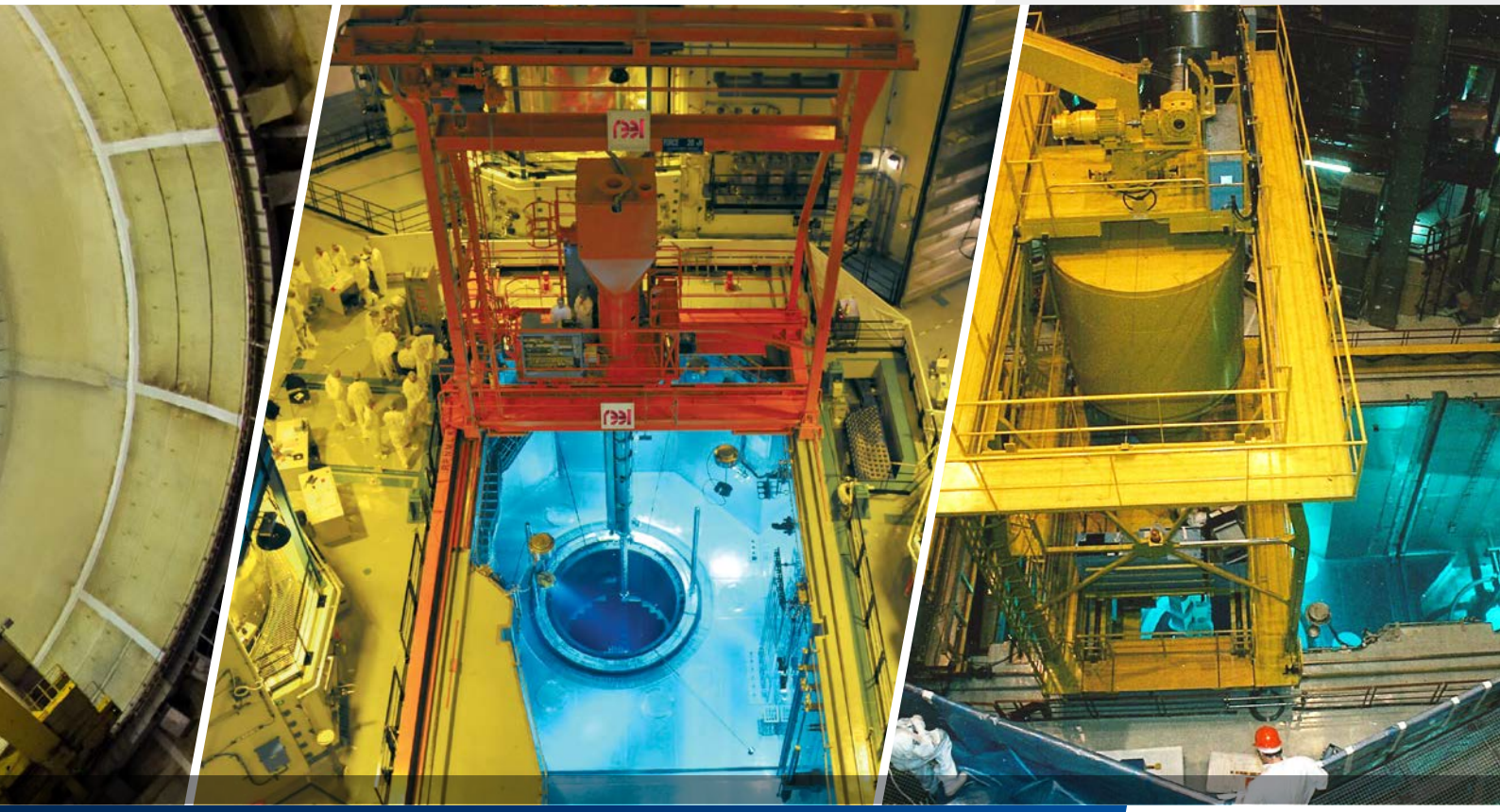
RegalRexnord



Braking Solutions

FOR NUCLEAR APPLICATIONS

Stromag

PRODUCT CATALOG

STROMAG™ PROVIDES BRAKING SOLUTIONS FOR ALL LIFTING SYSTEMS USED IN A NUCLEAR POWER PLANT

Main supplier of disc brakes for the French Nuclear Industry for more than 40 years, Stromag provides worldwide (Europe, China, Brazil, South Africa and South Korea) braking solutions meeting all safety and quality requirements.

