

# Compact tank made of steel

## Type TMS

**RE 57120**

Edition: 2015-11



### Features

- ▶ Tank for hydrostatic fan drive systems or rotatory drive systems, railroad construction drive systems and cooling circuits
- ▶ Supply of fan pump or of the system components
- ▶ Compensation of system-related temperature, pressure and filling level variations
- ▶ Robust steel design for the mobile application range
- ▶ Compact dimensions and low weight
- ▶ Reduction of the oil volume and thus of the fire load and environmentally friendly maintenance concept
- ▶ Increase in the service life of the hydraulic fluid and the life cycle of the system components
- ▶ Large flow range
- ▶ Little maintenance efforts
- ▶ Version for rail traffic engineering available
- ▶ Level and temperature monitoring
- ▶ Large system volumes possible

### Contents

Ordering code for standard program	2
Preferred types	2
Function	3
Level monitoring	3
Electric level monitoring type TMS	4
Technical data	5, 6
Dimensions	7, 8
Pin assignment: electric level monitoring	9
Installation information	10
Fire protection notes DIN EN 45545	11
General notes	11
Maintenance	12
Spare parts	12
Safety instructions	13, 14

## Ordering code for standard program

01 02 03 04 05

<b>TMS</b>				-	<b>1X</b>
------------	--	--	--	---	-----------

### Design

01	Compact tank made of steel for mobile applications	<b>TMS</b>
----	--	------------

### Level monitoring version

02	<b>Without</b> electric level monitoring	<b>N</b>
	<b>- With electric level monitoring</b>	
	Permanent <b>with</b> analog output signal / detector	<b>D</b>
	Float switch with 2 switching points at minimum and maximum filling level / float switch	<b>S</b>

### Capacity

03	Inner volume of tank 16 liters (standard)	<b>16</b>
	Variable adjustment to the system volume possible by adjustment of the tank height	

### Application range

04	Design according to the corresponding established standardization in rail vehicle technology (e. g. DIN EN 15085 and DIN EN 45545)	<b>no code</b>
	Design according to different requirements	<b>A</b>

### Series

05	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	<b>1X</b>
----	--	-----------

## Preferred types

Material no.	Type code	Comment
<b>R901405247</b>	TMSD 16-1X	Detector / sensor
<b>R901426278</b>	TMSS 16-1X	Float switch
<b>R901431171</b>	TMSN 16-1X	Without electric level monitoring

## Function

The robust tanks are intended for open hydraulic circuits and especially for hydrostatic fan drive systems or rotatory drive systems, railroad construction drive systems and cooling circuits. Thanks to their low weight and compact dimensions, the tanks are particularly suitable for mobile applications.

Optionally, the tank can supply several pumps. In the breathing filter, one check valve for ventilation and one for bleeding and a filter element for the protection against the deposition of dirt are installed in the system. This ensures that a change in volume of the hydraulic fluid due to temperature influences is possible without any problems and a preload pressure is generated in the hydraulic circuit during operation. By means of an oil dip stick which is integrated in the breathing filter, the filling level can be visually checked. Due to the automatic pressure increase as a consequence of the temperature increase in the tank, cavitation of the pump is prevented. Thanks to optimized degassing, the service life of the hydraulic fluid and as a result also the life cycle of the system components is extended.

The tanks are equipped with a visual filling level indicator by default and optionally with a temperature sensor. The optional electric filling level indicator shows variations from the target condition or shuts the system down in case of an error.

## Level monitoring

Independent from the version of the electric level monitoring, all tanks are equipped with a visual filling level indicator in the form of an oil dip stick. The oil dip stick is integrated in the breathing filter. You can access the oil dip stick by unscrewing the breathing filter. The stick has markings for the minimum and the target filling level at **20 °C** as well as for the **maximum filling level**. This ensures that the filling quantity can be checked manually at commissioning and during operation. The filling level is correctly determined in the screwed in condition and can be read from the moistened height at the oil dip stick.

## Hydraulic fluid

The tank is approved for the use in systems with the following hydraulic fluids:

- ▶ Hydraulic oils according to DIN 51524, part 2 and part 3 or HLP and HVLP, e. g. "Shell Tellus HLP 32"
- ▶ Engine oils, e. g. "Shell Rimula R6 ME 5W-30"
- ▶ Cooling liquids/glycol/water mixtures, e. g. Clariant Antifrogen N 60/40 and Clariant Antifrogen N 52/48

## Condition as supplied

In the condition as supplied, the connections of the tank are completely closed by screw plugs and flange covers. The tanks are shipped on a standard pallet on which the collar and cover are tied down. The components are protected against transport damage by filler material (e. g. Padpak paper).

