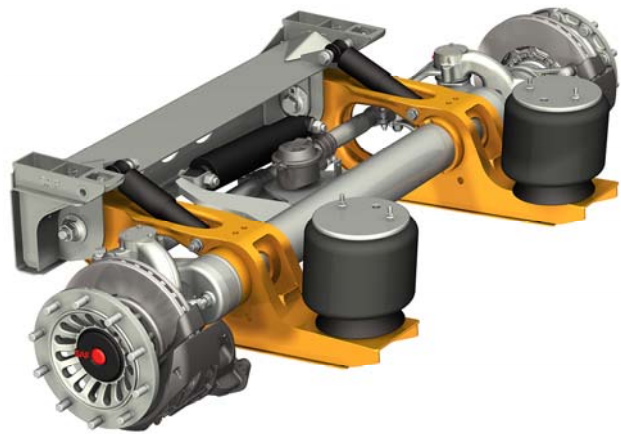


SAF INTRADISC *plus* INTEGRAL



rigid axle

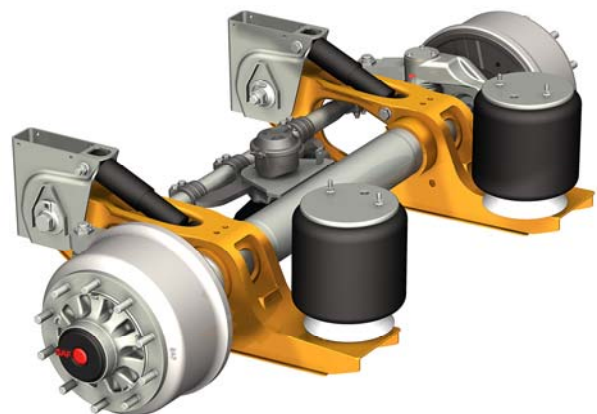


self-steering axle

SAF INTRADRUM



rigid axle



self-steering axle

Realized updates of this version to INTRA 2013-12

- Page 9 - 12; [Weight data updated to the new SAF brake calipers, Important Info 75](#)
Page 23-29; [Axle versions with SAF brake callipers SBS 1918/ SBS2220 K0, Important Info 75/ 76.](#)
Page 31; [Changes to hanger bracket style, Important Info 73/ 89](#)
Page 42 - 43; [New air bag 2619UP for crain loading](#)
Page 52; [Update two sided lift, Important Info 78](#)
Page 67; [Tightening torques on shock absorber connections, Important Info 77](#)

Realized updates of the version INTRA 2013-08 to INTRA 2013-12

- Page 51; [Surface treatment of SAF-HOLLAND components](#)

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Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

This manual is over the internet available. The newest version is always to be found with:
<http://designmanual.safholland.de>.

Update type plate and serialnumber designation

Due to change of regulation for checking and homologating the brake systems (by ECE R 13), new data is required on the type plate. The identification of the test equivalent and the applicability areas of the test report are now described with the following four identifiers:

- ID 1 identifies the axle
- ID 2 identifies the brake
- ID 3 identifies the test axle load
- ID 4 identifies the test report number

The conversion to the new type plates follows step by step because of updating the test reports.

Furthermore is a QR Code added. With a QR Code Reader and an internet access on a smart phone, tablet PC or an industrial 2D scanner, you can scan the data of the type plate. The QR Code will guide you to the spare parts list of the scanned axle. The needed parts can than directly being ordered of the spare parts list free of failure.

All axles are supplied from Q4 2012 with a QR-Code on the type plate.

Example new type plate from Q4 2012

Without Identifiers:

SAF-HOLLAND GMBH D-63856 BESENBAACH · GERMANY			
Version	B19-22S	Serial No.	11 12 124 0267
Type	SBS2243-10*	Ident No.	347 96 64 7 48 20
Test Report	TDB0843	Perm. axle cap stat.	9000 kg
Made in Germany		V max.	105 km/h
E		 SN 11121240267	

With Identifiers:

SAF-HOLLAND GMBH D-63856 BESENBAACH · GERMANY			
Version	S9-4218	ID1-SNK4218-11S	
Serial No.	11 12 194 0155	ID2-SNK420X180	
Ident No.	247 90 66 2 59 3	ID3-10791	
Stat. 9000kg Vmax105km/h		ID4-TDB0381	
Made in Germany	E	 SN 11121940155	

The serial number appears as follows:

XX JJ TTT NNNN

XX..... - Place of manufacture:
 11 – Germany, Plant 01
 12 – Germany, Plant 02
 13 – Germany, Plant 03 etc.

JJ..... - Year of manufacturing

TTT..... - Day of manufacturing

NNNN.... - Running number per day, year and place

Example serial number: **11 12 194 0155**

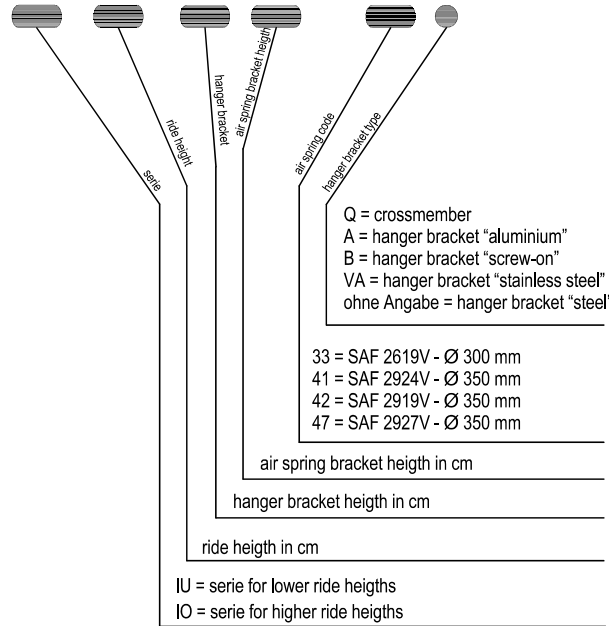
This is about the **155**th product of the **194**th manufacturing day at the manufacturing year **2012** from the **plant 01 in Germany**.

Type identification for suspension: INTRADISC *plus* INTEGRAL and INTRADRUM

Letters are marked with "X", numbers with "0"

Example:

IU28 / 2005 33Q
 IO44 / 3000 41
 XX00 / 0000 00X

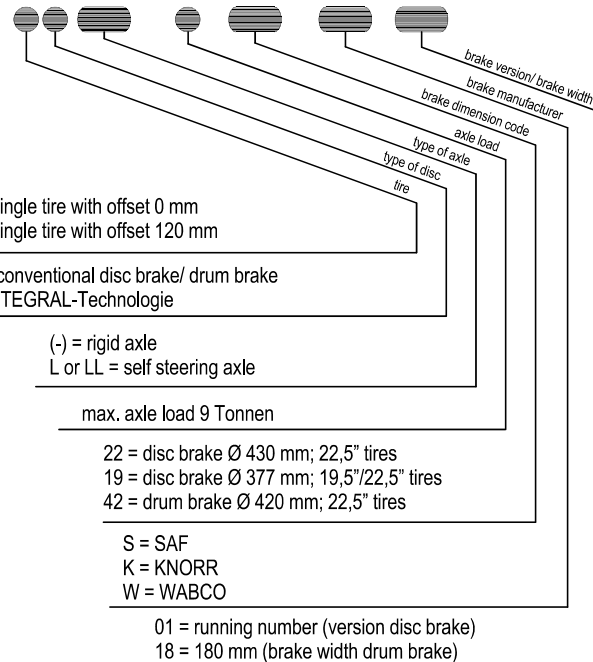


Type identification for axle generation 06

Letters are with "X", numbers with "0"

Example:

S 9-42 18
 BI L 9-22 K 01
 XX (X) 9-00 (X) 00



Key

Summary	Explanation
A	Unsprung mass
AX	Distance wheel attachment faces left to right
B	Total width
BH	Hanger bracket height, distance centre pivot bolt to top side hanger bracket
BL	Hanger bracket length, distance top hanger bracket from front- to backside
BM	Air spring centre, distance air spring centre line between left- and right side
ET	Offset, distance wheel attachment face to centre tire
DP	Pivot point centre (steering axle), distance pivot bolts centre line between left- and right side
F	Nominal ride height, distance centre axle to bottom chassis in driving condition
G	Total axle width
H	Air spring bracket height
H ₂	Air spring bracket height at lift air spring
HM	Hanger bracket centre, distance hanger bracket centre line between left- and right side
Hmax	Air spring height maximum
Hmin	Air spring height minimum
i	Ratio
K	Brake chamber centre (with drum brake), centre distance brake chamber bracket between left- and right side
KTL	Cathodic dip coating
L	Trailing arm length (L1), distance centre pivot bolt to centre axle (standard 500 mm)
La	Distance centre axle to centre air spring (L2, standard 385 mm)
LM	Spring centre, centre distance spring between left- and rightside
Lmax	Shock absorber length maximum
Lmin	Shock absorber length minimum
P	Air pressure in the air spring (Mpa)
p	Air pressure in the air spring (Mpa/kg)
Pt	Air pressure in the air spring at partial load (Mpa)
Q	Axle load on the ground (kg)
Qt	Axle load on the ground at partial load (kg)
S	Track, centre distance tires between left- and right side
V	Air spring offset, distance centre air spring to centre spring
X	Overall height, distance centre axle to under side of chassis beam when air springs are without air
Y	Installation height of liftarm, when raised.

All measurements are given in mm if not specified otherwise.

Overview of ride heights and weights for INTRADISC *plus* INTEGRAL rigid axles

air spring type 2619 V (code: **33**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version B19-22S ²⁾	axle version B19-19S ³⁾
IU25/2000 33	230-270	200	0	398	383
IU28/2005 33	260-300	200	50	403	388
IU30/2505 33	280-320	250	50	407	392
IU33/2510 33	310-350	250	100	409	394
IU35/3010 33	330-370	300	100	413	398
IO35/2000 33	335-375	200	0	400	385
IO37/2500 33	355-395	250	0	403	388
IO40/2505 33	385-425	250	50	408	393
IO42/3005 33	405-445	300	50	412	397
IO45/3010 33	435-475	300	100	414	399
IO47/3510 33	455-495	350	100	417	402
IO50/3515 33	485-525	350	150	420	405

air spring type 2919 V (code: **42**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version B19-22S ²⁾	axle version B19-19S ³⁾
IU25/2000 42	225-265	200	0	402	387
IU28/2005 42	255-295	200	50	407	392
IU30/2505 42	275-315	250	50	411	396
IU33/2510 42	305-345	250	100	413	398
IU35/3010 42	325-365	300	100	417	402
IO35/2000 42	330-370	200	0	404	389
IO37/2500 42	350-390	250	0	407	392
IO40/2505 42	380-420	250	50	412	397
IO42/3005 42	400-440	300	50	416	401
IO45/3010 42	430-470	300	100	418	403
IO47/3510 42	450-490	350	100	421	406
IO50/3515 42	480-520	350	150	424	409

air spring type 2924 V (code: **41**), total axle travel **200** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version B19-22S ²⁾	axle version B19-19S ³⁾
IU29/2000 41	250-310	200	0	403	388
IU31/2500 41	270-330	250	0	407	392
IU34/2505 41	310-360	250	50	412	397
IU36/3005 41	320-380	300	50	416	401
IU39/3010 41	350-410	300	100	418	403
IU42/3015 41	375-435	300	150	420	405
IO44/3000 41	395-455	300	0	413	398
IO49/3505 41	445-505	350	50	421	406

air spring type 2927 V (code:47), total axle travel **260** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BI9-22S ²⁾	axle version BI9-19S ³⁾
IU30/2000 47	270-350	200	0	406	391
IU32/2500 47	290-370	250	0	410	395
IU35/2505 47	320-400	250	50	414	399
IU37/3005 47	340-420	300	50	418	403
IU40/3010 47	370-450	300	100	420	405
IU42/3510 47	390-470	350	100	424	409
IO44/3000 47	415-495	300	0	415	400
IO49/3505 47	465-545	350	50	423	408

INTRA „MEGA“, air spring type 2927 V (code:47), total axle travel **260** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	Weight ¹⁾ [kg]	
				axle version BI9-22S ²⁾	axle version BI9-19S ³⁾
IU27/2000 47V90	240-320	200	0	406	391

- 1) Weight deviations lie within the permitted DIN tolerances for the respective manufacturing process. Weight when track/spring centre 2040/1300 with steel hanger brackets, without wheel nuts.
- 2) Axle version with SAF-HOLLAND brake calliper (SBS2220);
 - a. with SAF-HOLLAND brake calliper (SBS2220 K0) have the same weight
 - b. with KNORR brake calliper (SB7...SK7) an additional weight of 11 kg per axle needs to be accounted for.
- 3) Axle version with SAF-HOLLAND brake calliper (SBS1918); for KNORR brake calliper (SB6...SN6) an additional weight of 11 kg per axle needs to be accounted for.

Further variants on request.

Overview of ride heights and weights for INTRADISC *plus* INTEGRAL self-steering axles (BILL9-...)

Important:

The ride height range for self-steering axles is depending on the resulting caster. Because of this caster not every ride height range as with the rigid axle can be covered. See also page 76, [Caster](#).

air spring type 2619 V (code: **33**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BILL9-22S ²⁾	axle version BILL9-19S ³⁾
IU25/2000 33	255-270	200	0	534	519
IU28/2005 33	260-295	200	50	539	524
IU30/2505 33	305-320	250	50	543	528
IU33/2510 33	310-345	250	100	545	530
IU35/3010 33	355-370	300	100	549	534
IO35/2000 33	335-350	200	0	536	521
IO37/2500 33	365-395	250	0	539	524
IO40/2505 33	385-400	250	50	544	529
IO42/3005 33	415-445	300	50	548	533
IO45/3010 33	435-450	300	100	550	535
IO47/3510 33	465-495	350	100	553	538
IO50/3515 33	485-500	350	150	556	541

air spring type 2919 V (code: **42**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BILL9-22S ²⁾	axle version BILL9-19S ³⁾
IU25/2000 42	255-265	200	0	538	523
IU28/2005 42	255-295	200	50	543	528
IU30/2505 42	305-315	250	50	547	532
IU33/2510 42	305-345	250	100	549	534
IU35/3010 42	355-365	300	100	553	538
IO35/2000 42	330-350	200	0	540	525
IO37/2500 42	365-390	250	0	543	528
IO40/2505 42	380-400	250	50	548	533
IO42/3005 42	415-440	300	50	552	537
IO45/3010 42	430-450	300	100	554	539
IO47/3510 42	465-490	350	100	557	542
IO50/3515 42	480-500	350	150	560	545

air spring type 2924 V (code: **41**), total axle travel **200** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BILL9-22S ²⁾	axle version BILL9-19S ³⁾
IU29/2000 41	255-295	200	0	539	524
IU31/2500 41	305-330	250	0	543	528
IU34/2505 41	305-345	250	50	548	533
IU36/3005 41	355-380	300	50	552	537
IU39/3010 41	355-395	300	100	554	539
IU41/3510 41	405-430	350	100	558	543
IO44/3000 41	415-450	300	0	549	534
IO49/3505 41	465-500	350	50	557	542

air spring type 2927 V (code:47), total axle travel **260** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BILL9-22 ²⁾	axle version BILL9-19S ³⁾
IU30/2000 47	270-295	200	0	542	527
IU32/2500 47	305-345	250	0	546	531
IU35/2505 47	320-345	250	50	550	535
IU37/3005 47	355-395	300	50	554	539
IU40/3010 47	370-395	300	100	556	541
IU42/3510 47	405-445	350	100	560	545
IO45/3000 47	415-450	300	0	551	536
IO49/3505 47	465-500	350	50	559	544

INTRA „MEGA“, air spring type 2927 V (code:47), total axle travel **260** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]	
				axle version BILL9-22 ²⁾	axle version BILL9-19S ³⁾
IU27/2000 47V90	255-295	200	0	542	527

- 1) Weight deviations lie within the permitted DIN tolerances for the respective manufacturing process. Weight when track/spring centre 2040/1300 with steel hanger brackets, without wheel nuts.
- 2) Axle version with SAF-HOLLAND brake calliper (SBS2220);
 - a. with SAF-HOLLAND brake calliper (SBS2220 K0) have the same weight
 - b. with KNORR brake calliper (SB7...SK7) an additional weight of 11 kg per axle needs to be accounted for.
- 3) Axle version with SAF-HOLLAND brake calliper (SBS1918); for KNORR brake calliper (SB6...SN6) an additional weight of 11 kg per axle needs to be accounted for.
- 4) The extra weight for the axle version with B(I)L in stead of B(I)LL is about 24 kg.

Further variants on request.

Overview of ride heights and weights for INTRADRUM rigid axle

Axle version **S9-4218**

air spring type 2619 V (code: **33**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU25/2000 33	230-270	200	0	410
IU28/2005 33	260-300	200	50	415
IU30/2505 33	280-320	250	50	419
IU33/2510 33	310-350	250	100	421
IU35/3010 33	330-370	300	100	425
IO35/2000 33	335-375	200	0	412
IO37/2500 33	355-395	250	0	415
IO40/2505 33	385-425	250	50	420
IO42/3005 33	405-445	300	50	424
IO45/3010 33	435-475	300	100	426
IO47/3510 33	455-495	350	100	429
IO50/3515 33	485-525	350	150	432

air spring type 2919 V (code: **42**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU25/2000 42	225-265	200	0	414
IU28/2005 42	255-295	200	50	419
IU30/2505 42	275-315	250	50	423
IU33/2510 42	305-345	250	100	425
IU35/3010 42	325-365	300	100	429
IO35/2000 42	330-370	200	0	416
IO37/2500 42	350-390	250	0	419
IO40/2505 42	380-420	250	50	424
IO42/3005 42	400-440	300	50	428
IO45/3010 42	430-470	300	100	430
IO47/3510 42	450-490	350	100	433
IO50/3515 42	480-520	350	150	436

air spring type 2924 V (code: **41**), total axle travel **200** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU29/2000 41	250-310	200	0	415
IU31/2500 41	270-330	250	0	419
IU34/2505 41	310-360	250	50	424
IU36/3005 41	320-380	300	50	428
IU39/3010 41	350-410	300	100	430
IU42/3015 41	375-435	300	150	432
IO44/3000 41	395-455	300	0	425
IO49/3505 41	445-505	350	50	433

air spring type 2927 V (code:47), total axle travel **260** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU30/2000 47	270-350	200	0	418
IU32/2500 47	290-370	250	0	422
IU35/2505 47	320-400	250	50	426
IU37/3005 47	340-420	300	50	430
IU40/3010 47	370-450	300	100	432
IU42/3510 47	390-470	350	100	436
IO44/3000 47	415-495	300	0	427
IO49/3505 47	465-545	350	50	435

- 1) Weight deviations lie within the permitted DIN tolerances for the respective manufacturing process. Weight when track/spring centre 2040/1300 with steel hanger brackets and automatic slack adjusters, without wheel nuts.

Further variants on request.

Overview of ride heights and weights for INTRADRUM self-steering axle

Axle version **SL9-4218**

Important:

The ride height range for self-steering axles is depending on the resulting caster. Because of this caster not every ride height range as with the rigid axle can be covered. See also page 76, [Caster](#).

air spring type 2619 V (code: **33**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU25/2000 33	255-270	200	0	570
IU28/2005 33	260-295	200	50	575
IU30/2505 33	305-320	250	50	579
IU33/2510 33	310-345	250	100	581
IU35/3010 33	355-370	300	100	585
IO35/2000 33	335-350	200	0	572
IO37/2500 33	365-395	250	0	575
IO40/2505 33	385-400	250	50	580
IO42/3005 33	415-445	300	50	584
IO45/3010 33	435-450	300	100	586
IO47/3510 33	465-495	350	100	589
IO50/3515 33	485-500	350	150	592

air spring type 2919 V (code: **42**), total axle travel **180** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU25/2000 42	255-265	200	0	574
IU28/2005 42	255-295	200	50	579
IU30/2505 42	305-315	250	50	583
IU33/2510 42	305-345	250	100	585
IU35/3010 42	355-365	300	100	589
IO35/2000 42	330-350	200	0	576
IO37/2500 42	365-390	250	0	579
IO40/2505 42	380-400	250	50	584
IO42/3005 42	415-440	300	50	588
IO45/3010 42	430-450	300	100	590
IO47/3510 42	465-490	350	100	593
IO50/3515 42	480-500	350	150	596

air spring type 2924 V (code: **41**), total axle travel **200** mm

air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU29/2000 41	255-295	200	0	575
IU31/2500 41	305-330	250	0	579
IU34/2505 41	305-345	250	50	584
IU36/3005 41	355-380	300	50	588
IU39/3010 41	355-395	300	100	590
IU41/3510 41	405-430	350	100	594
IO44/3000 41	415-450	300	0	585
IO49/3505 41	465-500	350	50	593

air spring type 2927 V (code:47), total axle travel **260** mm

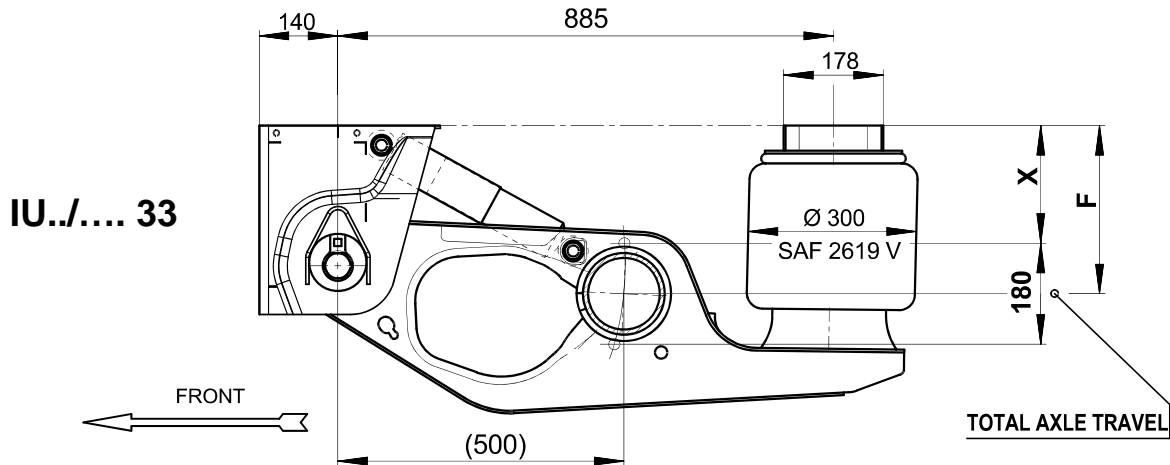
air suspension type	ride height range [mm]	hanger bracket [mm]	air spring bracket [mm]	weight ¹⁾ [kg]
IU30/2000 47	270-295	200	0	578
IU32/2500 47	305-345	250	0	582
IU35/2505 47	320-345	250	50	586
IU37/3005 47	355-395	300	50	590
IU40/3010 47	370-395	300	100	592
IU42/3510 47	405-445	350	100	596
IO44/3000 47	415-450	300	0	587
IO49/3505 47	465-500	350	50	595

- 1) Weight deviations lie within the permitted DIN tolerances for the respective manufacturing process. Weight when track/spring centre 2040/1300 with steel hanger brackets and automatic slack adjusters, without wheel nuts.

Further variants on request.

Air suspension type IU with air spring 2619V (33)

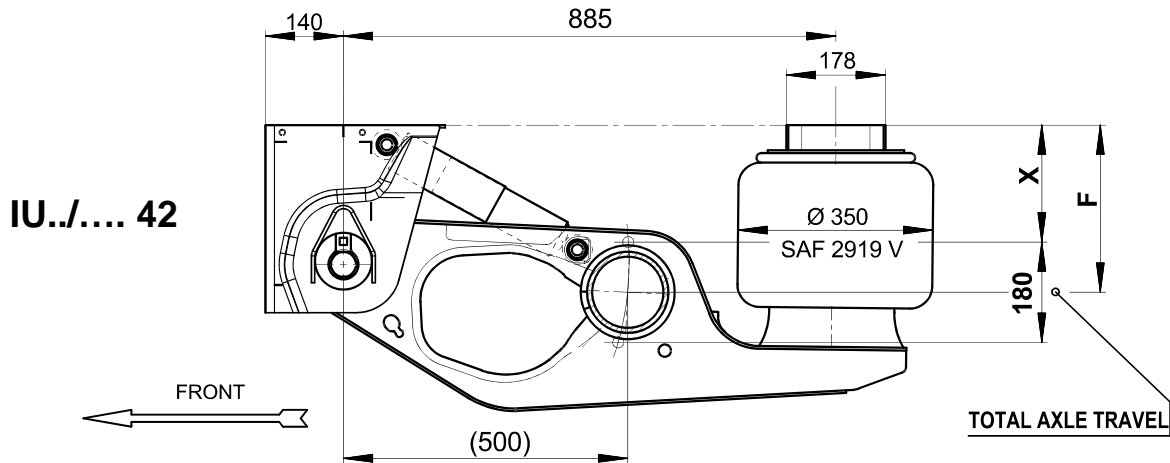
nominal ride heights 250 – 350 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IU25/2000 33	250	230-270	160	145
IU28/2005 33	280	260-300	190	175
IU30/2505 33	300	280-320	210	195
IU33/2510 33	330	310-350	240	225
IU35/3010 33	350	330-370	260	245

Air suspension type IU with air spring 2919V (42)

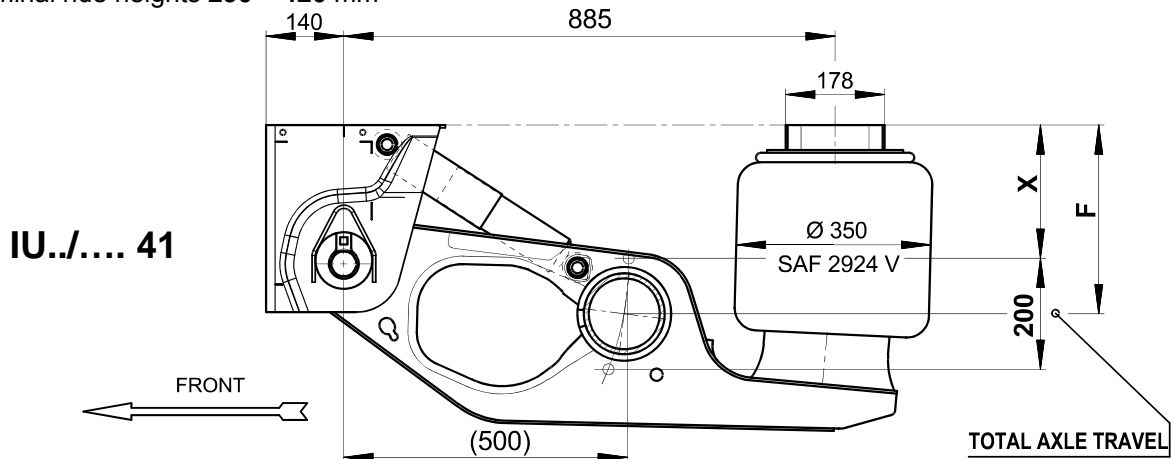
nominal ride heights 250 – 350 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IU25/2000 42	250	225-265	155	140
IU28/2005 42	280	255-295	185	170
IU30/2505 42	300	275-315	205	190
IU33/2510 42	330	305-345	235	220
IU35/3010 42	350	325-365	255	240

Air suspension type IU with air spring 2924V (41)

nominal ride heights 290 – 420 mm

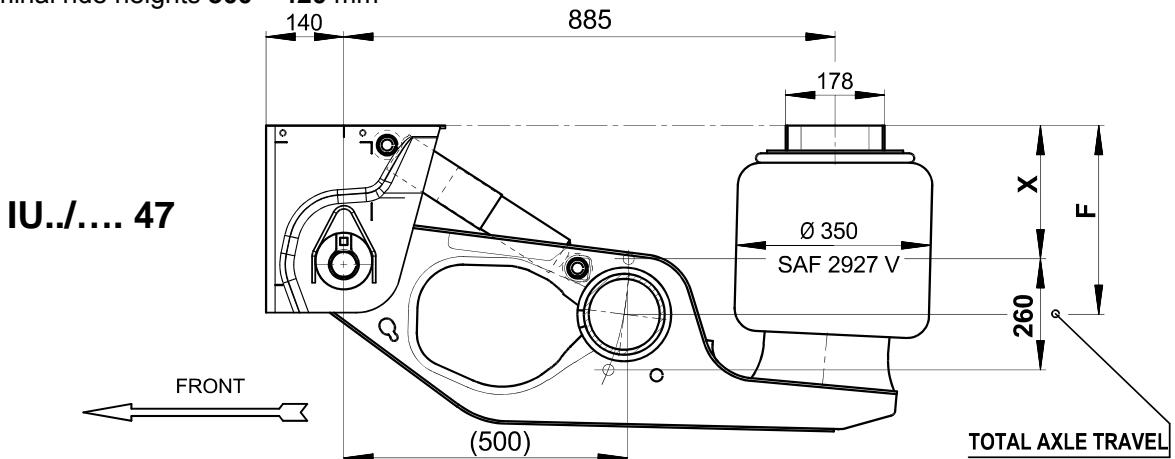


air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IU29/2000 41	290	250-310	180	165
IU31/2500 41	310	270-330	200	185
IU34/2505 41	340	300-360	230	215
IU36/3005 41	360	320-380	250	235
IU39/3010 41	390	350-410	280	265
IU42/3015 41 ¹⁾	420	375-435	305	290

1) in combination with self-steering axles the air suspension type IU41/3510 41 is used

Air suspension type IU with air spring 2927V (47)

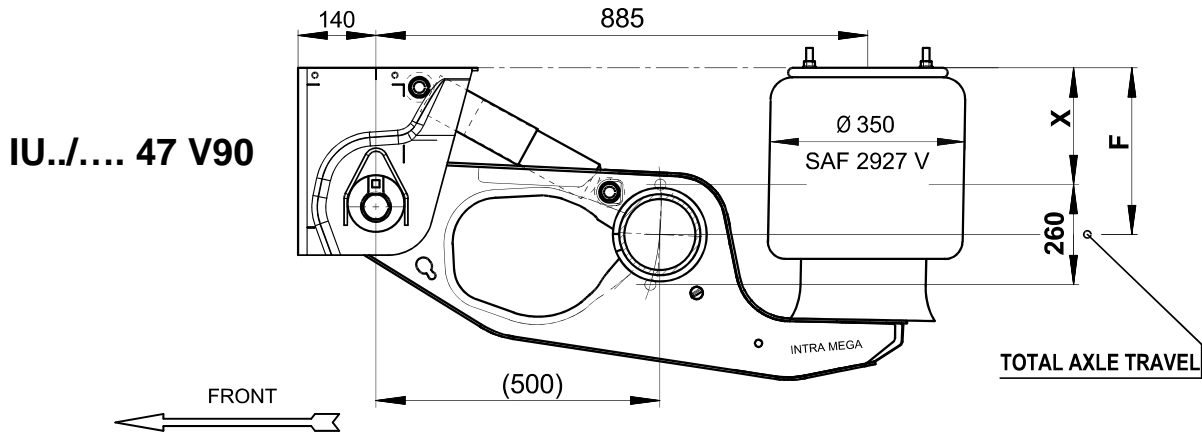
nominal ride heights 300 – 420 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IU30/2000 47	300	270-350	200	185
IU32/2500 47	320	290-370	220	205
IU35/2505 47	350	320-400	250	235
IU37/3005 47	370	340-420	270	255
IU40/3010 47	400	370-450	300	285
IU42/3510 47	420	390-470	320	305

Air suspension type Intra „MEGA“ with air spring 2927V (47)

nominal ride height 270 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IU27/2000 47 V90	270	240-320	170	155

The INTRADISC plus INTEGRAL is also as „MEGA“ available.

This special trailing arm offers the possibility to lower ride heights with a big axle travel because of the lower air spring position. With the asymmetrical design of the trailing arm this suspension is optimized for the use of the new tire generation (super single) with sizes as for example: 455/40R22,5“, 445/45R19,5“ and 435/50R19,5“.

This „MEGA“ version contains:



✓ More cranked

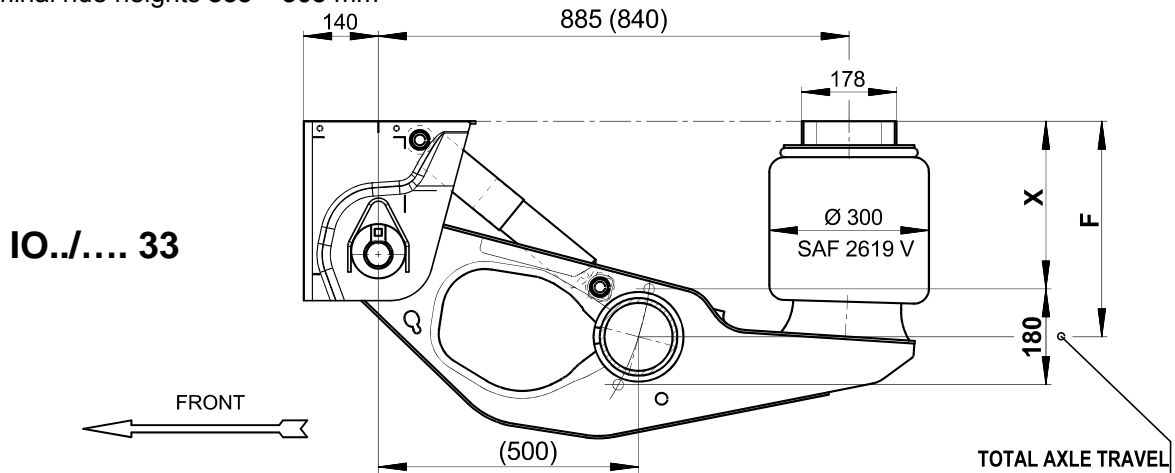


✓ Asymmetrical design, possible air spring offset (V) 30, 60 or 90 mm

Other track/ spring centre possibilities on request.

Air suspension type IO with air spring 2619V (33)

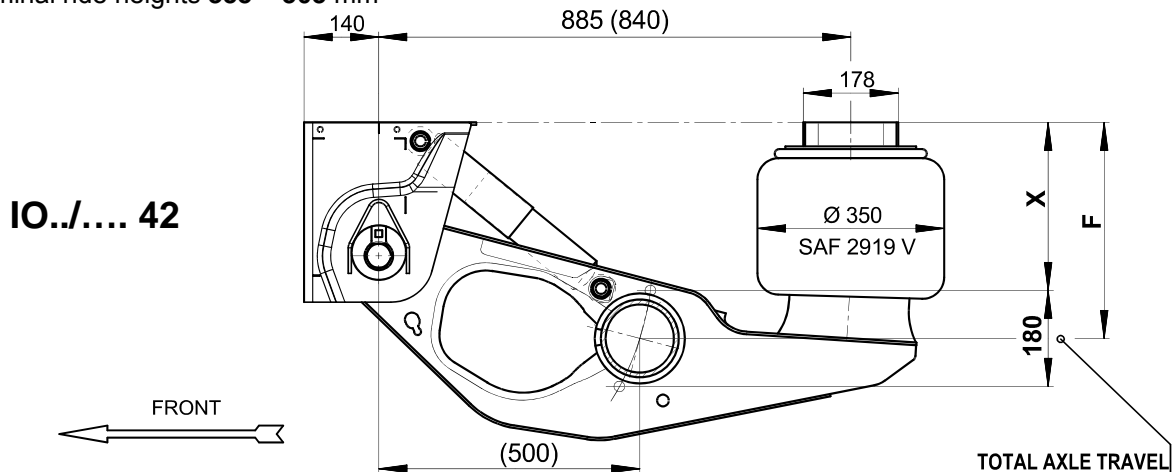
nominal ride heights 355 – 505 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO35/2000 33	355	335-375	265	250
IO37/2500 33	375	355-395	285	270
IO40/2505 33	405	385-425	315	300
IO42/3005 33	425	405-445	335	320
IO45/3010 33	455	435-475	365	350
IO47/3510 33	475	455-495	385	370
IO50/3515 33	505	485-525	415	400

Air suspension type IO with air spring 2919V (42)

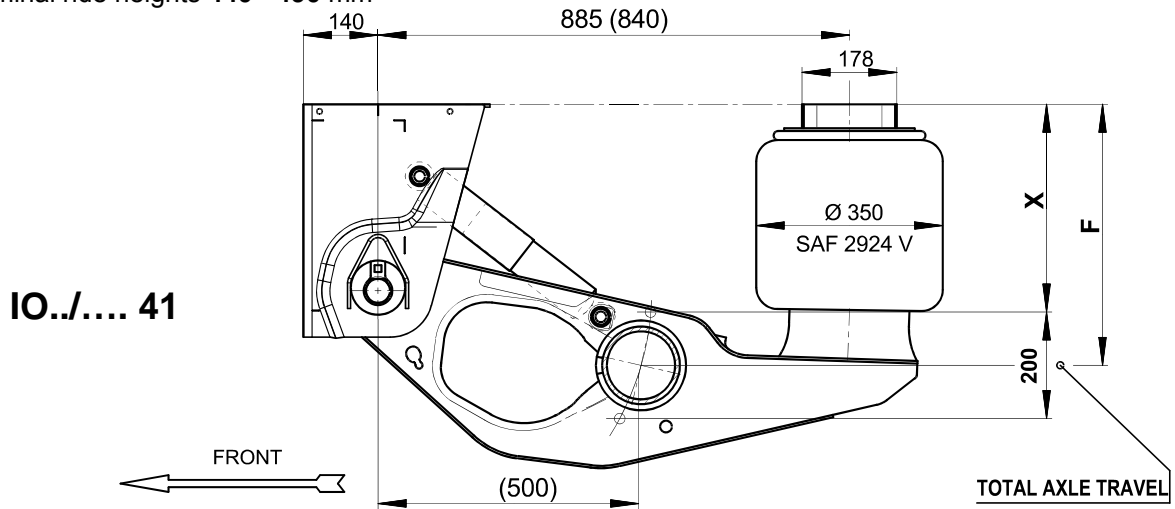
nominal ride heights 355 – 505 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO35/2000 42	355	330-370	260	245
IO37/2500 42	375	350-390	280	265
IO40/2505 42	405	380-420	310	295
IO42/3005 42	425	400-440	330	315
IO45/3010 42	455	430-470	360	345
IO47/3510 42	475	450-490	380	365
IO50/3515 42	505	480-520	410	395

Air suspension type IO with air spring 2924V (41)

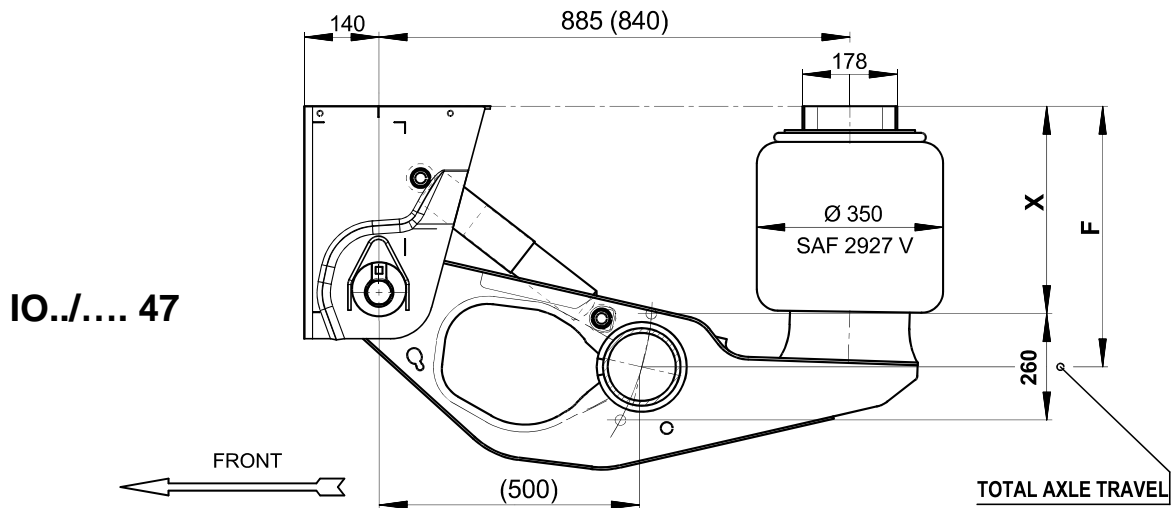
nominal ride heights 440 - 490 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO44/3000 41	440	395-455	325	310
IO49/3505 41	490	445-505	375	360