All Stromag products are designed and manufactured to meet the stringent and specific needs of the nuclear environment, such as radiation resistance, implementation of a quality plan, reinforced controls, use of PMUC components, and certification of material and surface treatment conformity.

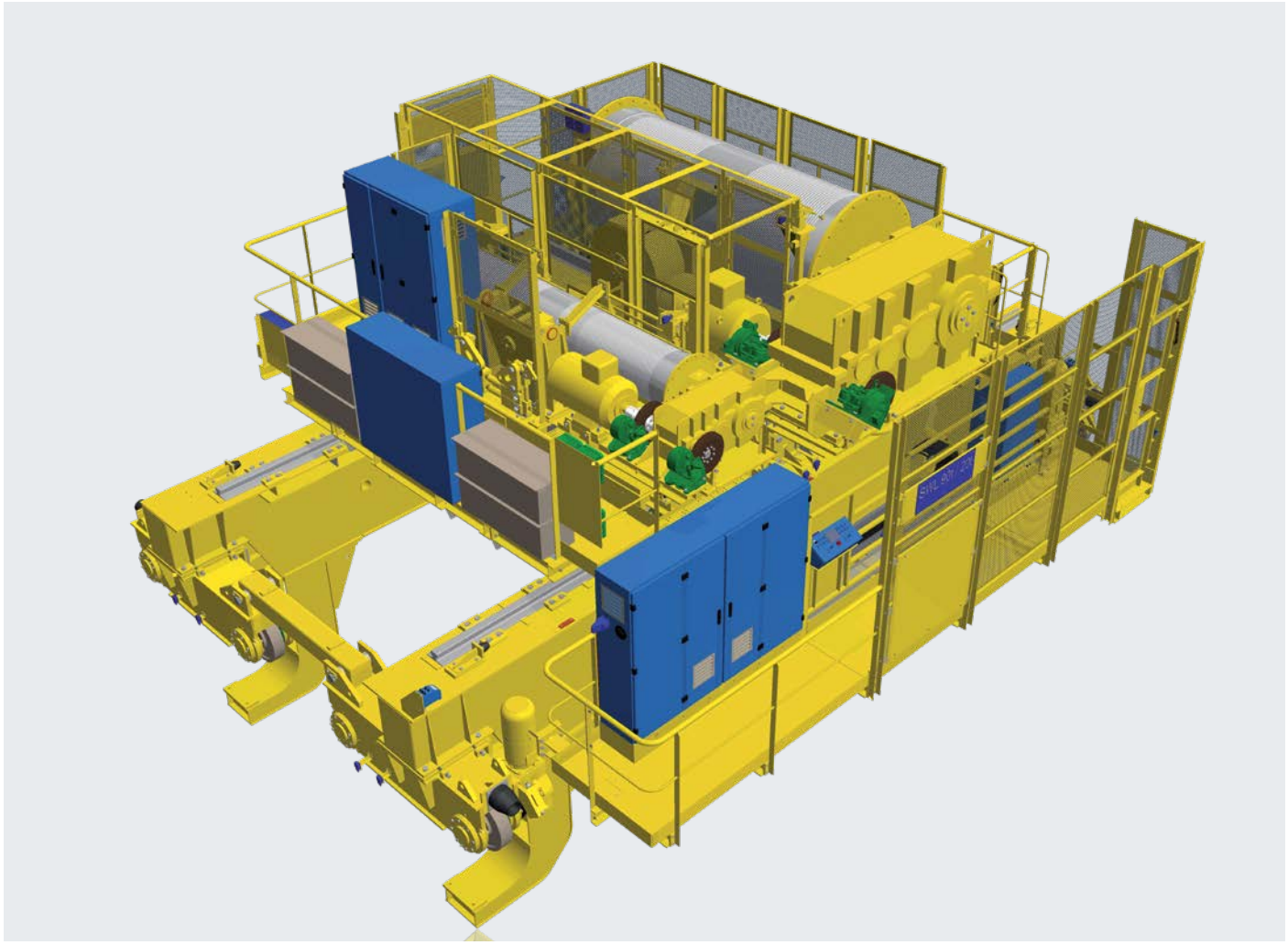
The SIME™ Brakes braking systems equip today:

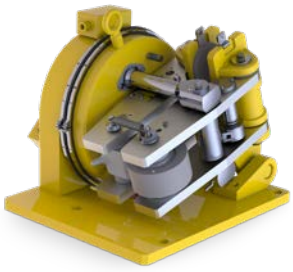
- Multiple Civil Installations such as nuclear power plants (cooling pool cranes, external gantries, lowering devices, fuel manipulative equipment), sites of waste reprocessing, EPR (Taicang, UK), experiment research center (CEA, ITER),
- Military Installations such as the DCNS (Naval Group) of Toulon and Brest, the Charles de Gaulle aircraft carrier cranes.

