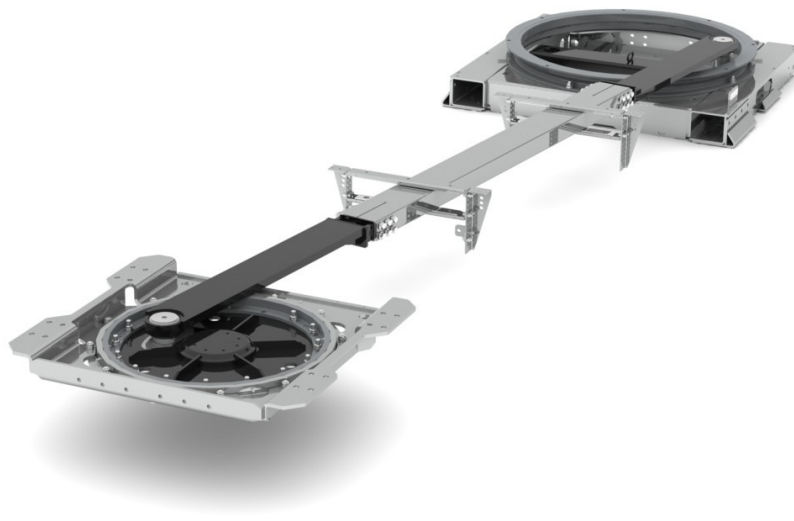


# WAP<sup>TM</sup>

Fahrzeugtechnik GmbH

[www.waptech.de](http://www.waptech.de)

## WAP Forced Steering Instruction Manual



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## **Instruction Manual for Forced Steering Systems**

The information and specifications in this document were compiled with the greatest care. We assume no liability for any deviations.

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## Contents

1	Safety .....	4
1.1	Driving using the steering system .....	4
1.2	Maintenance work .....	4
1.3	Environmental protection .....	4
2	Warranty .....	5
3	Technical Data .....	6
3.1	Model designation .....	6
3.2	Lubricant .....	7
3.3	Tightening torques .....	9
4	Hitching and Unhitching a Trailer .....	10
4.1	Hitching .....	10
4.2	Unhitching .....	10
5	Maintenance .....	11
6	Cleaning .....	11

# Instruction Manual for Forced Steering Systems

## 1 Safety

**WAP Fahrzeugtechnik GmbH assumes no liability whatsoever for any damage caused to the steering system that is caused by a non-adherence to these instructions.**

### 1.1 Driving using the steering system

- Semi-trailers with force-steered axles have other driving properties as vehicles with unsteered axles.
- It is to be taken into account when driving in curves that a steered trailer behaves differently to an unsteered one.
- Please note that the rear of a steered trailed swings out to a greater extent than an unsteered one.

### 1.2 Maintenance work

- The forced steering system is a safety-critical system. Maintenance work is to be carried out with the corresponding care. Maintenance work that is not carried out with care can cause damage and/or result in accidents.
- When working underneath the trailer, the wheels are to have wedges placed under them in such a way that it is ensured that they are unable to roll away.
- If the wheels have been removed, the trailer is to be supported by jacks.
- When dismantling or mounting heavy parts, use suitable lifting tools.
- Avoid unnecessary contact with lubricants and prevent uncovered parts of the body from coming into contact with the corresponding lubricants.
- Only use original spare parts from WAP Fahrzeugtechnik GmbH.

### 1.3 Environmental protection

- Do not pour used lubricants, old oil and hydraulic fluids in drains or sewers or allow them to drain into the soil. This conduct is a punishable offence and is extremely damaging to the environment.
- Hand used lubricants to appropriate companies. These companies ensure that they are correctly disposed of or recycled respectively.
- Never mix used fluids as this can cause health impairments and/or result in serious accidents.

## Instruction Manual for Forced Steering Systems

### 2 Warranty

#### Warranty conditions for WAP forced steering system, Type TFS

The following warranty conditions have validity for the forced steering system, Type TFS from WAP Fahrzeugtechnik GmbH.