Air suspension type IO with air spring 2927V (47)¹⁾

nominal ride heights 450 - 500 mm



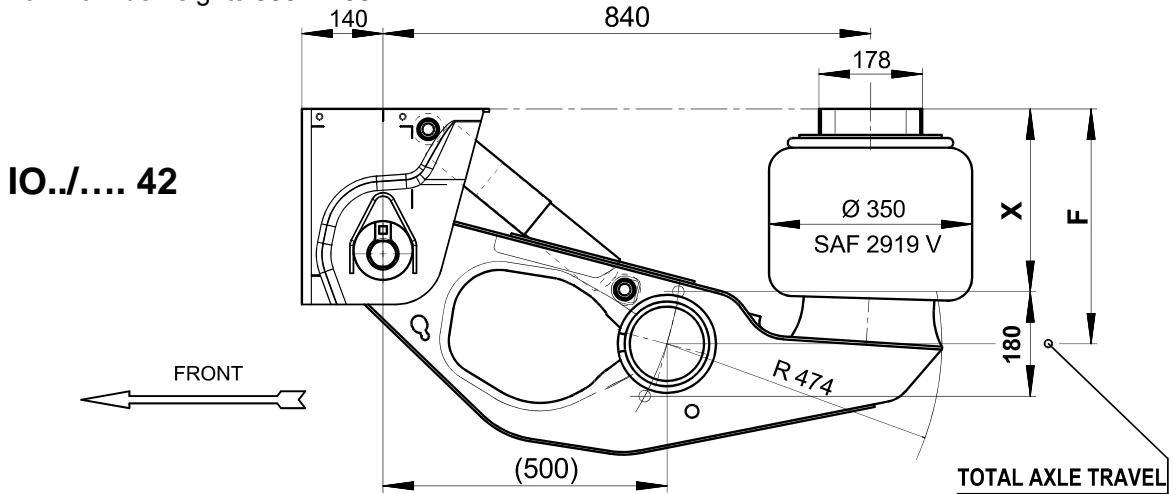
air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO45/3000 47	450	415-495	345	330
IO50/3505 47	500	465-545	395	380

1) Cross member not possible

Trailing arm in pavers serie IO; only CD-Version

with air spring 2919V (42)

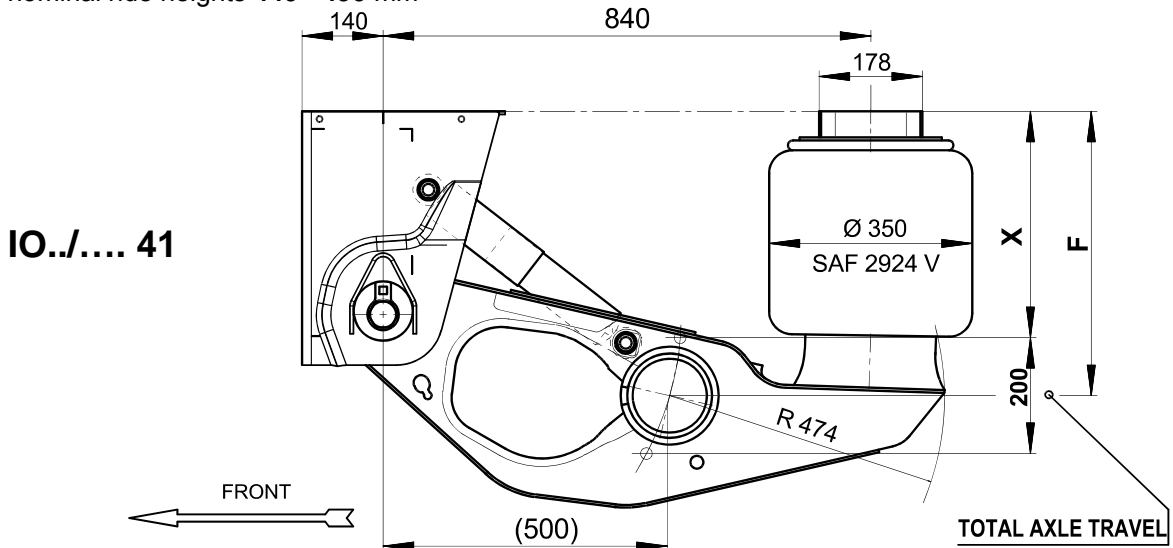
nominal ride heights 355 – 455 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO35/2000 42	355	325-365	255	240
IO37/2500 42	375	345-385	275	260
IO40/2505 42	405	375-415	305	290
IO42/3005 42	425	395-435	325	310
IO45/3010 42	455	425-465	355	340
IO47/3510 42	475	445-485	375	360
IO50/3515 42	505	475-515	405	390

with air spring 2924V (41)

nominal ride heights 440 - 490 mm



air suspension type	F; nominal ride height [mm]	ride height range [mm]	X; overall height	
			unladen without air [mm]	laden without air [mm]
IO44/3000 41	440	390-450	320	305
IO49/3505 41	490	440-500	370	355

Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

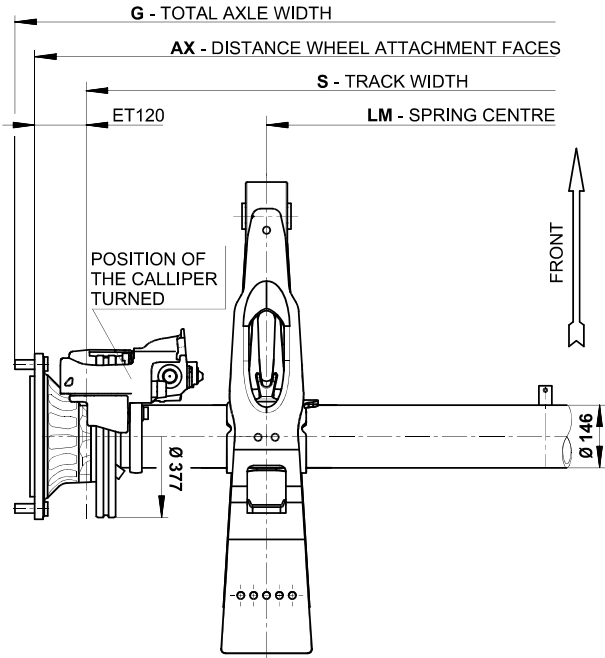
Axle version BI9-19.:

Axle load maximum: **9.000 kg**

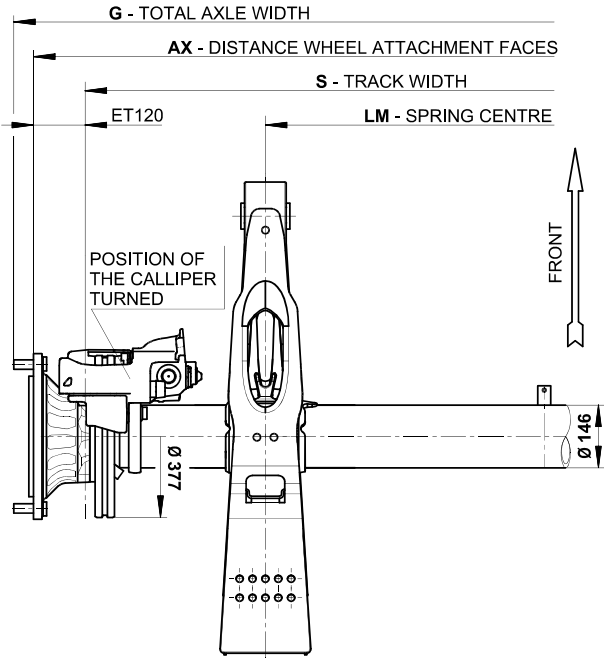
Wheel fixing: **10 / 280 / 335 / 22x1,5**

Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm

IU



IO



axle version/ axle type/ brake/ test report	AX / LM [mm]	S ¹⁾ / LM [mm]	G ²⁾ [mm]
	tire (example):425/55R19,5"		
<p>illustration IU</p> <p>BI9-19S / SBS1937 / SAF, SBS1918 / TDB 0870 BI9-19K / SBK1937 / KNORR, SBK1937 / TDB 0605</p>	2210/1200	1970/1200	2302
	2250/1200	2010/1200	2342
	2250/1300	2010/1300	2342
	2280/1200	2040/1200	2372
	2280/1300	2040/1300	2372
	2330/1300	2090/1300	2422
	2380/1300	2140/1300	2472
	238/1400	2140/1400	2472

1) **S = AX - 2 * ET (120 mm)**

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

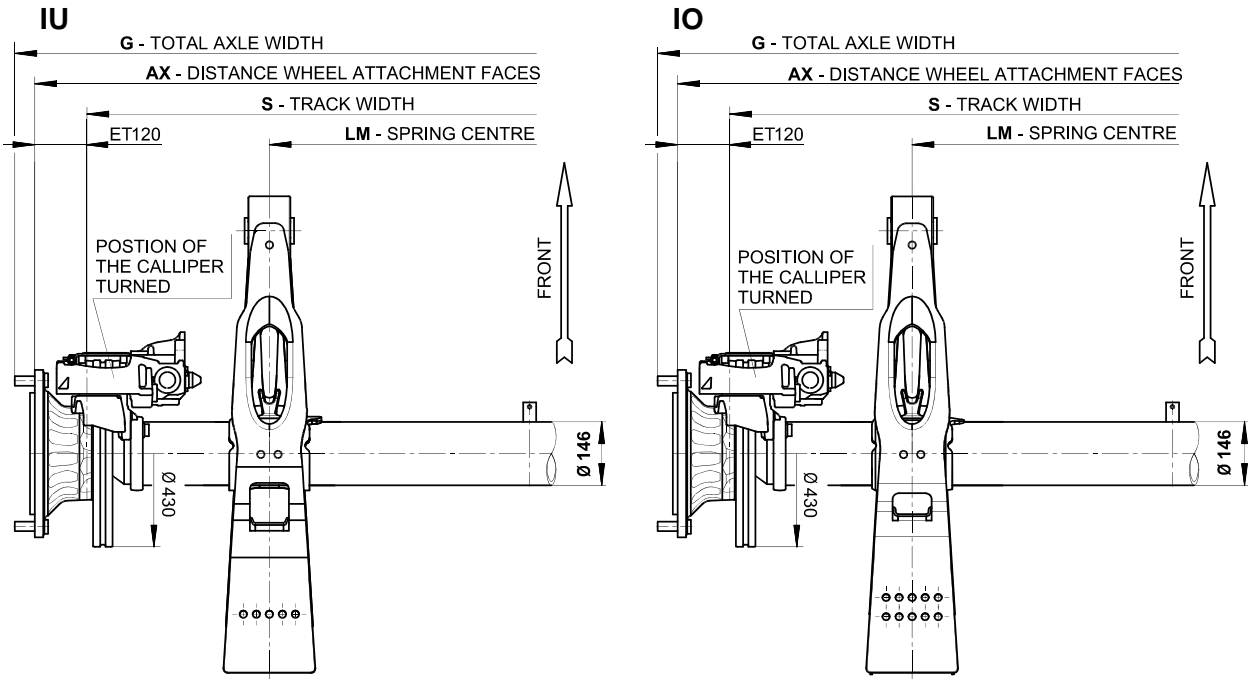
Further variants on request.

Axle version BI9-22...:

Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm



axle version/ axle type/ brake/ test report	AX / LM [mm]	S ¹⁾ / LM [mm]	G ²⁾ [mm]
	tire (example): 385/65R22,5"		
<p>illustration IU</p> <p>BI9-22S / SBS2243 / SAF, SBS2220 / TDB 0843 BI9-22K01 / SBK2243- / KNORR, SB7..SK7 / 36110303 BI9-22S01 / SBS2243 / SAF, SBS2220 K0 / 36102214</p>	2210/1200	1970/1200	2302
	2250/1200	2010/1200	2342
	2250/1300	2010/1300	2342
	2280/1200	2040/1200	2372
	2280/1300	2040/1300	2372
	2330/1300	2090/1300	2372
	2380/1300	2140/1300	2472
	2380/1400	2140/1400	2472

1) **S** = **AX** - 2 * **ET** (120 mm)

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V** = **0 / 30 / 60** mm. The clearance between air spring (max. diameter) and chosen tire should be at least **25** mm.

Further variants on request.

Axle version BILL9-19. with Intra Standard:

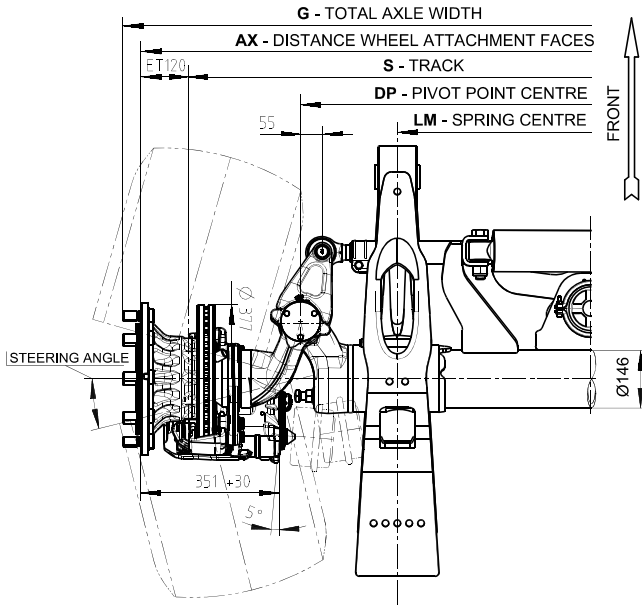
Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

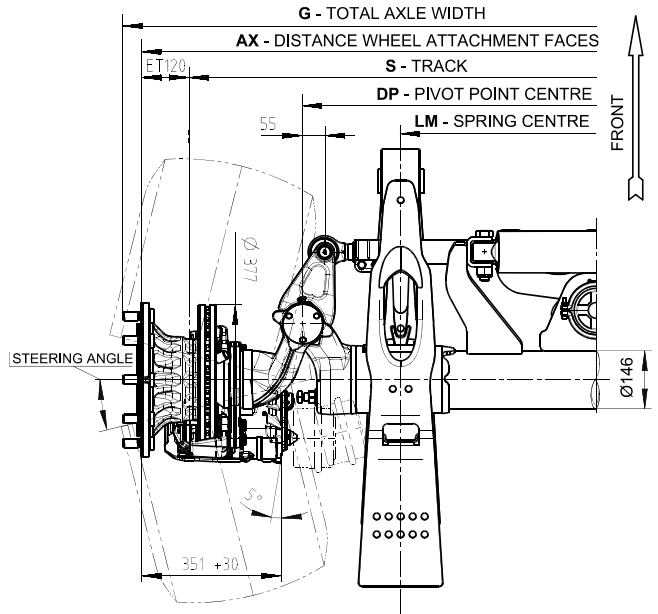
For air springs with diameter \varnothing **300 mm** and \varnothing **350 mm**

Steering angles up to max. 20°, depending on track, spring centre, tire size and other components.

IU



IO



axle version/ axle type/ brake/ test report	AX / LM	S ¹⁾ / LM	G ²⁾	DP
	[mm]	[mm]	[mm]	[mm]
<p>BILL9-19S / SBS1937 / SAF, SBS1918 / TDB 0870 BILL9-19K / SBK1937 / KNORR, SBK1937 / TDB 0605</p>	2250/950	2010/950	2342	1440
	2280/980	2040/980	2372	1470
	2330/1030	2090/1030	2422	1520
	2330/1080	2090/1080	2422	1520
	2380/1080	2140/1080	2472	1570

1) **S = AX - 2 * ET (120 mm)**

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

Axle version BIL9-19. with Intra CD

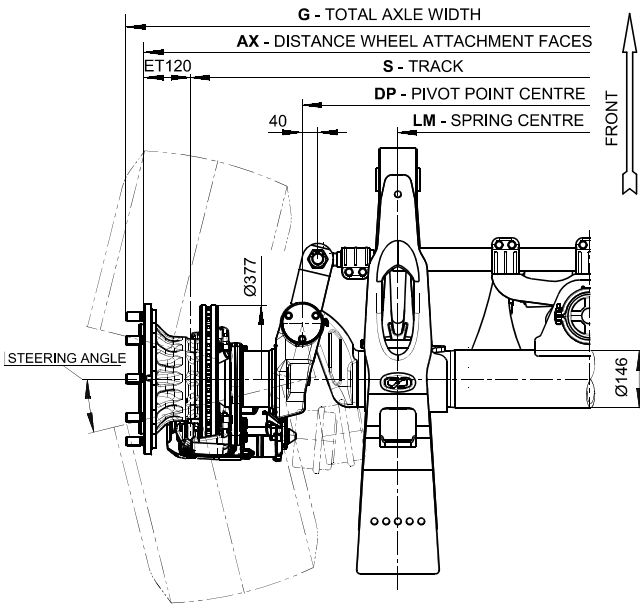
Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

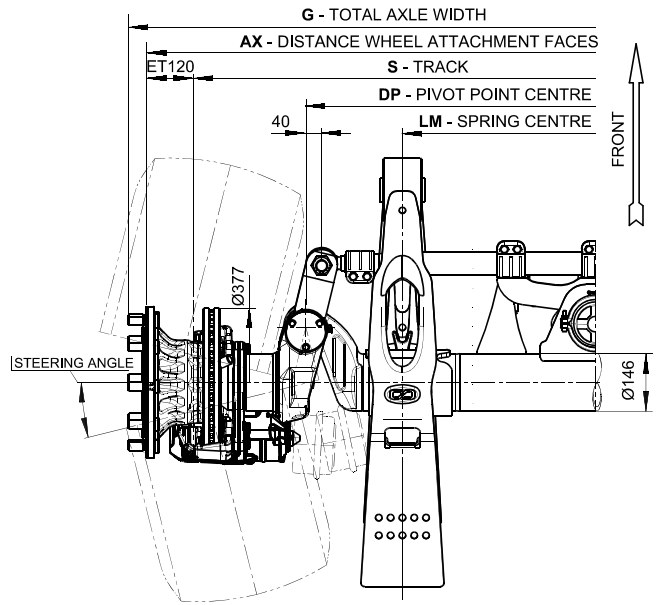
Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm

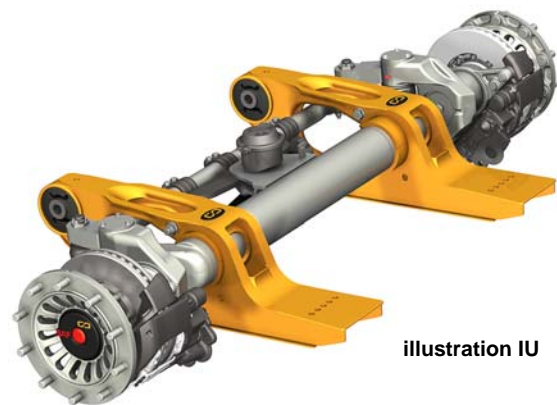
Steering angles up to max. 20°, depending on track, spring centre, tire size and other components.

IU



IO



axle version/ axle type/ brake/ test report	AX / LM	S ¹⁾ / LM	G ²⁾	DP
	[mm]	[mm]	[mm]	[mm]
 <p>illustration IU</p> <p>BIL9-19S / SBS1937 / SAF, SBS1918 / TDB0870 BIL9-19K / SBK1937 / KNORR, SBK1937 / TDB0605</p>	tire (example): 425/55R19,5"			
	2250/950	2010/950	2342	1440
	2280/980	2040/980	2372	1470
	2330/1030	2090/1030	2422	1520
	2330/1080	2090/1080	2422	1520
2380/1080	2140/1080	2472	1570	

1) **S = AX - 2 * ET (120 mm)**

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

Axle version BILL9-22...with Intra Standard

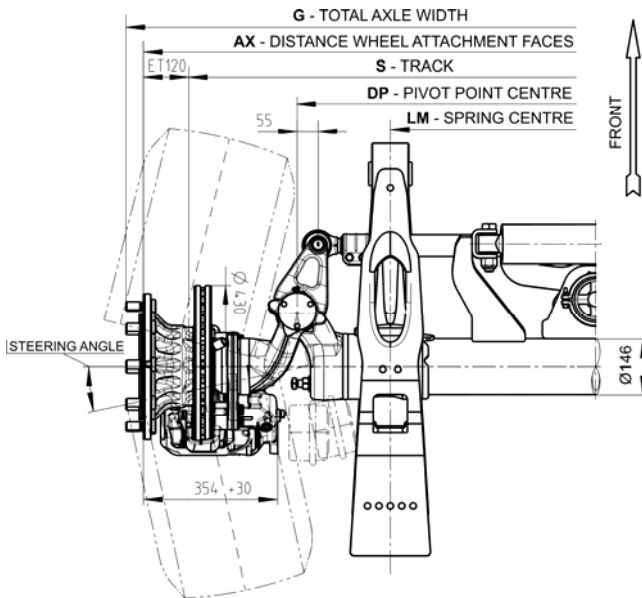
Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

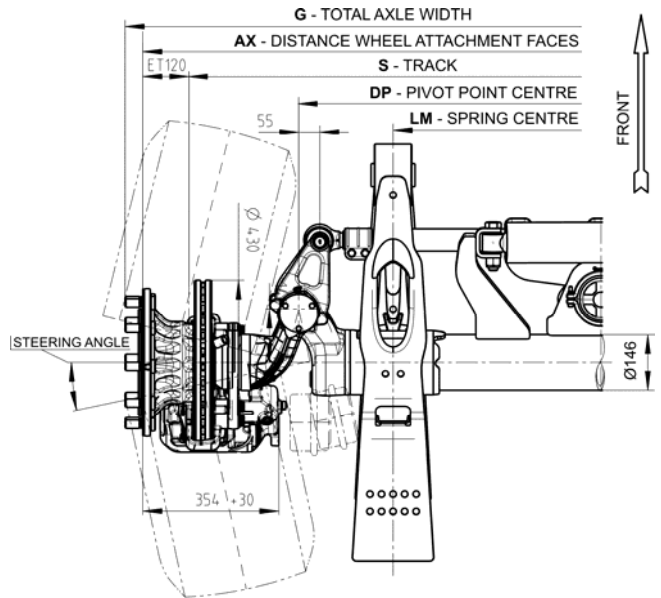
Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm

Steering angles up to max. 20°, depending on track, spring centre, tire size and other components.

IU



IO



axle version/ axle type/ brake/ test report	AX / LM	S ¹⁾ / LM	G ²⁾	DP
	[mm]	[mm]	[mm]	[mm]
<p>BILL9-22S / SBS2243 / SAF, SBS2220 / TDB0843 BILL9-22K01 / SBK2243- / KNORR, SB7..SK7 / 36110303 BILL9-22S01 / SBS2243 / SAF, SBS2220 K0 / 36102214</p>	tire (example):385/65R22,5"			
	2250/950	2010/950	2342	1440
	2280/980	2040/980	2372	1470
	2330/1030	2090/1030	2422	1520
	2330/1080	2090/1080	2422	1520
	2380/1080	2140/1080	2472	1570

1) **S = AX - 2 * ET (120 mm)**

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

Axle version BIL9-22...with Intra CD

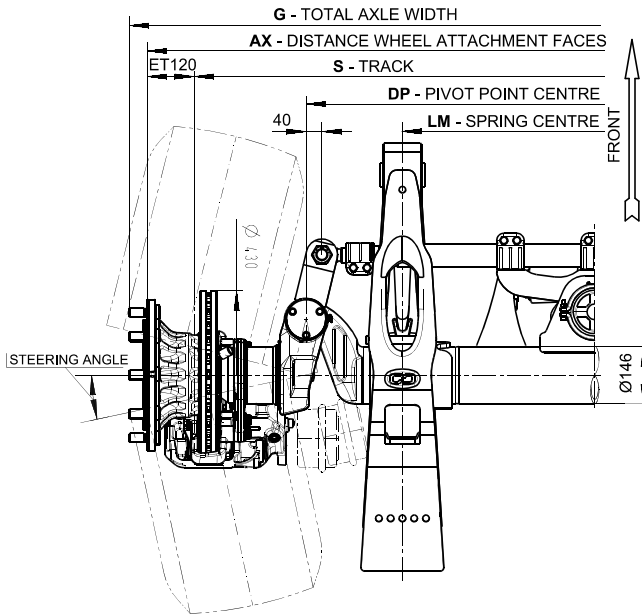
Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

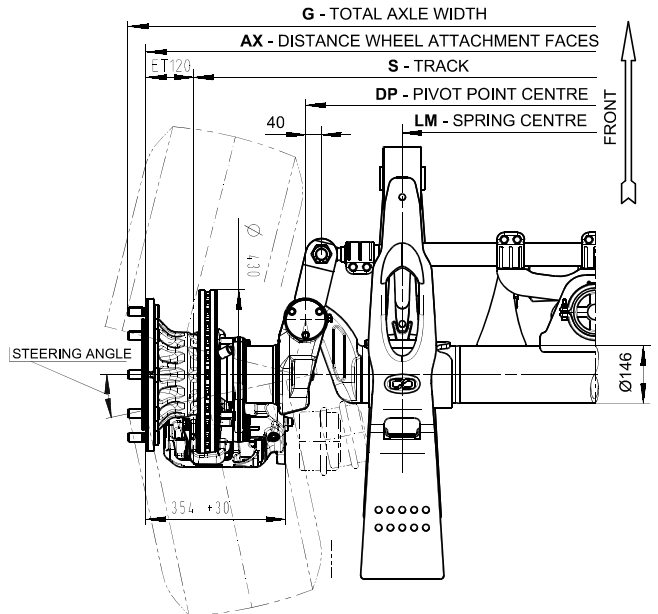
Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm

Steering angles up to max. 20°, depending on track, spring centre, tire size and other components.

IU



IO



axle version/ axle type/ brake/ test report	AX / LM	S ¹⁾ / LM	G ²⁾	DP
	[mm]	[mm]	[mm]	[mm]
<p>BIL9-22S / SBS2243 / SAF, SBS2220 / TDB0843 BIL9-22K01 / SBK2243- / KNORR, SB7..SK7 / 36110303 BIL9-22S01 / SBS2243 / SAF, SBS2220 K0 / 36102214</p>	tire (example): 385/65R22,5"			
	2250/950	2010/950	2342	1440
	2280/980	2040/980	2372	1470
	2330/1030	2090/1030	2422	1520
	2330/1080	2090/1080	2422	1520
	2380/1080	2140/1080	2472	1570

1) **S = AX - 2 * ET (120 mm)**

2) **G** is increased by 20 mm when wheel studs are used for mounting aluminium rims

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

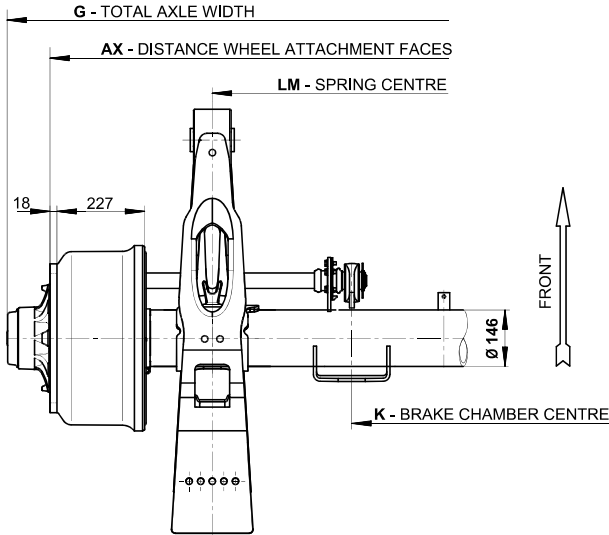
Axle version S9-4218:

Axle load maximum: **9.000 kg**

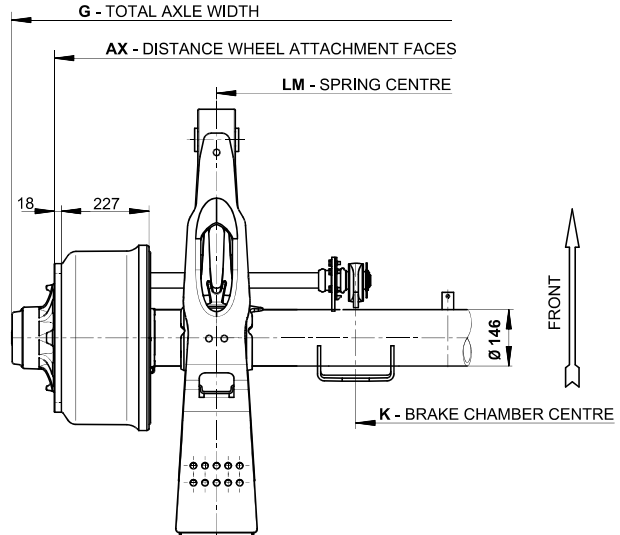
Wheel fixing: **10 / 280 / 335 / 22x1,5**

Suitable for air springs with diameter \varnothing 300 mm and \varnothing 350 mm

IU



IO



axle version/ axle type/ brake/ test report	AX ¹⁾ / LM [mm] tire (example):385/65R22,5"	G [mm]	K [mm]
<p>illustration IU</p> <p>S9-4218 / SNK4218 / SNK420x180 / TDB 0381</p>	2040/1200	2238	478
	2040/1300	2238	536
	2090/1300	2288	586
	2140/1300	2338	578
	2140/1400	2338	636

1) AX = S

Note:

The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

Axle version SL9-4218:

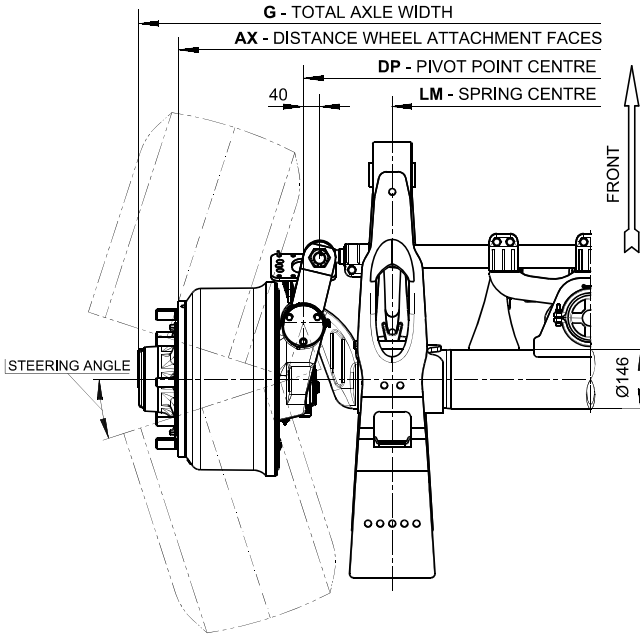
Axle load maximum: **9.000 kg**

Wheel fixing: **10 / 280 / 335 / 22x1,5**

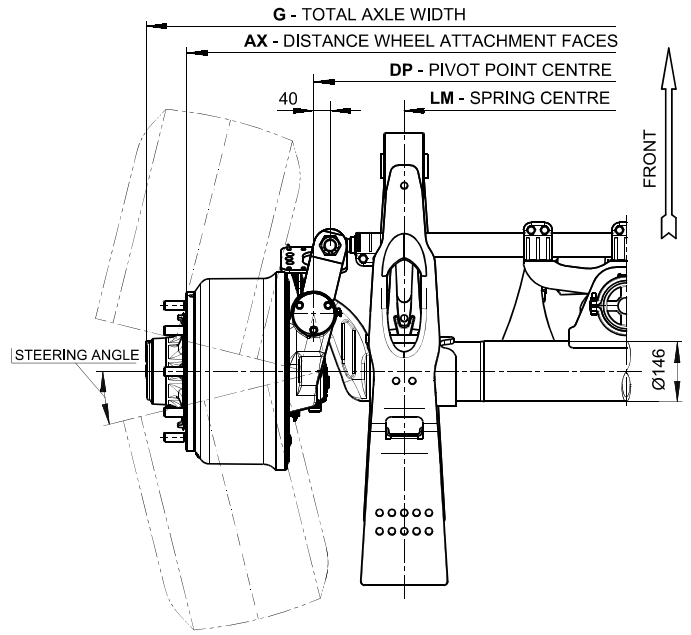
Suitable for air springs with diameter \varnothing **300 mm** and \varnothing **350 mm**

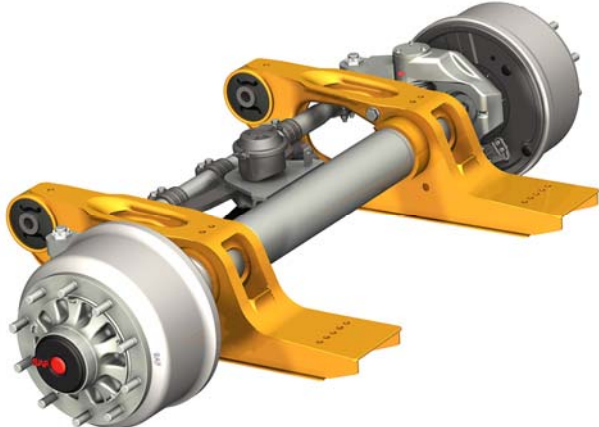
Steering angles up to max. 20°, depending on track, spring centre, tire size and other components.

IU



IO



axle version/ axle type/ brake/ test report	AX ¹⁾ / LM [mm] tire (example):385/65R22,5"	G [mm]	DP [mm]
 illustration IU SL9-4218 / SNK4218 / SNK420x180 / TDB 0381	2040/980	2238	1420
	2090/980	2288	1470
	2090/1030	2288	1470
	2140/1080	2338	1520

1) **AX = S**

Note:

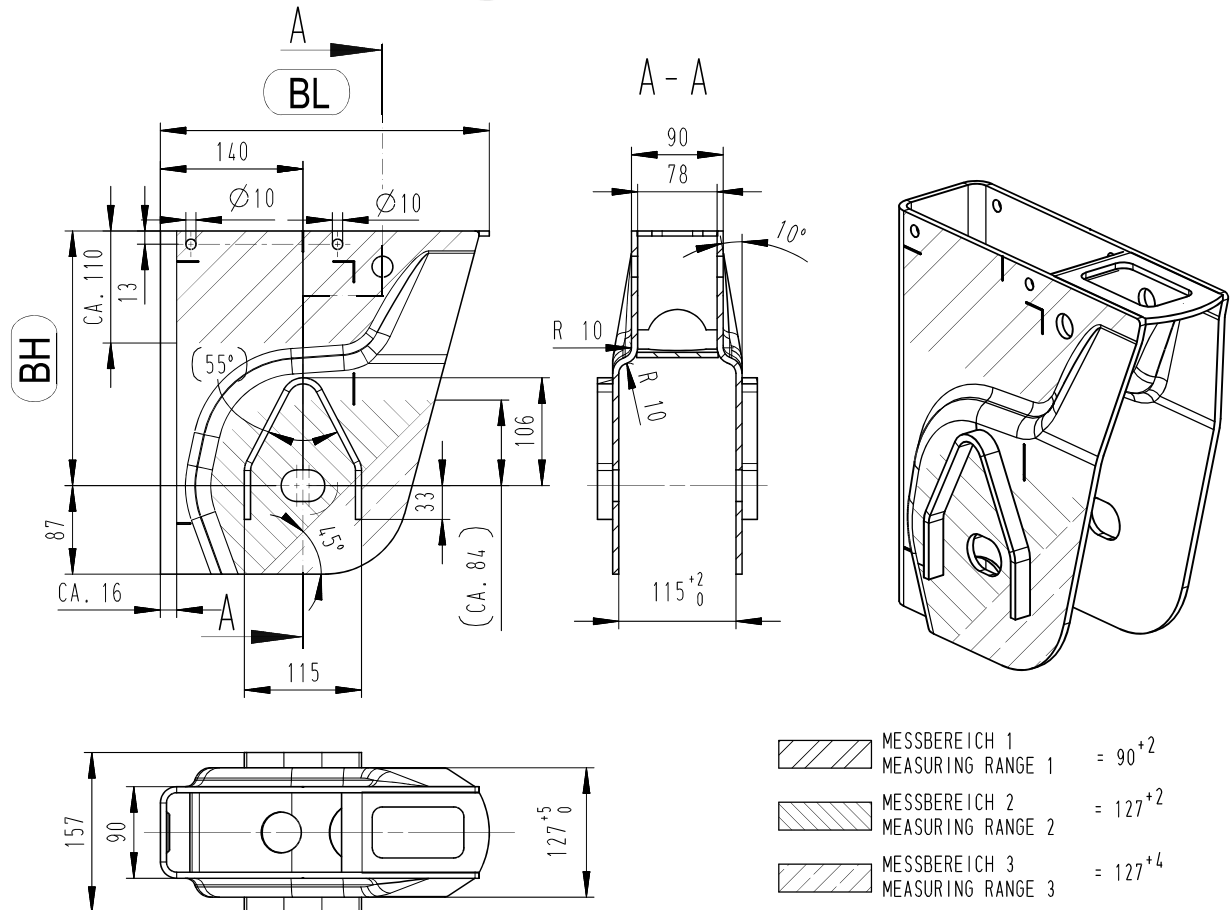
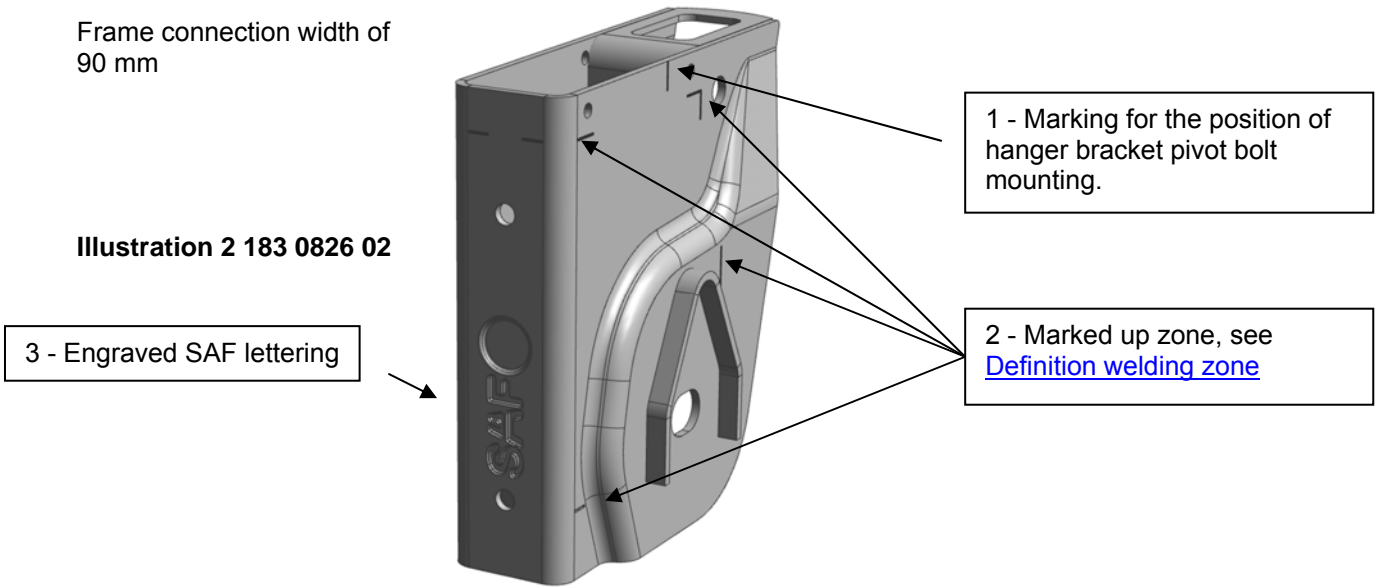
The following air spring offsets are possible **V = 0 / 30 / 60 mm**. The clearance between air spring (max. diameter) and chosen tire should be at least **25 mm**.

