

PALLET CHANGING CAM SYSTEM

CPS 165 - CPS 200 - CPS 300

CPS



COLOMBO FILIPPETTI SPA

- Rapid silent motion.
- Mechanical synchronisation of cycle.
- Ground and hardened steel cams.
- Positive control of motion, speed and acceleration.
- Cast iron sealed housing.
- Long-life lubrication.
- Possibility of mounting geared-motor directly on the housing.
- Extremely compact housing.
- Torque limiter incorporated within gearbox.

LA MECCANICA RAZIONALE

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COLOMBO FILIPPETTI SPA. reserve the right to make any changes they deem advisable for the improvement of their products without prior notice, so the amounts given in this catalogue are not binding.

This catalogue supersedes all earlier editions.

The measuring units comply with the international metric system [S.I].

Illustrations and drawings according to UNI 3970 (ISO 128-82).

Projection method of the drawings.

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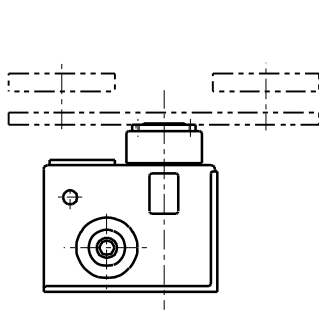
1.- General

The CPS devices manufactured by COLOMBO FILIPPETTI are mechanical, machine-independent pallet changing groups which, by means of a cam drive, transform an incoming uniform rotary motion supplied by a gearmotor into a regular series of stop-and-go linear and rotary movements of the output shaft onto which the pallet pick-up arm is keyed. The synchronous combination of movements performed by the arm provides the typical pallet changing cycle which is a characteristic feature of this device.

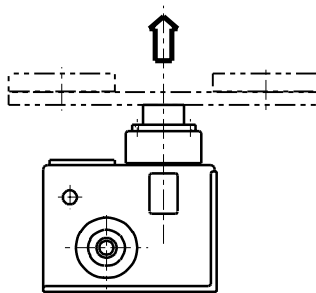
The design of the product is simple; its movements are transformed directly by a mechanical cam and feeler system which controls the acceleration of the intermittent motions and assures positive control throughout the cycle. The main features which are a result of this include accuracy, speed and smoothness of the movements, low vibration and silent operation, versatility in its applications and minimal overall dimensions.

2.- Sequence of cycle motions

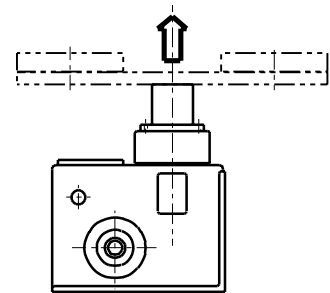
The angle of rotation of the pallet pick-up arm can be, on demand: 180° - 120° - 90° - 60° - 45° - 30°.



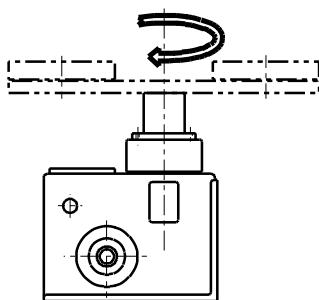
1 - Starting position



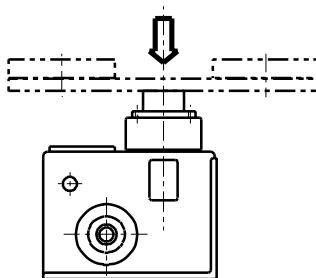
2 - Pallet lifting including gentle pick-up



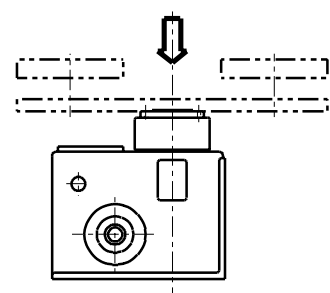
3 - Pallet lifting to the top position



4 - Rotation in top position



5 - Pallet placer descent including gentle put down



6 - Uncoupler descent to the end of cycle position

Fig.1- Sequence of the Pallet Change cycle

3. - Directions of rotation

The directions of rotation refer to the pallet holder arm. Rotation left (counter-clockwise) is standard, rotation right is to order. If unspecified **S** or **D** the pallet change is supplied in the std. version **S**.

The direction of rotation of the input shaft (clockwise) is obligatory.

