Hydraulic inch power brake valve
LT 31

RE 66227
Edition: 10.2013
Replaces: 06.2006


HAD 5793

- Series 1X
- Service brake pressure 60, 80 and 100 bar
- Inch pressure 25 bar

Features

- Integrated inch valve
- Inch and brake pressure proportional to the actuating force
- Low hysteresis
- Integrated maximum pressure limitation for inch and brake pressure
- All ports on one side
- Perfect piping possible due to freely rotatable mounting flange
- Ergonomic adjustment of the pedal's angle of attack possible
- All pedal variants are equipped with anti-slid pedal rubber that can be disassembled

Fields of application

- Construction machines
- Conveyor vehicles
- Forestry and agricultural machinery
- Municipal vehicles
- Special vehicles

Contents

Functional description

The inch power brake valve LT 31 is a combination of 1-circuit braking valve (3-way pressure reducing valve) and inch valve (2-way pressure reducing valve) with stepless mechanical operation.
The inch power brake valve basically consists of housing (**1**), main control spool (**2**), inch control spool (**3**), return spring (**4**), main control spring (**5**), actuation element (**6**), inch pressure limitation spring (**7**) and inch pressure control spring (**8**).

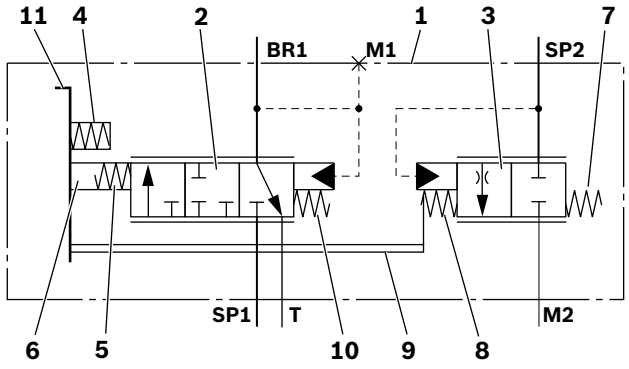
Hydraulic inching

The valve is usually actuated via a foot pedal (**11**) moving the actuation element (**6**). The latter pushes against the return spring (**4**) and - via the rod (**9**) - acts on the inch pressure control spring (**8**) together with the inch pressure against the inch pressure limitation spring (**7**).
With increasing actuation, the inch control spool (**3**) is moved and opens from **SP2** to **M2**. The inch pressure available at **SP2** can be discharged, the traction drive pump swivels back and the vehicle is hydrostatically braked (see application example on page 7).

Hydraulic braking

If the actuation element (**6**) is deflected further, it acts on the main control spring (**5**) which moves the main control spool (**2**). First of all, the control edges at channel **T** are closed, then, the control edges from **SP1** to **BR1** are opened and the pressure in the brake circuit builds up. The flow from the accumulator to the brake cylinder is released. The brake pressure that builds up acts on the back side of the main control spool (**2**). Dependent on the actuation, the main control spool (**2**) controls the brake pressure proportionally to the actuating force and to the actuating path.
Any pedal path limitation will act as maximum pressure limitation of the secondary circuit (brake pressure). If the main control spring (**5**) is unloaded, the return spring (**10**) will move the main control spool (**2**) back into the basic position and open from **BR1** to **T**; in this way, the service brake circuit is unloaded. In case of further unloading, the inch pressure limitation spring (**7**) moves the inch control spool (**3**) into its basic position. The opening from **SP2** to **M2** is closed and consequently, the inch pressure of the traction drive can build up so that the vehicle is no longer braked. The return spring (**4**) brings the actuation element (**6**) and the pedal (**11**) back into the initial position.

▼ **Symbol LT 31**



1 Housing
2 Main control spool
3 Inch control spool
4 Return spring for actuation element
5 Main control spring
6 Actuation element
7 Inch pressure relief spring
8 Inch pressure control spring
9 Rod
10 Return spring for control spool
11 Pedal

Connections	
SP1	Service brake supply (1st brake circuit)
SP2	Inch pressure input
T	Tank
BR1	Service brake (1st brake circuit)
M1	Pressure switch (braking light)
M2	Tank, traction drive