Further variants on request.

Geometry hanger bracket „steel“

Frame connection width of 90 mm

Illustration 2 183 0826 02



Dimension		Hanger bracket number		
BH [mm]	BL [mm]	in steel		in stainless steel
		primed	non-primed	non-primed
200	310	2 183 0825 02	2 183 0825 92	2 183 0843 00
250	323	2 183 0826 02	2 183 0826 92	2 183 0849 00
300	337	2 183 0827 02	2 183 0827 92	2 183 0850 00
350	350	2 183 0828 02	2 183 0828 92	-

Geometry hanger bracket „steel“ – „screw-on“

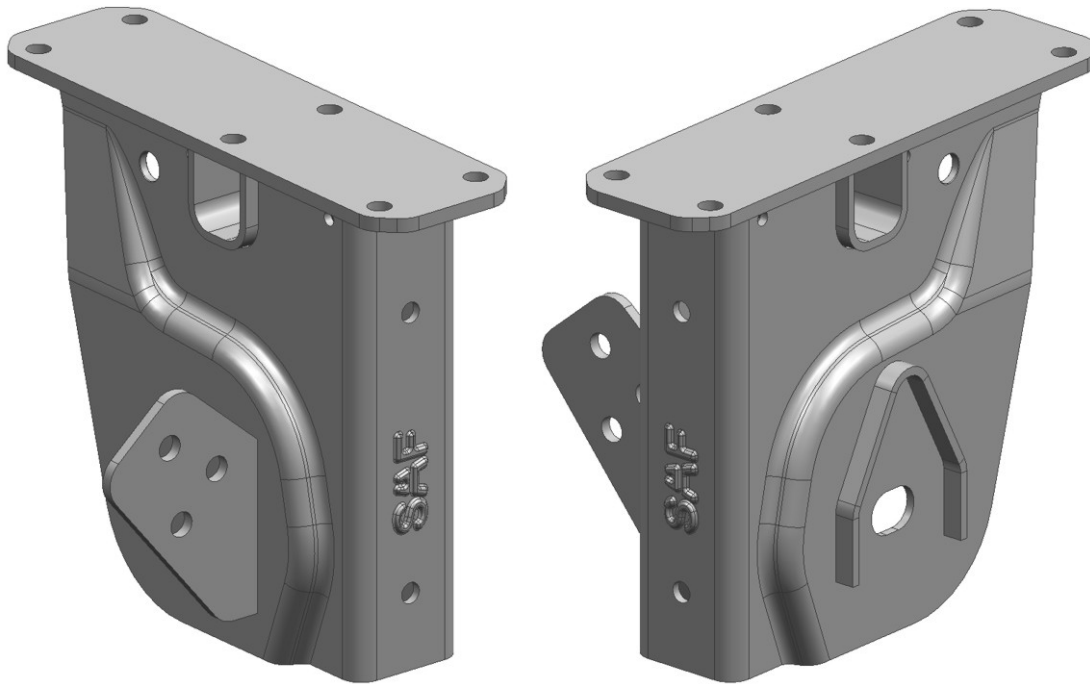
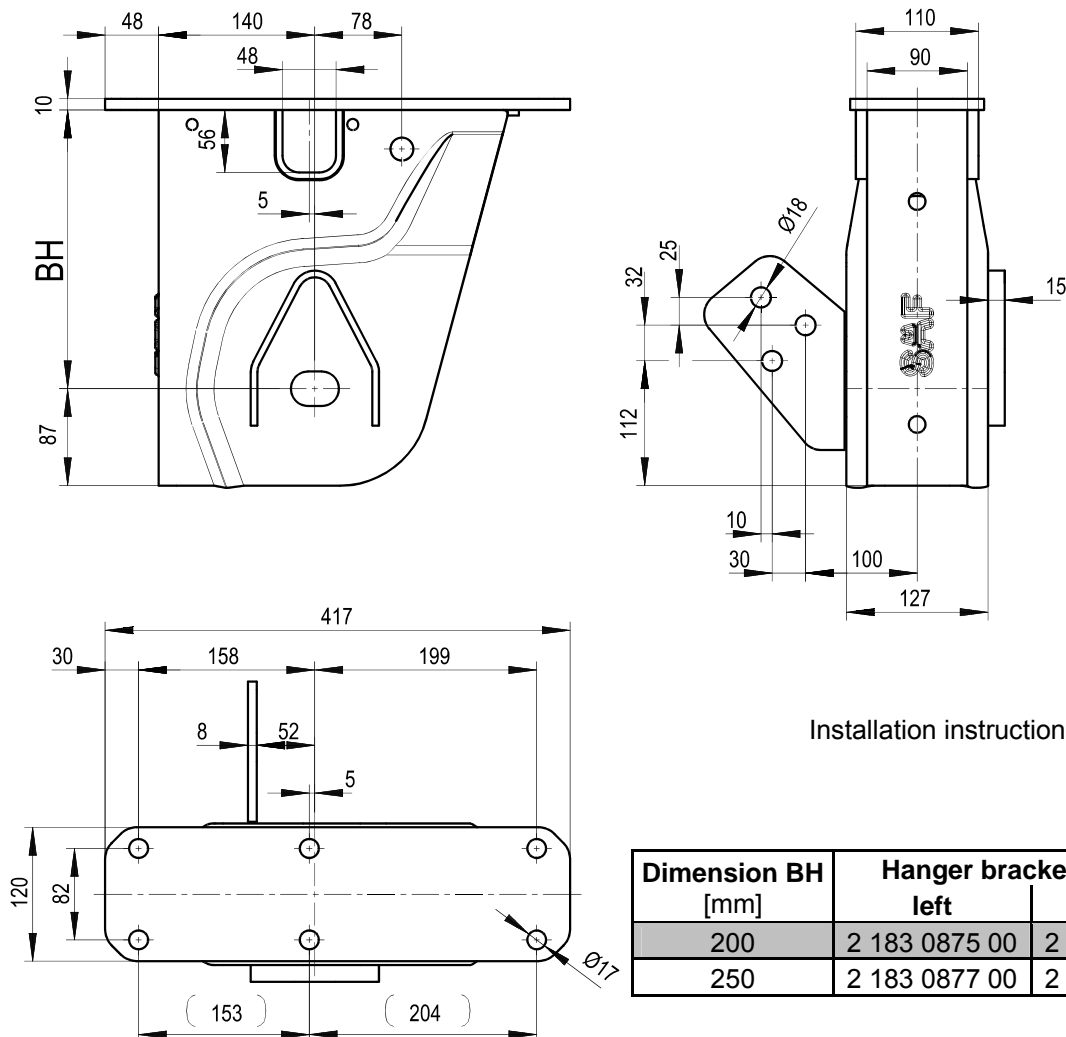


illustration 2 183 0877 00, „inside“ – „outside“



Dimension BH [mm]	Hanger bracket number	
	left	right
200	2 183 0875 00	2 183 0876 00
250	2 183 0877 00	2 183 0878 00

Geometry cross member, rigid axle

LM = HM

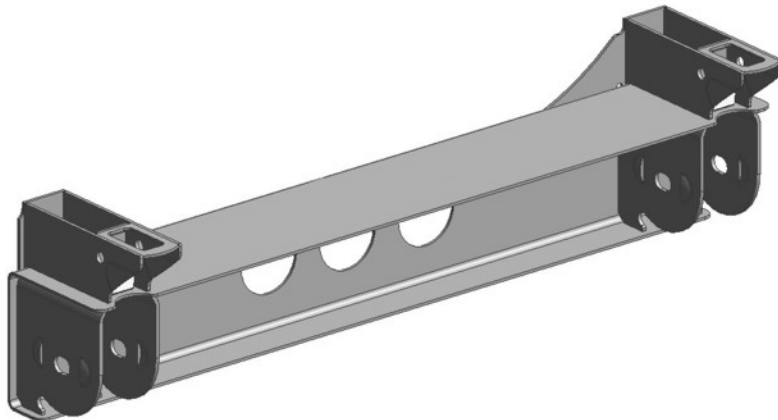
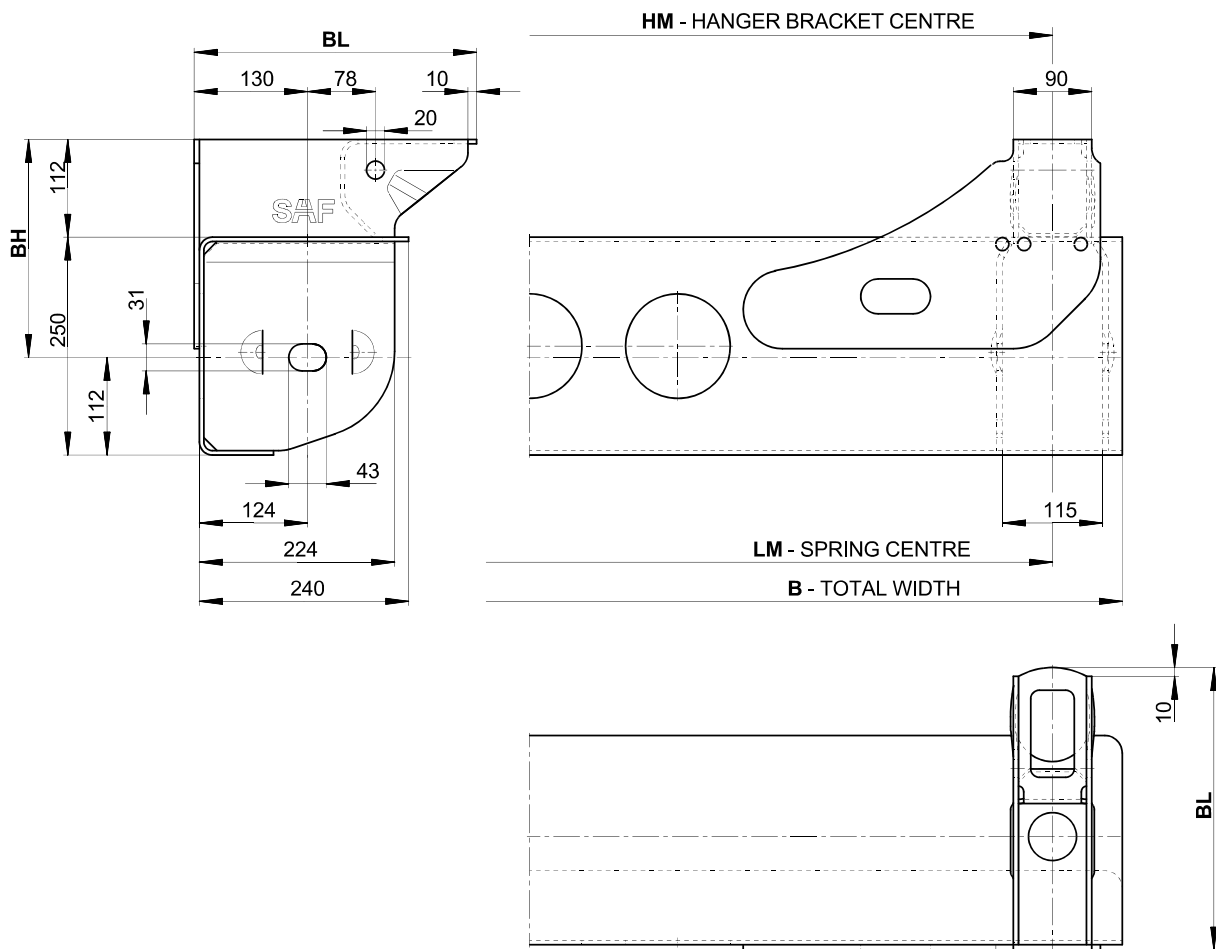


illustration 2 291 0401 00



LM [mm]	B [mm]	BH = 200 mm	BH = 250 mm	BH = 300 mm	BH = 350 mm
		BL = 324 mm		BL = 335 mm	
1200	1360	2 291 0426 00	2 291 0423 00	2 291 0428 00	2 291 0465 00
1300	1460	2 291 0400 00	2 291 0401 00	2 291 0402 00	2 291 0404 00
1400	1560	2 291 0427 00	2 291 0424 00	2 291 0421 00	2 291 0464 00

Geometry cross member, steering axle

LM < HM

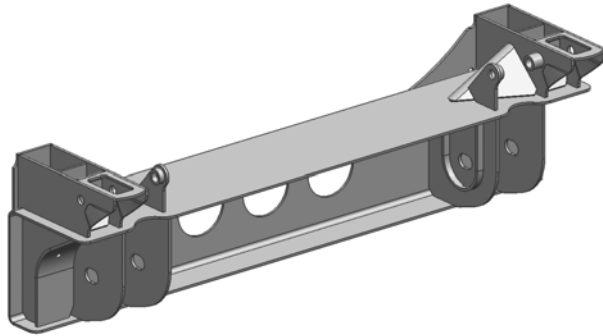


illustration 2 291 0435 00

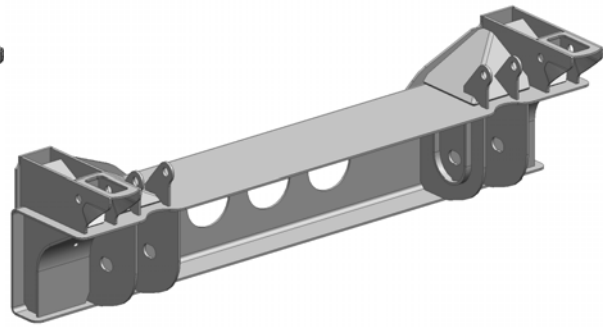
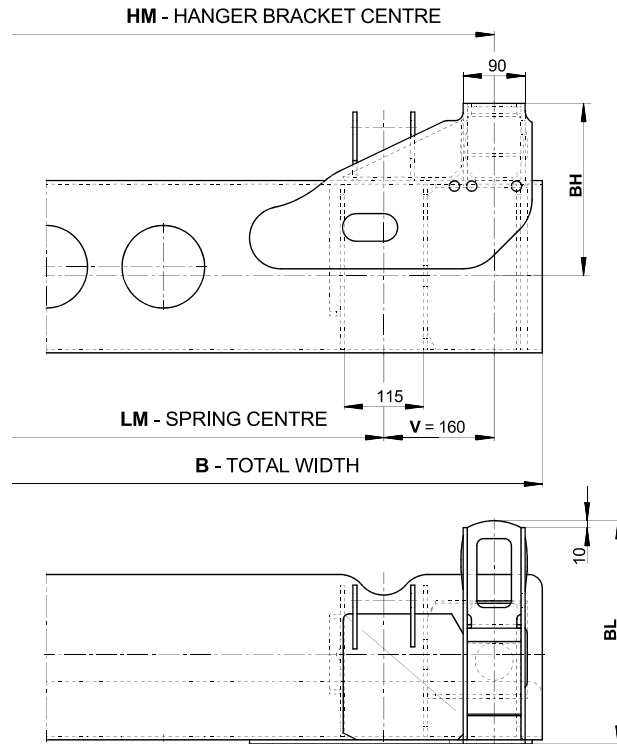
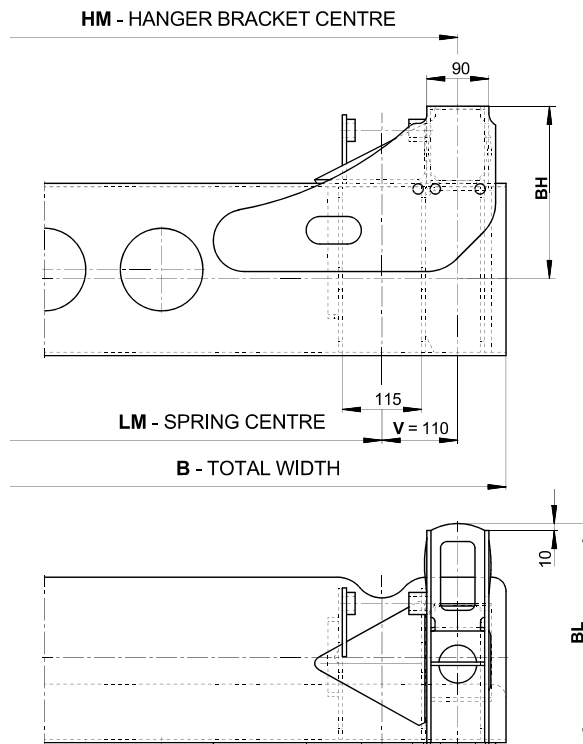
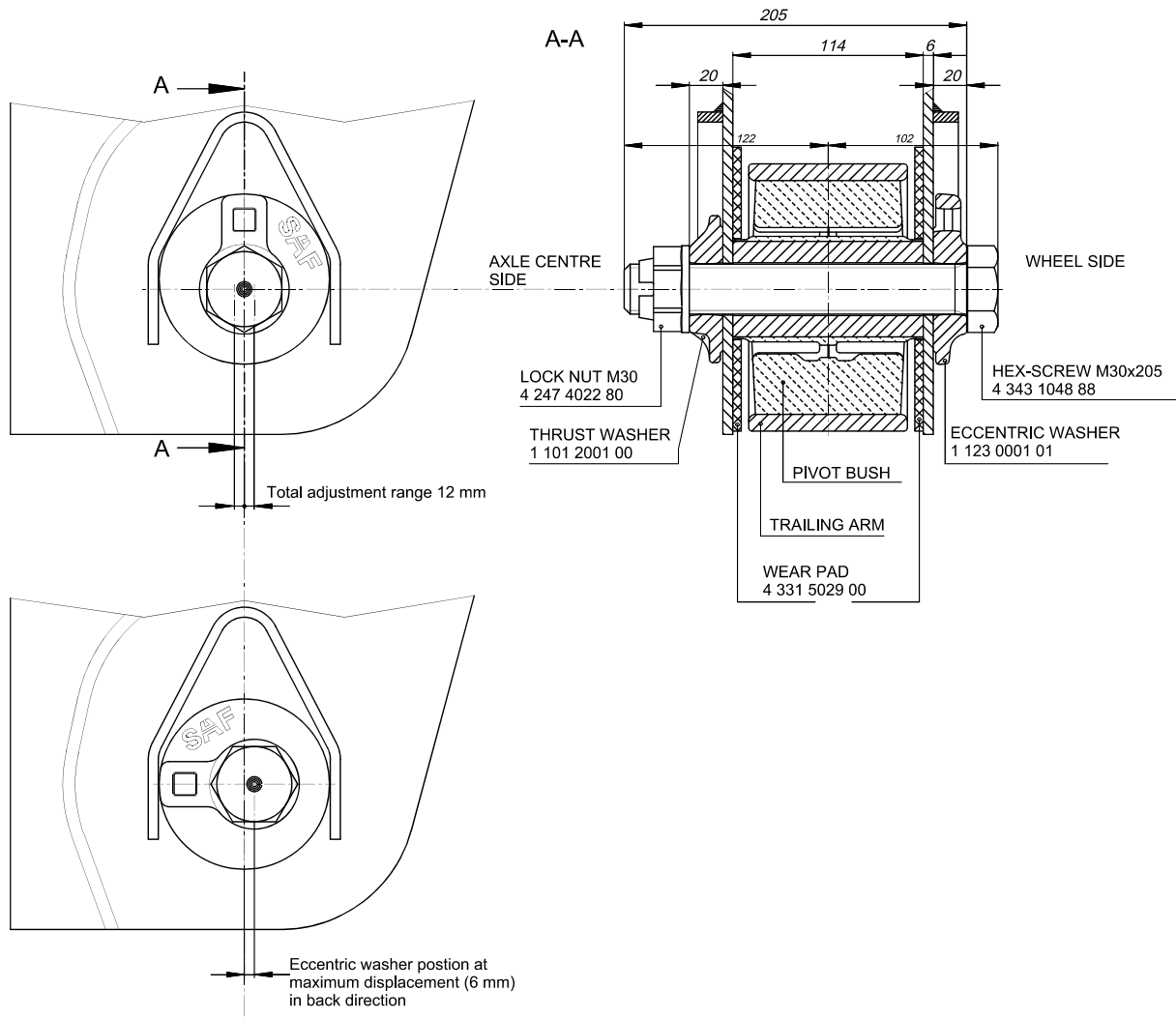


illustration 2 291 0449 00



LM [mm]	HM [mm]	V [mm]	B [mm]	BH = 200 mm; BH = 250 mm; BL = 324 mm		BH = 300 mm; BH = 350 mm; BL = 335 mm	
980	1200	110	1340	2 291 0434 00	2 291 0435 00	2 291 0436 00	2 291 0442 00
980	1300	160	1440	2 291 0448 00	2 291 0449 00	2 291 0450 00	2 291 0467 00
1080	1300	110	1440	2 291 0438 00	2 291 0439 00	2 291 0440 00	2 291 0443 00
1080	1400	160	1540	2 291 0458 00	2 291 0459 00	2 291 0460 00	2 291 0468 00

Adjustable pivot bolt for hanger bracket „steel“ and „cross member“



Ref.: 03 143 1010 00

Tightening torque : 400 Nm + 120°; tightening procedure page 68

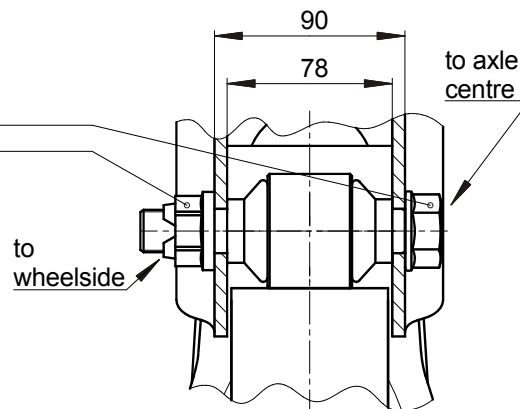
Attention:

- Threads are not to be oiled or greased!
- Pivot bolt mounting for hanger bracket „steel“ maintenance free.
- Pivot bolt mounting on galvanized hanger brackets are up to a coating thickness of **120 µm** maintenance free.

**Shock absorber assembly:
hanger bracket „steel“/ cross member/ cross member V=160/ cross member
V=110 and trailing arm**

BOLT KIT	
3 341 2803 10	
HEXAGON BOLT M20x1,5x125	4 343 2803 10
LOCK NUT M20x1,5	4 247 4044 10

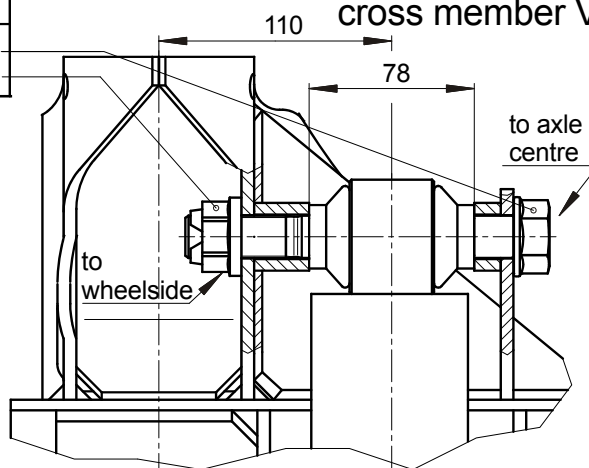
TIGHTENING TORQUE: 600 Nm



view hanger bracket / cross member /
cross member V=160

BOLT KIT	
3 341 2802 10	
HEXAGON BOLT M20x1,5x155	4 343 2802 10
LOCK NUT M20x1,5	4 247 4044 10

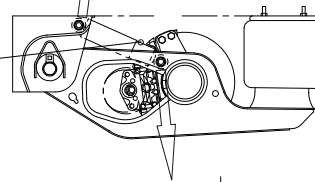
TIGHTENING TORQUE: 600 Nm



view cross member V=110

Attention: Mark **TOP** facing upwards in working position!

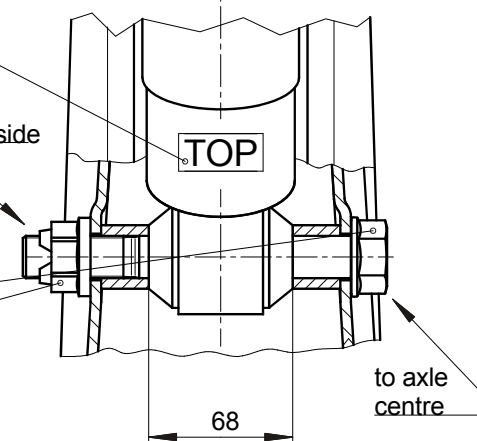
Position TOP



BOLT KIT	
3 341 2802 10	
HEXAGON BOLT M20x1,5x155	4 343 2802 10
LOCK NUT M20x1,5	4 247 4044 10

TIGHTENING TORQUE: 600 Nm

to wheelside



view trailing arm

Ref.: 00 378 0028 00, 00 378 0030 00, 00 378 0031 00

Geometry hanger bracket „aluminium“

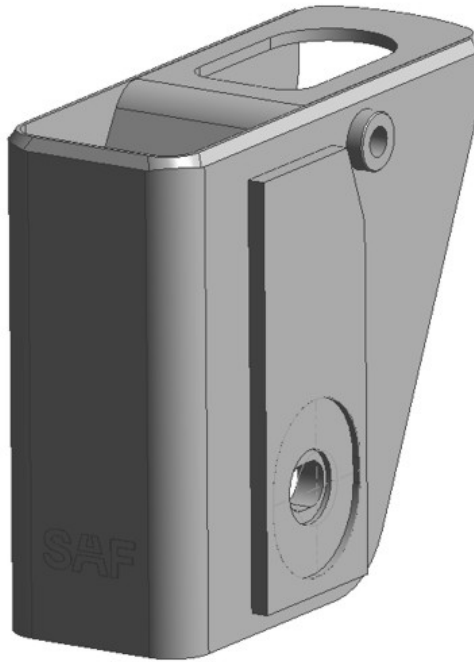
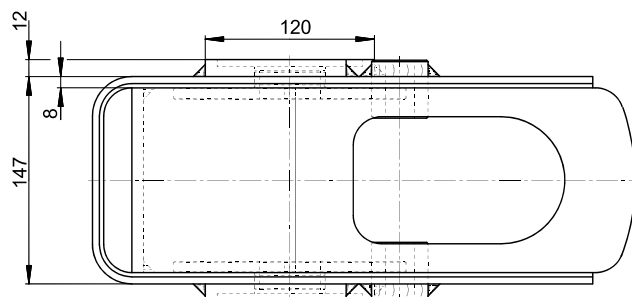
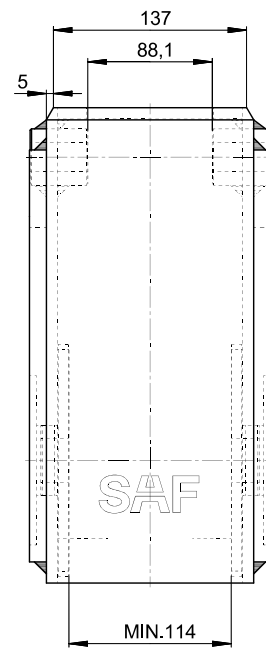
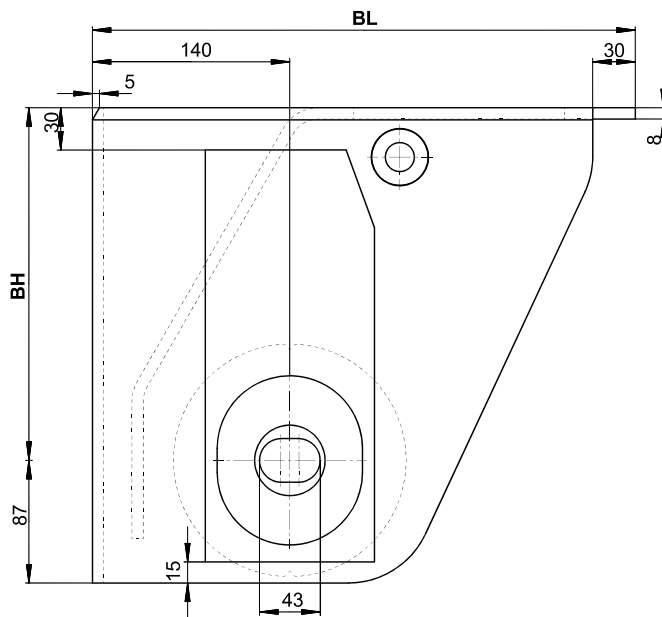


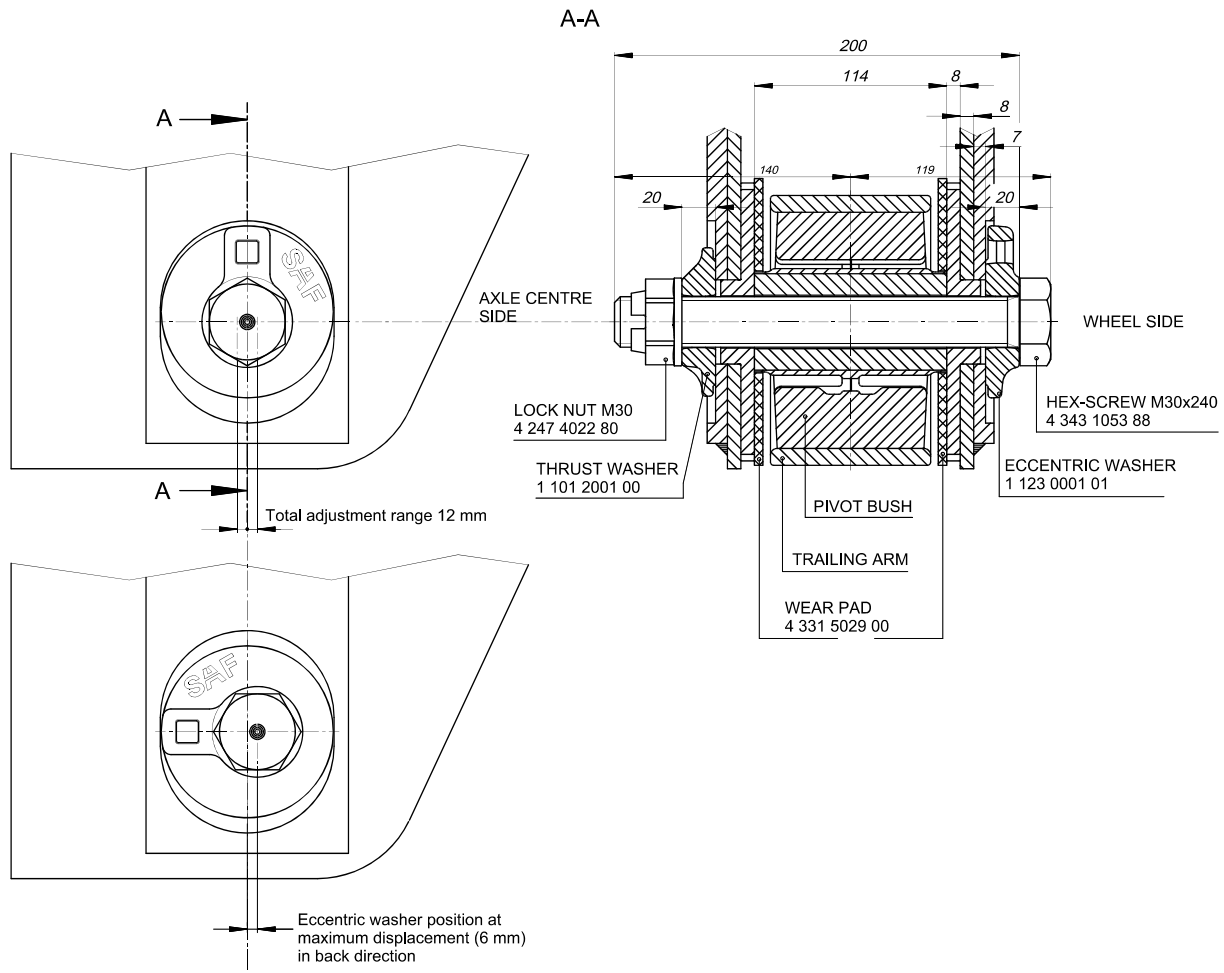
Illustration 2 183 0830 00

Symmetrical hanger brackets



Dimension		Hanger bracket number
BH [mm]	BL [mm]	
200	360	2 183 0829 00
250	385	2 183 0830 00
300	405	2 183 0831 00
350	430	2 183 0832 00

Adjustable pivot bolt for hanger bracket „aluminium“



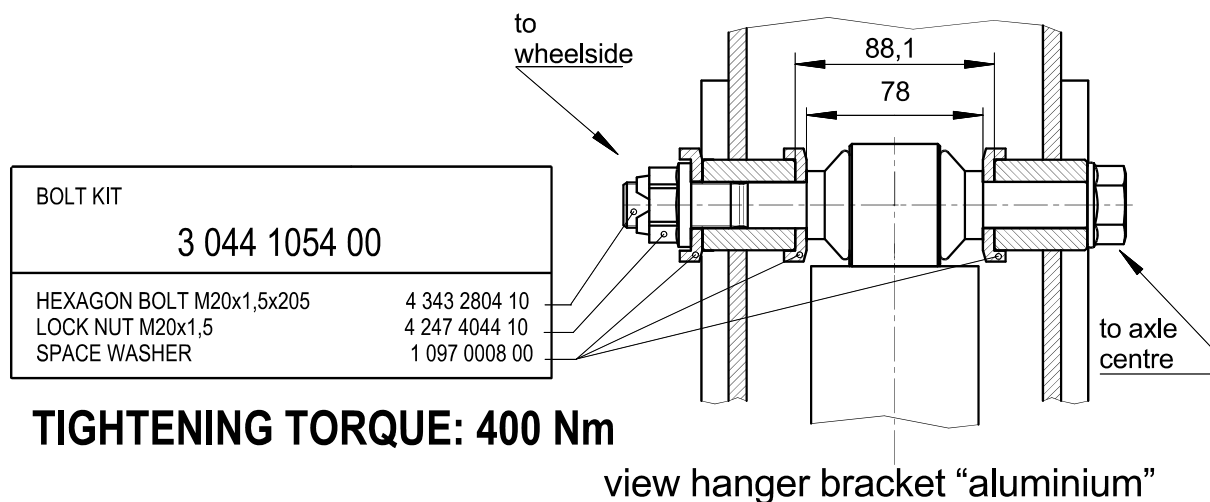
Ref.: 03 143 1011 00

Tightening torque: 400 Nm + 120°; tightening procedure Page 68

Attention:

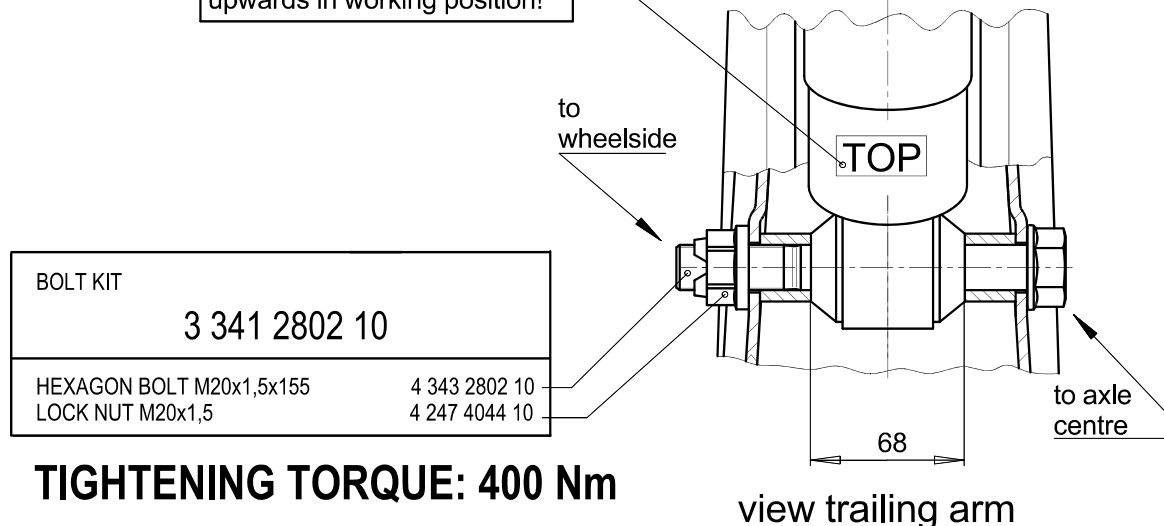
- Threads are not to be oiled or greased!
- Connections on hanger bracket „aluminium“ or stainless steel are not maintenance free! This needs to be checked after first 500 km, further checks every 6.000 km. Inspection torque 1200 Nm.

Shock absorber assembly: hanger bracket „aluminium“



Attention:
Screw connections at aluminium or stainless steel hanger brackets are not maintenance free! Service intervals see SAF – Operating and Servicemanuals.

Attention: Mark **TOP** facing upwards in working position!



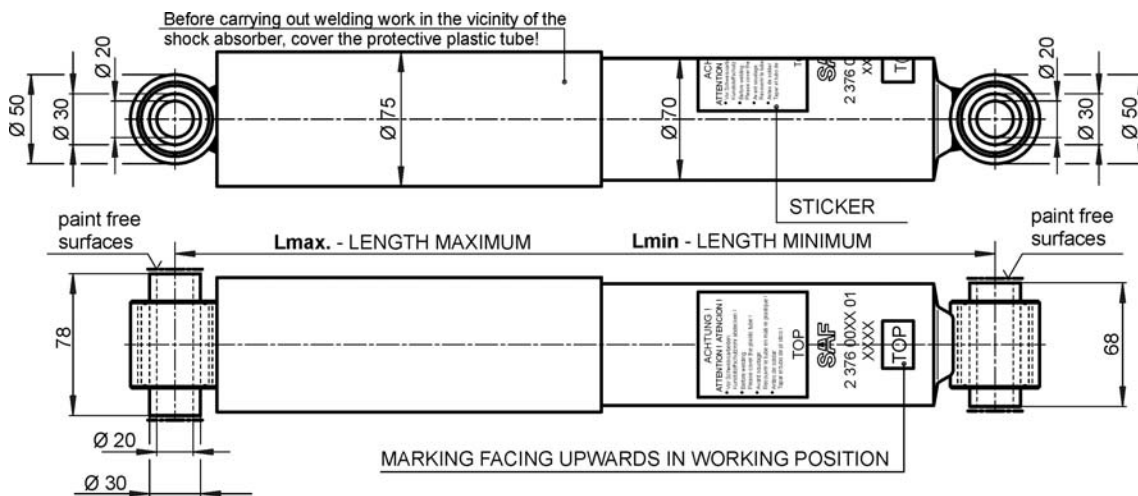
Ref.: 00 378 0029 00

Shock absorber overview

Technical details:

Shock absorber number		Lmax. [mm]	Lmin. [mm]	Stroke [mm]	USE WITH ENGRAVING "TOP" FACING UP
for Intra Standard	for Intra CD / UP				
2 376 0070 02	2 376 0084 00	410	281	129	
2 376 0071 02	2 376 0085 00	484	318	166	
2 376 0072 02	2 376 0086 00	532	342	190	
2 376 0073 02	2 376 0087 00	457	304,5	152,5	
	2 376 0088 00	447	297	150	
	2 376 0078 02	395	275	120	

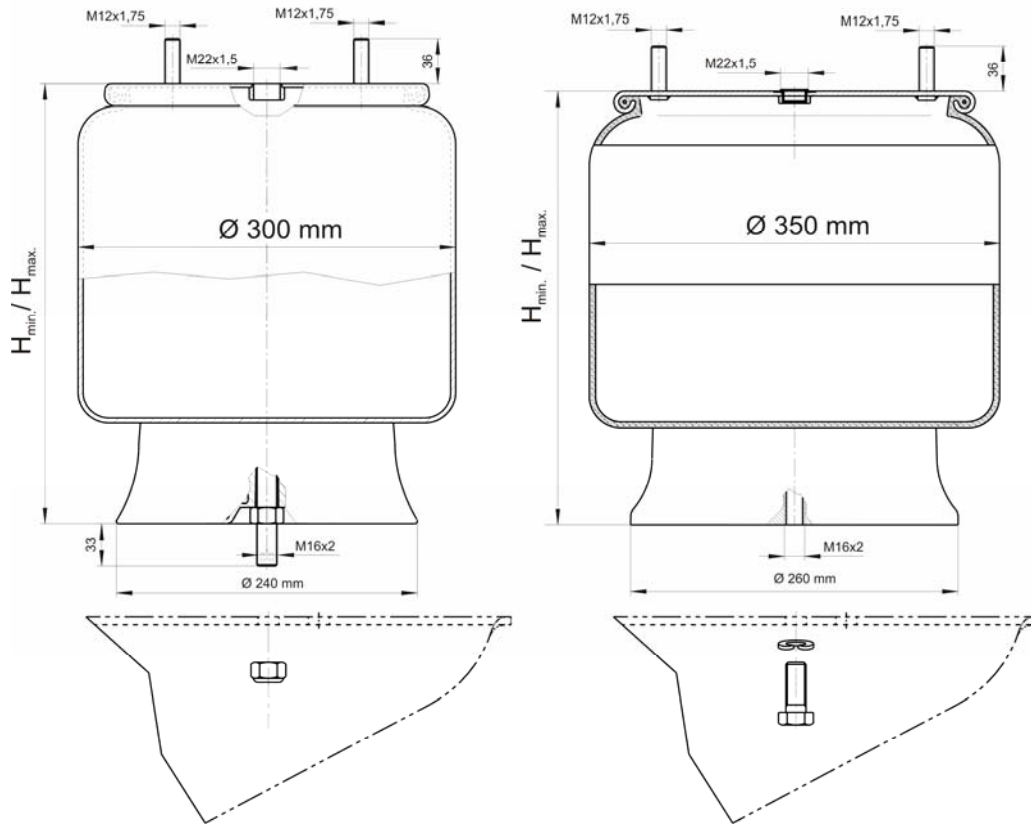
Attention: only install shock absorbers from the same manufacturer per axle!



