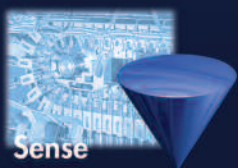




Lifts Handbook

Rev.2 January 2007



Sense



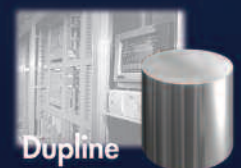
Switch



Control



Safety



Dupline

A lifetime of commitment to automation

CONTENTS

- ★ Chapter 1
INTRODUCTION

- ★ Chapter 2
TYPES OF LIFTS

- ★ Chapter 3
KEY APPLICATIONS

- ★ Chapter 4
PRODUCTS OFFERING

- ★ Chapter 5
SALES ARGUMENTS

- ★ Chapter 6
NORMS AND REGULATIONS

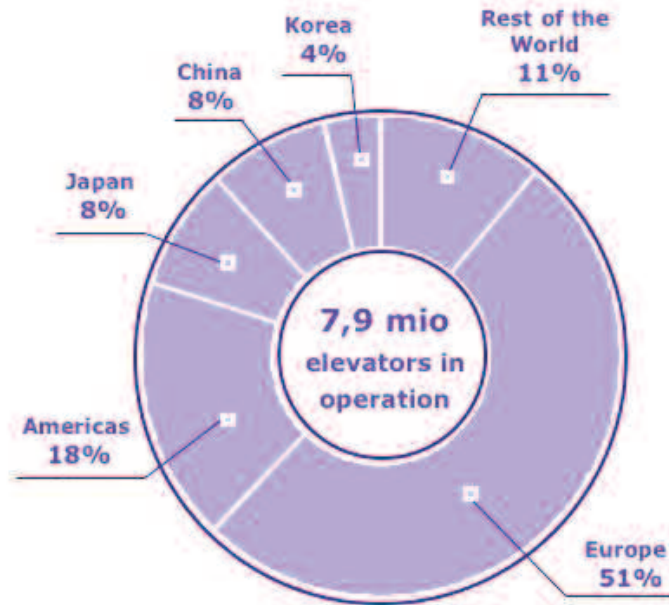


Chapter 1 INTRODUCTION

MARKET INFORMATION

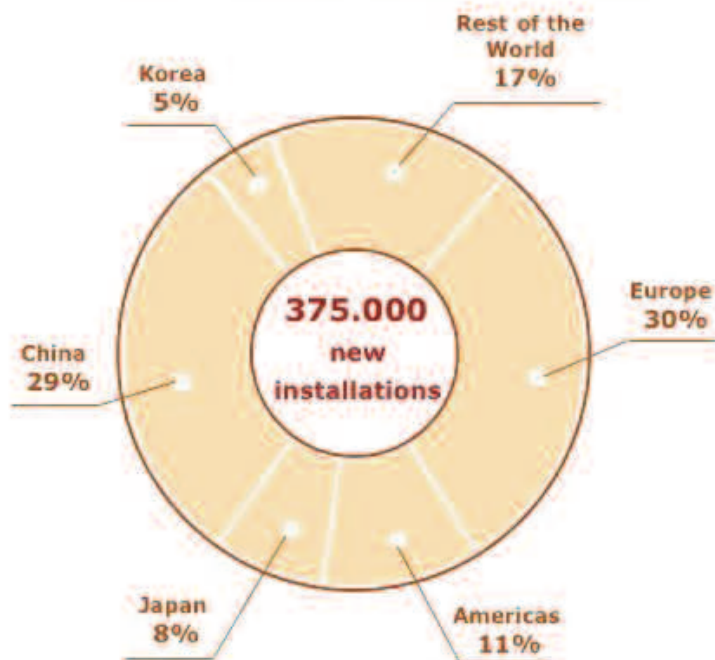
Existing plants, Year 2005

2005 Worldwide Market



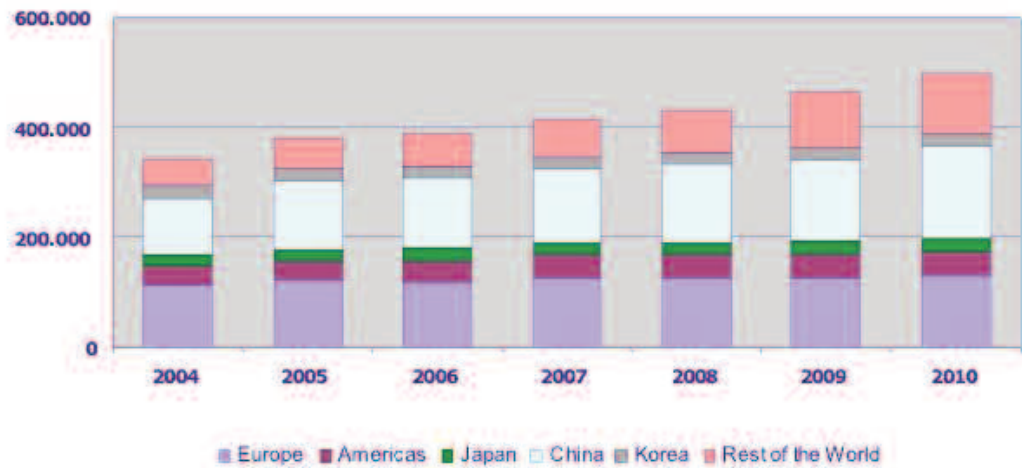
New installations, Year 2005

2005 Worldwide Market



Trends in new installations (Years 2004-2010)

Worldwide Market Annual forecast for New Elevators



Over the course of the next five years, the market for new elevators is expected to grow at a CAGR of 5,4%.



