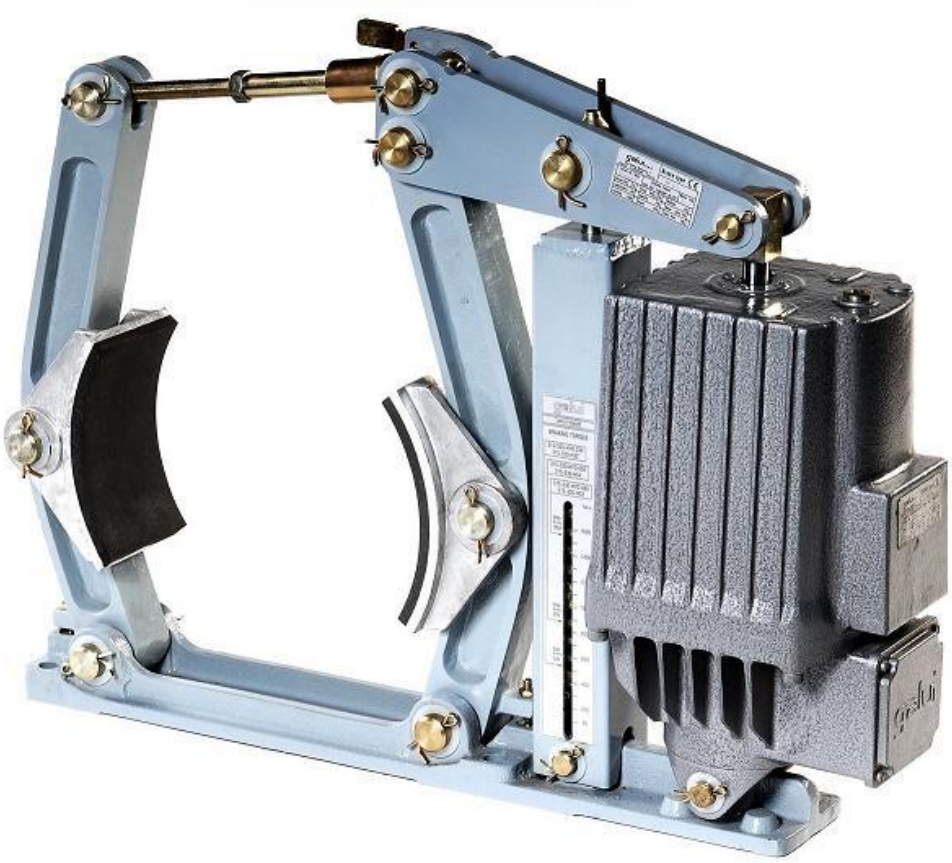
GALVI SHOE BRAKES TYPE NV.HYD
INSTALLATION AND MAINTENANCE MANUAL



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01.01 - INTRODUCTION

We thank you for choosing a GALVI Shoe Brake type NV.HYD with HYDRO GALVI electrohydraulic Thruster.

Before installing
your GALVI Shoe Brake
it is indispensable to read in full this document.

Not reading this document may cause malfunctioning of your GALVI Shoe Brake.

This document must be available for anyone who needs to work on the GALVI Shoe Brake.

The Manufacturer is not liable for any damages caused by unskillfulness, negligence, non-fulfillment and not observance of the instructions of this Manual.

All your suggestions for this Manual will be appreciated and considered for improving it.

We thank you for your kind attention.

Best regards.

NEWCOMEN S.r.l.

galvi BRAKING FORCE NEWCOMEN

Tommaso Galbiati

01.02 - DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY AS PER MACHINERY DIRECTIVE 2006/42/EC, ANNEX II, POINT B

Manufacturer

NEWCOMEN S.r.l.
Via della Betulla, 7
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Internet **www.galvi.com**

We hereby declare that the following GALVI partly completed machinery

Product Description	Product Code
Failsafe Shoe Brakes	**NV.HYD**, NV.HYD.IS, NV.HYD.TM, NV.H, NV.H.EX, NV.EM, NV.PN NV.HYD.CA, NV.HYD.IS.CA
Positive Shoe Brakes	NV.OL
Failsafe-positive Shoe Brakes	NV.HYD/OL
Thrusters	**HYD**, H, H.EX, EM, PN, OL

eventually combined with following Accessories and Spare Parts

Product Description	Product Code
Brakedrums	PD, PL, PA, PAG
Couplings	GD, GL, GA
Brake Shoes	RF2, RF4, RFA
Other	COV, PO, SB, RSH, RSH.EX, RG

with serial numbers according to delivery notes

are in conformity with the following Standards

DIN 15435 (NV.HYD, NV.HYD.IS, NV.HYD.TM, NV.H, NV.H.EX, NV.EM, NV.PN, NV.OL, NV.HYD/OL, RF2)
DIN 15431 (PD, GD)
AISE 11 (NV.HYD.CA, NV.HYD.IS.CA, PA, PAG, GA, RFA)
Machinery Directive 2006/42/EC, Annex I +
+ 1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.2.1, 1.2.3, 1.2.4.1, 1.2.4.3, 1.3.2, 1.3.4, 1.5.1, 1.5.2, 1.5.8, 1.5.9, 1.6.4,

must not be put into service until the final machinery into which they are to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/CE.

We furthermore declare that the relevant technical documentation is compiled in accordance with part B of Annex VII and we undertake to transmit relevant information on the partly completed machinery in response to a reasoned request by the National Authorities.

This Declaration is invalidated by every modification of the above mentioned GALVI Products.

Place, date

Lissone, 11/04/12

President and Chief Executive Officer

Tommaso Galbiati

01.03 – GENERAL DESCRIPTION OF THE PRODUCT

The GALVI Shoe Brake type NV.HYD is a safety component which, installed on a rotating Brakedrum, decelerates and stops the Brakedrum through pressure and friction, that is to say through a closing spring, a system of levers, a friction material and an electrohydraulic Thruster whose function is to open the Brake with a lifting Force in contrast with the Force of the Brake's main spring.

The Brake is normally installed between motor and gear box, that is to say on high speed shaft, with Brakedrum always installed on gear box side, which is the load side, so that it can brake a lifted mass or a travelling or a rotating mass.

The Brake is combined with the GALVI flexible Coupling with Brakedrum type GD or GL or, in case the Brake is not installed between motor and gear box, with the Brakedrum type PD or PL.

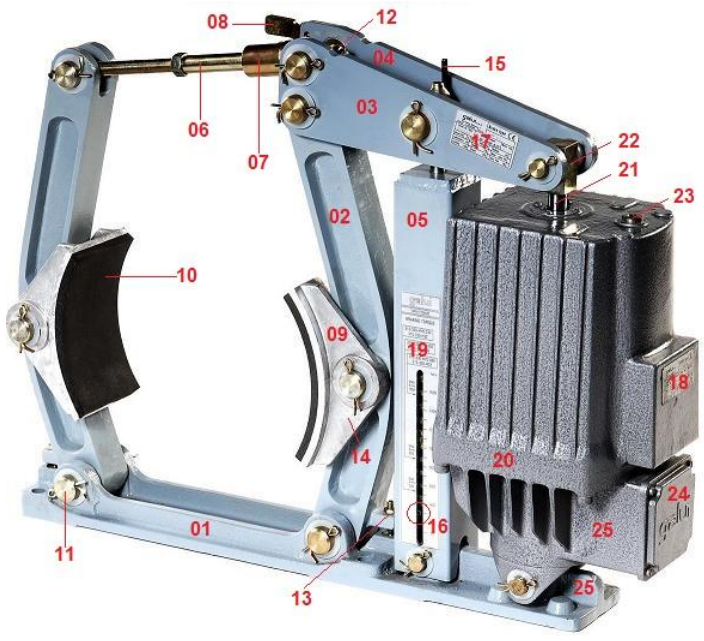
The main dimensional features of the Brake are in conformity with the DIN 15435 Standard, the ones of the Brakedrum are in conformity with DIN 15431 Standard.

The range of Brakes and Brakedrums is available with diameters 160, 200, 250, 315, 400, 500, 630, 710 mm.

The following are the main components of the GALVI Shoe Brake type NV.HYD :

Pos.	Description
01	Cast iron base (or steel base for some models)
02	Cast iron main levers (or steel levers for some models)
03	Cast iron left upper lever (or steel lever for some models)
04	Cast iron right upper lever preset for NV option
05	Main spring set
06	Galvanized main tie rod
07	Optional self adjusting device NV
08	Fork for self adjusting device NV
09	Aluminum brake Shoe with anti-wear steel bushes
10	Asbestos free bonded linings
11	Galvanized pins secured with split pins and washers (or optional SS pins)
12	Self lubricating bushes on main pins
13	Balancing screws
14	Brake Shoes holding screws
15	Elastic pin for locking main spring tie rod
16	Cursor for main spring showing Braking Torque in Nm
17	Aluminum serial number plate for Brake
18	Aluminum serial number plate for Thruster
19	Adhesive Braking Torque plate
20	Aluminum HYDRO electrohydraulic Thruster, a.c., three phase, IP.65, Class F
21	Chromed Thruster shaft
22	Galvanized Thruster push rod
23	Galvanized Thruster screw cap for oil fill and oil drain
24	Aluminum Thruster terminal box cover
25	Polyurethane epoxy antisalt paint

Table 1



Picture 1
Model shown
NV.315.HYD.080/06.CD.42.PS.AU.ZN

01.04 – PACKING AND HANDLING OF THE PRODUCT

The GALVI Shoe Brakes are delivered packed in different ways according to the type of shipment and the Customer's need.

Pallets, ISPM 15 cases for sea freight or air freight and containers are normally used in function of the type of delivery.

It is necessary to pay maximum attention during the handling of the Shoe Brakes in order to avoid any kind of damage.

In case of damage of any component of the Brake we recommend to report to info@galvi.com attaching pictures of the damage in order to decide whether to replace the damaged component only or the whole Product.

⚠	**Never install a Shoe Brake with damaged components. Risk of accident.**

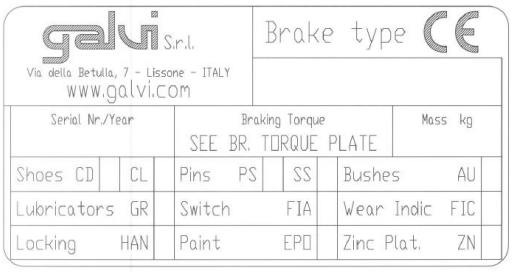
01.05 – IDENTIFICATION AND MARKING OF THE PRODUCT

All the GALVI Shoe Brakes have an aluminum serial number plate fixed to the left upper lever (page 4, Table 1, Picture 1); **the serial number plate must never be removed.**

The following data are printed on the serial number plate :

Description
type and diameter of GALVI Shoe Brake in the "Brake type" cell (N or NV.160, 200, 250, 315, 400, 500, 630, 710)
serial number and year of manufacturing in the "Serial Nr./Year" cell
mass of the GALVI Shoe Brake in the "Mass kg" cell
"X" in the "AU" (self lubricating bushes on main pins) and "ZN" cells (galvanized pins, tie rods, screws and small metallic items)
"X" in the "CD" cell (brake Shoes as per DIN 15435 Standard) or in the "CL" cell (extra-wide brake Shoes, 50 % wider than CD Shoes)
"X" in the "PS" cell (standard pins) or in the "SS" cell (stainless steel pins)
"X" in the "GR", "FIA", "FIC", "HAN" cells if these options are installed

Table 2



Drawing 1
Serial Number Plate for Shoe Brake

Picture 2
Serial Number Plate for Shoe Brake

For a complete identification of the GALVI Shoe Brake it is indispensable to read also the data printed on the serial number plate of the relevant HYDRO GALVI Thruster (page 4, Table 1, Picture 1); **the serial number plate must never be removed**.

The serial number plate of the Thruster is fixed to the vertical frontal part of the Thruster and among its data it is necessary to know the following ones :

Description
Model of HYDRO GALVI Thruster in the "HYDRO type" cell (HYD.023, 024, 030, 031, 050, 051, 080, 081, 121, 201, 301/06 or .../12 + optional codes IS, LO, LI, 90, VIT, HEA if any)
Rated Voltage (V) and Frequency (Hz)

Table 3

Drawing 2
Serial Number Plate for Thruster

01.06 – WARRANTY OF THE PRODUCT

All the GALVI Shoe Brakes if not differently agreed have a warranty period of

12 months from start-up and maximum 18 months from Invoice date.

The warranty does not cover parts subject to wear.

Any modification of the Product made by the User invalidates totally the warranty.

The use of not genuine Spare Parts invalidates in any case the warranty of the Product, especially the use of not genuine brake Shoes and friction material.

The use of GALVI Shoe Brakes combined with Thrusters different from HYDRO GALVI Thrusters is not suggested and limits the warranty to the GALVI Products only.

Repairs under warranty are made in the Manufacturer's Factories after claim to info@galvi.com writing in any case the serial numbers of Brakes and Thrusters (page 5, Drawing 1, Drawing 2).

The Manufacturer case by case will be free to choose between repairing or replacing the Product.

Products received at the Manufacturer's Factories already disassembled and/or modified will be considered in any case out of warranty and will be eventually repaired or replaced at cost price.

	**Never use not genuine Spare Parts, especially brake Shoes. Loss of warranty. Risk of accident.**

	**Never modify the Product. Loss of warranty. Risk of accident.**

02.01 – INSTALLATION

Before installing the GALVI Shoe Brake it is necessary to arrange a horizontal anchor plane on which the base of the Brake (page 4, Table 1, Picture 1) can be in contact at least for the length shown in drawings and Catalogue.

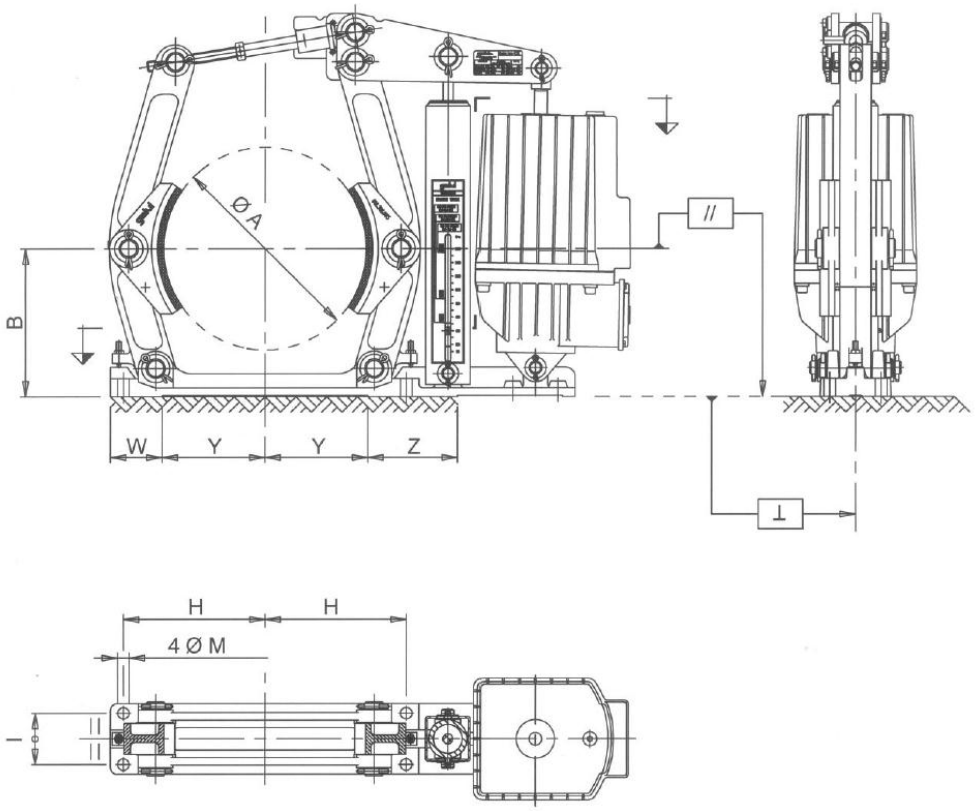
For Brakes with cast iron base it is enough that the portion of base shown with dimensions W, Y, Z is in contact with the anchor base (Drawing 3).

For Brakes with steel base it is instead necessary that the base is totally in contact with the anchor base as per dimensions E, F (Drawing 4).

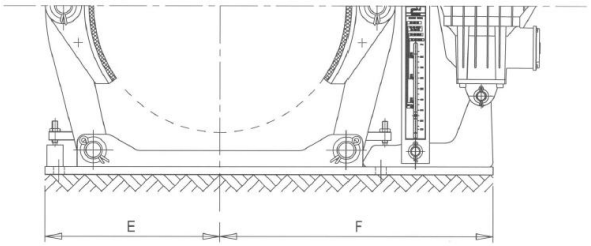
The material of the anchor plane must have a tensile strength ≥ 430 N/mm^2.

The anchor plane of the Brake must be parallel to the brake axis and it must be made observing carefully dimensions A, B, H, I, M (Drawing 3).

The four holes for fastening the Brake to the anchor plane must be made observing carefully dimensions H, I, M (Drawing 3) and the perpendicularity between the average main plane of the Brake and the Brakedrum's rotation axis.