Overview table with classification to air suspension type

Air suspension type	Shock absorber number		Air suspension type	Shock absorber number	
	Standard	CD		Standard	CD
IU25/2000 33	2 376 0070 02	2 376 0084 00	IU25/2000 42	2 376 0070 02	2 376 0084 00
IU28/2005 33	2 376 0070 02	2 376 0084 00	IU28/2005 42	2 376 0070 02	2 376 0084 00
IU30/2505 33	2 376 0071 02	2 376 0085 00	IU30/2505 42	2 376 0071 02	2 376 0085 00
IU33/2510 33	2 376 0071 02	2 376 0085 00	IU33/2510 42	2 376 0071 02	2 376 0085 00
IU35/3010 33	2 376 0071 02	2 376 0085 00	IU35/3010 42	2 376 0071 02	2 376 0085 00
IO35/2000 33	2 376 0071 02	2 376 0085 00	IO35/2000 42	2 376 0071 02	2 376 0085 00
IO37/2500 33	2 376 0071 02	2 376 0085 00	IO37/2500 42	2 376 0071 02	2 376 0085 00
IO40/2505 33	2 376 0072 02	2 376 0086 00	IO40/2505 42	2 376 0072 02	2 376 0086 00
IO42/3005 33	2 376 0071 02	2 376 0085 00	IO42/3005 42	2 376 0071 02	2 376 0085 00
IO45/3010 33	2 376 0072 02	2 376 0086 00	IO45/3010 42	2 376 0072 02	2 376 0086 00
IO47/3510 33	2 376 0071 02	2 376 0085 00	IO47/3510 42	2 376 0071 02	2 376 0085 00
IO50/3515 33	2 376 0072 02	2 376 0086 00	IO50/3515 42	2 376 0072 02	2 376 0086 00
IU29/2000 41	2 376 0070 02	2 376 0084 00	IU30/2000 47	2 376 0073 02	2 376 0087 00
IU31/2500 41	2 376 0071 02	2 376 0085 00	IU32/2500 47	2 376 0072 02	2 376 0086 00
IU34/2505 41	2 376 0071 02	2 376 0085 00	IU35/2505 47	2 376 0072 02	2 376 0086 00
IU36/3005 41	2 376 0071 02	2 376 0085 00	IU37/3005 47	2 376 0072 02	2 376 0086 00
IU39/3010 41	2 376 0071 02	2 376 0085 00	IU40/3010 47	2 376 0072 02	2 376 0086 00
IU42/3015 41	2 376 0072 02	2 376 0086 00	IU42/3510 47	2 376 0072 02	2 376 0086 00
IO44/3000 41	2 376 0072 02	2 376 0086 00	IO45/3000 47	2 376 0072 02	2 376 0086 00
IO49/3505 41	2 376 0072 02	2 376 0086 00	IO50/3505 47	2 376 0072 02	2 376 0086 00
			IU27/2000 47 V90	2 376 0073 02	2 376 0087 00

Air spring overview



Description	Article number - code:	Top view	Bottom view
2619V $H_{min} = 190 \text{ mm}$ $H_{max} = 560 \text{ mm}$ $\varnothing 300 \text{ mm}$ Plastic piston	3 228 1033 00 - 33		
2919V $H_{min} = 190 \text{ mm}$ $H_{max} = 560 \text{ mm}$ $\varnothing 350 \text{ mm}$ Plastic piston	3 228 1042 00 - 42		
2924V $H_{min} = 230 \text{ mm}$ $H_{max} = 675 \text{ mm}$ $\varnothing 350 \text{ mm}$ Plastic piston	3 228 1041 00 - 41		
2927V $H_{min} = 250 \text{ mm}$ $H_{max} = 795 \text{ mm}$ $\varnothing 350 \text{ mm}$ Plastic piston	3 228 1047 00 - 47		

All air spring with diameter $\varnothing 350$ also available with steel piston

Air spring for train loading

With the new SAF UP train loading system (air spring type 2619 UP) we offer the opportunity to operate the air suspension system for train loading without any extra parts.

Trailer operation:

driving condition

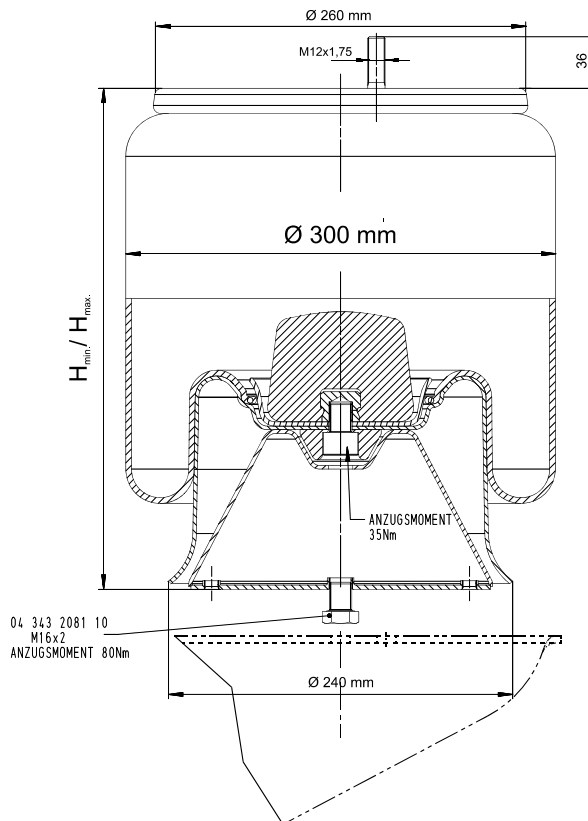


rail loading



In driving condition, an optimal load transmission occurs between the air spring and the trailing arm through the specially-designed support brackets at the interface points

When rail loading, the axle sinks down and is held by the shock absorber with bump stop. When the trailer is set down, the bellows and support brackets are joined again automatically and without creases.



Description	Article number - code:	Top view	Bottom view
2619UP Hmin = 190 mm Hmax = 560 mm $\varnothing 300\text{ mm}$ Piston and support bracket	3 228 1053 00 - 53		

The use of the SAF 2619 UP air spring can only be applied with the right shock absorber length to the used air suspension type. The needed shock absorber lengths can differentiate to the same air suspension type with 2619V air spring.
 In the table below, you will find an overview of the permitted air suspension types with the designated shock absorber version.


Air suspension type	Shock absorber [02 376]	Ride height range [mm]	X; overall height	
			Unladen without air [mm]	Laden without air [mm]
IU25/2000 53	0078 02	230-270	160	145
IU28/2005 53	0078 02	260-300	190	165
IU30/2505 53	0088 00	280-320	210	195
IU33/2510 53	0088 00	310-350	240	225
IU35/3010 53	0088 00	330-370	260	245

Air suspension type	Shock absorber [02 376]	Ride height range [mm]	X; overall height	
			Unladen without air [mm]	Laden without air [mm]
IO37/2500 33	0085 00	355-395	285	270
IO40/2505 33	0085 00	385-425	315	300
IO42/3005 33	0085 00	405-445	335	320
IO45/3010 33	0085 00	435-475	365	350
IO47/3510 33	0085 00	455-495	385	370
IO50/3515 33	0085 00	485-525	415	400

Further variants on request.

Calculation of clearance between tire and air spring

The calculated clearance is the distance between tire and air spring. This must be at least **25 mm**.

Calculation formula: 

$$\text{Clearance} = \frac{AX - LM - \text{air bag diameter} - \text{tyre width}}{2} + V - ET$$

Example 1:

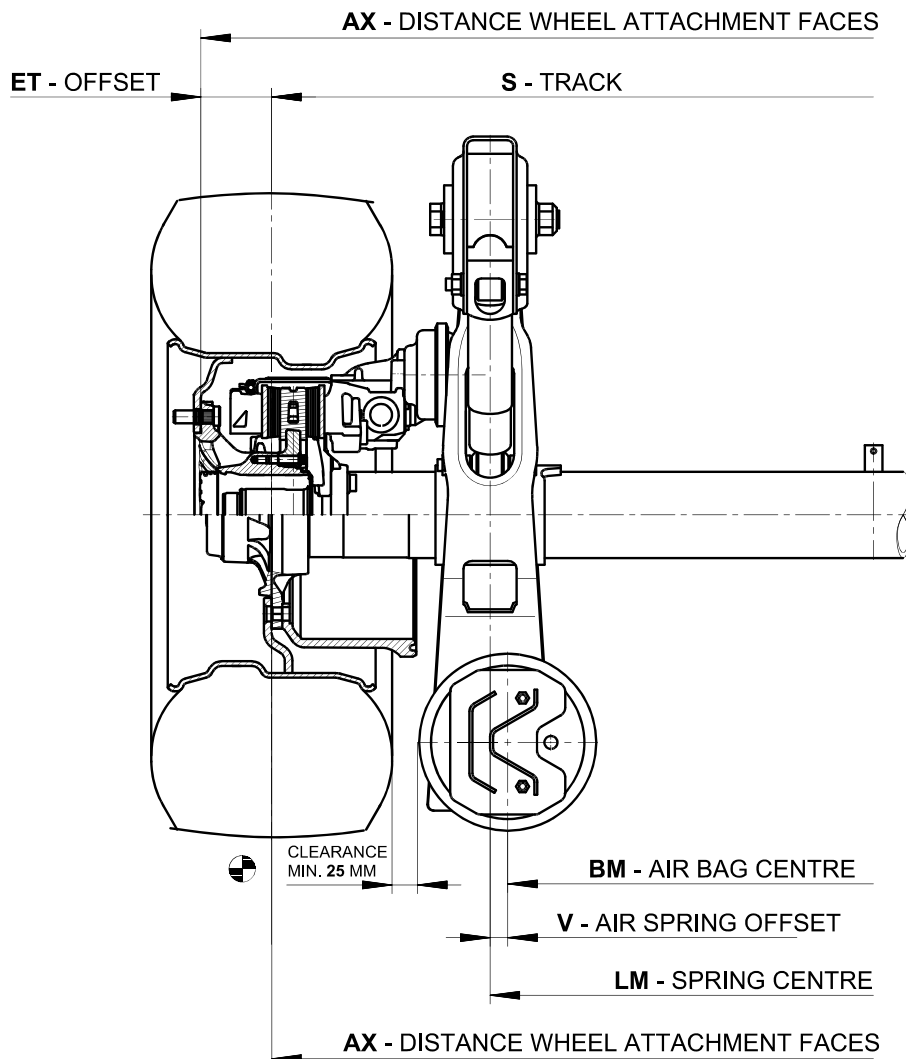
IO35/2000 33 S9-4218
 distance wheel attachment faces: 2040 mm
 spring centre 1300 mm
 air spring diameter 300 mm
 mounted tire 385/65R22,5"
 (E.T.R.T.O Norm 405 mm)
 air spring offset 30 mm
 offset 0 mm

$$\frac{2040 - 1300 - 300 - 405}{2} + 30 - 0 = 47,5 \text{ mm}$$

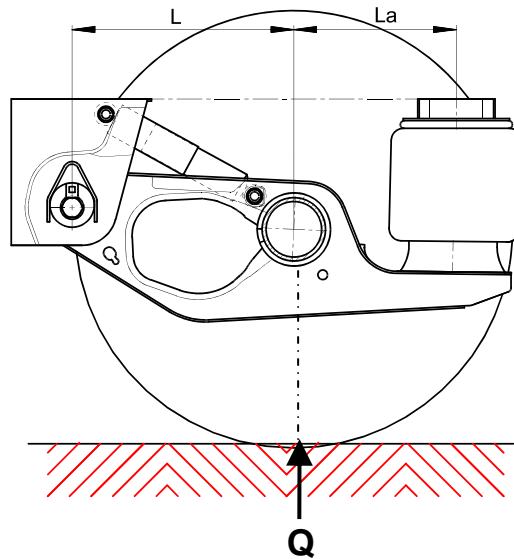
Example 2:

IU34/2505 41 BI9-19W
 distance wheel attachment faces: 2330 mm
 spring center 1300 mm
 air spring diameter 350 mm
 mounted tire 425/55R19,5"
 (E.T.R.T.O Norm 438 mm)
 air spring offset 30 mm
 offset 120 mm

$$\frac{2330 - 1300 - 350 - 438}{2} + 30 - 120 = 31 \text{ mm}$$



Calculation of the air spring pressure



Formula to calculate the air pressure when fully laden:

$$P = \frac{(Q - A) \cdot i \cdot p}{2} \cdot 10^5 \text{ Pa} \quad (1 \text{ bar} = 10^5 \text{ N/m}^2 = 10^5 \text{ Pa} = 0,1 \text{ MPa})$$

P = air pressure in the air spring [Pa]

Q = permissible axle load on the ground [kg]

A = unsprung mass [kg]

i = ratio
$$i = \frac{L}{L + La}$$

p = air pressure in the air spring per kg load

air spring Ø 300mm (SAF 2619V)

air spring Ø 350mm (SAF 2919V / 2924V / 2927V)

$$p = 0,00244 \cdot 10^5 \text{ Pa/kg}$$

$$p = 0,00187 \cdot 10^5 \text{ Pa/kg}$$

Example with air suspension type IU30/2505 33 (air spring SAF 2619V)

Q = 9000 kg,

A = 750 kg

L = 500 mm , La = 385 mm

$$i = \frac{500}{500 + 385} = 0,565$$

$$p = 0,00244 \cdot 10^5 \text{ Pa/kg}$$

$$P = \frac{(9000 - 750) \cdot 0,565 \cdot 0,00244}{2} \cdot 10^5 \text{ Pa}$$

$$\underline{P = 5,69 \cdot 10^5 \text{ Pa}}$$

Formula to calculate the air pressure when partially loaded:

$$P_t = \frac{(Q_t - A) \cdot i \cdot p}{2} \cdot 10^5 \text{ Pa}$$

Q_t = axle load on the ground when partially loaded

Example with air suspension type IU30/2505 33 (air spring SAF 2619V)

Q_t = 2100 kg,

A = 750 kg

L = 500 mm , La = 385 mm

$$i = \frac{500}{500 + 385} = 0,565$$

$$p = 0,00244 \cdot 10^5 \text{ Pa/kg}$$

$$P_t = \frac{(2100 - 750) \cdot 0,565 \cdot 0,00244}{2} \cdot 10^5 \text{ Pa}$$

$$\underline{P_t = 0,93 \cdot 10^5 \text{ Pa}}$$

Force-pressure-diagram

The shown air pressure line in the diagramm (force-pressure-diagramm) shows the force-pressure-values of an ideal adjusted air suspension.

This can be influenced as follow:

- Utilization of the total ride height range, thereby changing the ratio i and the air spring length
- Anomaly of the real unsprung mass caused by different suspension types, wheels and tires
- Anomaly of the effective area of the air spring caused by the angled position (depending on the air suspension type)

Therefore we recommend for the adjusting of the EBS – installation a inspection to compare both values (theoretically and measured) to achieve a optimized utilization of suspension- and brake-characteristics.

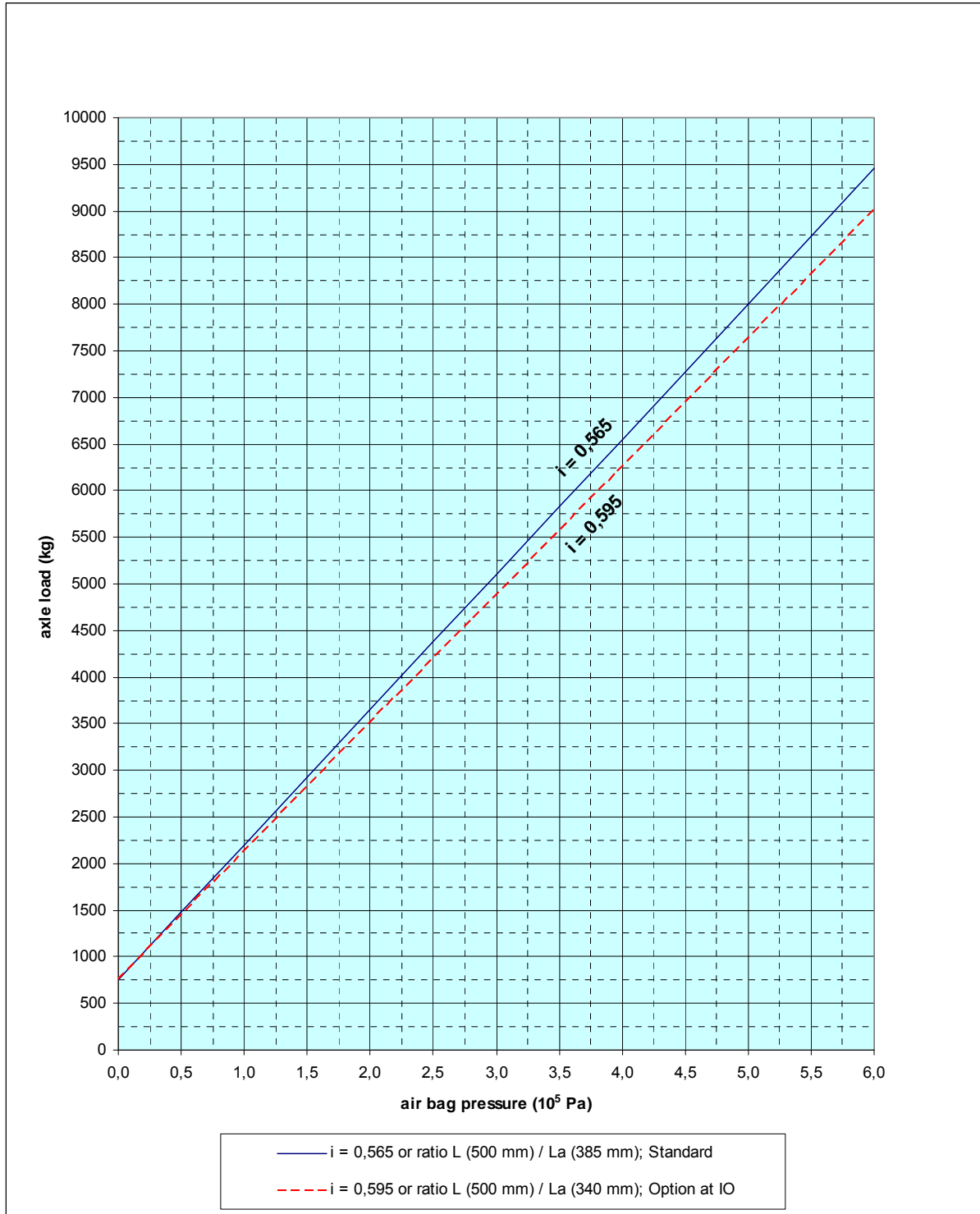
Possible inspection method:

1. position trailer on even ground
2. connect the air pressure gauge to the test-outlet of the carrying air spring
3. measurement to be done with unladen trailer
4. put the, to be measured axle, on a scale
5. measure the weight of the axle
6. read out of the air pressure in the air spring
7. compare the measured values with the values at the force-pressure diagram
8. if necessary EBS values needs re-adjusting to the measured values
9. conduct measurement with a partial- and full-load
10. repeat steps 4 – 8 for all carrying air springs

It is assumed that all measuring instruments are calibrated

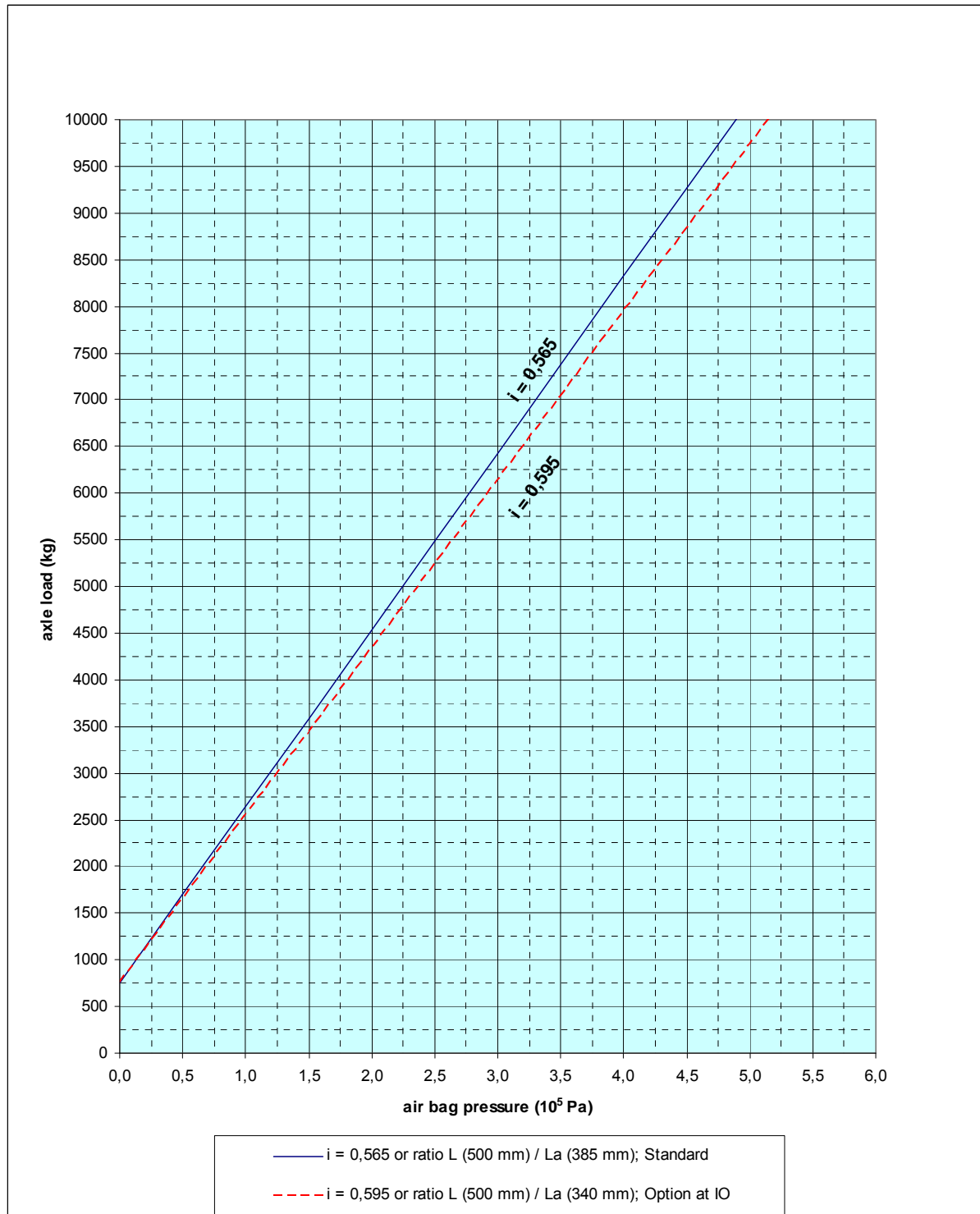
Force-pressure-diagram for air spring with diameter 300 mm

**Air spring: SAF 2619V (33)
SAF 2619UP (53)**



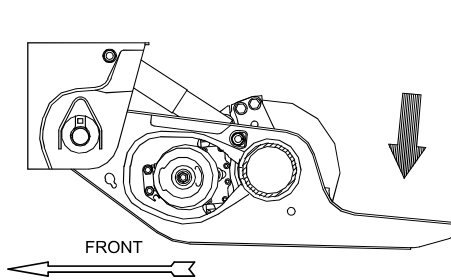
Force-pressure-diagram for air spring with diameter 350 mm

**Air springs: SAF 2919V (42)
 SAF 2924V (41)
 SAF 2927V (47)**

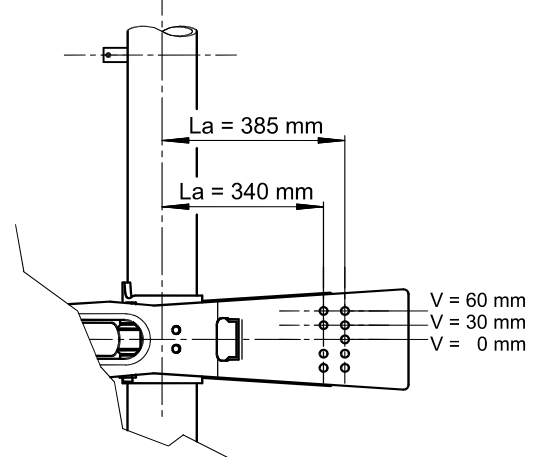
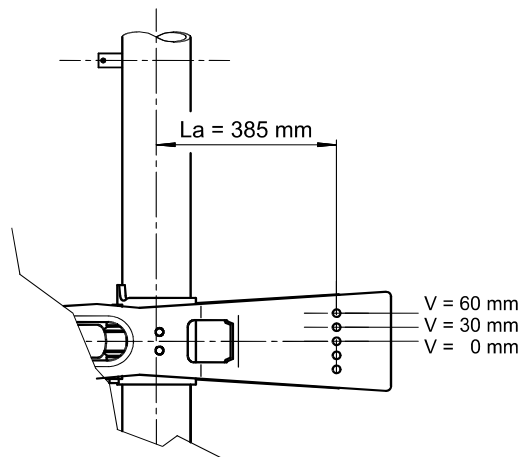
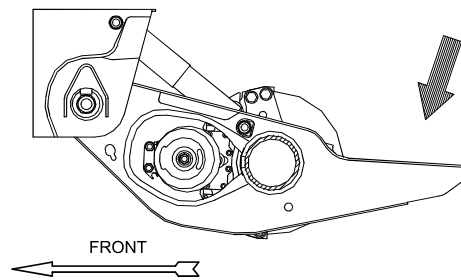


Air spring fixing / trailing arm – air spring

trailing arm IU



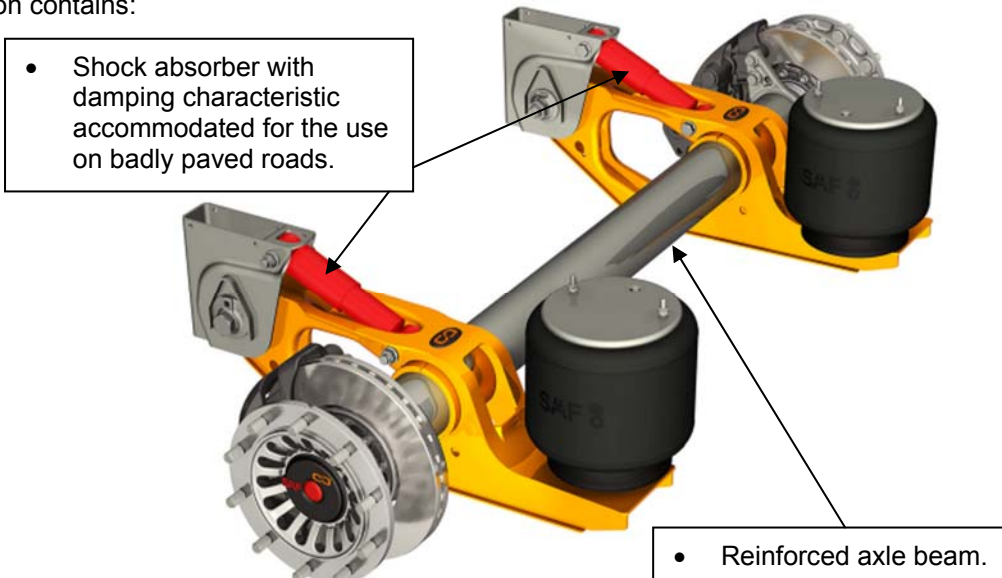
trailing arm IO



Custom Design Version

The INTRADISC *plus INTEGRAL* or INTRADRUM air suspension are also available as reinforced version named CD version. This version is preferably used for heavy application, for example off-road, and for trailers with torsionally stiff bodies as in tippers, pavers, tipping silo- and moving floor trailers, furthermore for trailers, which come to be used out of the “geographical” areas as named in our Guaranty of Competence.

The CD version contains:



The additional weight to the standard version is about 10 kg for rigid axles and for self-steering axles (B(I)L9..) about 24 kg

Overview air spring brackets

Standard air spring bracket „steel“

article number:		H [mm]	
primed	non-primed		
2 237 0081 01	2 237 0081 91	50	
2 237 0080 01	2 237 0080 91	100	
2 237 0082 01	2 237 0082 91	150	

air spring bracket „steel“ – screw-on

article number:	H [mm]			
2 237 1081 01	55			
2 237 1080 01	105			
2 237 1082 01	155			

	at V:	at position .. and / or ..
	0	1 / 6
	30	3 / 7
	55	4 / 2
	60	5 / 2

example V = 30, pos. 3 and 7.

Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

Surface treatment of SAF-HOLLAND components

Corrosion protection of SAF-HOLLAND products:

To achieve a ideal corrosion protection on SAF-HOLLAND products, we use the following different coating methodes:

Cathodic dip coating (KTL):

Features:

- Complete corrosion protection in all areas of the component.
- High surface hardness with uniform coat thickness.
- Recoatable with all single-component or 2-component top coats.
- Coat thickness is max. **45** µm.
- Min. **504 h.** salt spray test according to DIN EN ISO 9227.

Application example: trailing arm, axle beam.

Cathodic dip coating (KTL) thin layer:

Features:

- Complete corrosion protection in all areas of the component.
- High surface hardness with uniform coat thickness.
- Recoatable with all single-component or 2-component top coats.
- Coat thickness is max. **20** µm.
- Min. **200 h.** salt spray test according to DIN EN ISO 9227.

Application example: wheelhub

Dip coating:

Features:

- Complete corrosion protection in all areas of the component.
- Recoatable with all single-component or 2-component top coats.
- Coat thickness is max. **30** µm.
- Min. **100 h.** salt spray test according to DIN EN ISO 9227.

Application example: hanger bracket

Zinc-flake coating (Cr(VI)-free types):

Features:

- High quality corrosion protection for threaded fastening elements.
- Suitable for high-strength bolting elements.
- Adjustable friction coefficient for a reliable screwing process.
- Min. **480 h.** salt spray test according to DIN EN ISO 9227.

Application example: pivot bolt mounting, disc brake mounting.

Recommendation for users:

- In principle, dip coating can be welded over. SAF-HOLLAND recommends, however, that these coats needs to be removed in the area of weld seams.
- All contact surfaces of the pivot bolts and shock absorbers bolts are not allowed to have additional primer or paint coatings.
- Wheel attachment faces are not allowed to be painted. The wheel attachment face must be clean and free of grease. In general the remarks of the wheel manufactures needs to be followed.

Two sided axle lift

We recommend a minimum of 100 mm lift travel when setting the ride height.

- Not suitable for 19,5" tires due to insufficient ground clearance.
- No installation possible together with "splitter" for train loading by crane.

Calculation of clearance between lift air spring and tire

The clearance must be at least 25 mm.

Formula:

$$\frac{AX - LM - \text{max. tire width} - 270}{2} - ET = \text{clearance}$$

Example with: IU25/2000 33 BI9-22K01

- distance wheel attachment faces: 2280 mm
- spring centre: 1300 mm
- tire width (max.): 405 mm
(E.T.R.TO. Norm for tire size 385/65R22,5")
- lift air spring diameter max. 270 mm
- offset 120 mm

$$\frac{2280 - 1300 - 405 - 270}{2} - 120 = \text{clearance} = 32,5 > 25$$

New type for hanger bracket "Steel"*

Kitnumber:	application	Weight [kg per axle]
3 027 1278 01	for hanger bracket „steel“	21

* replaces 3 027 1278 00

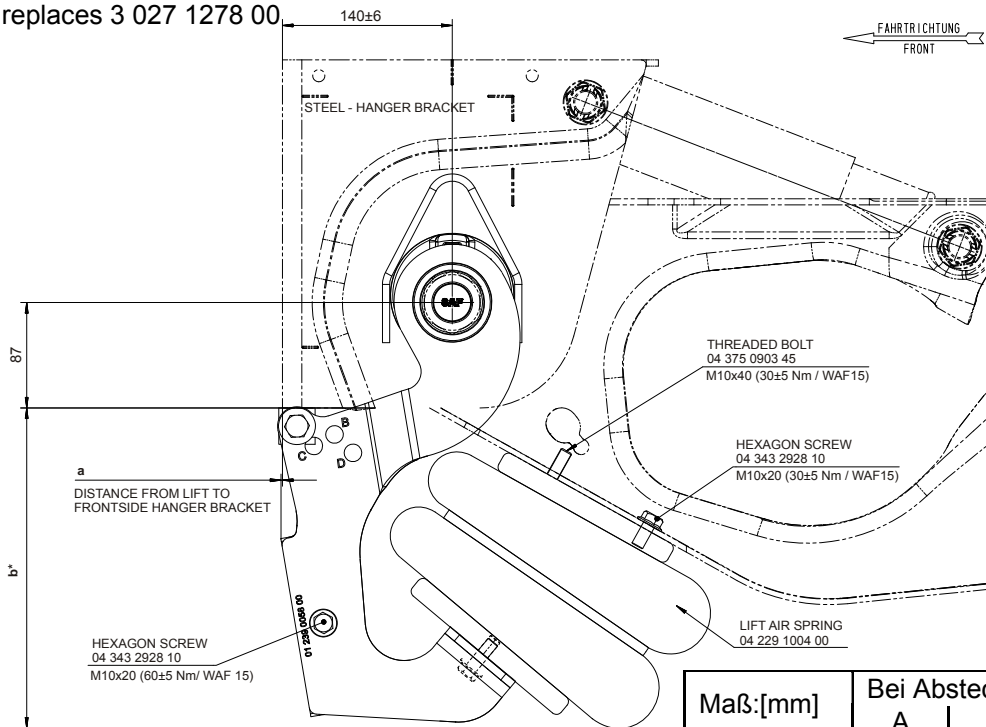
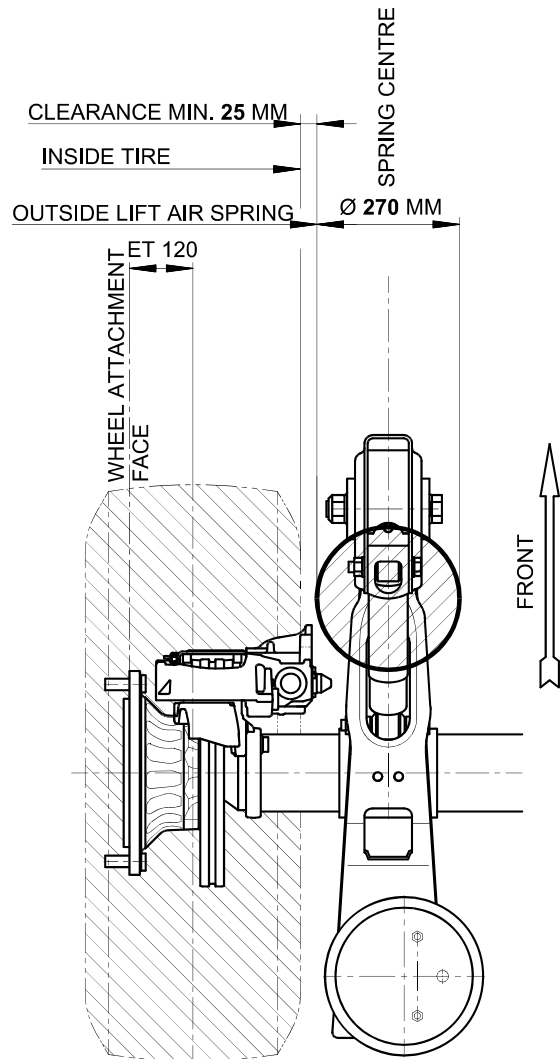


Illustration for hanger bracket "steel" – 3 027 1278 01

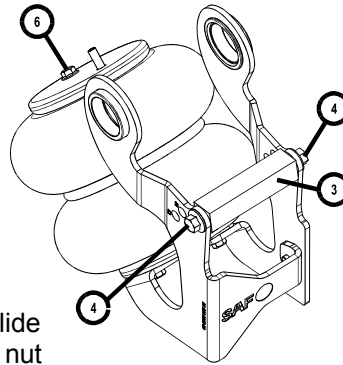


Maß:[mm]	Bei Absteckposition:			
	A	B	C	D
a (±6mm)	5	15	30	55
b	270	280	285	290

Installation instruction

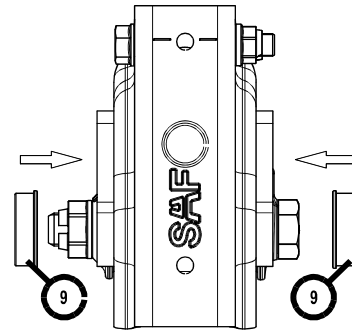
Installation of the lift:

1. Demount support bar (3) with hexagon screws (4), and demount hexagon screw (6) on lift air bag .

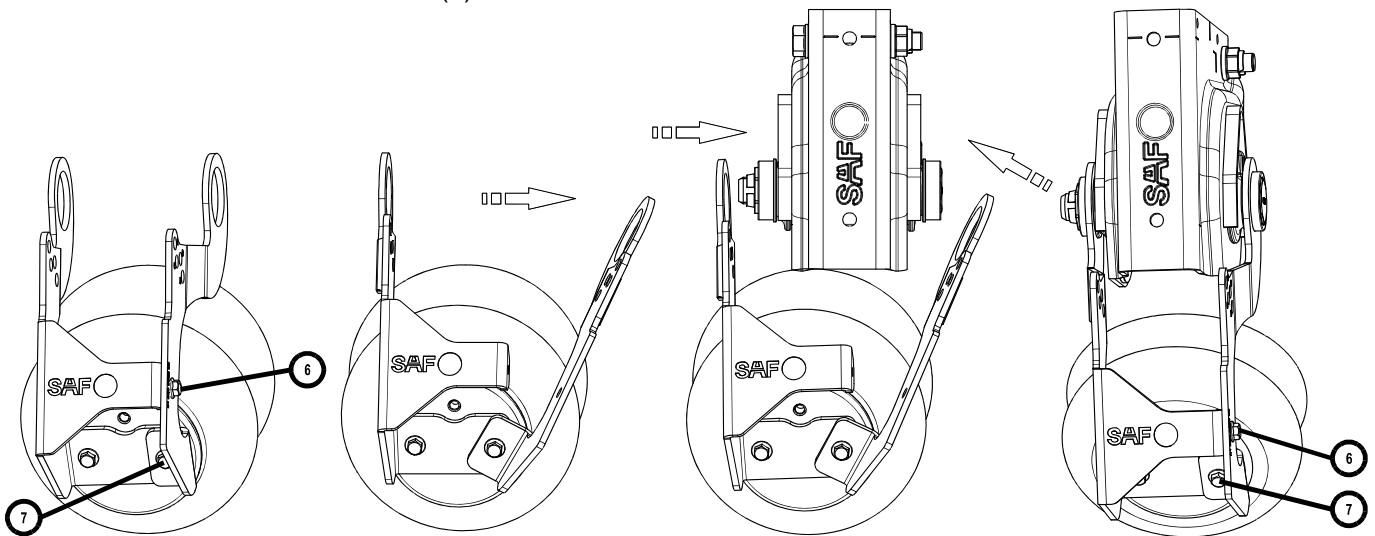


2. Remove cable straps. Slide one washer(9), over the nut against the thrust washer and one over the bolt head of the pivot bolt mounting against the eccentric washer.