MARKET DRIVERS AND TRENDS

New Equipment Business

The elevator market is tied to growth and new developments in the construction industry, following the same trends in demand with approximately a one-year lag.

A key driver for the market is population density. As a result, geographical regions such as Asia, which demonstrate a rapidly increasing growth in population density, are expected to provide a key source for elevator demand.

The ageing population of several western countries will logically also further drive demand both within new and pre-existing buildings that currently are not equipped with elevators.

Maintenance and Modernization

In 2005, more than **60 per cent** of all existing units (including escalators) were estimated to be more than 20 years old. It is therefore safe to assume that approximately **2,4 million** elevator units will be refitted over the next 10 years, with an yearly rate of approximately **250,000 units**.

Product trends

The increasing demand for safety and hence, related regulations, and the shift in the types of elevators (electric versus hydraulic) are driving the requirements of automation and monitoring components including light curtains, frequency drives, soft starters, access controls, safety mats, force guided relays, and I/O bus systems.



TYPES OF LIFTS

We will distinguish elevators between **Electric** (or Rope), **Machine Roomless** (Electric with all the machinery in the lift well) and **Hydraulic**.

1. Electric Lift



2. Machine Roomless Lift



3. Hydraulic Lift



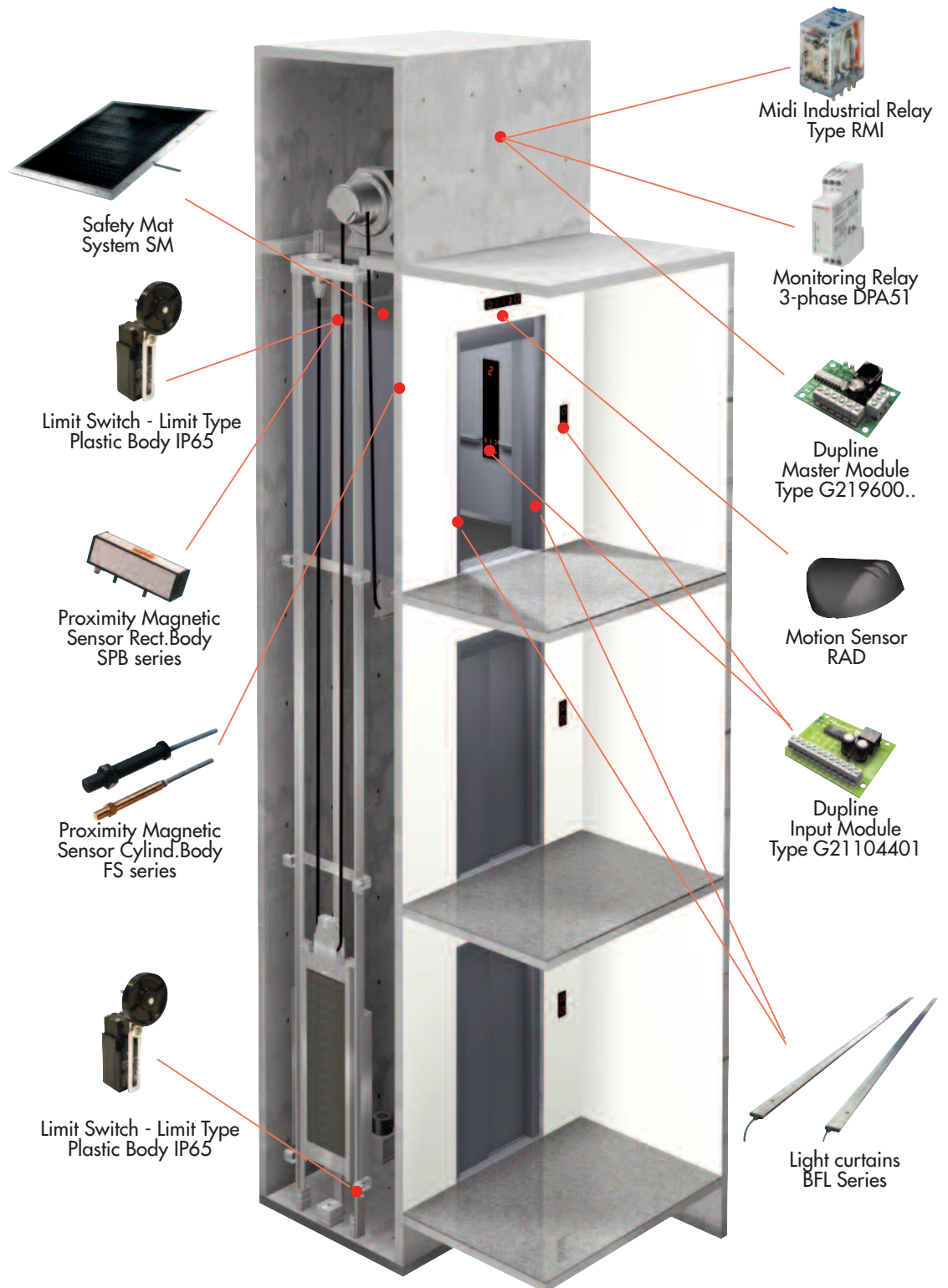
CG MARKET CODES

Winner	15
Goldmine	"Elevators, Escalators"
Sigip	15

Chapter 2 TYPES OF LIFTS

1. Electric (Roped) Lift

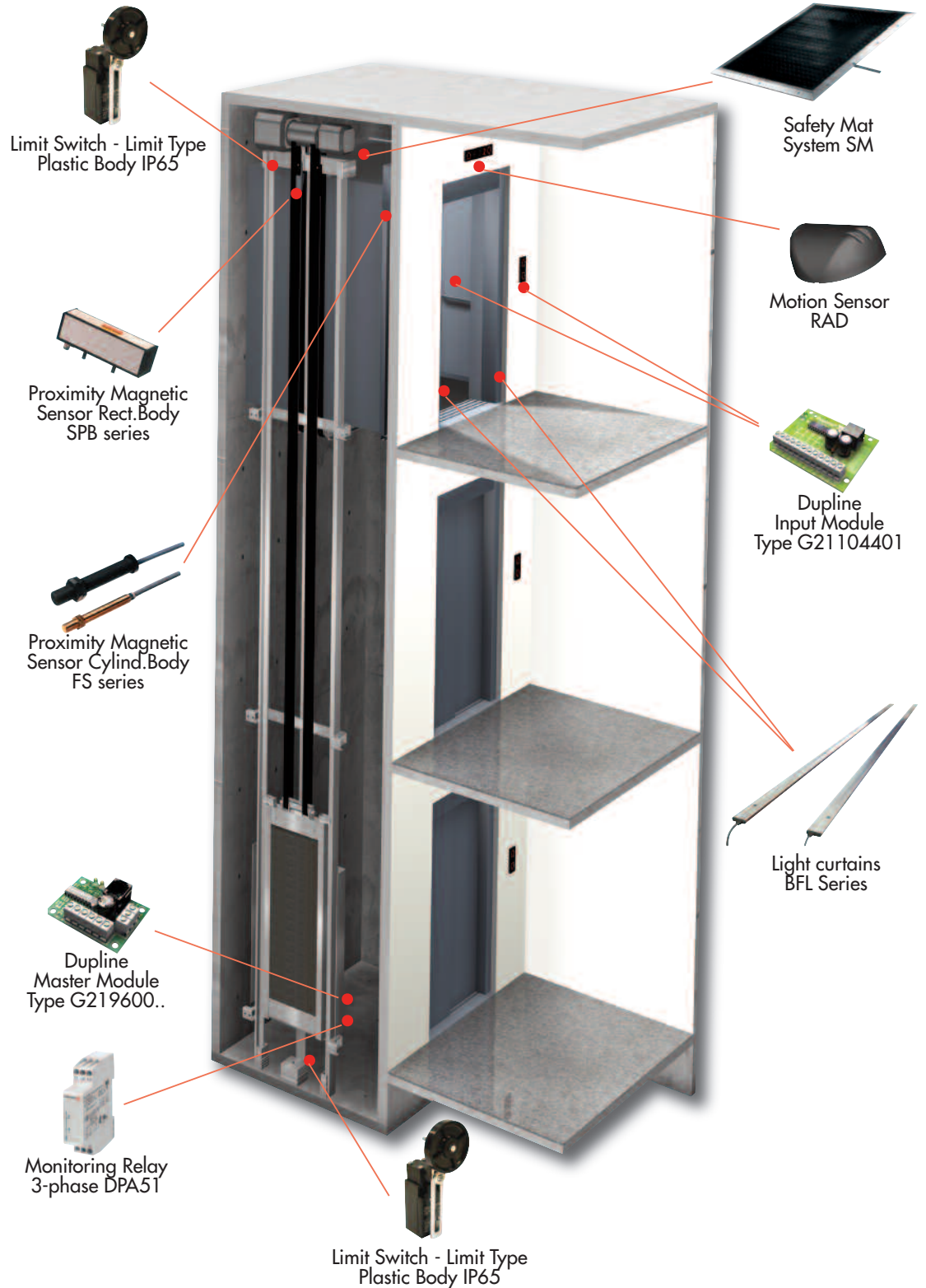
In roped elevators, the car is raised and lowered by traction steel ropes attached to the elevator car and looped around a sheave. The ropes that lift the car are also connected to a counterweight, which hangs on the other side of the sheave. Both the elevator car and the counterweight ride on guide rails along the sides of the elevator shaft.