Drawing 3
Shoe Brake with cast iron base
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN



Drawing 4
Shoe Brake with steel base
Model shown NV.630.HYD.301/06.CD.42.SS.AU.ZN

In the following Table 4 taken from pages 4 and 5 of the GALVI Shoe Brakes Catalogue all the dimension for the whole range are available; specific drawings of every Shoe Brake in 2D (dwg format) and 3D (sldprt and step formats) can be downloaded from the Products page of the website www.galvi.com or can be required to info@galvi.com :

Freno tipo Brake type Frein type Bremse Typ	Cf [1] (μ=0,42) min-max [N•m]	Ø A	B	C max	D	E	F	G max	H	I	L	Ø M	N	O max	P max	R min	S	T (CD)	T [2] (CL)	W	Y	V	Z	Massa [3] Mass [3] Masse [3] Masse [3] [kg]
N(NV).160.HYD.023/05[5]	25 - 250	160	130	383	480	140	340	530	120	55	100	12	20	132	398	84	5	55	85	55	85	160	92	23
N(NV).160.HYD.024/05[5]	25 - 250	160	130	383	480	140	340	530	120	55	100	12	20	132	398	84	5	55	85	55	85	160	92	22
N(NV).200.HYD.023/05	29 - 310	200	160	402	538	170	368	588	145	55	100	14	23	161	427	106	4	70	105	65	105	160	100	27
N(NV).200.HYD.024/05	29 - 310	200	160	402	538	170	368	588	145	55	100	14	23	161	427	106	4	70	105	65	105	160	100	26
N(NV).200.HYD.030/05	29 - 400	200	160	467	538	170	368	588	145	55	100	14	23	161	427	106	4	70	105	65	105	160	100	31
N(NV).200.HYD.031/05	29 - 400	200	160	467	538	170	368	588	145	55	100	14	23	161	427	106	4	70	105	65	105	160	100	29
N(NV).250.HYD.023/05	43 - 330	250	190	481	615	200	415	671	180	65	100	18	25	197	474	127	3	90	135	76	124	160	114	35
N(NV).250.HYD.024/05	43 - 330	250	190	481	615	200	415	671	180	65	100	18	25	197	474	127	3	90	135	76	124	160	114	34
N(NV).250.HYD.030/05	43 - 440	250	190	481	615	200	415	670	180	65	100	18	25	197	473	127	3	90	135	76	124	160	114	39
N(NV).250.HYD.031/05	43 - 440	250	190	481	615	200	415	670	180	65	100	18	25	197	473	127	3	90	135	76	124	160	114	37
N(NV).250.HYD.050/06	43 - 720	250	190	552	615	200	415	699	180	65	100	18	25	197	502	127	3	90	135	76	124	190	114	51
N(NV).250.HYD.051/06	43 - 720	250	190	552	615	200	415	684	180	65	100	18	25	197	487	127	3	90	135	76	124	190	114	44
N(NV).315.HYD.030/05	95 - 520	315	230	595	722	240	482	784	220	80	110	18	28	244	540	153	1,5	110	165	80	160	160	140	60
N(NV).315.HYD.031/05	95 - 520	315	230	595	722	240	482	784	220	80	110	18	28	244	540	153	1,5	110	165	80	160	160	140	58
N(NV).315.HYD.050/06	95 - 870	315	230	595	722	240	482	812	220	80	110	18	28	244	568	153	1,5	110	165	80	160	190	140	70
N(NV).315.HYD.051/06	95 - 870	315	230	595	722	240	482	797	220	80	110	18	28	244	553	153	1,5	110	165	80	160	190	140	63
N(NV).315.HYD.080/06	95 - 1550	315	230	595	722	240	482	812	220	80	110	18	28	244	568	153	1,5	110	165	80	160	190	140	71
N(NV).315.HYD.081/06	95 - 1550	315	230	595	722	240	482	797	220	80	110	18	28	244	553	153	1,5	110	165	80	160	190	140	64
N(NV).400.HYD.050/06	250 - 860	400	280	731	850	295	555	939	270	100	140	22	33	297	642	188	3	140	210	100	195	190	155	95
N(NV).400.HYD.051/06	250 - 860	400	280	731	850	295	555	924	270	100	140	22	33	297	627	188	3	140	210	100	195	190	155	88
N(NV).400.HYD.080/06	250 - 1620	400	280	731	850	295	555	939	270	100	140	22	33	297	642	188	3	140	210	100	195	190	155	96
N(NV).400.HYD.081/06	250 - 1620	400	280	731	850	295	555	924	270	100	140	22	33	297	627	188	3	140	210	100	195	190	155	89
N(NV).400.HYD.121/06	250 - 2670	400	280	772	850	295	555	938	270	100	140	22	33	297	641	188	3	140	210	100	195	240	155	117
N(NV).500.HYD.080/06	350 - 1600	500	340	811	1037	360	677	1081	325	130	180	22	35	362	719	236	3	180	270	115	245	190	185	150
N(NV).500.HYD.081/06	350 - 1600	500	340	811	1037	360	677	1066	325	130	180	22	35	362	704	236	3	180	270	115	245	190	185	143
N(NV).500.HYD.121/06	350 - 2910	500	340	811	1037	360	677	1080	325	130	180	22	35	362	718	236	3	180	270	115	245	240	185	161
N(NV).500.HYD.201/06	350 - 5220	500	340	811	1037	360	677	1080	325	130	180	22	35	362	718	236	3	180	270	115	245	240	185	161
N(NV).630.HYD.121/06	1200 - 3700	630	420	974	1114	435	679	1249	400	170	220	27	20	437	812	287	5	225	335	-	-	240	-	242
N(NV).630.HYD.201/06	1200 - 5900	630	420	974	1114	435	679	1249	400	170	220	27	20	437	812	287	5	225	335	-	-	240	-	242
N(NV).630.HYD.301/06	1200 - 7900	630	420	974	1114	435	679	1249	400	170	220	27	20	437	812	287	5	225	335	-	-	240	-	243
N(NV).710.HYD.121/06	660 - 3620	710	470	1091	1286	480	806	1361	450	190	250	27	20	492	869	323	5	255	380	-	-	240	-	307
N(NV).710.HYD.201/06	870 - 5800	710	470	1091	1286	480	806	1361	450	190	250	27	20	492	869	323	5	255	380	-	-	240	-	307
N(NV).710.HYD.301/06	1250 - 8700	710	470	1091	1286	480	806	1361	450	190	250	27	20	492	869	323	5	255	380	-	-	240	-	308

Table 4

Once the horizontal anchor plane as per dimensions A, B, H, I, M of Table 4 is ready, it is possible to proceed with the installation of the GALVI Shoe Brake.

The GALVI Shoe Brakes are supplied ready for installation, with Thrusters complete with oil and with main spring not compressed (page 4, Table 1, Picture 1).

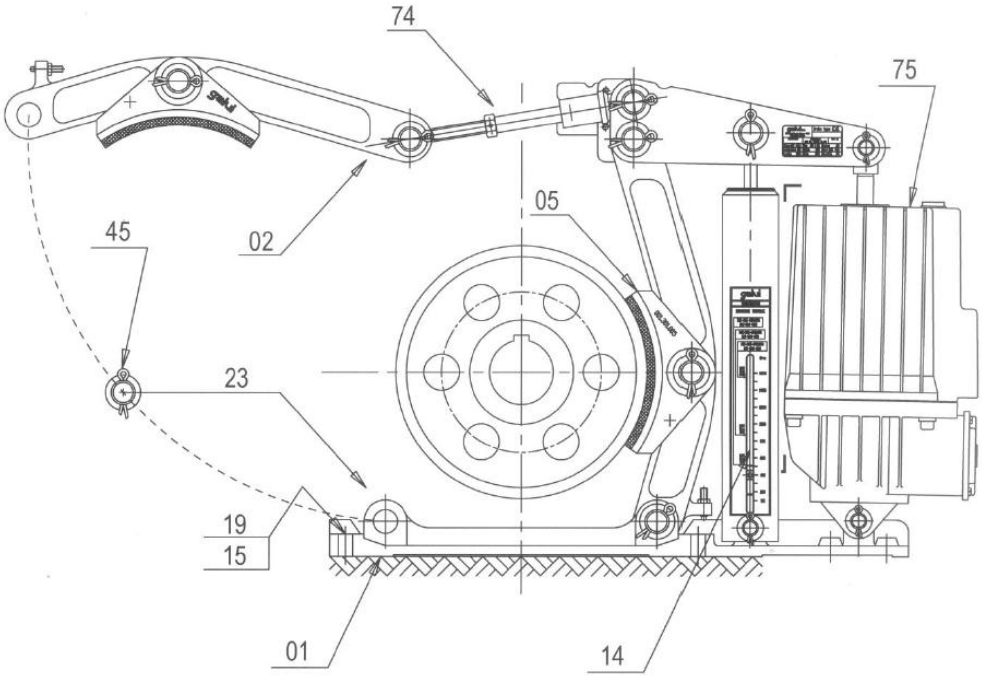
With reference to the Bill of Materials at page 40 of this document and following Drawing 5, it is necessary to remove the lower pin item 23 from the external main lever item 02 after removing its two split pins item 45 or its seegers in case the Brake has optional lubricators on main pins (GR).

Once pin item 23 has been removed, external main lever item 02 can be lifted and rotated on its upper pin tied up to the upper tie rod item 06 for "N" Brakes without self adjusting device or upper tie rod item 74 for "NV" Brakes with self adjusting device.

In this way the internal brake Shoe item 05 can be put in contact with the brakedrum and the base item 01 can be put under the brakedrum and it can be screwed to the anchor plane.

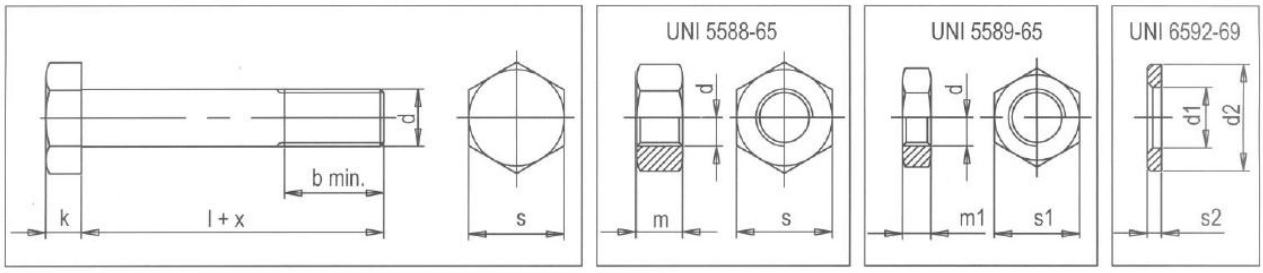
During this operation it is important not to lose disc item 19 and balancing spring item 15.

The base item 01 must be screwed to the anchor plane with four screws in the holes of the same base and in the holes of the face as per dimensions H, I, M (page 7, Drawing 3).



Drawing 5
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN

The features of the screws and nuts necessary for the fastening of the Brake are shown in the following Drawing 6 and Table 5 :



Drawing 6

Dia. Brake mm	Q.ty screws & nuts	Tightening Torque Nm	d	b min	d1	d2	k	l	m	m1	s	s1	s2
160	4	50	M10	26	10,5	21	6,4	28	8	6	16	16	2
200	4	85	M12	30	13	24	7,5	33	10	7	18	18	2,5
250	4	210	M16	38	17	30	10	41	13	8	24	24	3
315	4	210	M16	38	17	30	10	41	13	8	24	24	3
400	4	410	M20	46	21	37	12,5	50	16	9	30	30	3
500	4	410	M20	46	21	37	12,5	50	16	9	30	30	3
630	4	711	M24	54	25	44	15	55	21,5	12	36	36	4
710	4	711	M24	54	25	44	15	55	21,5	12	36	36	4
Use screws with resistance class ≥ 8.8 and nuts with resistance class ≥ 6S													

Table 5

Once the Shoe Brake is screwed to the anchor base with four screws as per Drawing 6 and Table 5, it is possible to fasten again the lower part of the main lever item 02 (opposite to Thruster item 75) to the base item 01 (Drawing 5).

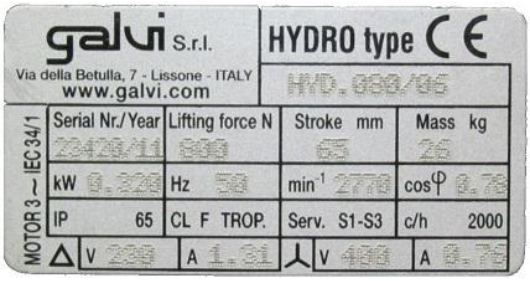
The lower part of the main lever item 02 opposite to Thruster item 75 must be put back in its original position in the Shoe Brake's base item 01, the lower pin item 23 must be put back in its original position with its two split pins item 45 or with its two seegers in case the Brake has optional lubricators on main pins (GR).

02.02 – ELECTRICAL CONNECTION

After installation of the GALVI Shoe Brake it is necessary to proceed with the electrical connection of the HYDRO GALVI Thruster.

The HYDRO GALVI Thrusters are available for any rated Voltage both Hz 50 and Hz 60, they have three phase electric motor, IP.65, insulation Class F, which can rotate in both directions.

As per following Picture 3, the main data of the electric motor of the Thruster are printed on the serial number plate placed on the frontal vertical part of the Thruster (page 4, Picture 1; page 5, Drawing 2).



Picture 3
Serial Number Plate for Thruster

The following are the main data of the electric motors of the HYDRO GALVI Thrusters for the most common rated Voltages **Hz 50** :

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	220	0.69	380	0,40	2689	0,85	50
030 – 031	0,20	220	0.85	380	0,49	2752	0,82	50
050 – 051	0,21	220	1.00	380	0,58	2802	0,84	50
080 – 081	0,32	220	1.31	380	0,76	2695	0,84	50
121	0,32	220	1.64	380	0,95	2733	0,84	50
201	0,45	220	1.87	380	1,08	2723	0,88	50
301	0,56	220	2.30	380	1,40	2703	0,91	50

Table 6
Thrusters V. 220/380 – Hz 50

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	290	0.52	500	0,30	2757	0,78	50
030 – 031	0,20	290	0.64	500	0,37	2767	0,79	50
050 – 051	0,21	290	0.75	500	0,44	2802	0,84	50
080 – 081	0,32	290	0.99	500	0,58	2695	0,84	50
121	0,32	290	1.24	500	0,72	2676	0,84	50
201	0,45	290	1.41	500	0,82	2666	0,88	50
301	0,56	290	1.73	500	1,07	2646	0,87	50

Table 9
Thrusters V. 290/500 – Hz 50

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	230	0.69	400	0,40	2716	0,81	50
030 – 031	0,20	230	0.85	400	0,49	2752	0,82	50
050 – 051	0,21	230	1.00	400	0,58	2830	0,80	50
080 – 081	0,32	230	1.31	400	0,76	2722	0,80	50
121	0,32	230	1.64	400	0,95	2761	0,80	50
201	0,45	230	1.87	400	1,08	2750	0,84	50
301	0,56	230	2.30	400	1,40	2730	0,86	50

Table 7
Thrusters V. 230/400 – Hz 50

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	305	0.52	525	0,30	2716	0,81	50
030 – 031	0,20	305	0.64	525	0,37	2780	0,78	50
050 – 051	0,21	305	0.75	525	0,44	2830	0,80	50
080 – 081	0,32	305	0.99	525	0,58	2722	0,80	50
121	0,32	305	1.24	525	0,72	2761	0,80	50
201	0,45	305	1.41	525	0,82	2750	0,84	50
301	0,56	305	1.73	525	1,07	2730	0,86	50

Table 10
Thrusters V. 305/525 – Hz 50

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	240	0.69	415	0,40	2727	0,78	50
030 – 031	0,20	240	0.85	415	0,49	2791	0,75	50
050 – 051	0,21	240	1.00	415	0,58	2841	0,77	50
080 – 081	0,32	240	1.31	415	0,76	2733	0,77	50
121	0,32	240	1.64	415	0,95	2772	0,77	50
201	0,45	240	1.87	415	1,08	2761	0,81	50
301	0,56	240	2.30	415	1,40	2741	0,83	50

Table 8
Thrusters V. 240/415 – Hz 50

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	380	0.40	660	0,23	2716	0,81	50
030 – 031	0,20	380	0.49	660	0,28	2780	0,78	50
050 – 051	0,21	380	0.58	660	0,33	2830	0,80	50
080 – 081	0,32	380	0.76	660	0,44	2722	0,80	50
121	0,32	380	0.95	660	0,55	2761	0,80	50
201	0,45	380	1.08	660	0,62	2750	0,84	50
301	0,56	380	1.40	660	0,81	2730	0,86	50

Table 11
Thrusters V. 380/660 – Hz 50

The following are the main data of the electric motors of the HYDRO GALVI Thrusters for the most common rated Voltages **Hz 60** :

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	220	0.69	380	0,40	3335	0,80	60
030 – 031	0,20	220	0.85	380	0,49	3366	0,80	60
050 – 051	0,21	220	1.00	380	0,58	3461	0,78	60
080 – 081	0,32	220	1.31	380	0,76	3368	0,78	60
121	0,32	220	1.64	380	0,95	3313	0,84	60
201	0,45	220	1.87	380	1,08	3299	0,87	60
301	0,56	220	2.30	380	1,40	3272	0,88	60

Table 12
Thrusters V. 220/380 – Hz 60

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	230	0.69	400	0,40	3369	0,76	60
030 – 031	0,20	230	0.85	400	0,49	3400	0,76	60
050 – 051	0,21	230	1.00	400	0,58	3496	0,74	60
080 – 081	0,32	230	1.31	400	0,76	3402	0,74	60
121	0,32	230	1.64	400	0,95	3346	0,80	60
201	0,45	230	1.87	400	1,08	3332	0,83	60
301	0,56	230	2.30	400	1,40	3305	0,84	60

Table 13
Thrusters V. 230/400 – Hz 60

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	255	0.60	440	0,35	3369	0,79	60
030 – 031	0,20	255	0.74	440	0,43	3400	0,79	60
050 – 051	0,21	255	0.87	440	0,50	3496	0,77	60
080 – 081	0,32	255	1.14	440	0,66	3402	0,77	60
121	0,32	255	1.42	440	0,83	3346	0,84	60
201	0,45	255	1.62	440	0,94	3332	0,87	60
301	0,56	255	2.00	440	1,22	3305	0,88	60

Table 14
Thrusters V. 255/440 – Hz 60

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	265	0,60	460	0,35	3369	0,77	60
030 – 031	0,20	265	0,74	460	0,43	3390	0,75	60
050 – 051	0,21	265	0,87	460	0,50	3501	0,77	60
080 – 081	0,32	265	1,14	460	0,66	3367	0,77	60
121	0,32	265	1,42	460	0,83	3352	0,77	60
201	0,45	265	1,62	460	0,94	3339	0,81	60
301	0,56	265	2,00	460	1,22	3315	0,83	60

Table 15
Thrusters V. 265/460 – Hz 60

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	280	0,60	480	0,35	3386	0,74	60
030 – 031	0,20	280	0,74	480	0,43	3417	0,72	60
050 – 051	0,21	280	0,87	480	0,50	3513	0,74	60
080 – 081	0,32	280	1,14	480	0,66	3419	0,74	60
121	0,32	280	1,42	480	0,83	3363	0,74	60
201	0,45	280	1,62	480	0,94	3349	0,78	60
301	0,56	265	2,00	460	1,22	3322	0,80	60

Table 16
Thrusters V. 280/480 – Hz 60

Thruster	kW	Volt Δ	A Δ	Volt Y	A Y	rpm	Cos. Φ	Hz
023 – 024	0,16	330	0,48	575	0,28	3369	0,76	60
030 – 031	0,20	330	0,59	575	0,34	3400	0,76	60
050 – 051	0,21	330	0,70	575	0,40	496	0,74	60
080 – 081	0,32	330	0,91	575	0,53	3402	0,74	60
121	0,32	330	1,14	575	0,66	3346	0,80	60
201	0,45	330	1,30	575	0,75	3332	0,83	60
301	0,56	330	1,60	575	0,97	3305	0,84	60

Table 17
Thrusters V. 330/575 – Hz 60

On request it will be possible to supply also the electrical data of Thrusters electric motors for rated Voltages different from the listed ones.