Attention! The shoulder of the washer is towards the sides of the hanger bracket.



3. Demount hexagon screws (6), loosen up the hexagon screw (7), push the lift arm outwards and slide them over the washers (9).

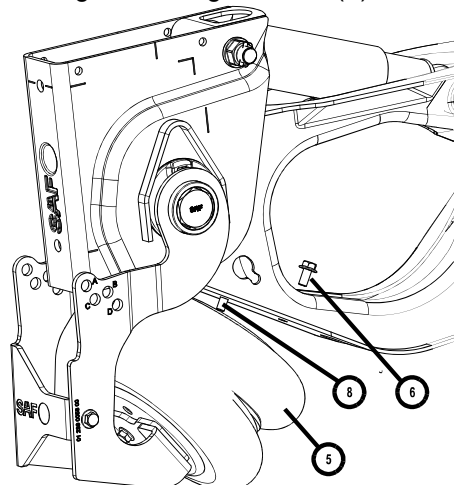


4. Tighten hexagon screw (6), **Tightening torque 60 Nm/ WAF15** and tighten hexagon screw (7), **Tightening torque 30 Nm/ WAF15**

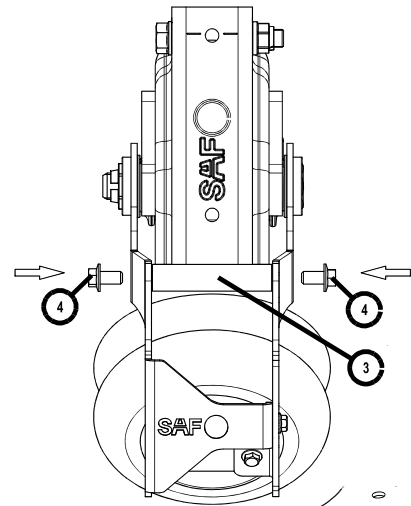
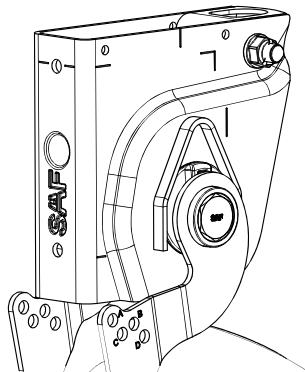
5. Position the lift air bag (5) at the trailing arm by threaded bolt (8). And fixate by the hexagon screw (6) from the inside of the trailing arm. **Tightening torque 30 Nm/ WAF15**

Attention!

Because of the accessibility to the screw (6) please, consider the position of the brake chamber!

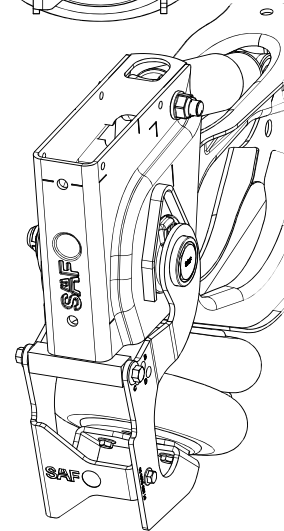


6. Take the required position (**Pos.**) as described from the [Table](#). Mount the support bar (**3**) in a horizontal position against the bottom of the hanger bracket with the hexagon screws(**4**).
Tightening torque 120 Nm/ WAF18



Installation instruction

- Positioning (Pos.)**
 The lift needs to be adjusted to every air suspension type (combination of trailing arm, hanger bracket, air spring and air spring bracket). The adjustment is done by positioning the support bar between the lift arms. This position (**pos.**) can be taken out of the table below.
- Installation required space in front of the hanger bracket (a)**
 Depending on the **pos.**, you'll find different sizes for the required space in front of the hanger bracket. These can be taken from the Table below (**a**). The +/- 6 (mm) need to be taken in consideration because of the adjusting of the pivot bearing (axle alignment).
- Ground clearance (b)**
 Depending on the **pos.**, you'll find different sizes for the ground clearance. These values can be taken from the Table below (**b**).



Air suspension type	Pos.	a [mm]	b [mm]
IU25/2000 33	A	5 ±6	270
IU28/2005 33	B	15 ±6	270
IU30/2505 33	A	5 ±6	270
IU33/2510 33	B	15 ±6	270
IU35/3010 33	A	5 ±6	270
IO35/2000 33	D	55 ±6	285
IO37/2500 33	C	30 ±6	285
IO40/2505 33	D	55 ±6	285
IO42/3005 33	C	30 ±6	285
IO45/3010 33	D	55 ±6	285
IO47/3510 33	C	30 ±6	285
IO50/3515 33	D	55 ±6	285
IU29/2000 41	B	15 ±6	270
IU31/2500 41	A	5 ±6	270
IU34/2505 41	B	15 ±6	270
IU36/3005 41	A	5 ±6	270
IU39/3010 41	B	15 ±6	270
IU42/3015 41	C	30 ±6	270
IO44/3000 41	C	30 ±6	285
IO49/3505 41	C	30 ±6	285

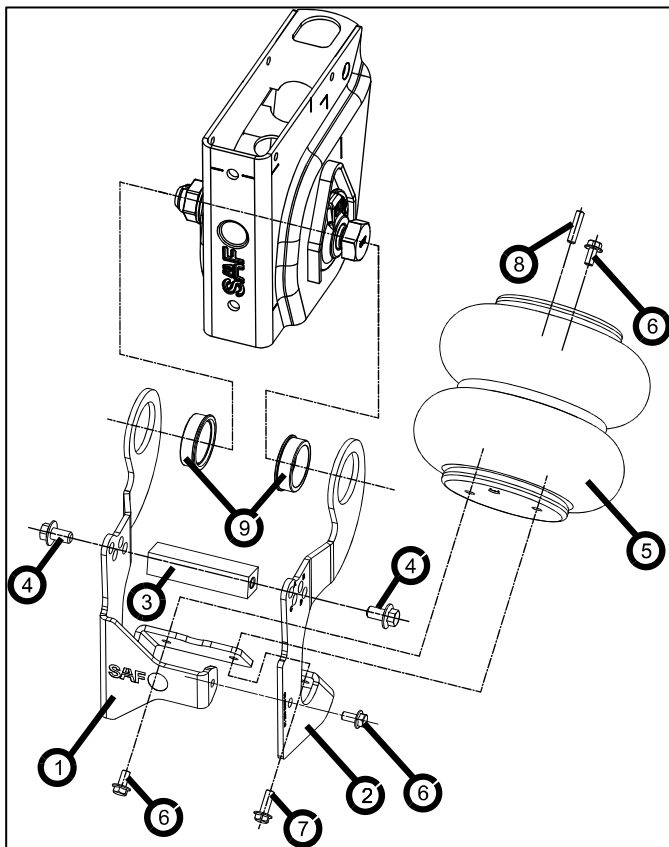
Air suspension type	Pos.	a [mm]	b [mm]
IU25/2000 42	A	5 ±6	270
IU28/2005 42	B	15 ±6	270
IU30/2505 42	A	5 ±6	270
IU33/2510 42	B	15 ±6	270
IU35/3010 42	A	5 ±6	270
IO35/2000 42	D	55 ±6	285
IO37/2500 42	C	30 ±6	285
IO40/2505 42	D	55 ±6	285
IO42/3005 42	C	30 ±6	285
IO45/3010 42	D	55 ±6	285
IO47/3510 42	C	30 ±6	285
IO50/3515 42	D	55 ±6	285
IU30/2000 47	C	30 ±6	285
IU32/2500 47	B	15 ±6	280
IU35/2505 47	C	30 ±6	285
IU37/3005 47	B	15 ±6	280
IU40/3010 47	C	30 ±6	285
IU42/3510 47	B	15 ±6	280
IO45/3000 47	D	55 ±6	290
IO50/3505 47	D	55 ±6	290
IU27/2000 47 V90	B	15 ±6	280

Further variants on request!

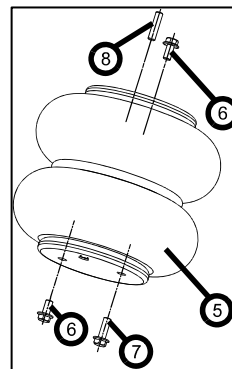
Kit-content for two sided lift, hanger bracket „steel“:

Per axle are two kits needed.

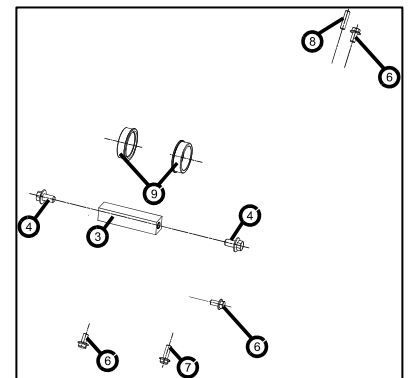
kitnumber:			complete – 3 027 1278 01	Lift air spring – 4 229 1004 00	Lift air spring group – 3 228 1004 01	Liftarmkit – 3 239 0059 00	Mounting parts group – 3 044 1074 01
	Article number.	Pos.	Per kit	Per kit	Per kit	Per kit	Per kit
	Liftarm left	(1)	1x			1x	
	Liftarm right	(2)	1x			1x	
	Support bar	(3)	1x			1x	1x
	Hexagon screw with flange M14 + ESLOCK	(4)	2x			2x	2x
	Lift air spring	(5)	1x	1x	1x		
	Hexagon screw with flange M10x1,5x20	(6)	3x		2x		3x
	Hexagon screw with flange M10x1,5x30	(7)	1x		1x		1x
	Threaded bolt	(8)	1x		1x		1x
	Washer	(9)	2x			2x	2x



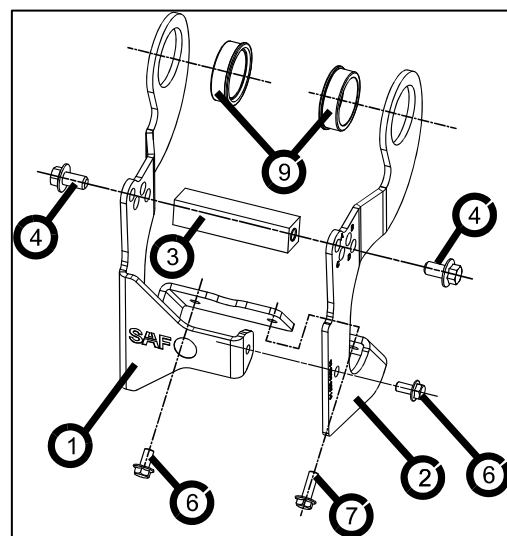
3 027 1278 01



3 228 1004 01



3 044 1074 01



3 239 0059 00

Types for hanger bracket „aluminium“ and cross member

Following versions are obtainable:

kitnumber:	application	weight [kg per axle]
3 027 1243 01	for crossmember	25
3 027 1244 01	for hanger bracket „aluminium“	25

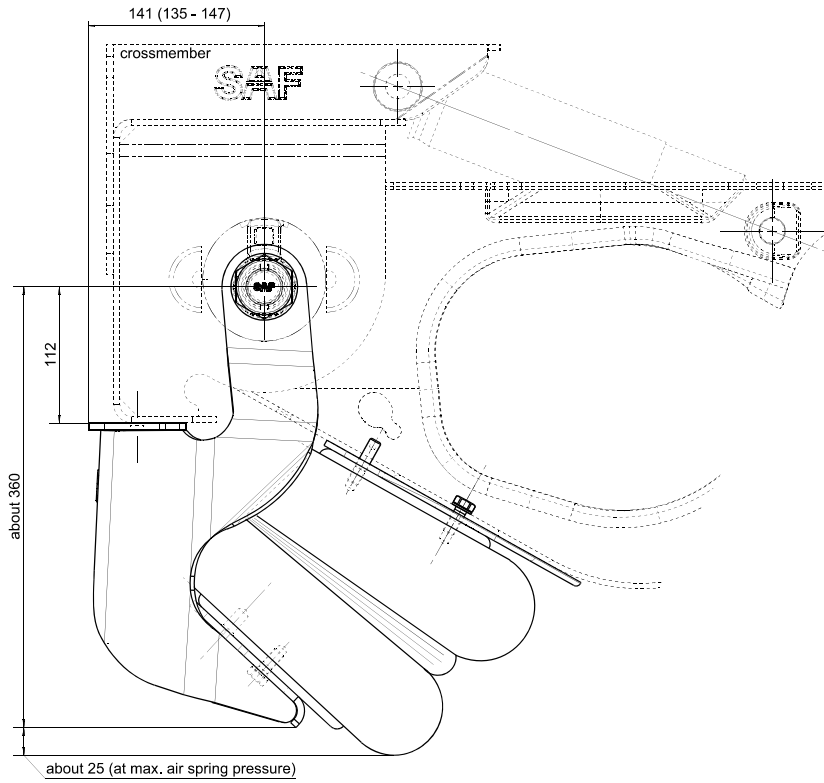


Illustration for „crossmember“ – 3 027 1243 01

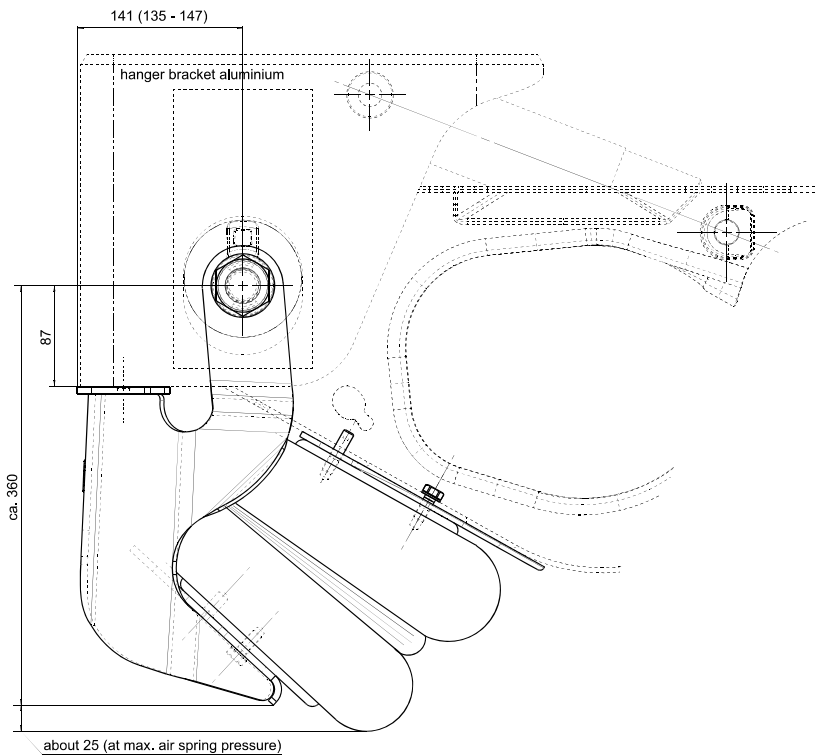
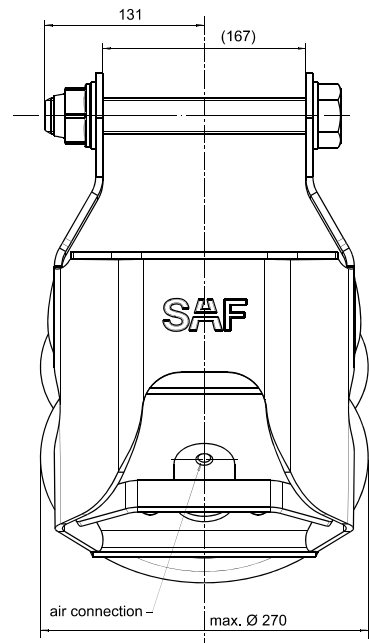
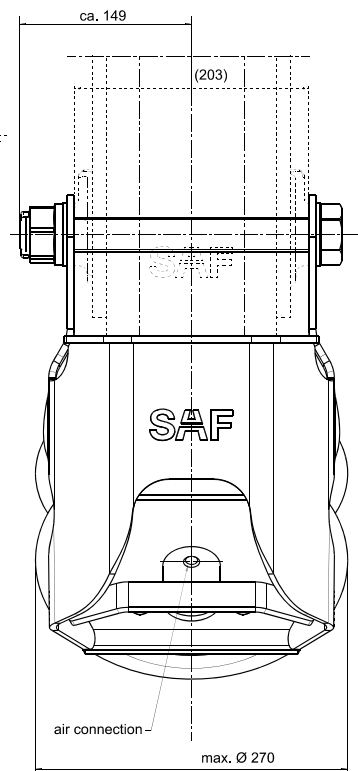


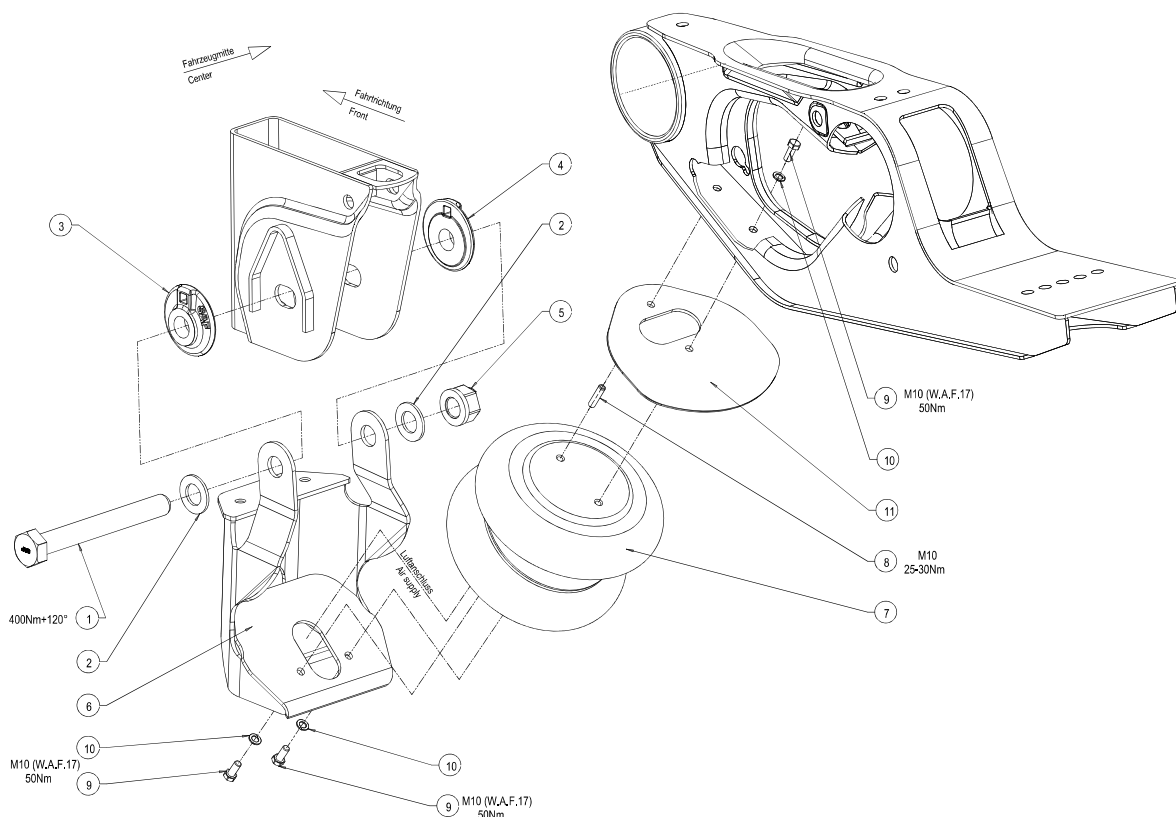
Illustration for hanger bracket „aluminium“ – 3 027 1244 01



Kit-content for crossmember and hanger bracket "aluminium"

Per axle are two kits needed.

	cross member	hanger bracket "aluminium"	pos.	per kit
kitnumber:	3 027 1243 01	3 027 1244 01		
liftarm	2 239 0040 00	2 239 0038 00	(6)	1x
hexagon screw	4 343 1085 88	4 343 1049 88	(1)	1x
lock nut		4 247 4022 80	(5)	1x
lift air spring		4 229 1005 01	(7)	1x
protection plate	1 336 0003 00		(11)	1x
washer	1 331 0117 00		(2)	2x
hexagon screw		4 343 1006 88	(9)	3x
spring washer		4 141 0002 00	(10)	3x
threaded bolt		4 375 0903 45	(8)	1x



Installation instruction

Installation of the lift arm:

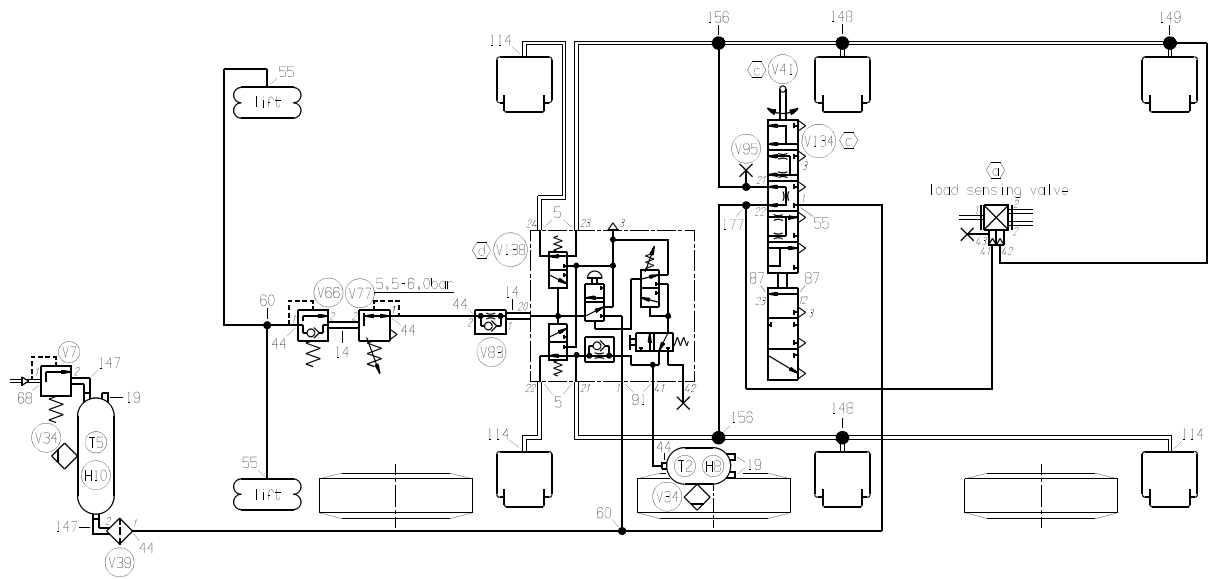
- ✓ Remove the existing pivot bolt mounting. Eccentric washer (3) and thrust washer (4) re-use.
- ✓ Position the lift arm (6) over the hanger bracket or cross member.
- ✓ Mount the pivot bolt according to the illustration. Use the hexagon screw (1), washers (2) and lock nut (5) new from the kit. Washers (3) and (4) of the demounting.
- ✓ **Important: the pivot bolt must be tightened according to the SAF-HOLLAND torque regulations in the ride height. (400Nm + 120°, see page 68)**

- ✓ Fix the lift air spring (7) from underneath with two bolts enclosed (9) and washers (10) to the lift arm. **Tightening torque 50 Nm**
- ✓ The air connection of the lift air spring **must**, point downwards to the lift arm (6), as illustrated.
- ✓ Screw the threaded bolt (8) to the upper spring plate as illustrated (positioning nearest to the pivot bolt). **Tightening torque 25-30 Nm**
- ✓ Lift air spring (7) and protection plate (11) are locked by the threaded bolt (8) to the trailing arm. And fixed with bolt (9) as well as the washer (10) from the inner side of the trailing arm. **Tightening torque 50 Nm**

Installation of the lift air spring:

Circuit diagram

Triaxle with two-side lift with lift axle control valve (pneumatically operated)



remarks to index no. ① spot our delivery volume (. 99) ② mounted to middle axle ③ adjustment according to air bag pressure diagram	explanations — tube 8x1 — tube 12x1,5 connexion designation at valve fitting 4 424 0068 00	valve 4 425 0007 00 fitting 4 424 0068 00
		according to DIN 91 all rights reserved !
00 53 34 4 01 4		2004 designed checked

Part list of
00 53 34 4 01 4
contains:

03 424 0019 00
03 424 0021 00
03 424 0010 00
03 424 0011 00

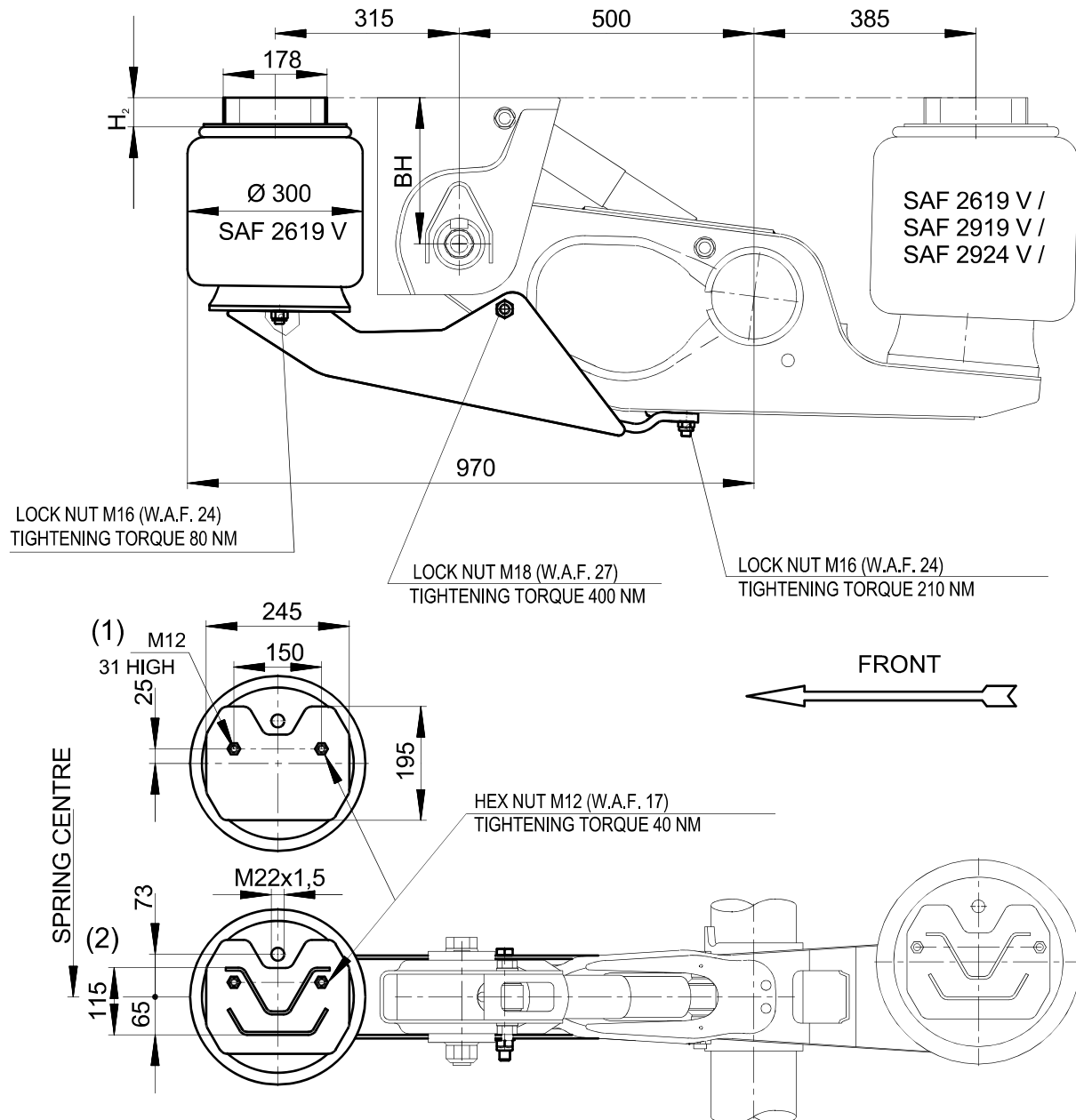
**Max. lif air spring pressure 6,0 bar;
residual pressure 0,5 bar!**

Partnumber	Quantity	Description	Dimensionen
4.424.0005.40	4	STRAIGHT MALE STUD COUPLING	M16x1,5/D12
4.424.0014.40	2	DOUBLE CONNECTOR WITH LOCK NUT	M22x1,5
4.424.0019.40	1	MALE PLUG	M22x1,5
4.424.0044.40	1	STRAIGHT MALE STUD COUPLING	M22x1,5/D8
4.424.0055.40	1	MALE STUD ELBOW COUPLING	M12x1,5/D8
4.424.0060.40	1	EQUAL TEE COUPLING	D8/8/8
4.424.0068.40	1	STRAIGHT MALE STUD COUPLING	M22x1,5/D12
4.424.0087.40	2	MALE PLUG	M16x1,5
4.424.0091.40	2	STRAIGHT MALE STUD COUPLING	M16x1,5/D8
4.424.0114.40	3	MALE STUD ELBOW COUPLING	M22x1,5/D12
4.424.0147.40	2	ELBOW WITH LOCK NUT	M22x1,5
4.424.0148.40	2	MALE STUD TEE COUPLING	M22x1,5/D12/D12
4.424.0149.40	1	MALE STUD TEE COUPLING	M22x1,5/D12/D8
4.424.0156.40	2	EQUAL TEE COUPLING	D12/8/12
4.424.0177.40	1	MALE STUD TEE COUPLING	M12x1,5/D8
V 4.425.0007.00	1	CHARGING VALVE WITHOUT RETURN FLO	M22x1,5
V 4.425.0034.40	1	DRAIN VALVE	M22x1,5
V 4.425.0039.00	1	LINE FILTER	M22x1,5
V 4.425.0041.00	1	LINK CONNECTION FOR LEVELLING VALVE	M8/D6
V 4.425.0066.00	1	CHARGING VALVE WITH RETURN FLOW 0	M22x1,5
V 4.425.0077.00	1	PRESSURE LIMITING VALVE 1,8 BAR	M22x1,5
V 4.425.0083.00	1	CHECK VALVE CONSTANT THROTTLING D1	M22x1,5
V 4.425.0095.00	1	STRAIGHT MALE STUD COUPLING WITH T	M12x1,5/D8
V 4.425.0134.00	1	LEVELLING VALVE	M12x1,5/M16x1,5
V 4.425.0138.00	1	LIFT AXLE CONTROL VALVE	M16x1,5/M22x1,5
T 4.105.0002.00	1	AIR RESERVOIR 10 LTR	D206x355
T 4.105.0008.00	1	AIR RESERVOIR 60 LTR	D310x880
H 4.405.0008.00	2	HOLDER (AIR RESERVOIR) 10/20 LTR	D206
H 4.405.0010.00	2	HOLDER (AIR RESERVOIR) 40/60 LTR	D310

One-side axle lift

We recommend a minimum of 100 mm lift travel when setting the ride height.
Suitable for steering axles.

Axle lift can be mounted on the left or right hand side. Lift air spring offset is not permissible.



air suspension type		BH	H ₂	article no.	weight complete
IU../20.. XX	IO../20.. XX	200	5	3 027 1257 00	approx. 30,5 kg
IU../25.. XX	IO../25.. XX	250	50	3 027 1258 00	approx. 31,4 kg
IU../30.. XX	IO../30.. XX	300	100	3 027 1259 00	approx. 32,3 kg
IU../35.. XX	IO../35.. XX	350	150	3 027 1260 00	approx. 33,2 kg

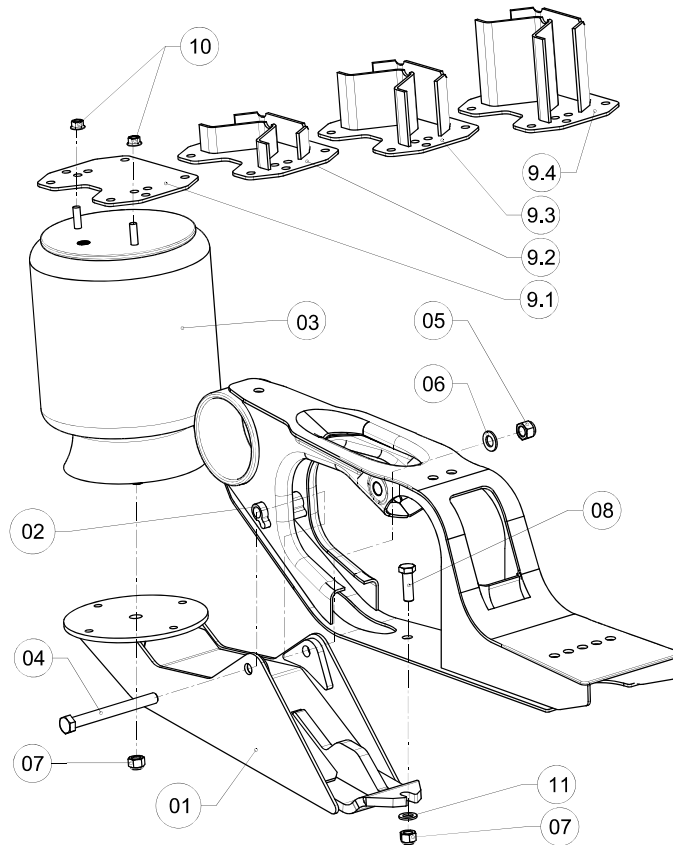
XX = „Standard“ air spring SAF 2619V, SAF 2918V, SAF 2919V, SAF 2923V, SAF 2924V
For air suspension types with air spring SAF 2927V on request.

For example, the one-side lift for air suspension type: **IO40/2505 33** is the article no. 3 027 1258 00.

Kit-content:

Per axle is one kit needed.

at:	BH 200	BH 250	BH 300	BH 350		
kitnumber:	3 027 1257 00	3 027 1258 00	3 027 1259 00	3 027 1260 00	pos.	per kit
air spring bracket (H ₂)	1 043 0261 01	2 237 0081 01	2 237 0080 01	2 237 0082 01	(9)	1x
lift arm		2 239 0042 00			(1)	1x
guide		1 148 0010 00			(2)	1x
lift air spring		3 229 0033 00			(3)	1x
hexagon bolt		4 343 0151 10			(4)	1x
loch nut		4 247 4026 10			(5)	1x
washer		4 348 1021 00			(6)	1x
lock nut		4 247 4007 80			(7)	2x
hexagon bolt		4 343 1010 88			(8)	1x
hexagon nut		4 247 4047 10			(10)	2x
washer		4 331 1004 00			(11)	1x



Installation instruction

Installation of the lift arm:

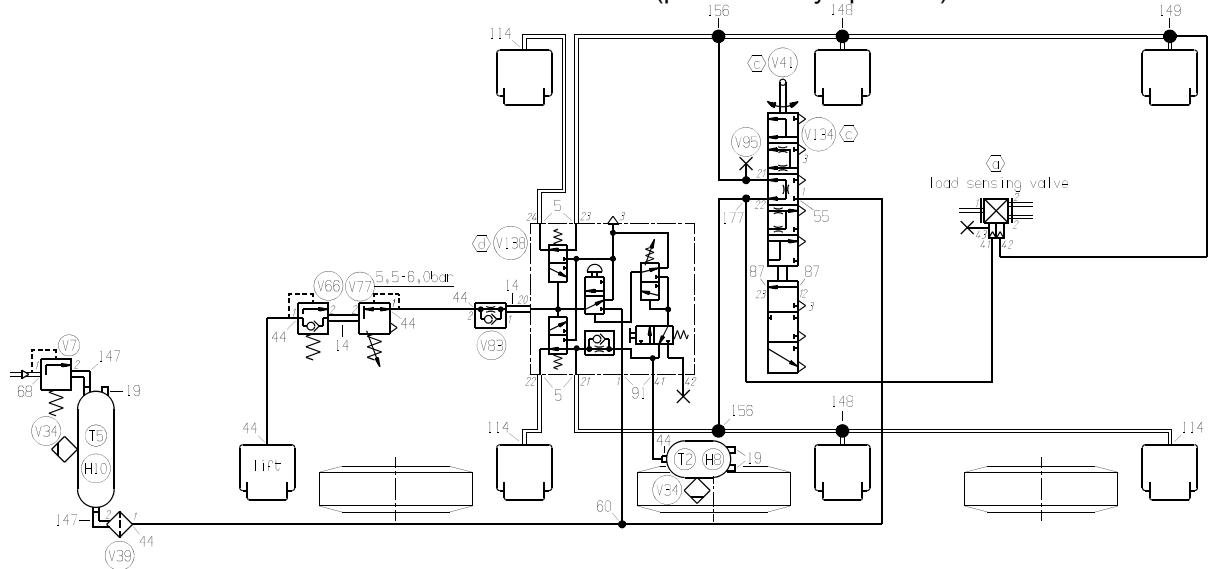
- ✓ Position the guide (2) in the gap in the trailing arm
- ✓ Place lift arm (1) in the guide (2) using bolt (4), nut (5), and washer (6) as in the illustration
- ✓ Fix the lift arm (1) to the under side of the trailing arm with bolt (8), washer (11) and nut (7). **Tightening torque 210Nm.**
- ✓ Tighten the assembly with bolt (4), **Tightening torque 400Nm.**

Installation of the lift air spring:

- ✓ Fix the lift air spring bracket (9.1...9.4) to the chassis, see [Page 64](#)
- ✓ Screw lift air spring (3) with nut (7) to lift arm (1) **Tightening torque 80Nm**
- ✓ Screw the dowel pins of the air spring plate to the air spring bracket (9.1...9.4) using nut (10) **Tightening torque 40Nm**
- ✓ The air supply of the lift air spring (3) **must** lie in the cut out position of the lift air spring bracket (9.1...9.4) see illustration.