Lifts

2. Machine-Room-less

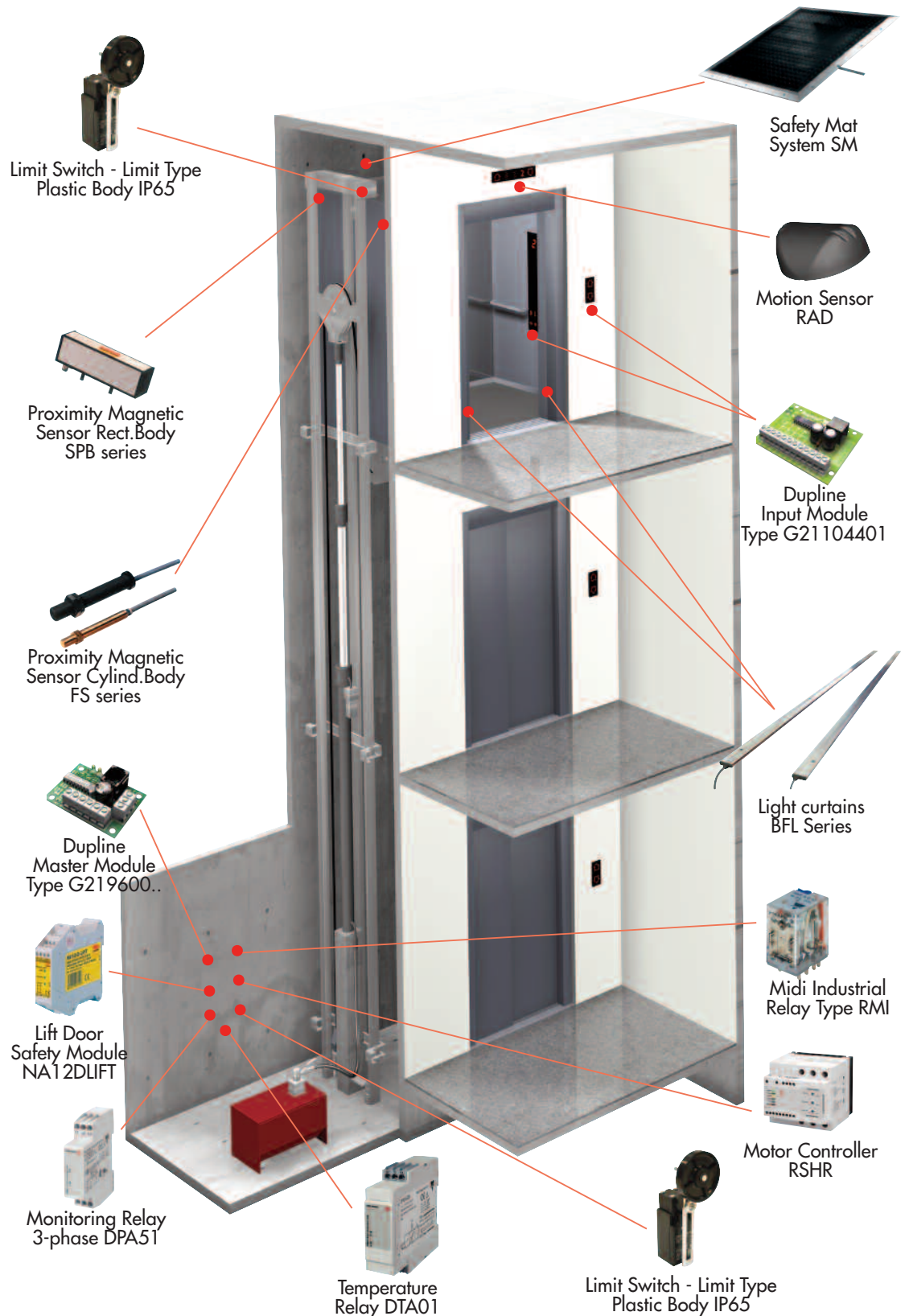
This machine is a roped elevator that eliminates the necessity to locate a machine room at the top of the hoistway. The reduced dimensions of the sheave and motor enable them to be mounted directly into the hoistway .



Lifts

3. Hydraulic Lift

A hydraulic elevator system lifts a car using a hydraulic ram, a fluid driven piston mounted inside a cylinder. The cylinder is connected to a fluid-pumping system that controls the movement of the elevator. Fluid from the tank is forced into a pipe leading to the cylinder so that as fluid collects within the cylinder, it pushes the piston up, thus lifting the elevator car.