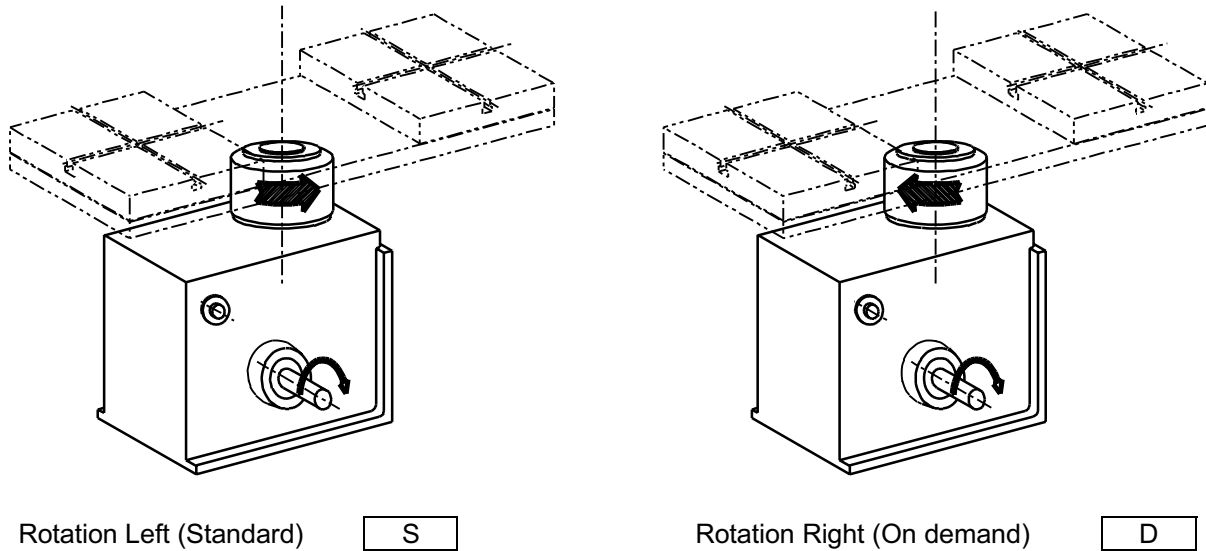


Fig. 2 Directions of rotation

4. - Danger area

Since it is a positive-action arrangement, the pallet holder arm moves only within its range. Apart from switching-off, stoppage can occur only owing to an overload of the drive motor, to action by a torque limiter or to breakdown of some internal part.

It is therefore essential not to enter the range of action of the device while it is in operation. When carrying out maintenance, the power must be cut before access to the danger area.

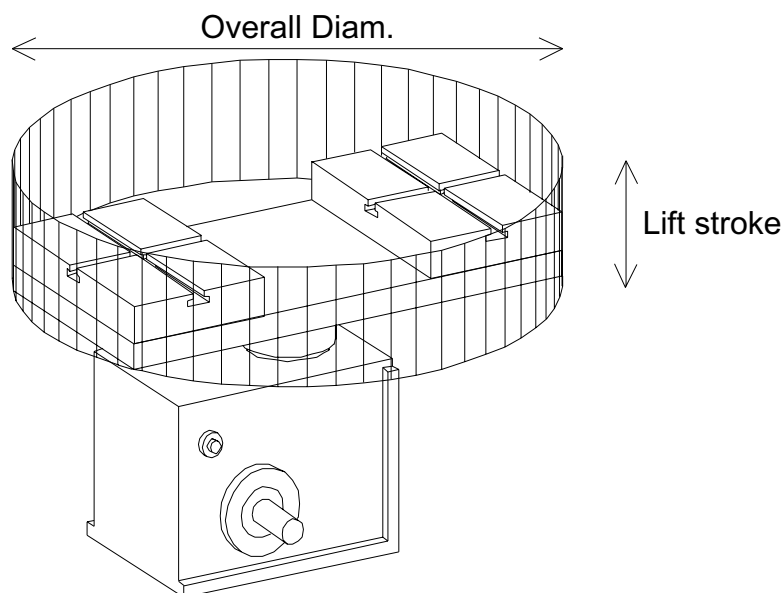


Fig. 3 Danger area

5. - Examples of applications

The CPS pallet changers can be used for various operational machines such as:

- machine tools
- production lines
- presses
- assembly lines
- welding or laser cutting systems, etc.
- wherever it is required to move pallets with quick cycles and smooth movements.

