

A NEW ERA OF

INTELLIGENT TAMPING TECHNOLOGY



www.s7-rail.com



ATTACHMENTS



OUR PHILOSOPHY

We think in systems.

The track and its individual components

form a system. The strength of a system grows out of the quality of the individual components and the way they interact. As a developer of track maintenance machines, units and system solutions, we improve and optimise this interaction.

MAIN ADVANTAGES

of system7 fully hydraulic tamping technology

up to 70 %

shorter operating time of the vibration drive

up to 70 %

lower maintenance costs

around 50 %

less fine dust emission

-65 dB(A)

less continuous noise

- Vibration only during penetration and squeezing — the rest of the time the vibration drive is at a standstill
- Significantly lower noise emission per tamping cycle
- No rotating masses — no eccentric shaft, no roller bearings, no connecting rod, no flywheel, no hydraulic motor
- Constant tamping quality through electronically controlled amplitude and frequency
- Frequency adapted to the ballast bed hardness as a penetration aid
- Reduced life cycle costs

- Pressure sensors in the squeezing cylinder record the compaction achieved for each sleeper
- Contactless displacement sensors in the squeezing and lowering cylinders, protected inside the cylinder tube
- Automated and computer-aided control
- Emission-free operation of the MTCU (S7 lifting and lining unit) from the battery system — tunnels and urban areas
- Ballast bed report with evaluation of the data for each sleeper
- Remote maintenance, remote diagnostics and digital spare parts catalogue



THREE MACHINES. ONE SYSTEM

Each machine solves a task on its own. Together they enable absolute track geometry correction including compaction on the small worksite.



S7 THA 8 4.0

Tamping Head Attachment

Task	Compacts the ballast bed
Drive	Fully hydraulic, via excavator
Application	Plain track and turnout
Control	Radio remote control
Display	Tablet in the excavator cab + display



S7-TMS

Track Maintenance Set

Task	Absolute track geometry incl. compaction
Drive	Combination of both machines
Application	Small worksite with documented proof
Control	Control panel or radio remote control
Measurement	Additionally CEOgo and total station



S7 MTCU

Mobile Track Correction Unit

Task	Lifts and lines the track
Drive	Battery-electric
Application	Railway crossing, industrial lines, main lines
Control	Control panel or radio remote control

S7 THA 8 4.0

Tamping Head Attachment

The THA is a fully hydraulic tamping head attachment for rail-road excavators. It compacts the ballast bed in the course of track maintenance and is supplied from the hydraulic and electrical systems of the carrier machine.

system7 thereby transfers the proven fully hydraulic tamping drive of the universal tamping machine to an attachment: a linear drive generates the squeezing movement and the compaction vibration at the same time. During squeezing, an electronic control keeps amplitude and frequency constant — 35 Hz at 2.5 mm. During penetration, the control adapts the frequency to the hardness of the ballast bed, so the unit penetrates faster and the output increases.

Transport is not rail-bound. This makes the THA flexible in use and a cost-effective alternative to rail-bound tamping machines.