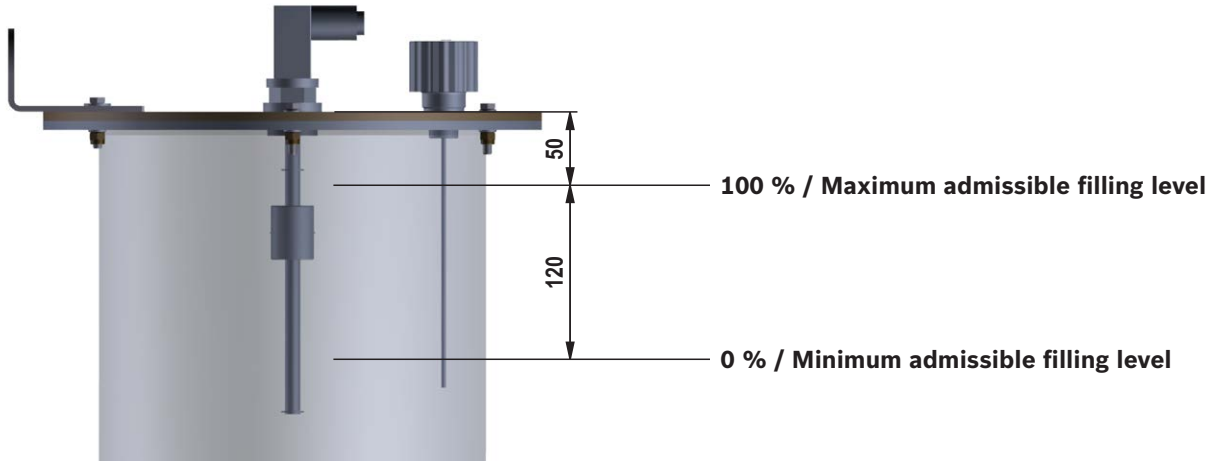
In addition, an electric level monitoring may optionally be installed in the tank which automatically checks the filling level during operation.

The following options for electric level monitoring can be implemented:

- ▶ **TMSD:** Permanent monitoring in steps of 5 mm between minimum and maximum admissible filling level
- ▶ **TMSS:** Monitoring by means of two switching points for minimum and maximum filling level
- ▶ **TMSN:** No additional electric level monitoring

**Electric level monitoring type TMS**  
(dimensions in mm)

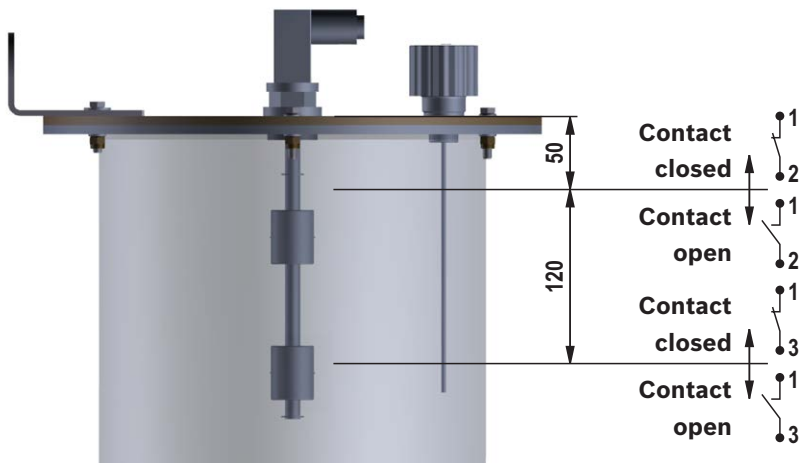
**Version "D"**



Symbolic representation of the electric level monitoring with permanent output signal. The system is not automatically shut off if the admissible filling level is undercut or exceeded. An automatic shut-off can be implemented

e. g. by using an RC28-14/30 BODAS control unit (not included in the scope of delivery). If you are interested, please contact the relevant specialist department.

**Version "S"**



Symbolic representation of the electric level monitoring with fixed switching points.

**Technical data**

(for applications outside these values, please consult us!)