Chapter 3

KEY APPLICATIONS

SPEED CONTROL



APPLICATION REQUIREMENTS :

Cabin speed reduction before stop at the floor

RELEVANT STANDARDS :

- EN 81-1 & EN 81-2
- ASME - A17.1
- CAN/CSA - B44 - M94

ISSUE

- A low speed zone in relation of the floor level must be defined
- The presence of the cabin within this range must be detected

SOLUTION

A bistable sensor is mounted on the cabin; two magnets mounted with opposite polarity bound the low speed zone. As long as the cabin is into the low speed zone, the sensor is activated. When the cabin goes out, the second magnet deactivates the switch.

PRODUCTS :

Magnetic switches

- Block-shaped / rectangular body: SP.B.2 ; SP.B.2/2MT ; S.B.2
- Cylindrical body: FMP.B.2 ; FS.B.2/2MT ; FSLP.B.2

PRESENCE AT THE FLOOR



APPLICATION REQUIREMENTS :

Detection of the lift cabin presence at the floor

RELEVANT STANDARDS :

- EN 81-1 & EN 81-2
- ASME - A17.1
- CAN/CSA - B44 - M94

ISSUE

- Lift cabin presence at the floor means that the cabin base is within a precise zone centred with the floor level

SOLUTION

Two monostable magnetic sensors installed on the top of the cabin and activated by a magnetic stripe. The presence of the cabin within the floor zone will lead to the activation of both sensors.

PRODUCTS :

Magnetic switches

- Cylindrical / Plastic: FMP.A.7 ; FMP.A.9 ; FMP.A.9/S1 ; FMP.C.7 ; FMP.C.9 ; FSLP.A.7
- Cylindrical / Metallic: FS.A.2/S3/2MT ; FS.A.2/S4/2MT

Note: *two more bistable sensors are normally placed at the edge positions reachable by the cabin, in order to provide the control system information.*

CABIN LEVELLING



APPLICATION REQUIREMENTS :

- Door Locking/unlocking control
- Acknowledgment to the cabin levelling at the floor in safety conditions
- Execution of the cabin levelling to the floor level.

RELEVANT STANDARDS :

- EN 81-70 & EN 81-80:

ISSUE

- Lift cabin must be within the above-mentioned range of ± 20 mm

SOLUTION

Two monostable sensors mounted on the cabin and connected to a safety module allows the Safety Control System to operate the level adjustment. The indications on levelling are given to the Sourcing Cos by two further monostable magnetic switches.

PRODUCTS :

Light curtains

- Light curtains for Lift Doors BFL series.

Note: *This series is going to include also new low-end and high-end versions with, respectively, less than 50 beams and 154 beams.*

DOORS CONTROL



APPLICATION REQUIREMENTS :

- Detection of persons and objects in order to avoid physical contact.

RELEVANT STANDARDS :

- **EN 81-1 & EN 81-2:** the cabin levelling must be controlled by a safety contact
- **EN 81-70 & EN 81-80:** step between car & landing floors within ± 10 mm; levelling accuracy within ± 20 mm of floor level.

ISSUE

- User protection in the demanded area between 25 and 1800 mm.

SOLUTION

Light curtains with criss-cross beams for area monitoring. Whenever a beam is broken, the output signal generated by the light curtains produces the re-opening of the lift door.

PRODUCTS :

Magnetic switches :

- Cylindrical / Plastic: FMP.A.7; FMP.A.9; FMP.A.9/S1; FSLP.A.7
- Cylindrical / Metallic: FS.A.2/S3/2MT; FS.A.2/S4/2MT

Safety relays :

- NA1/2D LIFT; MA1D LIFT

Note: The requirement of cabin levelling is mainly present in hydraulic plants

ELEVATOR CONTROL



APPLICATION REQUIREMENTS :

Enable the Elevator Controller to process signals from Push-buttons, Lamps and Position Indicators (by using only 3 wires, which also provide power).

RELEVANT STANDARDS :

- EN 81-1 & EN 81-2
- ASME - A17.1
- CAN/CSA - B44 - M94

ISSUE

Provide Interfaces for :

- Floor fixtures
- Car fixtures
- Position Indicators
- Elevator Controller

SOLUTION

- I/O-boards with 2 inputs and 2 outputs are mounted in each floor fixture and connected to the push buttons and lamps.
- In the elevator car, boards with 4 inputs / 4 outputs, 8 inputs or 8 outputs are used.
- The interfacing to Position Indicators are performed by using Dupline boards with 8 outputs to control the 8 position inputs
- All the I/O-boards are connected to the same 3-wire cable, which provides both 24 VDC power and communication with the Dupline Master Module (DMM).
- The connection between Dupline and PLC is carried out by means of the DMM

PRODUCTS :

Dupline :

- Dupline Master Module, open PCB: G219600XX700
- Dupline Master Module, H4 housing: G349600XX700
- I/O module 2in/2out, open PCB: G21404421700
- I/O module 4in/4out, open PCB: G214055X0700
- Input module 8 inputs, open PCB: G2120550X700
- Output module 8 output, open PCB: G213055X1700