35 Hz

Tamping frequency

2.5 mm

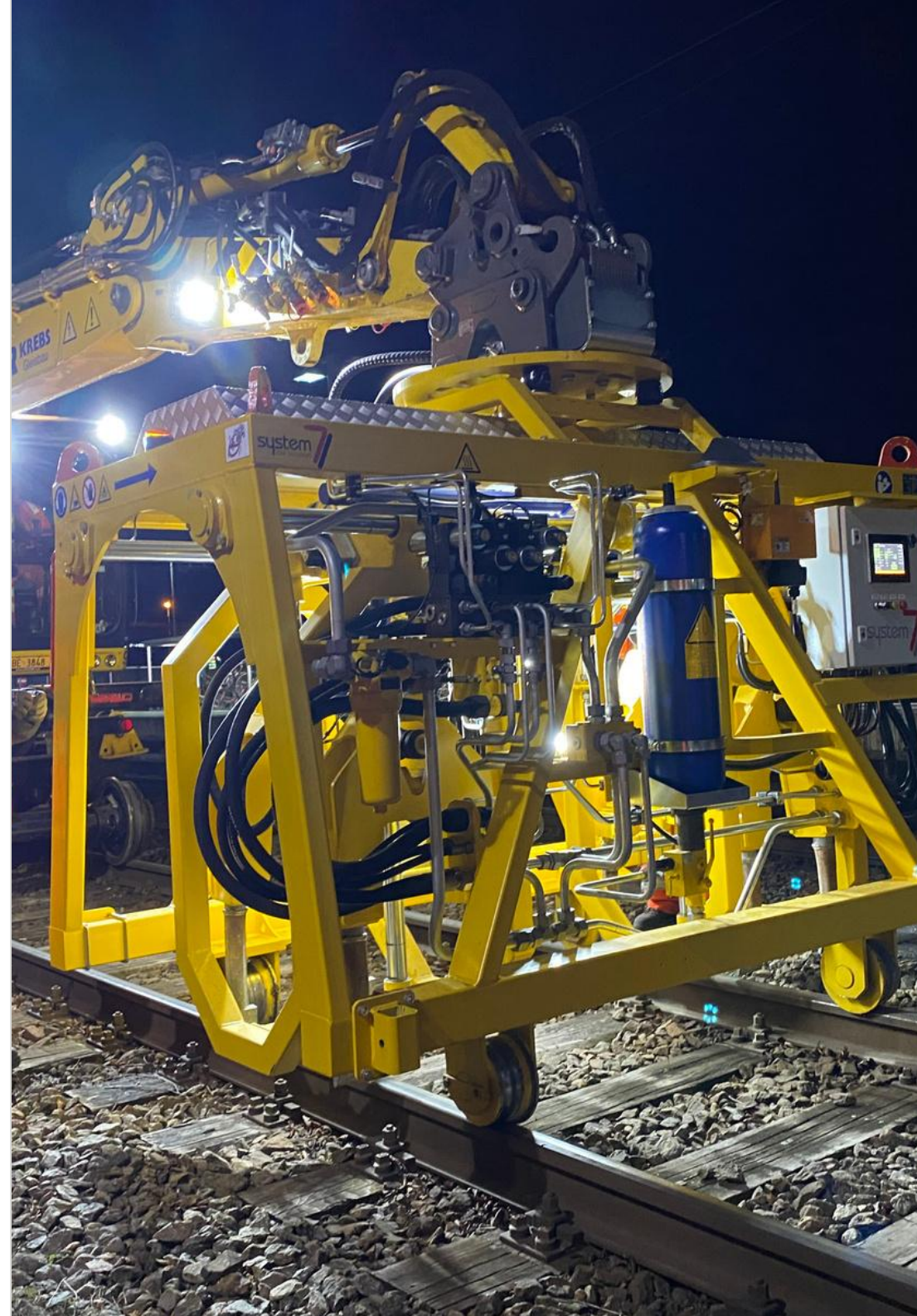
Amplitude

565–710 mm

Opening width

450 mm

Tamping depth



TECHNOLOGY IN DETAIL

S7 THA 8 4.0

FULLY HYDRAULIC TAMPING DRIVE

The vibration drive runs only during penetration and squeezing. This reduces the operating time of the drive by up to 70 % — with lower noise emission, around 50 % less fine dust and reduced wear and energy demand. As no rotating masses are moved, there is no eccentric shaft, no roller bearing, no connecting rod, no flywheel and no hydraulic motor.

SINGLE-OPERATOR CONTROL

A video camera for documenting and positioning the working area is part of the standard equipment. Combined with the tablet it allows the machine to be operated by excavator operator. Control is via a railway-approved radio remote control; settings can be made on the touch display or on the tablet at the machine.

