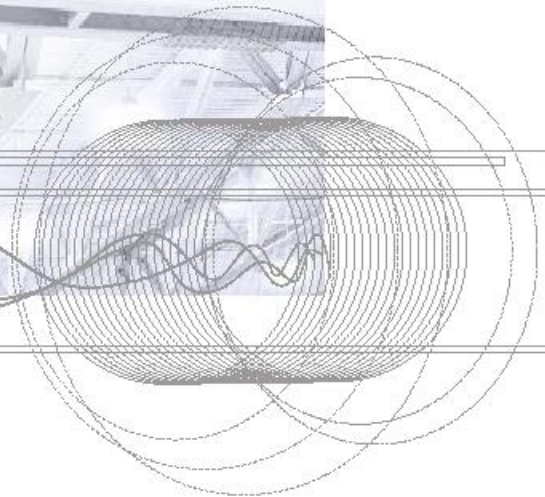


The SH wire rope hoist



Partner of Experts

STAHL
CraneSystems



The SH wire rope hoist



The SH wire rope hoist programme has been the embodiment of perfection in lifting and crane technology all over the world for many years. Compact, high-performing and particularly maintenance-friendly. Users, crane manufacturers and system manufacturers appreciate the modular system based on field-proven, low-maintenance components. Series manufacture of the standard components means economic advantages for you. And this combined with precise manufacture of off-standard components makes the SH wire rope hoist a widely acknowledged top quality product.

The modular system permits practically unlimited combinations of the sub-assemblies to produce your individual solutions. The SH series from STAHL CraneSystems is available for the load capacity range from 500 kg to 25,000 kg in five frame sizes with 26 load capacity variants. The wire rope hoists can be used as stationary models or together with a trolley or crab in standard cranes, off-standard cranes or systems manufacture. If your requirements are exceptional, the experts in our engineering department will develop customised solutions tailored to them.

Various off-standard designs are available for use in particular conditions. IP 66 protection for example is required for outdoor use without a protective roof or if the hoist is exposed to water jets. If there is a danger of the formation of condensation, or in arctic temperatures, space heaters are required. Even in explosive atmospheres you do not have to manage without the SH wire rope hoist. On request, the entire wire rope hoist programme is available in explosion-protected design for Zone 1, Zone 2, Zone 21 or Zone 22. It's no coincidence that we are market leader for explosion-protected lifting technology and crane components.

The facts

- 5 frame sizes, 26 load capacity variants
 - Stationary design or different trolleys and crabs for cranes and systems manufacture
 - U-shape makes for compact dimensions
 - Largely maintenance-free, low wear, service life
 - Equipped as standard with two hoisting and travel speeds
 - Particularly smooth starting and braking characteristics
 - Standard high-quality safety components for increased safety at work
 - Optionally available in explosion-protected design in compliance with ATEX and IECEx
- Please order our brochure with fundamental information on expertise in explosion protection.



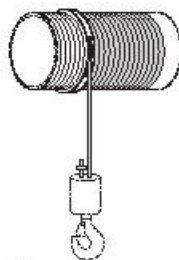
KE monorail trolleys with SH series wire rope hoists are available in standard version for load capacities up to 16,000 kg.

The models and travel carriage variants

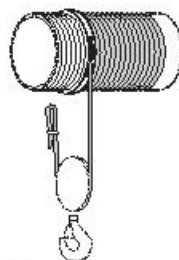
Different types and variants of travel carriage for the SH wire rope hoist open up the most varied applications. Individually tailored to your specific requirements as stationary hoisting or towing equipment, for use with a trolley or crab, or for systems manufacture. The travel carriages are equipped as standard with two travel speeds. But in this matter too we are open to your requirements. Other speeds are available as options. Our wire rope hoists are known world-wide for their flexible and versatile use. Compact dimensions and extremely short approach dimensions help to make optimum use of the shop.

Single-grooved rope drum

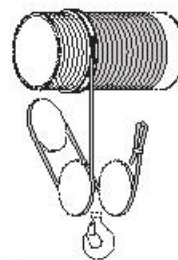
The model with single-grooved rope drum is used for stationary hoisting or towing equipment or combined with various travel carriage variants.



1/1



2/1

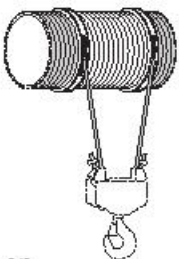


4/1

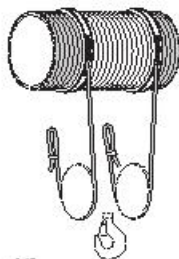
Standard reeving

Double-grooved rope drum

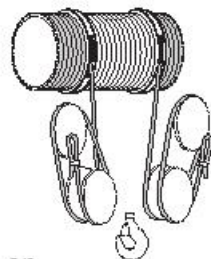
If true vertical lift is required, we recommend this model with double-grooved rope drum (right-/left-hand thread). This version can be used both in stationary form or with travel carriages.



