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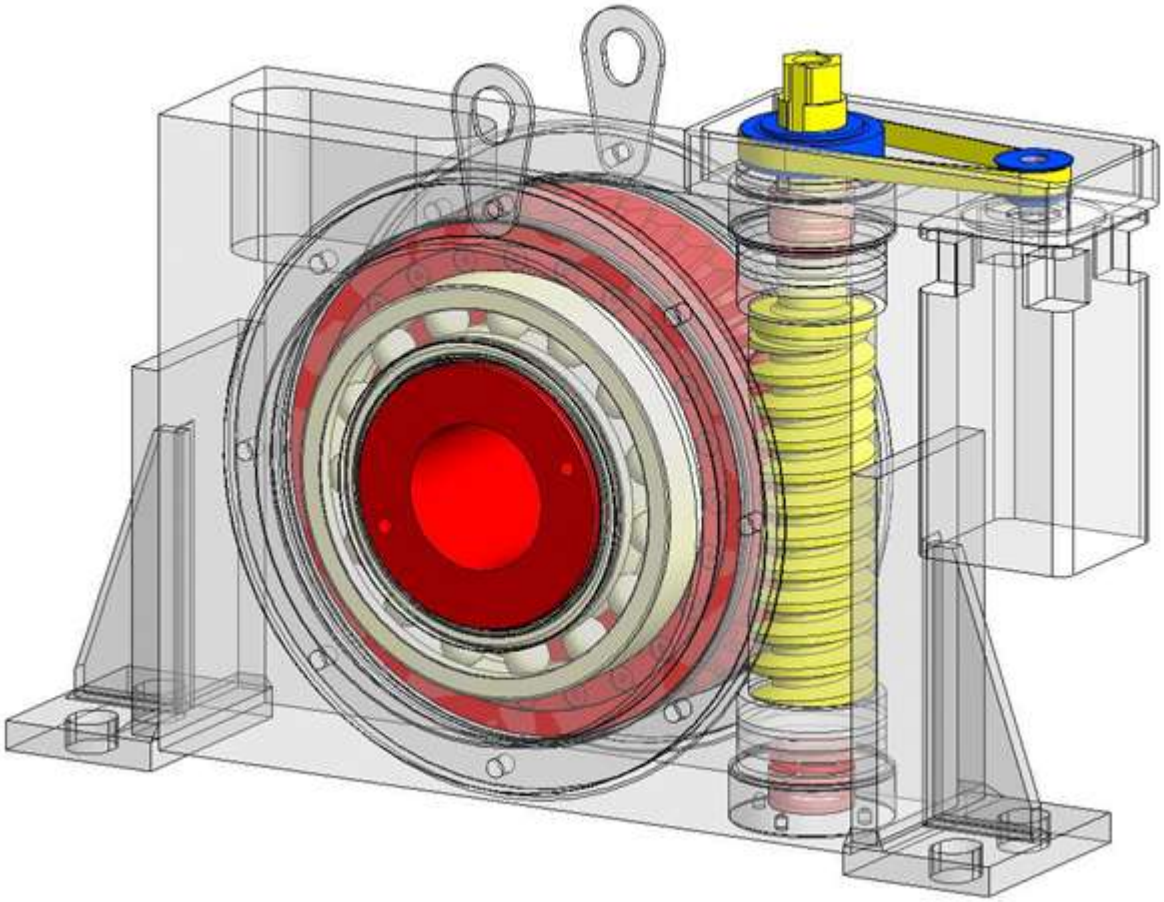
CATALOGUE

SIGUREN
failsafe movement

SIGUREN UNIT®
"Motosuiveur®" (MS)



Crane application

July 2014

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SIGUREN
failsafe movement

All indications listed in this catalogue (characteristics and dimensions) are subject to be modified, they can not consitute a commitment from Siguren.

1 PRESENTATION OF SIGUREN UNIT®

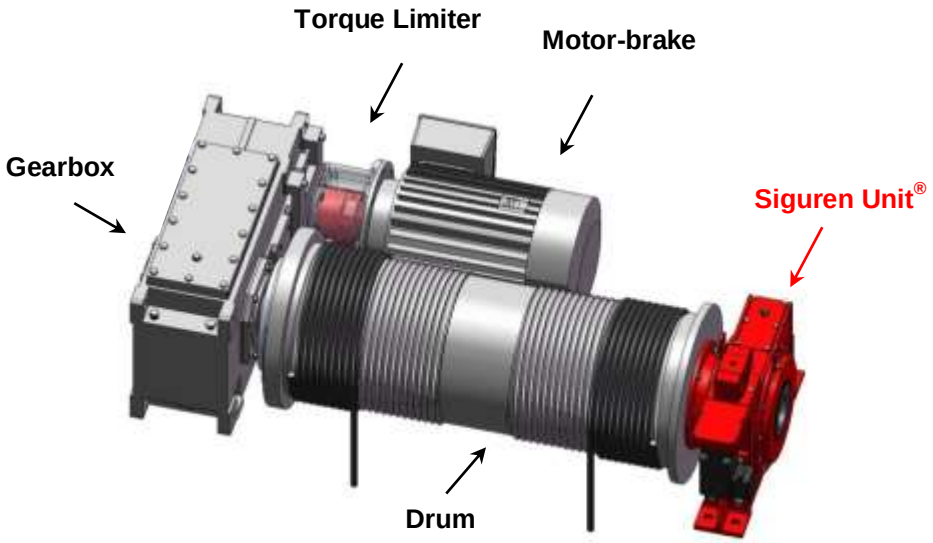
1.1 APPLICATION OF SIGUREN UNIT®

SIGUREN UNIT® (MS) is a hoist safety device, preventing from load drop and overloads in case of electrical or mechanical failure. It is designed to protect winches against risks of control loss on the handled load.

It's a permissive load arrestor in the event of electrical or mechanical failure.

This compact self-locking unit :

- Ensures **alone all the safety functions**: load drop, snag load,
- **Eliminates** dynamic overloads and overspeed,
- Negates the need for a secondary safety brake,
- Ensures failsafe operation (alternative actuation path),
- Has an independent load recovery option,
- Range from 10 Kg to 250 tonne cranes,
- No wear parts.



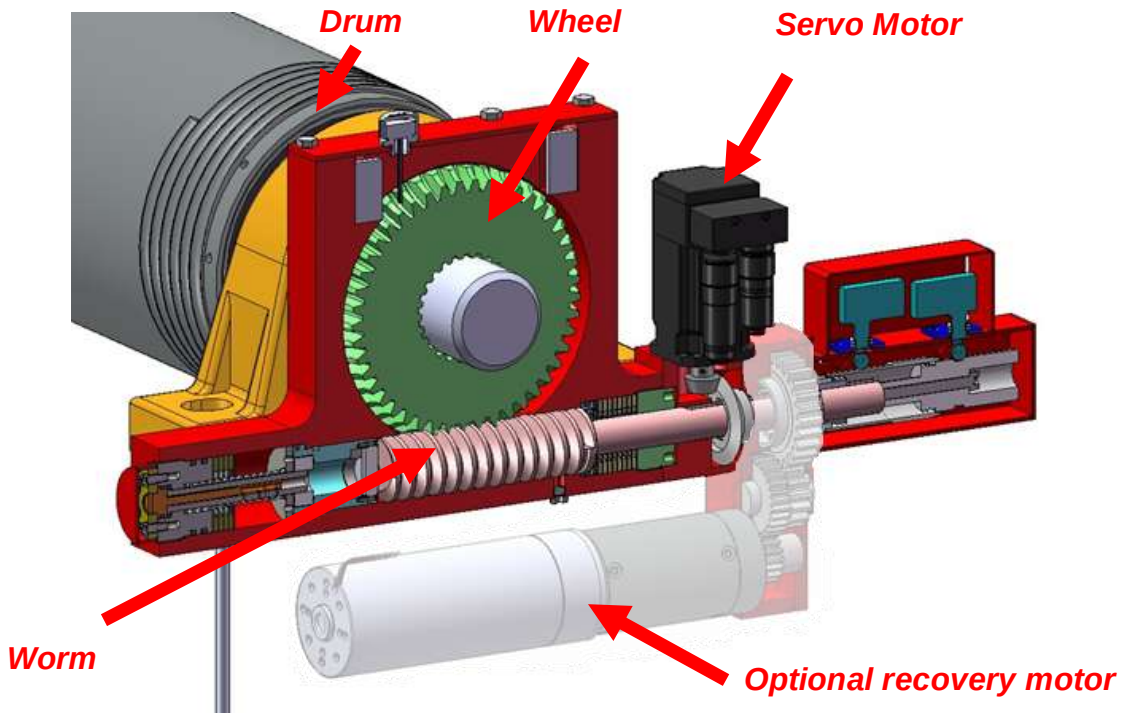
Options :

- Event monitor (cycles, load spectrum, alarms …)
- Diagnostic aid and preventive maintenance (SWP to FEM 9.755)
- Removable or integrated recovery mechanism, remotely engageable
- Position management

1.2 OPERATING PRINCIPLE

A failsafe mechanical hoist brake, the Motosuiveur® (MS) consists of a worm and wheel gearbox mounted directly to the hoist drum. The worm is a permissive system which allows the wheel and barrel to rotate at any speed within the hoist's normal operating parameters. Any large differential acceleration between the worm and wheel will cause the system to mechanically lock, safely arresting the load.

This provides mechanical failsafe protection in the event of any electrical or mechanical failure



Should an arrest situation occur, the Motosuiveur® absorbs any impact force, bringing the load to a safe drop within 30° rotation of the drum. Dependant on rope and barrel configurations, this could translate to a load drop of as little as just 15mm before arrest.

The incorporation of a Motosuiveur® unit means the reliance on the integrity of the motor, gearbox, drum or shaft is reduced. This allows for the incorporation of a torque limiter between the motor and gearbox which gives mechanical protection against any overload, for example in the event of a snagged load or double blocking.

With an arrested load held by the worm and wheel, an optional integrated independent recovery motor is able to drive the worm to remotely recover the arrested load.

1.3 TWO VERSIONS

There are two types of SIGUREN UNIT®:

- **Damping (Hydraulic or Elastomer):**
  its main feature is the constant braking distance, which is limited by design to approximately 30° of rotation of the drum (or on SIGUREN UNIT® wheel),
  Usually, Hydraulic Damping version must be used with a torque limiter in the hoist power train, providing absolute safety against dynamic overloads

- **Passive Friction - with or without Torque Limiter (TL):**
  its main feature is the factory set braking torque.

1.4 GENERAL DESCRIPTIONS OF THE SIGUREN UNIT

A classic winch equipped with a SIGUREN UNIT® is typically made up of the following main parts:

1.4.1 Mechanical part

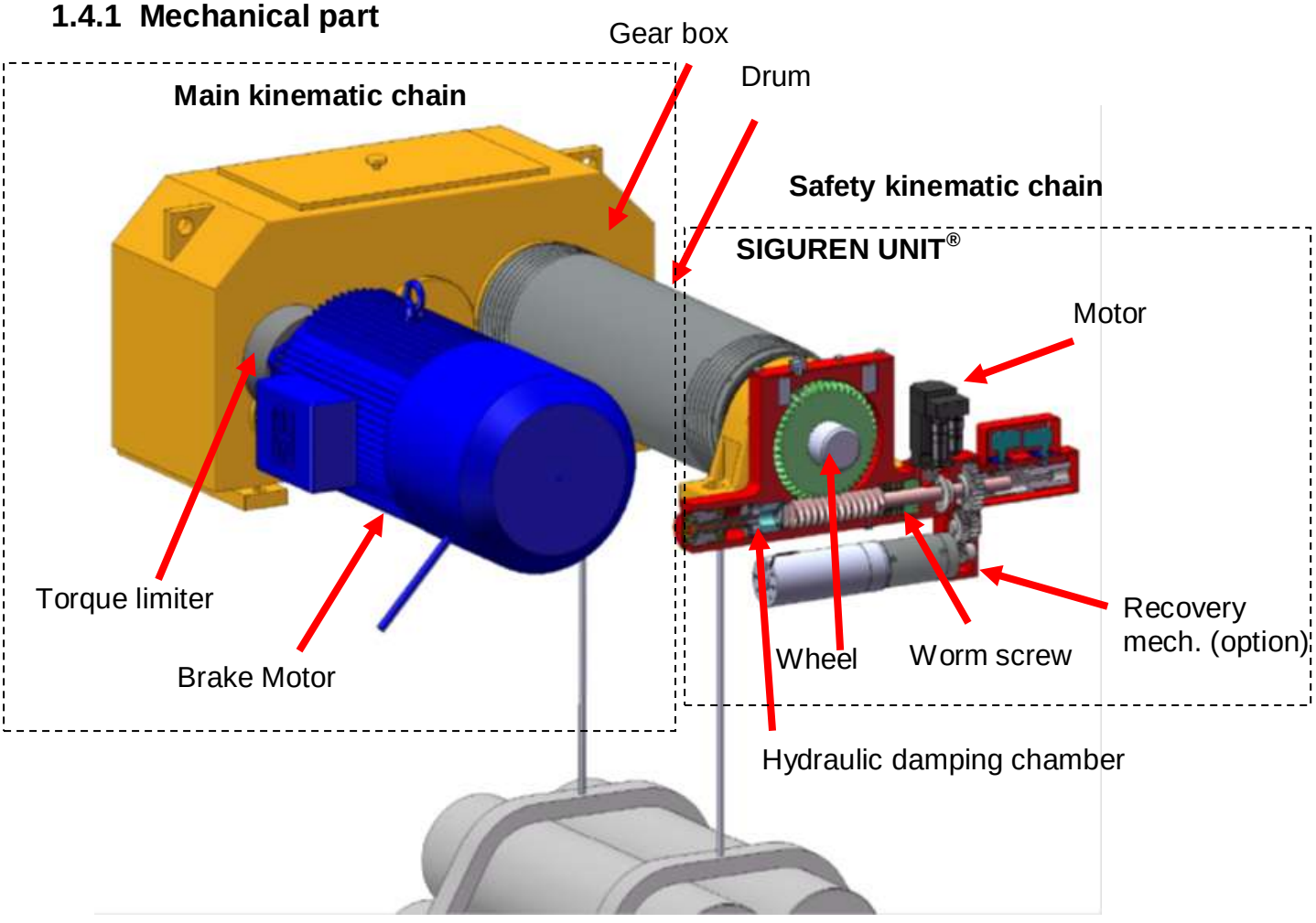


Figure 1: Winch equipped with hydraulic damping SIGUREN UNIT®

1.4.2 Electrical part

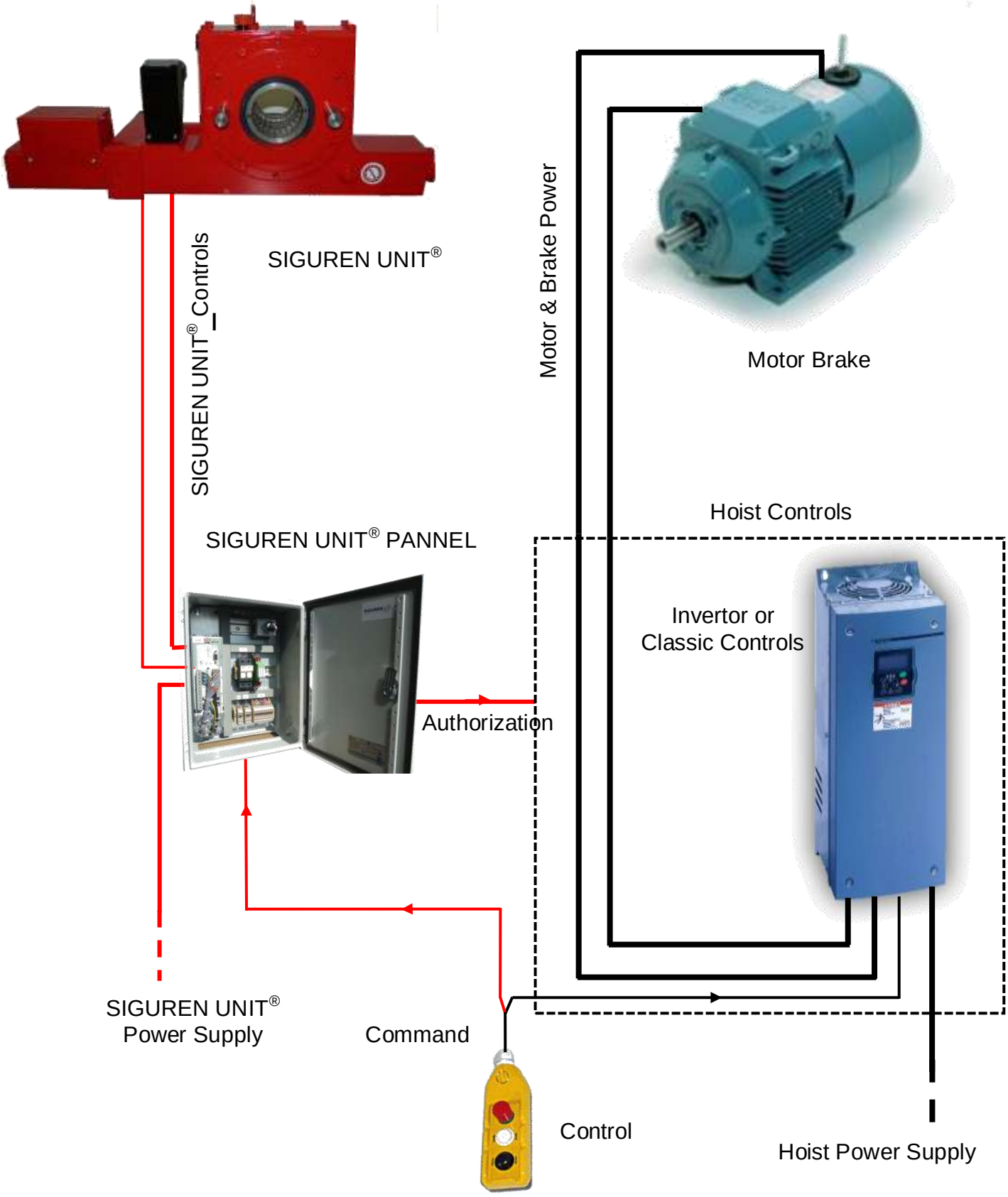
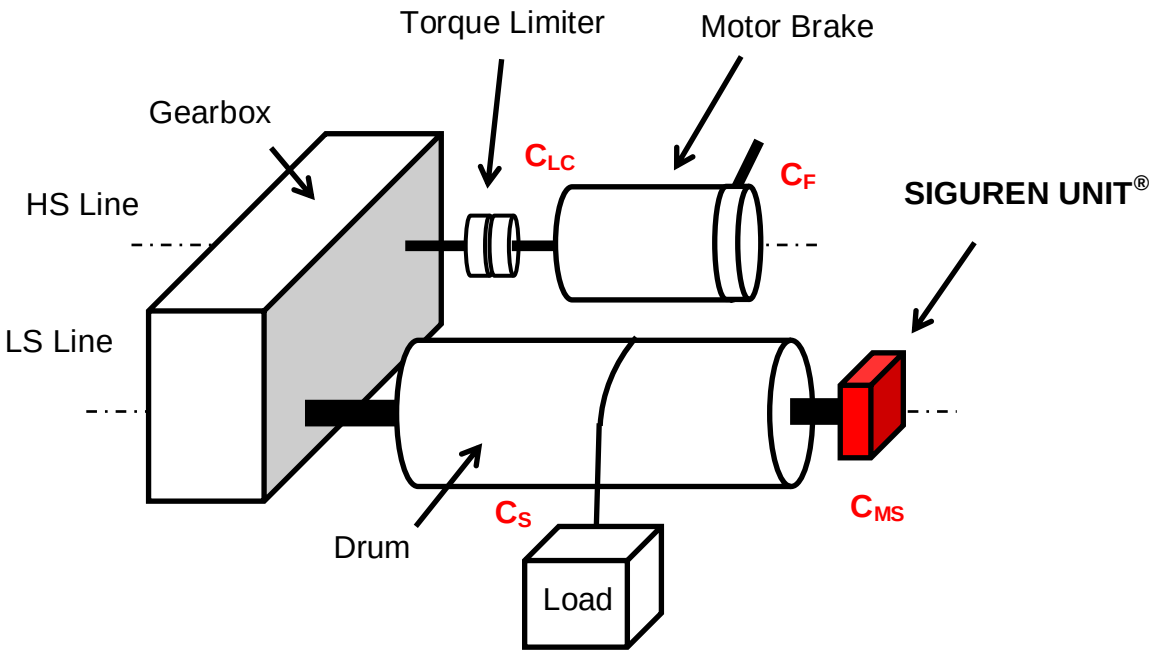