Circuit diagram

Triaxle with one-side axle lift with lift axle control valve (pneumatically operated)



remarks to index no.	explanations
① spot our delivery volume (. 99) ② mounted to middle axle ③ adjustment according to air bag pressure diagram	— tube 8x1 — tube 12x1,5 valve V 4 425 0007 00 fitting 4 424 0068 00
	according to DIN 34 all rights reserved ! circuit no. 00 53 34 4 01 5 2004 designed 16.11. checked

**Max. lif air spring pressure 6,0 bar;
residual pressure 0,5 bar!**

Part list of
00 53 34 4 01 5
contains:

03 424 0019 00
03 424 0021 00
03 424 0010 00
03 424 0011 00

Partnumber	Quantity	Description	Dimensionen
4.424.0005.40	4	STRAIGHT MALE STUD COUPLING	M16x1,5/D12
4.424.0014.40	2	DOUBLE CONNECTOR WITH LOCK NUT	M22x1,5
4.424.0019.40	1 2	MALE PLUG	M22x1,5
4.424.0044.40	1 5	STRAIGHT MALE STUD COUPLING	M22x1,5/D8
4.424.0055.40	1 2	MALE STUD ELBOW COUPLING	M12x1,5/D8
4.424.0060.40	2	EQUAL TEE COUPLING	D8/8/8
4.424.0068.40	1	STRAIGHT MALE STUD COUPLING	M22x1,5/D12
4.424.0087.40	2	MALE PLUG	M16x1,5
4.424.0091.40	2	STRAIGHT MALE STUD COUPLING	M16x1,5/D8
4.424.0114.40	3	MALE STUD ELBOW COUPLING	M22x1,5/D12
4.424.0147.40	2	ELBOW WITH LOCK NUT	M22x1,5
4.424.0148.40	2	MALE STUD TEE COUPLING	M22x1,5/D12/D12
4.424.0149.40	1	MALE STUD TEE COUPLING	M22x1,5/D12/D8
4.424.0156.40	2	EQUAL TEE COUPLING	D12/8/12
4.424.0177.40	1	MALE STUD TEE COUPLING	M12x1,5/D8
V 4.425.0007.00	1	CHARGING VALVE WITHOUT RETURN FLO	M22x1,5
V 4.425.0034.40	1 1	DRAIN VALVE	M22x1,5
V 4.425.0039.00	1	LINE FILTER	M22x1,5
V 4.425.0041.00	1	LINK CONNECTION FOR LEVELLING VALVE	M8/D6
V 4.425.0066.00	1	CHARGING VALVE WITH RETURN FLOW 0,	M22x1,5
V 4.425.0077.00	1	PRESSURE LIMITING VALVE 1,8 BAR	M22x1,5
V 4.425.0083.00	1	CHECK VALVE CONSTANT THROTTLING D1	M22x1,5
V 4.425.0095.00	1	STRAIGHT MALE STUD COUPLING WITH T	M12x1,5/D8
V 4.425.0134.00	1	LEVELLING VALVE	M12x1,5/M16x1,5
V 4.425.0138.00	1	LIFT AXLE CONTROL VALVE	M16x1,5/M22x1,5
T 4.105.0002.00	1	AIR RESERVOIR 10 LTR	D206x355
T 4.105.0008.00	1	AIR RESERVOIR 60 LTR	D310x880
H 4.405.0008.00	2	HOLDER (AIR RESERVOIR) 10/20 LTR	D206
H 4.405.0010.00	2	HOLDER (AIR RESERVOIR) 40/60 LTR	D310

Welding instruction for hanger bracket „steel“

Note

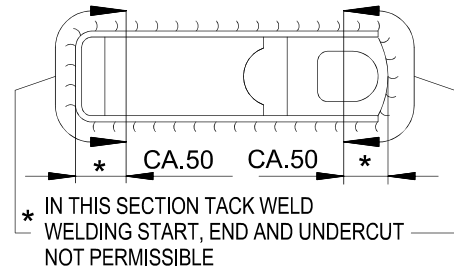
Cover the trailing arm to protect it from flying sparks. Welding and connecting the welding equipment ground cable to the trailing arm is not permissible. In order to avoid bearing damage, the welding equipment ground cable must also not be connected either to the wheel, wheelhub or wheelflange.

Welding recommendation

The high tensile steel (in accordance with DIN EN 10025 (class 3) used for the hanger brackets with a carbon content C of max. 0,2 % can easily be welded.

SAF-HOLLAND is using the gas metal arc welding procedure with the additional material G4 Si 1 (previous designation SG 3) in accordance with DIN EN ISO 14341, shielding gas in accordance with DIN EN ISO 14175, welding seams to DIN EN ISO 5817 "quality levels for imperfections" to "group C".

WELDING SEAM 5



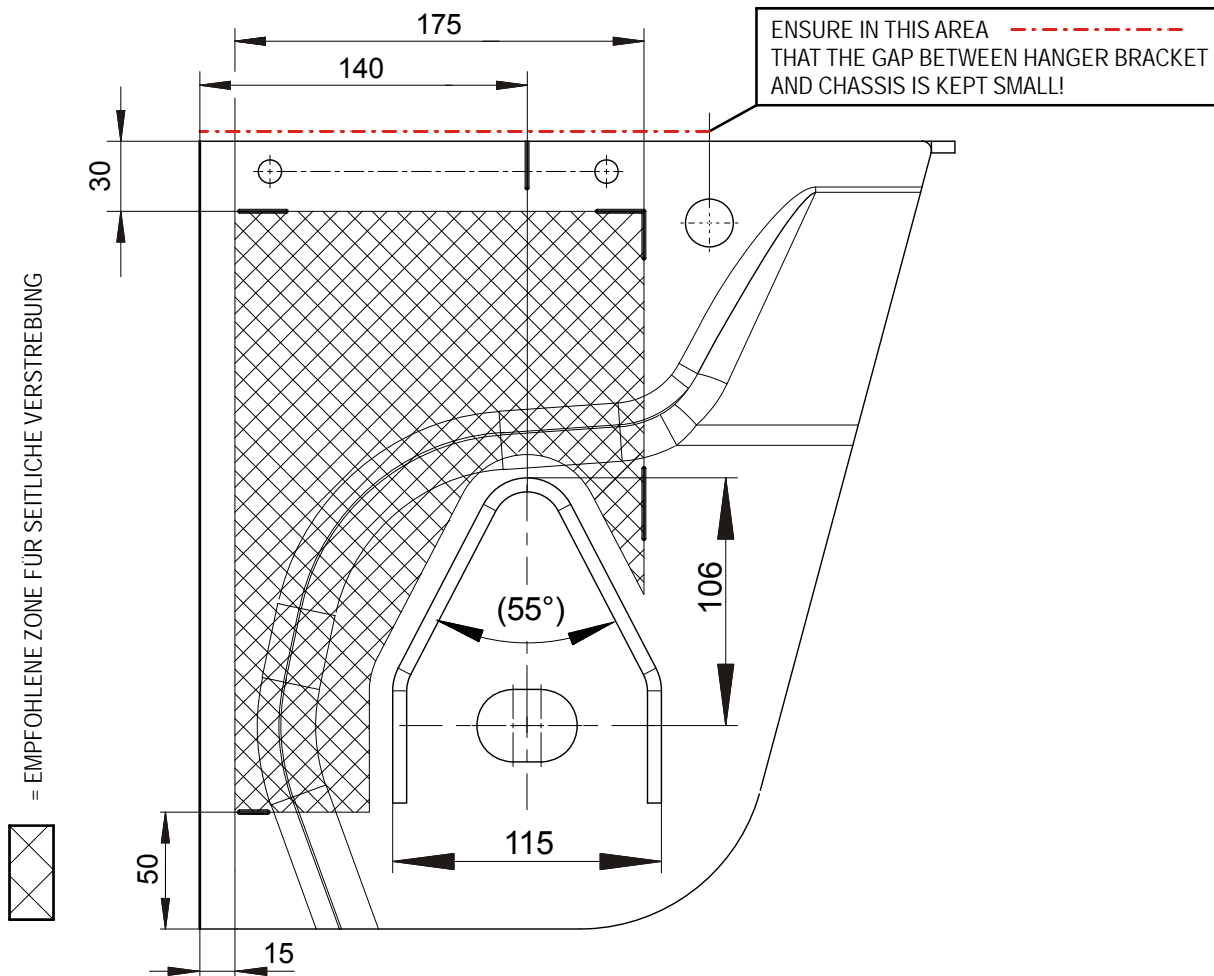
Design information

The chassis must be reinforced so that it can absorb the forces to which it is exposed. The hanger brackets need an additional reinforcement.

Recommendation for lateral reinforcement of the hanger brackets

Overlapping of the lateral brace (gusset plate) and inner brace plate of the hanger bracket is necessary to avoid any diaphragm effect. The use of a cross member can replace the lateral brace, but this doesn't replace a crossmember in the chassis.

Geometry dimensions of the hanger bracket, see [page 31](#).



Welding instruction for hanger bracket „aluminium“

Note

Cover the trailing arm to protect it from flying sparks. Welding and connecting the welding equipment ground cable to the trailing arm is not permissible. In order to avoid bearing damage, the welding equipment ground cable must also not be connected either to the wheel, wheelhub or wheelflange.

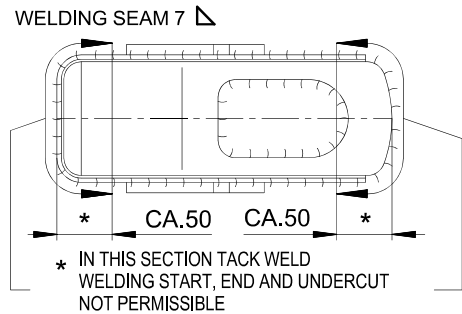
Material

Al Mg 4,5 Mn W 28 (W=soft; 28=tensile strength Rm min. 275 N/mm max. 350 N/mm)

Welding recommendation

Pre-treat welding edges with steel brush (brushes with CrNi-steel). They should not be polished (misguides the arc). The welding seam should be kept as narrow as possible (SAF-HOLLAND recommends a = 7 mm, chamfer 5 x 30°), to minimise the heat-induced distortion and tension. SAF-HOLLAND is using the gas metal arc welding procedure with the additional material SG – Al Mg 4,5 in accordance with DIN EN ISO 18273.

Shielding gas “Argon” in accordance with DIN EN ISO 14175, welding seams to DIN EN ISO 5817 “quality levels for imperfections” to “group C”.



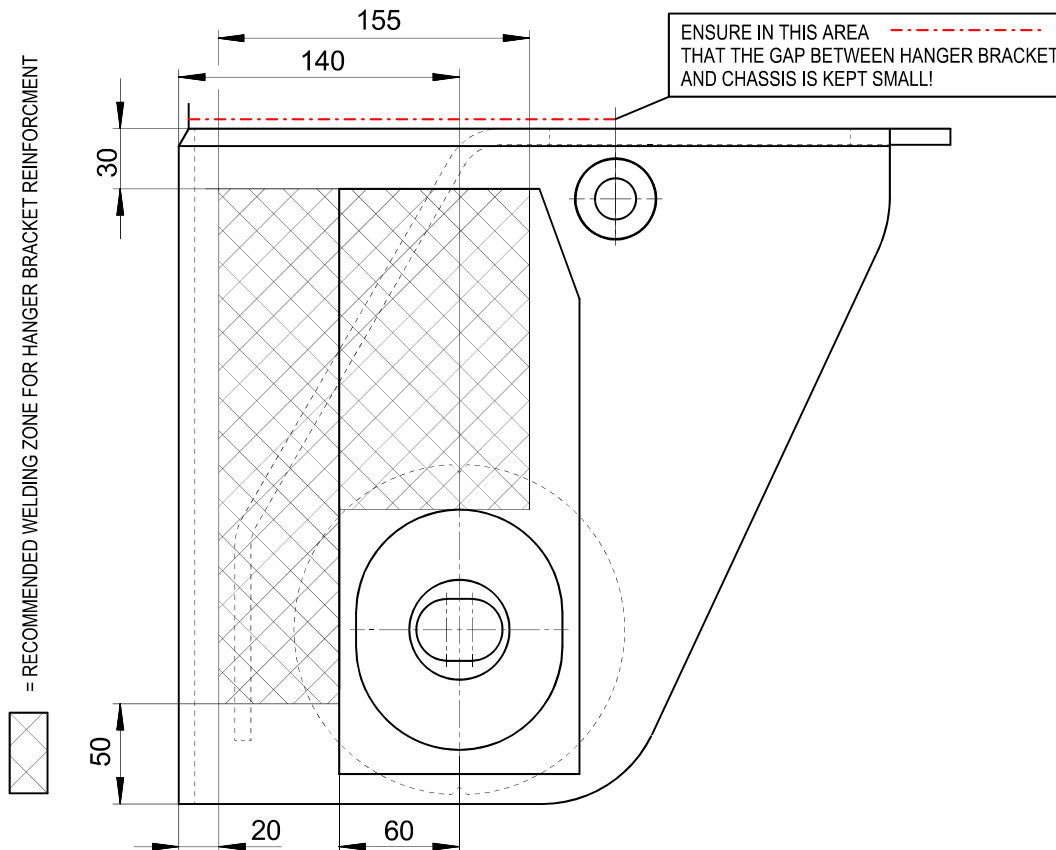
Design information

The chassis must be reinforced so that it can absorb the forces to which it is exposed. The hanger brackets need an additional reinforcement.

Recommendation for lateral reinforcement of the hanger brackets

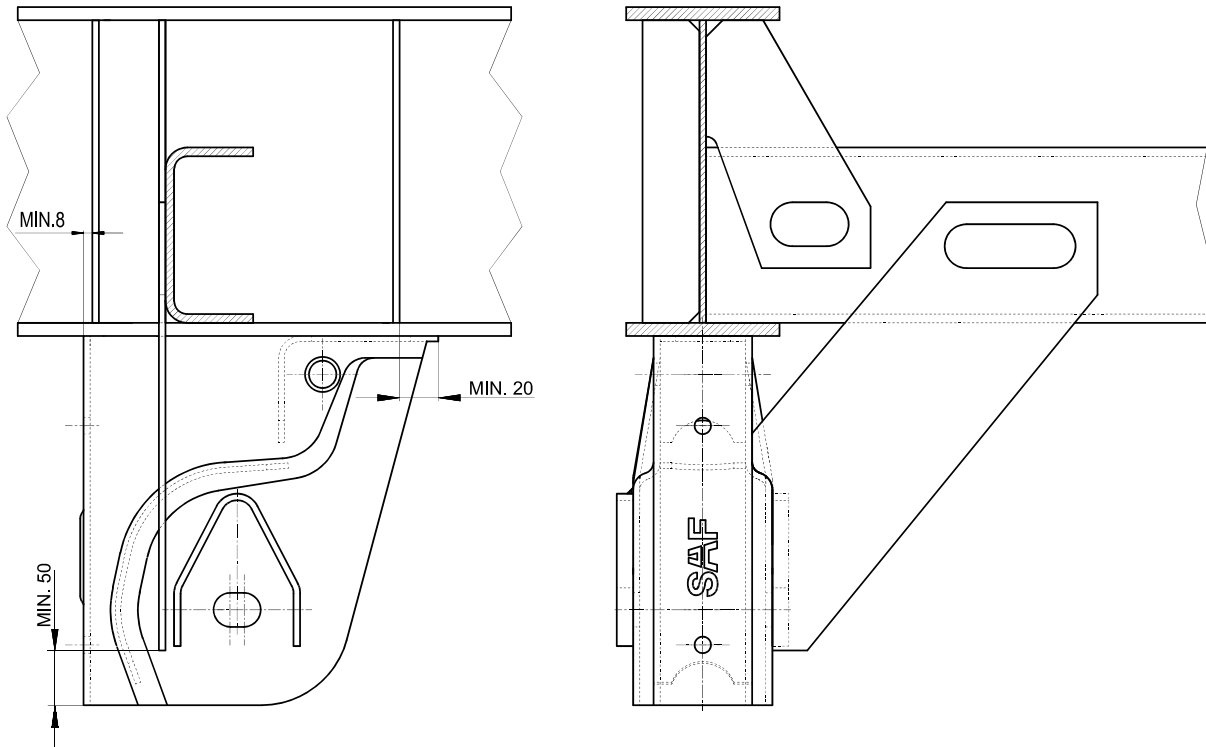
Overlapping of the lateral brace (gusset plate) and inner brace plate of the hanger bracket is necessary to avoid any diaphragm effect.

Geometry dimensions of the hanger bracket, see [page 37](#).

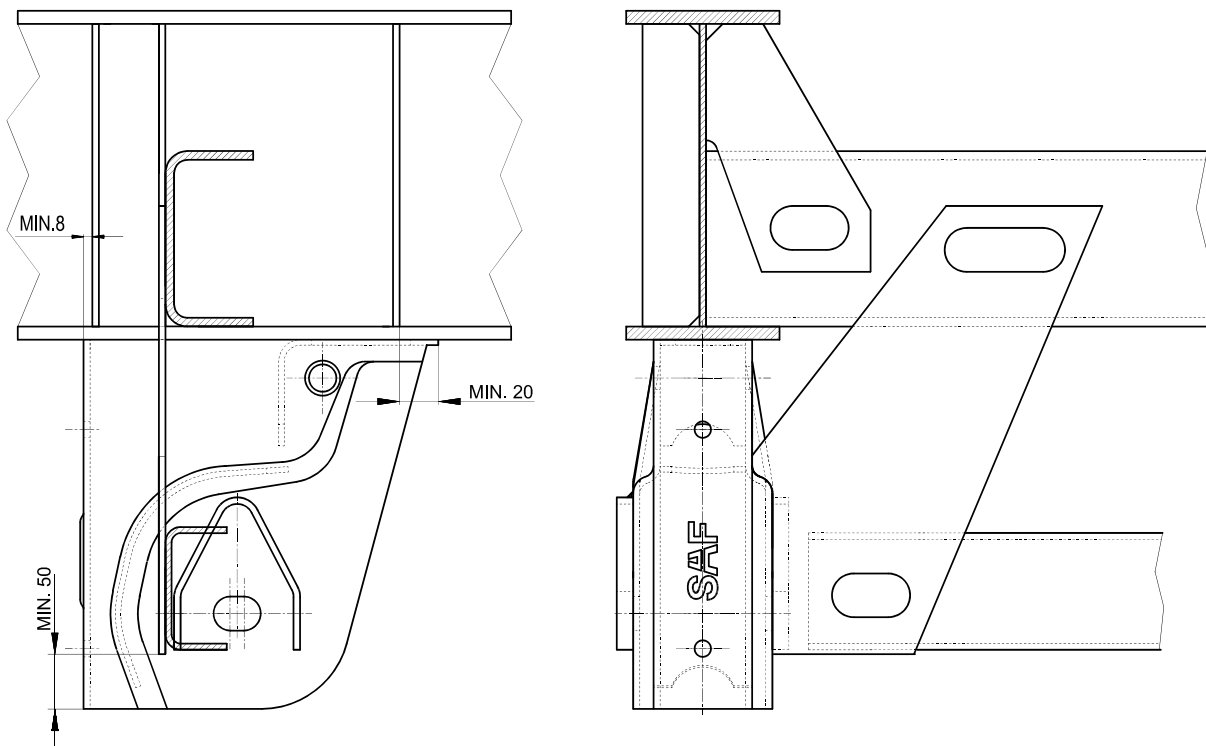


Recommendation for lateral reinforcement of hanger bracket „steel“

for torsionally flexibel chassis



for torsionally stiff chassis

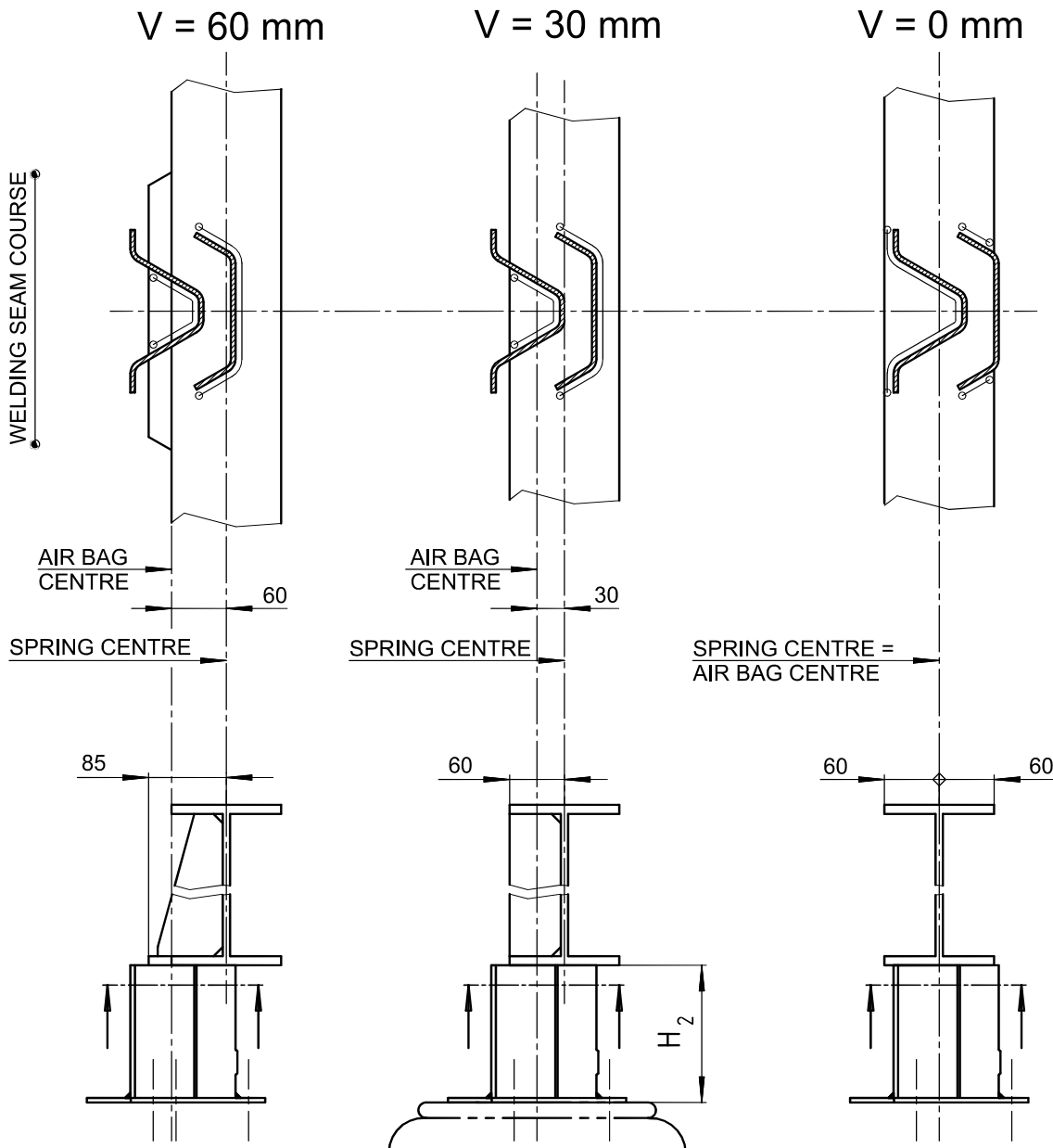
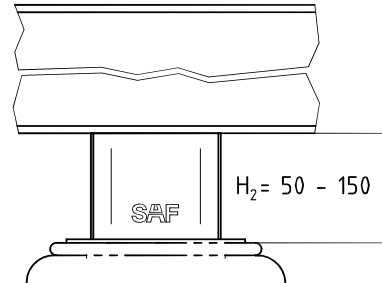


[Hanger bracket welding instruction see page 62.](#)

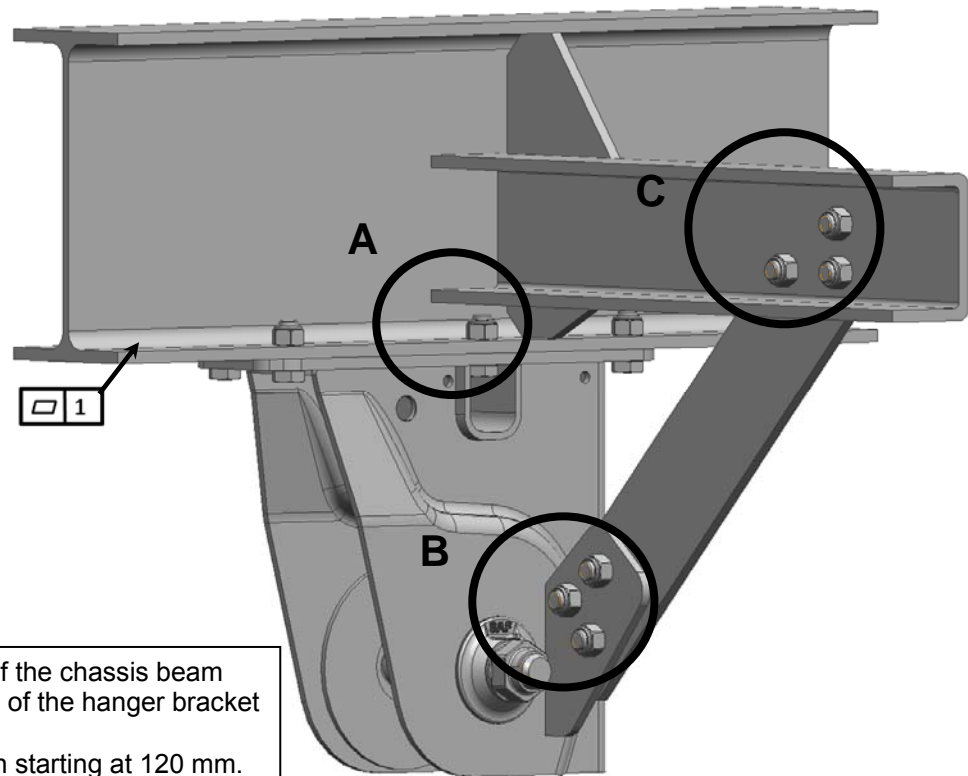
The design and dimensioning of the hanger bracket reinforcement is the responsibility of the trailer manufacturer, this depends on the type and operating conditions of the trailer.

Welding recommendation for air spring bracket

Welding seam course and bracing are SAF-recommendations. Dimensions, design and implementation are under responsibility of the trailer manufacturer.



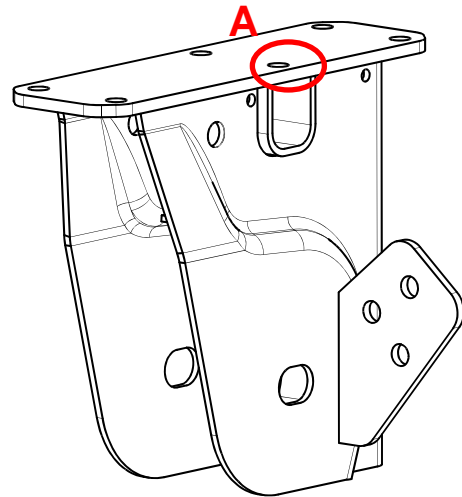
Installation of hanger brackets „screw-on“



Max. unevenness of the chassis beam
1 mm in the section of the hanger bracket
mounting plate.
Chassis beam width starting at 120 mm.

Installation:

- 1) Install the hanger bracket with at least 5 screws M16, 10.9, **230 – 250 Nm** on the chassis. Only the middle screw towards axle centre can fail (Pos. A).
- 2) Pre-assemble the lateral brace as appropriate with 3 screws M16, 10.9 on the hanger bracket (Pos. B) and chassis (Pos. C) – do not tight these yet.
hole in cross member \varnothing 16mm
hole in brace \varnothing 18mm
- 3) Adjustment of track and mounting the pivot bolt according to SAF-HOLLAND installation recommendation, see [page 68](#).
- 4) Tighten the lateral brace connections (Pos. B und C) on the hanger bracket and chassis with maximum allowed torque.



Lateral brace and bolted connections are not SAF-HOLLAND delivery volume.

Attachment faces for bolting connection parts:

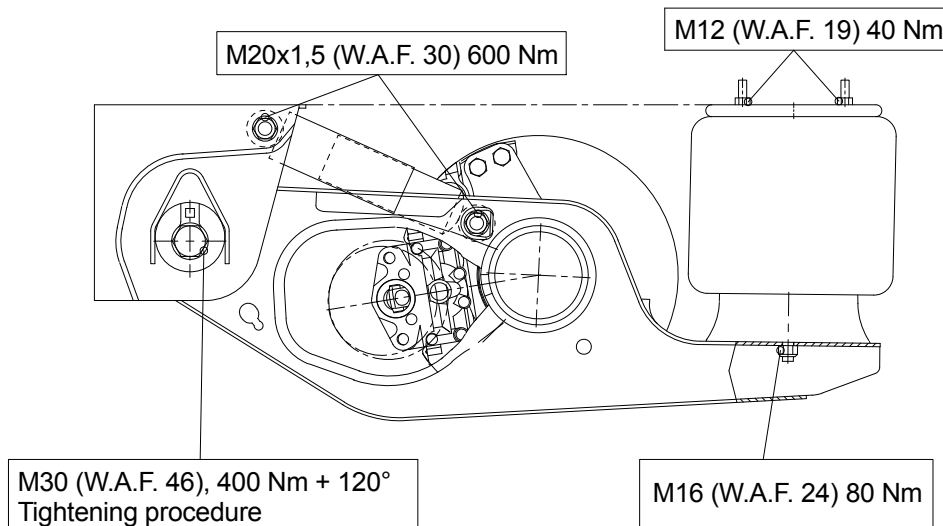
- coat thickness when painting max. **30 μ m**
- coat thickness when galvanizing max. **100 μ m**

The top plate with the verified hole pattern as the lateral position and hole pattern of the lateral brace are the same for all [mentioned hanger brackets](#).

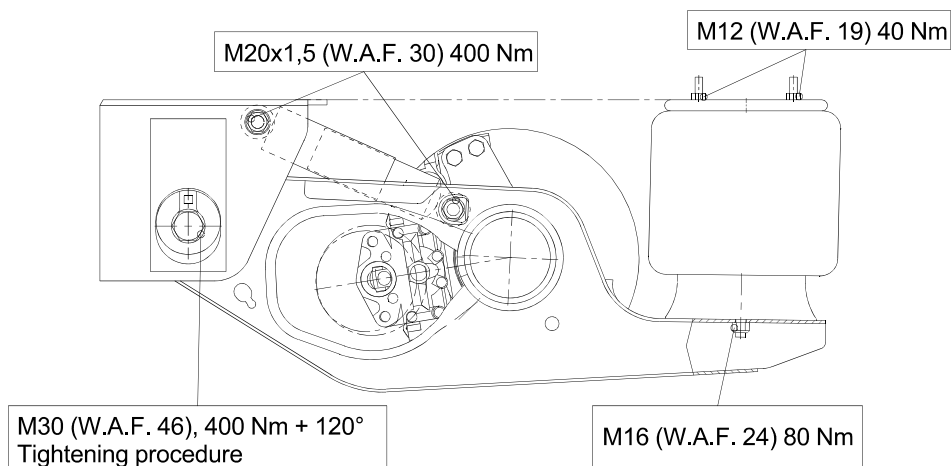
Tightening torques

The max. coating thickness on the contact surfaces (interfaces) of the trailing arm and shock absorber bolts must not surpass **45 µm**!

Hanger bracket „steel/ stainless steel“ – trailing arm – shock absorber – air spring



Hanger bracket „aluminium“ – trailing arm – shock absorber – air spring

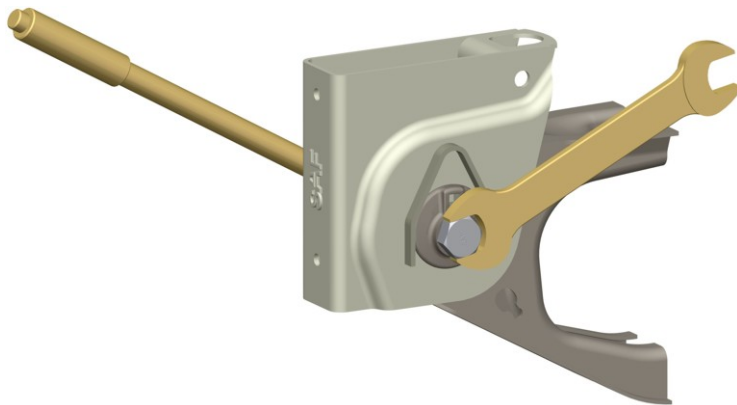


Attention:

- Threads are not to be oiled or greased!
- Pivot bolt mounting for hanger bracket „steel“ maintenance free.
- Connections on hanger bracket „aluminium“ or stainless steel are not maintenance free!
This needs to be checked after first 500 km, further checks every 6.000 km with an inspection torque:
 - of 1200 Nm for the pivot bolt connection
 - of 400 Nm for the shock absorber connection.
- Pivot bolt mounting on galvanized hanger brackets are up to a coating thickness of **120 µm** maintenance free.

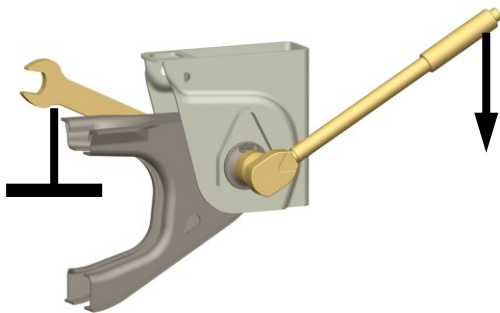
Tightening instructions for adjustable pivot bolt

Attention always within the specified ride height range!
No paint residues between eccentric washer and hanger bracket!

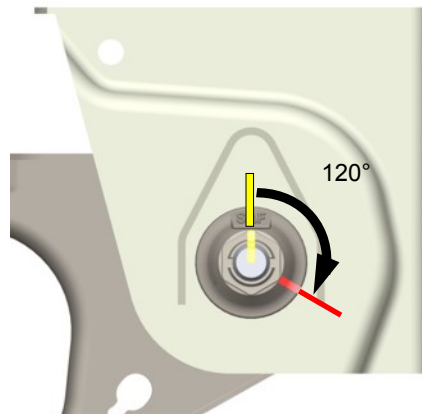


Bolt head always on the eccentric washer side

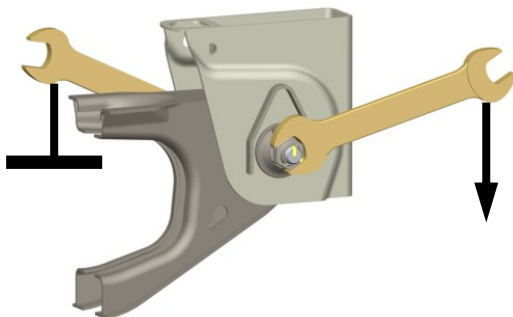
Pre tightening **400 Nm**
Use torque wrench



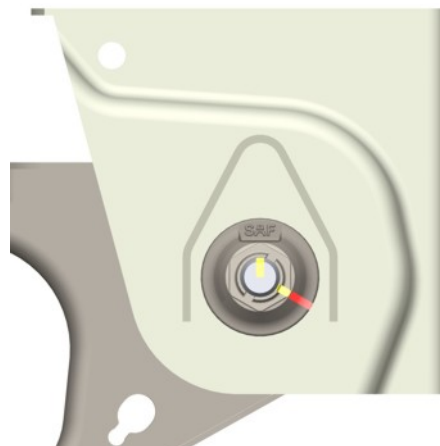
Marking for angle tightening



Angle tightening **120°**
Use impact wrench or extend lever to 2,5 Meter

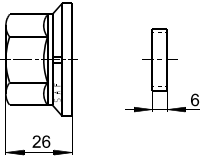
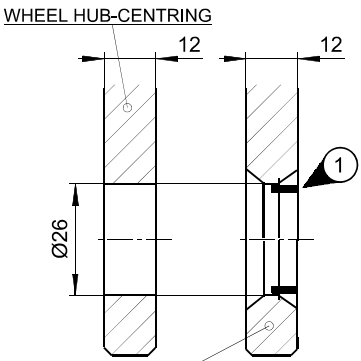
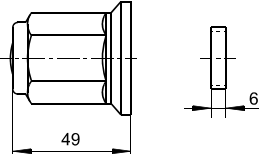
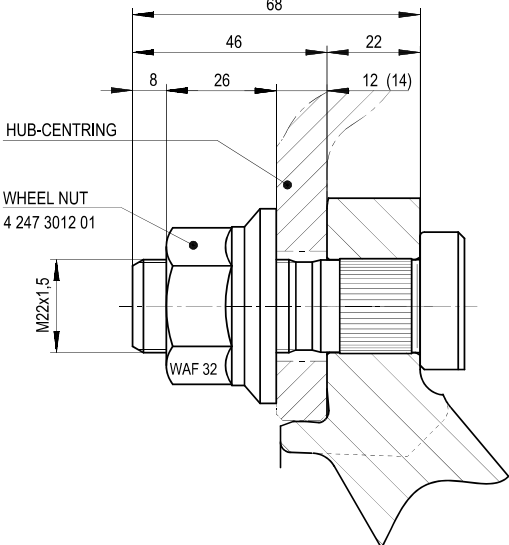
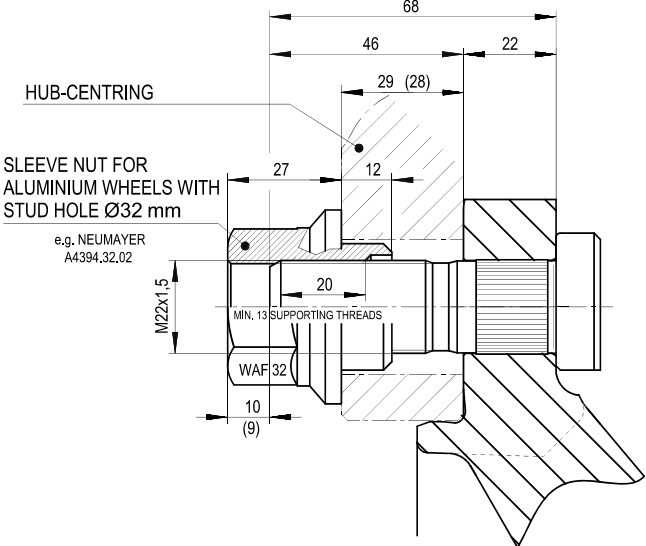


Visual inspection



Wheel fixing – standard, wheel size 19,5”/22,5“, disc brake (code 48)

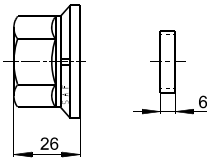
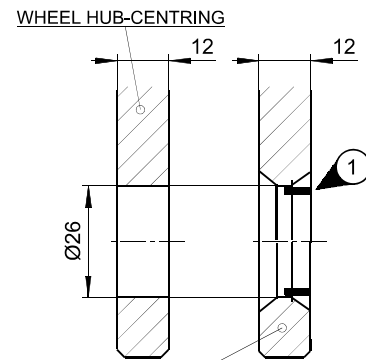
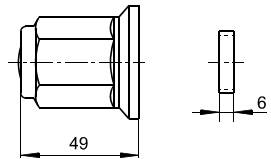
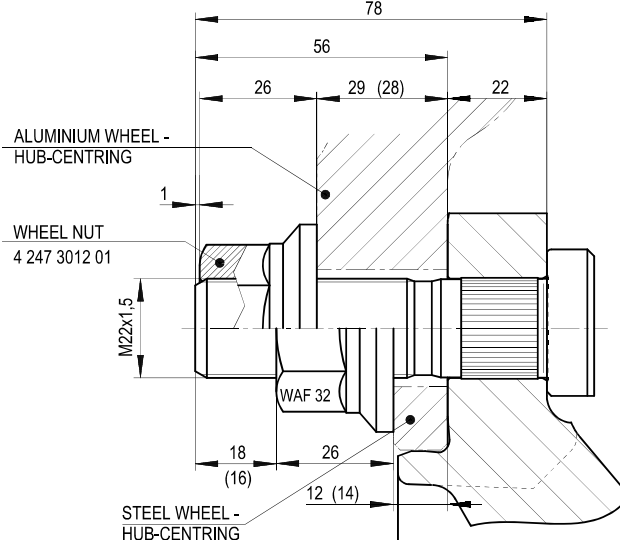
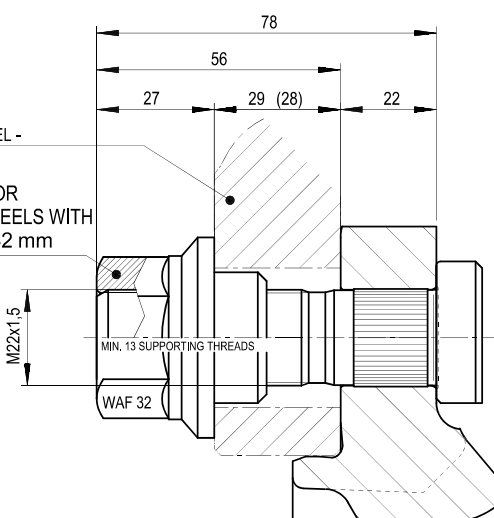
Axle versions: BI(L/LL)9-22. / BI(L/LL)9-19.
Single tire with ET 120 mm,
Studs 1 303 1118 11 with length 68 mm