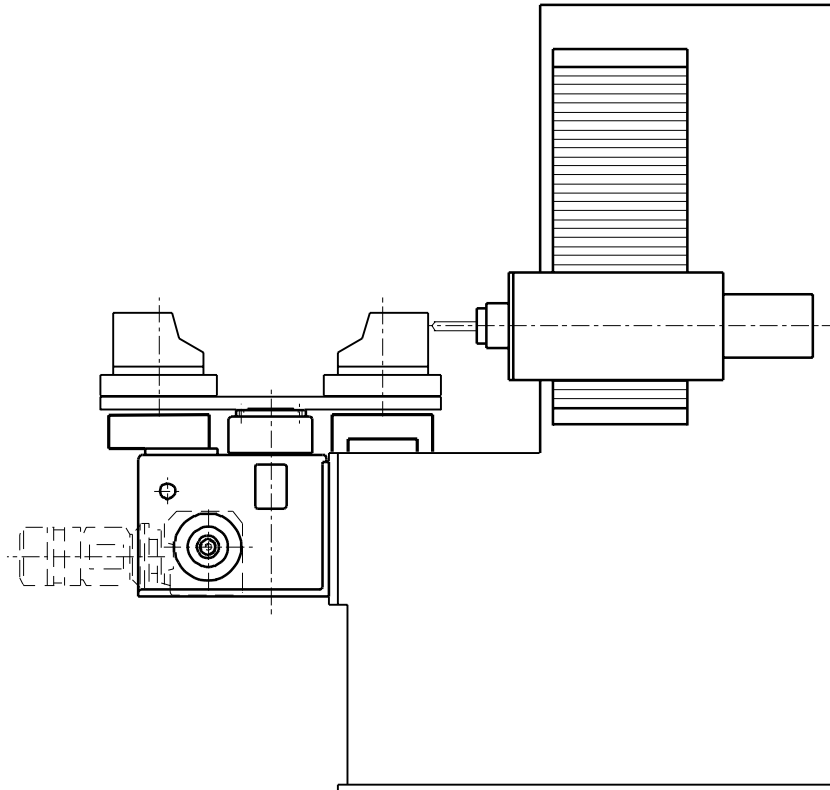


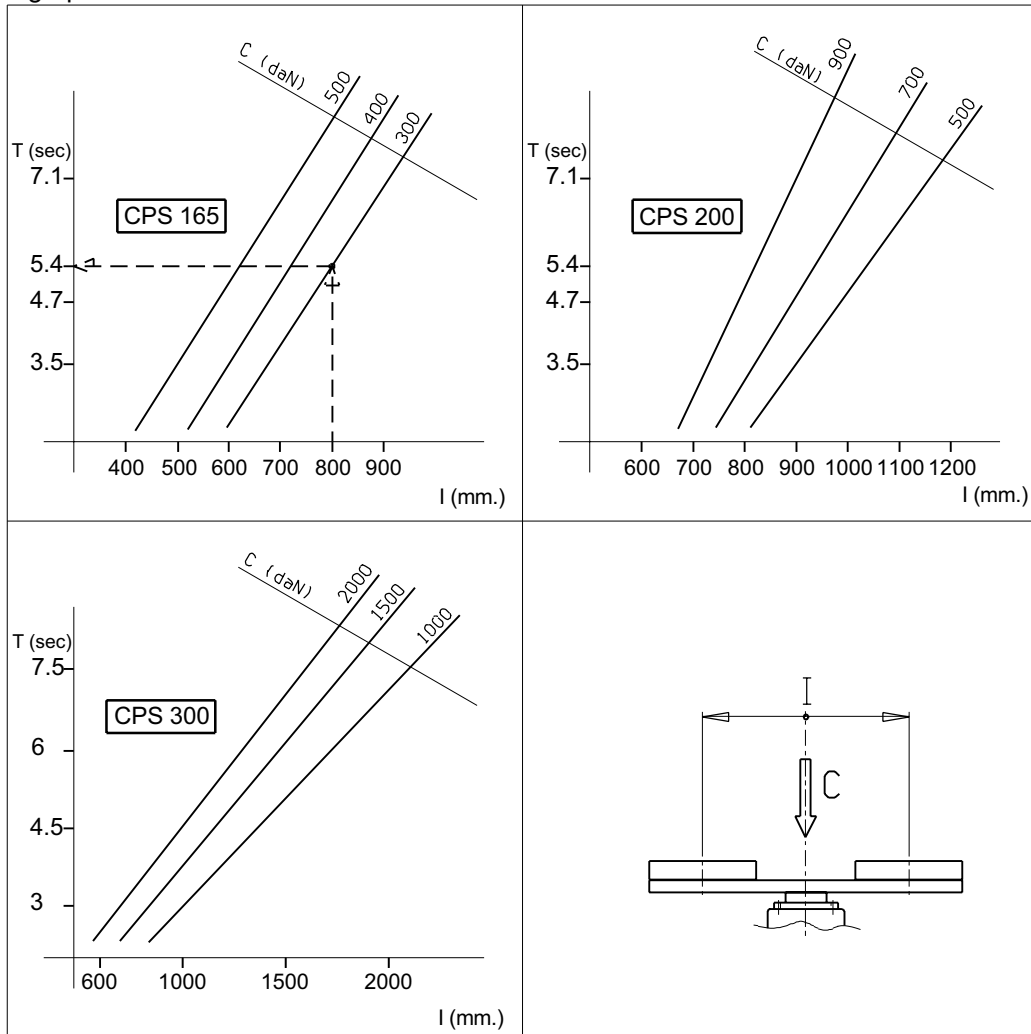
Fig.4- Fitted on a horizontal tool machine