Figure 3: General electrical configuration

1.5 FUNCTIONAL STATES

A classic winch equipped with a SIGUREN UNIT® typically consists of the following parts:



C_S : Static Torque at the Drum

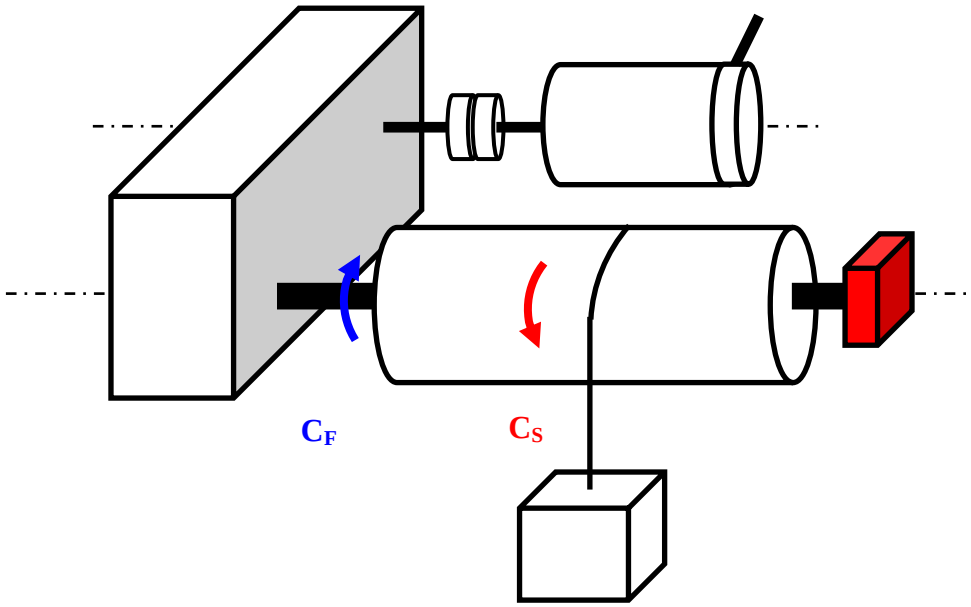
C_F : Brake Torque

C_{MS} : MS Braking Torque

C_{LC} : Torque Limiter Slippage Torque

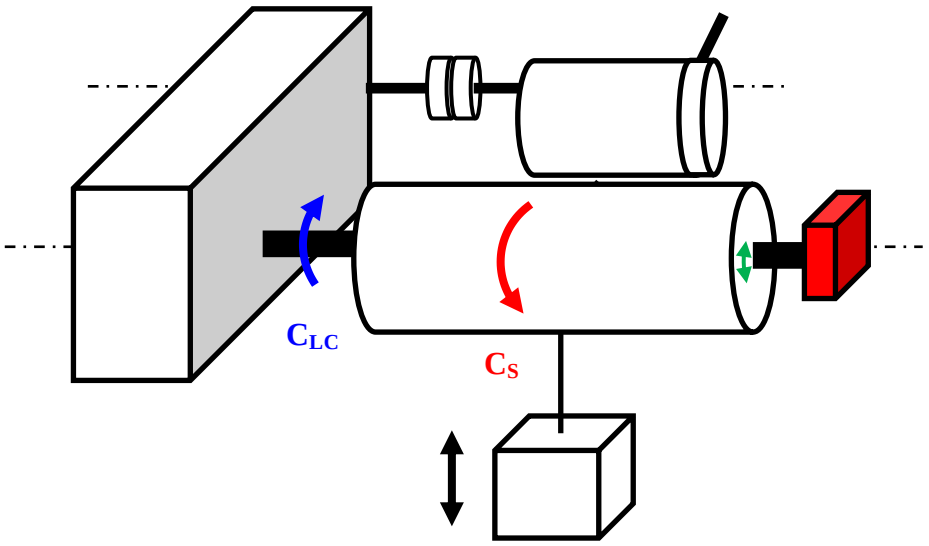
1.5.1 At Stop

During no movement, the load is hold by the service brake. No torque on SIGUREN UNIT® during this state.



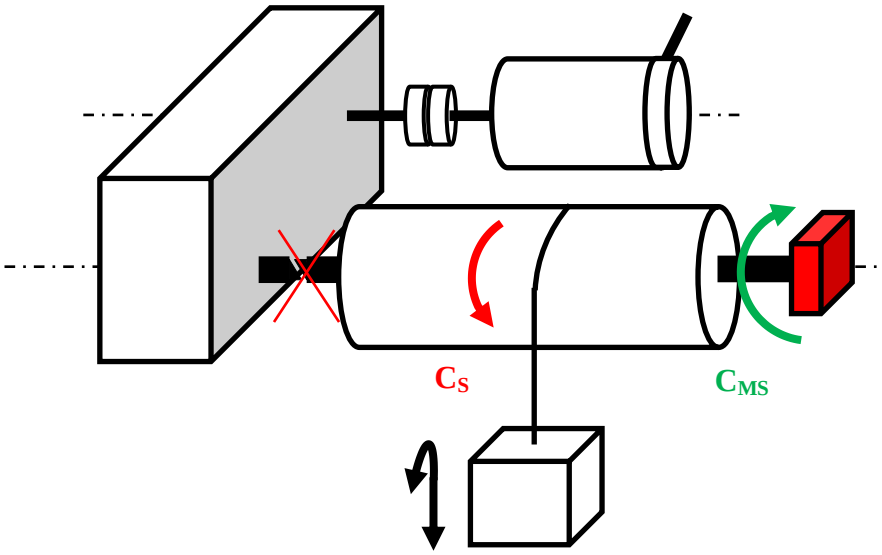
1.5.2 Follow-up

During the follow-up phase down or up direction, the load is hold by the winch motor. The SIGUREN UNIT® follows the movement of the drum.



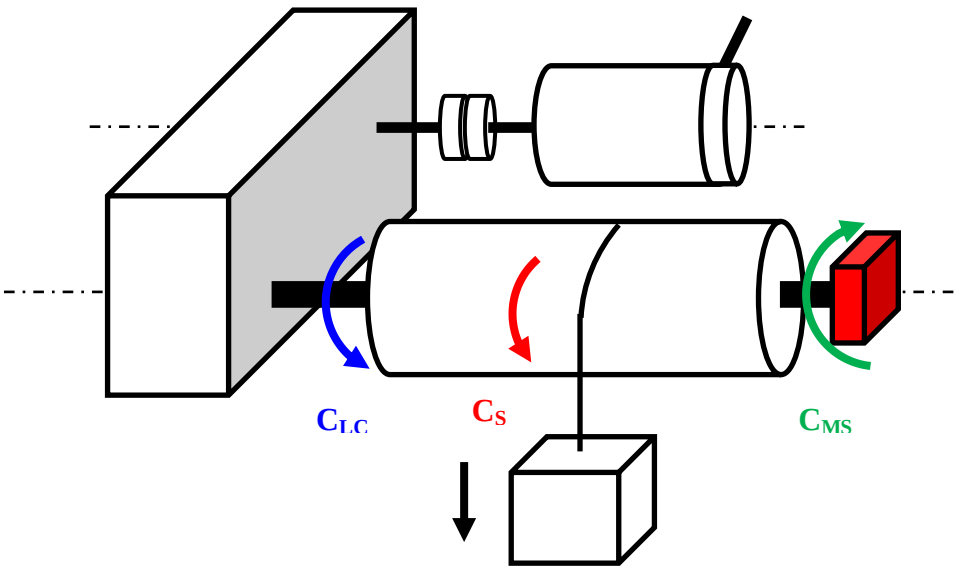
1.5.3 Electrical or mechanical failure

When the power train loses the control of the drum (eg shaft rupture or electrical failure), the MS triggers, because it is not able to follow the resulting acceleration. The load is arrested and holds by the SIGUREN UNIT®. During the braking, the torque Cms can reach 2.5xCs (Damping MS) or 1.4 to 2 x Cs (Friction MS), depending on the remaining inertia and on the behaviour of the motor and brake (energized or not).



1.5.4 Overspeed

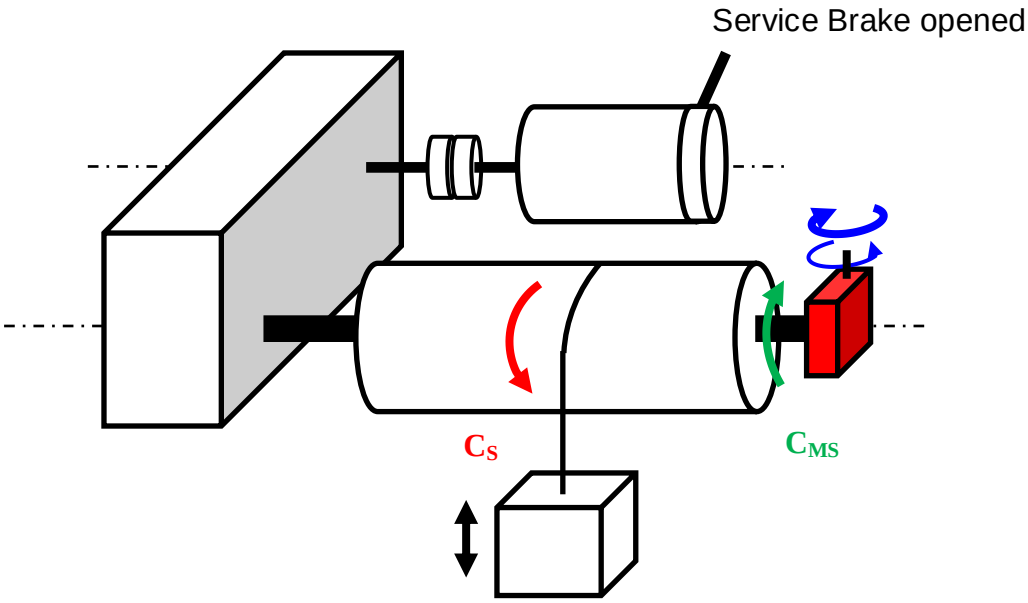
The SIGUREN UNIT® is monitoring the actual speed of the drum. Should an over speed occurs without excessive acceleration; it detects it and acts on the hoist controls. If the hoist controls fail to stop the movement, it will arrest the load.



1.5.5 Recovery

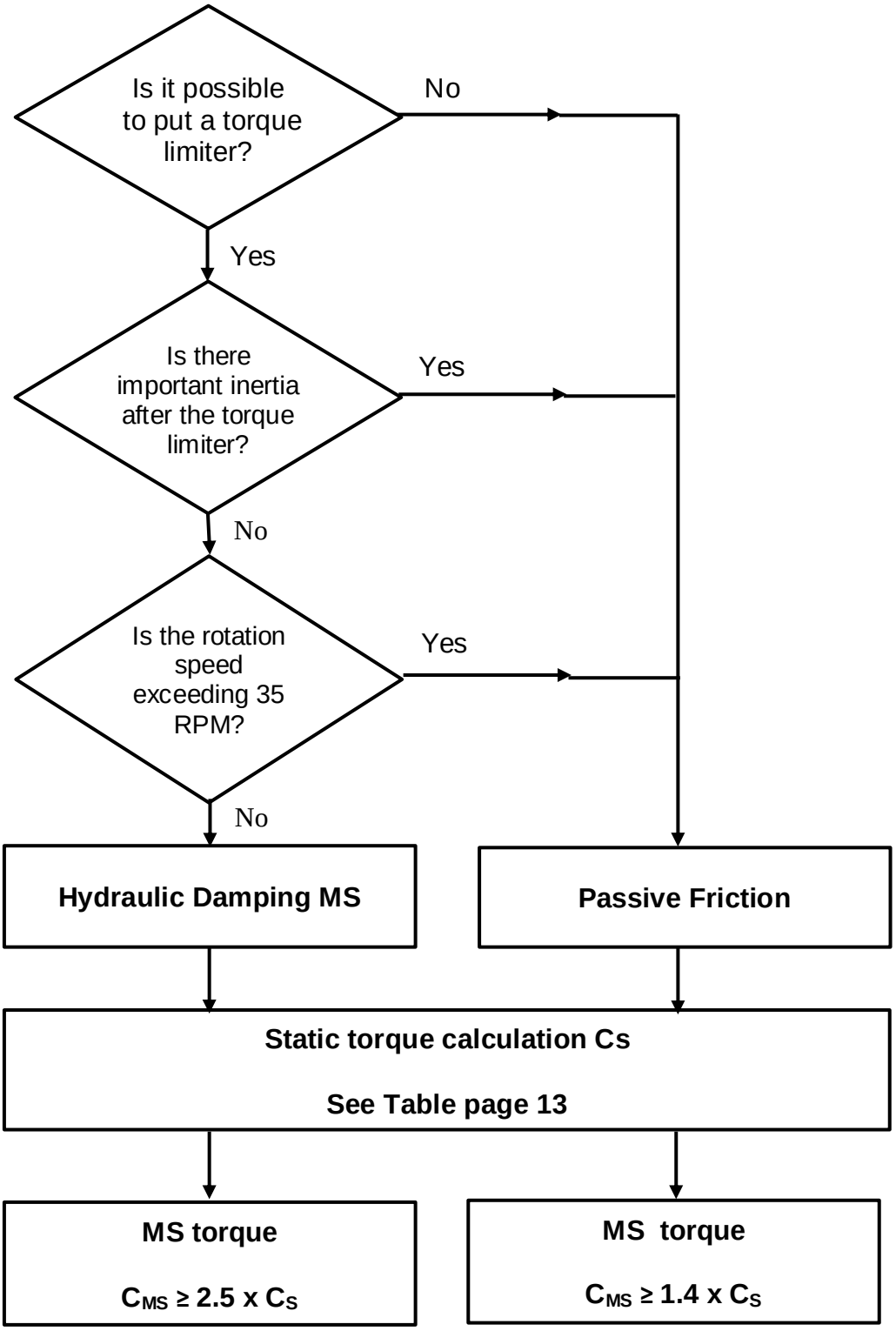
By turning the SIGUREN UNIT® shaft, it is possible to lower / lift the load. If still active, the service brake can be opened without any risk. At full load, the raising torque is approximately 3 times bigger than the lowering torque.

Optionally, the SIGUREN UNIT® can be equipped with an electrical, pneumatical or hydraulic recovery built-in facility or a recovery drive can be supplied separately.