2/2

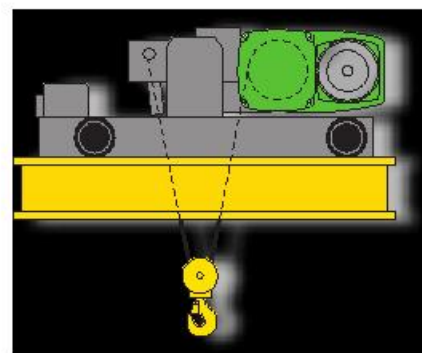
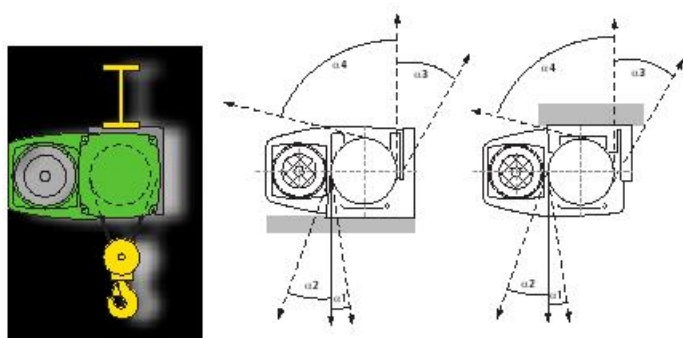


4/2



8/2

True vertical lift

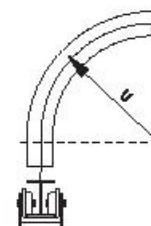
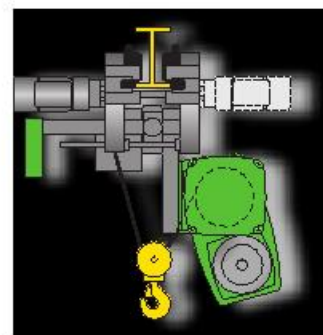
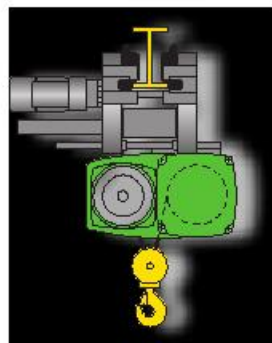
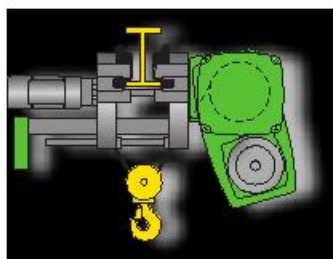


Stationary model

The SH wire rope hoist can be used as stationary hoisting or towing equipment, for example in systems manufacture. Depending on the application, the rope lead-off angle, the attachment of the hoist and the mounting position of the hoist motor can be varied.

OE double rail crab

The OE double rail crab is intended for use on double girder overhead travelling cranes. The extremely compact construction makes very low approach and headroom dimensions possible and the available space can thus be used to the full. The double rail crab is available with various track gauges for the whole load capacity range and automatically compensates for any unevenness of the cross travel runway.



KE monorail trolley

The KE monorail trolley is used on monorail runways and single girder overhead travelling cranes. The particularly low headroom of the trolley makes long hook paths possible even in low-ceilinged rooms.

UE monorail trolley

The overall width of the UE monorail trolley is minimal and especially designed for narrow clearances. It is used on monorail runways and single girder overhead travelling cranes.

DKE articulated trolley

The DKE articulated trolley is available for frequent travel around bends and narrow radii. Depending on radius of bend, runway flange width or application it is equipped with one or two travel motors. The DKE articulated trolley is designed for load capacities up to 10,000 kg.

■ Standard
□ Option

Type	Load capacity up to [kg]	Stationary	OE double rail crab	Monorail trolleys		
				KE	UE	DKE
SH 3	3,200	■	■	■	■	■
SH 4	6,300	■	■	■	■	■
SH 5	10,000	■	■	■	■	■
	12,500	■	■	■	■	□
SHR 6	16,000	■	■	■	■	□
SH 6	25,000	■	■	□	■	□

The technology

It's reassuring to know what convincing technology is concealed in the SH wire rope hoist. The largely maintenance-free components of the modular wire rope hoist are optimally matched to each other. They guarantee constant performance, high efficiency and long service life. The standard safety components such as gear limit switch, motor temperature control and overload device, or even an optional additional brake, increase workplace safety.