AUTOMATIC TAMPING CYCLE

Once squeezing time, penetration depth and the number of insertions have been preset, a single press of a button on the radio remote control is enough. Penetration, squeezing and lifting back to the rest position run fully automatically. The displacement measuring system integrated in the lowering cylinders ensures that the preset tamping depth is reached.

DATA ACQUISITION

Every squeezing cylinder records compaction force and squeezing bath. From this, the ballast bed hardness for each sleeper and the quality index of the ballast bed are derived. The data goes to the system 7 web platform and the tamping operation is linked to GNSS.

TURNOUT AND DOUBLE SLEEPER

The opening width of the tine arms is infinitely adjustable from 565 to 710 mm. This makes it possible to tamp double sleepers and also turnouts under difficult conditions. The tamping banks can be moved laterally, and both units can be controlled individually or synchronously.

TRACK GAUGES

Conversion is carried out with changing position of running wheels; the tamping banks can be adjusted laterally.

Standard: 900 · 1000 · 1435 · 1458 · 1600 · 1668 mm
Option: 1520 · 1581 · 1588 · 1676 mm
Further track gauges between 900 and 1676 mm on request.

TECHNICAL DATA

S7 THA 8 4.0

DIMENSIONS AND WEIGHT

Dimensions L × W × H	2167 × 2728 × 2019 mm
Height above rail head	2019 mm
Height with support feet (transport position)	2070 mm
Machine weight without options	2.65 t
Wheel diameter / wheel profile	200 mm / cylindrical
Wheelbase	1.43 m

WORKING PARAMETERS

Tamping frequency (adjustable)	35 Hz
Amplitude	2.5 mm
Opening width	565–710 mm
Max. tamping depth (adjustable)	450 mm below TOR
Max. twist, base 3 m / 9 m	10 / 5 mm/m
Max. cant when working	200 mm

HYDRAULICS AND ELECTRICS

Hydraulic oil	HLP 46
Max. operating pressure	180 bar
Hydraulic flow rate	180 l/min at 180 bar ±10 %
Power supply	24 VDC, 20 A
Electrical energy consumption	0.5 kWh
Protection class	≥ IP55
Lighting	LEDs for working area

OPERATING CONDITIONS

Max. operating altitude (class A2)*	≤ 1,000 m
Ambient temperature (class T1)*	–25 to +40 °C
Working temperature	–10 to +40 °C
Humidity	according to EN 50125-1, 4.4
Max. wind speed	35 m/s

Clearance gauges

G1, GI1 · W6A · Barcelona Metro LP-1674 · Hamburg City Line · SSÄ SÄB-0338 (V9-2019-04-09) · FMB SW1674 · RIS-1530-PLT

* Classes according to EN 50125-1

S7-TMS

Track Maintenance Set

Absolute track geometry including compaction on the small worksite — without a rail-bound machine and with measurable proof.

The S7-TMS is a system package made up of three components. The MTCU lifts and lines the track panel, the THA tamps, and the GEDO trolley surveys the actual position and guides the MTCU into the target geometry. A rail-road excavator serves as the carrier machine: it supplies the THA and pushes the assembly from one tamping position to the next.

The TMS therefore covers the performance range of a rail-bound light tamping machine, without such a machine having to be purchased or scheduled. The machines remain individually transportable and individually usable.



SYSTEM SCOPE

MTCU

Lifts and lines, carries CEOgo and the 360° prism

IMU on the GEDO trolley

Inertial survey, track geometry optimisation, approval record

THA 8 4.0

Compacts the ballast bed, operated on the rail-road excavator

Coupling rod THA — MTCU

Connects both machines to be pushed together

GEDO trolley with total station

Surveys the actual position and the fixed points, guides the MTCU

Rail-road excavator

Carrier machine, provided by the customer

HOW THE SYSTEM WORKS

S7-TMS

The MTCU is usually set up several sleepers — five, for example — ahead of the THA. Both machines are connected by the length-adjustable coupling rod and are moved together by the rail-road excavator. There is no electrical or wireless connection between the THA and the MTCU: the MTCU has its own power supply from batteries, the THA is supplied by the excavator.