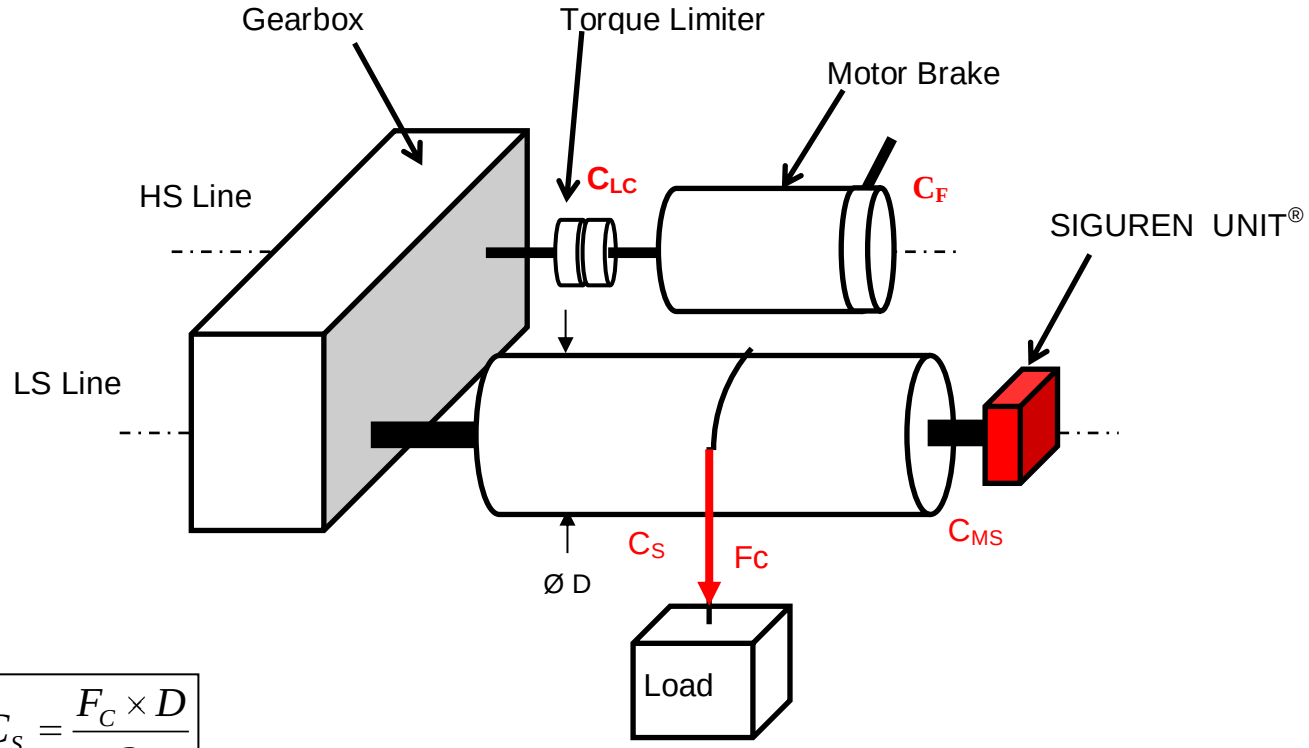
2 HOW TO SELECT YOUR SIGUREN UNIT®

2.1 SIGUREN UNIT® TYPE SELECTION DIAGRAM



2.2 HYDRAULING DAMPING SIGUREN UNIT®

The main criterion is the damping torque at full speed Vmax. The starting point to define this torque is the full load static torque at the drum (or at the MS wheel) Cs, without taking into account the efficiency.



$$C_S = \frac{F_C \times D}{2}$$

In order to be able to lift the full load, the torque limiter slippage point C_{LC} should be set to:

$$\mathbf{C_{LC} \geq 1.2 \times C_S}$$

The damping torque (C_{MS}) at full speed Vmax is set to:

$$\mathbf{C_{MS} \geq (C_S + C_{LC}) \times 1.13}$$ or approximately $$\mathbf{C_{MS} \geq 2.5 \times C_S}$$

The Hydraulic Damping SIGUREN UNIT® is intended only for kinematic chains with low inertia, where the system is compatible with a stop in 30° of rotation at the SIGUREN UNIT® wheel.

Generally, there should not be brake between the torque limiter and the SIGUREN UNIT® and the maximum speed of rotation of this later should not exceed 30 to 35 RPM.

2.3 PASSIVE FRICTION SIGUREN UNIT®

The Passive Friction SIGUREN UNIT® is directly selected to ensure sufficient torque to stop the full load.

Generally, $\mathbf{C_{MS} \geq 1.4 \times C_S}$

The speed at the SIGUREN UNIT® wheel can be up to 100 RPM.

See Table next page.

3 SIGUREN UNIT® SIZE

MS size	Maximal braking torque : Hydraulic Damping MS	Maximal braking torque : Passive Friction MS	Recovery option : Lifting capacity
	C_{MS}_hyd	C_{MS}_fri	C_{MS}_rec
Units	Nm	Nm	Nm
MS0	4 000	2 400	1 600
MS1	9 500	6 100	3 800
MS2	18 500	12 600	7 400
MS3	32 000	23 000	1 2 800
MS4	50 750	40 000	20 300
MS5	75 750	63 600	30 300
MS6	148 000	130 200	59 200
MS7	-	225 000	102 200

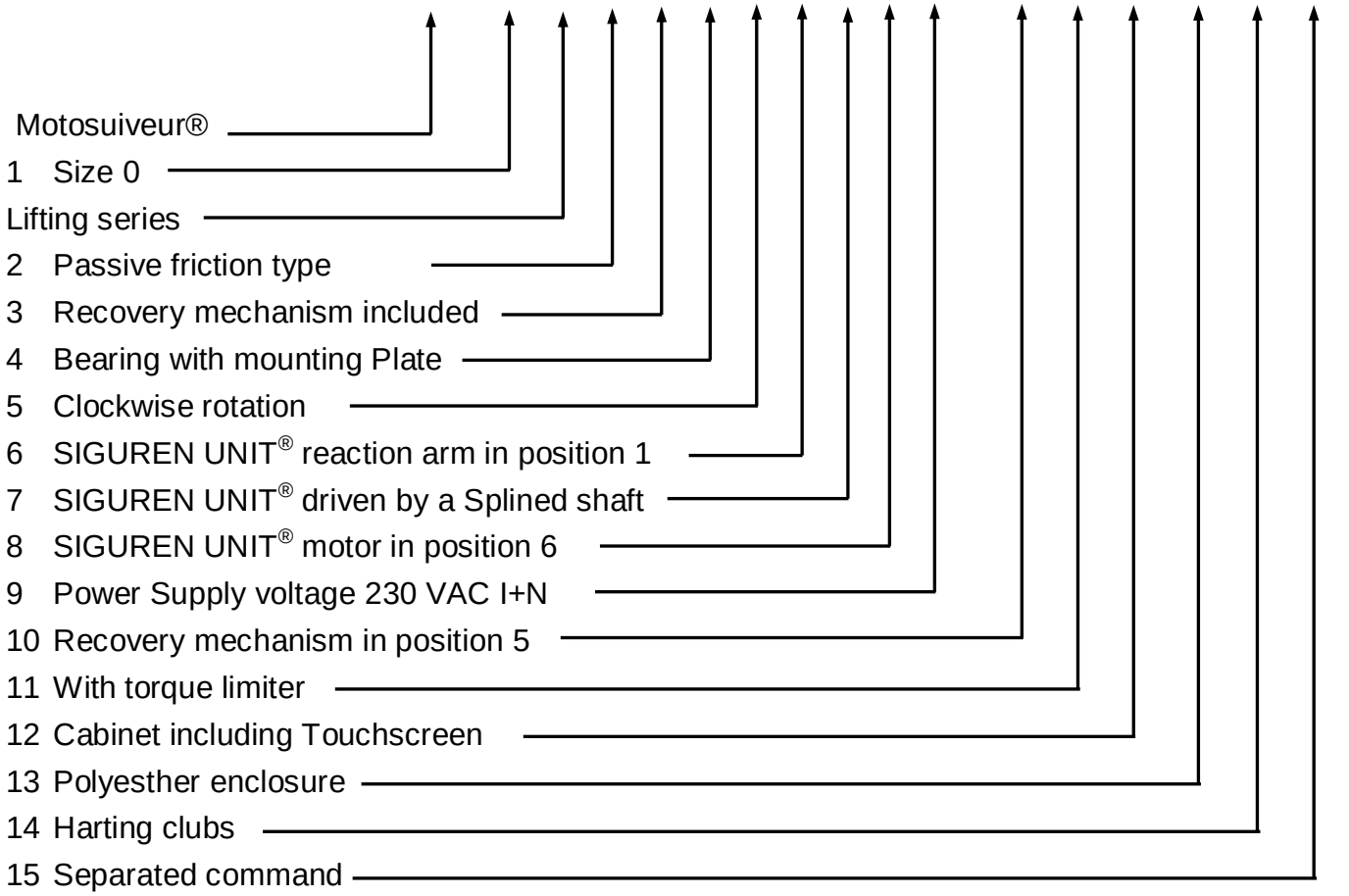
4 CODIFICATION

M	S	1	L	2	3	4	5	6	7	8	9	/	10	11	12	13	14	15

***Example** : MS0 L F R P C 1 S 6 1 / 5 TS*

Example :

M	S	0	L	F	R	P	C	1	S	6	1	/	5	TL	TS	CP	C	CD

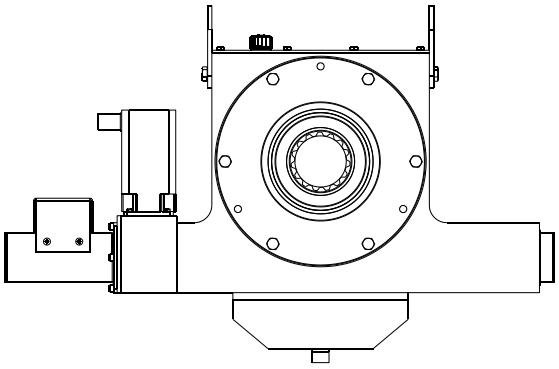


1	**SIZE (cf. §3)**	
	Hydraulic damping	**0/ 1/ 2/ 3/ 4/ 5/ 6**
	Passive friction	**0/ 1/ 2/ 3/ 4/ 5/ 6/ 7**
2	**TYPE (cf. §5)**	
	Hydraulic damping	**D**
	Passive friction	**F**
	Elastomer damping	**E**
3	**RECOVERY (cf. §6)**	
	Integrated Electrical Recovery Mechanism	**R**
	Electrical Recovery Tool Included	**E**
	Manual Recovery Tool Included	**M**
	Not Applicable	**X**
4	**MOUNTING TYPE (cf. §7)**	
	Bearing with mounting plate	**P**
	Foot mounted bearing (only for passive friction)	**F**
	Shaft mounted with reaction arm on side	**A**
	Shaft mounted with reaction arm support	**S**
5	**ROTATION DIRECTION AT LOWERING (cf. §8)**	
	Clockwise	**C**
	Anti-clockwise	**A**
6	**SIGUREN UNIT® REACTION ARM POSITION (cf. §10)**	
	Hydraulic damping	
	Bearing with mounting plate	**1**
	Shaft mounted with reaction arm on side	**1/ 2/ 3/ 4/ 5/ 6/ 7/ 8/ 9/ 10/ 11/ 12**
	Shaft mounted with reaction arm support	**1/ 2**
	Passive friction	
	Bearing with mounting plate	**1/ 2/ 3**
	Foot mounted bearing	**1/ 2**
	Shaft mounted with reaction arm on side	**1/ 2/ 3/ 4/ 5/ 6/ 7/ 8/ 9/ 10/ 11/ 12**
	Shaft mounted with reaction arm support	**1/ 2/ 3**
7	**SIGUREN UNIT® DRIVING TYPE (cf. §11)**	
	Splined shaft	**S**
	Flange (only for bearing SIGUREN UNIT® type)	**F**
8	**SIGUREN UNIT® MOTOR POSITION (cf. §12)**	
	1/ 2/ 3/ 4/ 5/ 6/ 7/ 8/ 9/ 10/ 11	
9	**POWER SUPPLY VOLTAGE**	
	230 VAC I+N	**1**
	400VAC III	**2**
	230-400VAC III+N	**3**
	OPTIONS (cf. §13)	
10	Recovery mech. position	**1/ 2/ 3/ 4/ 5/ 6/ 7**
11	Torque limiter (1) (only for passive friction MS)	**TL**
12	Touchscreen	**TS**
13	Steel enclosure	**CT**
	Stainless steel enclosure	**CI**
	Polyesther enclosure	**CP**
	Plate enclosure	**P**
14	Terminal blocks	**B**
	Harting Plugs	**C**
15	Separated commands (Recovery mechanism version only)	**CD**

(1) :The Torque Limiter is mandatory with Hydraulic Damping SIGUREN UNIT®

5 SIGUREN UNIT® TYPE

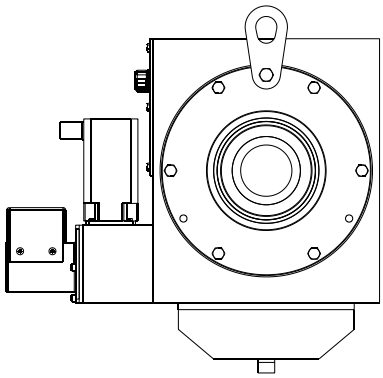
5.1 HYDRAULIC DAMPING SIGUREN UNIT®



D

Figure 4: Hydraulic damping SIGUREN UNIT®

5.2 PASSIVE FRICTION SIGUREN UNIT®

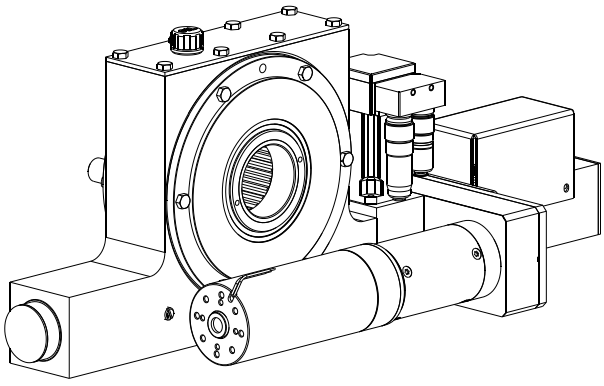


F

Figure 5: Passive friction SIGUREN UNIT®

6 RECOVERY

The purpose of the recovery system is to lower the load on a safe place if a component of the overall lifting equipment is damaged or unavailable.

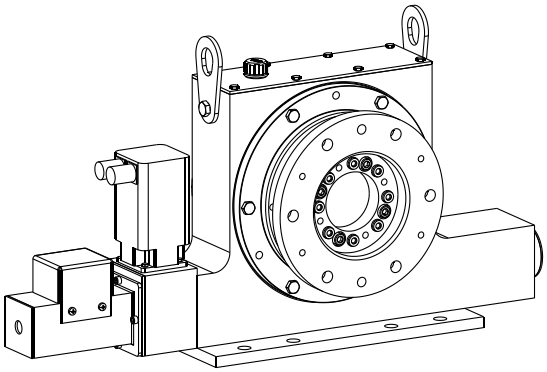


R

Figure 6: SIGUREN UNIT® including recovery mechanism

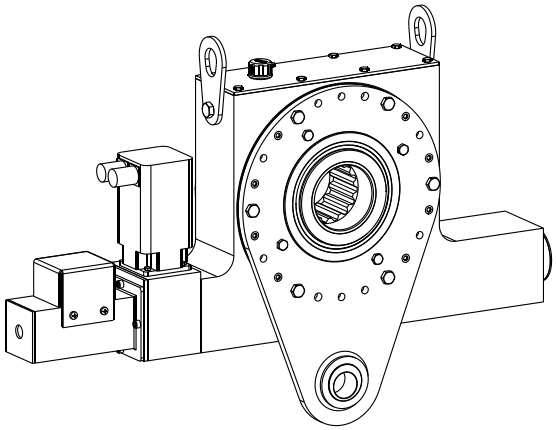
7 MOUNTING TYPE

7.1 HYDRAULIC DAMPING SIGUREN UNIT®



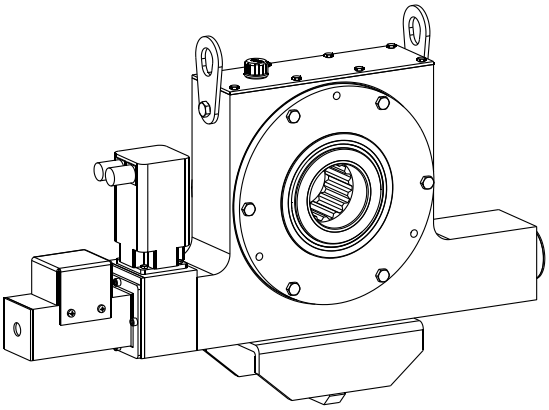
P

Figure 7: Bearing with mounting plate



A

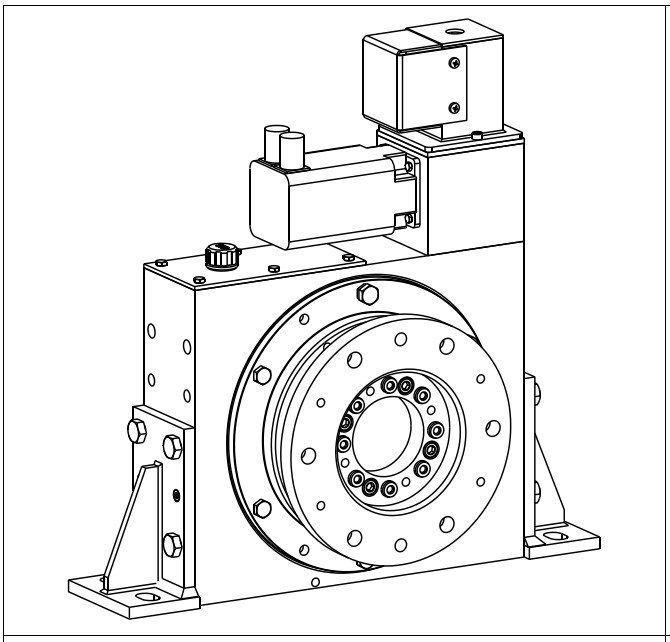
Figure 8: Shaft mounted with reaction arm on side



S

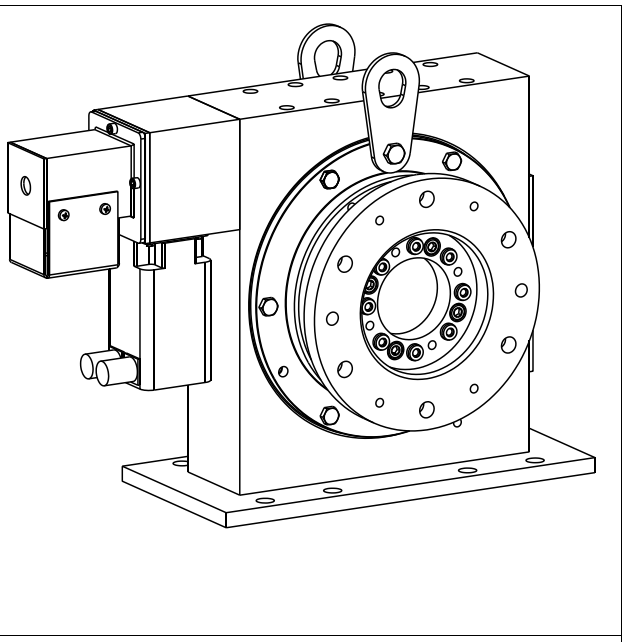
Figure 9: Shaft mounted with reaction arm support

