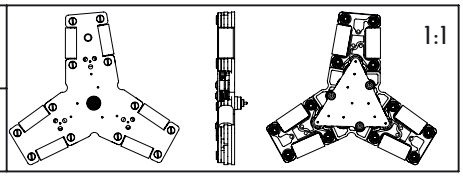
SOPROD

SOCIÉTÉ DE PRODUCTION HORLOGÈRE

103.02.xxx

Gear Box, 3 motors



1:1

DESCRIPTION

number of ouput		3, coaxial
ouput angle	hour	2°
	minute	2°
	second	6°
steps per turn	hour	180
	minute	180
	second	60
Main plate material		Plastic
Gears		Metal, Soptec

Prepared	RC
Checked	BS
Version	2.2
Date	21.06.2017

SPECIFICATIONS

Description	symbole	Unit	Minimum	Nominal	Maximum
pulse width	T_0	ms	-	2.9	-
Time between pulses	T_1	ms	16.6	-	Infinite
motor step frequency	$M_{fréq}$	Hz	0		60
voltage	U_0	V	-	3	-
Motor start voltage	U_{start}	V	-	2.2	2.6
Motor average consumption (1 step)	I_{mot}	µAs	-	3.8	4.2
Motor peak consumption	I_{peak}	mA	-	2	2.5
Coils resistor	Rcoil	Ohm	1480	1600	1720
Motor torque 2°	Mti	µNm	20	-	40
Motor torque 6°	Mti	µNm	10	-	18
Motor positioning torque 2°	MPT	µNm	-	90	-
Motor positioning torque 6°	MPT	µNm	-	30	-
Total Angular play	∠	°	-	-	2°

Hands specifications

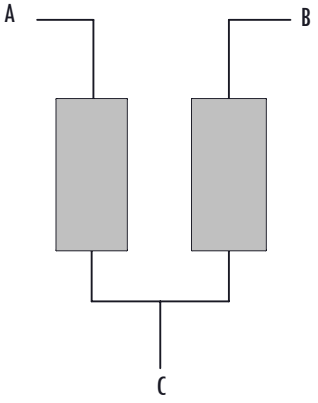
Unbalance (µNm)	0.3	0.3	0.1
Inertia (gmm²)	0.7	0.7	0.3
F. Max (N)	40	40	25

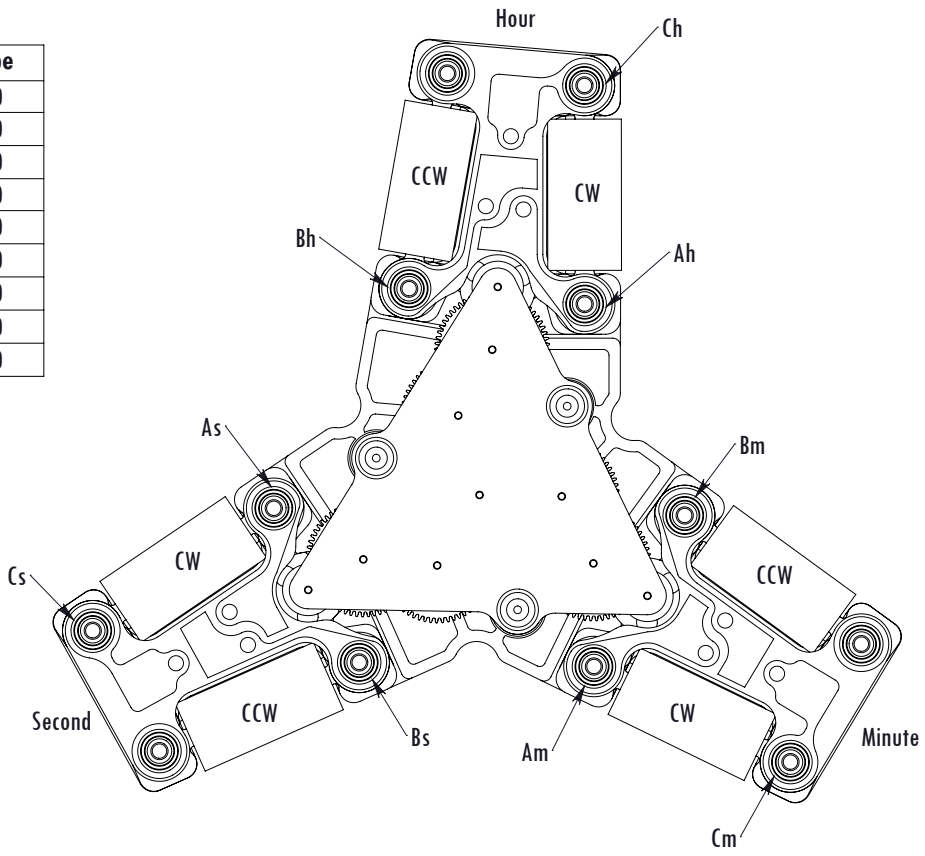
Unbalance is given for a linear shock resitance up to 300G perpendicular to the hand direction.
For higher values, please contact us.