6. - Choice of model

The nomographs in Fig.5 are to be considered as a general guide only because they assume the pallet centre of gravity is at the pallet geometric centre .

Correct selection must depend on an analysis of true mass moment inertia.

Fig.5- Nomographs



Ex.: CPS 165 with centre distance (I)= 800 mm Load (C)= 300 daNm Change Time (T)= 5,4 sec.

7. - Mounting instructions

The CPS groups can be mounted with the axis in vertical position only. They can be fixed using either the horizontal (Fig. 6) or vertical (Fig. 7) fixing plate.

Fig. 6

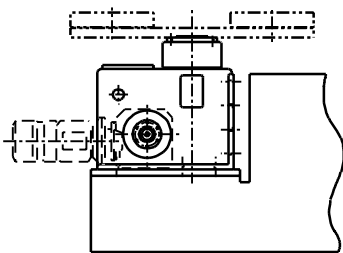
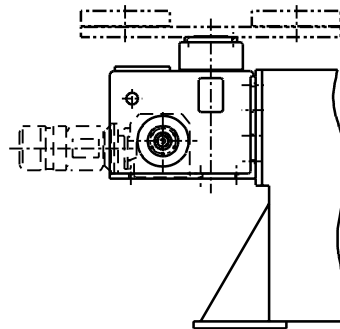


Fig. 7



8. - Using the self-braking motor.

The self-braking motor is used to stop the mechanism during the mechanical pause (cam dwell period), provided at the end of each pallet change cycle, where it will remain until machine control calls for another change cycle.

To facilitate adjustment and synchronisation on first mount or maintenance, a manual brake release and manual drive shaft is provided.

9. - Clutch torque limiter.

The CPS standard motor includes worm reduction gear with built-in, externally adjustable, torque limiter, the purpose of which is to eliminate, both during emergency stops and during cycle restart after the emergency, the overload impact caused by inertia of the masses undergoing intermittent motion and therefore to prevent breakage of the mechanical driving parts.

10. - Instructions for correct operation

The CPS pallet changers are fitted with a microprocessor cycle control group described in para. 18. It is necessary to avoid motor stoppage during motion as it might cause serious damage to the assembly. If a jogging motion is required during synchronising, this must be planned ahead when selecting the machine configuration, for example by allowing such operations to take place only at low speed. It is best to make provision for manual execution of these operations by turning the drive shaft by hand.

11. - Set-up

Unless otherwise specified, we supply the CPS devices already filled with long-life lubricant, consisting of mineral lubricating oil ISO VG-150. Two holes are provided on the box for filling and draining the lubricant. A label is glued to each box showing the presence or absence of the lubricant. There follows a list of some of the equivalents to ISO VG-150 mineral oil.