1 Rope and rope guide



- Highly flexible special rope with long service life
- Field-proven enclosed rope guide in spheroidal graphite cast iron has no temperature limitations
- The GJS material (previously designated GG40) is suitable for highest and lowest temperature ranges
- 360° rope tensioner, avoiding the formation of slack rope

2 Paint



- Standard paint treatment as per RAL 6018 yellow-green and RAL 7021 greyish black
- High-quality primer and top coats for standard applications
- Off-standard paint treatment for outdoor use or corrosive ambient conditions
- Shade as per customer's requirement

3 Overload cut-off



- Continuous monitoring of suspended loads with dual load sensor
- Maximum load limited by sensors at rope suspension or in gear torque support
- For systems manufacturers: overload cut-off is also possible for 1/1 or 2/2 reeving, measuring the load on the gear

4 Hoist gear



- All gear steps with lifetime lubrication in oil bath
- Minimum noise development thanks to state-of-the-art technology

5 Control and SLE motor management



- Condition monitoring as standard
- Inching operation is suppressed thus reducing stress
- All common control voltages available
- High degree of safety thanks to overdimensioned contactors

The options

There's always room for improvement. Although it is already first-class in standard design, you have the alternative of making your SH wire rope hoist even safer, even more cost-effective, even more convenient by selecting from numerous mechanical, electrical and electronic options. As a welcome side-effect, the service life of the wire rope hoists is prolonged. The extensions to the programme increase the performance of the wire rope hoist and adapt it to your individual requirements. Here we show you some examples of the options available. If you need further detailed information, please pay a visit to our website at www.stahlcranes.com, or contact us directly.

STH control pendant



- Robust control pendant with EMERGENCY STOP palm button and control cable
- All switching elements for hoist, cross and long travel are 2-step
- IP 65 protection
- Additional buttons, for example to activate a horn, can easily be fitted.
- Optional load display. All data displayed can be read out on a notebook with the aid of the SMC Multicontroller.

Radio remote control units



- Micron push-button transmitter with belt clip, as an option signal feedback from crane
- Spectrum joystick transmitter with harness
- Automatic battery chargers with replacement batteries

Emergency hoist limit switch (gear limit switch)



- In standard version, the hoist is equipped with a gear limit switch for top and bottom hook position and an operational limit switch for top hook position.
- As an option, up to eight switching elements can be fitted to the switch. This permits for example further stopping positions and operational limiting in bottom hook position.

SMC Multicontroller



- Continuous load monitoring by overload cut-off even if hoist is at a standstill
- Overload protection with ALC automatic load control
- Load spectrum memory for load-related operating time summation
- Monitoring of motor temperature for hoist and travel motors
- Operating data registration, e.g. operating hours, load spectrum, motor switching operations and load cycles
- Data exchange with PC possible

Travel limit switch



- Travel limit switches on trolley/crab for cross travel, optional
- Limiting for both directions of travel
- Switchover from "fast/slow" (predisconnect)
- Switch contacts designed for control current
- IP 66 protection

Load display

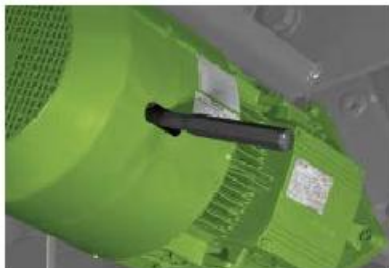


- SLD four-digit 7-segment load display (Stahl Load Display), large format, luminous red, available with various interfaces including CAN.
- Choice of 60, 100 or 150 mm digit height
- No additional sensor is required as the standard load sensor is used.

Signal transmitters



- Visual and acoustic signal transmitters such as horn and flashing light can be mounted on travel carriages.
- The signal transmitters can be activated by a button on the control pendant.

Manual release of hoist brake

- The brake release device permits the hoist brake to be released manually and thus the load to be lowered during a power cut.
- As an option, every hoist can be equipped with this supplementary equipment to the standard brake.

Rope drum brake

- Redundant brake system provides increased safety
- Intercept and holding brake, prevents the load falling even if the gear should break
- The rope drum brake is controlled by the SBC brake controller

Frequency control**Frequency inverters for ›lifting‹**

- Smooth starting and braking characteristics
- Load swing greatly reduced
- Fast, precise positioning of the load, corrective switching operations rarely necessary
- The reduced dynamic load means a longer service life for hoist motor and gear and reduces stress on the whole system.
- ESR function (Extended Speed Range) for higher hoisting speeds with partial load
- Worldwide approvals for all frequency inverters
- Certified in compliance with DIN ISO 9001

Frequency inverters for ›cross/long travel‹

- Simple to install, parametrise and operate
- Standard speed range 1:10, up to 1:30 as an option
- SPS compatible to super-ordinate systems (optional)
- All internationally customary mains voltages are available
- Also available in design for installing in panel box