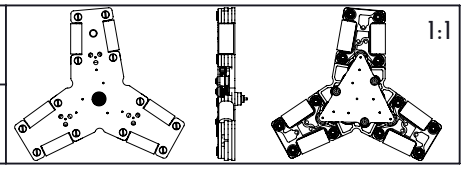
ELECTRICAL PRINCIPLE

Pin configuration

Motor	Pin description	Symbol	Type
Minute	Coil CW	Am	I/O
	Coil CCW	Bm	I/O
	Common	Cm	I/O
Hour	Coil CW	Ah	I/O
	Coil CCW	Bh	I/O
	Common	Ch	I/O
Second	Coil CW	As	I/O
	Coil CCW	Bs	I/O
	Common	Cs	I/O



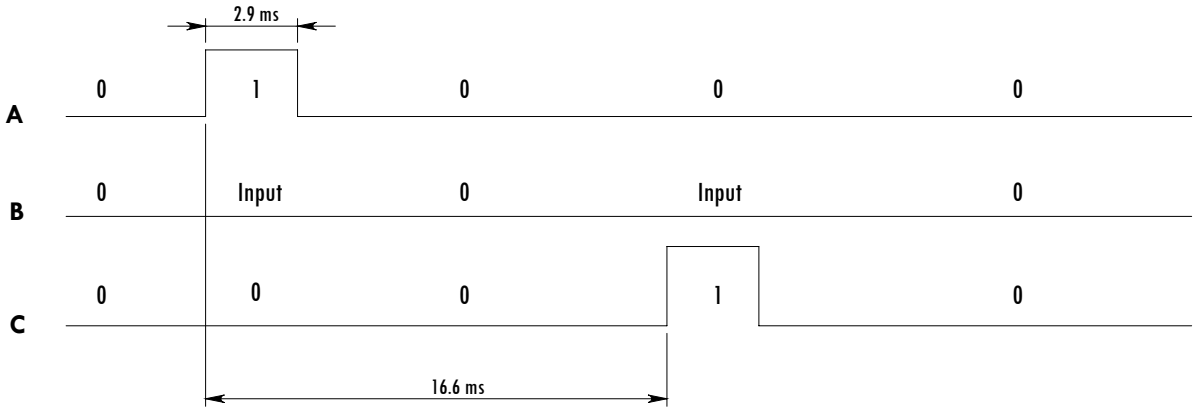




ELECTRICAL PRINCIPLE

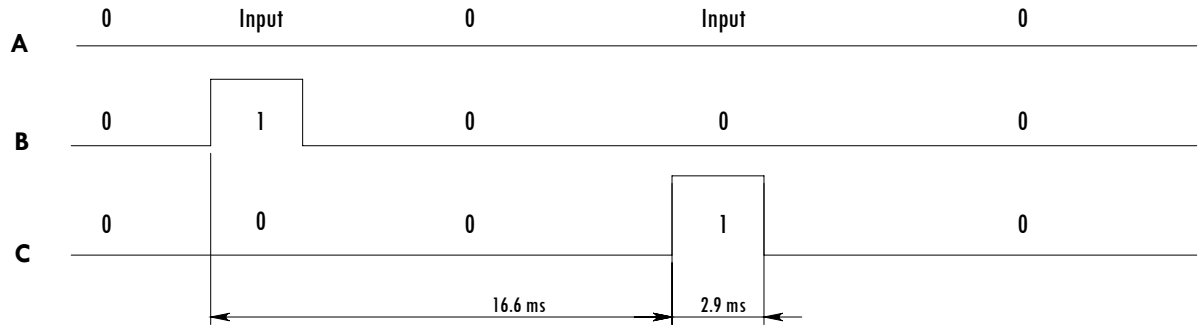
Step Clockwise

Description	Pin A		Pin B		Pin C	
	Direction	Output	Direction	Output	Direction	Output
Init	Output	'0'	Output	'0'	Output	'0'
Step 1	Output	'1'	Input	'0'	Output	'0'
Between the steps	Output	'0'	Output	'0'	Output	'0'