Warranty claims only have validity if WAP Fahrzeugtechnik GmbH has been informed of these in advance and it has recognised them.

The warranty performances cover the components and the function of the forced steering. The requirement for this is that the installation is carried out in accordance with the design agreed to WAP Fahrzeugtechnik GmbH, adhering to the installation instructions. All warranty claims are deemed to be invalid in the case of incorrect treatment.

The warranty comes into force on the initial vehicle registration date. This is to be proven by WAP Fahrzeugtechnik GmbH being sent a copy of the vehicle registration document.

The warranty for complete systems is valid for **2 years (24 months)** when the vehicles are used in the following countries:

Germany, the Netherlands, Belgium, Luxembourg, France, England, Switzerland, Austria, Denmark, Sweden, Norway and Finland.

In all other countries, the warranty is valid for **1 year (12 months)**.

The warranty period for spare/replaceable parts is **1 year (12 months)**. The date on which the parts were shipped by WAP Fahrzeugtechnik GmbH. Only original parts from WAP Fahrzeugtechnik GmbH are to be fitted.

The warranty period for the entire system is not altered by a replacement of new parts.

Borchen, valid September 2008

## Instruction Manual for Forced Steering Systems

### 3 Technical Data

#### 3.1 Model designation

WAP	2	A	V200	1200-1300/140/26°	
	1				Trailer with one axle
	2				Trailer with two axles
	3				Trailer with three axles
		A			one axle steered
		B			two axles steered
			V140		Bolts offset hitch plate
				980-1100/100/24° 980-1100/100/28° 980-1100/140/24° 980-1100/140/28° 1200-1300/100/21° 1200-1300/100/18° 1200-1300/140/21° 1200-1300/140/18°	Rotary frame FM/ height/ max. steering angle
			V165		Bolts offset hitch plate
				980-1100/100/28° 980-1100/100/33° 980-1100/140/28° 980-1100/140/33° 1200-1300/100/21° 1200-1300/100/24° 1200-1300/140/21° 1200-1300/140/24°	Rotary frame FM/ height/ max. steering angle
			V180		Bolts offset steering frame
				980-1100/100/30° 980-1100/100/36° 980-1100/140/30° 980-1100/140/36° 1200-1300/100/23° 1200-1300/100/26° 1200-1300/140/23° 1200-1300/140/26°	Rotary frame FM/ height/ max. steering angle
			V200		Bolts offset steering frame
				980-1100/100/34° 980-1100/100/41° 980-1100/140/34° 980-1100/140/41° 1200-1300/100/26° 1200-1300/100/30° 1200-1300/140/26° 1200-1300/140/30°	Rotary frame FM/ height/ max. steering angle

## Instruction Manual for Forced Steering Systems

### 3.2 Lubricant

**In order to meet the warrant conditions and ensure the shelf life of the forced steering system, only lubricants are to be used that are con form with the following specifications:**

WAP Fahrzeugtechnik GmbH assumes no liability for damage that is caused

- by using a lubricant that does not meet the following requirements
- by exceeding the maintenance intervals.

**In order to ensure a perfect lubrication, the grease that is used is to have the following properties:**

- resistant to high loads and impacts
- collar formation
- good adhesion to metals (steel)
- good thermal and mechanical stability
- water resistance
- corrosion resistance
- minimal environmental burden

#### Grease application

The following grease application forms are permissible:

- manual lubrication
- automatic lubrication (central lubrication)

#### Greasing the turntables

The turntables are fitted with lubricating nipples around their circumferences. The lubricating nipples are connected to a central nipple block on the steering frame or the rotary frame respectively. An automatic lubricating system can be connected to this central nipple block. If automatic lubrication should not be carried out, then manual lubrication has to take place.

The turntables are filled with grease ex works.

#### Grease quantities that are to be pumped during automatic lubrication

- Turntable: 35 grams / 80 operating hours
- Coupler area: 20 grams / 80 operating hours

## Instruction Manual for Forced Steering Systems

### Lubricating the spherical plain bearings in the steering rods

Lubricating nipples are mounted on the seats between the spherical plain bearings and the steering rods. These can either be connected to the central lubrication system or lubricated manually.