<b>general</b>				
<b>Design</b>		<b>TMSD</b>	<b>TMSS</b>	<b>TMSN</b>
Electric level monitoring		Permanent (5 mm increments)	2 switching points (maximum / minimum)	None
Maximum flow	l/min	350		
Tank material		1.0579+N /S355J2C+N		
Weight (empty)	kg	23.5		
Weight (target filling level at 20 °C).	kg	33		
Operating temperature range	°C	-30 ... +90		
Total volume of tank	l	16		
Filling volume at 20 °C	l	10.6		
Maximum admissible system volume (incl. filling volume at 20 °C)				
	▶ Hydraulic oil	l	70	
	▶ Engine oil	l	65	
	▶ Clariant Antifrogen N 60/40	l	81	
	▶ Clariant Antifrogen N 52/48	l	85	
Filter properties		Filter rating of breathing filter: 2 µm Solenoid plug: iron particles dissolved in the medium		
Minimum wall thickness of the jacket	mm	3		
Internal tank pressure resulting from bleeding / air suction function	bar (relative)	-0.03 (±0.015) ... +0.35 (±0.1)		
Maximum pressure at return flow and leakage line	bar (absolute)	2.5		
Electrical connection	V	AC < 50 / DC < 75 (protective extra-low voltage)		
Protection class	IP	65		
Coating		Duplex coating (powder coating with CED priming) according to BN918340		
Installation position		Vertical		
Maximum inclination	°	8		
Corrosion protection		DIN EN ISO 12944: Protection period 5 ... 15 years with corrosivity category C4 strong or according to BN 918340		
Supplies		Rail approval / free from chromium(VI)		
Resistance against vibrations and shocking		DIN EN 61373: Category 1, class B		
Fire protection according to DIN EN 45545-2		Hazard level 3		
Color		Outside: RAL 7032 (pebble gray) Inside / priming: RAL 9005 (deep black)		

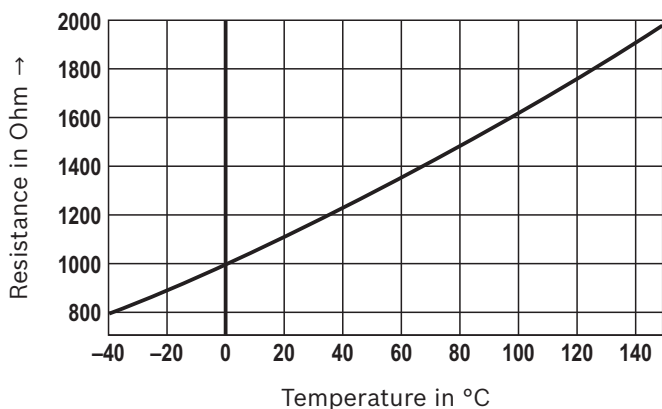
<b>electric level monitoring type TMS version "D"</b>			
Supply voltage	V	DC < 1 V without current limitation (e. g. by using an RC28-14/30 BODAS control unit (not included in the scope of delivery))	
Supply current	mA	< 5	
Total resistance between pin 1 and pin 2	Ω	2000	
Series resistance at pin 2	Ω	200 (cable break monitoring)	
Increments	mm	5	
Protection class according to EN 60529 with connector (PG 11)	IP	65	
Material		1.4571 / X6CrNiMoTi17-12-2	
Density of operating medium	kg/m <sup>3</sup>	≥ 800	
Oscillation resistance	m/s <sup>2</sup>	5.9	
Shock resistance	m/s <sup>2</sup>	50	
Maximum filling level from sealing surface	mm	50	
Minimum filling level from sealing surface	mm	170	
Tested acc. to.		BN 411002 / DIN EN 50155 and DIN EN 61373	
The mating connector is included in the scope of delivery			

**Technical data**

(for applications outside these values, please consult us!)