7.2 PASSIVE FRICTION SIGUREN UNIT®



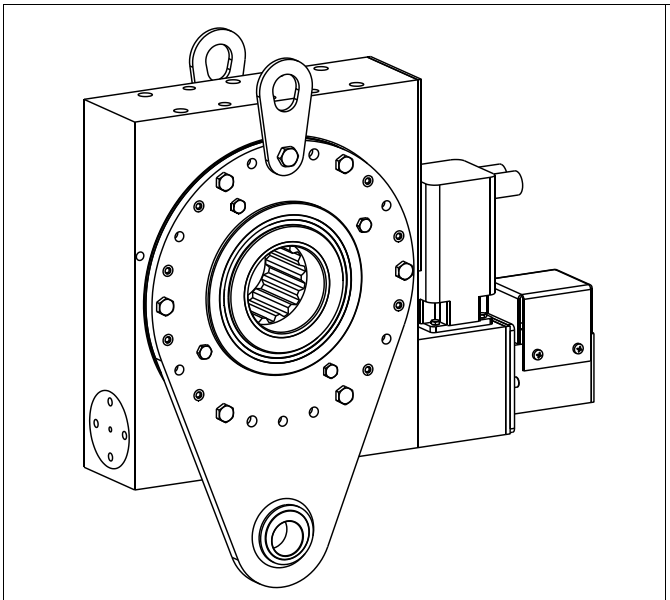
F

Figure 10: Foot mounted bearing



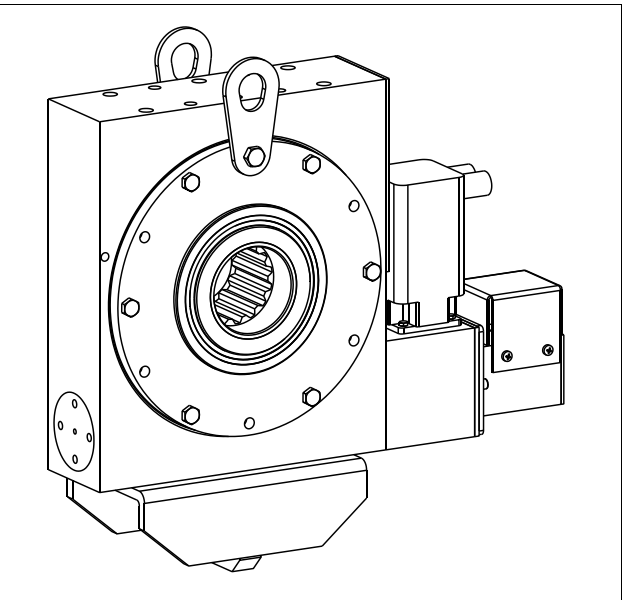
P

Figure 11: Bearing with mounting plate



A

Figure 12: Shaft mounted with reaction arm on side

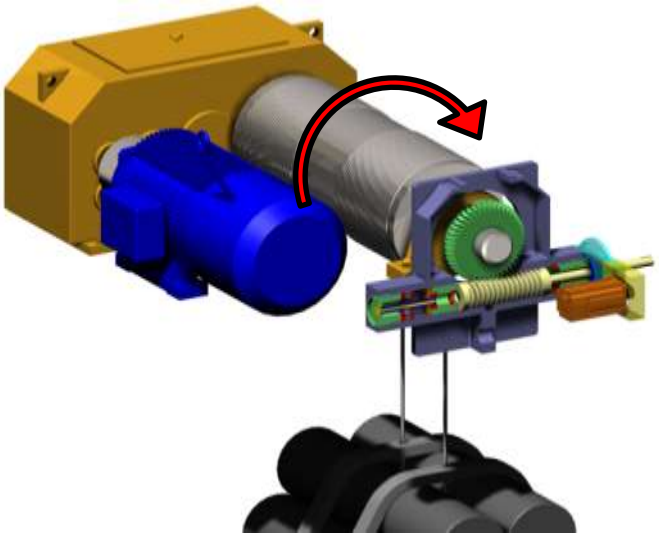


S

Figure 13: Shaft mounted with reaction arm support

8 DIRECTION CHOICE OF THE ROTATION AT LOWERING

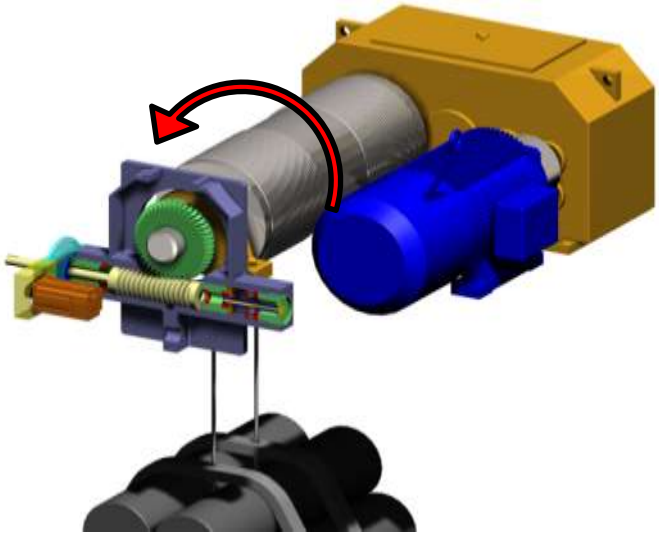
8.1 CLOCKWISE



C

Figure 14: Clockwise

8.2 ANTICLOCKWISE



A

Figure 15: Anticlockwise

9 SIGUREN UNIT® POSITION CHOICE

9.1 HYDRAULIC DAMPING SIGUREN UNIT®

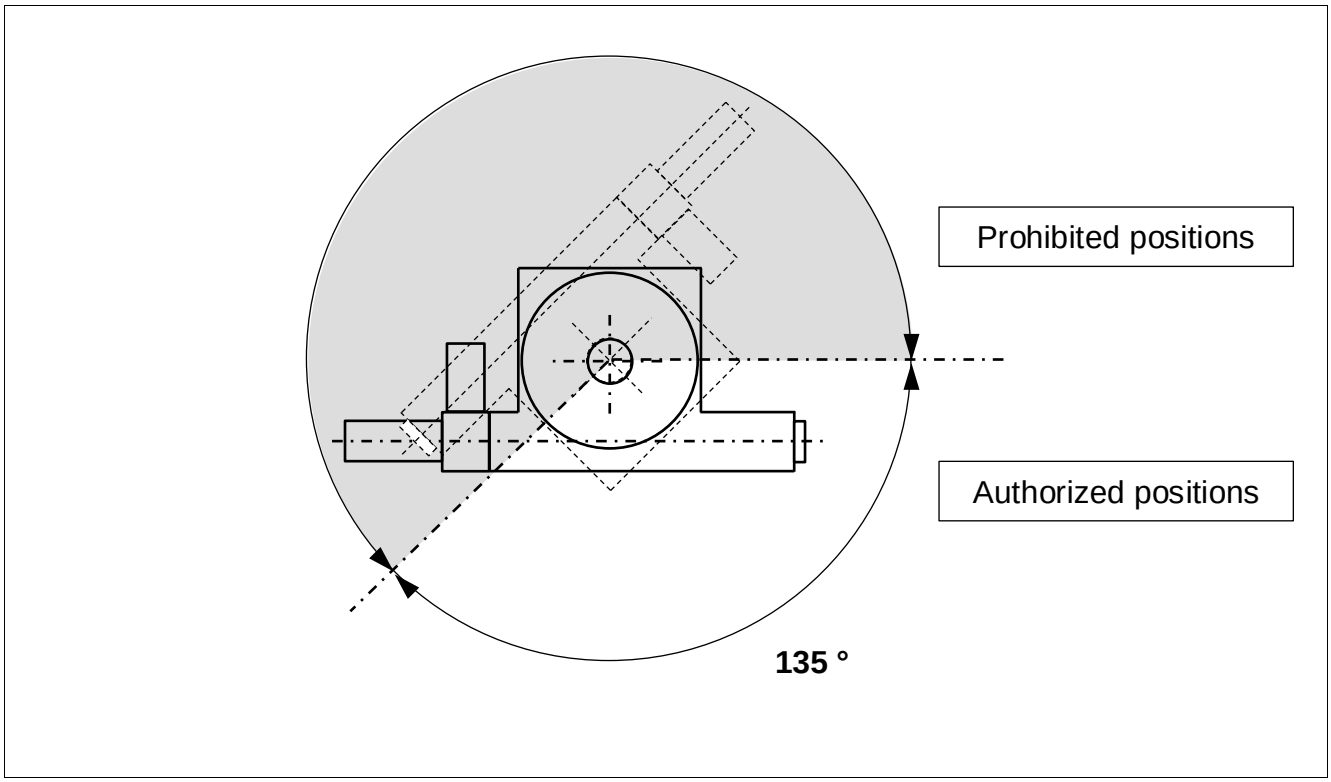


Figure 16: Hydraulic damping SIGUREN UNIT® positions

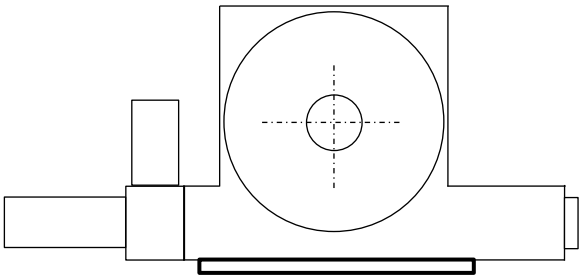
9.2 PASSIVE FRICTION SIGUREN UNIT®

Passive friction SIGUREN UNIT® can be mounted in all positions.

10 SIGUREN UNIT® REACTION ARM POSITION CHOICE

10.1 HYDRAULIC DAMPING SIGUREN UNIT®

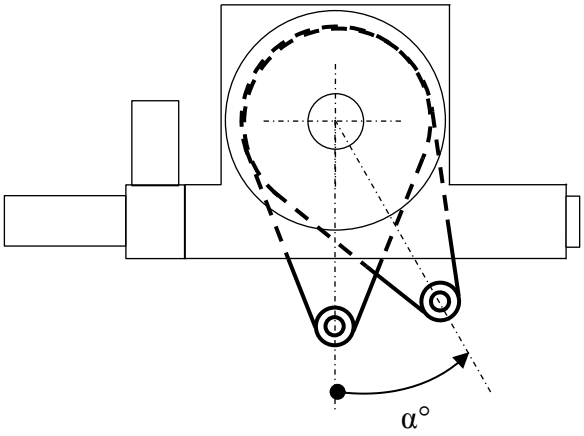
10.1.1 Position of mounting plate



1

Figure 17: Bearing Hydraulic damping SIGUREN UNIT® with mounting plate

10.1.2 Position of reaction arm



1 to 12 (See tables below)

Figure 18: Shaft mounted Hydraulic damping SIGUREN UNIT® with reaction arm on side

For SIGUREN UNIT® size 0, 1, 2, 3 and 4:

Position n°	**1**	*2(1)*	**3**	**4**	**5**	**6**	**7**	*8(1)*
α°	**0**	*45*	**90**	**135**	**180**	**225**	**270**	*315*

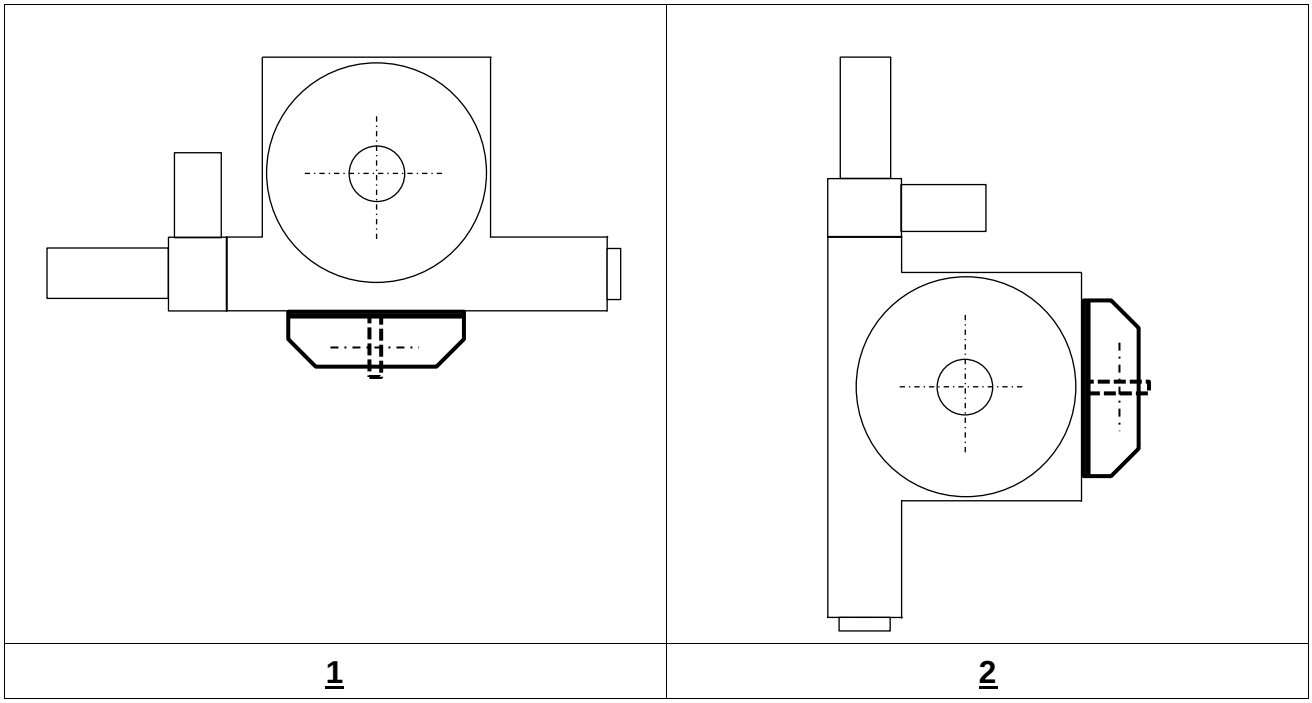
(1) Special positions

For SIGUREN UNIT® size 5 and 6:

Position n°	**1**	**2**	*3(1)*	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*11(1)*	**12**
α°	**0**	**30**	*60*	**90**	**120**	**150**	**180**	**210**	**240**	**270**	*300*	**330**

(1) Special positions

10.1.3 Position of reaction arm support

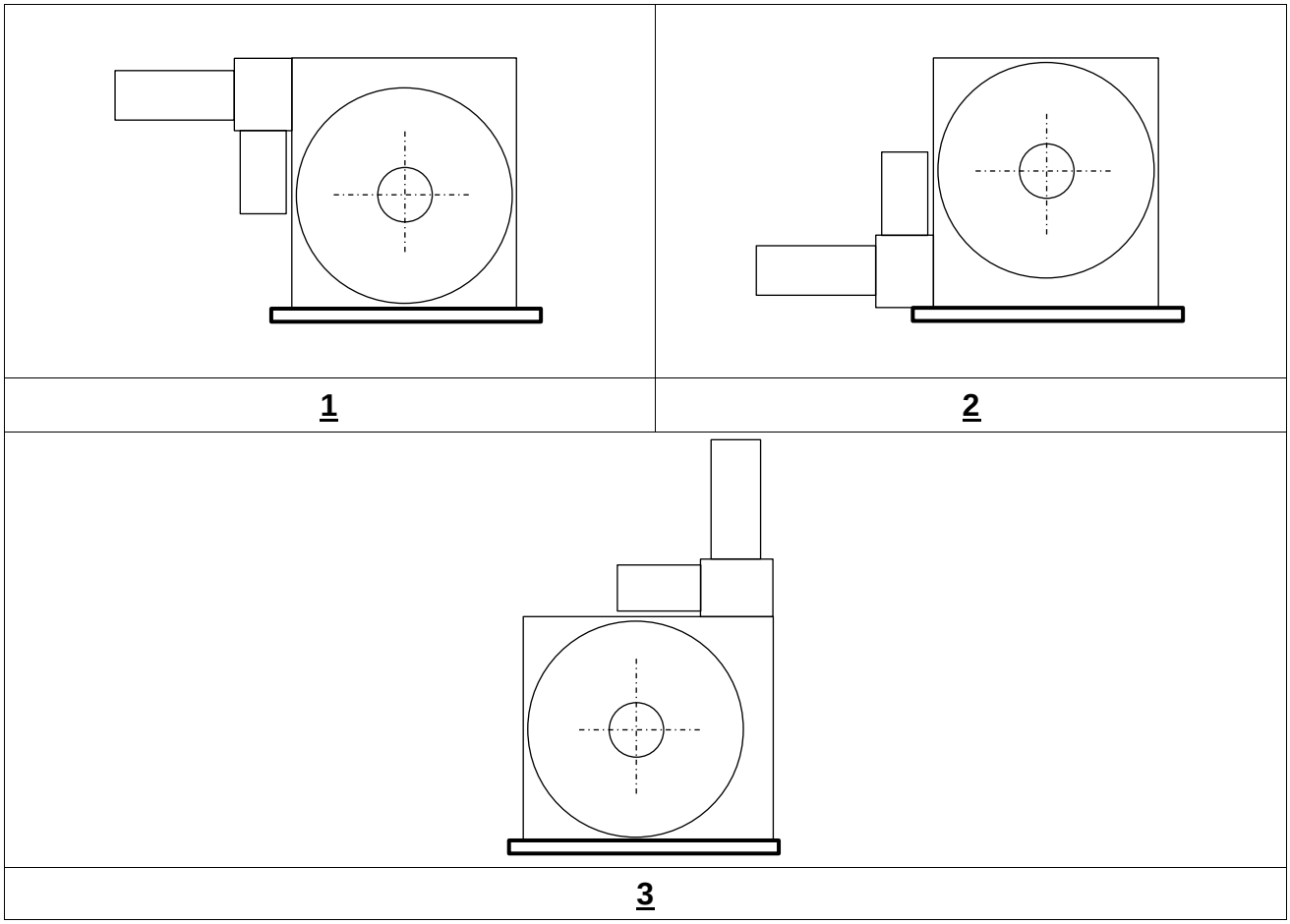


1 **2**

Figure 19: Shaft mounted Hydraulic damping SIGUREN UNIT® with reaction arm support