		Standard	Options
Ambient temperature		–20 °C to +40 °C	–40 °C to +70 °C
Protection to IEC/EN 60529		IP 55	IP 66
Paint	Colour	Greyish black/yellow-green RAL 7021/6018	All other colours from RAL colour chart
	D.F.T.	80 µm	120 µm to 240 µm
	Paint	Polyurethane topcoat	Epoxy-resin base (240 µm)
Control pendants		–	STH 1 control pendant with/without load display Radio remote control in pushbutton or joystick version
Control		Hoist motor connection wired into motor terminal box	Complete control with transformer and crane switch contactor Crane manufacturers' control without transformer and without crane switch contactor
Hoist motor control		Pole-changing or frequency controlled, control range 10–100 %	Frequency controlled, control range 1–100 %
Travel motor control	50 Hz	5/20 m/min	2.5/10 m/min or 8/32 m/min
	60 Hz	6.3/25 m/min	3.2/12.5 m/min or 10/40 m/min
	50/60 Hz	2.5...25 m/min frequency controlled	4.0...40 m/min frequency controlled
Motor supply voltage	50 Hz	380–415 V	All voltages possible
	60 Hz	440–480 V	
Rope to DIN 3063, DIN 3067 Rope safety factor		Bright or galvanised	–
		Generally ≥ 5.0	Off-standard ropes and higher rope safety factor
Rope drive		Bottom hook block, rope return sheaves, rope suspension and wire rope with 1/1, 2/2-1, 2/1, 4/1, 4/2-1, 8/2-1, also 2/2-2, 4/2-2	Ramshorn hook Additional bottom hook blocks and/or return sheaves, off-standard reevings
Limit switches	Emergency hoist limit switch (gear limit switch)	For top and bottom hook position and operational limit switch for top hook position	With additional switching elements for further stopping positions of hook
	Travel limit switch	–	For up to four switching functions – pre- and end limiting in both directions of travel, carriage spacing
Overload cut-off		SLE	SMC
	Signal transmitter	–	Horn, flashing light
	Visualisation	–	SLD large-format load display, display in control pendant, readable on PC
	Data exchange	–	RS 232, RS 485, CAN
Temperature control of travel motors		Ptc thermistors including tripping device	–
Mechanical safety devices		Anti-derail device	Wheel arresters
		Buffers on all trolleys/crabs	Runway endstops
Hoist brake		Monodisc spring-loaded brake with asbestos-free brake linings	Manual release of brakes, or drive redundance with Twin Drive Concept SBC rope drum brake

The engineering

Engineering means innovation and individuality. Constantly redefining the lifting and transporting of loads for complex requirements even in explosive areas is a job for our experts. Drawing on one of the widest product ranges of standard components, they regularly develop modern, individual off-standard and customised solutions. Hardly any other manufacturer of lifting and crane technology can offer you this diversity of precisely designed top quality customised solutions with maximum cost-effectiveness.

The modular SH wire rope hoist programme forms the basis for the most varied solutions. Compact construction, low headroom, double-grooved wire rope hoists, SHF frequency controlled wire rope hoists, TDC twin drive concept. Various travel carriages are available for all wire rope hoists. Customised system solutions individually adapted to your precise requirements are our forte. The experience and knowledge gained from over 130 years of crane technology give us the flexibility to develop and produce the optimum solution for your project in short time. On request, all off-standard wire rope hoists and customised solutions are available in explosion-protected design for Zone 1, Zone 2, Zone 21 and Zone 22.

The facts

- Perfectly matched to your project
- Every hoist is the result of over 130 years of experience and expertise
- Short development time
- Cost-effective thanks to modular system
- Technically mature thanks to the use of field-proven standard components
- High quality and reliability ensured by in-house production
- All customised solutions are available as an option in explosion-protected design complying with ATEX and IECEx.



Example 1 TDC Twin Drive Concept

The TDC Twin Drive Concept TDC is the uncompromising solution for hoists complying with DIN EN 14492-2, Annex B. Hoists in TDC design are suitable for transporting molten metals and other goods with a similar risk potential. They are equipped as standard with two motor-gear units. Both motors are always synchronously controlled. The brakes mounted on the two motors are designed so that in an emergency each one is capable of braking or holding the load by itself. The two brakes are activated in conjunction and act as operating and holding brakes. On twin drive concept hoists, all drives are monitored by STAHL CraneSystems condition monitoring systems.

The facts

- TDC prevents the load dropping even if the gear should break
- Continuous monitoring of brakes, drives and load
- Two synchronously controlled hoist motors and brakes
- Two brakes with manual release for emergency lowering
- Robust, fully enclosed system
- Standard components used
- Operating and safety brake of the same construction
- Up to 60 % higher load capacity when not transporting molten metals

Version with an SH wire rope hoist as auxiliary hoist



Frame size	Reeving	Monorail trolley (UE) *	Double rail crab (OE) *
SH 50 TDC	4/1	6.3–8	6.3–8
SH 60 TDC	2/1; 4/2–1	6.3–8	6.3–8
SH 60 TDC	4/1; 8/2–1	10–12, 5–16	10–12, 5–16