Chapter 4 PRODUCTS OFFERING

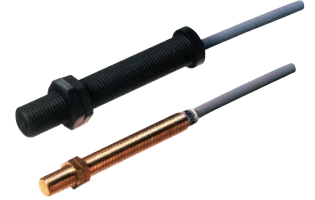


	<i>Electric</i>	<i>Roomless</i>	<i>Hydraulic</i>
 Magnetic Switch (*)	✓	✓	✓
 Phase Seq.&Loss (*)	✓	✓	✓
 Limit Switch	✓	✓	✓
 Dupline	✓	✓	✓
 Safety Levelling			✓
 Photoelectric Sensor	✓	✓	✓
 Industrial Relay	✓	✓	✓
 Soft Starter			✓
 Safety Mat	✓	✓	✓
 Light Curtains	✓	✓	✓
 Radar	✓	✓	✓
 Temperature Control			✓

(*) For more details please refer to a "Key Applications" Section

Chapter 5 SALES ARGUMENTS

FEATURES & BENEFITS : MAGNETIC SENSORS



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Need to reduce cost of spare parts replacements as much as possible	No physical contact between the magnetic switch and the actuator.	Long lasting reliability means less maintenance required.
Power supply in the building is unstable: it might cause problems with the sensors and could stop the system functioning	Magnetic switches do not require any power supply, so they do not lose any information if the power supply is cut off	No emergency calls due to instability of power supply
"Time is money" in our job! Must be quick and accurate in any installations	FSLP magnetic family is provided with a complete guide kit. For FMP series the mounting kit is available on request. Full-threaded body for fast installation and positioning.	Save time and money while keeping quality at higher level
Dirty & dusty environments cause failures in the sensors and might stop the plant.	All magnetic switches are completely dirtproof since they are sealed and dipped in resin	Maximum insulation and durability: no maintenance calls because of dust problems
Need to re-calibrate switches once installed because of reed contact tolerance	Careful selection of the reeds means a guaranteed repeatability for each sensor	No extra calibrations needed: quick installation time, same performance for every switch.

FEATURES & BENEFITS :
MAGNETIC SENSORS



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Having problems of interference due to the mounting of several sensors very close each other	SP.B.2 family switches are laterally shielded in order to reduce magnetic interferences	Possibility to install sensors side by side.
Require special /customized product for specific needs	Our 25 years of expertise in magnetic sensors enables us to provide fully customized products from Customer specifications	Higher capability to match different market requirements
When using magnetic stripes as actuator, the operating point of the magnetic sensor can vary each time	All our magnetic switches feature low differential travel as standard: the operating point is not affected by the small variations of distance between switch and actuator	Maximum precision/reliability of signals on cabin position, lower accuracy required in mounting

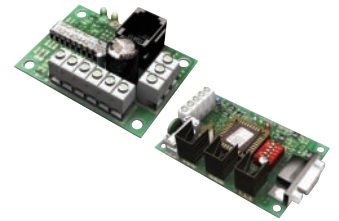
FEATURES & BENEFITS :
SAFETY RELAYS



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Safety relay might stop the entire lift because the low speed of the car is interpreted as a failure signal	NA 1/2-D LIFT is specifically designed to accept a delay between the activation of the two input channels from equal to infinity	Avoid needless technical calls due to false alarms
Unstable power supply might cause intervention of safety relay stopping the lift	NA 1/2-D LIFT has a very high immunity to even the smallest power interruptions	Avoid needless technical calls due to false alarm

FEATURES & BENEFITS :

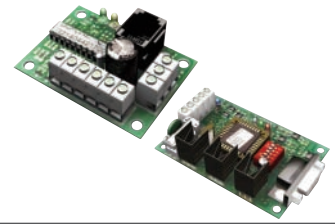
DUPLINE



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
High costs/time to install a conventional wired system due to multiple wires	Dupline is a two-wire bus system for both power and communication	Faster installations without wiring mistakes; less cabling costs; faster commissioning
Complexity of a conventional wired system makes troubleshooting difficult and time-consuming	Dupline's simple structure makes it easy to diagnose	Easier troubleshooting helps to reduce intervention time
Complexity of a conventional wired system might cause frequent failures and more emergency calls	Dupline's simple structure reduces chances of system failure	Less maintenance/intervention costs
I don't like too many different control cabinet sizes	Dupline is a flexible bus system allowing additional I/O points without increasing the size of the controller and of the control cabinet	Sensible reduction of stock
Bus technology is complicated	Dupline is easy to be programmed and tested: only a few simple rules to kept in mind	Save training costs and gain installer acceptance: only ONE day of training is required.