10.2 PASSIVE FRICTION SIGUREN UNIT®

10.2.1 Position of mounting plate

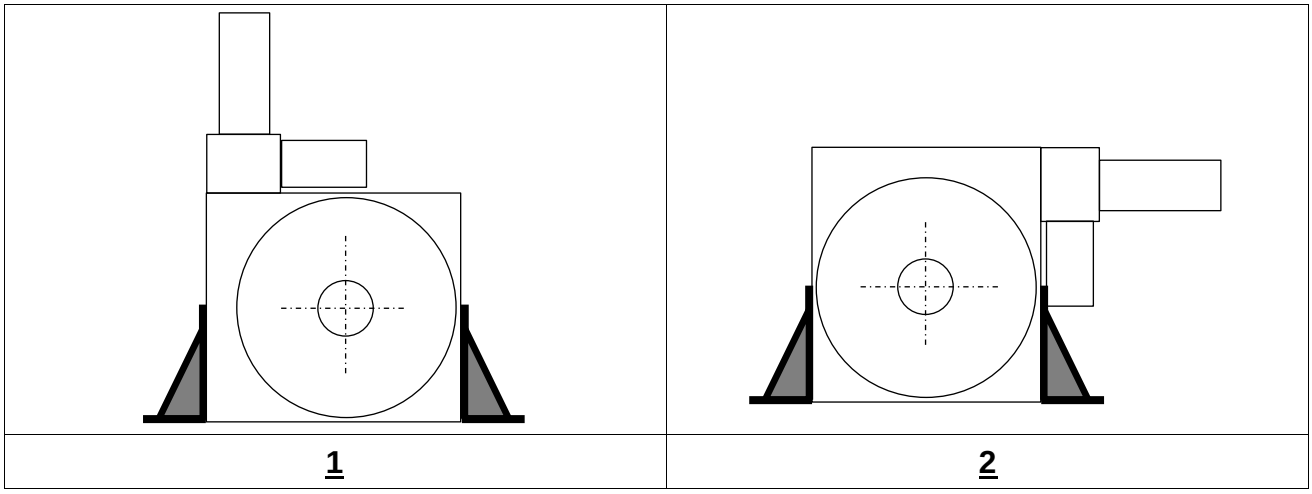


1 **2**

3

Figure 20: Bearing passive friction SIGUREN UNIT® with mounting plate

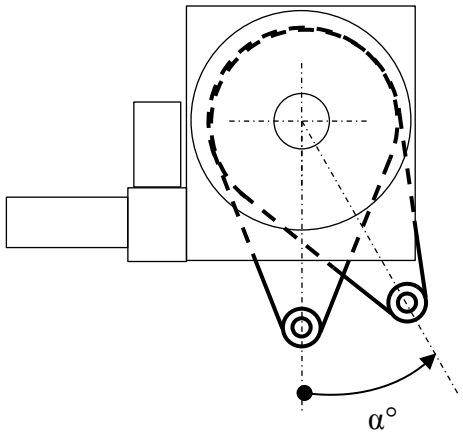
10.2.2 Feet position



1 **2**

Figure 21: Foot Bearing passive friction SIGUREN UNIT®

10.2.3 Position of reaction arm



1 to 12 (See tables below)

Figure 22: Shaft mounted Passive friction SIGUREN UNIT® with reaction arm on side

For SIGUREN UNIT® size 0, 1, 2, 3 and 4:

Position n°	**1**	**2**	**3**	**4**	**5**	**6**	**7**	*8(1)*
α°	**0**	**45**	**90**	**135**	**180**	**225**	**270**	*315*

(1) Special positions

For SIGUREN UNIT® size 5, 6 and 7:

Position n°	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*11(1)*	**12**
α°	**0**	**30**	**60**	**90**	**120**	**150**	**180**	**210**	**240**	**270**	*300*	**330**

(1) Special positions

10.2.4 Position of reaction arm support

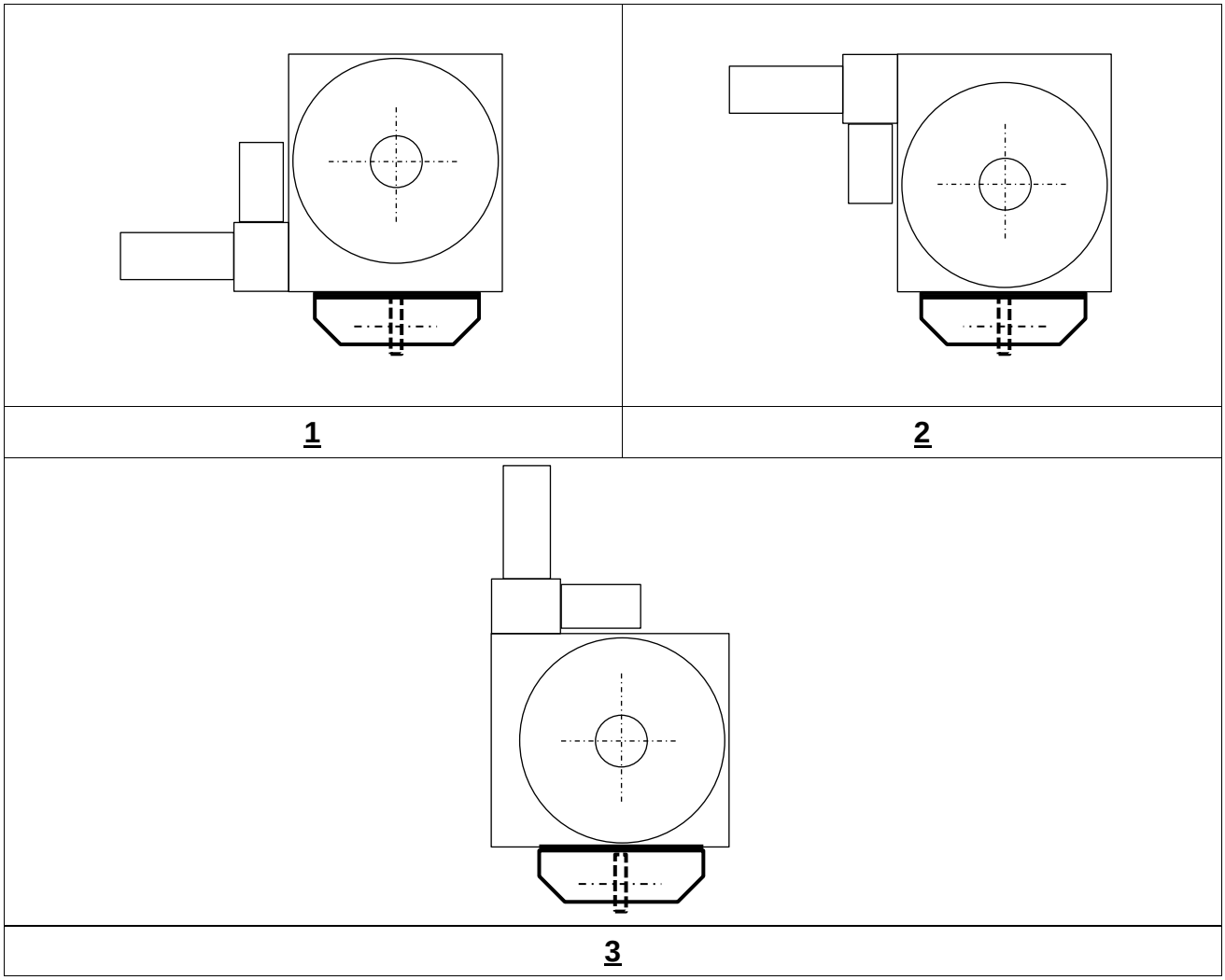
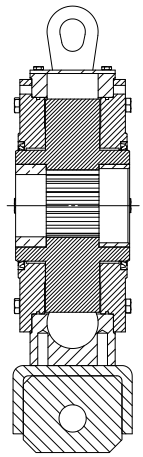


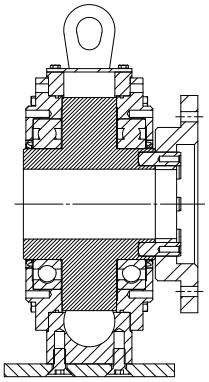
Figure 23: Reaction arm support positions on passive friction SIGUREN UNIT®

11 CHOICE OF THE SIGUREN UNIT® DRIVING TYPE



S

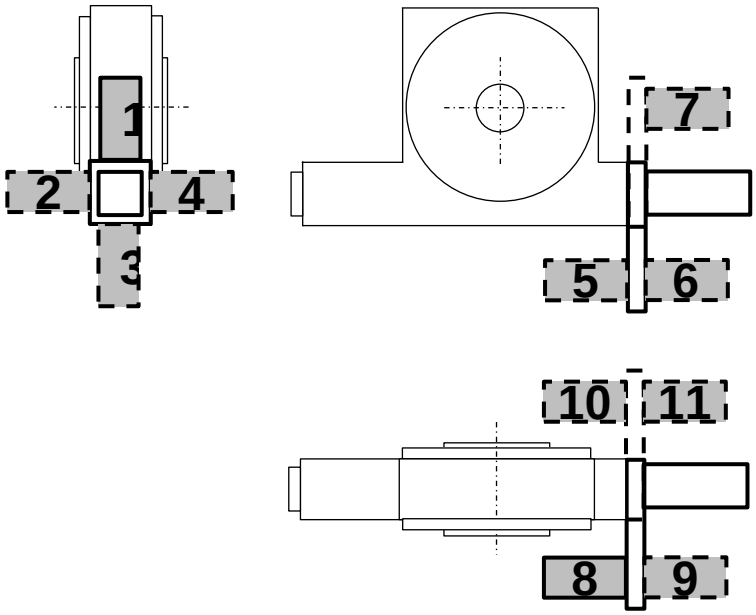
Figure 24: Splined shaft



F

Figure 25: Flange

12 SIGUREN UNIT® MOTOR POSITION CHOICE

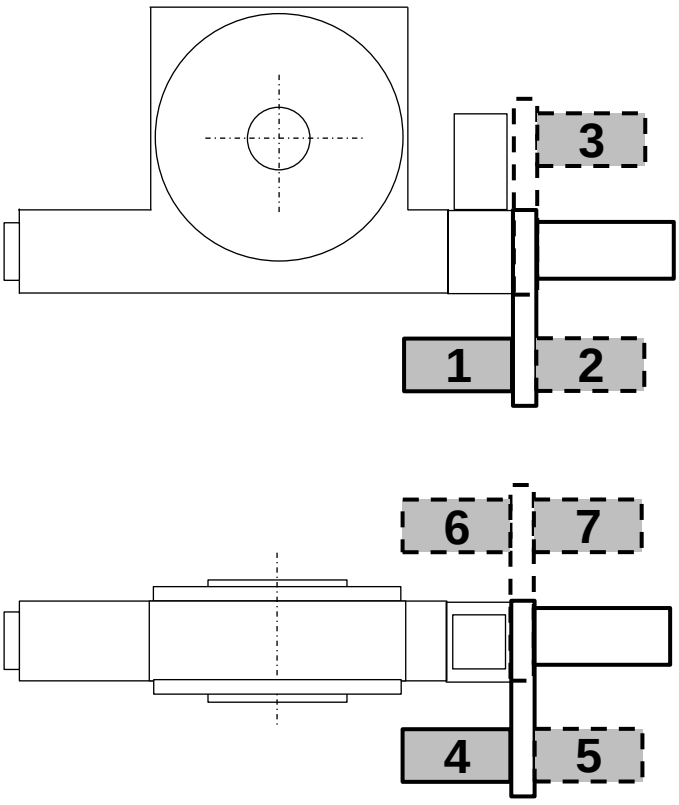


1 to 11

Figure 26: SIGUREN UNIT® motor position

13 OPTIONS

13.1RECOVERY MOTOR POSITION



1 to 7

Figure 27: SIGUREN UNIT® Recovery motor position

MS motor/ Recovery motor positions compatibility

MS motor position	Recovery motor position						
1	1	2	3	4	5	6	7
2	1	2	3	-	5	-	7
3	-	2	3	4	5	6	7
4	1	2	3	-	5	-	7
5	-	2	3	4	5	6	7
6	-	-	3	4	5	-	7
7	1	2	-	4	5	6	7
8	1	2	3	-	5	-	7
9	1	2	3	-	-	-	7
10	1	2	3	-	5	-	7
11	1	2	3	4	5	6	-

13.2 TOUCH SCREEN

The display has two functions:

- Display the data and main information (speed, current functioning mode, state of the motion authorization signal, fault history, mechanical functioning time)
- Enter data in SIGUREN UNIT® system by a qualified operator (over speed threshold, acceleration deceleration)
- SWP (Safe Working Periods) calculation according to FEM 9.755

Figure 28: Touchscreen

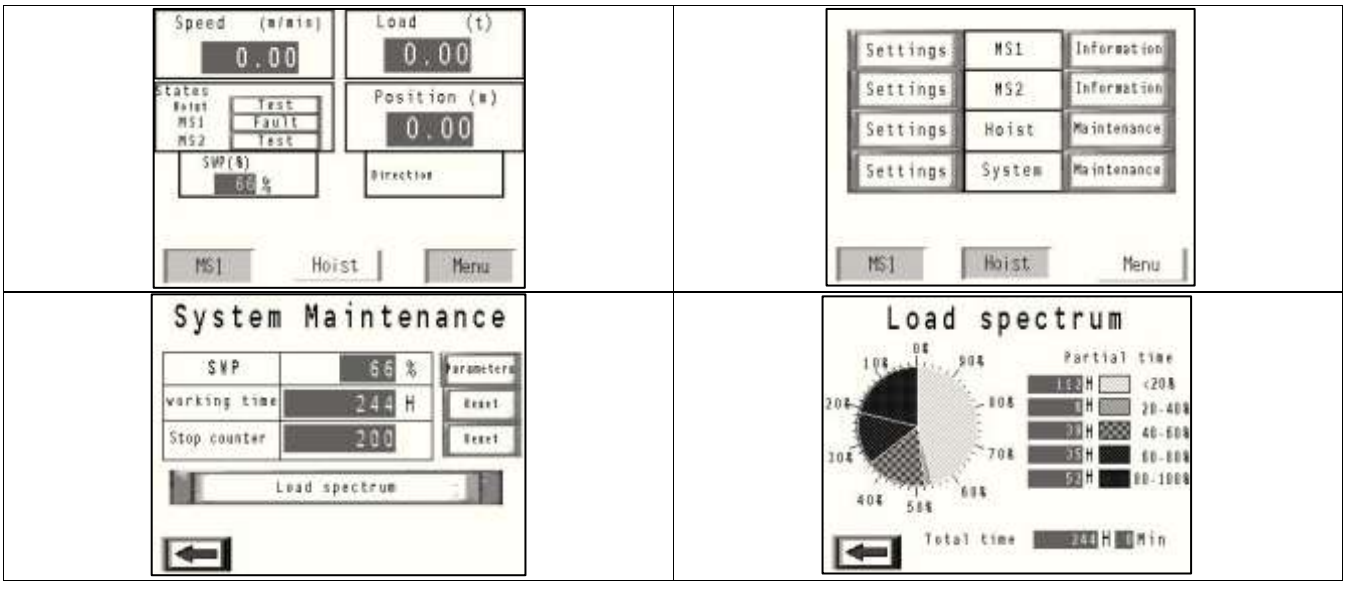


Figure 29: Touchscreen interface examples

13.3 TORQUE LIMITER

The use a torque limiter between the main motor and the gear box is mandatory with a hoist equipped of a hydraulic braking SIGUREN UNT®.

It is optional in the case of use a passive friction braking SIGUREN UNIT®. The torque limiter cuts the static and dynamic overloads. The torque limiter is delivered factory rated to the value necessary to the application.