Step 2	Output	'0'	Input	'0'	Output	'1'
End	Output	'0'	Output	'0'	Output	'0'



Step Counterclockwise

Description	Pin A		Pin B		Pin C	
	Direction	Output	Direction	Output	Direction	Output
Init	Output	'0'	Output	'0'	Output	'0'
Step 1	Input	'0'	Output	'1'	Output	'0'
Between the steps	Output	'0'	Output	'0'	Output	'0'
Step 2	Input	'0'	Output	'0'	Output	'1'
End	Output	'0'	Output	'0'	Output	'0'



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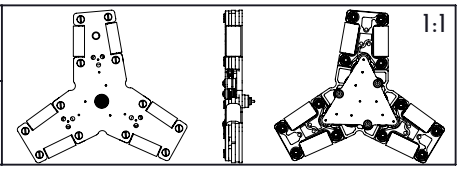
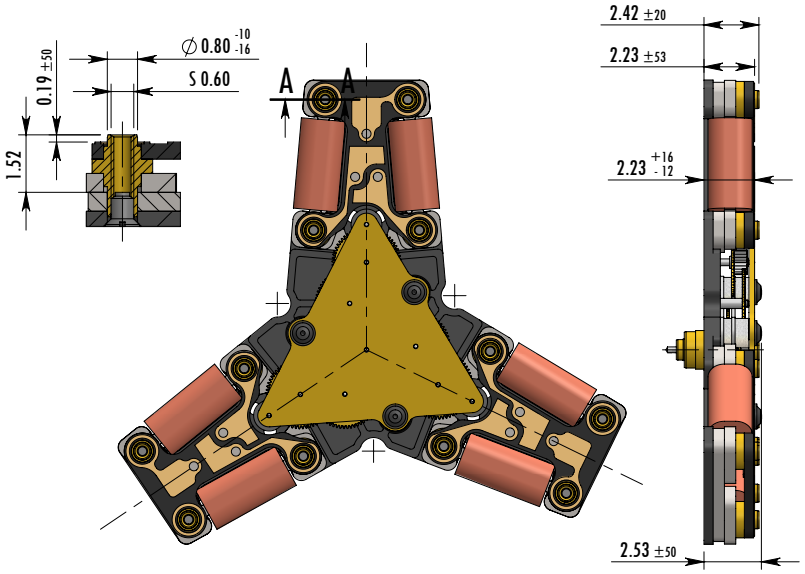
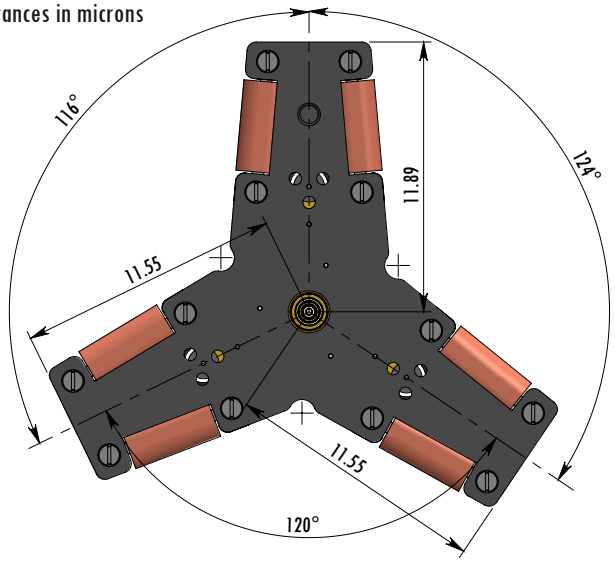