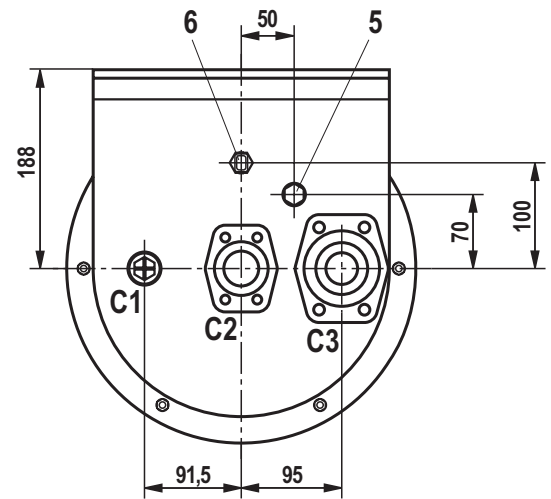
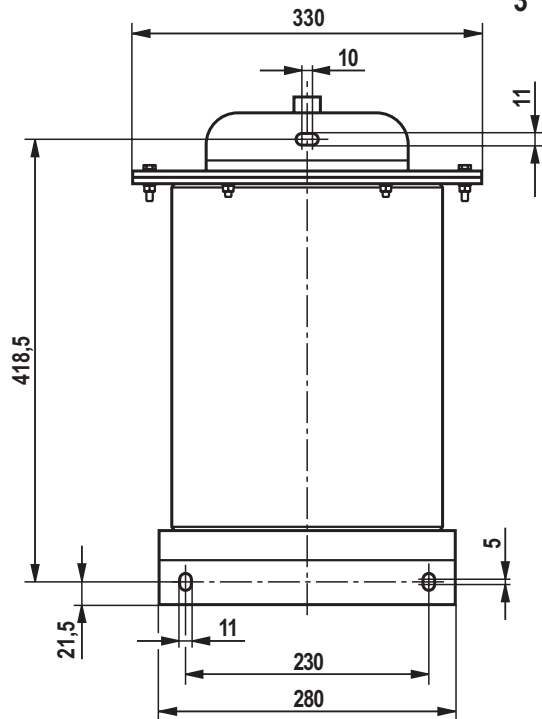
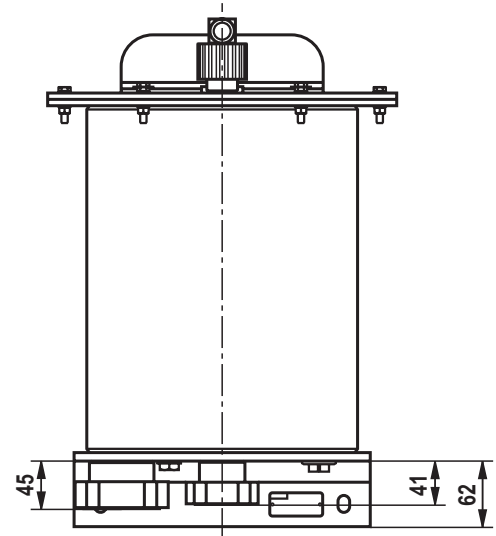
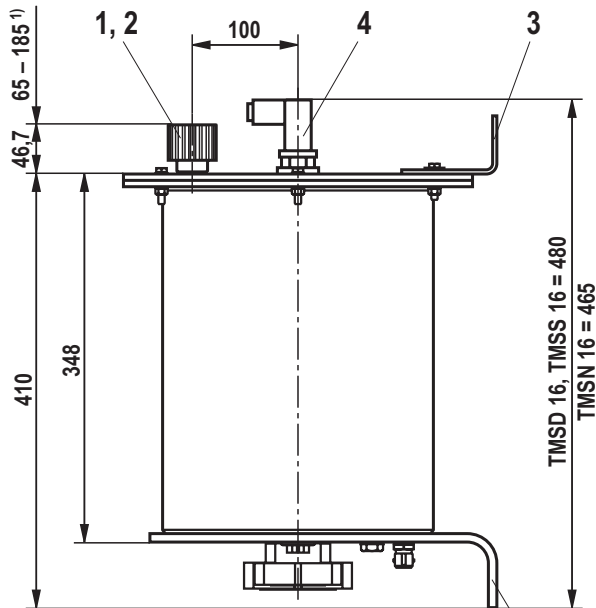
<b>electric level monitoring type TMS version "S"</b>		
Supply voltage	V	AC < 230 (50 Hz)
Supply current	mA	< 5
Power	W	< 5
Series resistance at pin 1	$\Omega$	200 (cable break monitoring)
Switching characteristic of both switching points		Closes at increasing level, opens at falling level
Protection class according to EN 60529 with connector (PG 11)	IP	65
Material		1.4571 / X6CrNiMoTi17-12-2
Density of medium	kg/m <sup>3</sup>	$\geq 800$
Oscillation resistance	m/s <sup>2</sup>	5.9
Shock resistance	m/s <sup>2</sup>	50
Maximum filling level switching point from sealing surface (S2)	mm	50
Minimum filling level switching point from sealing surface (S1)	mm	170
Tested acc. to.		BN 411002 / DIN EN 50155 and DIN EN 61373
The mating connector is included in the scope of delivery		

<b>Temperature sensor type TSF</b>		
Nominal voltage	V	DC approx. 0.45 V depending on measurement current (e. g. by using an RC28-14/30 BODAS control unit (not included in the scope of delivery)) and ambient temperature
Measurement range	°C	-40 ... +150
Resistance at 0 °C	$\Omega$	1000
Tolerance		
▶ at 20 °C	K	$\pm 0.5$ corresponds to $\pm 0.3$ % of $R_{20}$
▶ at 100 °C	K	$\pm 1.1$ corresponds to $\pm 0.5$ % of $R_{100}$
Maximum admissible current	mA	5
Time constant (in standing water)	s	11
Dead time	s	1
Vibration resistance	g	40
Protection class according to EN 60529 with connector	IP	65
Plug-in connection		Jet connector, 2-pole
Flat connector according to		DIN 46244
Tested acc. to.		DIN EN 61373
The connector set is included in the scope of delivery and supplied together with the ordered tank		