* Load capacity in tonnes when transporting molten metals

Example 2 Two SH wire rope hoists and a turntable

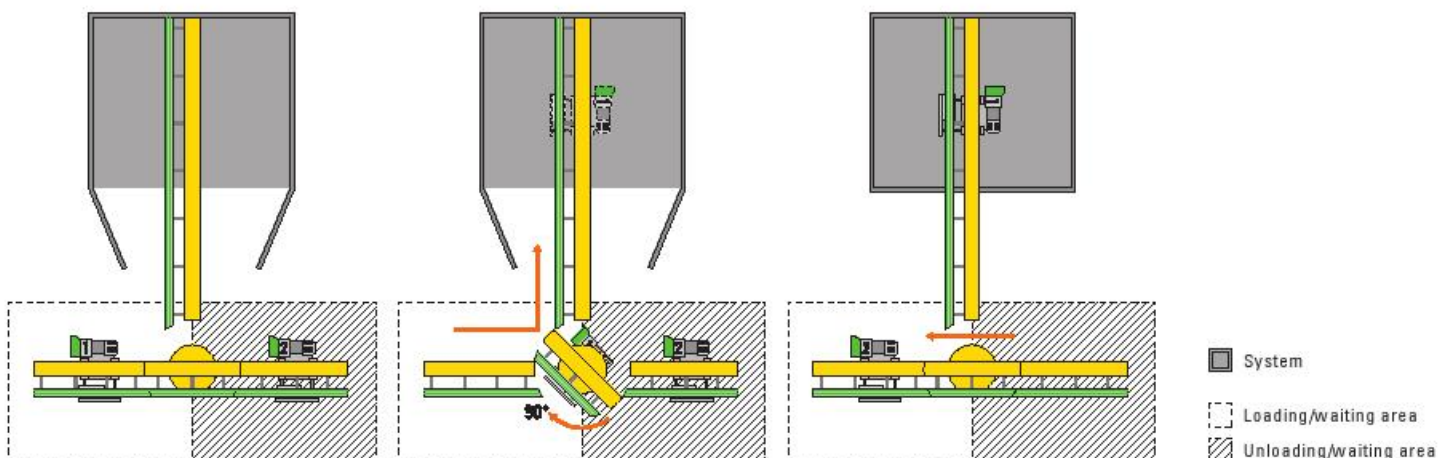
STAHL CraneSystems engineers developed for the efficient loading of a system a customised solution in which two SH wire rope hoists travel into a system on electrically driven trolleys and are then are automatically taken over by the system's control. The workpieces are rotated and run in by the electrically driven turntable.

The intelligent control, the load limiting of the wire rope hoists and the turntable are controlled by the condition monitoring system in combination with signal transmission via conductor lines. Overloading the conveyor system is prevented. If a wire rope hoist reaches its maximum load capacity, the load measurement on the second wire rope hoist comes into action and disconnects the hoisting motion. The hoisting motion is not released until the load has been set down and the hoist thus unloaded. The two wire rope hoists and the turntable operate with standard radio remote controls.

After the hoist has automatically been taken over by the system control at a defined point, it can be moved within the system. The second wire rope hoist is now unloaded at the set-down point, then moved to the take-up point and loaded. The first wire rope hoist is released from the system by the radio remote control and moved to the set-down point via the turntable. It is not possible for the two wire rope hoists to travel onto the turntable at the same time.

The facts

- Electrically driven turntable
- Condition monitoring
- Radio remote control with integrated turntable control and handover to the machine
- Electrically rotating load hook
- High FEM classification



Example 3 SH wire rope hoist and crane components in explosion-protected design for extremely low temperatures

In winter, temperatures can fall to -55°C in many regions of the world. This has an effect on explosion protection, electronics, mechanics and the crane components' materials. STAHL CraneSystems has developed an off-standard solution especially for the extremely low temperature range. All the components are drawn from the standard programme.

The hoisting gear and control of the wire rope hoist are in thermally insulated housings. As soon as external sensors measure temperatures below -15°C the explosion-protected space heater in the housing switches on. Space heaters in all motors reliably prevent icing up, condensation and material embrittlement.

The crane system can be radio controlled. However at temperatures below -20°C the control switches automatically from radio to manual operation. If temperatures drop below -40°C , the crane switches off automatically.

The catwalk along the crane bridge is equipped with a handrail on both sides for safe maintenance work in snow and ice. The platforms over the crane endcarriages protect the travel drives and facilitate climbing onto the crab.

The facts

- Wire rope hoist and crane components in explosion-protected design for Zone 1
- ATEX and IECEx certified
- Automatic cut-off at -40°C , storage down to -50°C when shut down
- Thermally insulated housings for hoisting gear and control
- Explosion-protected space heaters in all motors
- Brass rail sweeps clear snow from the rails
- Maintenance catwalk with railings on both sides