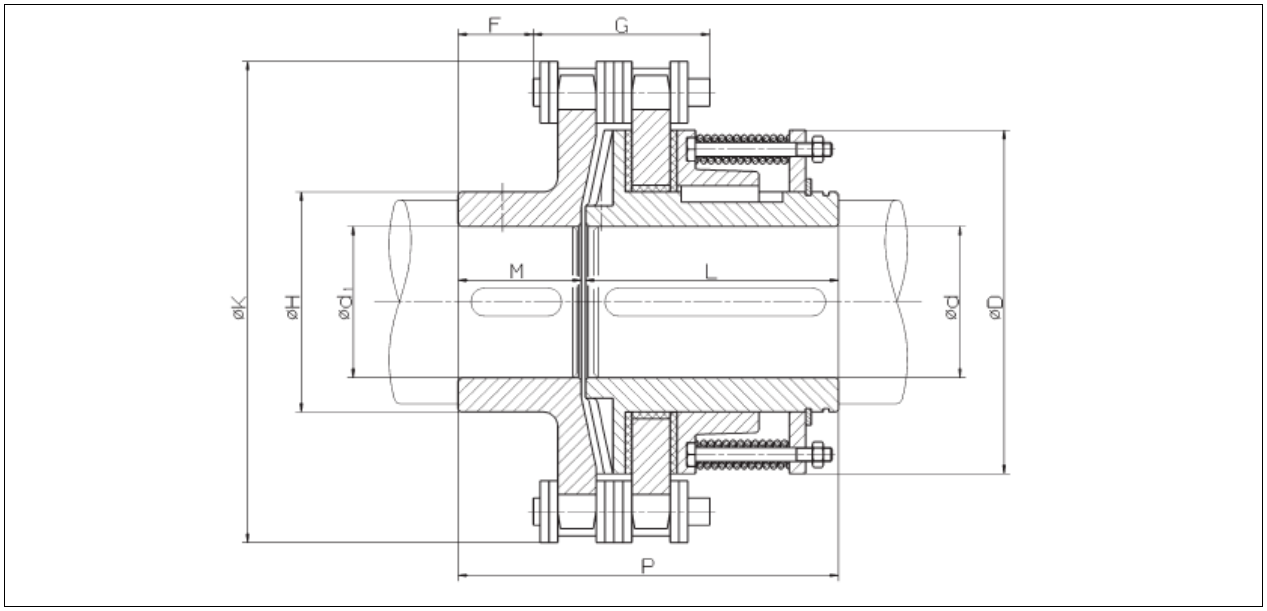
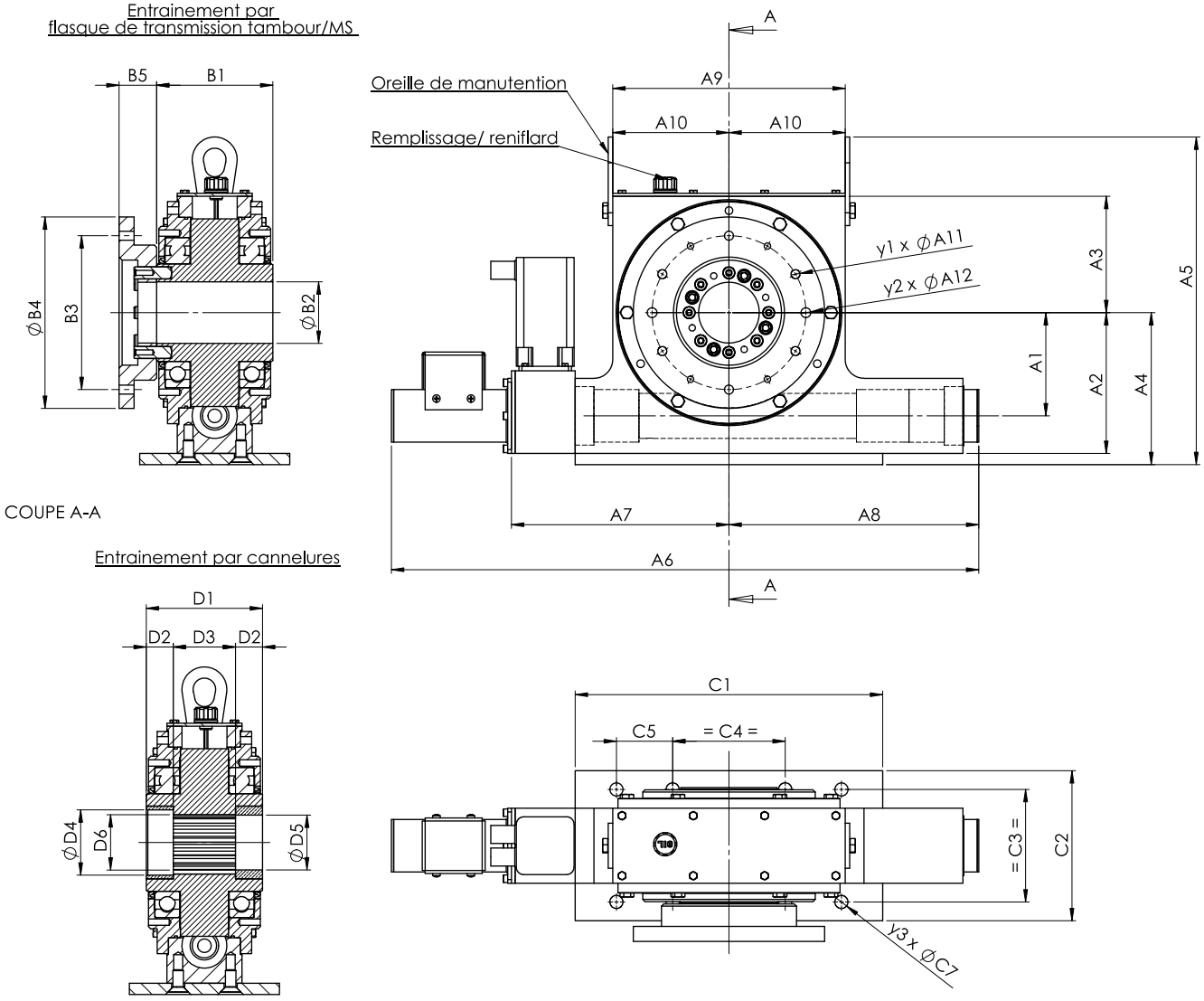


Figure 30: Torque limiters example

14 DIMENSIONS

14.1 SIGUREN UNIT® HYDRAULIC DAMPING

14.1.1 Bearing version

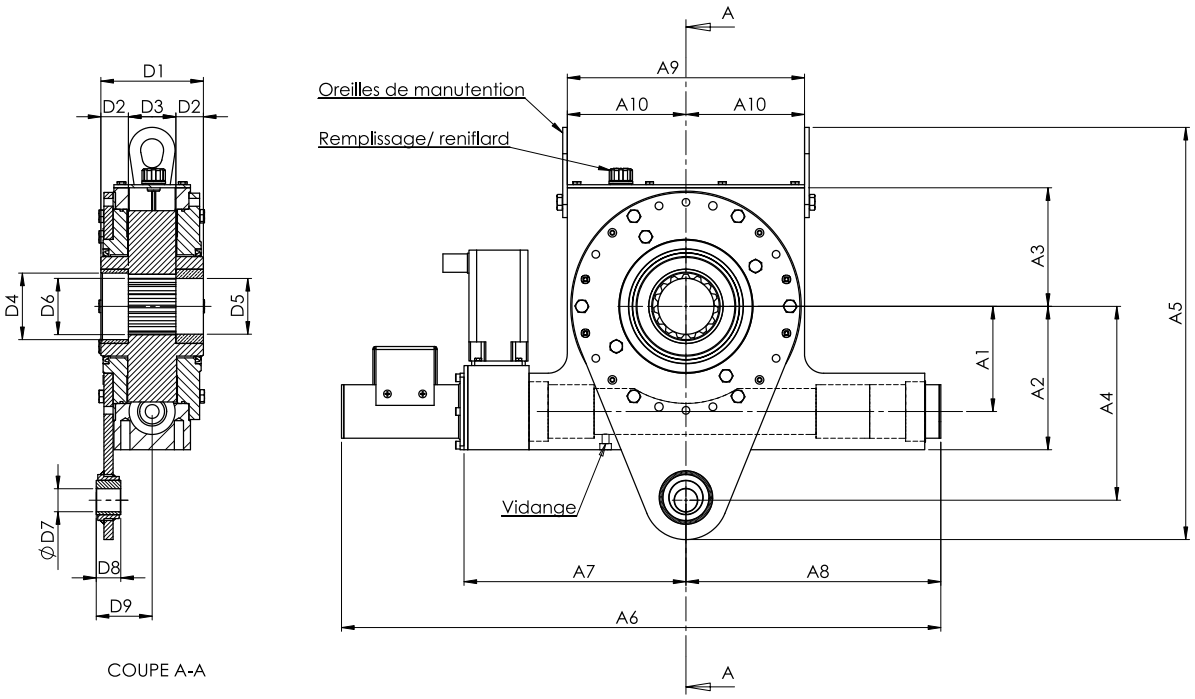


Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6
A1	84,5	110	137,5	165	192,5	220	275
A2	114,5	150	187,5	225	262,5	300	375
A3	97	124	155	186	216	246	305
A4	126,5	164	202,5	243	282,5	320	400
A5	258,5	333	436,5	506	570,5	652	782
A6	511,5	632,5	783	933	1095	1236	1514
A7	196	231,5	290	345	409	456	564
A8	216,5	272	333	393	458	519	632
A9	194	248	322	372	432	492	610
A10	97	124	161	186	216	246	305
ØA11 H8	10	12	16	16	20	25	30
ØA12	11	11	13	13	13	17	17
C1	262	323	410	484	562	646	788
C2	120	150	200	220	250	300	350
C3	90	120	150	170	200	240	280
C4	80	100	150	150	180	220	250
C5	40	50	75	75	90	110	125
C7	14	16	18	18	22	22	26
Driving flange							
B1	103	122	155	173	208	238	287
ØB2 H8	40	64	82	90	105	125	170
B3 (1)	125	170	210	260	280	350	440
ØB4 (1)	150	200	250	300	340	400	500
B5	40	45	50	60	70	75	90
M (kg)	37	73	136	227	354	530	1000
Driving spline							
D1	103	122	155	173	208	238	287
D2	25	31	36	44	50	58	72
D3	53	60	83	85	108	122	143
Ø D4 H7	61	81	102	122	142	162	204
Ø D5 H7	54	72	92	110	128	148	180
D6 (DIN 5480) (2)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8
M (kg)	34	68	125	210	331	492	930
y1	6	6	6	8	8	8	8
y2	2	2	2	4	4	4	4
y3	8	8	8	8	8	10	10

Dimensions subject to engineering changes

(1) Standard specifications (others possible on demand)
(2) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.1.2 Shaft mounted with reaction arm on side

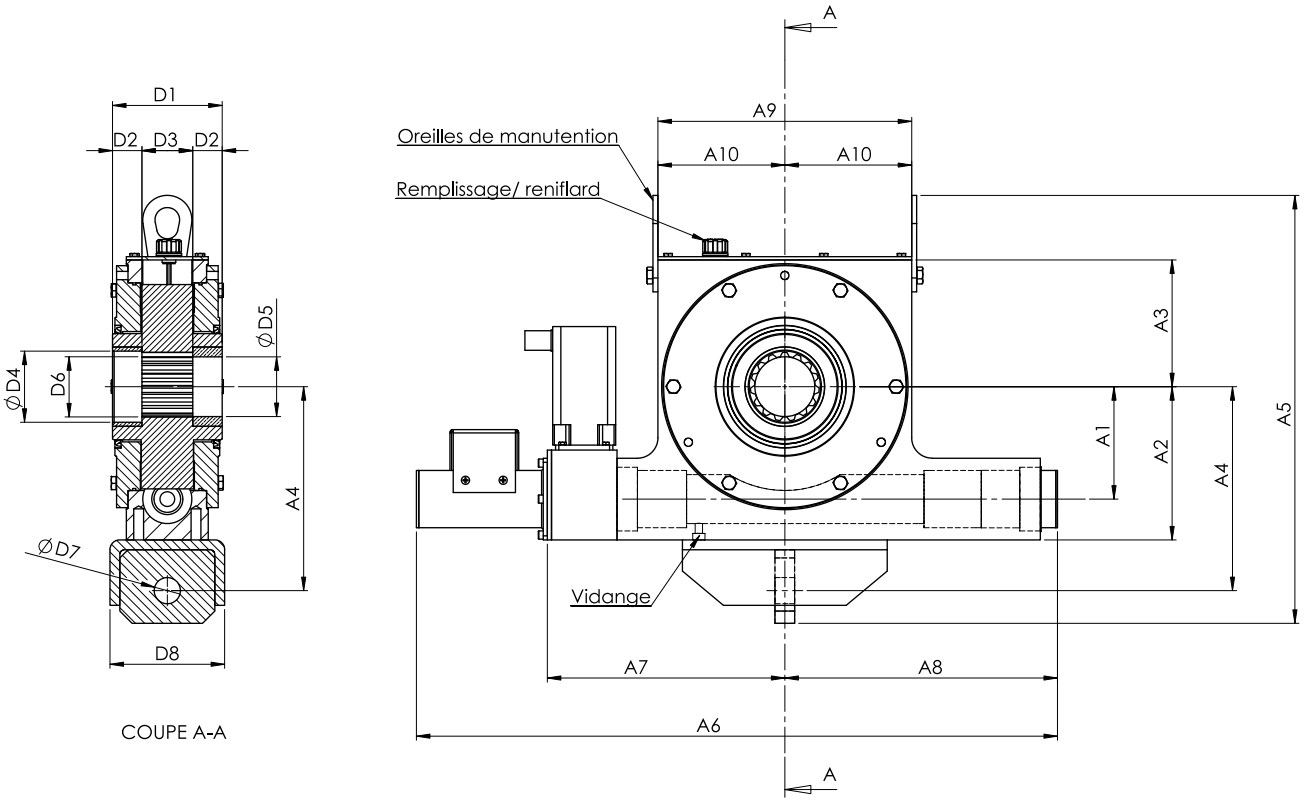


Dim. (mm) \ Size	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6
A1	84,5	110	137,5	165	192,5	220	275
A2	114,5	150	187,5	225	262,5	300	375
A3	97	124	155	186	216	246	305
A4	180 +/-2	225 +/- 3	280 +/- 3,5	340 +/- 4	385 +/- 4	440 +/- 4	550 +/- 4,5
A5	342	444	569	673	753	862	1032
A6	511,5	632,5	783	933	1095	1236	1514
A7	196	231,5	290	345	409	456	564
A8	216,5	272	333	393	458	519	632
A9	194	248	322	372	432	492	610
A10	97	124	161	186	216	246	305
D1	90	112	134	158	182	212	254
D2	25	31	36	44	50	58	72
D3	40	50	62	70	82	96	110
Ø D4 H7	61	81	102	122	142	162	204
Ø D5 H7	54	72	92	110	128	148	180
D6 (DIN 5480) (1)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8
Ø D7 H8	18	25	30	35	40	50	60
D8	18	20	23	29	32	36	44
D9	45	56	68,5	81,5	94	108	133
M (kg)	31	64	120	201	316	480	897

Dimensions subject to engineering changes

(1) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.1.3 Shaft mounted with reaction arm support



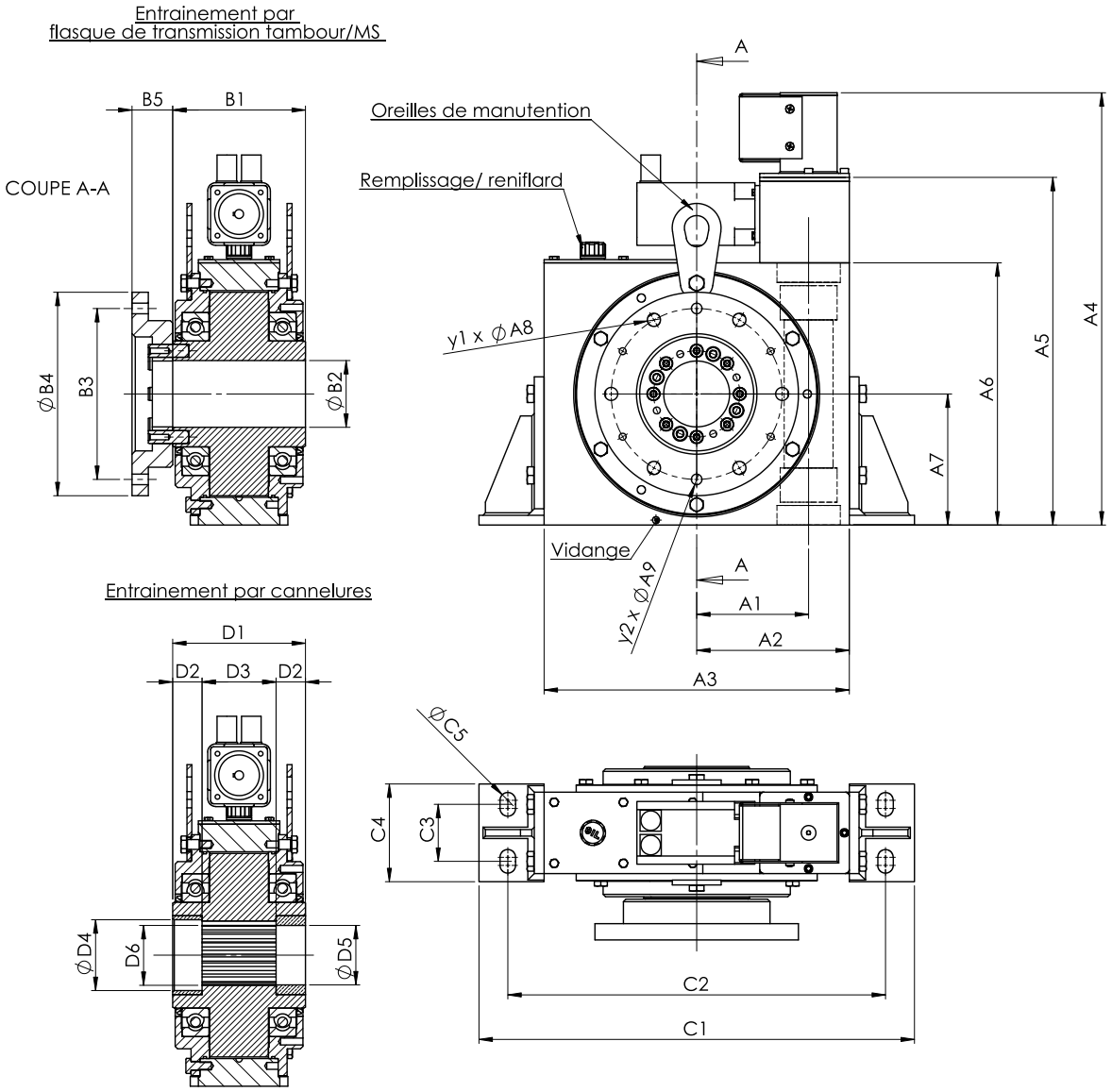
Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6
A1	84,5	110	137,5	165	192,5	220	275
A2	114,5	150	187,5	225	262,5	300	375
A3	97	124	155	186	216	246	305
A4	147,5	195	247,5	295	342,5	390	480
A5	300	389	522	600	677	777	927
A6	511,5	632,5	783	933	1095	1236	1514
A7	196	231,5	290	345	409	456	564
A8	216,5	272	333	393	458	519	632
A9	194	248	322	372	432	492	610
A10	97	124	161	186	216	246	305
D1	90	112	134	158	182	212	254
D2	25	31	36	44	50	58	72
D3	40	50	62	70	82	96	110
Ø D4 H7	61	81	102	122	142	162	204
Ø D5 H7	54	72	92	110	128	148	180
D6 (DIN 5480) (1)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8
Ø D7	20	26	32	37	47	55	64
D8	90	110	134	150	180	205	250
M (kg)	30	62	115	195	305	460	868