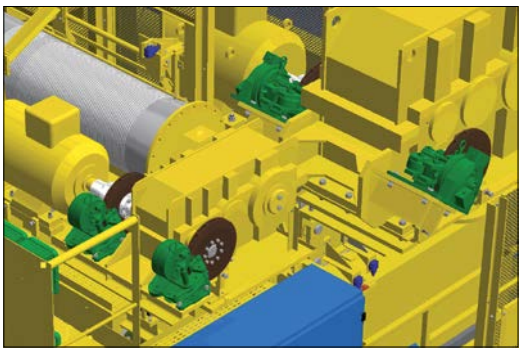
Stromag skills are world-renowned, validated by the certification ISO 9001-V2015 and ISO19443, as well as EDF supplier qualification, and customer follow-up through regular audits and stop-point inspections during the manufacturing process.
To ensure the best reliable performance in safety, Stromag can supply complete braking solutions including:

- Fail-safe Service Brakes for intensive use at "high speed"
- Fail-safe Emergency Brakes for safety use at "low speed"
- Electrical Power units allowing controlled and manual load lowering
- Hydraulic Power Packs with a large range of options
- Configurable Monitoring Systems of the kinematic chain (SSCC), designed accordingly to the CRT EDF rules
- Elastic Disc Couplings for the transmission of the torque with damping of the operation vibrations and shocks.

NUCLEAR APPLICATION EXAMPLE EQUIPPED WITH A STROMAG™ BRAKING SYSTEM







90 T/20 T Overhead Cranes realized by REEL SAS, to equip the Taishan EPR Fuel Buildings, fitted with Stromag SIME-Brakes

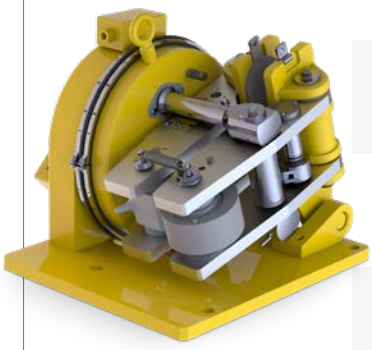
ELECTROMAGNETIC SERVICE BRAKES

SIME™ Brakes electromagnetic disc brakes ensure a high performance of braking that meet the quality requirements of the nuclear applications.

The 5, 45 and CA2 fail-safe brakes are used in dynamic braking applications.

The power supplies AC64 and AC32 are designed to give optimum performance to the electromagnetic calipers. The brakes can be fitted with specific options in order to meet requirements and specifications of the installation.

CALIPERS	BRAKING TORQUES (N.m) Ø Disc (mm)	
5K 5D	48 Ø315	555 Ø625
45K 45D	285 Ø315	1190 Ø625



4CA2	665 Ø445	2400 Ø795
3CA2	1120 Ø445	4020 Ø795
2CA2	2660 Ø625	8040 Ø995
1CA2	3860 Ø625	11660 Ø995

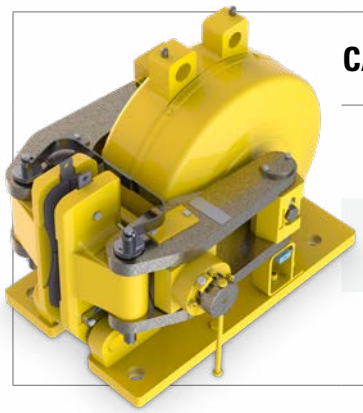
AC64 and AC32 ELECTRICAL POWER UNITS

- Easy to set up and use
- High "call" voltage to reduce opening response time
- Economy mode after caliper opening
- Short and constant closing times
- Available in polycarbonate or steel enclosure

ELECTROMAGNETIC EMERGENCY BRAKES

The SA range includes the electromagnetic fail-safe brakes OSA, OOSA and 2SA. Those brakes are particularly renowned for their braking power, they are a reference in terms of safety.