The explosion-protected SH ex wire rope hoist



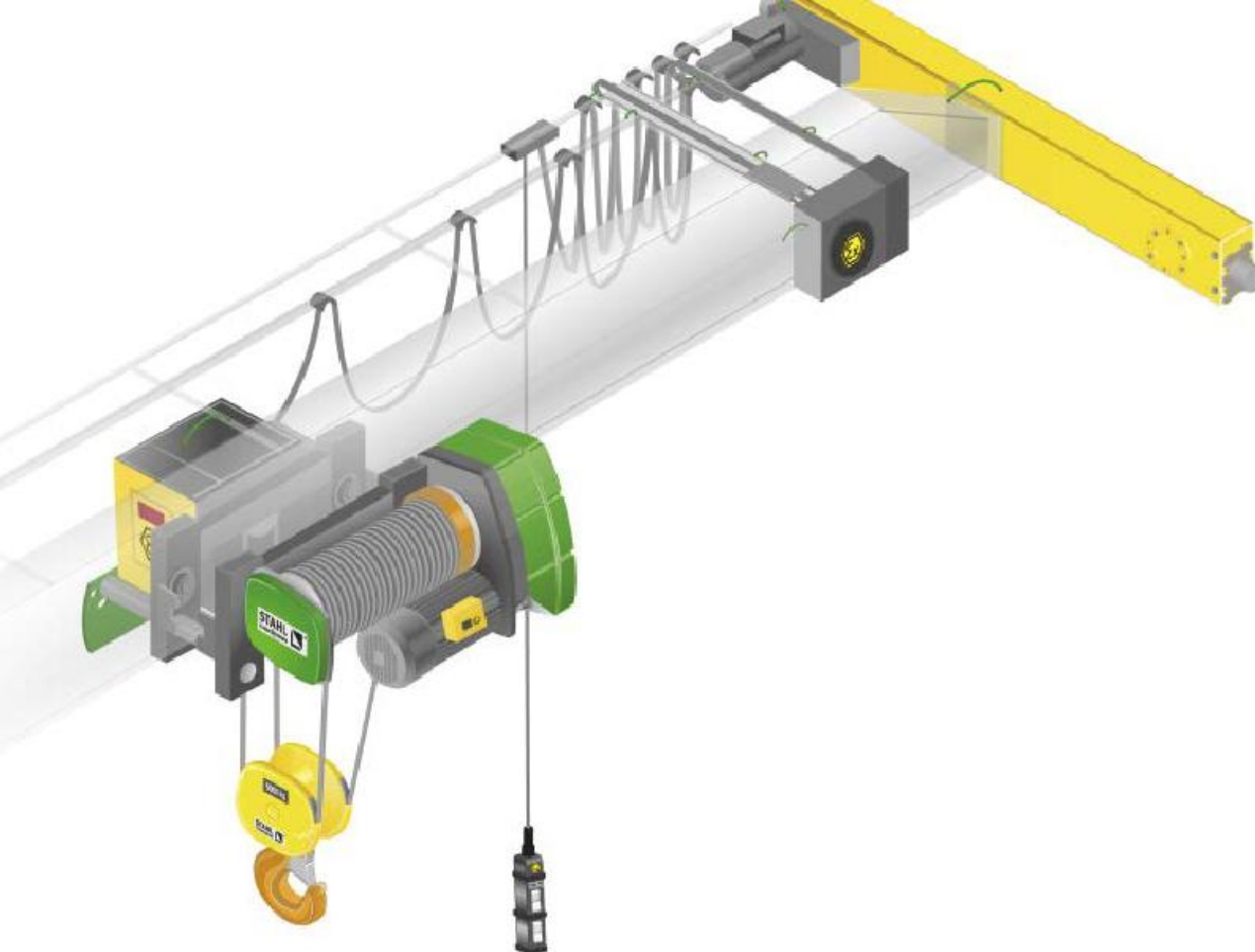
STAHL CraneSystems is known internationally as an explosion protection specialist and is regarded as world market leader in explosion protection technology. The safety of people and machines in areas subject to gas and dust explosion hazards is our top priority. Here we make no compromises. As developer of numerous innovations in this field we have had palpable influence on crane technology. Experience and know-how from many decades, our own fundamental research and development, approvals from the Federal Physico-Technical Institute (PTB) and other test institutes in many countries underline our expertise. Hoisting technology from STAHL CraneSystems ranks among the safest technology on the market in the chemical, petrochemical and pharmaceutical industries, the food processing industry, power supply, shipbuilding, offshore and natural gas liquefaction industries (LNG).

Without exception, the SH ex wire rope hoist programme is based on the modular SH wire rope hoist programme. All components of the explosion-protected hoists come from our own production, from motor and brake to controls and control pendant. For this ensures the complete, high-quality explosion protection on which users, crane manufacturers and system manufacturers all over the world have relied for decades. The strict ATEX directives and IECEx regulations on mechanical and electrical explosion protection are of course met.

The facts

- Internationally leading specialist for explosion protection technology
- The world's first complete, most comprehensive wire rope hoist programme for Zone 1, Zone 2, Zone 21 and Zone 22
- Based on the SH wire rope hoist
- Design and maintenance to ATEX IECEx in certified quality
- All equipment available in explosion-protected design

Use	Category	Protection against	Explosion protection class
Zone 1	Ex II 2 G	Gas	Ex de IIB T4 Gb or Ex de IIC T4 Gb
Zone 2	Ex II 3 G	Gas	Ex de nA IIB T3 (T4) Gc or Ex de nA IIC T3 (T4) Gc
Zone 21	Ex II 2 D	Dust	Ex tb IIIC T 120°C Db
Zone 22	Ex II 3 D	Dust	Ex tc IIIC T 120°C Dc



The SH ex wire rope hoist is available for gas explosion protection Zone 1 and Zone 2 and dust explosion protection Zone 21 and Zone 22. It meets the technical, normative and practical requirements specified by ATEX and IECEx.