In no case a Thruster for Hz 50 can be used at Hz 60, also if rated Voltage is the same, because the Thruster's impeller for Hz 50 is different from the Thruster's impeller for Hz 60.

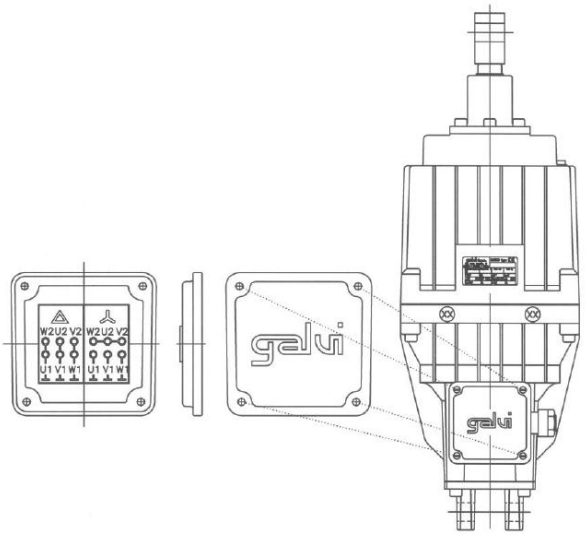
	**Never use a Thruster for Hz 50 at Hz 60.** **Never use a Thruster for Hz 60 at Hz 50.** **Risk of accident.**

For the cables connection it is necessary to remove the terminal box cover of the Thruster by unscrewing its four screws, and to remove the cable gland of the Thruster (Table 18, Picture 4).

Pos.	Description
01	Terminal box cover of Thruster
02	Screws for terminal box cover of Thruster
03	Cable gland of Thruster
04	Motor housing

Table 18

The wiring instructions are printed on the internal part of the terminal box cover, wiring can be of delta type or star type. (Drawing 7, Picture 5).



Drawing 7

Picture 4
Model shown HYD.301/06

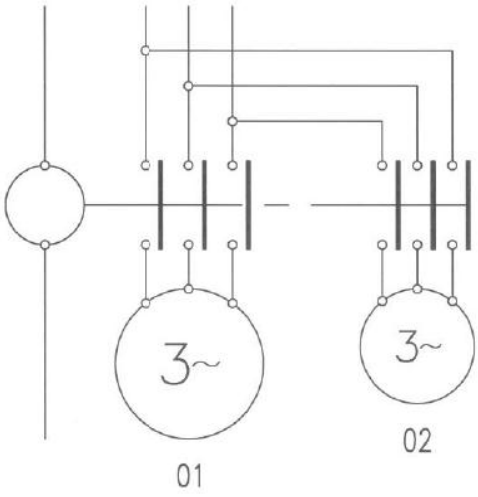
The HYDRO GALVI Thrusters if not differently required are star connected.

The Thruster motor must be connected to the main motor of the machine as per following suggested wiring diagram (Table 19, Drawing 8).

Picture 5

Pos.	Description
01	Main motor
02	Thruster motor

Table 19



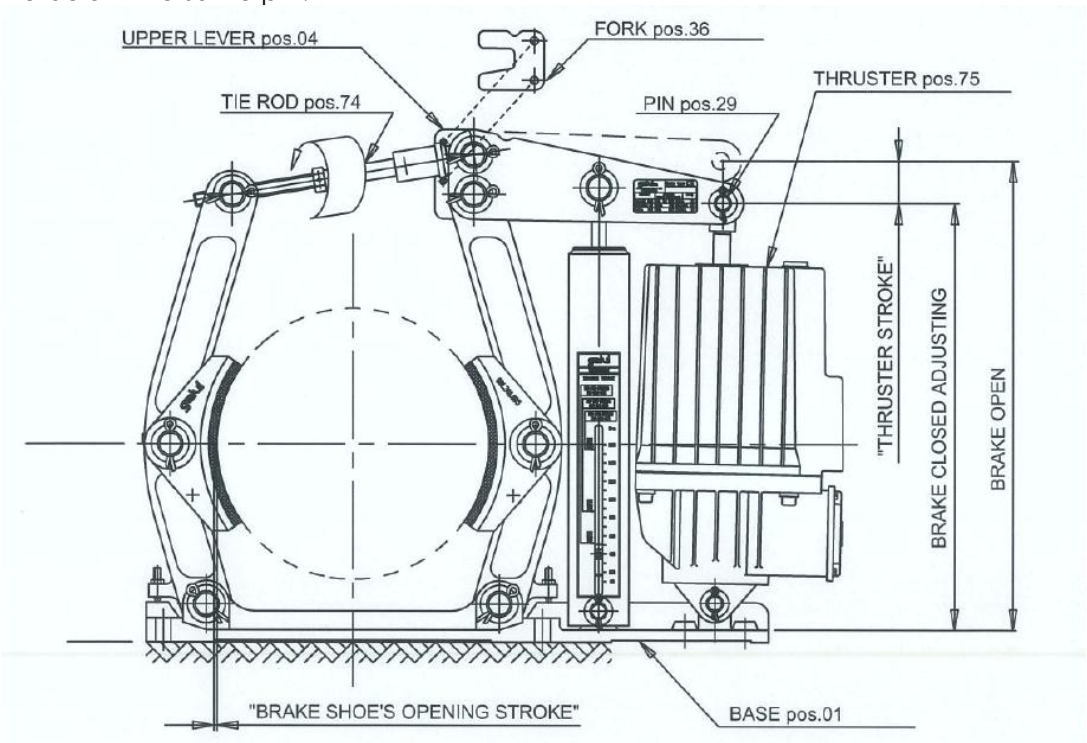
Drawing 8
Suggested wiring diagram

02.03 - ADJUSTMENT OF OPENING STROKES & BALANCING SCREWS

After installation of the GALVI Shoe Brake and electrical connection of the HYDRO GALVI Thruster it is necessary to proceed with the adjustment of the opening strokes of brake Shoes and Thruster.

With Shoe Brake in closed position, in "NV" version with self adjusting device, it is necessary to remove temporarily fork item 36 from self adjusting device for rotating the upper tie rod item 74 until the Thruster item 75 is totally open, without forcing beyond the normal opening stroke (Drawing 9).

With Brake in open position it is necessary to measure the distance between the axis of pin item 29 and plane below the same pin.



Drawing 9
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN

Rotate back in opposite direction the upper tie rod item 74 until pin item 29 is lowered in a measure equal to the "Thruster stroke" as per following Table 20, that is to say the opening stroke of the Brake at Thruster axis.

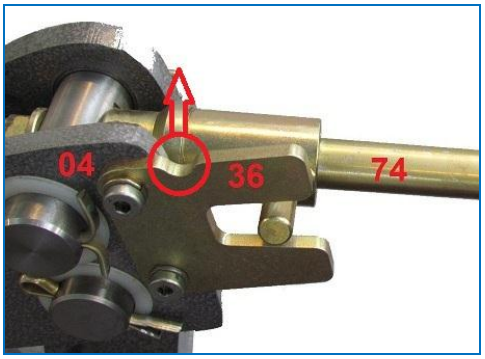
Brake diameter	160 mm not DIN Standard	200 mm	250 mm	315 mm	400 mm	500 mm	630 mm	710 mm
Thruster stroke	30 mm	30 mm	38 mm	38 mm	42 mm	48 mm	50 mm	35 mm

Table 20

After this operation **the fork item 36 of the self adjusting device must be screwed again to the upper lever item 04, always paying attention to install it again with reference mark A upwards** (Table 21, Picture 6).

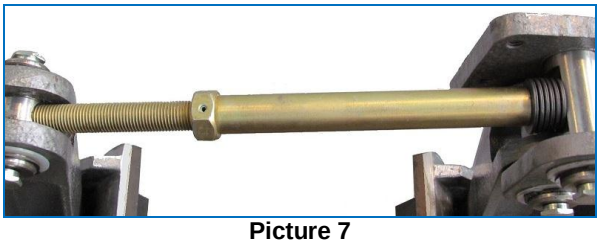
Pos.	Description
04	Upper right lever
36	Fork
74	Upper tie rod
A	Reference mark for fork 36

Table 21



Picture 6

In Shoe Brakes in "N" version without self adjusting device there is no fork item 36 and the adjusting procedure with the upper tie rod is the same as per "NV" Shoe Brakes (Picture 7).



Picture 7

Adjusting the opening stroke of the Thruster the brake Shoes will have an opening stroke equal to the "brake Shoe stroke" as per following Table 22 and DIN Standard 15435, where the "brake Shoe stroke" is the gap between each lining and the brakedrum :

Brake diameter	**160 mm** not DIN Standard	**200 mm**	**250 mm**	**315 mm**	**400 mm**	**500 mm**	**630 mm**	**710 mm**
Brake Shoe stroke	0,80 mm	1,00 mm	1,25 mm	1,25 mm	1,60 mm	1,60 mm	2,00 mm	2,00 mm

Table 22

In Shoe Brakes in "NV" version with self adjusting device the brake Shoes opening stroke remains constant also during the linings wear, so that also the Braking Torque remains constant.

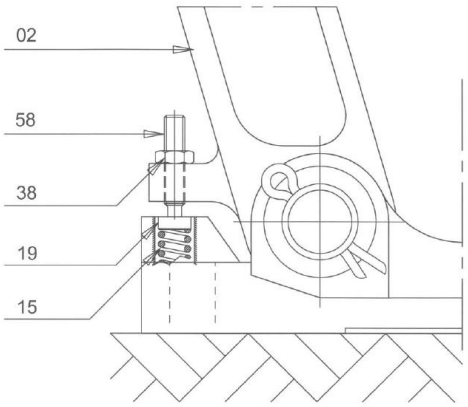
In Shoe Brakes in "N" version without self adjusting device the opening stroke of the brake Shoes increases during linings wear, so that there is a progressive loss of Braking Torque during the use of the Brake, for such reason it is necessary to screw periodically the upper tie rod of the Brake for resetting the correct opening stroke of the brake Shoes.

After adjusting the opening strokes of the brake Shoes and of the Thruster it is necessary to proceed with the adjustment of the balancing screws item 58 of the main levers item 02 of the GALVI Shoe Brake (Drawing 10, Picture 8).

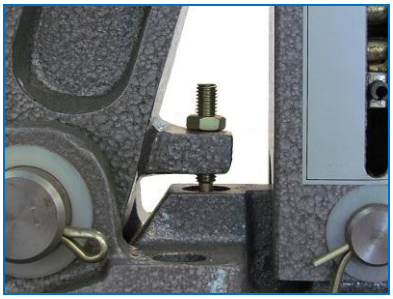
The function of this adjustment if to have an equal opening of the main levers.

It is necessary to open the GALVI Shoe Brake and to keep it in open position using the lifting Force of the HYDRO GALVI Thruster.

During this phase the balancing screws item 58 at the base of the main levers item 02 must be conveniently screwed or unscrewed until main levers item 02 can open equally.



Drawing 10



Picture 8

Once this last operation is completed and nuts item 38 are fastened on balancing screws item 58 the GALVI Shoe Brake is ready for working and for the adjustment of the Braking Torque.

02.04 – ADJUSTMENT OF THE BRAKING TORQUE

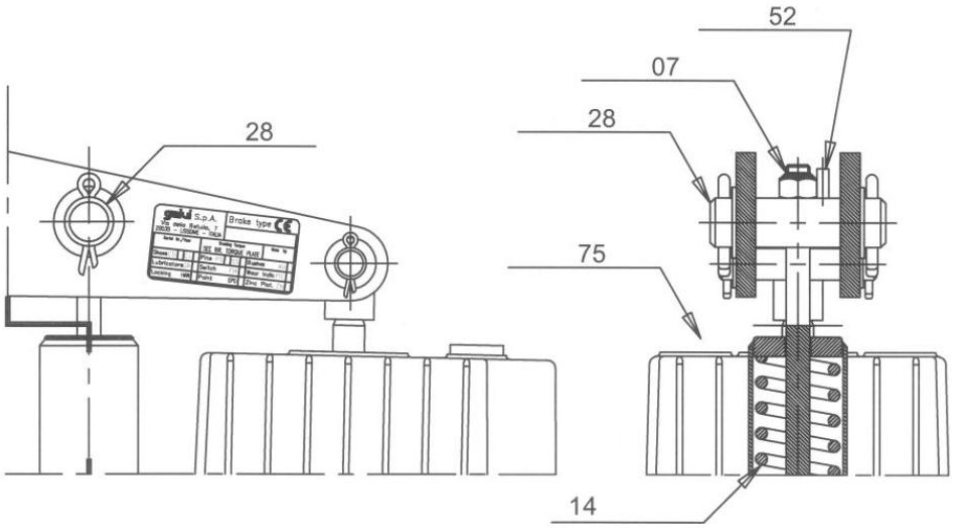
After installation, electrical connection and adjustment of opening strokes and balancing screws of the Brake it is necessary to proceed with the adjustment of the Braking Torque.

This operation must be made with HYDRO GALVI Thruster item 75 in closed position, that is to say with brake Shoes item 05 in contact with the brakedrum (page 9, Drawing 5).

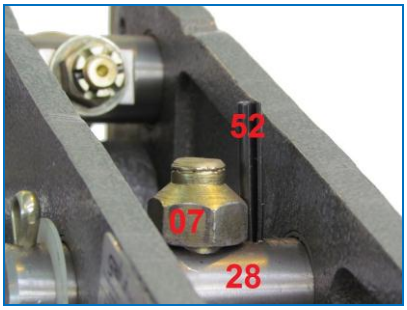
The adjustment of the Braking Torque is substantially made compressing the Brake's main spring item 14 by screwing the nut at the top of the main spring's tie rod item 07 (Drawing 11).

For rotating this nut it is necessary to remove temporarily the elastic pin item 52 from its hole in pin item 28 above the main spring set (Picture 9).

It is necessary to keep the elastic pin item 52 and to put it back in its original position at the end of the operation in order to avoid the rotation of the above mentioned nut.

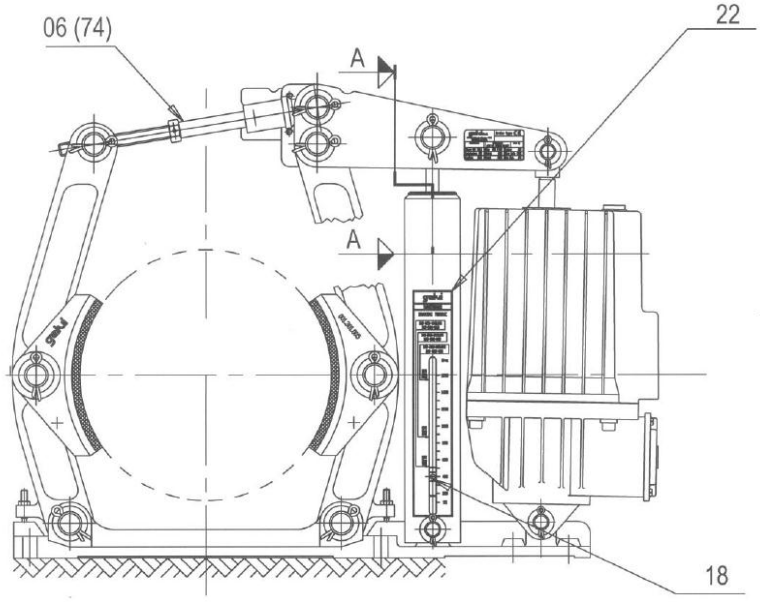


Drawing 11

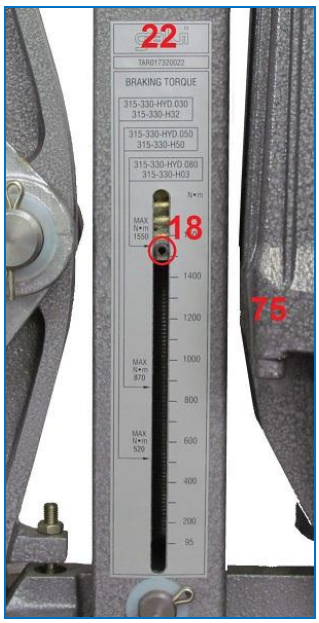


Picture 9

Screw the nut of tie rod item 07 until the pointer (that is to say the elastic pin item 18) in the slit of the main spring set reaches the estimated value of Braking Torque expressed in Nm on the Braking Torque plate item 22 (Drawing 12, Picture 10).