Technical data

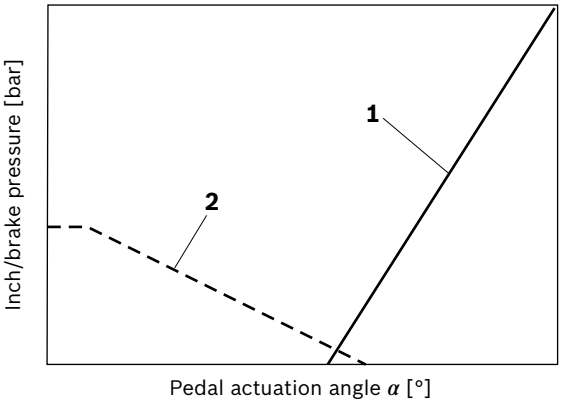
general				
Weight	without pedal		kg	5.0
	with pedal		kg	6.6
Installation position				Preferably vertical
Type of connection				Metric thread according to DIN 3852-1
Ambient temperature range		θ	°C	–25 to +80
Priming				Single-layer coating RAL 5010

hydraulic				
Maximum operating pressure at the port	BR1	p_{Br}	bar	100
Maximum inlet pressure at the port	SP1	p	bar	210
Maximum inch pressure at the port	SP2	p_{Inch}	bar	30
Maximum tank pressure at the port	T	p	bar	0.5 (The tank pressure must not exceed the application pressure of the brake.)
Maximum brake cylinder volume (braking valve)			cm^3	120
Rated flow (inch valve)			l/min	12
Hydraulic fluid				Mineral oil (HL, HLP) according to DIN 51524, other hydraulic fluids, such as HEES (synthetic esters) according to VDMA 24568, as well as hydraulic fluids as specified in data sheet RE 90221, upon request
Hydraulic fluid temperature range		θ	°C	–20 to +80
Viscosity range		ν	mm^2/s	2.8 to 380
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)				Class 20/18/15, for this, we recommend using a filter with a minimum retention rate of $\beta_{10} \geq 75$

Notice
For applications outside these parameters, please consult us!

Characteristic curve

▼ **Pressure depending on the pedal's actuation angle**



1 Brake pressure p_{Br}
2 Inch pressure p_{Inch}

Ordering code

01	02		03		04		05		06	07	08	09
LT 31	**MKA**	**–**	**1X**	**/**		**–**	**025**	**/**	**02**	**M**		*****

Model code

01	Hydraulic inch power brake valve LT 31	**LT 31**

Type of actuation

02	Mechanical	**MKA**

Series

03	10 to 19 (unchanged installation and connection dimensions)	**1X**

Service brake pressure

04	60 bar	**060**
	80 bar	**080**
	100 bar	**100**

Inch pressure

05	25 bar	**025**

Line connections

06	Metric thread similar to DIN 3852-1 (see table on page 5)	**02**

Seal material

07	NBR seals, suitable for mineral oil (HL, HLP) according to DIN 51524	**M**

Additional equipment (optional)