An explosion-protected SH ex wire rope hoist transports goods through a shaft over several storeys of a chemical plant. The single-girder overhead travelling crane with a load capacity of 5,000 kg is operated by radio remote control.

The support

Quality right down to the most minor detail is the standard STAHL CraneSystems is committed to. Not only in the field of crane technology, but also on the subject of support. You will find lifting and crane technology from STAHL CraneSystems all around the world. Developed by engineers and experts, manufactured with maximum care following our well-known standard of quality. All around the world, many companies from various fields have decided on maximum safety and quality, on products from STAHL CraneSystems.

When it comes to sales, we are committed exclusively to capable, professional crane manufacturing partners. You can expect optimum support from them when your individual crane system with components from STAHL CraneSystems is at stake. Consulting and erection of a new system, system-oriented testing and maintenance, modernisation, spare parts supply and training courses. Together with our subsidiaries and crane manufacturing partners we offer you perfectly coordinated support all over the world.





Spare parts – accessible right around the clock

Our own subsidiaries and numerous partners around the world ensure reliable spare parts supply and expert assistance in your area. Even decades after a series has been discontinued, spare parts are available all over the world right around the clock.



Training courses

We constantly keep our regional crane manufacturing partners up to date with training courses, seminars and information material. You too can profit directly from our expertise. We impart practical and theoretical knowledge in our own training centre or on your premises. The seminars on offer in the form of individual, basic and advanced courses cover all main product groups. However we would also be pleased to match a special programme to your individual specifications and requirements.

You will find our current seminar programme at
www.stahlcranes.com/en/support



Factory service centre – in action all over the world

Our factory service centre is a service for our customers: wherever you are we assist your crane or systems manufacturer with our experience and expertise whenever he needs us. Up-to-date diagnostic apparatus and condition monitoring systems stand by to support professional service and maintenance work. Not only you, but your system, are in safe hands. You can rely on us.

Your will find our online service at
www.web.stahlcranes.com
 and you can reach our factory service centre on
customer.service@stahlcranes.com



The SH wire rope hoist in action

Experts in all countries immediately recognise hoist and crane components from STAHL CraneSystems. For the SH wire rope hoist is in action all around the world in the most diverse variants and solutions. Innovative, thought through down to the most minor detail and manufactured with greatest care, the SH wire rope hoist continues to conquer new areas of application. It thus proves its well above average flexibility and cost-effectiveness. STAHL CraneSystems is represented on all continents by subsidiaries, sales and crane manufacturing partners.





5



6

- 1 71 STAHL CraneSystems hoists operating in a new wagon factory in Belarus. Each double girder overhead travelling crane is equipped with two SH60 wire rope hoists with safe working loads of 16,000 kg and 20,000 kg. An additional SH40 wire rope hoist with a safe working load of 5,000 kg acts as an auxiliary hoist.
- 2 A double girder overhead travelling crane equipped with two AS7 wire rope hoists combined as a twin hoist is used for transporting castings. The twin hoist's single-sided counter-rotating rope reeving lifts and lowers the load without lateral hook travel, the load can be positioned accurately.
- 3 In Europe there is only one engine maintenance plant for the
- 4 Rolls-Royce Trent engines which are used in the Airbus models A 330, A 340 and A 380. It is one of the most up-to-date and progressive maintenance plants in the world employing the highly efficient vertical strip process. Here STAHL CraneSystems wire rope hoists of the SHF3 to SHF6 series are in use. The hoists have true vertical lift and extremely low load swing.
- 5 The crane operator operates the crane system over a paper machine with radio remote control. The paper reel weighing several tonnes must be rotated for it to be mounted in the machine's take-up fixture. It is lifted by two SH6 wire rope hoists with independent load hooks. These can be adjusted on the common travel rail by an electric drive to the correct distance between hooks.
- 6 The crane system's maximum working load of 12,500 kg is distributed among four STAHL CraneSystems SH30 wire rope hoists. Each wire rope hoist has a safe working load of 3,200 kg. The functions of the cranes, the two hoists and the pallet grab are controlled by a joystick radio remote control.



1 Single and double girder overhead travelling cranes with STAHL CraneSystems SH wire rope hoists and magnet spreaders are used in a flame-cutting plant for transporting steel sheets which weigh several tonnes. A slewing jib crane with an ST chain hoist provides assistance as a workplace crane.

2 Two SH wire rope hoists with double rail crabs and a load capacity of 7,500 kg each are operated in synch with the aid of a radio remote control. In this way steel girders of different lengths can be transported safely.