Drawing 12
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN



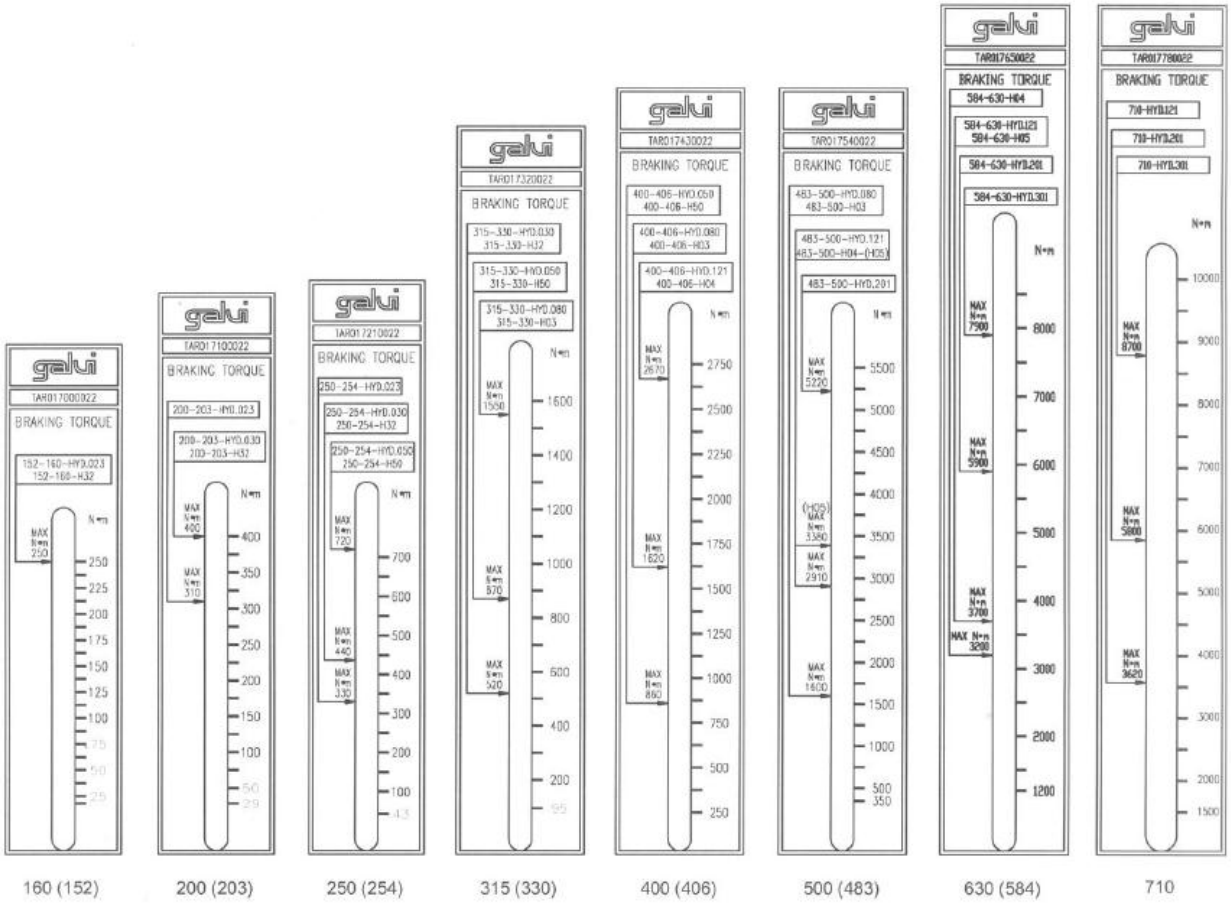
Picture 10

As per following Drawing 13, the GALVI Shoe Brakes' Braking Torque plate item 22 shows for each diameter of Brake more than one maximum Braking Torque to which the Brake can be set in function of the model of HYDRO GALVI Thruster item 75.

More precisely, the Braking Torque plate item 22 shows two different maximum Braking Torques for Brake dia. 160 mm and three different maximum Braking Torques for Brakes from dia. 200 mm to dia. 710 mm included.

As an example, a GALVI Shoe Brake type NV.315… can be set up to a maximum Braking Torque of 520 Nm with HYDRO GALVI Thruster type HYD.030/05 or up to a maximum Braking Torque of 1550 Nm with HYDRO GALVI Thruster type HYD.080/06, as shown also at page 8 in Table 4.

The following Drawing 13 shows the eight Braking Torque plates item 22 for GALVI Shoe Brakes from dia. 160 mm to dia. 710 mm :



Drawing 13

It is always necessary to know which model of HYDRO Thruster is installed for knowing which maximum Braking Torque each Brake can be set to.

	**Never set the Braking Torque beyond the maximum limit shown in the Braking Torque plate in function of the installed Thruster. Risk of malfunctioning.**

If the Shoe Brake has been selected by the Manufacturer, its Braking Torque is always written in the "Btt" line of the calculations report for the Brake's selection, selection which can be made by filling the data sheets in the Inquiries page of the website www.galvi.com .

If the Shoe Brake hasn't been selected by the Manufacturer and if the User doesn't know which Braking Torque is necessary, it is suggested to initially set the Brake to its maximum Braking Torque and then eventually decrease the Braking Torque in function of the results of the first test brakings, until optimal braking time and braking space are reached, after an adequate running in of the linings and of the brakedrums which must be perfectly clean.

Once the GALVI Shoe Brake has been set to a satisfactory Braking Torque it is necessary to put the elastic pin item 52 back in its hole in pin item 28 above the main spring set in order to avoid accidental unscrewing of the nut of tie rod item 07 with possible loss of Braking Torque.

In GALVI Shoe Brakes in "NV" version with self adjusting device the Braking Torque remains constant during the linings wear.

In GALVI Shoe Brakes in "N" version without self adjusting device the Braking Torque decreases progressively during linings wear and during increase of brake Shoes opening stroke, for such reason it is necessary to screw periodically the upper tie rod of the Brake for resetting the correct opening stroke of the brake Shoes.

A correct selection of the Shoe Brake is at the base of a lasting and reliable installation, the Manufacturer for such reason is available to make without obligation and free of charge the selection of GALVI Brakes supplying calculations report, it is therefore suggested to let the Manufacturer select the Brake.

03.01 – OPTIONAL ITEMS

The GALVI Shoe Brakes with HYDRO GALVI Thrusters can be supplied with optional items as per following Table 23 :

Description	Code
Self adjusting device	**NV**
Extra-wide brake Shoes, 1,5 times wider than the DIN 15435 Standard brake Shoes	**CL**
Stainless steel pins	**SS**
Lubricators on main pins	**GR**
Open position microswitch	**FIA**
Linings wear microswitch	**FIC**
Manual opening system	**HAN**
Supporting spheres for vertical brake axis	**ORZ**
Protection cover	**COV**
Lowering valve for Thruster	**LO**
Lifting valve for Thruster	**LI**
Foot rotated 90° for Thruster	**90**
VITON seals for Thruster	**VIT**
Heaters for Thruster	**HEA**
Special Voltage for Thruster	**V-Hz**

Table 23

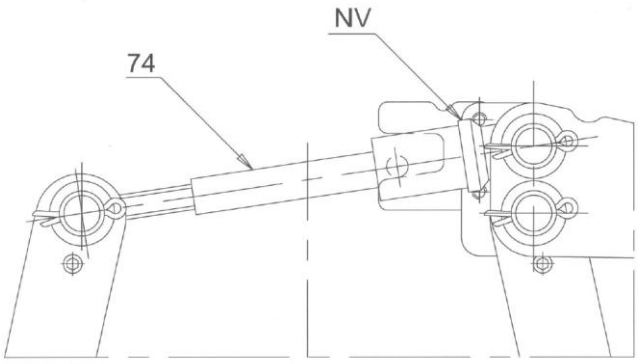
03.02 – SELF ADJUSTING DEVICE (NV)

The GALVI Shoe Brakes with self adjusting device have "NV" code instead of "N" code typical of standard Shoe Brakes.

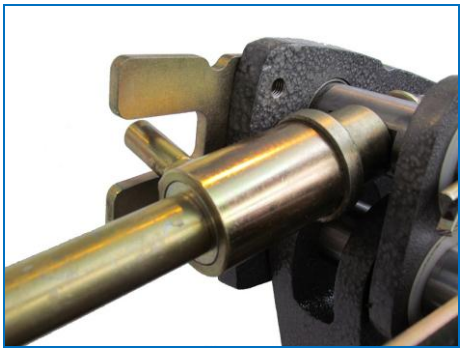
The self adjusting device is now installed on all GALVI Brakes and it is considered indispensable for all the hoist drive Brakes and for heavy duty Brakes.

In Shoe Brakes in "NV" version the self adjusting device automatically adjusts the Brake with repeated and minimum rotations of the upper tie rod during the progressive linings wear, so that the Braking Torque and the opening stroke of the brake Shoes remain constant.

The self adjusting device is substantially a unidirectional needle bearing installed on the upper tie rod which works also through its pin and its fork (Drawing 14, Picture 11).



Drawing 14



Picture 11
Self adjusting device (NV)

03.03 – BRAKE SHOES 1,5 TIMES WIDER THAN DIN 15435 STANDARD BRAKE SHOES (CL)

The GALVI Shoe Brakes with brake Shoes item 05 1,5 times wider than DIN 15435 Standard brake Shoes have "CL" code instead of "CD" code typical of standard brake Shoes.

The brake Shoes item 05 1,5 times wider than DIN 15435 Standard brake Shoes are an option suggested by the Manufacturer for all the heavy duty GALVI Shoe Brakes.

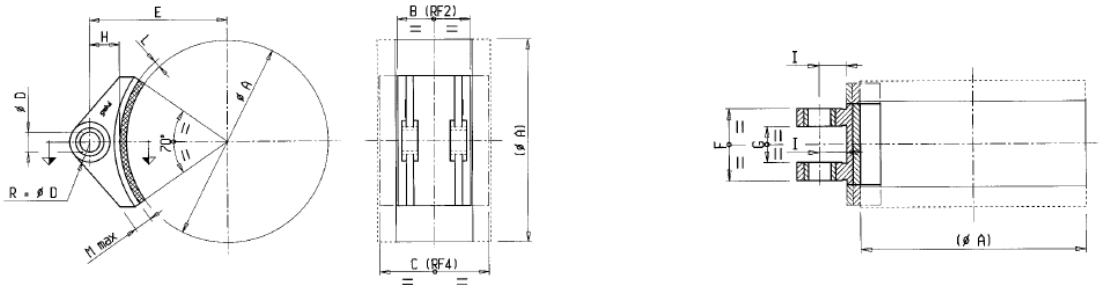
In case the Manufacturer has made the technical selection of the GALVI Shoe Brake it is possible that the brake Shoes item 05 1,5 times wider than DIN 15435 Standard brakes Shoes are indispensable for the service required by the Customer.

The brake Shoes item 05 1,5 times wider than DIN 15435 Standard brakes Shoes allow a better dissipation of thermal energy and a better use of the lining.

The brake Shoes item 05 1,5 times wider than DIN 15435 Standard brakes Shoes must be used with Brakedrums or Couplings with Brakedrums 1,5 times wider than the DIN 15431 Standard Brakedrums respectively named "PL" and "GL" in the GALVI range.

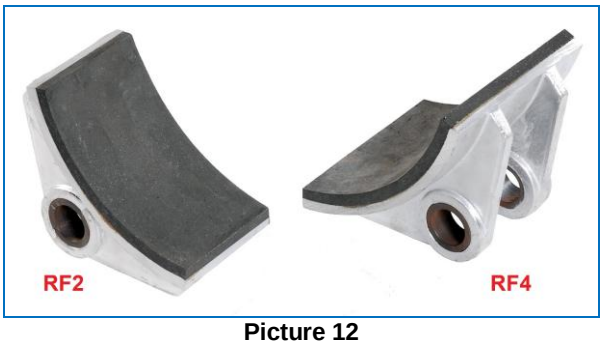
The DIN 15435 Standard brake Shoes item 05 are named "RF2" while the brakes Shoes 1,5 times wider than the DIN 15435 Standard brake Shoes are named "RF4".

All the brake Shoes "RF2" and "RF4" are listed in the following Table 24 taken from pages 36 and 37 of the GALVI Shoe Brakes Catalogue :



Ceppo freno tipo Brake Shoe type Sabots de frein type Bremsbacke Durchm. Typ		Ø A	B RF2	C [1] RF4	Ø D D10	E	F 0 - 0,2	G + 0,2 0	H	I	L	M max	Massa [2] Mass [2] Masse [2] Masse [2] [kg]	
													Ceppo DIN DIN Shoe Sabot DIN Backe DIN	Ceppo largo [1] Extra-wide Shoe [1] Sabot large [1] Breite Backe [1]
CD	CL [1]												RF2	RF4
RF2.160[1]	RF4.160[1]	160	55	85	16	115	52	28	29	23	6	13	0,31	0,77
RF2.200	RF4.200[1]	200	70	105	20	140	65	35	32	24	8	17	0,60	0,76
RF2.250	RF4.250[1]	250	90	135	25	170	80	40	37	29	8	22	0,99	1,24
RF2.315	RF4.315[1]	315	110	165	30	212	100	50	44,5	34,5	10	25	1,83	2,34
RF2.400	RF4.400[1]	400	140	210	35	260	125	62	50	40	10	30	3,06	3,88
RF2.500	RF4.500[1]	500	180	270	40	320	160	80	58	46	12	33	5,30	6,90
RF2.630	RF4.630[1]	630	225	335	45	390	200	100	63	51	12	38	17,5	22,0
RF2.710	RF4.710[1]	710	255	380	50	440	224	112	70	56	15	40	24,5	33,5

Table 24



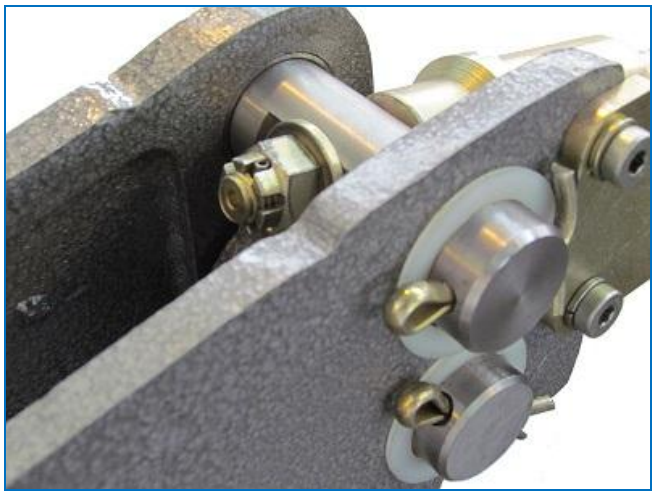
Picture 12
Standard brake Shoes "RF2" and 1,5 times wider brake Shoes "RF4"

03.04 - STAINLESS STEEL PINS (SS)

The GALVI Shoe Brakes with stainless steel pins have "SS" code instead of "PS" code typical of standard pins.

The stainless steel pins are an option suggested by the Manufacturer for all the GALVI Shoe Brakes installed outdoors or in salty and humid environments.

The stainless steel pins are made in AISI 420 HARDENED AND TEMPERED (Picture 13).



Picture 13
Stainless steel pins "SS"

03.05 – LUBRICATORS ON MAIN PINS (GR)

The GALVI Shoe Brakes with lubricators on main pins have "GR" code.

The lubricators on main pins are an option suggested by the Manufacturer for all the GALVI Shoe Brakes installed outdoors or in salty and humid environments.

The lubricators on main pins are available only combined with the optional stainless steel pins (SS).

The pins with lubricators are secured with seegers instead of split pins and washers used for securing the standard pins (PS) and the stainless steel pins (SS) (Picture 14).

The lubrication with lubricators on main pins is made with injection of grease (as an example grease EXXON Beacon 2) with specific guns for lubricators Tecalemit UNI 7662.

Picture 14
Lubricators on main pins "GR"

03.06 – OPEN POSITION MICROSWITCH (FIA)

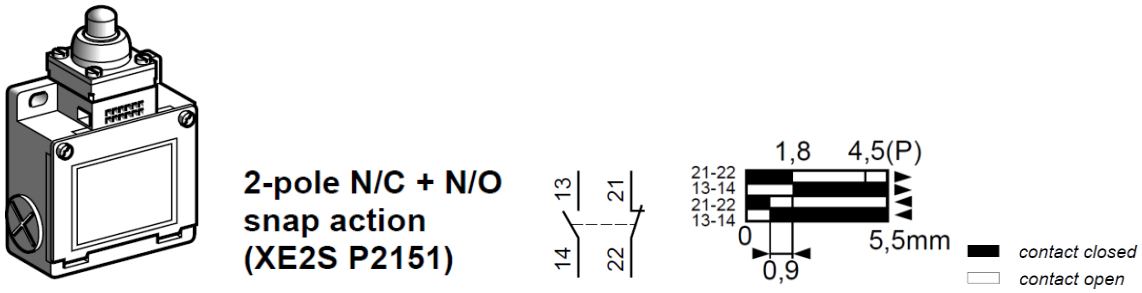
The GALVI Shoe Brakes with open position microswitch have "FIA" code.