#### **Permissible greases:**

#### **Only NGI Class 2 greases are permissible**

- worked penetration (in 0.1mm) pursuant to DIN ISO 2137: 265-295
- temperature range: between -20 and 150 °C

At temperatures lower than -20°C, types of grease that are suitable for such temperatures are to be used and they are also to be conform with the above specifications.



## Instruction Manual for Forced Steering Systems

### 3.3 Tightening torques

Screw Sizes	Tightening Torque (Nm) in Property Class		
	8.8	10.9	12.9
<b>Standard thread</b>			
M 4	2,8	4,1	4,8
M 5	5,5	8,1	9,5
M 6	9,6	14	16
M 8	23	34	40
M 10	46	67	79
M 12	79	115	135
M 14	125	185	220
M 16	195	290	340
M 18	280	400	470
M 20	395	560	660
M 22	540	760	890
M 24	680	970	1150
M 27	1000	1450	1700
M 30	1350	1950	2300
<b>Fine-pitch thread</b>			
M 8 x 1	25	37	43
M 10 x 1.25	49	71	83
M 12 x 1.25	87	130	150
M 12 x 1.5	83	120	145
M 14 x 1.5	135	200	235
M 16 x 1.5	210	310	360
M 18 x 1.5	315	450	530
M 20 x 1.5	440	630	730
M 22 x 1.5	590	840	980
M 24 x 2	740	1050	1250
M 27 x 2	1100	1550	1800
M 30 x 2	1500	2150	2500
<b>Flange screws</b>			
M 14 x 1.5		160 + 10	
M 16 x 1.5		250 + 10	

It is possible to deviate from the above tightening torques in special cases. You will find a summary of the screws that are used and their tightening torques together with the lubrication points in the annex.

## Instruction Manual for Forced Steering Systems

### 4 Hitching and Unhitching a Trailer

#### 4.1 Hitching

- When hitching, it is to be ensured that the hitch plate and the rim plate are at the same height.  
**Different hitching heights can result in an undesirable driving conduct of the trailer.**
- The motor tractor and the trailer are to be in a line when being hitched. The hitching of the trailer at an angle is **not** permitted as this can result in a misalignment and/or damage being caused to the forced steering system.

#### 4.2 Unhitching

- The motor tractor and the trailer are to be in a line when being unhitched.
- The combination is to be on a level and horizontal surface.
- The trailer supports are to be extended until the trailer retains its height after it has been unhitched.
- The motor tractor is to be driven out from under the trailer in a straight line. Unhitching at an angle is **not** permitted.

## Instruction Manual for Forced Steering Systems

### 5 Maintenance

#### Maintenance intervals

##### Upon delivery:

- lubricate all of the parts of the rotary rim of the steering frame and the rotary frame that are to be lubricated.

##### After 10,000km or after two months (whichever comes first):

- ensure that all of the screwed connections are firmly seated and tighten if necessary.
- lubricate all turntables and all other parts that are to be lubricated, should they not be connected to an automatic lubrication system.
- visual inspection for any signs of damage.

##### All 30,000km or after three months (whichever comes first):

- check all screwed connections for a firm seat and tighten if necessary.
- lubricate all turntables and all other parts that are to be lubricated, should they not be connected to an automatic lubrication system.
- visual inspection for any signs of damage.

##### **If used under extreme conditions, maintenance work is to be carried out every 10,000km or every two months (whichever comes first).**

The following are deemed to be extreme conditions:

- driving in countries in which there are above average amounts of rain and/or large amounts of salt are used for de-icing in winter.
- driving on poor roads (e.g. construction sites)
- regular cleaning of the vehicle with chemicals.

**You will find a summary of the screws that are used and their tightening torques together with the lubrication points in the annex.**

### 6 Cleaning

Please observe the following if the trailer is cleaned using a high-pressure cleaner:

- do not aim the water jet at rotary rims, bearings and bearing seals.
- Grease greasing points after cleaning.