This range has low maintenance requirements and offers an incomparable performance of braking. The electromagnetic brakes type SA can be associated with the electrical power unit type C4205, which allows the controlled lowering of the load with a joystick.



CALIPERS	BRAKING TORQUES (N.m) Ø Disc (mm)	
OSA	10 000 Ø750	44 000 Ø3000
OOSA	18 000 Ø750	86 000 Ø3000
2SA	32 000 Ø750	145 000 Ø3000

AS100 and AS200 ELECTRICAL POWER UNITS

- Association with the **OSA, OOSA** and **2SA** calipers
- Easy to set up and use
- High "call" voltage to reduce opening response time
- Economy mode after caliper opening
- Short and constant closing times
- Available in polycarbonate or steel enclosure

C4205 ELECTRICAL POWER UNIT

- Association with the **4CA2, 3CA2, OSA, OOSA** and **2SA** calipers
- Opening and closing control of the calipers
- Progressive release from 100 to 50% of the braking torque for load lowering by manual control or regulated control through a speed information feedback.
- High "call" voltage to reduce opening response time
- Economy mode after caliper opening
- Short and constant closing times
- Available in steel enclosure

HYDRAULIC EMERGENCY BRAKES

The brakes type SH are powerful hydraulic fail-safe brakes with a symmetrical design. Their robustness and simplicity of operation make them essential for emergency braking.

The brakes type SHD are single-spring hydraulic fail-safe brakes. Their compact design and low weight make them easy to install in restricted spaces.

SH and SHD calipers are powered by hydraulic power packs type SHPU. Mounted on the same bracket, two SH or SHD calipers can be connected to a single hydraulic power pack. The SHV version integrates the hydraulic power pack and the caliper on the same bracket.

CALIPERS	BRAKING TORQUES (N.m) Ø Disc (mm)		
SH5	15 000 Ø750		74 000 Ø3000
SH9A	28 000 Ø750		141 000 Ø3000
SH15	43 000 Ø750		212 000 Ø3000
SH18B	51 000 Ø750		254 000 Ø3000
SH25	62 000 Ø750		343 000 Ø3000
SH32	82 000 Ø750		458 000 Ø3000
SHD5A	17 000 Ø750		52 000 Ø2000
SHD9	28 000 Ø750		91 000 Ø2000

HYDRAULIC POWER PACKS

The SHPU Hydraulic Power Packs allow a perfect control of the opening and closing times of the hydraulic brakes. Depending on their configuration, they offer different operating modes.

Thanks to its compactness and simple design, the SHPU1 Hydraulic Power Pack is an economical solution for all braking systems in on/off operation.

Thanks to its modularity, the SHPU2 Hydraulic Power Pack can equip braking systems with advanced functions such as regulated braking, stepped braking, or lowering of the load. Electric level, temperature or clogging indicators are supplied optionally.

The SHPU3 Hydraulic Power Pack combines all the options of the SHPU1 and SHPU2 HPP. Thanks to its 35L reservoir, it can be associated with a very large number of brakes (e.g.: up to 30 SH5 calipers, 5 SH32 calipers).

OPTIONS

Many specific options are available:

- **MS**: Motor Special
- **EVS**: Solenoid valves coils with specific voltage
- **OP1**: Enhanced security return circuit by 2 solenoid valves
- **OP2-OP3**: Manual lowering with dead man safety device or with overspeed safety by solenoid valves
- **OP10**: Drip tray
- **Y5**: Regulated braking
- Indicators: of clogging, oil level and oil temperature
- **K-SI**: Electrical control unit with **SIMAN**: System of monitoring and management of the Hydraulic Power pack.

HYDRAULIC POWER PACKS MONITORING

SIMAN is an intelligent system for monitoring and management of the good operation of Hydraulic Power Packs whatever their functionalities.