The open position microswitch is an option suggested by the Manufacturer for avoiding the accidental start of the machine's main motor before the GALVI Shoe Brake is completely open.

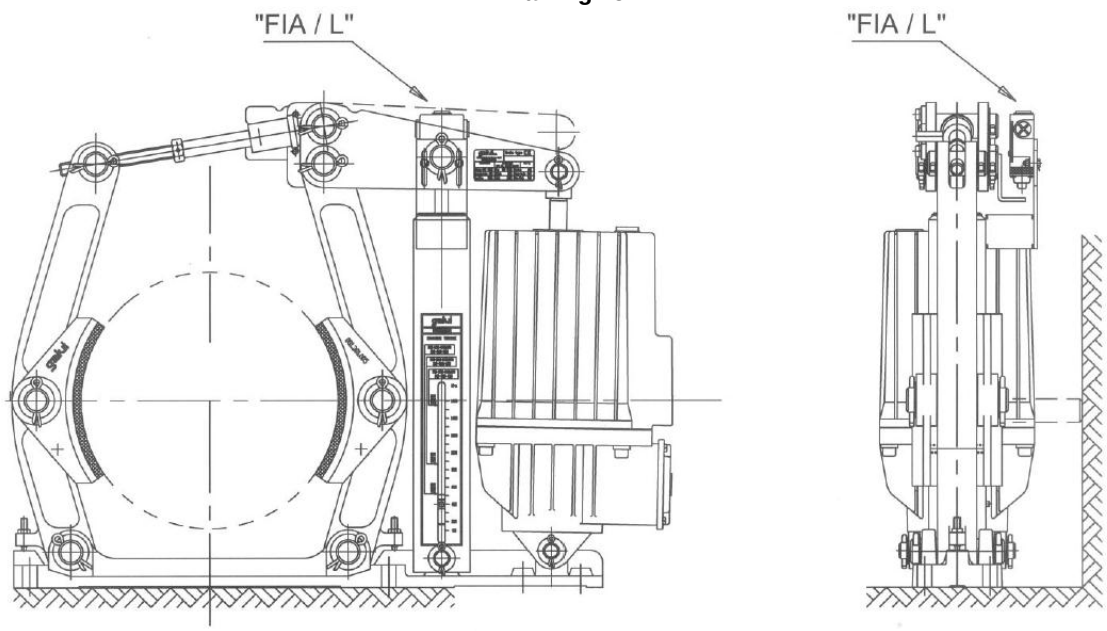
The option can be installed on left side ("FIA/L", Drawing 16) or on right side ("FIA/R"), in any case always opposite to eventual "HAN" option's side.

The microswitch normally used is Telemecanique brand, type XCK.M110 (Drawing 15, Picture 15), preset for cable gland Pg.11 (cable gland normally not included); on request it is possible to supply the microswitch model XCK.M110.H20 preset for cable gland M20 x 1,5 mm.

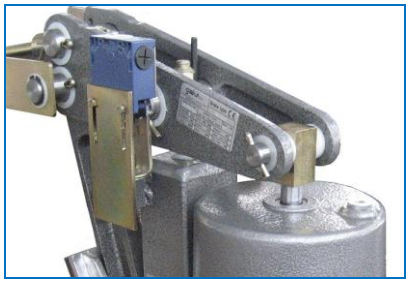
On request it is possible to supply also the cable gland, both Pg.11 and M20 x 1,5 mm, both in nylon and in stainless steel (Picture 16).



Drawing 15



Drawing 16
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN.FIA/L



Picture 15
Open position microswitch "FIA/L"

Picture 16
Nylon and stainless steel cable glands Pg.11 and M20

03.07 – LININGS WEAR MICROSWITCH (FIC)

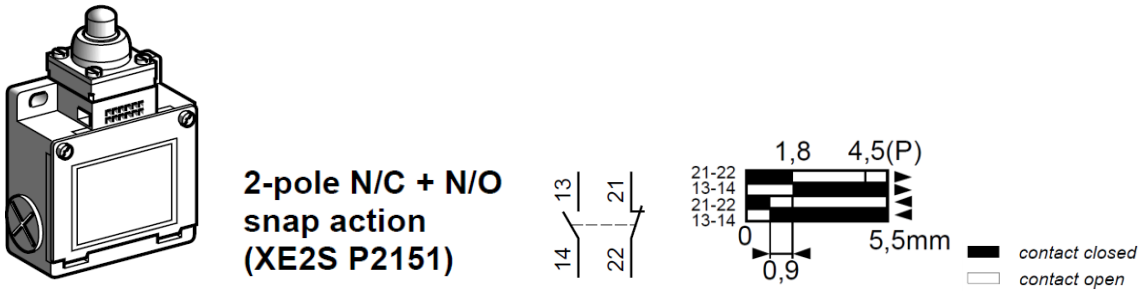
The GALVI Shoe Brakes with linings wear microswitch have "FIC" code.

The linings wear microswitch is an option suggested by the Manufacturer for detecting and signalling the linings wear.

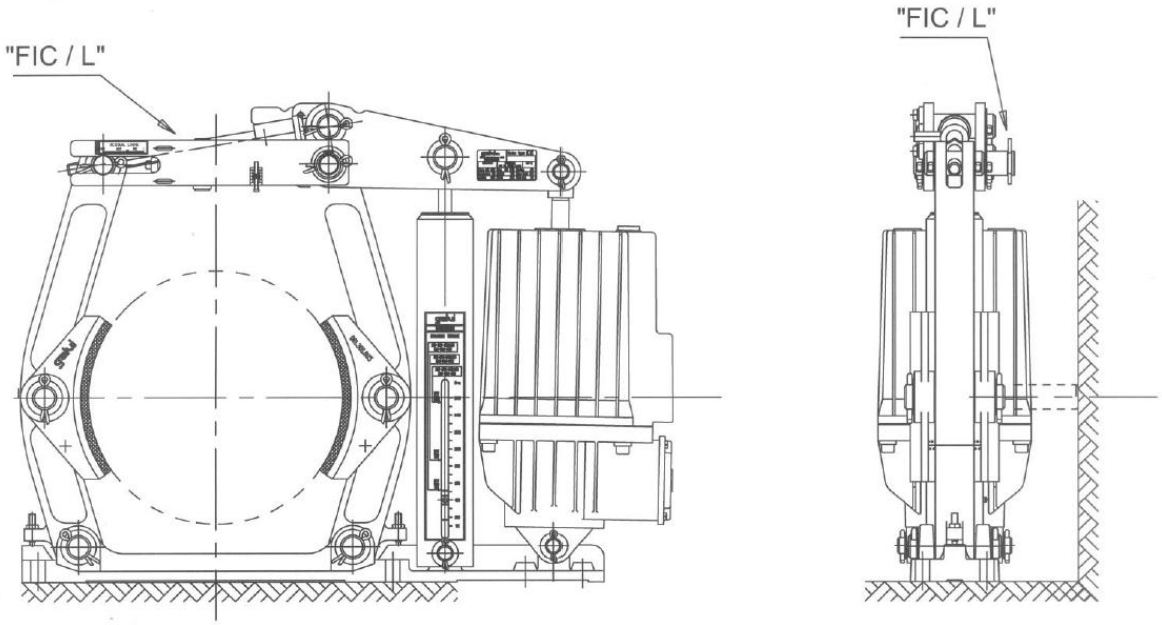
The option can be installed on left side ("FIC/L", Drawing 18) or on right side ("FIC/R").

The microswitch normally used is Telemecanique brand, type XCK.M110 (Drawing 17, Picture 17), preset for cable gland Pg.11 (cable gland normally not included); on request it is possible to supply the microswitch model XCK.M110.H20 preset for cable gland M20 x 1,5 mm.

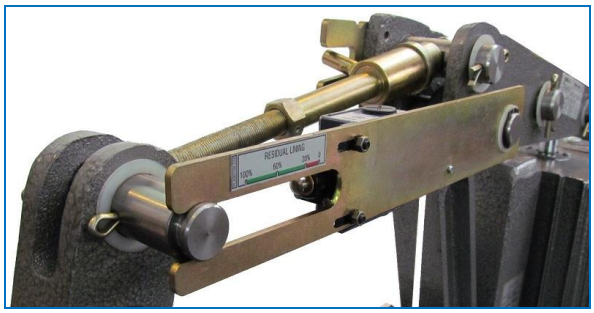
On request it is possible to supply also the cable gland, both Pg.11 and M20 x 1,5 mm, both in nylon and in stainless steel (Picture 18).



Drawing 17



Drawing 18
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN.FIC/L



Picture 17
Linings wear microswitch "FIC/L"

Picture 18
Nylon and stainless steel cable glands Pg.11 and M20

03.08 – MANUAL OPENING SYSTEM (HAN)

The GALVI Shoe Brakes with manual opening system have “HAN” code.

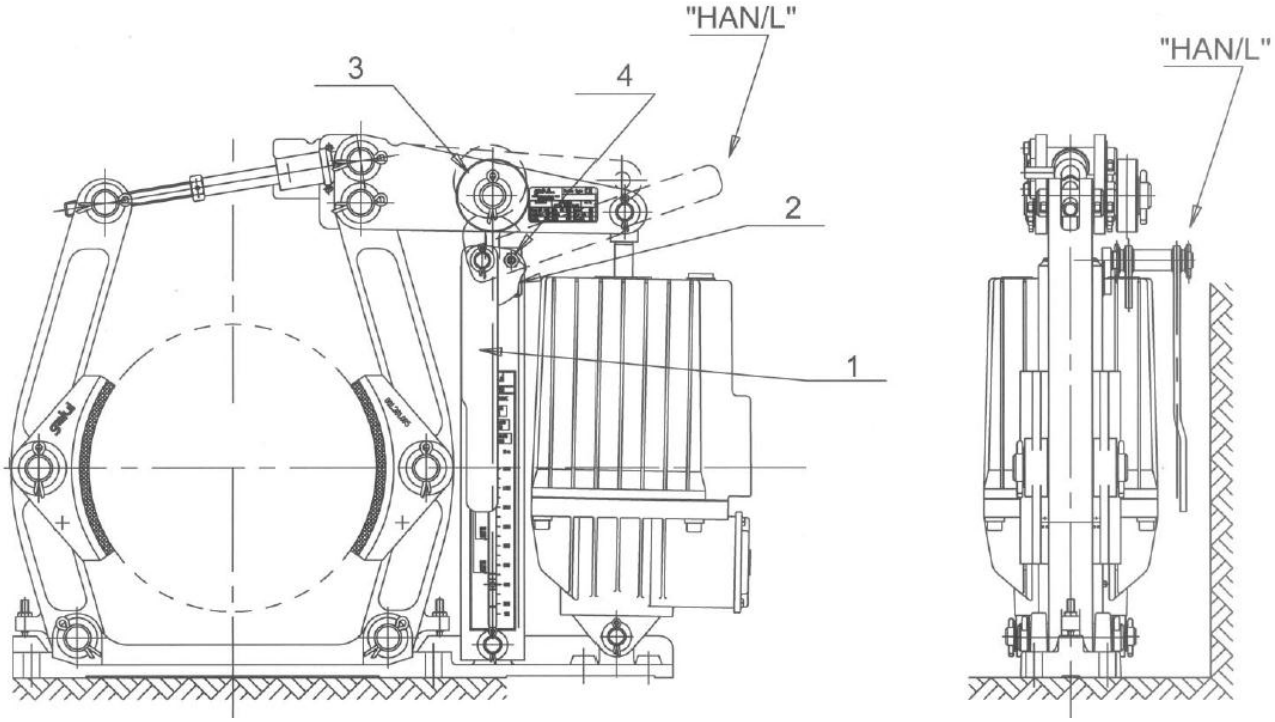
The manual opening system is an option suggested by the Manufacturer for facilitating maintenance and/or for some special installations which require the possibility to open the Brake manually and eventually to lock it in open position, as it happens with Brakes for boom rotation for port cranes.

The system is made with a lever with eccentric cam which, held and lifted, working on a wheel allows to open the GALVI Shoe Brake and to eventually lock it in open position.

The system is designed for being automatically disengaged going back to closed position as soon as the Thruster starts working opening electrically the Brake.

For closing the Brake it is necessary to put the lever back in vertical position.

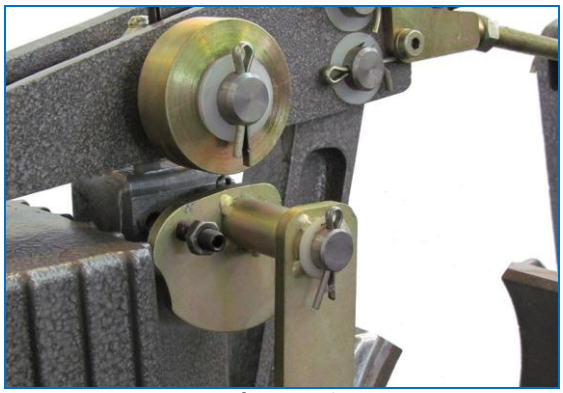
The option can be installed on left side (“HAN/L”, Drawing 19) or on right side (“HAN/R”).



Drawing 19
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN.HAN/L

Pos.	Description
01	Lever
02	Eccentric cam
03	Wheel
04	Setscrew

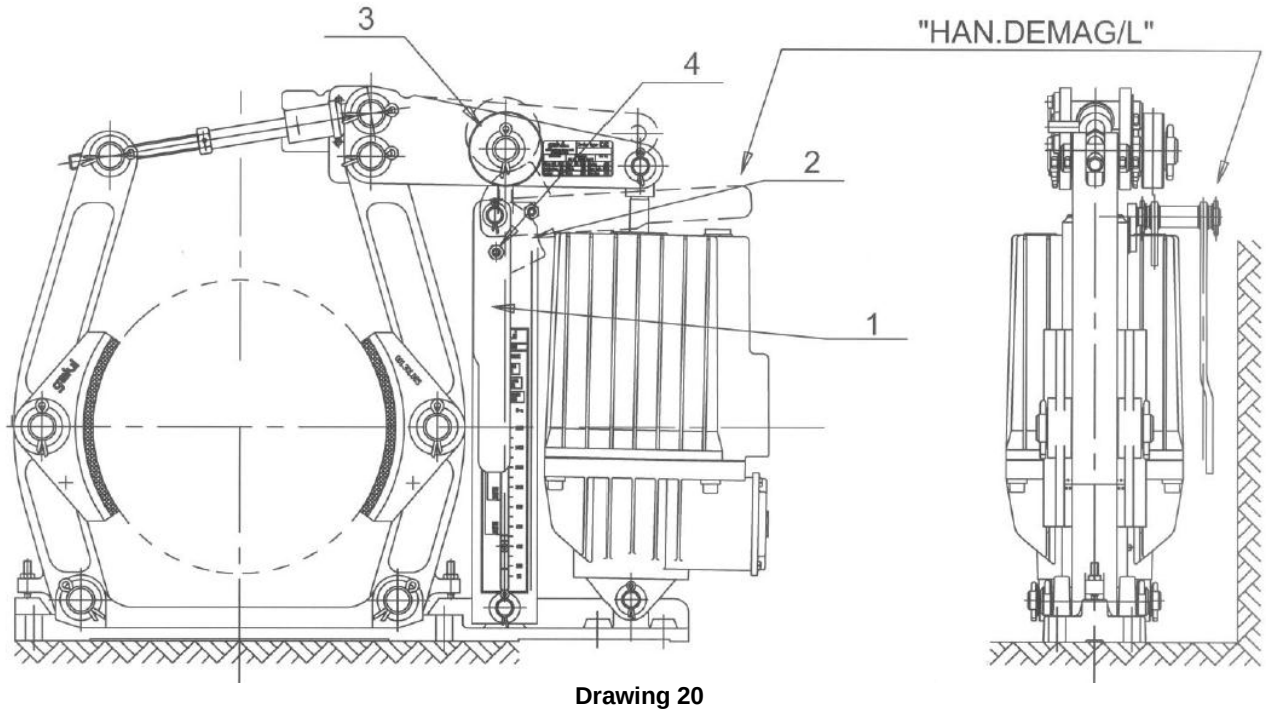
Table 25



Picture 19
Manual opening system “HAN/R”

On specification of Customer Demag Cranes & Components GmbH the manual opening system is made also in special version which, unlike the standard version, doesn't allow to lock the Brake in open position, in this special version the option is named "HAN.DEMAG".

The option also in this version can be installed on left side ("HAN.DEMAG/L", Drawing 20) or on right side ("HAN.DEMAG/R", Picture 20).