## Dimensions: TMS

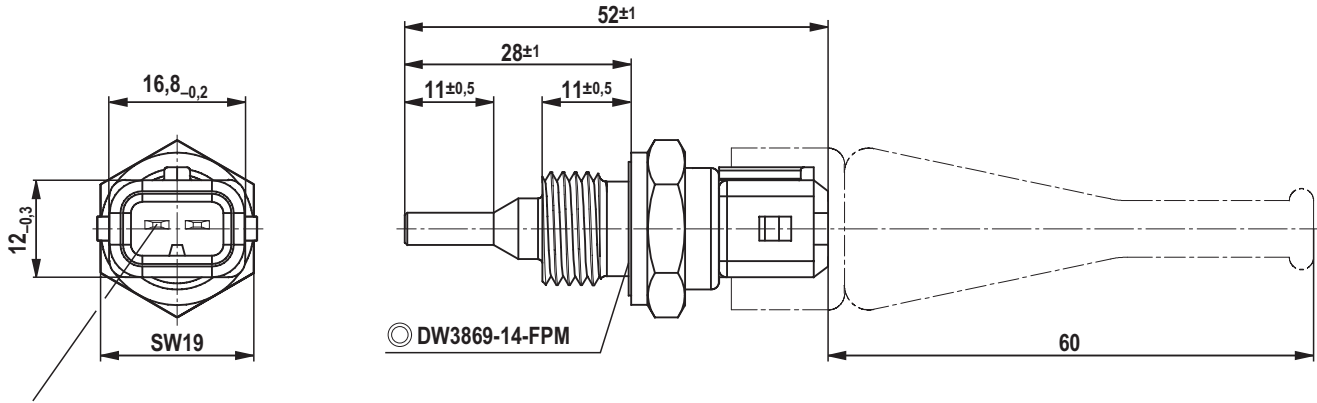
(dimensions in mm)



- 1 Breathing filter incl. "2" / filling opening
- 2 Fluid level monitoring (visual) / oil dip stick
- 3 Mounting points
- 4 Fluid level monitoring (electric)
- 5 Oil drain plug (magnetic)
- 6 Temperature sensor, see page 8
- C1 Drain line (M26 x 1.5)
- C2 Return line (flange SAE 1 1/4S-42,0X3,0-G140ST)
- C3 Suction line (flange SAE 2 S-60,3X3,6-G016ST)

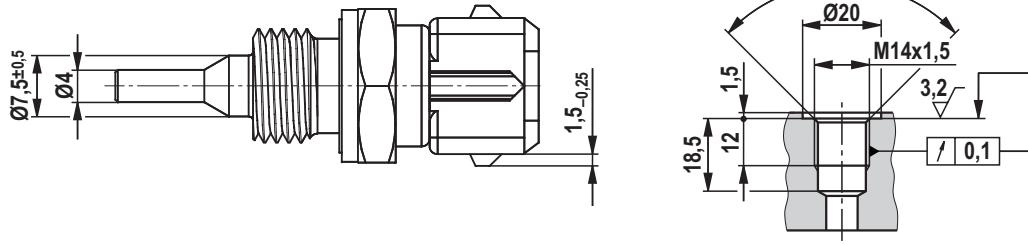
<sup>1)</sup> Servicing height for breathing filter exchange

**Dimensions: Temperature sensor**  
(dimensions in mm)



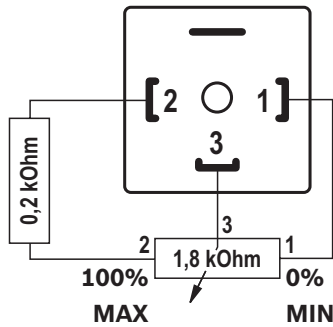
Flat connector 2.8 x 0.8 according to DIN 46244 without snap-in hole  
Gold-plated surface  $0.5 \mu\text{m}$   
Tightening torque: 30 Nm

Threaded hole for screw-in stud DIN 3852 part 11 form E



## Pin assignment: electric level monitoring type TMS

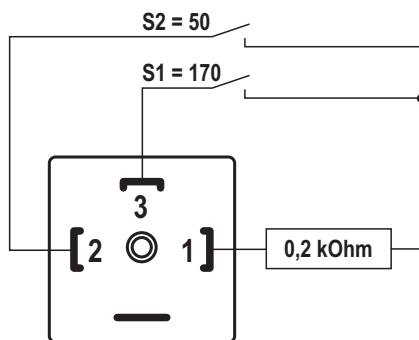
### Version "D"