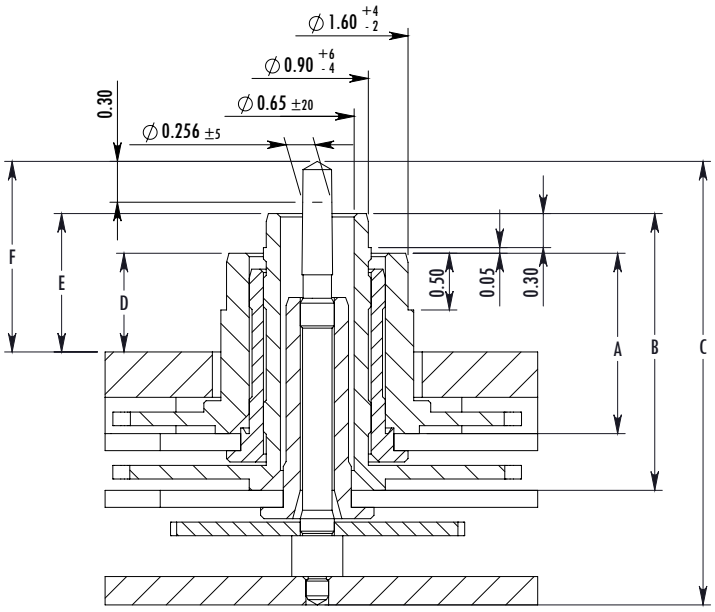
DIMENSIONS



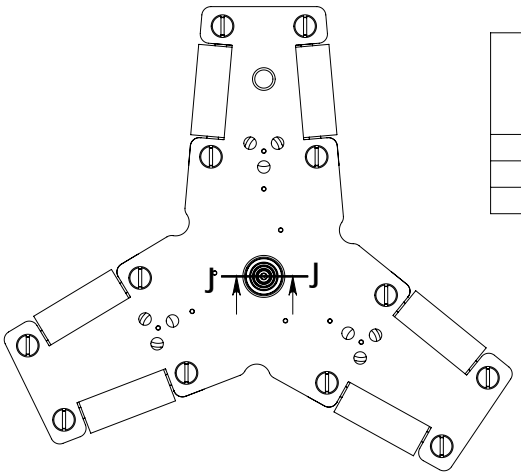
All dimension in mm
tolerances in microns