AGIP	Blasia 150
BP	Energol GR-XP 150
CASTROL	Alpha SP 150
CHEVRON	NL Gear Compound 150
ESSO	Spartan EP 150
FINA	Giran 150
MOBIL	Mobilgear 629
SHELL	Omala Oil 150
TOTAL	Carter EP 150

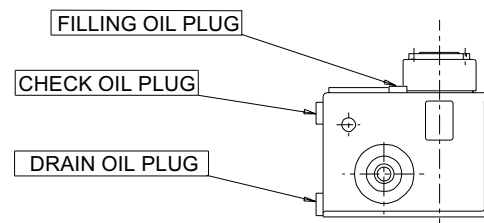


Fig.8- Positions of the oil holes

When topping up, check that the oil is clean. A fine-mesh filter should be used to pour in the oil. See table 1 for the right amount of oil required for proper lubrication.

12. - Maintenance

CPS assemblies require very little maintenance. Check the box regularly for oil leakage, always a sign of malfunctioning of the assembly or wear of the seals. If any is noticed, proper maintenance should identify and eliminate the cause.

When carrying out routine servicing, and in any case after 8'000 hours of operation, the arm shaft should be checked for backlash; if necessary, the whole assembly should be overhauled.
 Always ensure that there is unrestricted free airflow for motor cooling purposes, and that such air cannot be contaminated with oil and hence affect the brake.
 Check brake wear in accordance with motor manufacturer's instructions.

13. - Versions

The pallet changers come in the following versions:

- VS** CPS with bare input shaft (camshaft).
- VL** CPS with long input shaft for mounting of standard speed reducer.
- VLR** CPS complete with bare input shaft speed reducer and torque limiter.
- VLRP** CPS complete with speed reducer (and torque limiter) which is prepared for mounting motor.
- VLRA** CPS with self-braking gearmotor and torque limiter

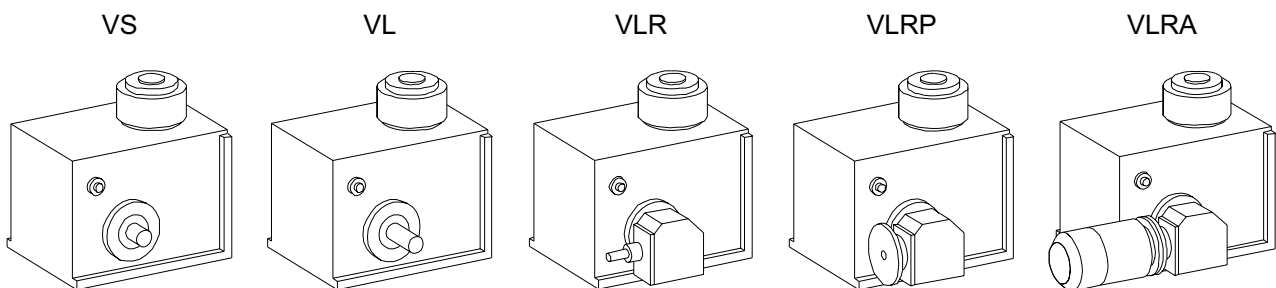
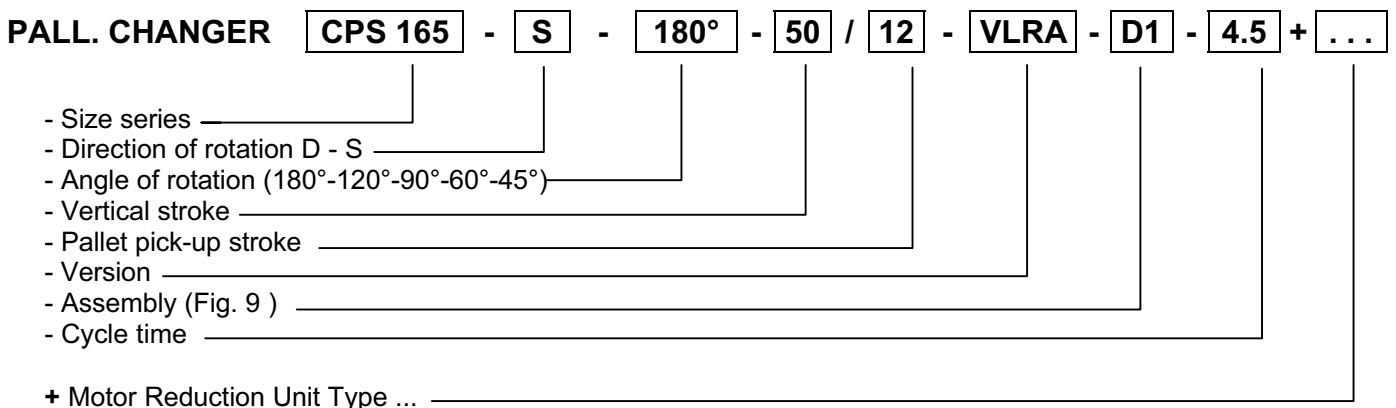


Fig. 9 - Versions

14. - Designation for the CPS pallet changer.