FEATURES & BENEFITS :

DUPLINE



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Long time wasted for installations	Dupline's I/O modules can be pre-programmed and pre-mounted in pushbutton panels	Reduction of installation costs by moving wiring process from the field to the factory
Need to install a bus system in an EMC environment: is Dupline reliable?	Dupline has a high noise immunity proven by more than 1000 lift installations	Very limited risk of expensive troubleshooting calls
Complexity of a conventional wired system might cause frequent failures and frequent emergency calls	Dupline's simple structure reduces failure risk	Less maintenance/intervention costs
Bus systems are expensive!	Dupline's I/O modules are implemented on small open printed circuit boards suitable for pushbutton panels	Cost-effective implementation
Need to interface the system to an existing PLC	Dupline can provide dedicated plug & play interfaces for all major PLC brands	Fast & easy integration with existing control systems
Interfaces incur extra costs from additional modules	With Dupline the lift control can be implemented in a small PLC because the I/O modules are located remotely	Costs of additional bus modules are widely compensated by the lower cost of a smaller PLC

FEATURES & BENEFITS :
PHASE SEQUENCE & LOSS
MONITORING RELAY (DPA51)



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Norms and regulations require that the lift always runs in the correct direction.	DPA51 is made to detect the sequence of 3-phase mains.	Simple solution with no need to deal with 400V AC to determine the phase sequence.
If a phase is lost (i.e. due to a blown fuse) the torque is reduced, so the lift may block and the motor overheat, possibility burning out the motor	DPA51 detects phase loss and even the voltage regenerated by the motor up to 85% of the nominal voltage. This means that phase loss is detected in all cases.	In case a phase is lost the lift can be positioned in a safe state.
Need to export the lifts to a lot of countries with different mains voltages	DPA51 is multi-voltage from 208 to 480V. This means a just one item to use, to order and to stock.	Less stock, faster delivery time, easier overseas replacements
Lift's panel board offers limited room for components	DPA51 is the smallest phase sequence and loss relay complete with all of these features.	Less space means less cost for the cabinet

FEATURES & BENEFITS :
LIGHT CURTAINS



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
Need to fit the light curtains in installations with tight room restrictions.	Extra-slim 9mm profile light curtains.	One product fitting different installations.
Need to keep the plant working in case of minor failure (diode) or vandalisme.	Automatic beam muting allows to keep the functionality of the light curtains even in case of vandalisme or failure of a diode.	Minimize plant stop.
Need to have maximum reliability and life span of the component.	The light curtains are featured by low current consumption and by power self-adjustment, according to the environment conditions and distance between TX-RX.	Maximum reliability and life expectancy.
In some applications, sunlight may affect the correct function of the light curtains.	With a light immunity >100Klux, light curtains by CG are suitable also in environment exposed to extraneous light.	Minimizing the malfunctioning due to extraneous light interferences.
Light curtains can be mounted on fixed or mobile parts.	BFL light curtains are suitable for fixed or mobile monitoring, thanks to the automatic cross-over of the criss-cross beams.	One product for applications with different requirements.

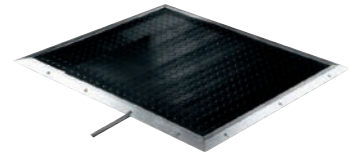
FEATURES & BENEFITS :

RADAR



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
In some special applications (e.g. hospitals) people approaching the elevator must be detected from distance, in order to keep the car doors open.	RAD Motion Sensor can be used to control opening/closing of external lift doors in a hospital, thus sensing approaching stretchers, people on wheelchairs or patients.	Making movements within the hospital easier for both patients and staff

SAFETY MAT



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
"I want to make absolutely sure that the lift does not move when my technicians are working on it"	SM Safety Mat, placed on the top of the lift car, operates like a normal open switch to prevent any accidental start of the lift until the technician leaves the lift car.	Lift technicians can operate in even safer conditions

TEMPERATURE CONTROL



CUSTOMER ISSUE	CARLO GAVAZZI SOLUTION	CUSTOMER BENEFIT
In heavy working conditions (frequent starts) oil in hydraulic lift plant could overheat, causing damages or even burning the pump.	DTA01 can monitor the oil temperature in the hydraulic system through a PTC resistor	No risk to replace oil or even the whole pump because of overheating, thus prolonging lifetime of the plant.









COMPETITORS MATRIX 1/3



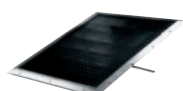































	CARLO GAVAZZI	Schneider Electric	Crouzet	OMRON	SIEMENS	ABB	BERNSTEIN	SCHMERSAL	BROYCE CONTROL
 Magnetic Switch (*)	✓						✓	✓	
 Phase Seq.&Loss (*)	✓	✓	✓		✓	✓			✓
 Limit Switch	✓	✓	✓	✓	✓		✓	✓	
 Dupline	✓								
 Safety Levelling	✓	✓	✓	✓					
 Photoelectric Sensor	✓	✓		✓					
 Industrial Relay	✓	✓		✓					
 Soft Starter	✓	✓		✓		✓			