HAND FITTING

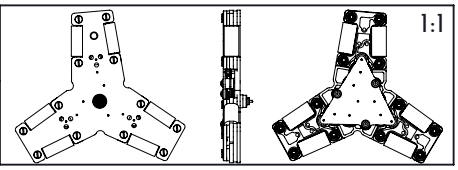


Support mandatory for the hand press in

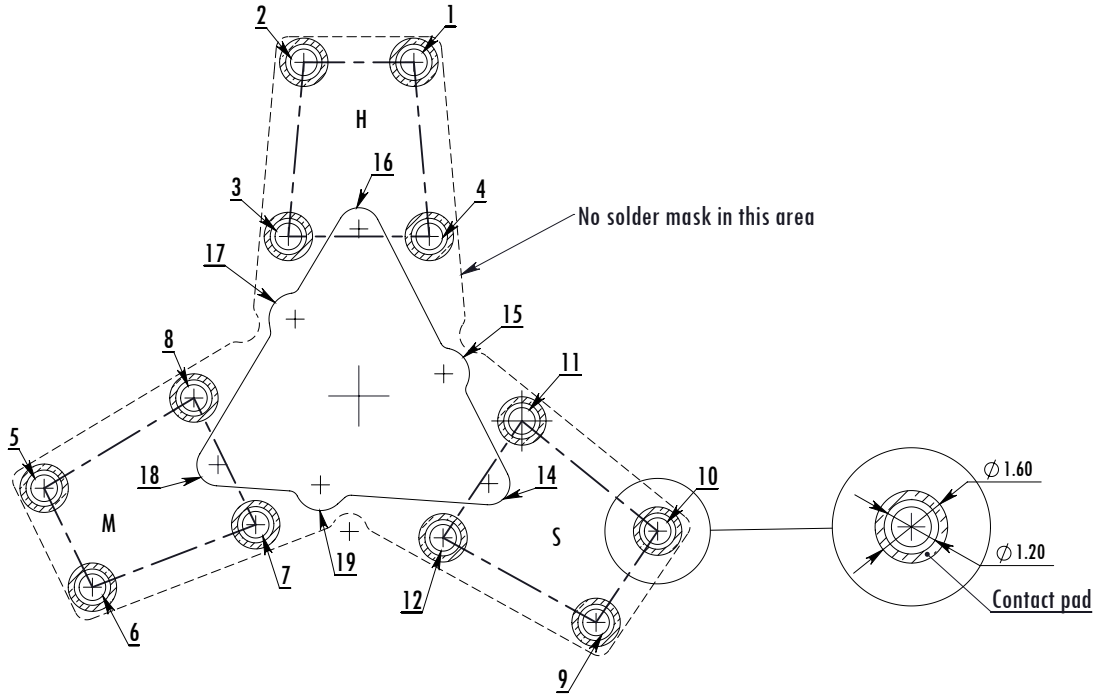


Hand fitting	Lenght			Height over dial seat		
	A	B	C	D	E	F
	Hour	Minute	Second	Hour	Minute	Second
H1	1.59	2.44	3.91	0.87	1.22	1.68
H4	2.34	3.19	4.66	1.62	1.97	2.43
H6	2.84	3.69	5.16	2.12	2.47	2.93

Other heights on demand



PCB LAYOUT



Connection pad location ⌖ 90 XY

REP.	X	Y	Size	TOL. [µm]	Note
1	1.820	11.031	Ø 0.88	±20	not connected
2	-1.820	11.031			Ch
3	-2.330	5.273			Ah
4	2.330	5.273			Bh
5	-10.404	-3.049			not connected
6	-8.808	-6.321			Cm
7	-3.410	-4.255			Am
8	-5.453	-0.067			Bm
9	7.843	-7.485			not connected
10	9.878	-4.468			Cs
11	5.390	-0.825			As
12	2.784	-4.689			Bs

Milling coordinates ◠ 200

14	4.295	-2.897	R 0.70		
15	2.806	0.733	R 0.85		
16	0.000	5.523	R 0.70		
17	-2.105	2.541	R 0.85		
18	-4.656	-2.271	R 0.70		
19	-1.269	-2.938	R 0.85		

Connection to main board is ensured trough S0.60 Screws
Soprod reference: 500.001 for PCB from 0.40 to 0.60 mm thick.