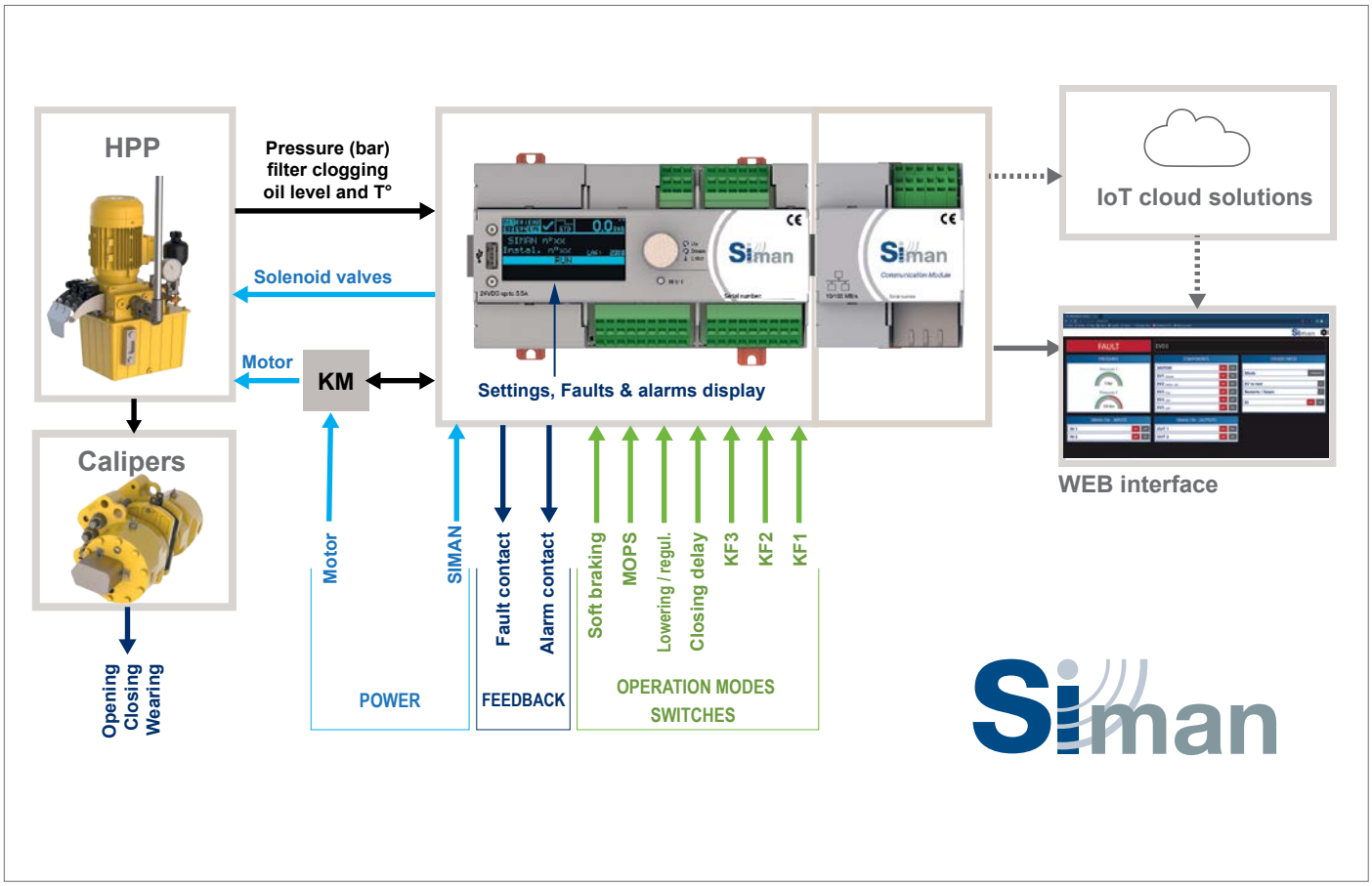
This system is a reliable solution for safety with:

- according to standard NF EN ISO 13849, a performance level PLd, category 2 system, MTBF = high, DC = high
- a service life of 1 million of ON/OFF cycles

It drives the HPP motor pump and the solenoid-valves. To ensure safety, it controls the good operation of the solenoid-valves and the oil return to the tank. For optimal operation, it monitors the HPP parameters and the condition of the associated hydraulic circuit.

SIMAN CM communication module allows connection to a Ethernet netwok (ModBus TCP server - WEB interface).