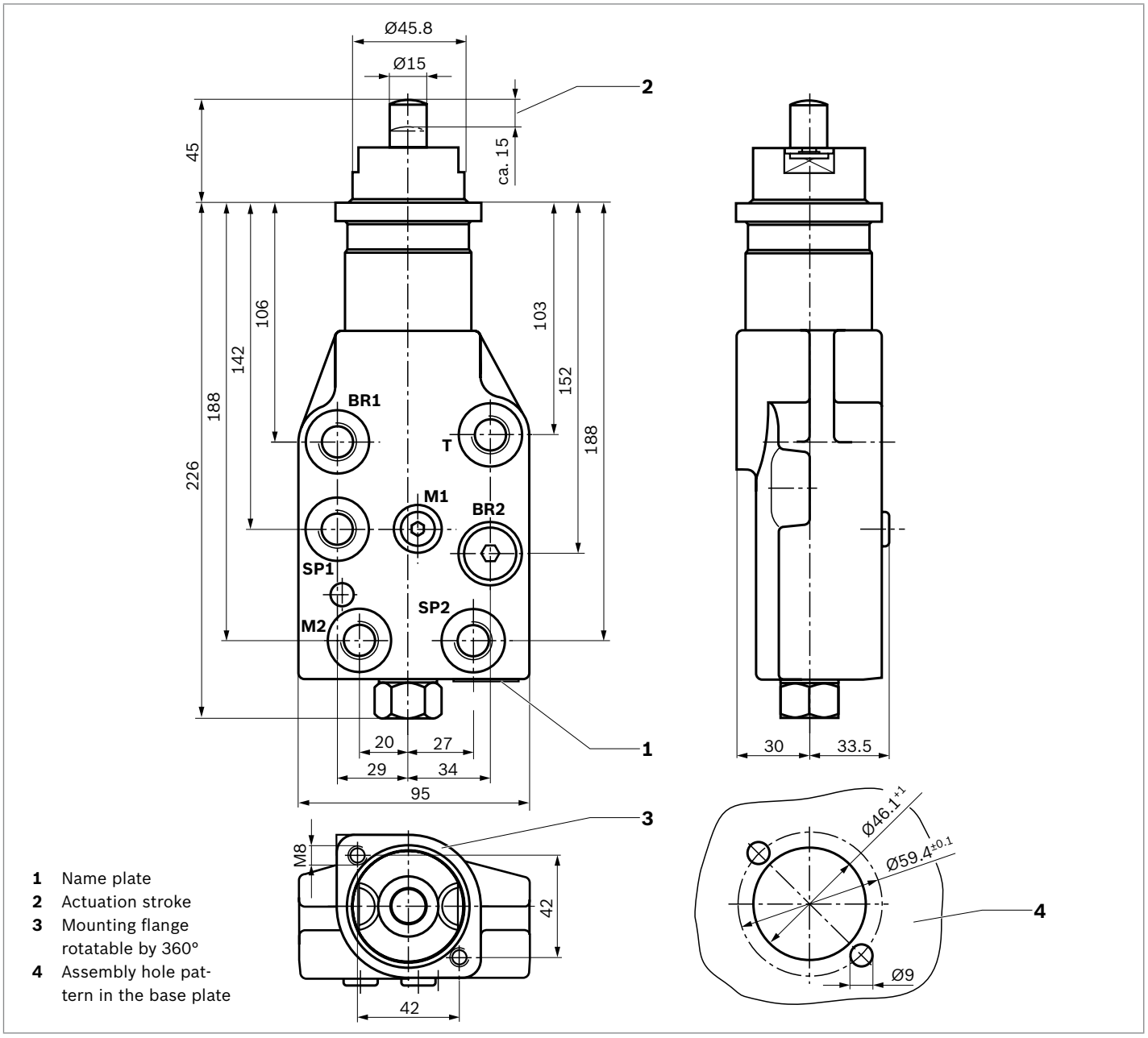
08	With attached pedal LT 19	**12**
09	Further details in the plain text	*****

Preferred types

Service brake pressure [bar]	LT 31 without pedal Material number	LT 31 with attached pedal Material number
060	R901146632	R901092968
080	R901092974	R900978598
100	R900956835	R900976108