#### Plug-in connection included in the scope of delivery:

- ▶ 3-pole plug-in connection according to DIN EN 175301-803-A or DIN 43650
- ▶ Cable gland PG11 for cable diameter 6 ... 9 mm
- ▶ Maximum wire cross-section 1.5 mm<sup>2</sup>
- ▶ Additional ground terminal for equipotential bonding
- ▶ Mating connectors for controlling electrically operated valves and sensors

### Version "S"



#### Plug-in connection included in the scope of delivery:

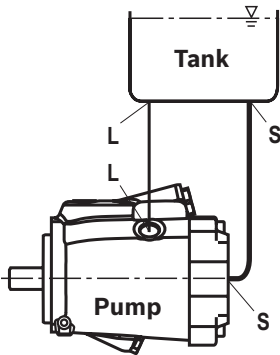
- ▶ 3-pole plug-in connection according to DIN EN 175301-803-A or DIN 43650
- ▶ Cable gland PG11 for cable diameter 6 ... 9 mm
- ▶ Maximum wire cross-section 1.5 mm<sup>2</sup>
- ▶ Additional ground terminal for equipotential bonding
- ▶ Mating connectors for controlling electrically operated valves and sensors

## Installation information

Piping from tank to pump:

Port	Pump / tank port
L	Highest leakage oil connection of pump / tank
S	Suction line of pump / tank outlet
R	Return line of pump / tank inlet

Use of the tank with several pumps is possible by means of a distributor piece (not included in Bosch Rexroth's scope of delivery) at port "S".



### Installation position (recommendation)

The minimum oil level in the tank should always be above the pump. To ensure perfect sucking properties of the pump, the suction line must be laid from the tank to the pump with a continuous gradient.



#### Notices:

- ▶ The installation position must be selected so that the tank will not be damaged in case of an accident.
- ▶ The mounting of the tank must withstand all loads to be expected.
- ▶ The tank may only be mechanically loaded at the mounting points.
- ▶ It must be ensured that leaking hydraulic fluid does not contact ignition sources (hot vehicle parts, sparks) in the case of damage.
- ▶ To exchange the breathing filter in the installation situation, to manually check the filling level and to fill the tank or system, the filter must be unscrewed and removed from the tank from above. This means that a sufficient clearance area above the breathing filter is required. For vertical removal, a clearance area of at least 185 mm is necessary. For inclined removal, a clearance of approx. 65 mm to any components / assemblies installed above may already be sufficient.
- ▶ To fill or drain the tank / system, a sufficient clearance area above the filling port (breathing filter port) and below the oil drain plug must be observed to ensure it is possible to access the relevant openings using required equipment or aids (cans, catch basins, pressure and suction devices) according to their standards.

## Fire protection notes DIN EN 45545

The container has been tested according to the requirements as per DIN EN 45545 (Fire protection on railway vehicles).

Due to the small surfaces and the low weight of the flammable components (including grouping regulations), only the fire behavior of the outer coating, which is considered as listed, must be verified according to DIN EN ISO 5658-2 for a layer thickness of < 0.3 mm.

The tank is considered as an external design feature or as a container for outdoors (EX5, EX6A, EX6B).

Based on the test according to DIN EN ISO 5658-2, the tank complies with the requirements for hazard level 3 (HL3).

Based on the standard and the test results, there are additional application ranges. If you have any questions, please contact the relevant specialist department.

## General notes

Project planning, assembly and commissioning of a tank requires the employment of trained experts.

The hydraulic working and functional connections are only intended for the attachment of hydraulic lines.

Manufacturer's specifications on the tightening torques of the fittings used are to be observed!

For the connection of the drain line, we recommend using pipe fittings or fittings according to DIN 3852-1 or according to the designation "screw-in stud 3852-1-A-M26x1.5" in combination with a copper seal ring according to DIN 7603 or according to the designation "seal ring DIN 7603-A33x39-Cu". The components are not included in the scope of delivery but can be ordered from Rexroth. In addition, we recommend using a torque of 90 Nm.

If other components or torques are used, please consult the relevant specialist department to prevent damage and leakage.

No faulty components must be used. If components fail or show malfunctions, they have to be repaired immediately. During and shortly after operation, the housing temperature of the tank increases. Suitable safety measures are to be taken (e. g. wear protective clothing / gloves).