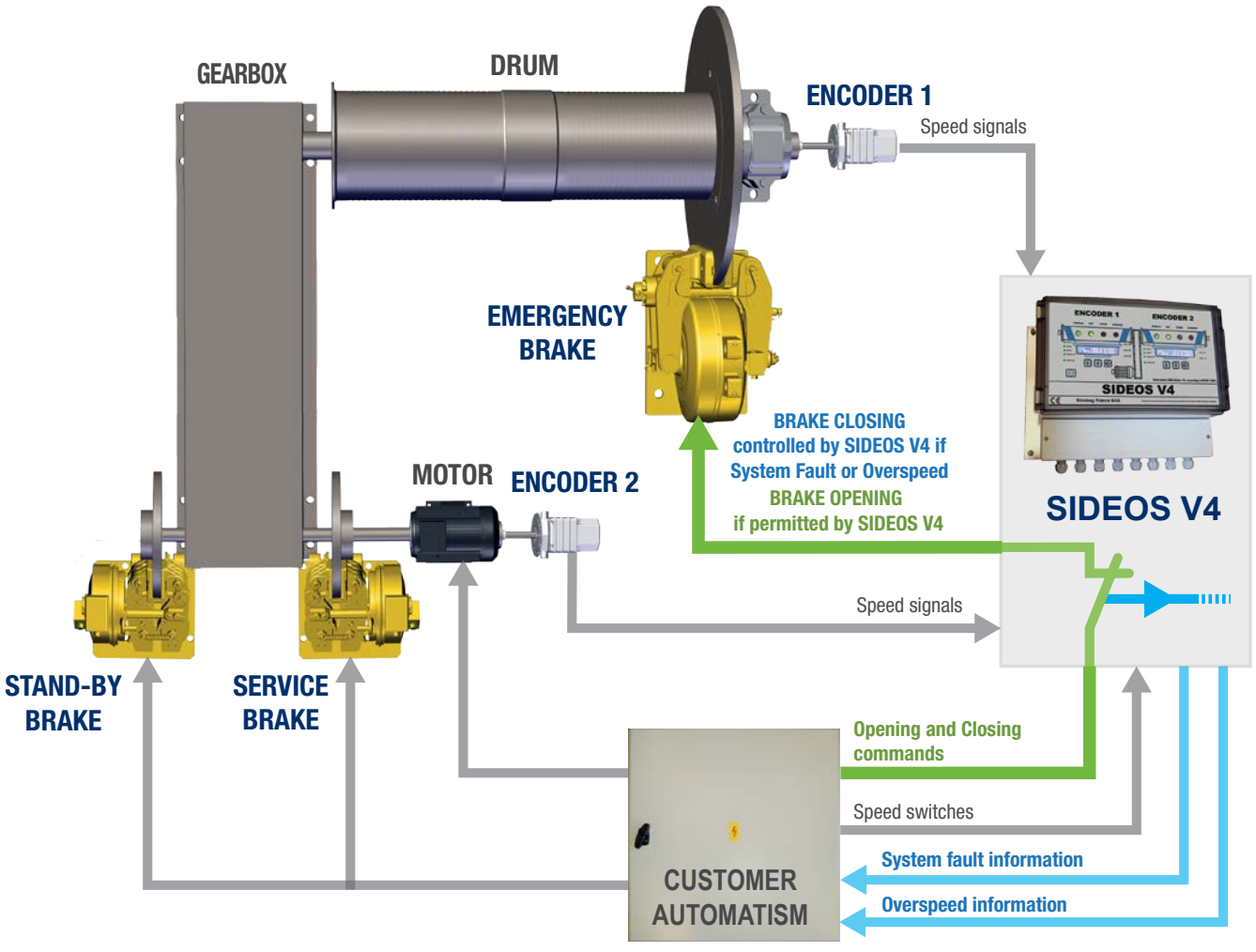
Diagram of the SIMAN inputs and outputs



SIDEOS V4 MONITORING SYSTEM

The SIDEOS V4 unit is a configurable monitoring system of the kinematic chain: it is designed to secure the kinematic chain of a lifting and handling equipment.

- It pilots the opening of the braking control circuit downstream of the control-command circuits from which it is independent.
- It prevents or stops the use of the lifting movement of the handling equipment, if it is unable to perform its function.
- It allows to obtain a secured monitoring system of the speed of:
  Category 4, Performance Level PL= e according to the standard ISO/IEC 13849-1
- It is designed according to **CRT16 60.C.016 EDF**



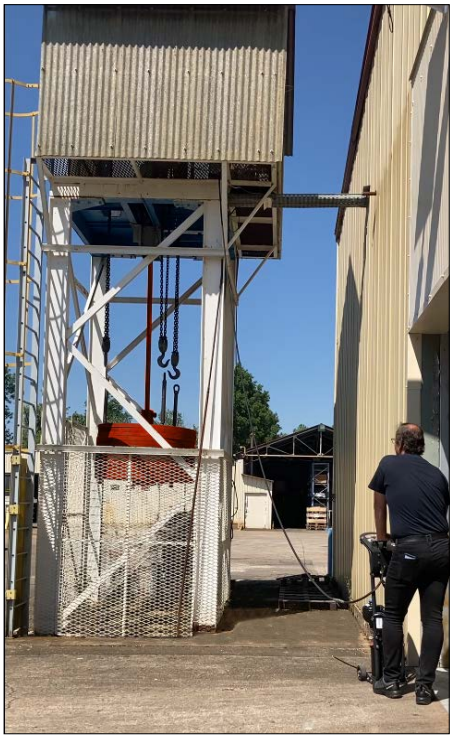
LOWERING UNIT

This system allows to control lowering of the load in a simple and safe way.