<p>Open wheel nut M22x1,5 mm Wrench size 32 mm</p> 	<p>WHEEL HUB-CENTRING</p>  <p>WHEEL - DOUBLE CENTRING SPHERICAL COUNTERSINK</p> <p>For wheels with double centring/ spherical countersink there are per hub 2 counter fitted centring rings needed (1)</p>
<p>Wheel nut set (Standard): per axle one set: VPE Red – 03 247 0401 10 contains, 20x wheel nuts (04 247 3012 01) + 4x centring rings (01 095 1040 01)</p>	
<p>Closed wheel nut M22x1,5 mm Wrench size 32 mm</p> 	
<p>Wheel nut set per axle one set: VPE Green – 03 247 0407 10 contains, 20x wheel nuts (04 247 3040 10) + 4x centring rings (01 095 1040 01)</p>	
<p>Illustration: Standard stud with steel wheel</p> <p>Tightening torque: 600 Nm!</p>	 <p>HUB-CENTRING</p> <p>WHEEL NUT 4 247 3012 01</p> <p>M22x1,5</p> <p>WAF 32</p>
<p>Illustration: Standard stud with aluminium wheel</p> <p>Sleeve nuts are not supplied by SAF-HOLLAND.</p>	 <p>HUB-CENTRING</p> <p>SLEEVE NUT FOR ALUMINIUM WHEELS WITH STUD HOLE Ø32 mm</p> <p>e.g. NEUMAYER A4394.32.02</p> <p>M22x1,5</p> <p>MIN. 13 SUPPORTING THREADS</p> <p>WAF 32</p>

Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

Wheel fixing – aluminium, wheel size 19,5"/22,5", disc brake (code 49)

Axle versions: BI(L/LL)9-22. / BI(L/LL)9-19.
Single tire with ET 120 mm
Studs 1 303 1120 10 with length 78 mm

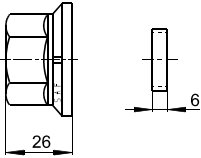
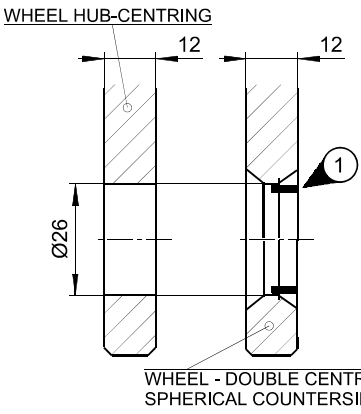
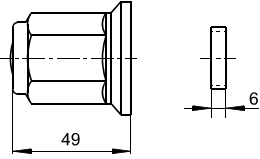
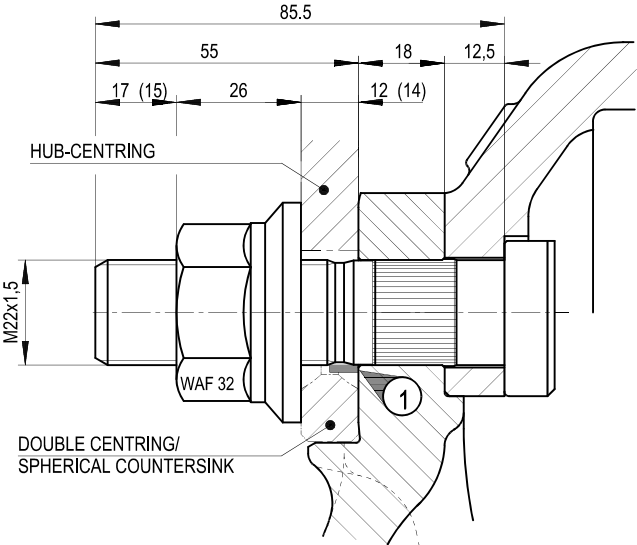
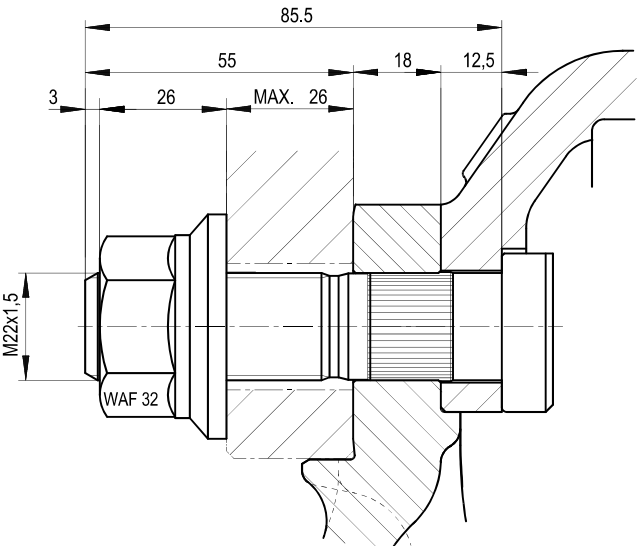
<p>Open wheel nut M22x1,5 mm Wrench size 32 mm</p> 	 <p>WHEEL HUB-CENTRING</p> <p>WHEEL - DOUBLE CENTRING SPHERICAL COUNTERSINK</p> <p>For wheels with double centring/ spherical countersink there are per hub 2 counter fitted centring rings needed (1)</p>
<p>Wheel nut set (Standard): per axle one set: VPE Red – 03 247 0401 10 contains, 20x wheel nuts (04 247 3012 01) + 4x centring rings (01 095 1040 01)</p>	
<p>Closed wheel nut M22x1,5 mm Wrench size 32 mm</p> 	
<p>Wheel nut set per axle one set: VPE Green – 03 247 0407 10 contains, 20x wheel nuts (04 247 3040 10) + 4x centring rings (01 095 1040 01)</p>	
<p>Illustration: Long stud with aluminium wheel/ steel wheel</p> <p>Tightening torque: 600 Nm!</p>	 <p>ALUMINIUM WHEEL - HUB-CENTRING</p> <p>WHEEL NUT 4 247 3012 01</p> <p>M22x1,5</p> <p>WAF 32</p> <p>STEEL WHEEL - HUB-CENTRING</p>
<p>Illustration: Long stud with aluminium wheel</p> <p>Sleeve nuts are not supplied by SAF-HOLLAND.</p>	 <p>ALUMINIUM WHEEL - HUB-CENTRING</p> <p>SLEEVE NUT FOR ALUMINIUM WHEELS WITH STUD HOLE Ø32 mm</p> <p>e.g. NEUMAYER A4394.32.02</p> <p>M22x1,5</p> <p>MIN. 13 SUPPORTING THREADS</p> <p>WAF 32</p>

Wheel fixing – standard, wheel size 22,5“, drum brake (code 58)

Axle version: S9-4218

Single tire with ET 0 mm

Wheelstud 1 303 1074 14 with stud length 85,5 mm

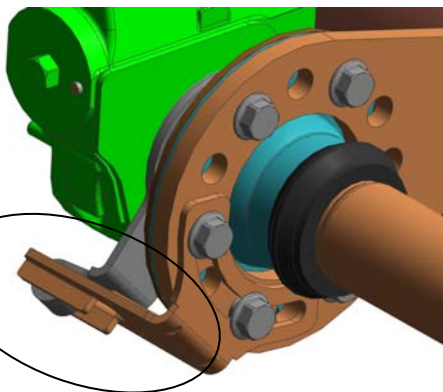
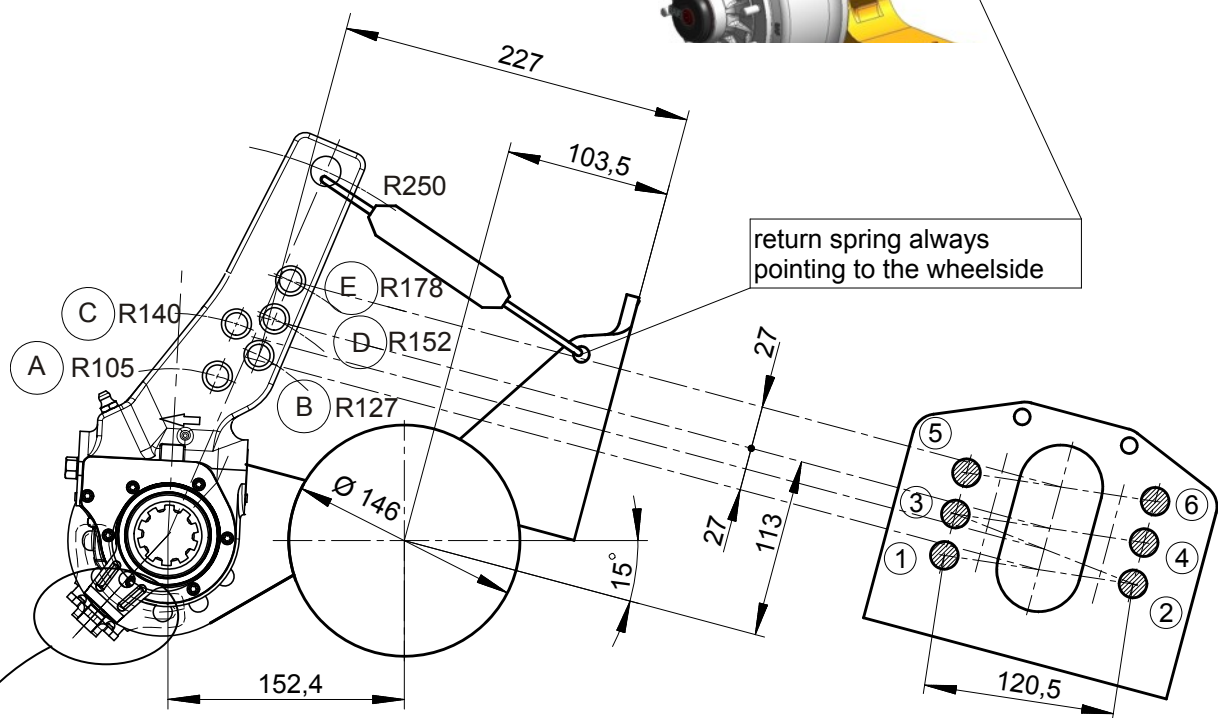
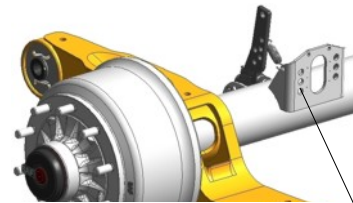
<p>Open wheel nut M22x1,5 mm Wrench size 32 mm</p> 	 <p>For wheels with double centring/ spherical countersink there are per hub 2 counter fitted centring rings needed (1)</p>
<p>Wheel nut set (Standard): per axle one set: VPE Red – 03 247 0401 10 contains, 20x wheel nuts (04 247 3012 01) + 4x centring rings (01 095 1040 01)</p>	
<p>Closed wheel nut M22x1,5 mm Wrench size 32 mm</p> 	
<p>Wheel nut set per axle one set: VPE Green – 03 247 0407 10 contains, 20x wheel nuts (04 247 3040 10) + 4x centring rings (01 095 1040 01)</p>	
<p>Illustration: Standard stud with steel wheel</p> <p>Tightening torque: 600 Nm!</p>	
<p>Illustration: Standard stud with aluminium wheel</p> <p>Sleeve nuts are not supplied by SAF-HOLLAND.</p>	

Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

Brake chamber bracket

Observe the installation instructions of the brake chamber manufacturers! A major factor for the functionality is the compliance with the specified tightening torque and its regular checking.

Design with SNK 420, Intradrum - rigid axles



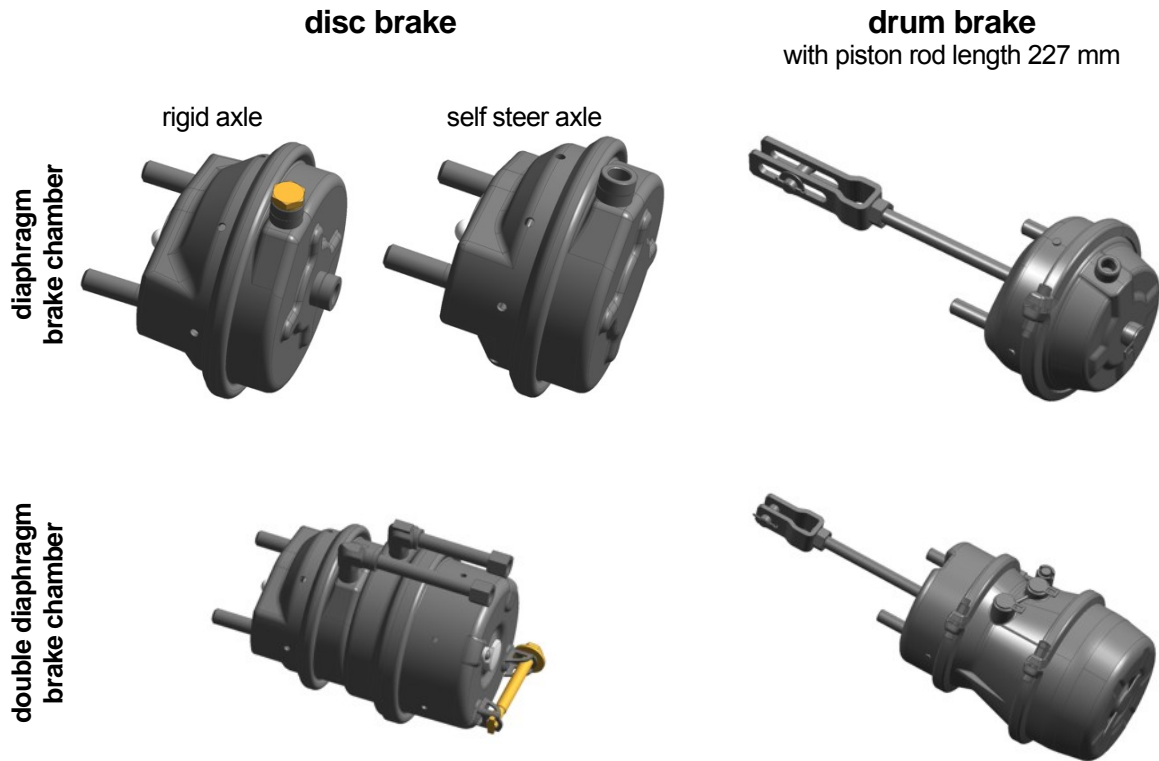
lever length of slack adjuster	code	brake chamber mounting position on the bracket
178 mm	E	5 – 6
152 mm	D	3 – 4
140 mm	C	2 – 3
127 mm	B	1 - 2
105 mm	A	

Brake chamber positions on the bracket are valid for manual and automatic slack adjusters!

Overview SAF-HOLLAND brake chambers

The brake chambers can be combined with all axle versions produced by SAF-HOLLAND.

The brake chambers in overview:



For axles with disc brake 22,5" and 19,5"

The versions in the table are available in both OEM and spare parts:

model	size	partnumber ¹⁾ brake chamber INTRADISC <i>plus</i> INTEGRAL	
		rigid axle	self steer axle
Diaphragm brake chamber	16"	3 454 1065 60	3 454 1081 60
	18"	3 454 1066 60	-
	20"	3 454 1067 60	3 454 1082 60
	22"	3 454 1068 60	-
	24"	3 454 1069 60	-
Double diaphragm brake chamber	16"/24"	3 454 1077 64	
	16"/30"	3 454 1096 64	
	18"/24"	3 454 1074 64	
	20"/24"	3 454 1079 64	
	20"/30"	3 454 1097 64	

¹⁾ partnumbers include the 2 fixing nuts

For axles with drum brake and piston rod length **227** mm

The versions in the table are available in both OEM and spare parts:

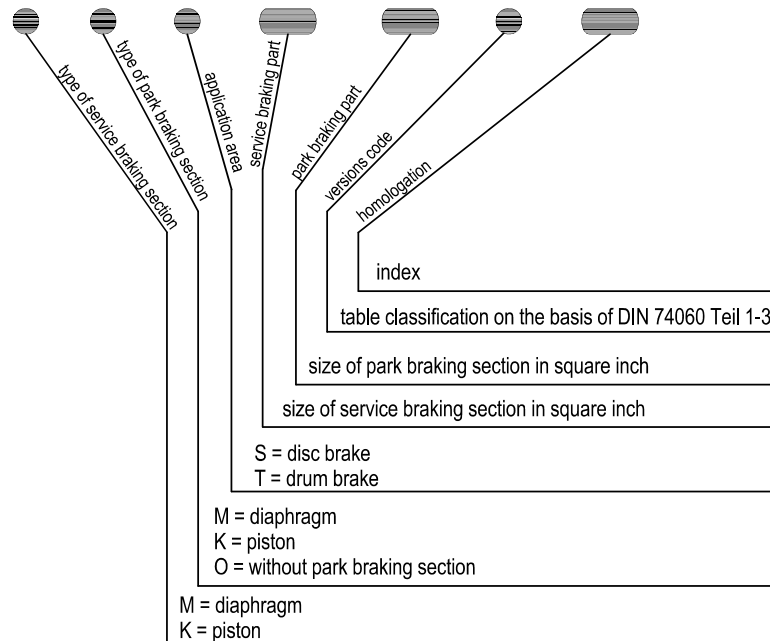
model	size	partnumber ¹⁾ brake chamber INTRADRUM
Diaphragm brake chamber	20"	3 454 1089 70
	24"	3 454 1090 70
Double diaphragm brake chamber	20"/30"	3 454 1091 70
	24"/30"	3 454 1092 70

¹⁾ partnumbers include the 2 fixing nuts

Typ identification for SAF-HOLLAND brake chambers

Letters are marked with "X", numbers with "0"
 Example:

M O S 16 00 B 60
 M M T 24 30 B 71
 X X X 00 00 X 00



Technical data

For axles with disc brake 22,5" and 19,5"

model	size	type	test report	max. stroke s _{max} [mm]	service brake: force [N] at 6,5 bar	parking brake: force [N] at 30 mm stroke
diaphragm brake chamber	16"	MOS1600B60	BC 0060.0	64	6590	-
	18"	MOS1800B60	BC 0061.0	64	6960	-
	20"	MOS2000B60	BC 0062.0	65	7564	-
	22"	MOS2200B60	BC 0063.0	65	8055	-
	24"	MOS2400B60	BC 0064.0	65	9374	-
double diaphragm brake chamber	16"/24"	MMS1624B60	BC 0044.0	63	6452	6160
	16"/30"	MMS1630B60	BC 0092.0	64	6590	7605
	18"/24"	MMS1824B60	BC 0045.0	63	6960	5911
	20"/24"	MMS2024B60	BC 0046.0	63	7564	6160
	20"/30"	MMS2030B60	BC 0093.0	65	7564	7605

For axles with drum brake and piston rod length 227 mm

model	size	type	test report	max. stroke	piston rod length	service brake:	parking brake:
				s _{max}		force [N]	
						[mm]	at 6,5 bar
diaphragm brake chamber	20"	MOT2000B70	BC 0047.0	77	227	7659	-
	24"	MOT2400B70	BC 0048.0	77	227	9234	-
double diaphragm brake chamber	20"/30"	MMT2030B71	BC 0049.1	73	227	7658	6440
	24"/30"	MMT2430B71	BC 0050.1	74	227	9175	6440

Further technical data can be found on the referenced test reports or can be provided by SAF-HOLLAND (<http://testreport.safholland.de>). Brake calculations with these brake chambers can be provided by the brake system manufactures WABCO, KNORR and HALDEX. The new test reports are in according with ECE R13 and will require an update of the trailer type approval. Please notice that due to the new test procedure the output force characteristics of the brake chambers have changed.

Self-steering axle with stabilising damper

Steering mechanism

In the case of self-steering axle with stabilising damper, the steering mechanism comprises:

- two pivot-mounted steering knuckles (1)
- a steering tie rod (2)
- a reversing lock (3)
- a stabilising damper (4)

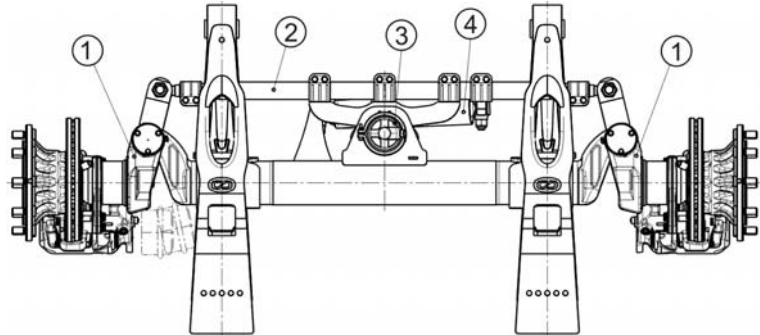
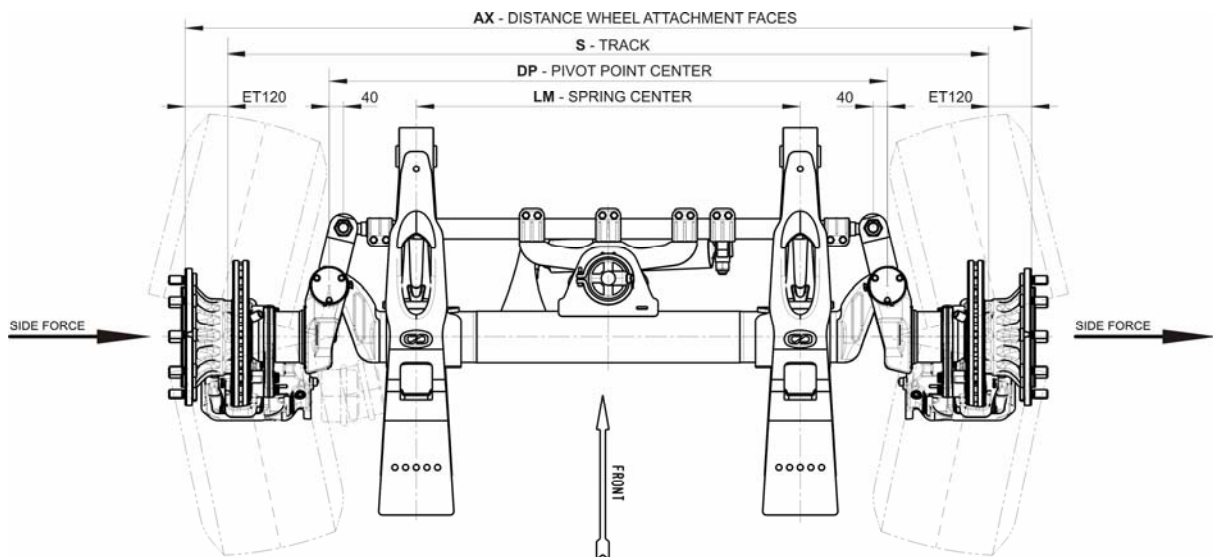


Illustration BIL9-22

Functional description

Side forces occur in the tire contact areas when vehicles drive round bends or overtake other vehicles. On account of the offset between the steering knuckle bearings to the axle centre of 140 mm, these side forces (left and right) produce a steering torque that acts on the steering knuckles and forces them into an angled position. This angled position is the so-called axle steering angle. The steering tie rod is responsible for the synchronous turning movement between the left and right steering knuckles.

The stabilisation damper is suspended on the axle body on one side and on the steering tie rod on the other. This is either pressed (shortened) or pulled (lengthened) depending on the angle of rotation of the steering knuckles. The special design of this SAF stabilisation dampers means that its internal spiral spring is always compressed during both movements.

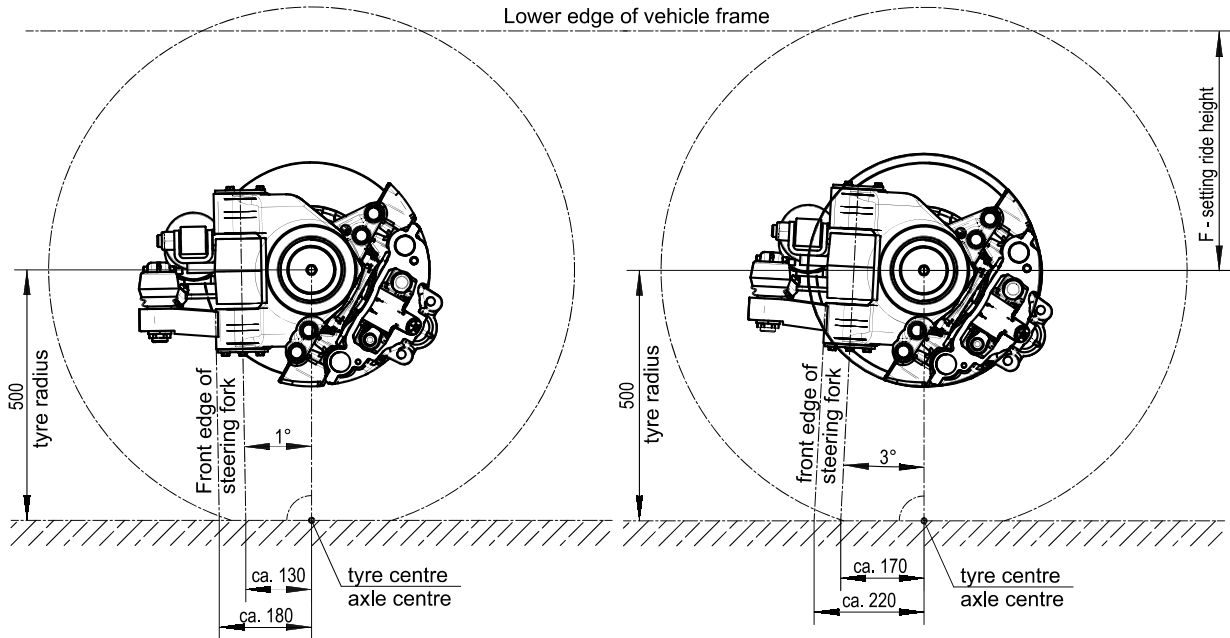


As the side forces decrease, the spring force increases in comparison with the side forces, and forces the tires and/or steering knuckles back into the straight position. The spiral spring, supported by the damper properties, is also the reason for a sturdy and flutter-free straight drive.

To make reversing possible with a self-steering axle, it has to be set rigid. This is done electro-pneumatically through the reversing lock, the task of which is to prevent the steering tie rod moving and to block it in the central position (driving straight on) by the spring-type cylinder.

Caster

Installed in a suspension system, the caster (distance steering bolt centre lengthened to the ground to the centre of the tire contact area) may vary in vehicle setting between 130 mm (steering pin tilted forwards) and 170 mm (steering pin tilted backwards). In contrast to leaf spring suspension, the caster can be influenced in the case of air suspension by the ride height setting.



Steering angle

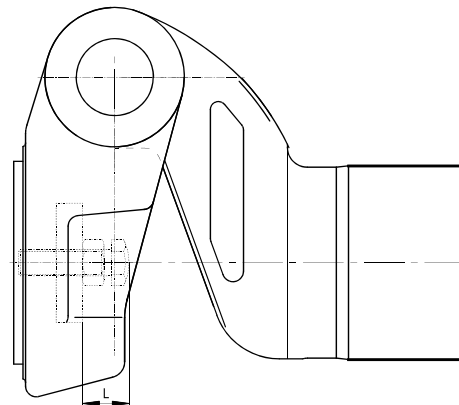
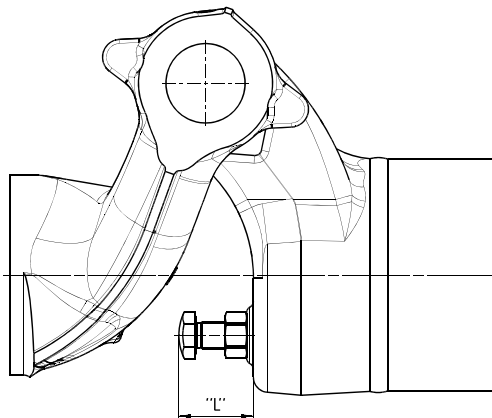
With SAF-HOLLAND self-steering axles, the steering angle is limited to 20° on account of the design. This can be reduced if required, depending on the track width and spring centre ratio. For this purpose, the adjusting screw on the steering knuckle should be screwed out according to the values in the following table (self-steering axle = α , screw extension = L) and then countered by a locknut.

For self-steering axle version(s):
B(I)LL9...

α [°]	L [mm]	α [°]	L [mm]
20	31	12	56
18	37	10	63
16	43	8	69
14	50		

B(I)L9... und SL9...

α [°]	L [mm]	α [°]	L [mm]
20	35	12	54
18	40	10	59
16	45	8	64
14	49		



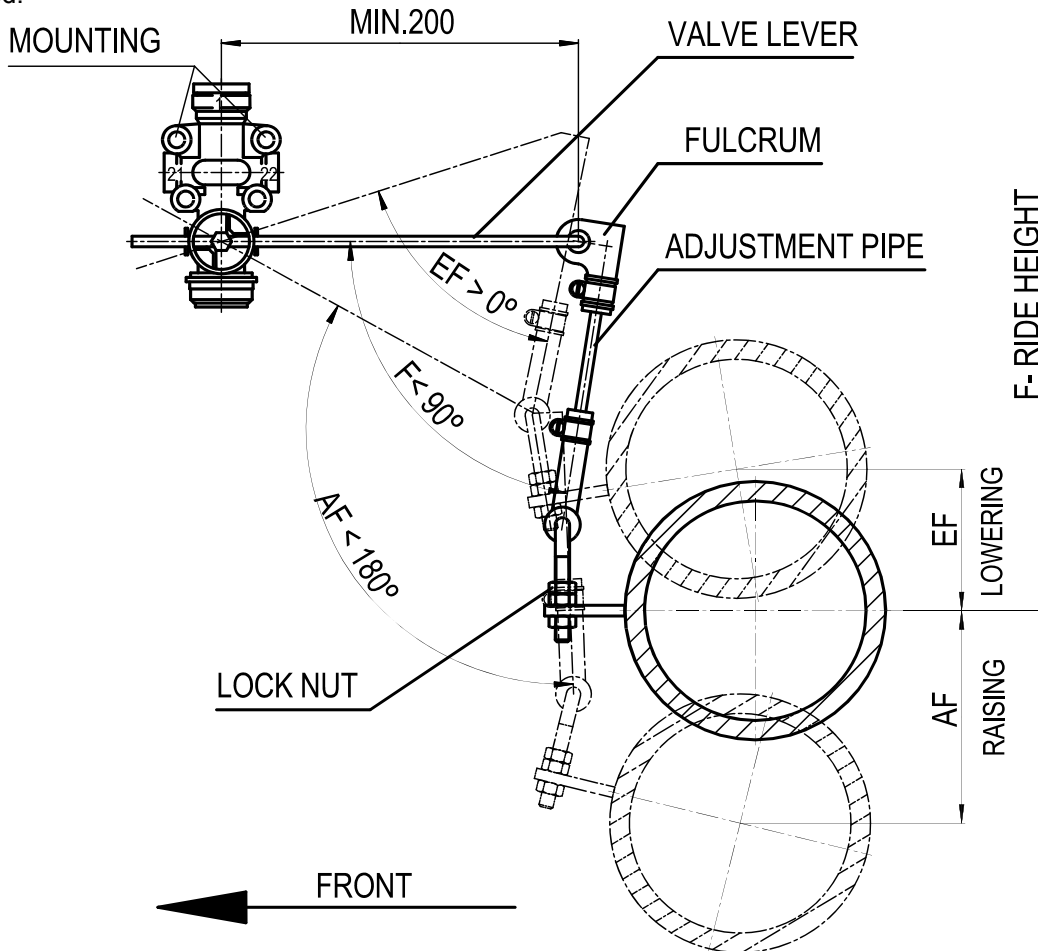
Adjustment of the air suspension ride height

Air suspension valve

As standard, SAF-HOLLAND air suspension system require only one air suspension valve. The air suspension valve controls the air spring pressure in relation to the trailer load in order to maintain a constant ride height (F) in every load condition.

The air suspension valve is fastened to the trailer frame with screws and connected to the axle via the pivot joint (valve lever and adjustment pipe). On tri-axle trailers, the system is generally connected to the middle axle (normally in the middle of the axle), and on twin-axle trailers to the rear axle. In special cases (e.g. large trailer tilt angle), the air suspension valve can be installed on the rear axle.

For trailers with axle lifting system, the axle to which the system is connected depends on the axle to be lifted.



Installation

The valve lever should be at least 200 mm long and is horizontal when the trailer is in the driving position. As a function check, move the lever down slightly. Air must now escape via the venting cap into the atmosphere. If air flows into the air springs when the lever is pushed down, the valve lever has to be turned through 180°. For this the valve lever has to be disconnected. The ride height is set by adjusting the adjustment pipe in the fulcrums and by turning the lock nuts. The adjustment must be carried out with the trailer standing on level ground. It can be carried out with the trailer either empty or loaded.

Note

For a final check, the air suspension system should be lowered to the suspension stop or raised to the limit (shock absorbers, stop ropes, air spring length). During this process, the specified angle between valve lever and adjustment pipe must not be exceeded in order that the valve lever does not move in the wrong direction.

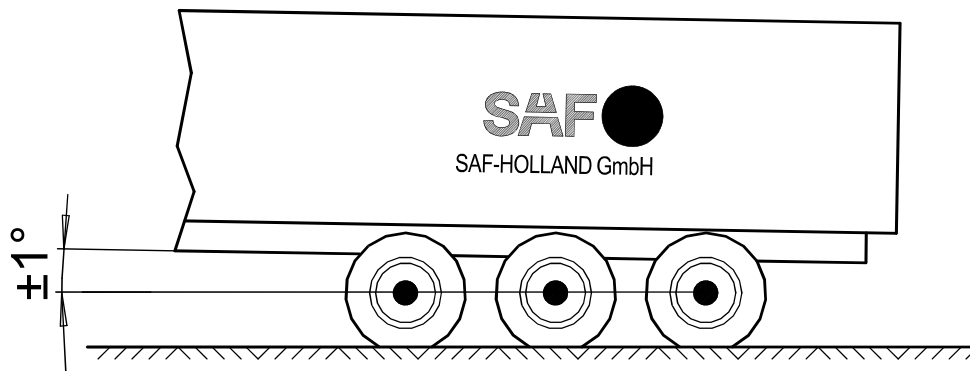
Ride heights

Adjust the ride height of the air suspension to the permissible range indicated in the corresponding SAF-HOLLAND documents

With single axles, a minimum lowering of **60** mm is allowed.
With multiple axles, a minimum lowering of **70** mm is allowed.

Exception:
For multi-axle trailers with lift axles, the minimum lowering at the lift axle should not be less than **100** mm in order to ensure an adequate ground clearance

Semi-trailer tilt angle



The maximum tilt angle of the semi-trailer can not be more than $\pm 1^\circ$ or 20 mm/m.

Axle alignment

General

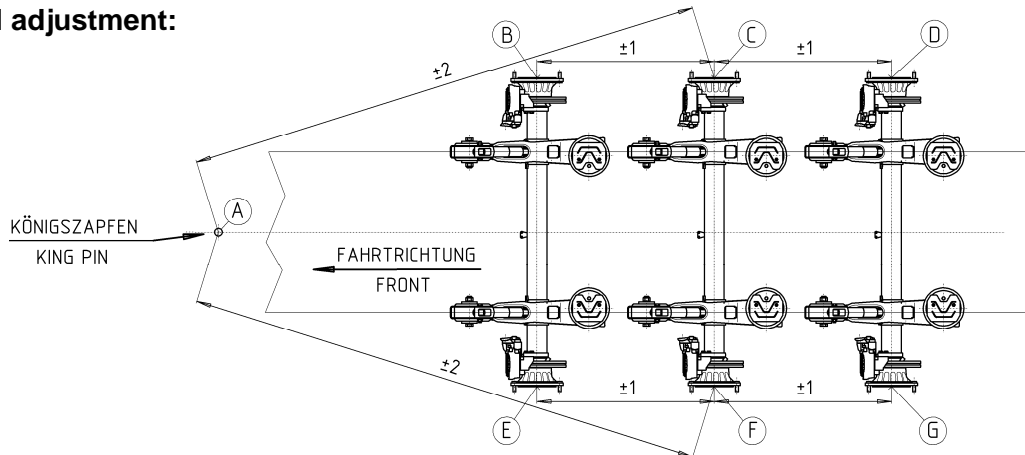
In order to compensate the production tolerances, an axle alignment and, if necessary, an adjustment should be carried out. The maximum permissible deviations (tolerances) of the alignment values are specified by the tire manufacturer.

The maximum possible wheelbase correction per axle is ± 6 mm, [see page 35](#)

Basic condition

The axle alignment must be done in unladen situation. With air suspension the trailer has to be adjusted in the right ride height.

Conventional adjustment:

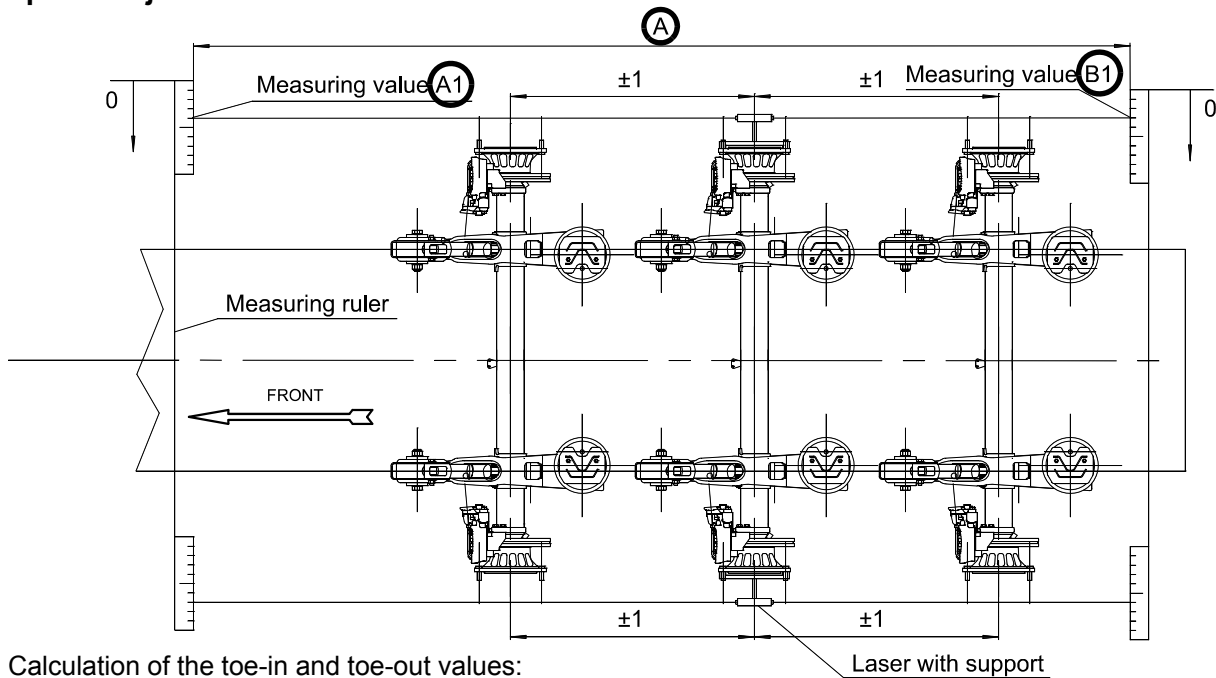


Procedure:

Determine the lengths of the diagonals **A - C** and **A - F** for the middle axle (reference axle) by comparison measurements, observing the tolerances ($\pm 2,0$ mm).

