cams A+A+E+E	FCL40011
2 x PRSL0111XX	2 cams A	FCL20002
	Cams A+C	FCL20004
	2 cams C	FCL20006
4 x PRSL0111XX	Cams D+D+B+F	FCL40002
	4 cams A	FCL40004
	Cams A+A+C+C	FCL40006
	4 cams C	FCL40008
	Cams C+C+C+E	FCL40010
	Cams A+A+E+E	FCL40012

6 Legend - Potentiometers, encoders and Yankee

Description	Code
Potentiometer 10 k Ω - with support	PA020001
Potentiometer 10 k Ω mechanical stop - with support	PA020002
Potentiometer 10 k Ω $\pm$ 10% 4 pins - with support	PA020003
Potentiometer 10 k Ω $\pm$ 10% 3 pins - with support	PA020004
Potentiometer 5 k Ω $\pm$ 10% - with support	PA020005
Potentiometer 4.7 k Ω - with support	PA020006
Potentiometer 10 k Ω - with support	PA020007
Potentiometer 2.2 k Ω - with support	PA020008
Potentiometer 2K Ω - with support	PA020009
Encoder 36 pulses/rev. - with support	PA030001
Encoder 150 pulses/rev. - with support	PA030002
Yankee - current output	PA01AA01 / PA02AA01
Yankee - voltage output	PA01AB01
Yankee - PWM output	PA01AC01

5 Legend - Switches

PRSL0110XX	PRSL0111XX
1NO+1NC	1NC
	

5 Legend - Cams

Cam			Cam code for PRSL0110XX switch	Switching angle with PRSL0110XX	Cam code for PRSL0111XX switch	Switching angle with PRSL0111XX
A		1 point	PRSL7194PI	21.5° $\pm$ 0.5°	PRSL7194PI	23.0° $\pm$ 0.5°
B		10 points	PRSL7193PI	21.5° $\pm$ 0.5°	PRSL7193PI	23.0° $\pm$ 0.5°
C		60° sector	PRSL7195PI	82.0° $\pm$ 0.5°	PRSL7195PI	86.0° $\pm$ 0.5°
D		72° sector	PRSL7196PI	94.0° $\pm$ 0.5°	PRSL7196PI	97.5° $\pm$ 0.5°
E		180° sector	PRSL7191PI	204.5° $\pm$ 0.5°	PRSL7191PI	203.0° $\pm$ 0.5°
F		305° sector	PRSL7192PI	328.5° $\pm$ 0.5°	PRSL7192PI	327.0° $\pm$ 0.5°

6 Configuration table

The following table shows possible configurations of Top and Top XL.

When it is not possible to mount a set of cams together with a potentiometer/encoder, the table shows «Not available.»

When the standard cover PA090018 is not high enough to hold the elements mounted inside the limit switch, it is possible to use the cover rise PRSL0707PI (the table shows «Top XL»).

In all other cases it is possible to mount the sets of cams and potentiometer/encoder with the standard cover PA090018 (the table shows «Top»).

	Set of cams with 2 switches	Set of cams with 3 switches	Set of cams with 4 switches	Set of cams with 5 switches	Set of cams with 6 switches
Set of cams only	Top	Top	Top	Top	Top XL
Set of cams + Egon 36-AL	Top	Top XL	Top XL	Not available	Not available
Set of cams + Yankee	Top	Top	Top	Top XL	Top XL
Set of cams + PA020001	Top	Top XL	Top XL	Not available	Not available
Set of cams + PA020002	Top	Top XL	Top XL	Not available	Not available
Set of cams + PA020003	Top	Top XL	Top XL	Top XL	Not available
Set of cams + PA020004	Top	Top XL	Top XL	Top XL	Not available
Set of cams + PA020005	Top	Top XL	Top XL	Top XL	Not available
Set of cams + PA020006	Top	Top XL	Top XL	Not available	Not available
Set of cams + PA020007	Top	Top XL	Top XL	Not available	Not available
Set of cams + PA020008	Top	Top XL	Top XL	Not available	Not available
Set of cams + PA030001	Top	Top XL	Top XL	Top XL	Not available
Set of cams + PA030002	Top	Top XL	Top XL	Top XL	Not available

6 Configuration form for Egon 36-AL

To generate the encoder code, fill in the boxes with the characters corresponding to the specifications required, as shown in the example. Enter the code in the space provided at point 6 (Potentiometers, encoders, Egon 36-AL, Yankee) of the «Request form for non standard limit switch».

F19 R A 1 1 0 X X X

F19 A 0 X X X

S = normal
R = redundant

A = analog

Output 1

1 = 4...20 mA
2 = 1...5 V
3 = 2...10 V

Output 2

(only for EGON 36-AL redundant version)*

1 = 4...20 mA
2 = 1...5 V
3 = 2...10 V

* Fill in "0" for Egon36-AL normal version.
ATTENTION: if required, Output 2 must be the same as Output 1.

Characters for sequential numbers

REMARKS