The designation of the CPS assemblies consists of sets of alphanumeric characters as in the chart below. Please refer to this chart when ordering, to avoid misunderstandings and delays in deliveries.



Example

Pallet changer size 165, standard rotation left 180°, vertical stroke 50 mm, pallet pick-up 12 mm (starting from the start of cycle position) with self-braking gearmotor unit and torque limiter mounted in position D1 with total cycle time of 4.5.

15. - Mounting position of the reduction gear

The CPS pallet changers can be supplied with a self-braking gearmotor or simply with a worm screw reduction gear. They can be mounted on the assembly in the following 6 different positions.

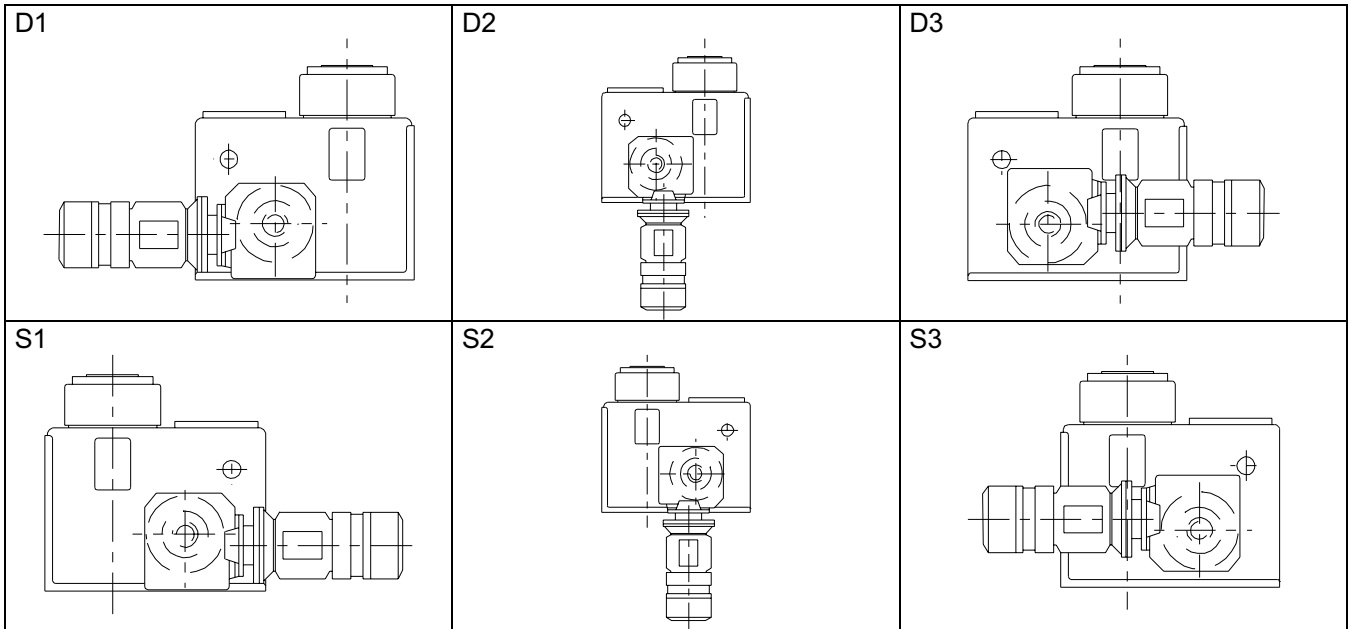


Fig.10- Positions of the gearmotor.

Since the CPS assemblies may be provided with other drive systems than standard, such as combinations of clutch-brake couplings, speed change gears, etc., all dimensional and technical features of these devices must be specified. On demand, these can also be supplied directly by COLOMBO FILIPPETTI TORINO.