This new lowering unit includes advantages of ergonomics and safety. In the event of a power failure or special conditions, the technician is able to control the lowering of the load quickly and effortlessly, in optimal safety conditions.

This unit can be brought and connected easily on the installation. It is fitted with a dead man safety device and can be fitted with OP2/OP3 functions for electrical control of the speed and/or the disc temperature. A control wheel and pressure gauges provide utilisation comfort and precise control.

Stromag offers training in real conditions (load 8 T, lowering hight: 5m), consult us.



Simulation in real conditions
8T lowering

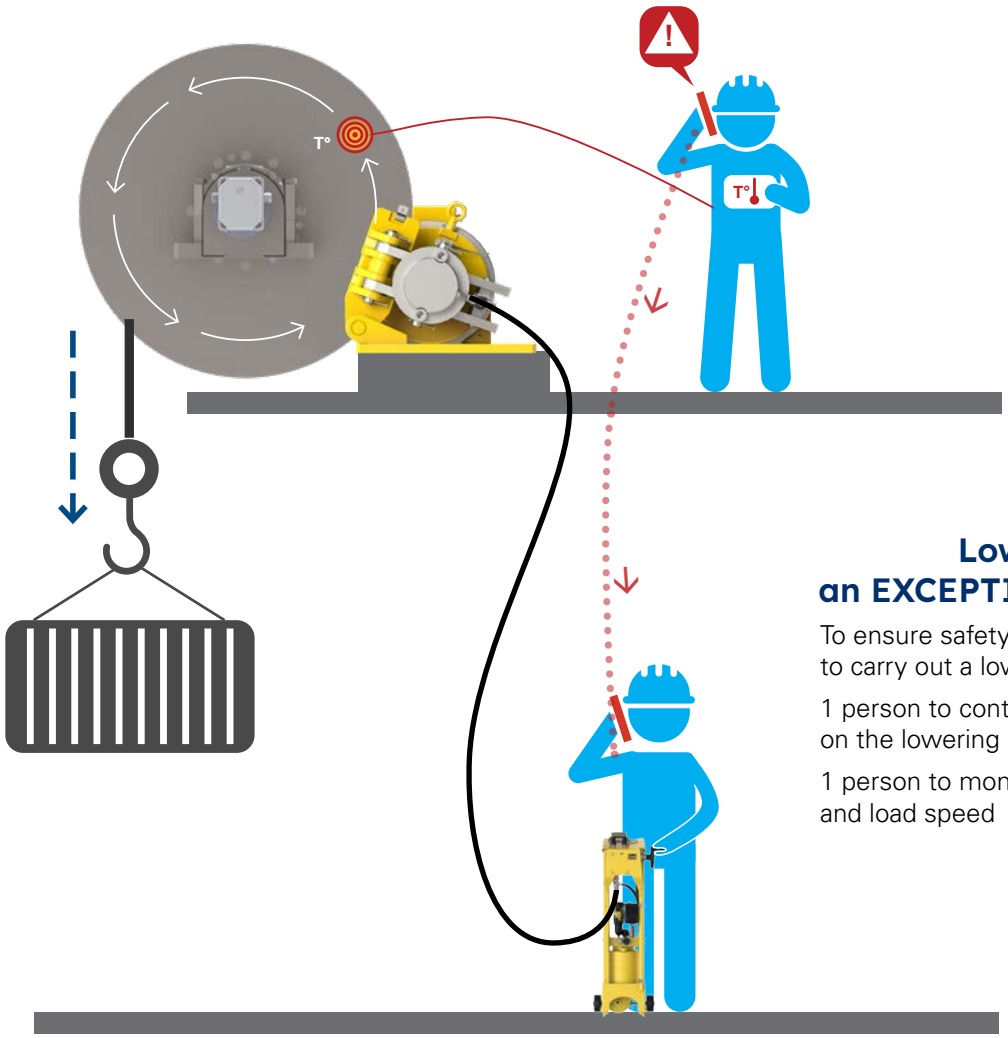
Accessory kit

- Electric screwdriver
- Charger
- Pyrotechnic probe
- Capillary hose: Ø4 / length: 10 to 50 m (10 meter modules)