Drawing 20
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN.HAN.DEMAG/L

Pos.	Description
01	HAN.Demag lever
02	Eccentric cam HAN.Demag
03	Wheel
04	Setscrew HAN.Demag with spring

Table 26

Picture 20
Manual opening system "HAN.DEMAG/R"

03.09 – SUPPORTING SPHERES FOR VERTICAL BRAKE AXIS (ORZ)

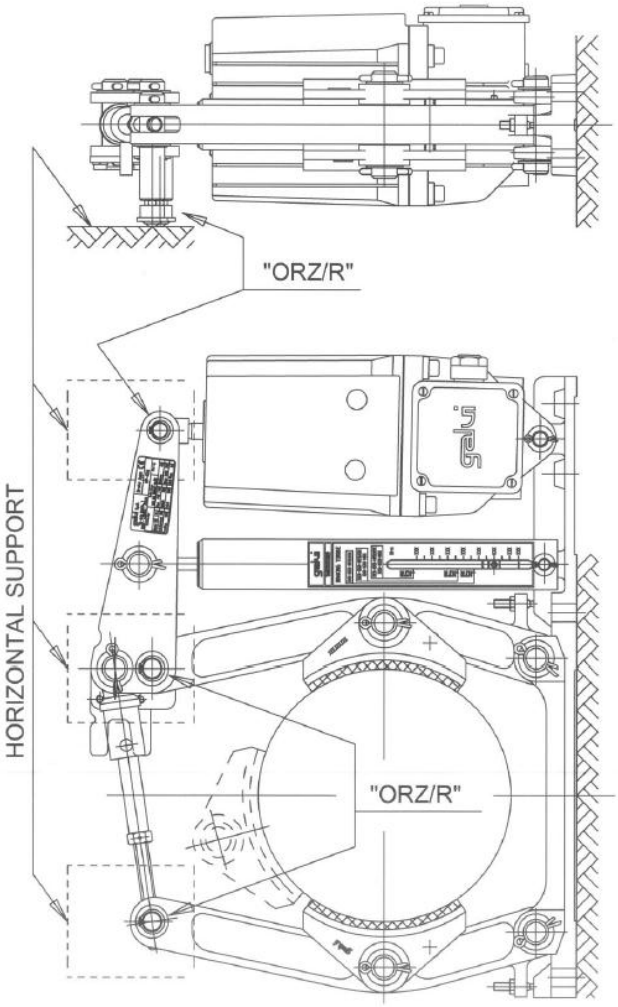
The GALVI Shoe Brakes with supporting spheres for vertical brake axis have "ORZ" code.

The supporting spheres for vertical brake axis are an option considered by the Manufacturer as indispensable for all the GALVI Shoe Brakes installed in horizontal position, that is to say with vertical brake axis.

These spheres support the GALVI Shoe Brake with vertical brake axis rolling on a horizontal support preset under the Brake.

In all the cases in which the Brake is installed in horizontal position, that is to say with vertical brake axis, it is indispensable to add the following "90" option to the "ORZ" option, that is to say it is indispensable for the HYDRO GALVI Thruster to have the foot rotated of 90 degrees so that the frontal part of the Thruster is facing upwards (Drawing 21).

The GALVI Shoe Brakes with "ORZ" option cannot be supplied with HYDRO GALVI Thrusters model HYD.024/05, 031/05, 081/06, 051/06 because these Thrusters are not available with option "90".



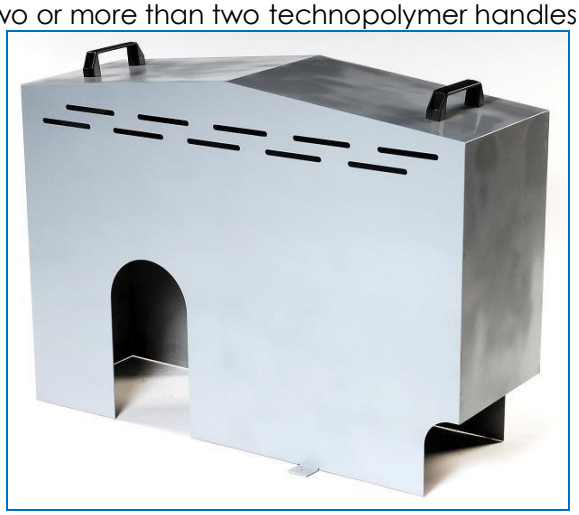
Drawing 21
Model shown NV.315.HYD.080/06.90.CD.42.PS.AU.ZN.ORZ/R

03.10 – PROTECTION COVER (COV)

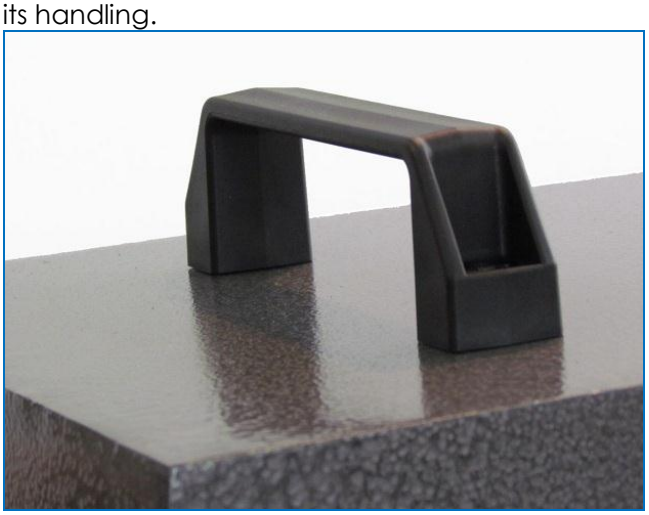
The protection cover is an option identified with "COV" code.

The protection cover is an option considered by the Manufacturer as sometimes suggested and sometimes indispensable for all the GALVI Shoe Brakes installed outdoors.

The protection cover is made of laser cut steel and in function of the diameter of Shoe Brakes it has two or more than two technopolymer handles for its handling.



Picture 21
Protection cover "COV"



Picture 22
Technopolymer handle for cover "COV"

03.11 – LOWERING VALVE FOR THRUSTER (LO)

The HYDRO GALVI Thrusters, excluding models HYD.024/05, 031/05, 051/06, 081/06, can be supplied with optional lowering valve identified with "LO" code.

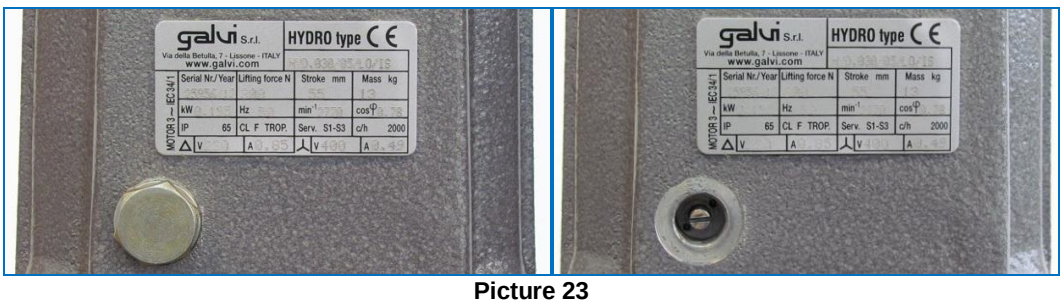
The lowering valve is an option considered by the Manufacturer as indispensable for all the GALVI Shoe Brakes whose application requires adjustment of closing time, with effects on braking time and braking space.

Normally this option is common on Brakes for horizontal movements (cranes' bridge travelling, cranes' trolley traversing, belt conveyors drives), while it shouldn't be installed on Brakes for vertical movements (hoist drives).

Externally the lowering valve can be used screwing its tie rod on the frontal part of the Thruster (protected by a screw cap) and increasing the normal closing time of Thruster and Brake.

The average closing time of a GALVI Shoe Brake with standard Thruster is 0,3 seconds, using the lowering valve this closing time can be increased up to maximum 15 times the standard average time, on the other hand the presence of the "LO" valve normally increases slightly the minimum closing time of the Brake.

The "LO" option is considered by the Manufacturer as not compatible with Thrusters installed in horizontal position, because its effectiveness is reduced on Shoe Brakes installed on vertical brake axis.



Picture 23
Lowering valve for Thruster "LO"

03.12 – LIFTING VALVE FOR THRUSTER (LI)

The HYDRO GALVI Thrusters, excluding models HYD.024/05, 031/05, 051/06, 081/06, can be supplied with optional lifting valve identified with "LI" code.

The lifting valve is an option suggested by the Manufacturer for all the GALVI Shoe Brakes whose application requires adjustment of the opening time.

Externally the lifting valve can be used screwing its tie rod on the frontal part of the Thruster (protected by a screw cap) and increasing the normal opening time of Thruster and Brake.

The average opening time of a GALVI Shoe Brake with standard Thruster is 0,3 seconds, using the lifting valve this opening time can be increased up to maximum 15 times the standard average time, on the other hand the presence of the "LI" valve normally increases slightly the minimum opening time of the Brake.

The "LI" option is considered by the Manufacturer as not compatible with Thrusters installed in horizontal position, because its effectiveness is reduced on Shoe Brakes installed on vertical brake axis.

Picture 24
Lifting valve for Thruster "LI"

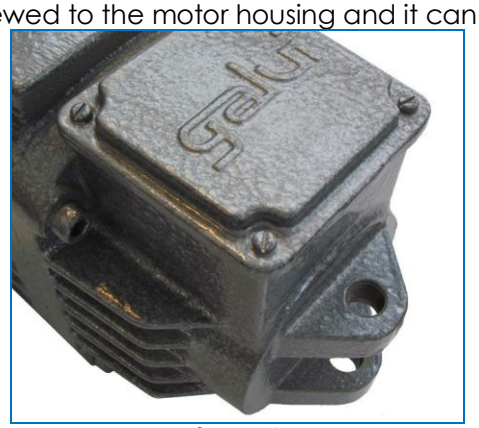
03.13 – FOOT ROTATED 90° FOR THRUSTER (90)

The HYDRO GALVI Thrusters, excluding models HYD.024/05, 031/05, 051/06, 081/06, can be supplied with foot rotated of 90° identified with "90" code.

The foot rotated of 90° is an option considered by the Manufacturer as indispensable for all the GALVI Shoe Brakes installed in horizontal position, that is to say installed with vertical brake axis and with "ORZ" option.

The function of "90" option is to position upwards the frontal part of the Thruster in cases where the Thruster is installed in horizontal position.

In Thrusters model HYD.023/05, 030/05, 050/06, 080/06 the "90" option is made with a special casting of the motor housing of the Thruster, while in models HYD.121/06(12), 201/06(12), 301/06(12) the foot is screwed to the motor housing and it can be easily rotated by the User if necessary.



Picture 25
Foot rotated 90° for Thrusters 023,030,050,080 "90"

Picture 26
Foot rotatable 90° for Thrusters 121,201,301

03.14 – VITON SEALS FOR THRUSTER (VIT)

The HYDRO GALVI Thrusters, excluding models HYD.024/05, 031/05, 051/06, 081/06, can be supplied with VITON seals identified with "VIT" code.

The VITON seals are an option considered by the Manufacturer as indispensable for all the GALVI Shoe Brakes installed at ambient temperature higher than +70 °C.

In function of the ambient temperature it could be necessary to use also a special oil for the Thruster besides the "VIT" option.

03.15 – HEATERS FOR THRUSTER (HEA)

The HYDRO GALVI Thrusters can be supplied with heaters identified with "HEA" code.

The heaters are an option considered by the Manufacturer as indispensable for all the GALVI Shoe Brakes installed at ambient temperature lower than -20 °C and in any case suggested for all the GALVI Shoe Brakes installed at ambient temperature lower than 0 °C.

In function of the ambient temperature it could be necessary to use also a special oil for the Thruster besides the "HEA" option.

03.16 – SPECIAL VOLTAGE FOR THRUSTER (V-Hz)

The HYDRO GALVI Thrusters are available for any rated Voltage both Hz 50 and Hz 60, they have three phase electric motor, IP.65, insulation Class F, which can rotate in both directions.

The data of the most common rated Voltages both Hz 50 and Hz 60 are listed in chapter 02.02 of this document.

In no case a Thruster for Hz 50 can be used at Hz 60, also if rated Voltage is the same, because the Thruster's impeller for Hz 50 is different from the Thruster's impeller for Hz 60.

	**Never use a Thruster for Hz 50 at Hz 60.** **Never use a Thruster for Hz 60 at Hz 50.** **Risk of accident.**

04.01 - MAINTENANCE

As it is fundamental to install correctly the GALVI Shoe Brake following the instructions of this document, it is equally important to follow scrupulously the following maintenance instructions.

A periodical and correct maintenance will ensure the best and correct functioning of the GALVI Shoe Brake, increasing its lifetime and ensuring safety.

For a correct and timely maintenance of the GALVI Shoe Brakes it is indispensable to have a stock of the following GALVI Genuine Spare Parts, in absence of these Spare Parts the User is exposed to risk of machine stop, production stop and possible damage of the Brake and its brakedrum.

⚠	**Never operate without strategic spare parts. Risk of machine stop.**

04.02 – REPLACEMENT OF BRAKE SHOES

All the brake Shoes item 05 of the GALVI Shoe Brakes are made of aluminum with anti-wear steel bushes and have asbestosfree bonded linings of exclusive GALVI formula and with a special substrate for maximizing the bonding (Table 27, Picture 27).

The lining is subject to wear in function of the type of service of the GALVI Shoe Brakes and also in function of the type of environment where the Brake is installed.

It is in any case indispensable to check periodically the wear level of the linings in order to replace the brake Shoes item 05 before the lining is totally worn.

The total wear of the linings must be avoided for avoiding the direct contact between the brakedrum and the aluminum casting of the brake Shoe with possible consequent damages and possible total loss of friction and Braking Torque.

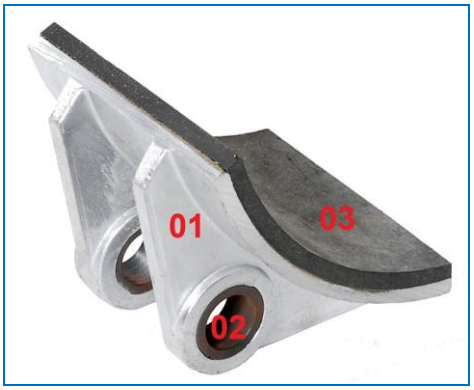
⚠	**Never wear totally the linings of the brake Shoes. Risk of accident. Inspect periodically the brake Shoes.**

The brake Shoes item 05, both in DIN 15435 Standard version (CD) named "RF2" and in extra-wide version (CL) named "RF4", can be easily replaced without disassembling the GALVI Shoe Brake.

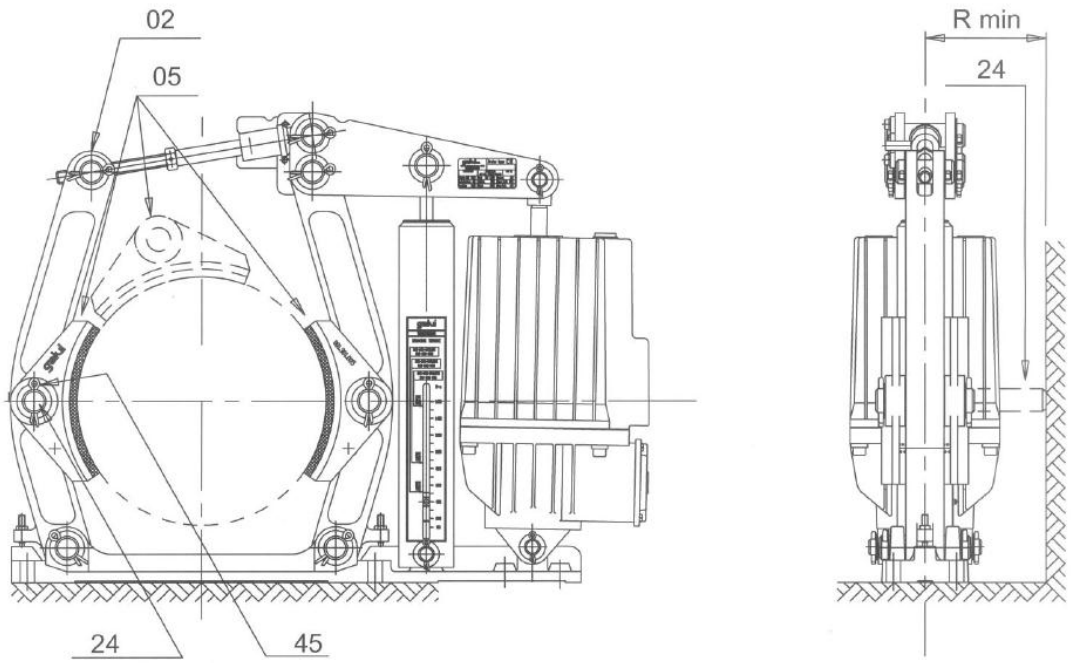
For replacing the brake Shoes item 05 it is in fact necessary to open the Brake, also using "HAN" option if installed, to remove the two split pins item 45 from their pin item 24 or the two seegers if the Brake has optional lubricators on main pins (GR), to remove pin item 24 in order to release the brake Shoes from the main levers item 02 and to rotate them upwards sliding them on the brakedrum (Drawing 22).

Pos.	Description
01	Aluminum brake Shoe
02	Anti-wear steel bushes
03	Asbestosfree bonded linings, with substrate for bonding

Table 27



Picture 27
Genuine GALVI brake Shoe "RF2" or "RF4"



Drawing 22
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN

The "R_{min}" dimension in above Drawing 22 and in Table 4 at page 9 of this document, table taken from pages 4 and 5 of the GALVI Shoe Brakes Catalogue, shows the minimum distance between the vertical axis of the GALVI Shoe Brake and eventual lateral obstacle for removing towards the same obstacle the pin item 24 which fastens the brake Shoe item 05 to the main lever item 02.

The brake Shoes item 05 with worn lining can be replaced with identical new brake Shoes or they can be regenerated, that is to say they can be sent to the Manufacturer who will remove the worn lining and will bond the new lining.

The linings of the GALVI brake Shoes are never riveted because this fixing technique is worse and outdated by thermal bonding.

Riveting the brake Shoes, that is to say fixing any lining with metallic rivets and making holes in the brake Shoes, is strongly unwary, as there is risk of possible disjunction of the lining during the braking phase.

We strongly do not recommend the regeneration of the brake Shoes made by the User because this procedure changes friction material and fixing technique of the friction material.

We recommend to use only genuine GALVI brake Shoes with genuine linings.

The use of not genuine brake Shoes and of not genuine friction material invalidates the Declaration of chapter 01.02 and the Product warranty terms of chapter 01.06 of this document.

⚠	**Never use not genuine Spare Parts, especially brake Shoes. Loss of warranty. Risk of accident.**

⚠	**Never modify the Product. Loss of warranty. Risk of accident.**

04.03 – OIL CHANGE FOR THRUSTER

All the HYDRO GALVI Thrusters are supplied complete with oil and ready for operation.