Dimensions

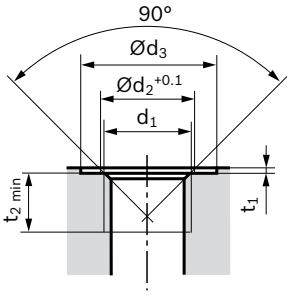
Without pedal



1 Name plate
2 Actuation stroke
3 Mounting flange rotatable by 360°
4 Assembly hole pattern in the base plate

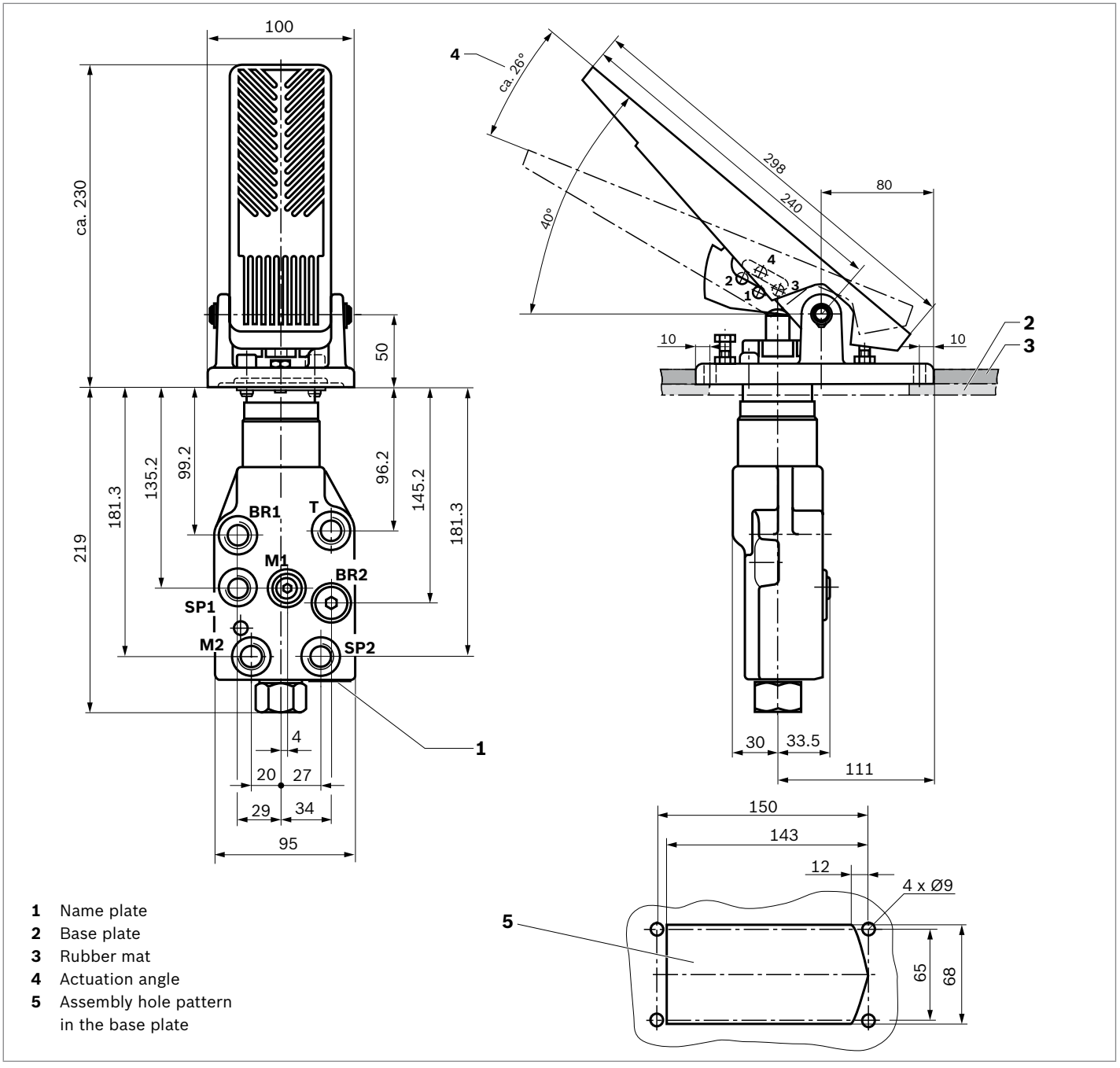
Connections similar to DIN 3852-1

Connection	d_1	$Ød_2^{+0.1}$	$Ød_3$	t_1	$t_{2\ min}$
BR1	M16 x 1.5	16.4	26	1.5	12
BR2	Port closed				
SP1, SP2	M16 x 1.5	16.4	26	1.5	12
T	M16 x 1.5	16.4	26	1.5	12
M1	M12 x 1.5	12.4	20	1.5	12
M2	M16 x 1.5	16.4	26	1.5	12



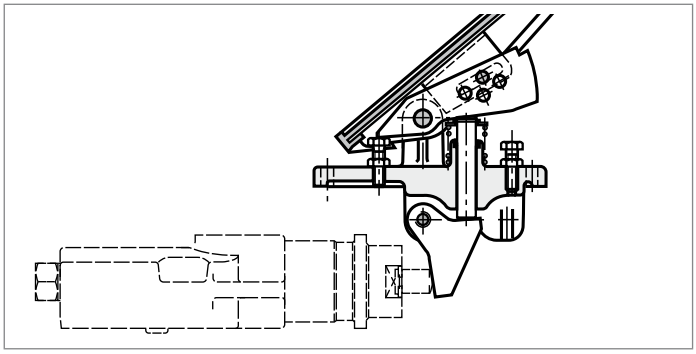
Port **M1** closed by default.