3 A single girder overhead travelling crane with an SH40 wire rope hoist operates in the up-to-date mechanical production of a foundry for high-strength castings. The hoist has a safe working load of 4,000 kg and is equipped with heat protection shields.

4 Two radio-controlled single girder overhead travelling cranes with safe working loads of 6,300 kg operate in a joinery for solid timber structures in Bavaria. They provide all transport required, from the untreated wooden beams up to the completed timber walls which are then loaded onto lorries.

5 Wall-mounted cranes and overhead travelling cranes with STAHL CraneSystems SH wire rope hoists operate in a production plant in China. They have safe working loads of up to 32,000 kg and are used in three identical bays for assembling production machinery.

6 A custom-built stacker crane is used in a company's semi-automated production plant for precast concrete components in Bavaria. The crane is equipped with a lifting mast. It lifts the concrete elements weighing up to 5,700 kg from the production line and stacks them on transport carts.





3



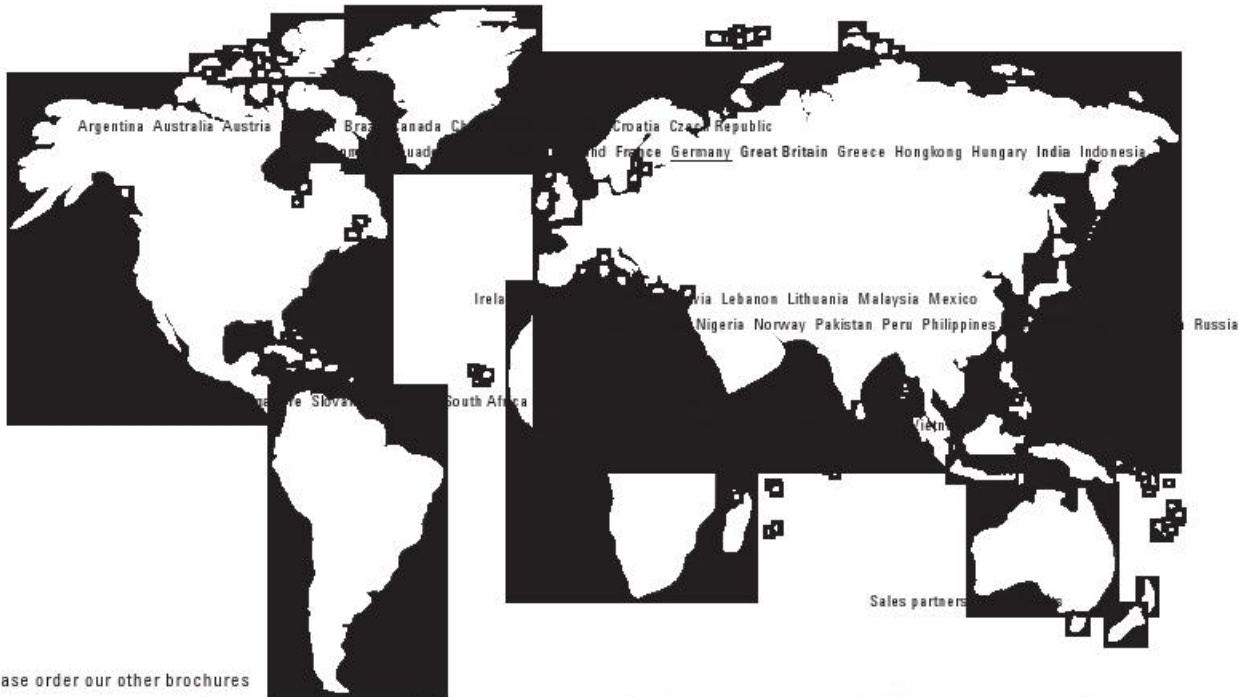
4



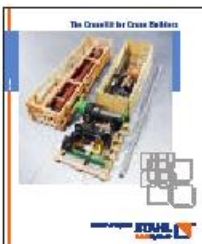
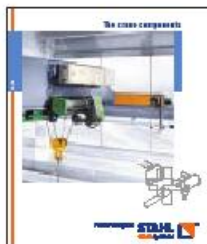
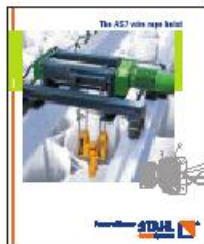
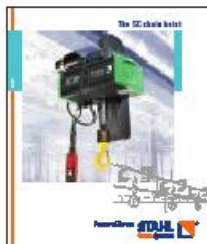
5



6



Please order our other brochures



Presented by



→ www.stahlcranes.com

STAHL CraneSystems GmbH
Daimlerstr. 6, 74653 Künzelsau, Germany
Tel +49 7940 128-0, Fax +49 7940 55665
marketing.scs@stahlcranes.com

Partner of Experts



All specifications and illustrations are non-binding.
Subject to modification, errors and printing errors excepted.
Printed in Germany Sach-Nr. 990 035 0 F-PB-2.1-EN-02.15-vis visuell.de