Check the wheelbases **B - C** and **E - F** for the front axle and **C - D** and **F - G** for the rear axle and correct, if necessary, observing the tolerances ($\pm 1,0$ mm).

optical adjustment:



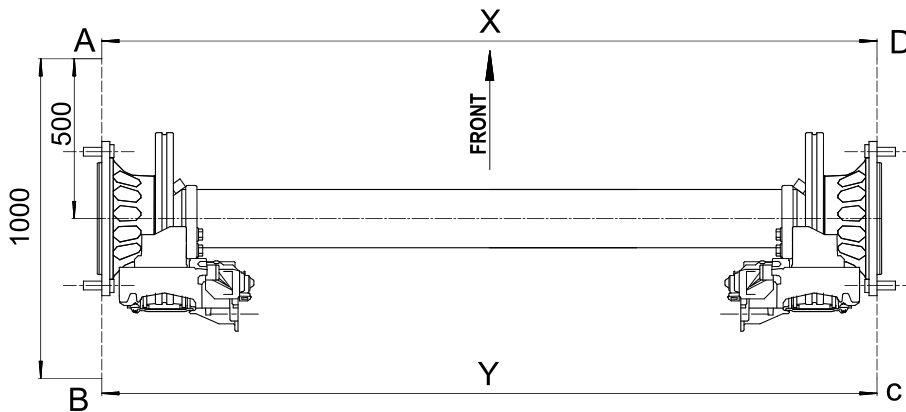
Calculation of the toe-in and toe-out values:

$$\frac{A1(\text{mm}) - B1(\text{mm})}{A(\text{m})} = C$$

C (positive value) = toe-in
C (negative value) = toe-out

Observe the operating and setting instructions of the measuring system manufacturer.

Positive toe-in/ toe-out:



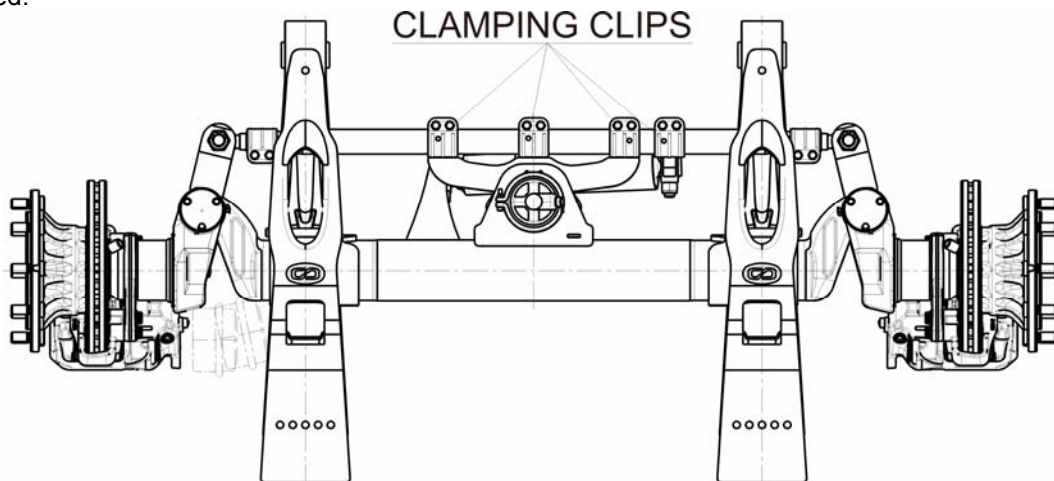
Rigid axle:

Toe-in: +0 to +12' = max. +3,5 mm/m (Example: $Y - X = 0 + 3,5 \text{ mm}$)

Self-steering axle:

Toe-in: +14 to +24' = min. +4 mm/m to max. +7 mm/m (Example: $Y - X = 4 \text{ mm to } 7 \text{ mm}$)

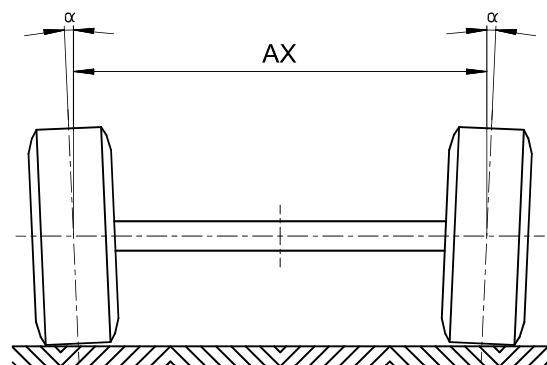
The setting is carried out by lengthening or shortening the steering tie rod. After all the clamping clips have been loosened, the required dimension is set by turning steering tie rod. The tie-rod ends are not affected.



Measuring the axle geometry: Deviations in the distances $AC - BD = 0 \pm 3 \text{ mm}$

Camber:

The wheel camber (α) has been designed fixed and cannot be adjusted. For the unloaded axle, the value is $\pm 12'$ positive camber (corresponds to 3,5 mm/m)



In order to avoid tire wear, we recommend that an axle alignment is performed at regular intervals. We recommend the use of an optical measuring system for carrying out the axle alignment. For alignment, only the centres of the middle of the wheel cap or the middle of the axle stub end are of interest as reference points. Possible causes of deviations in the axle alignment are:

- ✓ Wear of the pivot bush
- ✓ Deformation of the axle assembly components due to improper use.

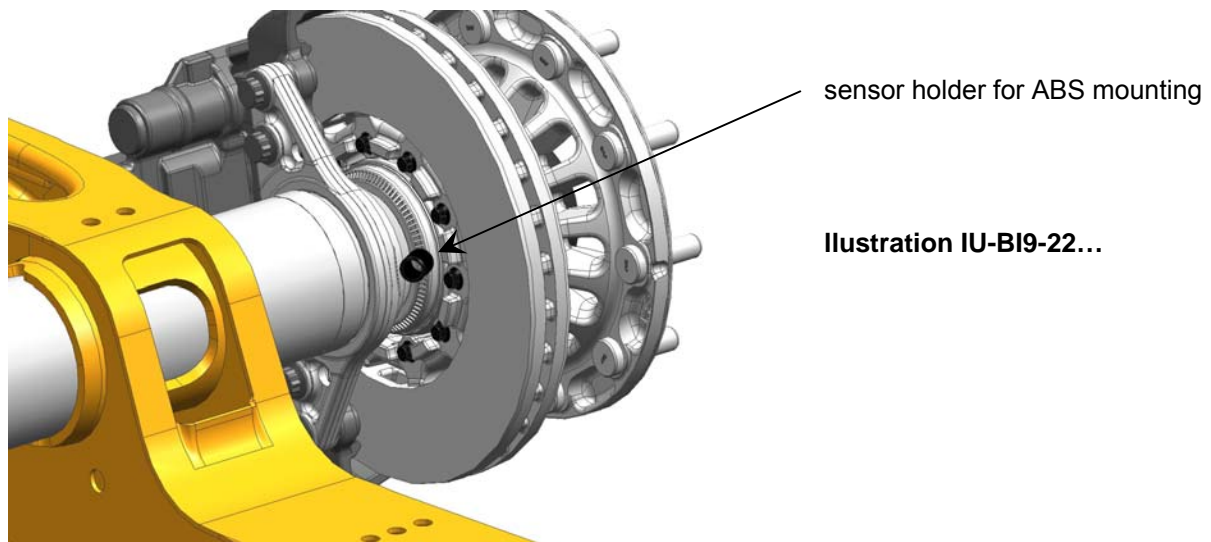
Classification of exciter ring teeth

SAF-HOLLAND standard supplies the exciter ring and sensor bracket preinstalled. The number of teeth is now dependent on the wheel mounting; tire size installed and their dynamic rolling circumference have been taken into consideration.

Wheel fixing			Tire size	Axle version	No. of teeth
bolt pitch circle	centre bore	no. of bolts			
335	280	10	19,5"/ 22,5"	BI(L)9-19	90
			22,5"	BI(L)9-22	
				S(L)9-4218	

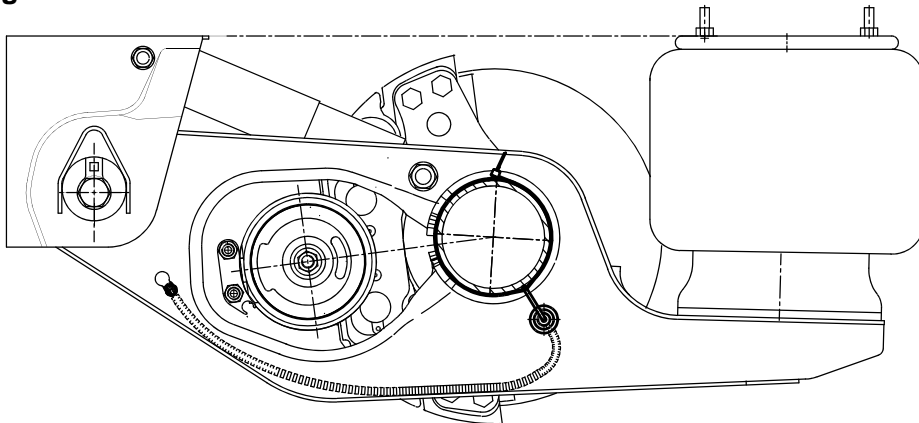
Note:

On the SAF-HOLLAND axle generation 06 (B-, S- and Z-serie) the position of the exciter ring is on the inside of the wheel hub, irrespective of the type of brake (disc or drum).



Installation instruction, ABS cable SAF INTRADISC *plus* INTEGRAL

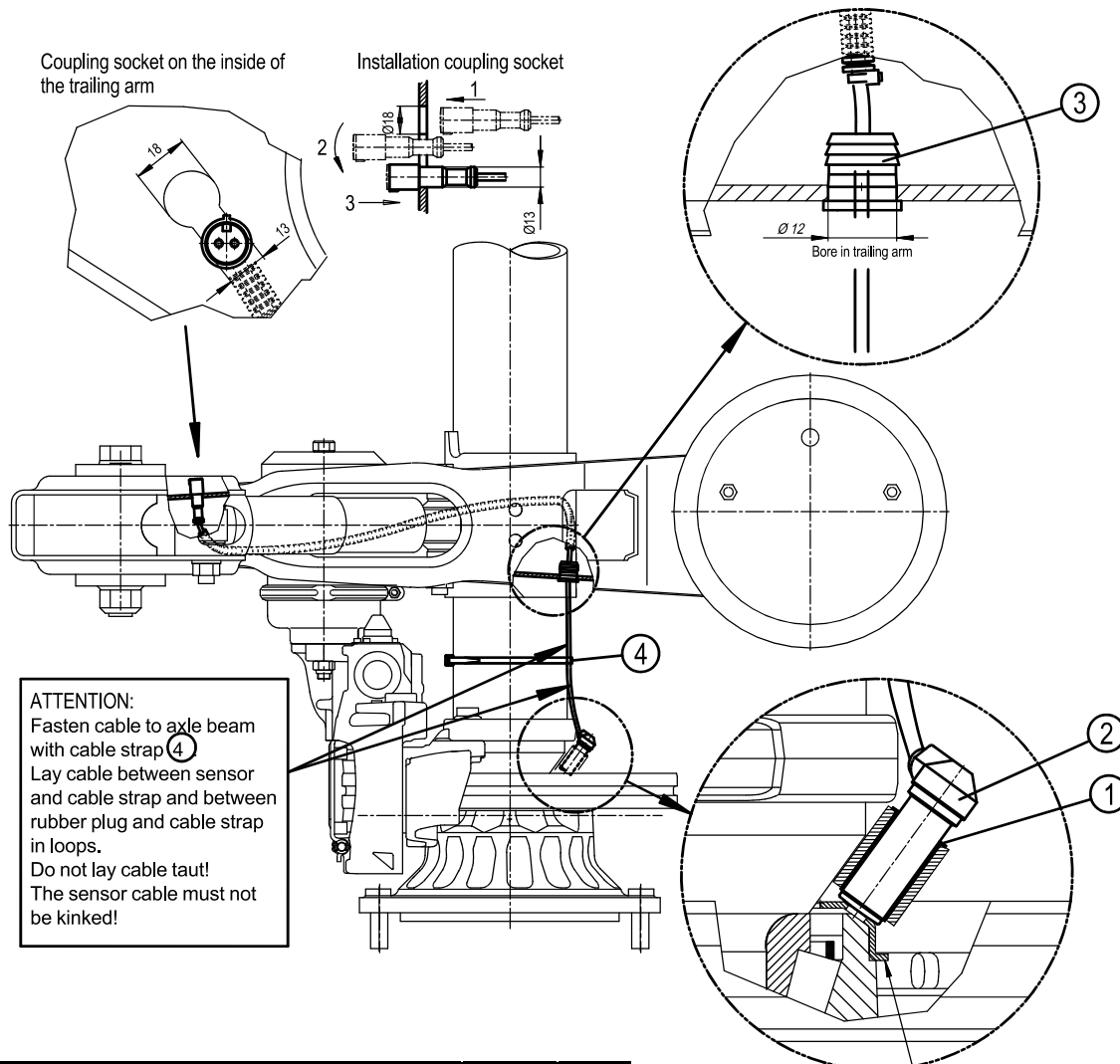
rigid axle



Plug pressed completely into Ø 22 diameter bore in trailing arm

Coupling socket on the inside of the trailing arm

Installation coupling socket



ATTENTION:
Fasten cable to axle beam with cable strap ④
Lay cable between sensor and cable strap and between rubber plug and cable strap in loops.
Do not lay cable taut!
The sensor cable must not be kinked!

EXCITER RING - 90 TEETH

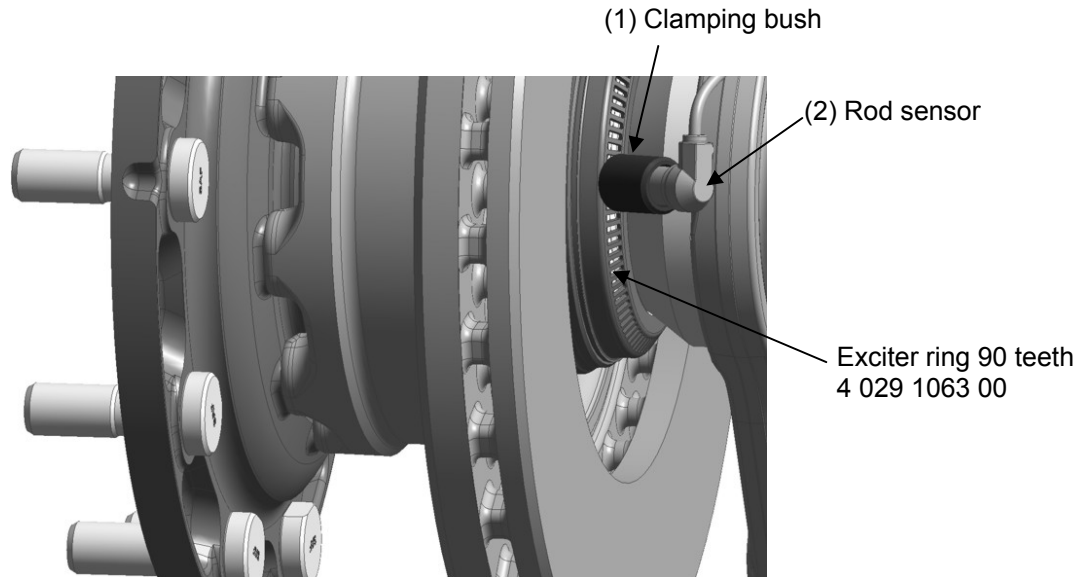
Clamping bush -part ①- pressed in completely
Rod sensor -part ②- pressed in completely

Ordernr. for ABS-group: 3 029 1064 00 (per axle 2x)		pos.:	per kit
clamping bush	4 029 1013 00	1	1x
rod sensor	4 029 1064 00	2	1x
plug	4 337 2028 00	3	1x
cable strap	4 194 2030 01	4	1x

Ref.: 03 029 1064 00

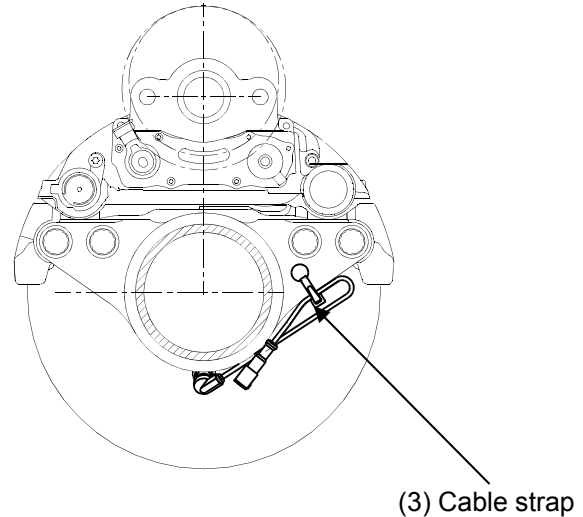
Installation instruction, ABS cable SAF INTRADISC plus INTEGRAL self-steering axle

Clamping bush (1) and rod sensor (2) pressed in completely.



Position the cable with cable strap (3) on the side in the recess of the brake spider. Lay the cable between rod sensor and cable strap in loops.

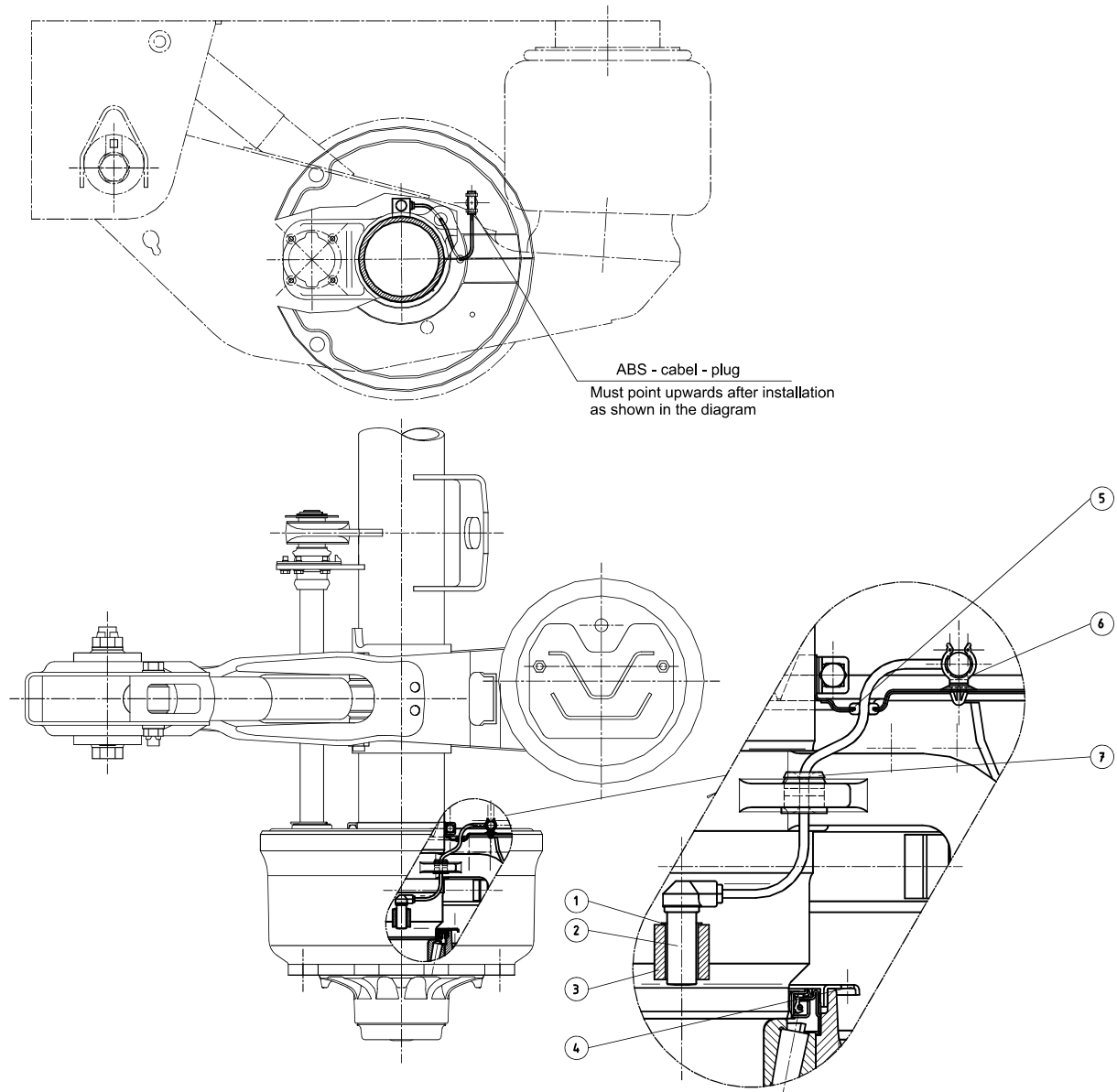
The sensor cable must not be laid taut or kinked!



Ordernr. for ABS-group: 3 029 1002 00 (per axle 2x)		pos.:	per kit
clamping bush	4 029 1013 00	1	1x
rod sensor	4 029 1002 00	2	1x
cable strap	4 194 2031 01	3	1x

Ref.: 03 029 1002 00

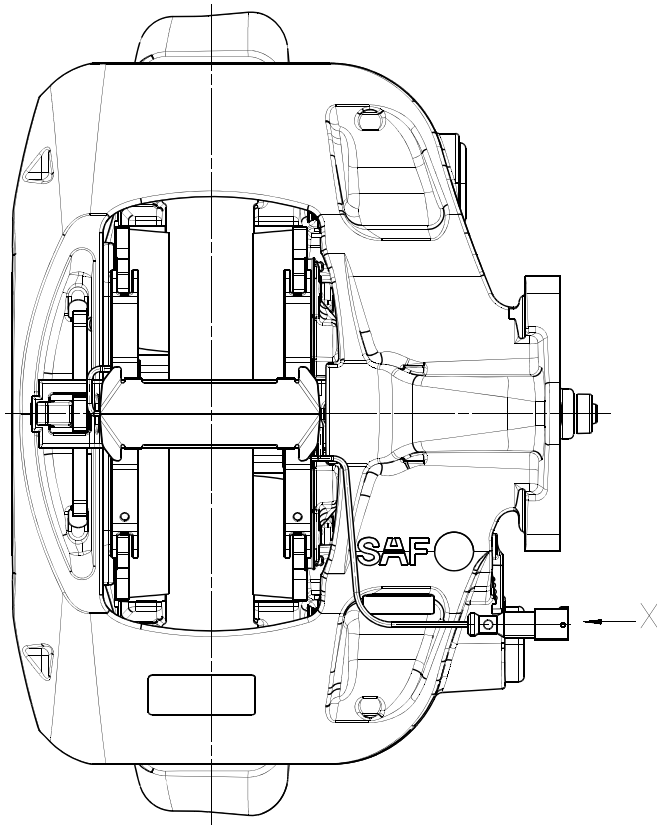
Installation instruction, ABS cable INTRADRUM



Ordernr. for ABS group: 3 029 0234 05 (per axle 2x)		pos ..	per kit
clamping bush	4 029 1013 00	1	1x
rod sensor	4 029 1002 00	2	1x
sensor adapter	-	3	-
exciter ring – 90 teeth	-	4	-
rubber grommet	4 177 3018 00	5	1x
cable clamp	4 189 0044 00	6	1x
plug	4 337 2028 00	7	1x

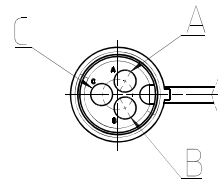
Ref.: 0 029 0002 00

Installation instruction, connecting cable kit for pad wear sensing on SAF calliper



Note:
1 connection cable kit per axle

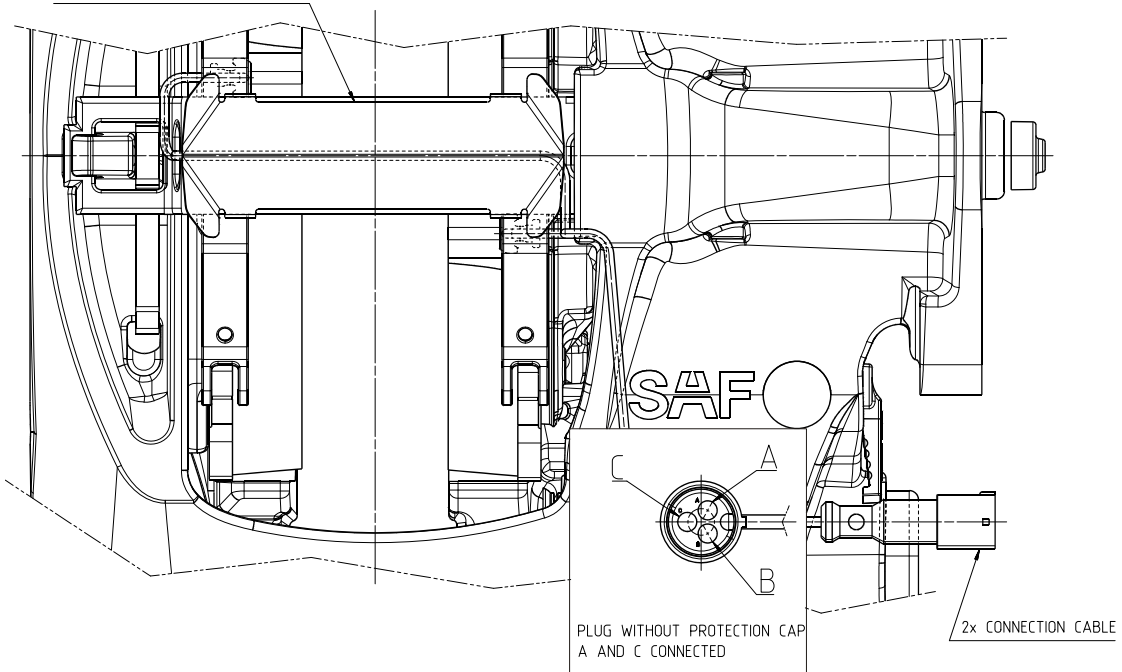
VIEW X



PLUG WITHOUT PROTECTION CAP
A AND C CONNECTED

Brake	Type	connecting cable kit
SBS 2243	SBS2220	3 424 2033 00
SBS 1918	SBS1918	

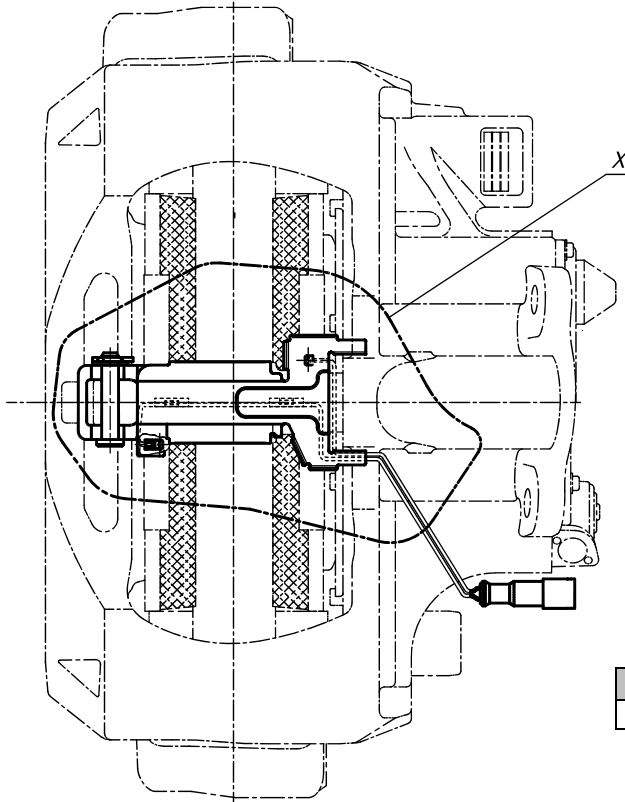
2x MOUNTING PLATE



Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

Installation instruction, connecting cable kit for pad wear sensing on SAF calliper

BREMSSATTEL

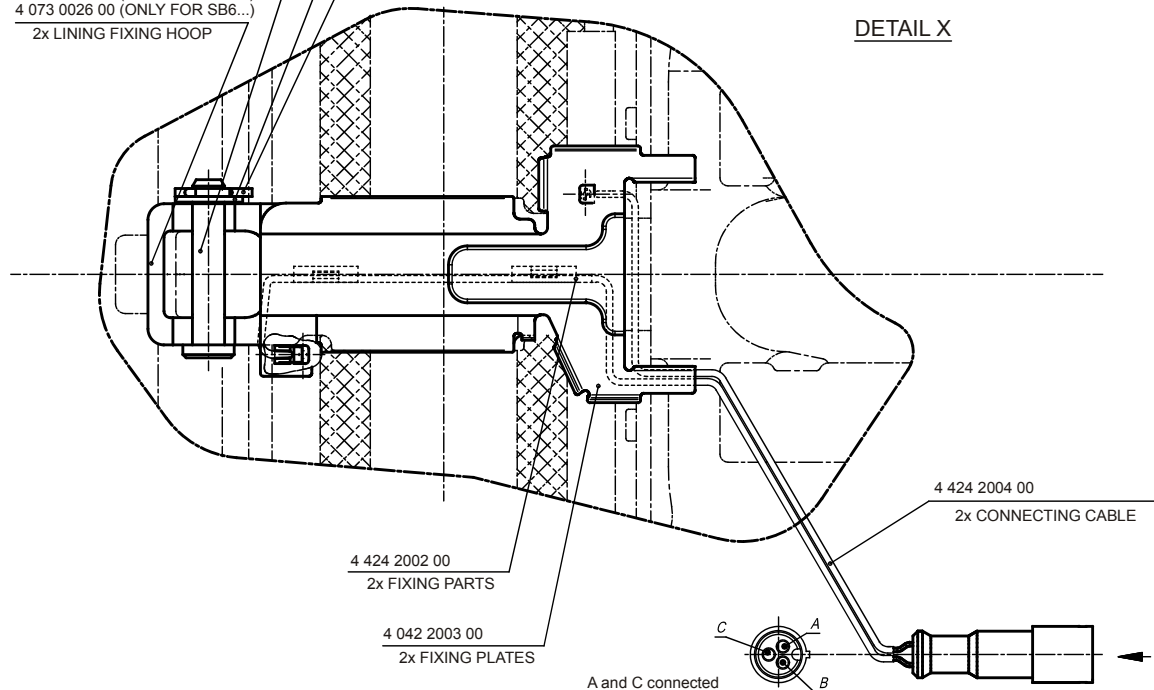


Note:
1 connection cable kit per axle

Brake	Type	connecting cable kit
SBS2243	SBS2220 K0	3 424 2008 00

- 4 353 0034 00
2x SPLINT
- 4 424 2004 00
2x WASHER
- 4 051 0058 00
2x BOLT
- 4 073 0025 00 (ONLY FOR SB7...)
- 4 073 0026 00 (ONLY FOR SB6...)
- 2x LINING FIXING HOOP

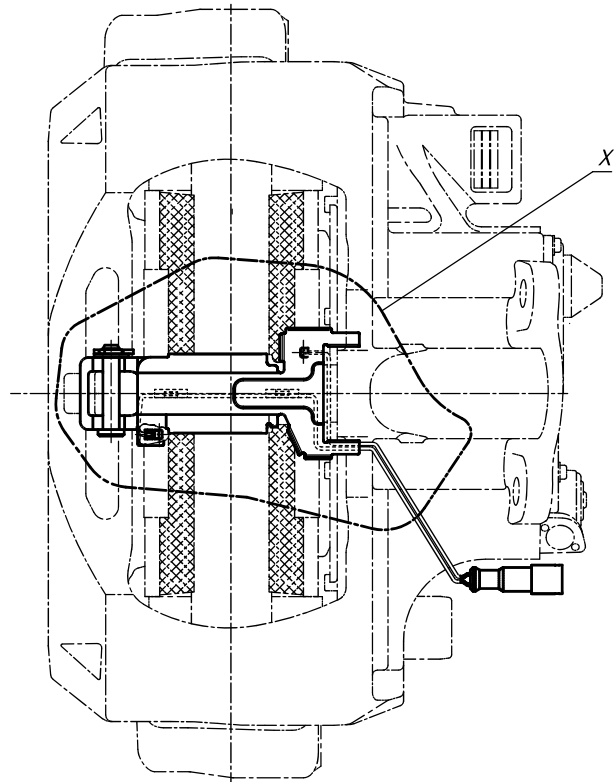
DETAIL X



Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

Installation instruction, connecting cable kit for pad wear sensing on KNORR calliper

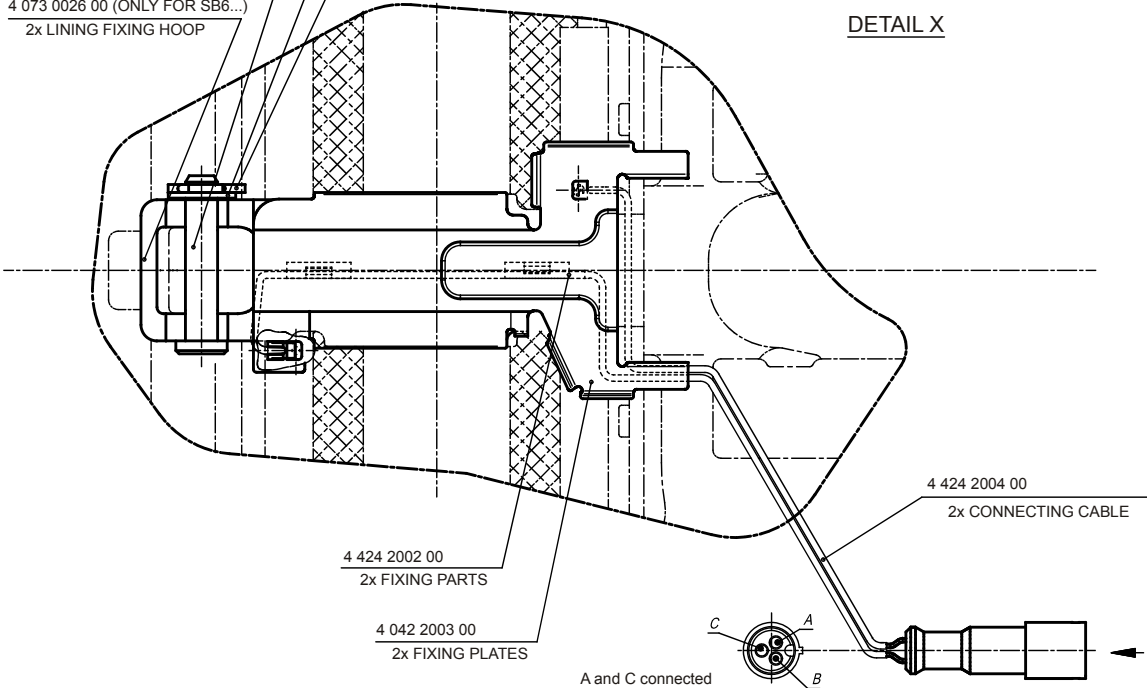
BRAKE CALIPER



Note:
1 connecting cable kit per axle

Brake	Typ	connecting cable kit
SBK 1937	SB6...(SN)	3 424 2008 00
SBK 2243	SB7...(SK)	

- 4 353 0034 00
2x SPLINT
- 4 424 2004 00
2x WASHER
- 4 051 0058 00
2x BOLT
- 4 073 0025 00 (ONLY FOR SB7...)
- 4 073 0026 00 (ONLY FOR SB6...)
- 2x LINING FIXING HOOP



Amendments and errors excepted. XL-AS10002DM-en-DE Rev F © SAF-HOLLAND

SAF-O-Meter

Designation:

Rolling circumference range:	SAF-O-meter orderno.:	Tire example:
2360 – 2455 mm	4 388 0241 00	245/70R17,5" or 235/75R17,5"
2590 – 2690 mm	4 388 0264 00	265/70R19,5"
2655 – 2765 mm	4 388 0271 00	445/45R19,5"
2850 – 2970 mm	4 388 0291 00	425/55R19,5"
2980 – 3100 mm	4 388 0304 00	385/55R22,5"
3125 – 3250 mm	4 388 0319 00	11R22,5" or 295/80R22,5"
3185 – 3315 mm	4 388 0325 00	385/65R22,5"
3420 – 3560 mm	4 388 0349 00	425/65R22,5"

For example:

Tire: 385/65R22,5" with rolling circumference (E.T.R.T.O Norm): 3248 mm

This rolling circumference fits best to the range 3185 - 3315 mm so:

- SAF-O-Meter 4 388 0325 00
- Hub cap 4 304 0103 01.

Installation

Please check before fitting whether you have received the right SAF-O-meter suitable to your tire size



standard hub cap
4 304 0102 01



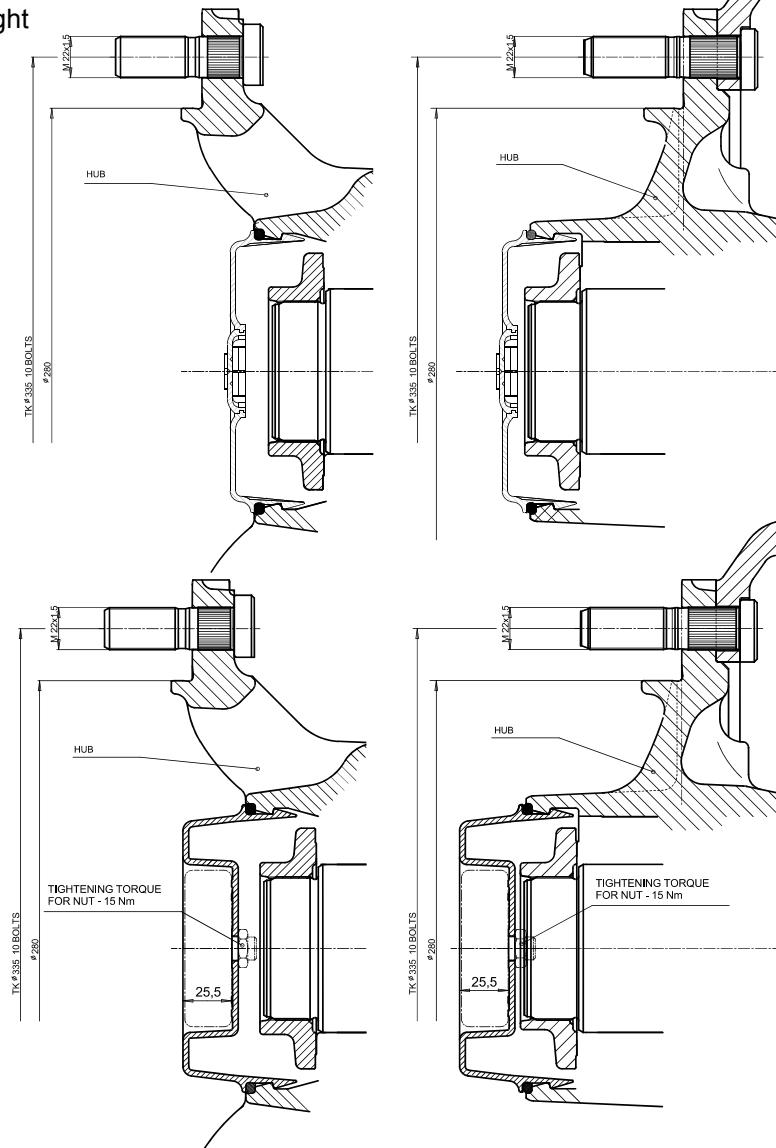
hub cap for SAF-O-meter
4 304 0103 01

axle versions:

B(I)(L/LL)9-22.. and B(I)(L/LL)9-19..

axle version:

S(L)9-4218



The sketches show, irrelevant of the axle versions, how the SAF-O-Meter is fitted in the hub caps. It is not important on which side of the vehicle it is fitted, as the counter functions are independent of the direction of rotation.