COMPETITORS MATRIX 2/3



	CARLO GAVAZZI	pizzato	SICK	SMS	Allen-Bradley	ELCHNER	CAN BUS	LON	Telco	MEMCO	ELCO
 Magnetic Switch (*)	✓		✓								
 Phase Seq.&Loss (*)	✓										✓
 Limit Switch	✓	✓			✓	✓					
 Dupline	✓						✓	✓			
 Safety Levelling	✓										
 Photoelectric Sensor	✓		✓						✓	✓	
 Industrial Relay	✓										
 Soft Starter	✓				✓						

COMPETITORS MATRIX 3/3

 Safety Mat	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <small>CARLO GAVAZZI</small> </div> <div style="text-align: center;">  <small>JOKAB</small> </div> <div style="text-align: center;">  <small>pilz</small> </div> <div style="text-align: center;">  <small>SCHMERSAL</small> </div> <div style="text-align: center;">  <small>Schneider Electric</small> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> ✓ ✓ ✓ ✓ ✓ </div>
 Light Curtains	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <small>CARLO GAVAZZI</small> </div> <div style="text-align: center;">  <small>CEDES</small> </div> <div style="text-align: center;">  <small>FORMULA SYSTEMS</small> </div> <div style="text-align: center;">  <small>INFRA</small> </div> <div style="text-align: center;">  <small>MEMGO</small> </div> <div style="text-align: center;">  <small>NING BO SAFETY ELEC.</small> </div> <div style="text-align: center;">  <small>FP</small> </div> <div style="text-align: center;">  <small>STEM</small> </div> <div style="text-align: center;">  <small>Telco</small> </div> <div style="text-align: center;">  <small>TL JONES</small> </div> <div style="text-align: center;">  <small>WECO</small> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ </div>
 Radar	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <small>CARLO GAVAZZI</small> </div> <div style="text-align: center;">  <small>bea</small> </div> <div style="text-align: center;">  <small>bircher</small> </div> <div style="text-align: center;">  <small>MS SEDCO</small> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> ✓ ✓ ✓ ✓ </div>
 Temperature Control	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <small>CARLO GAVAZZI</small> </div> <div style="text-align: center;">  <small>Crouzet</small> </div> <div style="text-align: center;">  <small>DOLD</small> </div> <div style="text-align: center;">  <small>pilz</small> </div> <div style="text-align: center;">  <small>CIES</small> </div> <div style="text-align: center;">  <small>saia-burgess</small> </div> <div style="text-align: center;">  <small>SCHLEICHER</small> </div> <div style="text-align: center;">  <small>SIEMENS</small> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> ✓ ✓ ✓ ✓ ✓ ✓ ✓ </div>

Chapter 6

NORMS & REGULATIONS THAT APPLIES TO THE LIFTS MARKET

EN & ANSI/ASME standards cover about 70% of the elevators installed worldwide.

Moreover, **EN 81** had been translated in Chinese language and Malaysia is considering the possibility to take EN 81 as a national standard.

Regulations applies to lifts which permanently serve specific levels of buildings and constructions, having a car moving between guides which are rigid and inclined at an angle of more than 15 degrees to the horizontal and designed for the transport of:

- persons
- persons and goods
- goods alone if the car is accessible, that is to say, a person enter without difficulty, and fitted with controls situated inside the car or within reach of a person inside.

★ **NORMS FOR EUROPEAN MARKET**

★ **NORMS FOR NORTH AMERICAN MARKET**



★ **NORMS FOR EUROPEAN MARKET**

The lift installations are regulated by the Lift Directive 95/16/EC, which includes the legal requirements written by the European Parliament and adopted by each Member State in their own National statute laws.

SCOPE

To reduce trade barriers among the member States and to maintain health and safety requirements at high level.

The responsibility of the Lift installation is attributed to the installer as the natural or legal person who looks after the design, manufacture, installation and placing on the market of the lift and who affixes the CE marking and draws up the EC declaration of conformity

EN HARMONIZED NORMS

The Harmonized Norms represent the technical way to automatically achieve compliance to the Lift Directive

RELEVANT NORMS

EN 81.1:

"Safety rules for the construction and installation of lifts – Part 1: electric lifts"

EN 81.2:

" Safety rules for the construction and installation of lifts – Part 2: hydraulic lifts"

EN 81.70:

"Rules for accessibility of disabled people to lifts"

EN 81.80:

"Existing lifts Rules for the improvement of safety of existing passengers and goods passenger lifts"



★ **NORMS FOR NORTH AMERICAN MARKET**

RELEVANT NORMS

ASME-A17.1; CAN/CSA-B44-M94:
"Safety Code for Elevators and Escalators"

ASME A117.1 (chap. 4.10):
"Guidelines for Accessible and Usable Buildings and Facilities - Elevators"

CAN/CSA-B44-M:
"Elevating devices for handicapped"

ASME A17.3:
"Safety Code for Existing Elevators"

ASME A17.4:
"Guide for Emergency Personnel"

ASME A17.5; CAN/CSA-B44.1:
"Elevator and Escalator Electrical Equipment"