If not differently required, the following type of hydraulic oil is used for ambient temperature included between -20 °C and +55 °C :

HLP32, DIN 51525
for Thrusters model HYD.023/05, 024/05, 030/05, 031/05, 050/06, 051/06, 081/06

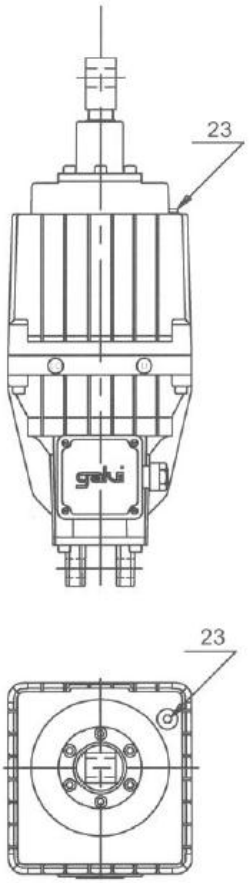
HL10, DIN 51524, part. 1
for Thrusters model HYD.121/06(12), 201/06(12), 301/06(12)

The HYDRO GALVI Thrusters can work also with water-glycol fluid instead of hydraulic oil; the Manufacturer has made successful tests with fluid Agip Arnica 104/FR, a non-flammable biodegradable hydraulic fluid made of solution of propylene-glycol and additive-treated water with anti-corrosive products.

The hydraulic oil of the HYDRO GALVI Thrusters must be replaced at least every twelve months.

The water-glycol fluid of the HYDRO GALVI Thrusters must be replaced at least every six months.

Every HYDRO GALVI Thruster has a screw cap item 23 for oil fill and oil drain (Drawing 23, Picture 28).



Drawing 23
Model shown HYD.201/06

Picture 28
Screw cap for Thruster's oil fill and oil drain

After unscrewing cap item 23 proceed with emptying totally the Thruster with repeated overturnings.

After emptying totally the Thruster, proceed with oil fill through the hole of cap item 23 as per data of following Table 28, where level is measured from the base of cap item 23 :

Thruster	Oil quantity liters	Oil level mm
HYD.023/05	1,75	17
HYD.024/05	1,45	17
HYD.030/05	2,70	20
HYD.031/05	1,90	20
HYD.050/06	5,15	22
HYD.051/06	3,75	22
HYD.080/06	5,15	22
HYD.081/06	3,75	22
HYD.121/06-201/06-301/06	7,80	28
HYD.121/12-201/12-301/12	7,70	28
Table 28		

A too low oil level can cause a loss of lifting Force of the Thruster with consequent difficult or missed opening of the Brakes.

A too high oil level can cause expulsion of oil in excess through the shaft of the Thruster.

For applications with particularly heavy duties, that is to say with Thruster working continuously, it is possible that a different oil level is required, normally slightly lower compared to the standard level as per Table 28.

After completing the operation the cap item 23 must be screwed with a tightening Torque of 25 Nm.

In case the Thruster has options like internal springs (IS, option not available for NV.HYD Brakes of this document) and/or lowering valve (LO) and lifting valve (LI), the quantity of oil inside the Thruster is smaller compared to the quantity shown in Table 28, more precisely it would be necessary to remove the quantity shown in the following Table 29 and Table 30 from the standard quantity shown in Table 28 :

Thruster with internal springs "IS"	Reduction oil quantity liters
HYD.023/05.IS	0,025
HYD.024/05.IS	0,025
HYD.030/05.IS	0,045
HYD.031/05.IS	0,045
HYD.050/06.IS	0,100
HYD.051/06.IS	0,100
HYD.080/06.IS	0,190
HYD.081/06.IS	0,190
HYD.121/06.IS	0,250
HYD.201/06.IS	0,400
HYD.301/06.IS	0,650
Table 29	

Thruster with valve/s LO/LI	Reduction oil quantity liters
HYD.023/05.LO	0,080
HYD.030/05.LO	0,085
HYD.050/06.LO	0,160
HYD.080/06.LO	0,160
HYD.121/06.LO-201/06.LO-301/06.LO	0,220
HYD.121/12.LO-201/12.LO-301/12.LO	0,220
Table 30	

04.04 – REPLACEMENT OF THRUSTER

In case it is necessary to replace the HYDRO GALVI Thruster item 75 it is necessary first of all to disconnect it from the power line after putting the machine in total safety conditions.

It is also necessary to note the Braking Torque the GALVI Shoe Brake is set to, because for replacing the Thruster item 75 it is necessary to set to zero the Braking Torque of the Brake.

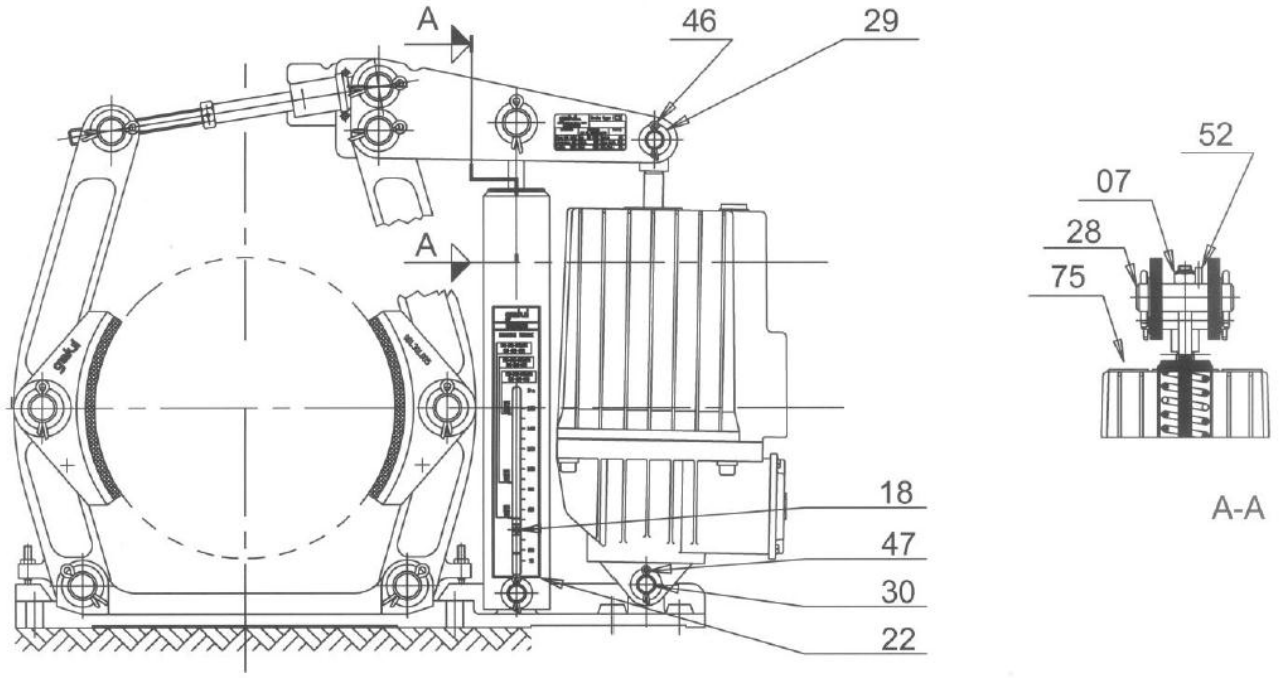
Remove temporarily the elastic pin item 52 from its hole in pin item 28 above the main spring set then rotate counterclockwise the nut at the top of the main spring tie rod item 07 until the pointer (elastic pin item 18) in the slit of the main spring set reaches the minimum Braking Torque value (Drawing 24).

It is necessary to keep elastic pin item 52 because at the end of the operation it will have the important function to prevent the rotation of the nut of tie rod item 07.

Remove the four split pins items 46 and 47 of Thruster's upper pin item 29 and lower pin item 30, remove the two same pins and release the Thruster from the Brake.

Once the Thruster item 75 has been replaced with a new HYDRO GALVI Thruster of same model, insert again upper pin item 29 and lower pin item 30, insert again their four split pins items 46 and 47 and connect again to the power line.

Once the GALVI Shoe Brake's Braking Torque has been reset to the same value noted before replacing the Thruster item 75 following the instructions of this document, it is necessary to put the elastic pin item 52 back in its hole in pin item 28 above the main spring set in order to avoid the accidental rotation of the nut of tie rod item 07 with consequent possible loss of Braking Torque.



Drawing 24
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN

04.05 – DISASSEMBLY AND ASSEMBLY OF THE THRUSTER

The HYDRO GALVI Thruster doesn't need maintenance apart from the oil change suggested every twelve months or the water-glycol fluid change suggested every six months.

The HYDRO GALVI Thruster must not be disassembled unless it is necessary to repair it and when possible it is always suggested to let the Manufacturer repair it in order to make any operation in a workmanlike manner and with final test.

The eventual disassembly and assembly of the Thruster made by the User invalidates the warranty of the Thruster itself.

In case for any reason the HYDRO GALVI Thruster has been disassembled it is in any case necessary to comply with the following instructions for reassembling the Thruster.

The disassembly of HYDRO GALVI Thrusters model 023, 030, 050, 080 (Picture 29) and 121, 201, 301 (Picture 30) requires necessarily to remove and replace gasket item 36 between the two aluminum castings the body of the Thruster is made of, then anyone who wants to disassemble and reassemble must have a new spare gasket item 36.

Thrusters model 024, 031, 051, 081 (Picture 31) are instead without gasket item 36.

Picture 29
Thruster 023, 030, 050, 080

Picture 30
Thruster 121, 201, 301

Picture 31
Thruster 024, 031, 051, 081

Before joining the lower half of the Thruster, called motor housing, to the upper half, called reservoir, it is necessary to clean perfectly the surfaces of the two castings which come into contact.

Then it is necessary to check the clearance between the two castings putting them together, initially without gasket item 36, by means of screws item 69 and tightening them with a tightening Torque of 5 Nm (Drawing 25).

A correct clearance in this initial phase is included between 0,5 and 0,75 mm (Drawing 25).

Once this check has been made it is necessary to separate temporarily the motor housing from the reservoir for preparing their definitive union with sealant and gasket item 36.

On both contact surfaces strew a strip 3-4 mm wide of liquid gasketing (the Manufacturer uses and suggests Loxeal type 58-31) code KKSEAL5831.

Strew uniformly the sealant on both contact surfaces, putting the sealant also around the four holes.

Insert the two pins item 83 in their holes in the reservoir, then position gasket item 36 placing it on the two pins item 83 (Drawing 25).

Join motor housing and reservoir, checking that the two pins item 83 go adequately in their holes.

Insert the four screws item 69 after putting three drops of threadlocker on their threads (the Manufacturer uses and suggests Loxeal type 54-03) code KKSEAL5403, tightening them partially just for joining the two castings.

Then tighten them definitively in three phases with procedure and tightening Torque as per following Table :

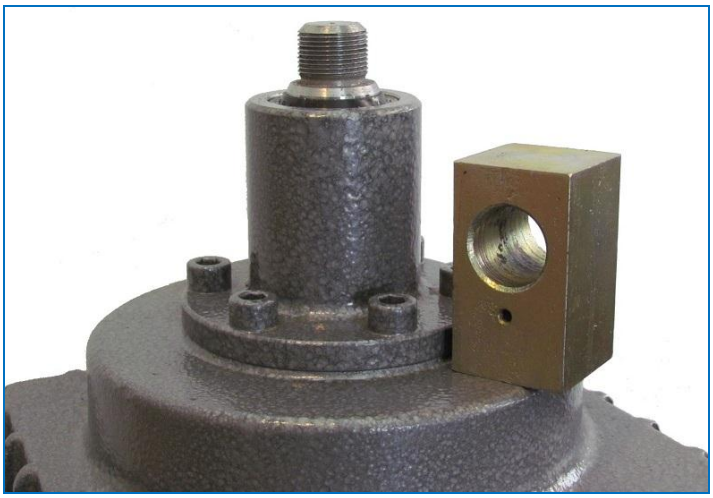
Thruster	First phase Sequence and tightening Torque	Second phase Sequence and tightening Torque	Third phase Sequence and tightening Torque
023-024-030-031	Screws 1, 3, 2, 4 10 Nm	Screws 4, 2, 3, 1 17 Nm	Screws 2, 4, 1, 3 25 Nm
050-051-080-081	Screws 1, 3, 2, 4 12 Nm	Screws 4, 2, 3, 1 20 Nm	Screws 2, 4, 1, 3 30 Nm
121-201-301	Screws 1, 3, 2, 4 20 Nm	Screws 4, 2, 3, 1 35 Nm	Screws 2, 4, 1, 3 50 Nm

Table 31

75 minutes after completing this operation it is possible to proceed with oil filling of the HYDRO GALVI Thruster following the instructions of this document.

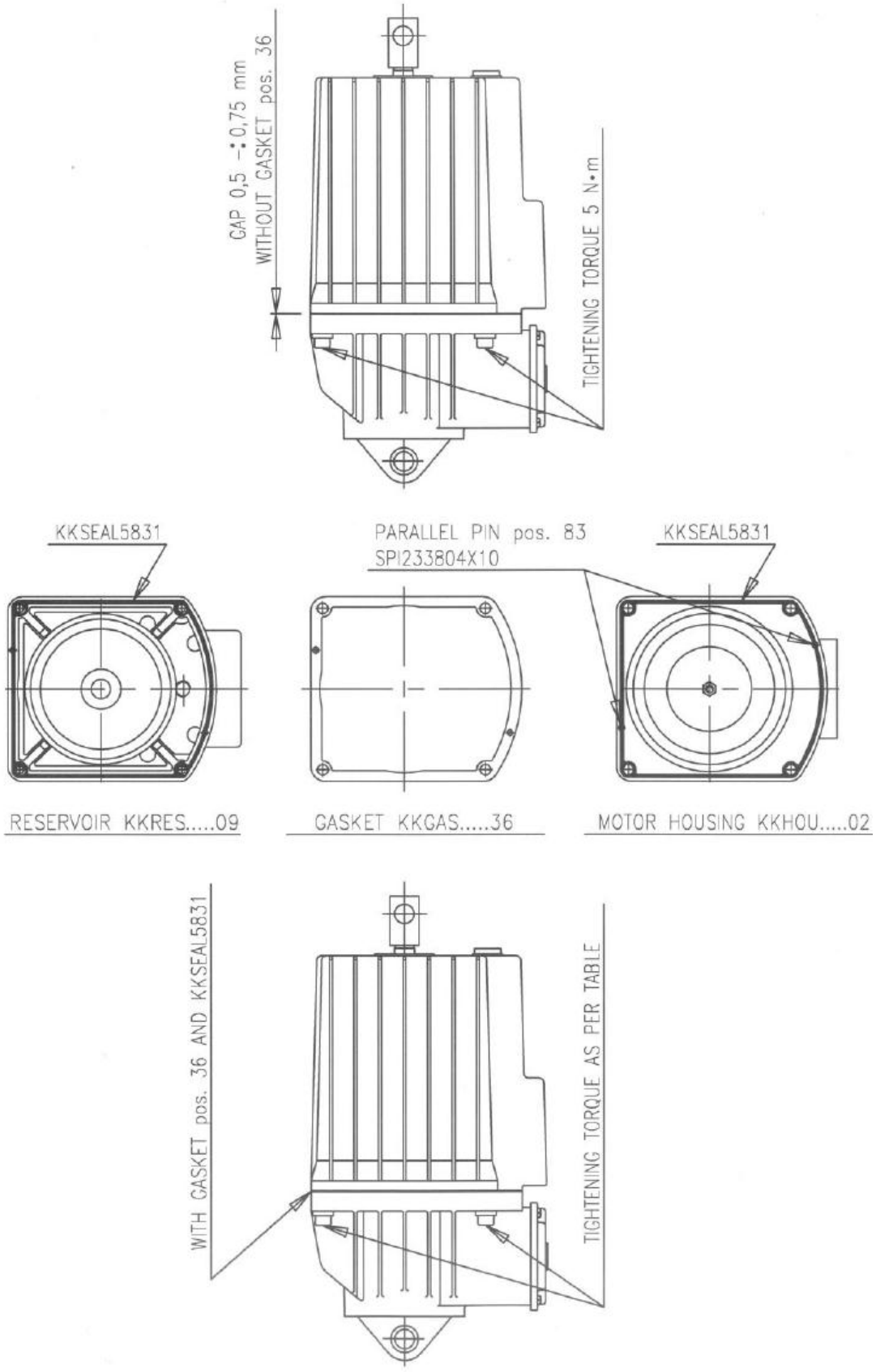
It is extremely important to manage correctly also the push rod of the Thruster, being it the component of connection of the Thruster with the Brake; this component should never be unscrewed from the shaft of the Thruster, should it be unscrewed and removed from the shaft during disassembly or in any other circumstance it would be indispensable to rescrew it again to the shaft fixing it with the specific screw properly positioned in order not to damage the thread of the shaft (Picture 32, Picture 33).