A 360° prism is mounted on the MTCU on the side of the reference rail. Its height and lateral offset above the top of rail are stored in the CEOgo, as are the height and offset of the total station. The total station measures the distance as well as the horizontal and vertical angles to the prism and transmits the measurements by radio to the CEOgo, which uses them to calculate the position of the MTCU within the target geometry.

The superelevated rail is lifted automatically to the target cant from the target geometry, by comparison with the measured actual cant. A completed stretch of track is referred to as a section and is transferred section by section to the web platform.

WORK SEQUENCE

- 1 Set up the total station, enter its position in the CEOgo and load the target geometry
- 2 Set up the MTCU at the work site — the prism is tracked by the total station
- 3 CEOgo continuously compares actual and target position, the MTCU lifts and lines until the difference is zero and holds the track in its final position
- 4 The THA tamps towards the MTCU until its set-up position is reached
- 5 Release the track from the control loop, measure the result, retract the support legs
- 6 Move the assembly forward — the sequence is repeated up to the position of the total station

S7 MTCU

Mobile Track Correction Unit · Lifting and lining device

The MTCU is a hydraulic lifting and lining device for track geometry correction. It lifts and lines the track panel in the course of tamping work and lifts the rails precisely, for example when individual components of the track panel are replaced during maintenance. The machine shows its strengths in lifting work that calls for particular care — relative as well as absolute.

The energy comes from a battery system, and the central hydraulic pump is driven by an electric motor. The MTCU therefore works emission-free — an advantage in urban areas and in tunnels, where freedom from exhaust gases is required. The machine needs no external power supply and is suitable for stand-alone operation.

200 kN

Lifting force

950 mm

Cylinder stroke

50 kN

Lining force



TECHNOLOGY IN DETAIL

S7 MTCU

LIFTING AND LINING

The machine grips the rail with clamps; the outriggers are supported in the crib or outside in the ballast at the sleeper ends. The lifting forces are transferred vertically through the outriggers, so the achievable lift values are independent of the ballast properties. The achievable lining values depend on the lateral support resistance of the outriggers in the ballast.

RELATIVE CONTROL

Without additional measuring equipment the MTCU works in relative mode: the operator enters the lift values via the position values of the internal displacement measuring systems, and the cant directly as a target value which the inclination sensor controls. The lining value is entered manually with the joystick.

EMISSION-FREE DRIVE

Two battery packs are included in the scope of delivery, each battery unit supplying 11.8 kWh. The batteries can be pulled out of the frame and charged externally or with the charger mounted on the MTCU. Additional battery packs extend the operating time.

ABSOLUTE CONTROL

In combination with a GEDO surveying system and the CEOgo geometry guidance computer the MTCU works in absolute mode. A 360° prism on the side of the reference rail is tracked by the total station, CEOgo continuously compares actual and target position and corrects until the difference is zero. The track is automatically held in its final position.

OPERATION

Control is via the control panel or a radio remote control whose control box can also be connected directly to the MTCU control system by cable. The cross level is measured by inclinometer and displayed. In the basic version the actuators can be operated with electrical push buttons or directly with hand levers on the valves.

TRACK GAUGES

The wheel and clamp units can be repositioned on the cross beam; conversion is simply a matter of remounting them.

Adjustable: 891/900 · 1000 · 1067 · 1435 mm
Further track gauges on request.

TECHNICAL DATA

S7 MTCU

WORKING PARAMETERS

Total lifting height (cylinder stroke)	950 mm
Lifting height above the sleeper	420 mm
Lifting force	200 kN
Lining travel (cylinder stroke)	± 55 mm
Lining force	50 kN
Max. travel speed (opt. travel drive)	≤ 20 km/h

MACHINE PARAMETERS

Machine weight	≤ 2.5 t
Available track gauges	891/900 · 1000 mm
	1067 · 1435 mm
Supply	own hydraulic supply
Wheel diameter / wheel profile	350 mm / cylindrical
Wheelbase	1.46 m
Lighting	4 LED work lights
Parking brake	Spring-applied brake
Clearance gauges	G1, G12 · W6A · SSÄ SÄB-0338