### Intended use:

- ▶ Rexroth tanks are intended for open hydraulic circuits.
- ▶ The Rexroth warranty applies only to the configuration supplied if the limitations of use indicated in this data sheet are observed. Any modification, reduction, extension of the components / system or the operation outside the specified limitations of use will void the warranty.

## Maintenance

The life cycle of the hydraulic pump decisively depends on the hydraulic fluid quality in the tank. We recommend exchanging the hydraulic fluid after 2000 operating hours or at least once per year.

The breathing filter **R901426694** should be exchanged every 1000 operating hours at the latest, at least, however, once per year. The breathing filter is only fastened hand-tight (5<sup>+2</sup> Nm). You can order the breathing filter from Rexroth as a spare part.

The seal ring **R900204369** should be exchanged at least every 8 years.

In addition, we recommend checking your system / unit regularly for correct filling level, hydraulic fluid quality, leak-tightness, damage, tight fit and corrosion. For an overview of the corresponding time intervals, refer to the maintenance schedule.

This list is to be understood as an amendment and not as a replacement of your internal maintenance regulations. All spare parts can be found in the spare part list.

### Maintenance schedule

No.	Activity / maintenance interval	1.5 months	3 months	1/2 y.	1 y.	2 y.	4 y.	8 y.	Alternative: Operating hours
1	Check filling level / cooling liquid level of tank			X <sup>1)</sup>					
2	Quality control of the operating medium ► Check the medium for characteristic values (e. g. cleanliness, frost and corrosion protection) Exchange the medium if the quality is poor				X <sup>1)</sup>				2000
3	Visual inspection / leak-tightness of the system ► Piping ► System components Exchange the relevant components	X <sup>1)</sup>							
4	Check for tight seat / mounting, corrosion and damage ► Mechanical attachment parts / interfaces ► Electrical attachment parts / interfaces In case of loose seat / mounting, tighten the components; in case of damage, exchange the components.		X <sup>1)</sup>						
5	Exchange of the breathing filter <b>R901426694</b>				X				1000
6	Exchange of the seal ring <b>R900204369</b>							X	

<sup>1)</sup> maintenance interval and scope must be defined by the vehicle manufacturer. The specifications constitute a recommendation.

## Spare parts

Material no.	Spare part	Additional description	Tightening torque
<b>R901426339</b>	Level detector / sensor	Permanent monitoring (TMSD)	60 Nm
<b>R901426340</b>	Float switch	Switching points at minimum and maximum (TMSS)	60 Nm
<b>R913048568</b>	Plug screw	Cap cover (TMSN)	140 Nm
<b>R900209895</b>	Seal ring of plug screw	Cap cover seal (TMSN)	-
<b>R901426694</b>	Breathing filter	Air off: +0.35 bar / air on: -0.03 bar	5 <sup>+2</sup> Nm (hand-tight)
<b>0538009252</b>	Temperature sensor type TSF	TSF Temperature Sensor for Fluids	30 Nm
<b>1834484094</b>	Socket	Connection socket TSF	-
<b>R913028640</b>	Solenoid plug	Oil drain plug and iron particle filter	10 Nm
<b>R900204369</b>	Seal ring	Seal between boiler and cover	8 Nm (screws / nuts)
<b>R901118144</b>	Lifting point warning sign	Lifting point marking	-

## Safety instructions

### General information

- ▶ Before determining your design, please request a binding installation drawing.
- ▶ The possible circuits recommended by Rexroth do not comprise any system-related responsibility for the system.
- ▶ Opening of the sensors or changes in or repair works at the sensors are forbidden. Changes in or repair works at the wiring may lead to dangerous malfunctions.
- ▶ Connections in the hydraulic system may only be opened in the depressurized state.
- ▶ Installation / disassembly of the sensor are only admissible in depressurized and de-energized state.
- ▶ System developments, installations and commissioning of electronic systems for the control of hydraulic drives may only be carried out by trained and experienced specialists who are sufficiently familiar with the handling of the components used and the overall system.
- ▶ During commissioning of the tank, there may be unforeseeable dangers caused by the machine. You must therefore ensure before the beginning of the commissioning that the vehicle and the hydraulic system are in a safe condition.
- ▶ Ensure that no persons are within the danger zone of the machines.
- ▶ No defective components or incorrectly working components must be used. If one of the tanks fails or shows malfunctions, it has to be replaced / repaired.
- ▶ Despite taking care when compiling this document, not any possible cases of application can be considered.
- ▶ If you miss notices regarding special applications, please contact the relevant specialist department at Rexroth.