Dimensions subject to engineering changes

(1) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.2 PASSIVE FRICTION

14.2.1 Foot mounted bearing

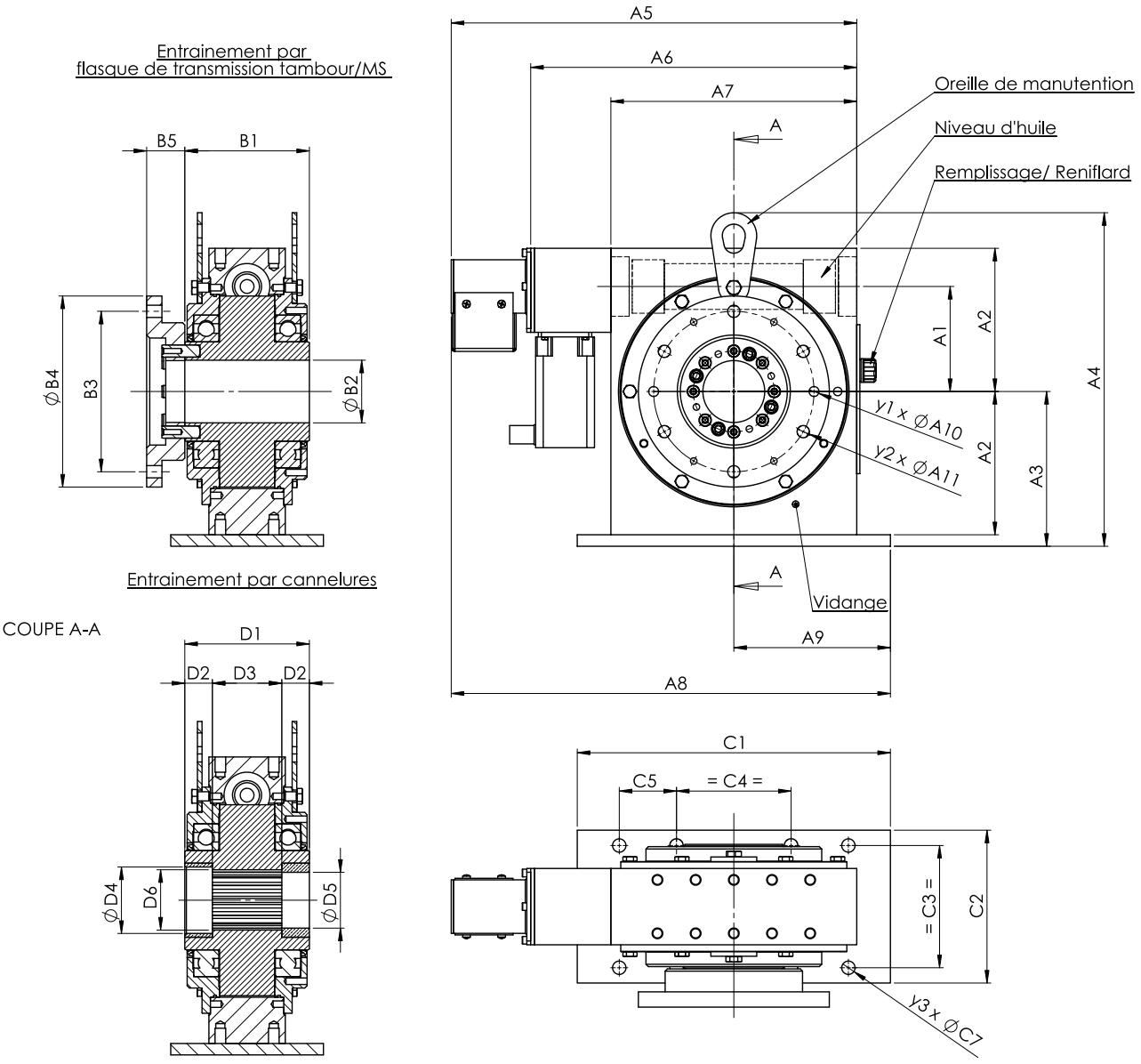


Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
A1	84,5	110	137,5	165	192,5	220	275	330
A2	119,5	150	187,5	225	262,5	300	375	450
A3	239	300	375	450	525	600	750	900
A4	391	432	531	594	691	761	892	1069
A5	294	333	427	490	580	650	780	954
A6	194	248	322	372	432	492	610	734
A7	97	124	161	186	216	246	305	367
ØA8 H8	10	12	16	16	20	25	30	35
ØA9	11	11	13	13	13	17	17	22
C1	339	430	535	640	745	860	1070	1280
C2	295	375	464	560	655	750	930	1120
C3	50	50	70	90	90	100	110	150
C4	80	100	120	140	160	180	220	260
ØC5	13	16	18	23	27	33	40	43
Driving flange								
B1	117	130	163	183	220	254	305	370
ØB2 H8	40	64	82	90	105	125	170	195
B3 (1)	125	170	210	260	280	350	440	520
ØB4 (1)	150	200	250	300	340	400	500	600
B5 (1)	40	45	50	60	70	75	90	100
M (kg)	41	69	133	224	349	518	967	1645
Driving spline								
D1	117	130	163	183	220	254	305	370
D2	25	31	36	44	50	58	72	95
D3	67	68	91	95	120	138	161	180
Ø D4 H7	61	81	102	122	142	162	204	244
Ø D5 H7	54	72	92	110	128	148	180	220
D6 (DIN 5480) (2)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8	240x28x8
M (kg)	39	65	123	208	327	482	900	1550
y1	6	6	6	8	8	8	8	8
y2	2	2	2	4	4	4	4	4

Dimensions subject to engineering changes

(1) Standard specifications (others possible on demand)
(2) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.2.2 Bearing with mounting plate

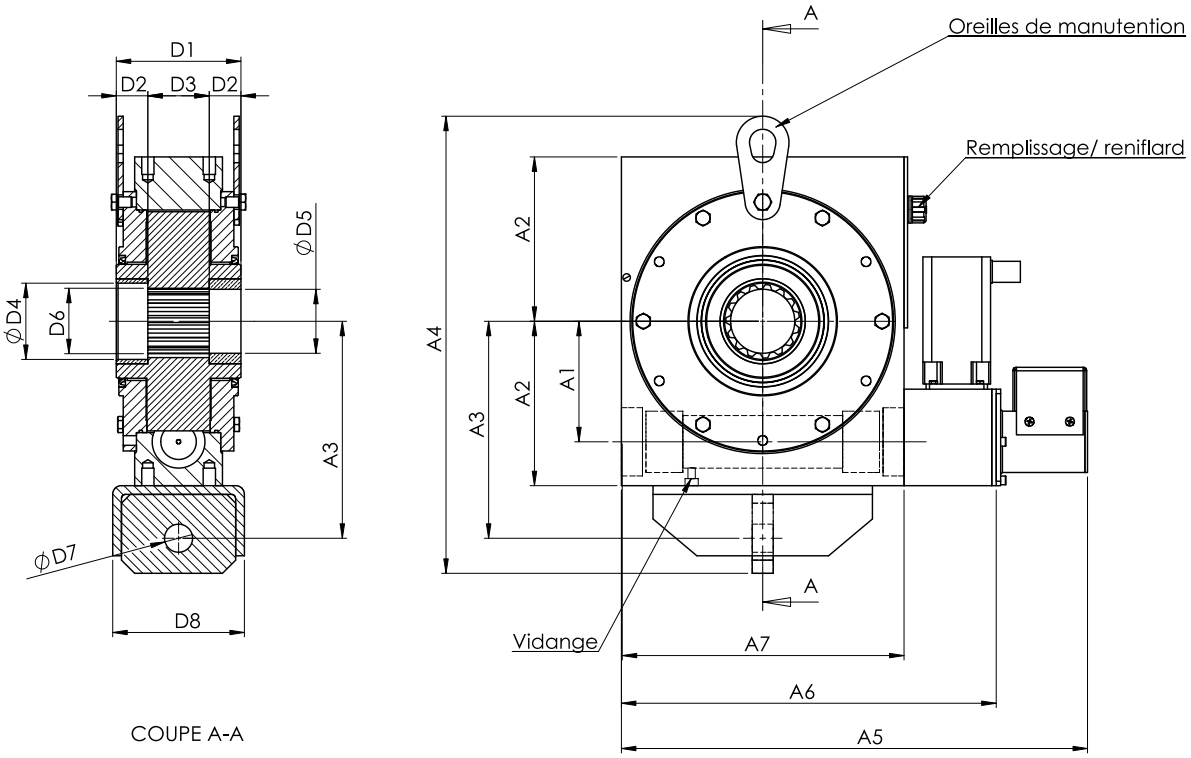


Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
A1	84,5	110	137,5	165	192,5	220	275	330
A2	119,5	150	187,5	225	262,5	300	375	450
A2 mini (2)	97	124	161	186	216	246	305	367
A3	131,5	164	202,5	243	282,5	320	400	480
A3 mini (2)	109	138	176	204	236	266	330	397
A4	260,5	333	436,5	506	570,5	652	782	1015
A5	391	432	531	594	691	761	892	1069
A6	294	333	427	490	580	650	780	954
A7	194	248	322	372	432	492	610	734
A8	425	469,5	575	650	756	838	981	1177
A9	131	161,5	205	242	281	323	394	475
ØA10	11	11	13	13	13	17	17	22
ØA11 H8	10	12	16	16	20	25	30	35
C1	262	323	410	484	562	646	788	950
C2	120	150	200	220	250	300	350	450
C3	90	120	150	170	200	240	280	340
C4	80	100	150	150	180	220	250	300
C5	40	50	75	75	90	110	125	150
C7	14	16	18	18	22	22	26	33
Driving flange								
B1	117	130	163	183	220	254	305	370
ØB2 H8	40	64	82	90	105	125	170	195
B3 (1)	125	170	210	260	280	350	440	520
ØB4 (1)	150	200	250	300	340	400	500	600
B5 (1)	40	45	50	60	70	75	90	100
M (kg)	42	72	137	229	353	524	985	1671
Driving spline								
D1	117	130	163	183	220	254	305	370
D2	25	31	36	44	50	58	72	95
D3	67	68	91	95	120	138	161	180
Ø D4 H7	61	81	102	122	142	162	204	244
Ø D5 H7	54	72	92	110	128	148	180	220
D6 (DIN 5480) (3)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8	240x28x8
M (kg)	40	67	127	213	331	488	917	1578
y1	2	2	2	4	4	4	4	4
y2	6	6	6	8	8	8	8	8
y3	8	8	8	8	8	10	10	12

Dimensions subject to engineering changes

(1) Standard specifications (others possible on demand)
(2) Special realisation -modification necessary
(3) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.2.3 Shaft mounted with reaction arm support

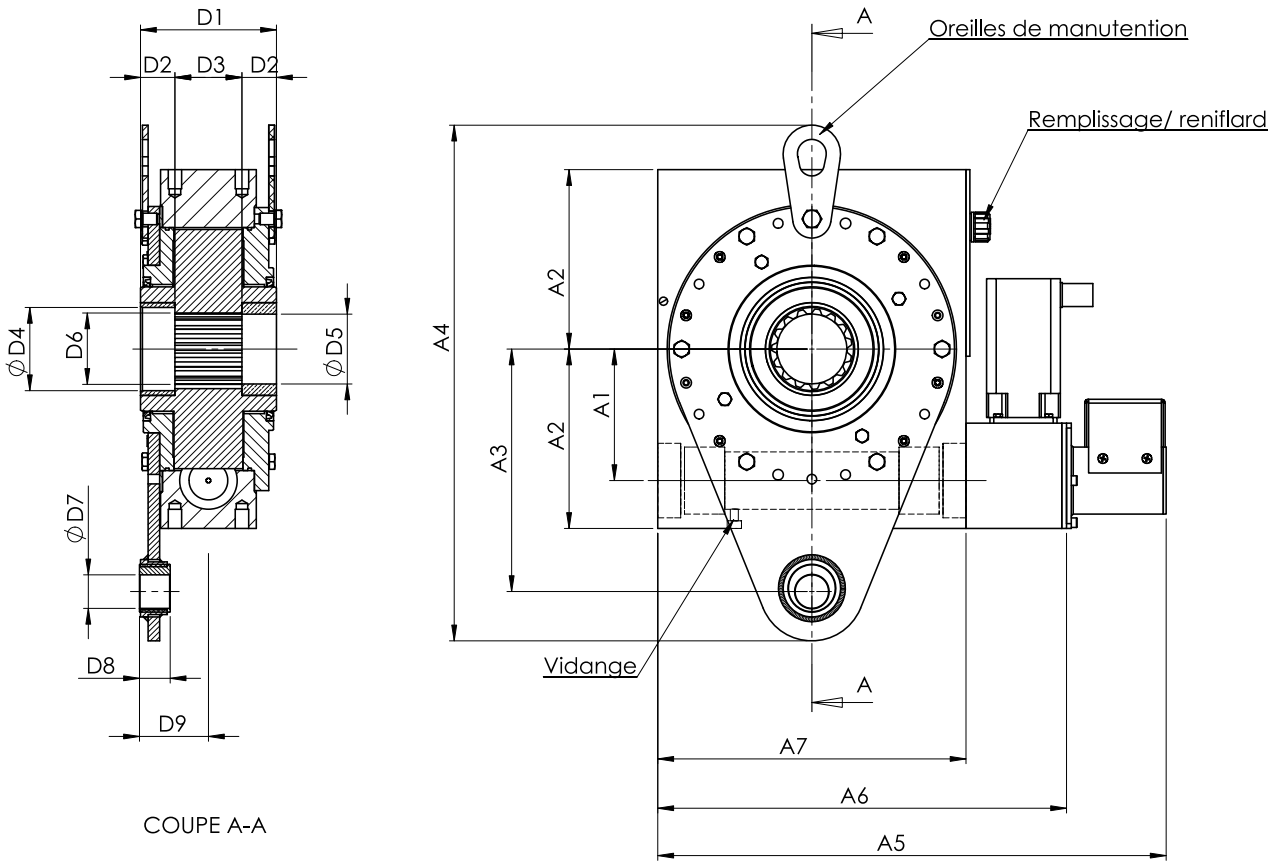


Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
A1	84,5	110	137,5	165	192,5	220	275	330
A2	119,5	150	187,5	225	262,5	300	375	450
A3	147,5	195	247,5	295	342,5	390	480	575
A4	302	389	524	600	676	777	927	1190
A5	391	432	531	594	691	761	892	1069
A6	294	333	427	490	580	650	780	954
A7	194	248	322	372	432	492	610	734
D1	104	120	142	168	194	228	272	340
D2	25	31	36	44	50	58	72	95
D3	54	58	70	80	94	112	128	150
Ø D4 H7	61	81	102	122	142	162	204	244
Ø D5 H7	54	72	92	110	128	148	180	220
D6 (DIN 5480) (1)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8	240x28x8
Ø D7	20	26	32	37	47	55	64	70
D8	90	110	134	150	180	205	250	310
M (kg)	38	65	12	202	315	473	895	1535

Dimensions subject to engineering changes

(1) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.2.4 Shaft mounted with reaction on side

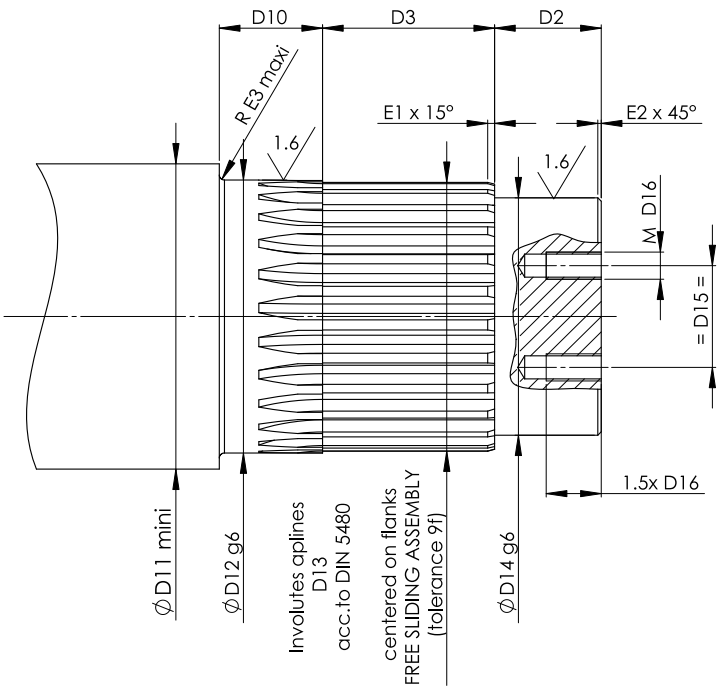


Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
A1	84,5	110	137,5	165	192,5	220	275	330
A2	119,5	150	187,5	225	262,5	300	375	450
A3	180 +/-2	225 +/- 3	280 +/- 3,5	340 +/- 4	385 +/- 4	440 +/- 4	550 +/- 4,5	655 +/- 4,5
A4	339	444	569	673	753	862	1032	1300
A5	391	432	531	594	691	761	892	1069
A6	294	333	427	490	580	650	780	954
A7	194	248	322	372	432	492	610	734
D1	104	120	142	168	194	228	272	340
D2	25	31	36	44	50	58	72	95
D3	54	58	70	80	94	112	128	150
Ø D4 H7	61	81	102	122	142	162	204	244
Ø D5 H7	54	72	92	110	128	148	180	220
D6 (DIN 5480) (1)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8	240x28x8
Ø D7 H8	18	25	30	35	40	50	60	70
D8	18	20	23	29	32	36	44	56
D9	49	56	68,5	81,5	94	108	133	161,5
M (kg)	38	65	123	202	315	473	895	1535

Dimensions subject to engineering changes

(1) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

14.3 DRUM SHAFT WITH SPLINES



Size / Dim. (mm)	MS 0	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
D2	25	31	36	44	50	58	72	95
D3 (DP) (1)	53	60	83	85	108	122	143	-
D3 (DA / DS) (1)	40	50	62	70	82	96	110	-
D3 (FP / FF) (1)	67	68	91	95	120	138	161	180
D3 (FA / FS) (1)	54	58	70	80	94	112	128	146
D10	24	30	35	43	49	57	71	94
Ø D11 mini	66	88	110	130	155	175	220	260
Ø D12 H7/g6	61	81	102	122	142	162	204	244
D13 DIN 5480 (2)	60x28x2	80x25x3	100x32x3	120x28x4	140x26x5	160x30x5	200x24x8	240x28x8
Ø D14 H7/g6	54	72	92	110	128	148	180	220
D15	25	30	35	40	50	60	80	90
D16	M8	M10	M10	M12	M12	M14	M14	M16
E1	2	2	2	2	3	3	3	3
E2	1	1	1,5	1,5	2	2	3	3
R E3 maxi	0,5	0,5	1	1	1,5	1,5	2	2

Dimensions subject to engineering changes

(1)

DP:	spline shaft for hydraulic Damping –	bearing version
DA/ DS:	spline shaft for hydraulic Damping –	shaft mounted version
FP/ FF:	spline shaft for passive Friction –	bearing version
FA/ FS:	spline shaft for passive Friction –	shaft mounted version

(2) Splines max. size. Other sizes or transmission connections (keyed …) are possible.