Picture 32
Thruster's shaft complete with push rod

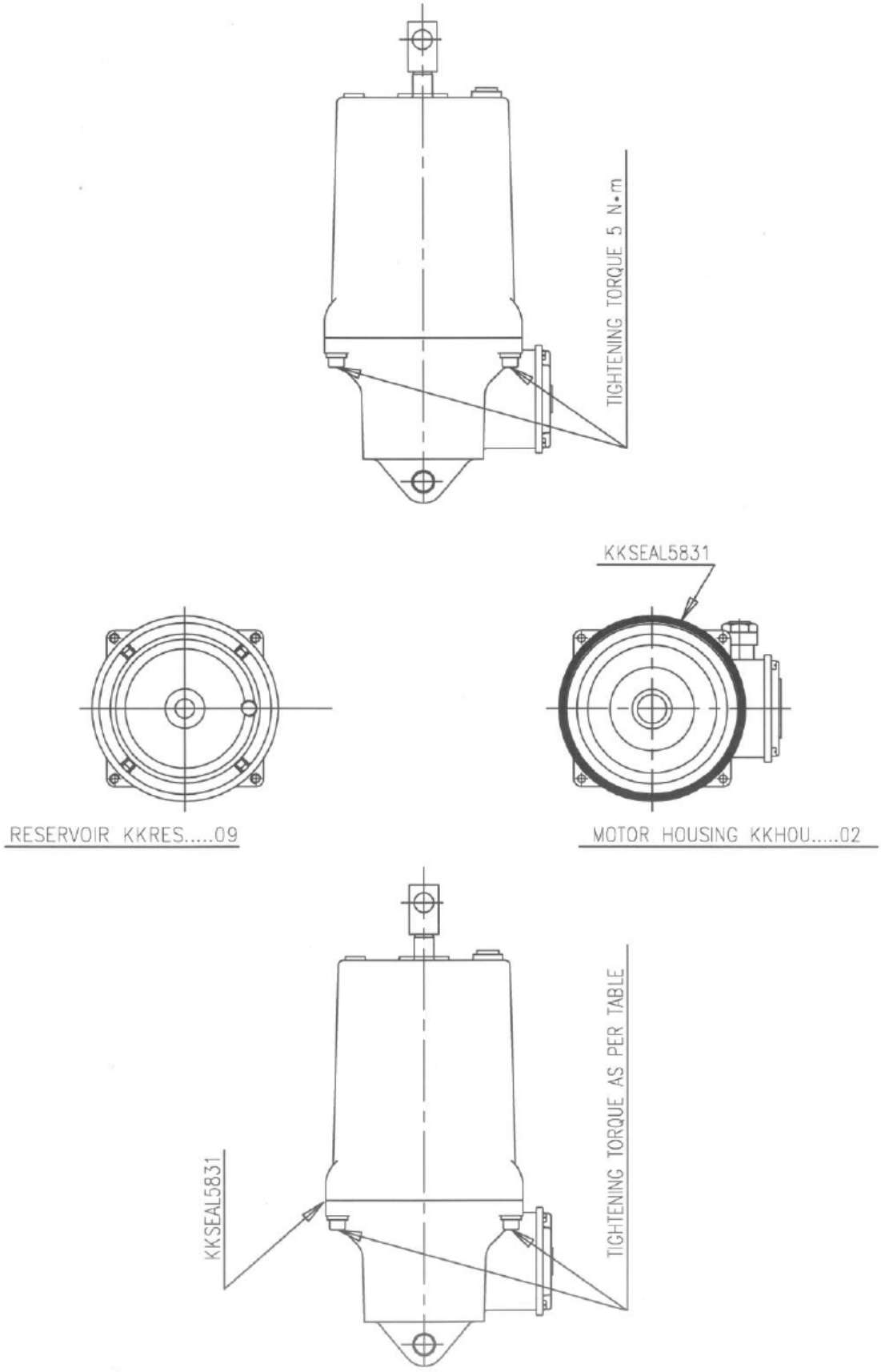


Picture 33
Thruster's shaft without push rod

⚠	**Never unscrew the push rod of the Thruster. If unscrewed, be sure to rescrew and fix the push rod of the Thruster. Risk of accident.**



Drawing 25
Instructions valid for models HYD.023/05, 030/05, 050/06, 080/06, 121/06(12), 201/06(12), 301/06(12)



Drawing 26
Instructions valid for models HYD.024/05, 031/05, 051/06, 081/06

05.01 – SPARE PARTS

For an adequate maintenance of the GALVI Shoe Brakes it is indispensable to have always the strategic Genuine GALVI Spare Parts as per following Table 32 :

Strategic Spare Part 1	Strategic Spare Part 2	Strategic Spare Part 3
nr. 4 brake Shoes RF2.XXX or RF4.XXX	nr. 1 Thruster HYD.XXX/XX	nr. 1 upper Tie rod RIP002XXX100
		

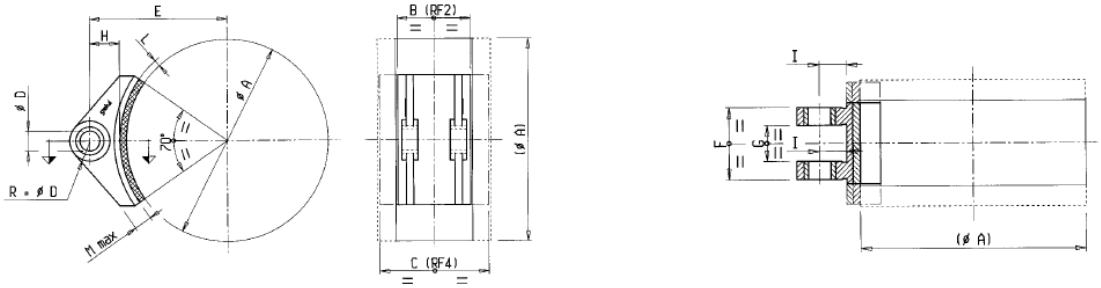
Table 32

The User who works without the strategic Spare Parts is exposed to risk of machine stop.

The User who uses not genuine Spare Parts, especially brake Shoes and their friction material, is exposed to risk of malfunctioning and, modifying substantially the Product, invalidates totally the warranty of the Product itself.

⚠	**Never use not genuine Spare Parts, especially brake Shoes. Loss of warranty. Risk of accident.**

All the brake Shoes type "RF2" and "RF4" are listed in the following Table 33 taken from pages 36 and 37 of the GALVI Shoe Brakes Catalogue :

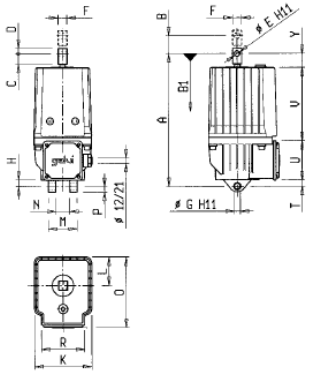


Ceppo freno tipo Brake Shoe type Sabots de frein type Bremsbacke Durchm. Typ		Ø A	B RF2	C [1] RF4	Ø D D10	E	F 0 - 0,2	G + 0,2 0	H	I	L	M max	Massa [2] Mass [2] Masse [2] Masse [2] [kg]	
CD	CL [1]												Ceppo DIN DIN Shoe Sabot DIN Backe DIN RF2	Ceppo largo [1] Extra-wide Shoe [1] Sabot large [1] Breite Backe [1] RF4
RF2.160 [1]	RF4.160 [1]	160	55	85	16	115	52	28	29	23	6	13	0,31	0,77
RF2.200	RF4.200 [1]	200	70	105	20	140	65	35	32	24	8	17	0,60	0,76
RF2.250	RF4.250 [1]	250	90	135	25	170	80	40	37	29	8	22	0,99	1,24
RF2.315	RF4.315 [1]	315	110	165	30	212	100	50	44,5	34,5	10	25	1,83	2,34
RF2.400	RF4.400 [1]	400	140	210	35	260	125	62	50	40	10	30	3,06	3,88
RF2.500	RF4.500 [1]	500	180	270	40	320	160	80	58	46	12	33	5,30	6,90
RF2.630	RF4.630 [1]	630	225	335	45	390	200	100	63	51	12	38	17,5	22,0
RF2.710	RF4.710 [1]	710	255	380	50	440	224	112	70	56	15	40	24,5	33,5

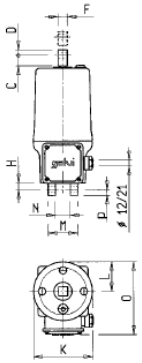
Table 33

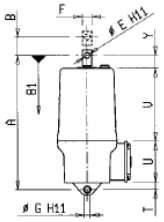
All the short stroke HYDRO GALVI Thrusters are listed in the following Table 34 taken from pages 30 and 31 of the GALVI Shoe Brakes Catalogue :

023-030-050-080

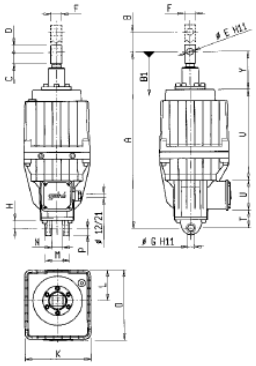


024-031-051-081





121-201-301



HYDRO tipo HYDRO type HYDRO type HYDRO Typ	Spinta a Lifting Force at Poussée à Druck bei + 20 °C [N]	Corsa Stroke Course Hub [mm]	Forza Molla Interna opzionale Optional Internal Spring Force Force Ressort Interne optionnel Kraft Opt. Innenfeder (IS) [N]	Potenza a Power at Puissance à Leistung bei + 20 °C [W]	Corrente a Current at Courant à Strom bei + 20 °C V. 400 - Hz 50 [A]	Numero max cicli orari con temperatura ambiente Max cycles per hour with ambient temperature of Nombre max cycles horaires avec température ambiante Max. Schaltzyklenanzahl bei Raumtemperatur + 50 °C [n°]	Max temperatura ambiente per servizio continuo Max ambient temperature for continuous operation Température ambiante max pour service continu Max Raumtemperatur für Dauerbetrieb [°C]	Massa (compreso olio) Mass (oil included) Masse (huile incluse) Masse (inkl. Öl) [kg]
HYD.023/05	220	50	140 - 235	160	0,40	2000	50	11
HYD.024/05	220	50	140 - 235	160	0,40	2000	50	10
HYD.030/05	300	50+5	230 - 300	195	0,49	2000	50	15
HYD.031/05	300	50+5	230 - 300	195	0,49	2000	50	13
HYD.050/06	500	60+5	375 - 550	210	0,58	2000	50	25
HYD.051/06	500	60+5	375 - 550	210	0,58	2000	50	18
HYD.080/06	800	60+5	570 - 820	320	0,76	2000	50	26
HYD.081/06	800	60+5	570 - 820	320	0,76	2000	50	19
HYD.121/06	1250	60+10	900 - 1290	320	0,95	2000	50	43
HYD.201/06	2000	60+10	1460 - 2010	450	1,08	2000	50	43
HYD.301/06	3000	60+10	2060 - 2920	560	1,30	1500	50	44

	HYDRO 023/05	HYDRO 024/05	HYDRO 030/05	HYDRO 031/05	HYDRO 050/06	HYDRO 051/06	HYDRO 080/06	HYDRO 081/06	HYDRO 121/06 201/06 301/06
A	286	286	370	370	435	435	450	450	645
B	50	50	50	50	60	60	60	60	60
B1	-	-	5	5	5	5	5	5	10
C	23	23	28,5	28,5	32,5	32,5	32,5	32,5	42
D	12	12	15	15	18	18	18	18	26
Ø E H11	12,05	12,05	16,05	16,05	20,05	20,05	20,05	20,05	25,05
F	20	20	25	25	30	30	30	30	40
Ø G H11	16,05	16,05	16,05	16,05	20,05	20,05	20,05	20,05	25,05
H	18	18	18	18	23	23	23	23	31
K	160	160	160	160	190	190	190	190	240
L	80	80	80	80	95	95	95	95	112
M	80	80	80	80	120	120	120	120	90
N	40	40	40	40	60	60	60	60	40
O	198	198	198	198	241	226	241	226	258
P	16	16	16	16	22	22	22	22	24
R	112	-	112	-	120	-	120	-	-
T	17	21	17	21	29	29	29	29	65
U	110	110	110	110	110	110	110	110	110
V	133,5	129,5	206	203	255	256	255	256	334
Y	25,5	25,5	37	36	41	40	56	55	136

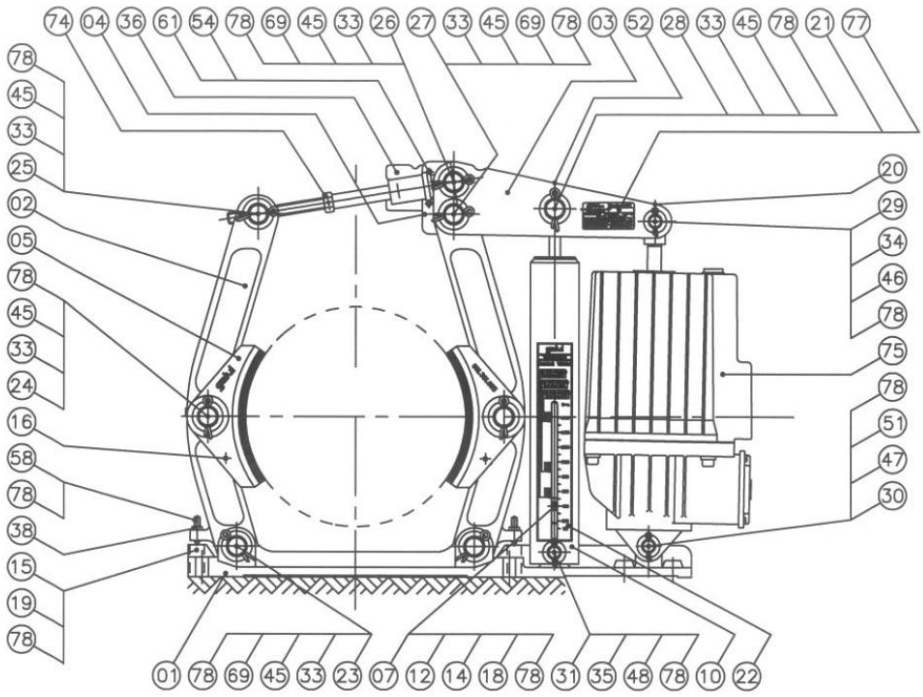
Table 34

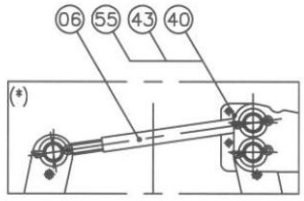
The Manufacturer suggests to use always and only HYDRO GALVI Thrusters.

The Manufacturer is not liable for eventual malfunctioning caused by the use of Thrusters which are not HYDRO GALVI Thrusters.

06.01 – BILL OF MATERIALS

The following is a numbered list of the main components of the GALVI Shoe Brakes.





(*) = VALID ONLY FOR "N" VERSION

POS.	CODE	ITEMS	Q.TY	POS.	CODE	ITEMS	Q.TY
01	BAS001XXX001	BASE	NR 1	31	PER001XXX031	PIN	NR 1
02	LEV001XXX002	MAIN LEVER	NR 2	33	ROS001XXX033	SPECIAL WASHER	NR 18
03	LEV001XXX003	UPPER LEVER	NR 2	34	ROS001XXX034	SPECIAL WASHER	NR 2
04	LEV002XXX004	UPPER LEVER NV	NR 1	35	ROS001XXX035	SPECIAL WASHER	NR 2
05	RFX.XXX	BRAKE SHOE	NR 2	36 **	FOR001XXX036	FORK	NR 1
06 *	TIR001XXX006	TIE ROD	NR 1	38	DAD5589MXX-6	NUT	NR 2
07	TIR001XXX007	TIE ROD	NR 1	40 *	DAD5593MXX-6	NUT	NR 1
10	CON001XXX010	SPRING FENDER	NR 1	43 *	MODXXXXXXXXX	DISC SPRING	NR 12
12	FON001XXX012	BOTTOM	NR 1	45	COF36UXXXXX	SPLIT PIN	NR 16
14	MOL017XXX014	MAIN SPRING	NR 1	46	COF36UXXXXX	SPLIT PIN	NR 2
15	MOL017XXX015	SPRING	NR 2	47	COF36UXXXXX	SPLIT PIN	NR 2
16	MOL0XXXXX016	HOLDER SPRING	NR 2	48	COF36UXXXXX	SPLIT PIN	NR 2
18	SPI6873XXXXX	ELASTIC PIN	NR 1	51	ROS001XXX033	SPECIAL WASHER	NR 4
19	DIS001XXX019	DISC	NR 2	52	SPI6873XXXXX	ELASTIC PIN	NR 1
20	ROSXXXXXX020	WASHER	NR X	54 **	ROS1751AXX	ELASTIC WASHER	NR 2
21	TAR001XXX021	SERIAL NUMBER PLATE	NR 1	55 *	SPI6873XXXXX	ELASTIC PIN	NR 1
22	TAR017XXX022	BRAKING TORQUE PLATE	NR 1	58	VIT25GXXXXXX	SCREW	NR 2
23	PER001XXX023	PIN	NR 2	61 **	VIT84GXXXXXX	SCREW	NR 2
24	PER001XXX024	PIN	NR 2	69	BOC.KUXXXXXX	SELF LUBRICATING BUSH	NR 8
25	PER001XXX025	PIN	NR 1	70	BOC.KUXXXXXX	SELF LUBRICATING BUSH	NR 2
26	PER001XXX026	PIN	NR 1	74 **	RIP002XXX100	AUTOMATIC WEAR ADJUSTING DEVICE	NR 1
27	PER001XXX027	PIN	NR 1	75	HYDXXXXXXX	HYDRO GALVI THRUSTER	NR 1
28	PER001XXX028	PIN	NR 1	77	VARBOS.5242C	BOSTIK	–
29	PER001XXX029	PIN	NR 1	78	VARGRA.BEA2	GREASE	–
30	PER0XXXXX030	PIN	NR 1		–	–	–

* = VALID ONLY "N" VERSION

** = VALIDO ONLY FOR "NV" VERSION

N.B. The letters "X" which appears in the code numbers replaces any other letter or number mentioned only in the specific lists

Drawing 27
Model shown NV.315.HYD.080/06.CD.42.PS.AU.ZN