With attached pedal LT 19



1 Name plate
2 Base plate
3 Rubber mat
4 Actuation angle
5 Assembly hole pattern in the base plate

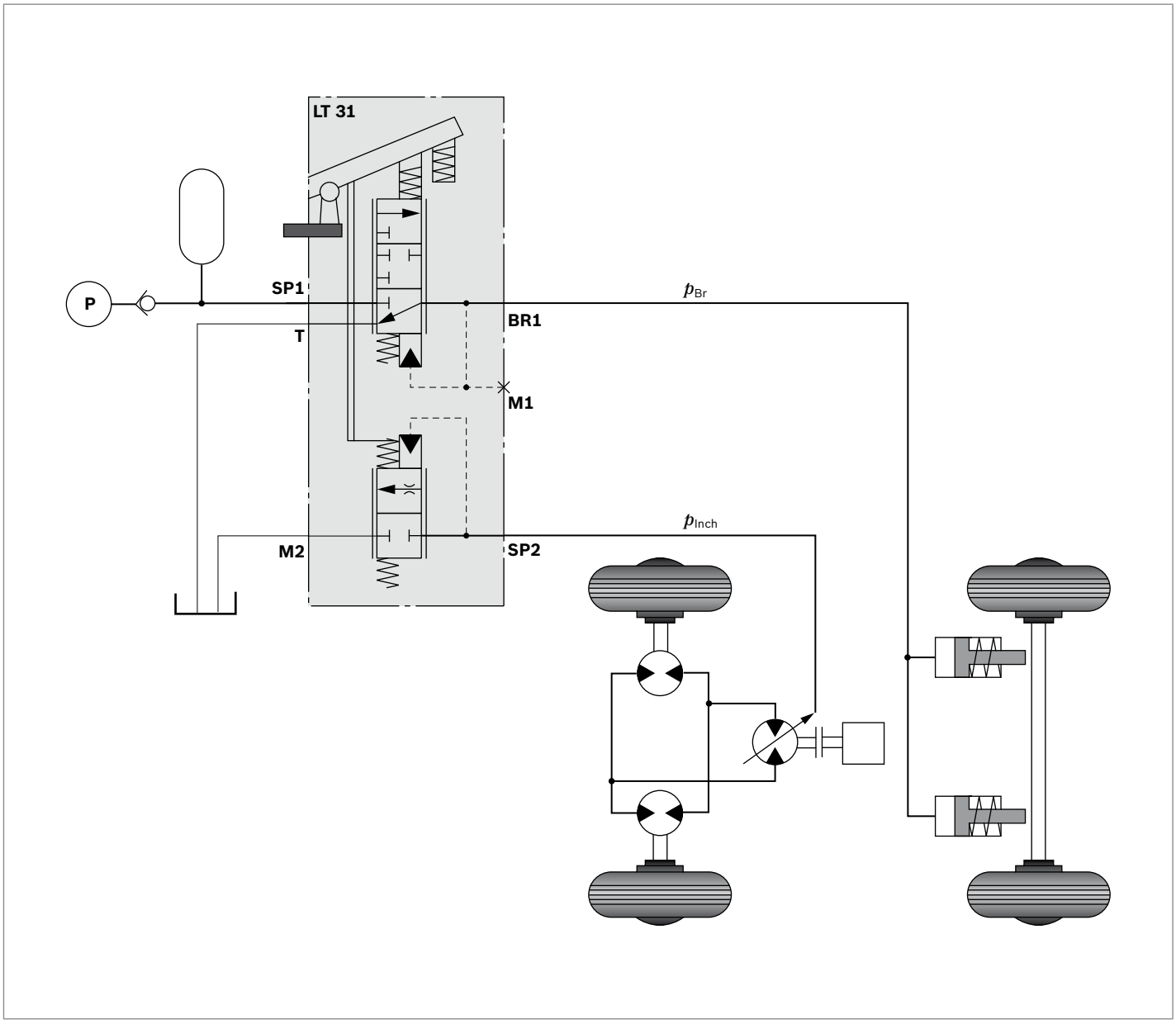
▼ **Version LT 20 for horizontally installed braking valve**



The power brake valve LT 31 is optionally supplied with or without pedal. Pedals LT 19 and LT 20 are available (other variants upon request).

Notice
All pedal variants are, by default, equipped with anti-slid pedal rubber that can be disassembled.

Application example



Related documents

The power brake valves LT 31 are hydraulic components in power brake systems in mobile machines.
Also observe the instructions for the other system components. Do not commission the product until you are provided with the following documentation and have understood and observed it.

Title	Document number	Document type
Hydraulic power brake valves for mobile applications	66200-B	Operating instructions
System documentation from the machine manufacturer		Operating instructions

Bosch Rexroth AG
Mobile Applications
Zum Eisengießer
97816 Lohr am Main, Germany
Phone +49 9352 18-0
info.ma@boschrexroth.de
www.boschrexroth.com