16. - Technical Characteristics

Tab. 1

TYPE	Max Vert. Stroke (mm)	Max. Load F (Kg)	Max Torque Mt ^(a) (daNm)	Total Mass ^(b) (Kg)	Accuracy of Output Movements ^(c)		LUBRIC. (Kg)
					Rotation	Lift	
165	60	500	90	357	± 0.05 on Ø 210	± 0.1	24
200	80	900	170	550	± 0.05 on Ø 230	± 0.1	41
300	90	1900	520	1320	± 0.05 on Ø 340	± 0.15	80

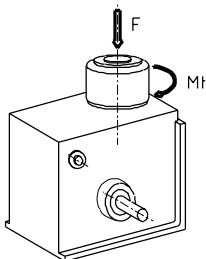


Fig. 11

NOTE

- (a) - 180° rotation values.
- (b)- Total CPS mass complete with motor reduction unit and lubricant.
- (c)- Accuracy exceeding those tabulated are available on demand.

17. - Overall Dimensions

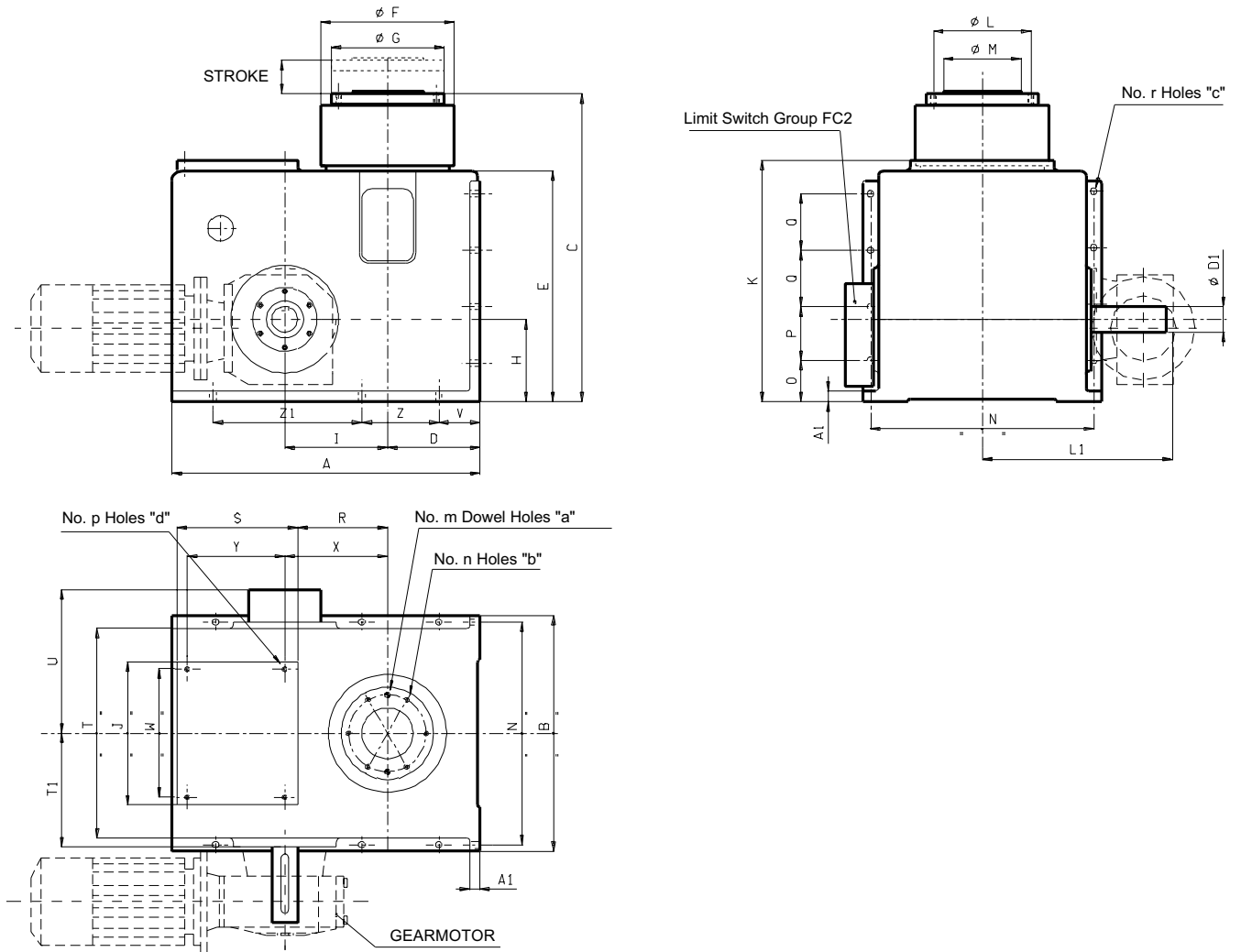


Fig. 12 - Overall sizes

CPS	A	A1	B	C	D	E	ØF	ØG	H	I	J	K	ØL	ØM ^{h7}	N	O	P	Q	Q1	R	S
165	505	20	420	550	150	390	230	180	160	165	280	410	150	100	395	50	90	115	70	140	205
200	600	20	460	600	180	450	260	220	160	200	280	470	190	150	435	80	110	110	110	175	235
300	740	35	640	825	160	650	310	288	265	300	450	655	255	70	600	100	110	110	150	325	250

CPS	T	T1	U	V	Z	Z1	W	X	Y	ØD1	L1	a ^{h7}	b	c	d	m	n	p	r	Max Str.
165	370	205	260	125	125	200	250	155	175	42	350	10	M10	13	M10	2	6	4	14	60
200	410	217,5	280	80	150	290	250	200	190	50	370	10	M10	13	M10	2	6	4	14	90