BENEFITS INCLUDE

- Ergonomics: steering wheel, pressure gauges
- Comfort in use: effortlessly rechargeable energy reserve
- Lowering controlled with precision
- Dead man safety device
- Lowering possible in case of power failure
- Easy transport and connection
- Adaptation to the installation with quick couplings and starting up by our team.
- Options: Accessory kit, OP2/OP3 functions.

LOWERING OPERATION



Lowering is an EXCEPTIONAL operation

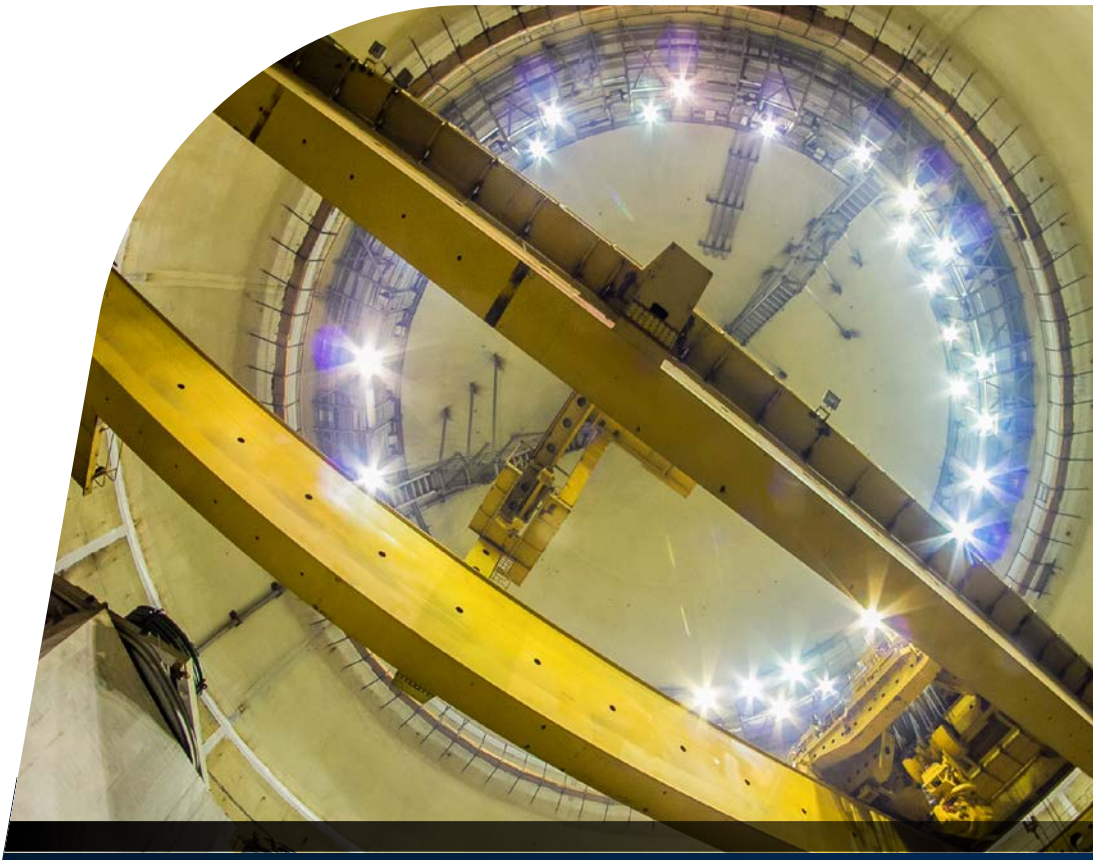
To ensure safety, 2 people are necessary to carry out a lowering:

1 person to control the lowering / action on the lowering unit

1 person to monitor load temperature or/ and load speed

- Handle for dead man safety
- 2 pressure gauges (brake + reserve pressures monitoring)
- Steering wheel
- Electrical screwdriver for energy (option)
- Accumulator for energy reserve
- Wheels for easy transport

Weight ≈ 30 kg
Height ≈ 1 m



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