HYDRAULICS AND ELECTRICS

Hydraulic oil	HLP 46
Max. operating pressure	220 bar
Power supply	48 VDC battery with charger
Voltage converter	48 / 24 VDC
Protection class	≥ IP55

OUTPUT UNTIL TWO BATTERIES ARE EMPTY

Max. cycles in continuous operation	240 sleepers
Working distance, every 5th sleeper	720 m
Working distance, every sleeper	144 m
Working speed, every 5th sleeper	180 m/h
Working speed, every sleeper	36 m/h

Sleeper spacing 60 cm, assumed total cycle time 60 s for lifting, lining and moving forward.

OPTIONS

- Coupling rod · roof · insulated version of wheels and clamps
- Expandable battery system, 11.8 kWh per unit
- Electric travel drive, gradients up to 50 ‰, max. 20 km/h (5 km/h by remote control)
- Company logo
- GNSS receiver S7-Locate

VERSIONS AND BENEFITS

The versions differ solely in the equipment of the GEDO trolley. THA and MTCU are identical in all versions.

FUNCTION COMPARISON

	GEDO with total station	GEDO with total station and IMU
Guidance of the MTCU	yes	yes
Fixed point survey	yes	yes
Track geometry optimisation	no	yes
Re-measurement	inertial with GEDO	inertial with GEDO
Approval record	no	yes *
GNSS	yes	yes

* The approval record is a non-binding document and does not replace an approved approval measurement.

YOUR BENEFITS

- Proof — approval record from the CEOgo, in some countries a prerequisite for releasing the small worksite at 70 km/h
- Cost structure — no possession for a heavy machine, the rail-road excavator is usually available anyway, both machines remain individually usable
- Emission-free operation of the MTCU from the battery system — relevant in tunnels and in urban areas
- Quality data for each sleeper as a basis for maintenance planning

TMS WITH AN EXISTING GEDO

Customers who already operate a GEDO system receive the TMS without Trimble hardware: CEOgo licence, integration into the existing surveying system and commissioning. That way hardware is not paid for twice.

TRACK GAUGES IN THE SYSTEM

The available track gauges are those covered by both machines: 900, 1000 and 1435 mm. We are happy to discuss further track gauges.

CARRIER MACHINE

The requirements of the THA apply. In addition, the carrier machine must be able to push the assembly of THA and MTCU.

YOUR DATA. EVALUATED.

Access via the S7 web platform with a customer-specific password and a valid licence.

TRACK DATA

- Compaction force per sleeper
- Ballast bed hardness per sleeper
- Quality index of the ballast bed
- Tamping depth: target value and achieved actual value
- Number of tamping insertions per sleeper
- Target lift and target cant with deviation from the actual value
- Lining correction value with deviation from the actual value
- Distance recording and GNSS coordinates
- Reference rail left/right

MACHINE DATA

- Min./max. compaction, lifting and lining forces per shift
- Oil temperature
- Number of automation system messages per shift
- Number of tamping insertions per shift and cumulative
- Operating hours of the vibration drive
- Electrical energy consumption
- Battery voltage min./max. per shift



YOUR DATA. EVALUATED.

Access via the web platform with a customer-specific password and a valid licence.



SOFTWARE PACKAGE

- Data evaluation via the S7 web platform
- Software updates for the platform and the machine software
- Online 3D spare parts catalogue
- SIM card and server maintenance by system7

Provided for a monthly fee, in the TMS as one system fee instead of one per machine.

SERVICE

- Remote maintenance, remote diagnostics and fault finding
- Spare parts online via the 3D spare parts catalogue, always up to date in the cloud
- Operating and maintenance manual in digital form
- Service team 24/7, 365 days a year
- On-site training, in the TMS separately for machine operation and surveying

system7
railtechnology



We think in systems.

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