### Information on the place and position of installation

- ▶ Assemble the tank so that it is not located close to parts with large heat development (e. g. exhaust system, turbo charger, motors etc.).
- ▶ The distance to radio equipment must be sufficient.
- ▶ It has to be ensured by individual sealing of the cables / wires that no water can get into the sensors.

### Information on transport and storage

- ▶ Please check the tank for any transport damage. If there is obvious damage, please immediately inform the transport company and Rexroth.
- ▶ After a fall of the tank, it must not be used any longer as invisible damage might impair its reliability.
- ▶ When storing the tank for an extended period, Rexroth recommends a constant ambient temperature of approx. 20 °C, a dry environment which is protected against dust and protection against strong solar radiation. The exposure to chemical agents (e. g. vapors, gases, humidity) must be avoided.
- ▶ To ensure the quality of the product is not significantly influenced by the storage, a maximum storage time of 12 months may not be exceeded. If products are to be used after the maximum storage time, please contact the relevant specialist department.

## Safety instructions

### Information on circuitry and running of the lines

- ▶ The tank may only be operated in the range of protective extra-low voltage (AC < 50 V / DC < 75 V). Operation outside this range, e. g. in the range of the Low-Voltage Directive 2006/95/EC or the EMC directive 2004/108/EG is not admissible.
- ▶ Lines to the sensors have to be as short as possible and shielded. The screening has to be connected at one side of the electronics or low-ohmic at the device or vehicle ground.
- ▶ The sensors may only be plugged and unplugged in the de-energized condition.
- ▶ Lines from the sensors to the electronics must not be laid close to other power cables in the device or vehicle.
- ▶ The sensors and the connection lines should be mechanically supported in the area of the attachment point.
- ▶ The cable harness must be mechanically captured in the area of the attachment point (distance < 150 mm) of the sensor. The cable harness must be captured so that the sensor is activated by the same phase (e. g. at the screw connection of the sensor).
- ▶ If possible, lines should always be installed inside the vehicle. If any lines are installed outside the vehicle, ensure secure fixation.
- ▶ Lines may not be inflected or twisted; they must not rub at edges and may not be installed in sharp-edged ducts without protection.
- ▶ Lines are to be laid at a sufficient distance to hot and movable vehicle parts.
- ▶ The sensor lines are sensitive to interference. Thus, the following measures should be observed in the sensor operation:
  - Sensor lines should be attached at the largest possible distance to large electric machines.
  - If the signal requirements are satisfied, there is the possibility to extend the sensor cable.

### Intended use

- ▶ The tank is designed for hydrostatic fan drives and other mobile applications such as rotatory auxiliary drives unless limitations / restrictions to certain application ranges are made in this data sheet.
- ▶ The tank must generally be operated within the operating ranges specified and released in this data sheet, particularly with regard to voltage, temperature, flow, temperature-dependent expansion of the medium, vibration, shock and other environmental influences described.

- ▶ Any use outside the specified and released boundary conditions may result in a hazard to life and/or damage of the components and/or subsequent damage at the machine.

### Improper use

- ▶ Any use of the tank other than described in the chapter "Intended use" is considered as improper.
- ▶ Any use in explosive areas is inadmissible.
- ▶ In case of damage resulting from improper use and/or from unauthorized interventions not intended in this data sheet, any warranty and any liability claim vis-à-vis Bosch Rexroth AG will be forfeited.

### Use in safety-relevant functions

- ▶ The customer is responsible for carrying out a risk analysis of their machine or system and for determining the possible safety-relevant functions.
- ▶ The customer is responsible for taking suitable measures in safety-relevant applications in order to achieve safety (sensor redundancy, plausibility check, emergency switch, ...).
- ▶ Necessary product data required for the safety evaluation of the machine can be provided upon request or are listed in this data sheet.

### More information

- ▶ More information on available spare parts can be found at "[www.boschrexroth.com/spc](http://www.boschrexroth.com/spc)".
- ▶ Please observe the legal regulations regarding hardly degradable and water-polluting substances applicable in your country during the use of the operating medium.
- ▶ Dispose of the individual materials in accordance with the national regulations in your country or your company-internal specifications/procedures.
- ▶ Particular attention is necessary when disposing of components with residues of operating liquids or the operating liquid itself.
- ▶ Observe the disposal notices in the operating liquid safety data sheet.
- ▶ When disposing of electric and electronic components (e. g. wiring, level detector, temperature sensor) observe the country-specific legal provisions and regulations.

## Notes

## Notes

Bosch Rexroth AG  
Hydraulics  
Zum Eisengießer 1  
97816 Lohr am Main, Germany  
Phone +49 (0) 93 52/18-0  
documentation@boschrexroth.de  
www.boschrexroth.de

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.  
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.