300	550	343	415	100	200	400	410	340	220	60	600	20	M16	22	M12	4	12	4	14	90

18. - Mounting and use of the limit switch cams

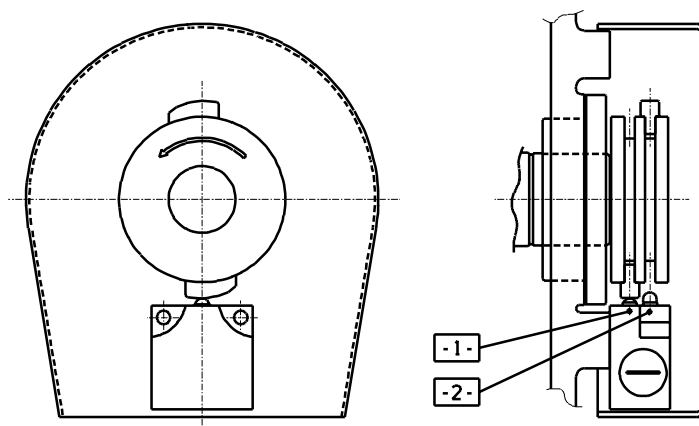


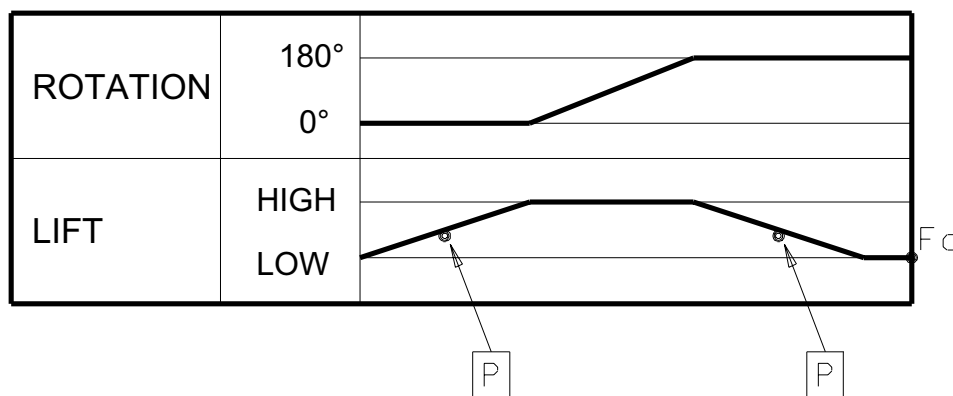
Fig. 13 - Multiple precision limit switch FC2

As already shown in paragraph 10, the cams are positioned to drive the limit switches with the following functions:

- 1 Control motor stopping at the end of cycle position, i.e. in cam dwell period
- 2 Available for customer purposes

N.B.: The complete motion cycle is performed in one complete 360° rotation of the camshaft.

19. - Cyclogram



Alternative cycle available to special order using non standard cams.
 All motions use sophisticated mathematical motion law for gentle acceleration/deceleration.
 The impact speed is virtually nil at the pallet pick-up (P) and put-down point.

20. - Electrical power supply and operation

Three phase AC fixed speed is standard. Many other options exist.

- ! The connection between control microcam and motor contactor should be hard wired.
- Operation via software can introduce undesirable and variable delays which could interfere with the precisely calculated mechanical cam motion cycle.