15 EXAMPLE OF CALCULATION

15.1 EXAMPLE N°1–HYDRAULIC DAMPING SIGUREN UNIT®

Hoist input data's:

- SWL = 19 700 kg
- Dead weight = 300 Kg
- Reeving = 4/1
- Drum diameter = 500 mm
- Gearbox ratio = 130
- Motor speed = 1500 rpm

- Is it possible to put a torque limiter? **Yes**
- Is there important inertia after the torque limiter? **No**
- Is the rotation speed at drum exceeding 35 rpm? **No, see calculation below (11.54 rpm < 35 rpm)**

Hydraulic damping MS

Designation	Symbol	Value	Units	Formula
Forces and torque				
Load weight	W_L	**19 700**	kg	
Dead weight	W_T	**300**	kg	
Load+ dead weight	SWL	20 000	kg	$=(W_L+W_T)$
Gravity	g	**9,81**	m/s²	
Lifting force	F_L	196 200	N	=SWL*g
Reewing ratio	im	**4**	-	
Drum pitch diameter	D	**500**	mm	
Gearbox ratio	ir	**130**	-	
Force at driven rope strand	Fc	49 050	N	=SWL*g/im
Static torque at drum	C_S	12 262.5	Nm	=Fc*D/2000
Speeds				
Speed at High Speed Line	S_{HSL}	**1 500**	rpm	
Speed at MS	S_{MS}	11.54	rpm	$=S_{HSL}$/ir

Size of the SIGUREN UNIT®:

C_{MS}= 2.5 x Cs = 2.5x 12 262.5 = **30 656 Nm**

According to table page 13, C_{MS}=**30 656 Nm < 32000 Nm → MS3**

15.2 EXAMPLE N°2 – PASSIVE FRICTION SIGUREN UNIT®

Hoist input data's:

- SWL = 4 900 kg
- Dead weight = 100 Kg
- Reeving = 2/1
- Drum diameter = 250 mm
- Gearbox ratio = 60
- Motor speed = 3000 rpm

- Is it possible to put a torque limiter? **Yes**
- Is there important inertia after the torque limiter? **No**
- Is the rotation speed at drum exceeding 35 rpm? **Yes, see calculation below (50 rpm > 35 rpm)**

Passive friction MS

Designation	Symbol	Value	Units	Formula / comment
Forces and torques				
Load weight	W_L	**4 900**	kg	
Dead weight	W_T	**100**	kg	
Load+ dead weight	SWL	5 000	kg	$=(W_L+W_T)$
Gravity	g	**9,81**	m/s²	
Lifting force	F_L	49 050	N	=SWL*g
Reeving ratio	im	**2**	-	
Drum pitch diameter	D	**250**	mm	
Gearbox ratio	ir	**60**	-	
Force at driven rope strand	Fc	24 525	N	=SWL*g/im
Static torque at drum	C_S	3 065	Nm	=Fc*D/2000
Speeds				
Speed at High Speed Line	S_{HSL}	**3 000**	Rpm	
Speed at MS	S_{MS}	50	Rpm	$=S_{HSL}/ir$

Size of the MS:

$C_{MS\ mini}$= 1.4 x Cs = 1.4x 3 065 = **4 291 Nm**

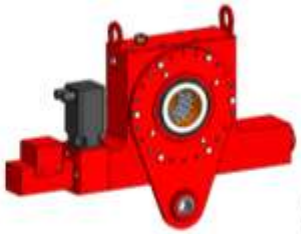
According to table page 13, C_{MS}=**4 291 Nm < 6 100 Nm → MS1**

SIGUREN
failsafe movement

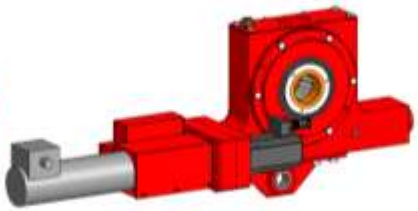
16 POSITIONS, TYPES AND OPTIONS EXAMPLES

HYDRAULIC DAMPING MOTOSUIVEUR CONFIGURATIONS

- BEARING

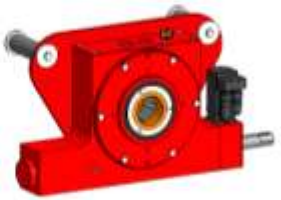


- FLOATING
- REACTION ARM ON SIDE



- FLOATING
- REACTION ARM SUPPORT
- WITH RECOVERY MECHANISM

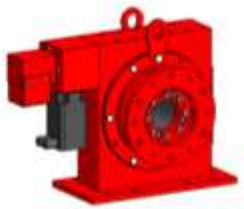
- FLOATING
- ADAPTED TO STREET CRANE HOISTS
- WITH RECOVERY MECHANISM



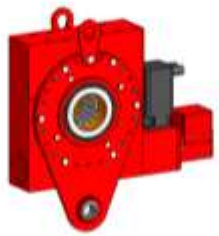
- FLOATING
- ADAPTED TO DONATI HOISTS

PASSIVE FRICTION MOTOSUIVEUR CONFIGURATIONS

- BEARING



- BEARING



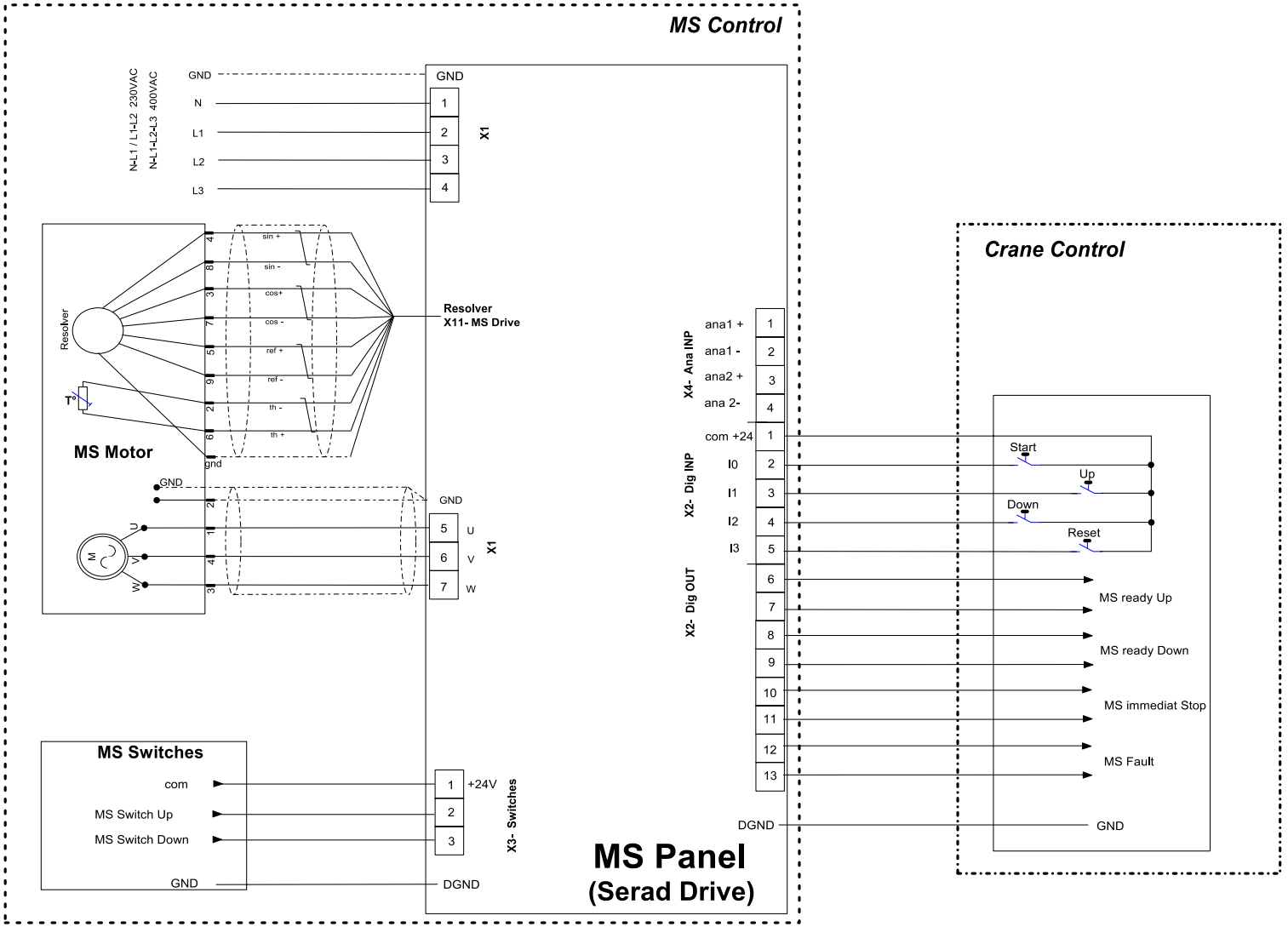
- FLOATING
- REACTION ARM ON SIDE

- FLOATING
- REACTION ARM SUPPORT

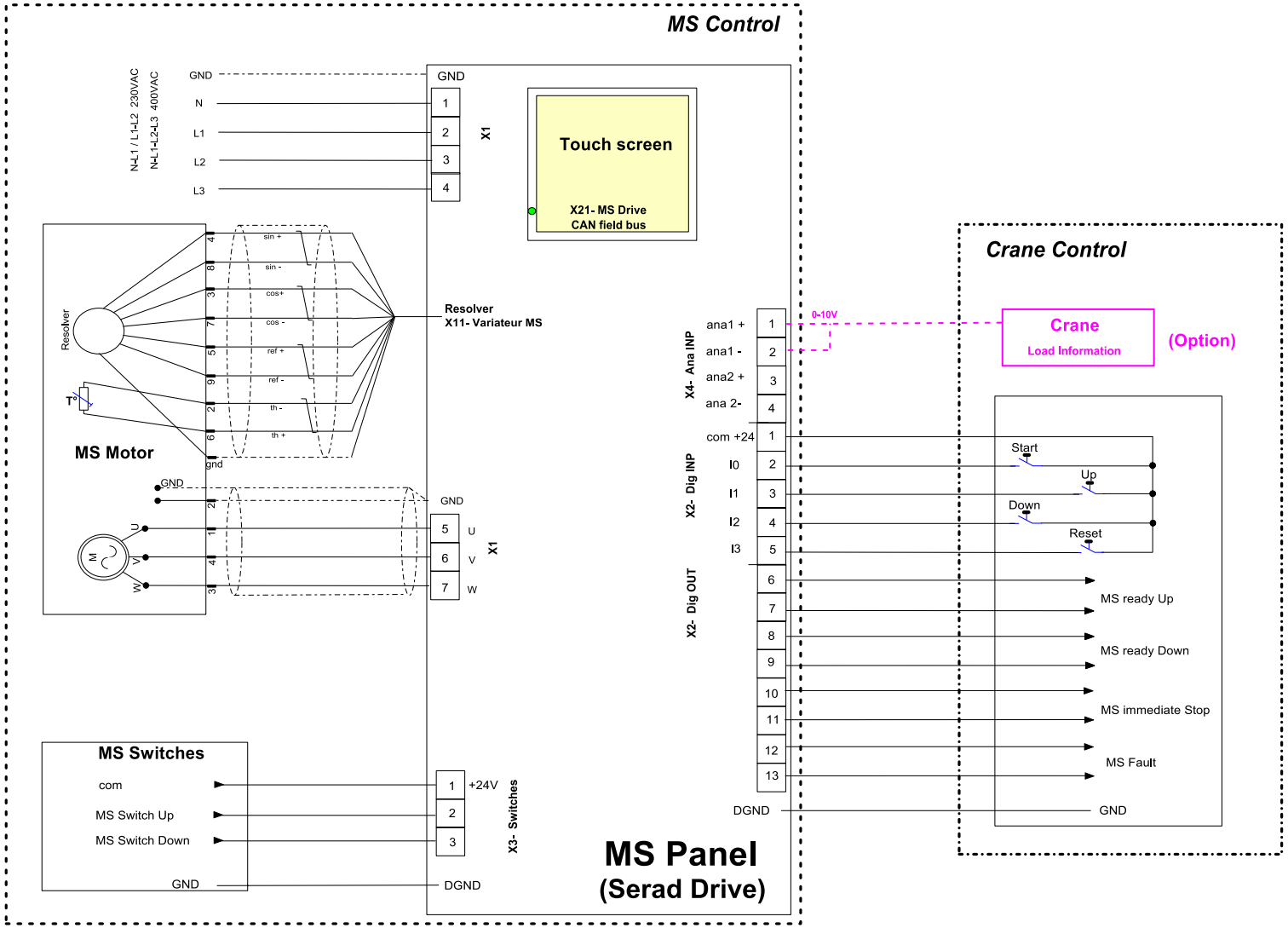
- FLOATING
- ADAPTED TO STREET CRANE HOISTS
- WITH RECOVERY MECHANISM

17 ELECTRICAL INTERFACE

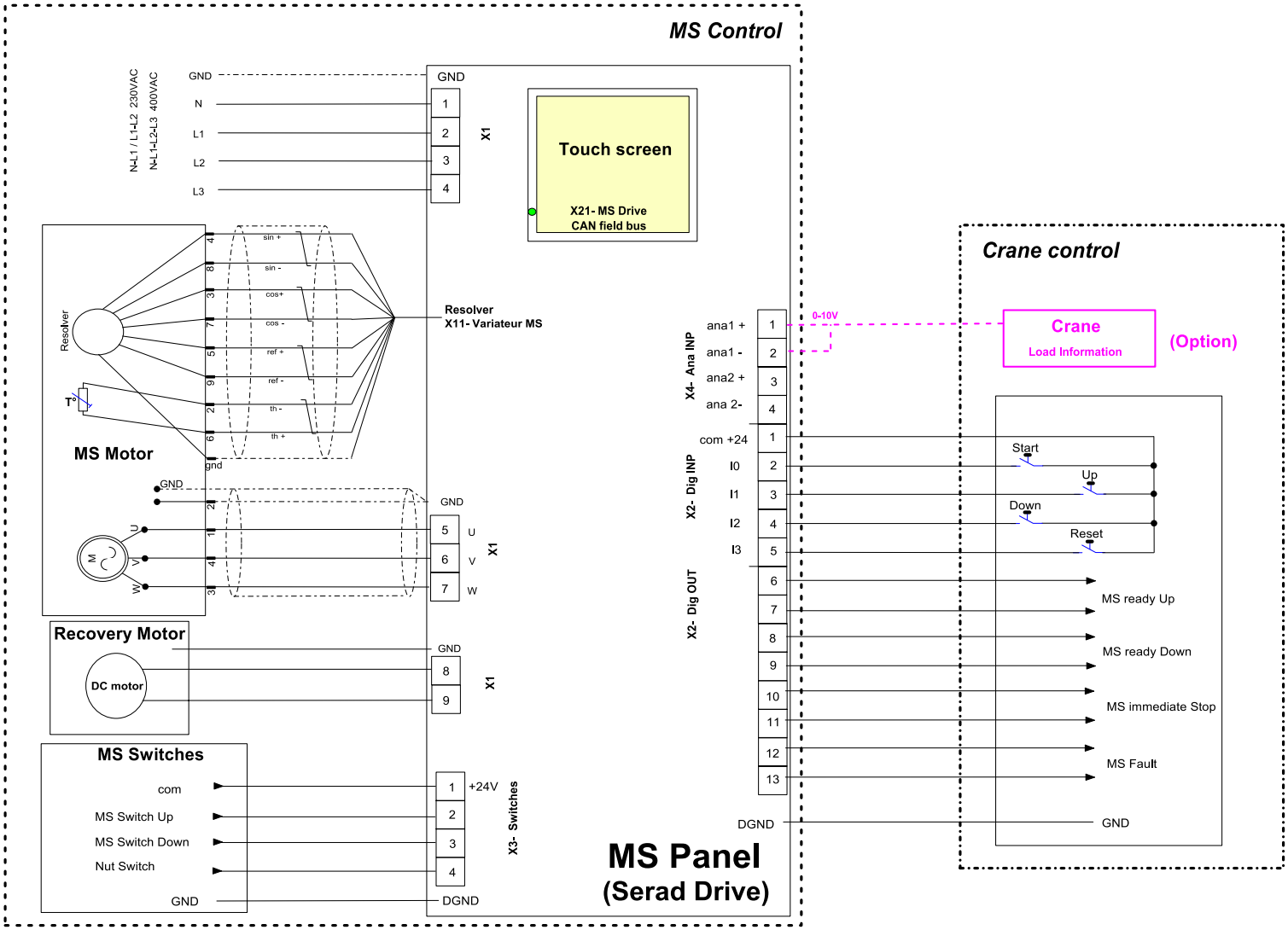
17.1 BASIC LINE



17.2 TOUCH SCREEN LINE



17.3 RECOVERY LINE



Our references

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SIGUREN technologies

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