



MAGSAFE SAFETY GATE INTERLOCKING SYSTEMS HANDBOOK

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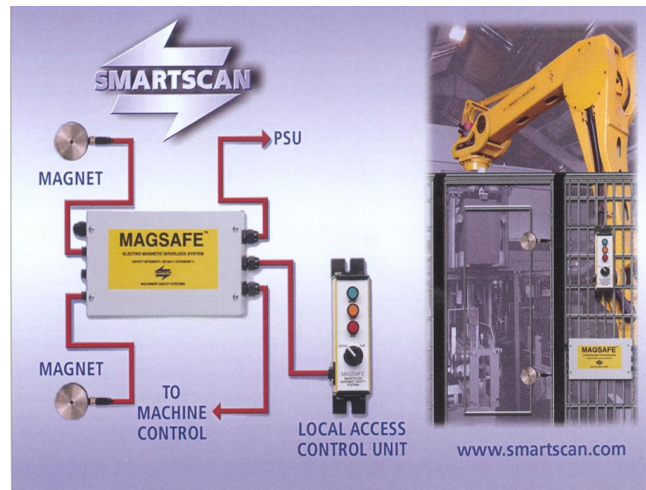
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INTRODUCTION

Magsafe™ is Smartscan's innovative solution to safety gate interlocking for personnel access into the protected zones surrounding hazardous machinery. Its design goals are to make a safety system in which the safe way to operate the machinery also has less impact on the production process, be tolerant of misalignment and withstand the rigors of harsh industrial environments. Magsafe™ offers a combination of safety innovation and cost effective design.



The system opens up many new ways to render a complex process line safe and easy to use. A complex machine can be fully protected by one base unit and a selection of electro-magnetic locks.

A key design element in Magsafe™ is to lock the door using magnetic force rather than by mechanical means. This makes alignment easier and helps remove the problems that plague existing gate locks due to alignment issues with mechanical locking. In addition to this, the problems of mechanical failure from the rigors of daily operation that cause fatigue are also removed.

Smartscan has also applied its safety light curtain technology background to the safety gate interlocking market by providing a system control unit which **continuously monitors the on and off state of the magnets**. This ensures the system detects when the gate is open and when it is closed. Only when the gate is closed and the magnetic locking force applied will the control system allow machine operation.

The Magsafe™ system comes with an E-Stop function as standard removing the need for a separate E-Stop relay offering the customer a further cost saving and simplifying installation of the Magsafe™ solution.

For more information see our web site, www.smartscan.com for details of your local Distributor or contact Smartscan direct on 01536 – 401313.

MAGSAFE™ - A SAFETY GATE LOCK WITH NO MOVING PARTS!

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FEATURES

Magsafe™ – provides a new approach to electro-magnetic safety interlocking and access control solutions for industrial machinery applications.

Typical machine safeguarding applications include:

Automotive

Building Materials

Food & Drink

Paper

Pharmaceutical

Petro-Chemical

Woodworking

and many others

Smartscan's Magsafe™ door interlocking system has been examined by a EUROPEAN NOTIFIED BODY thus ensuring full conformity with ALL relevant European and International Standards.

Together with our ISO 9001:2000 certification full confidence can be placed in the quality, reliability and above all the safety of Smartscan equipment.

- ❑ **EC Type Examined**
- ❑ **Safety Integrity Classification EN 954-1 – Category 4**
- ❑ **Simple installation and alignment**
- ❑ **Operation of up to 8 magnetic gate locks from a single control unit**
- ❑ **One year manufacturers warranty**

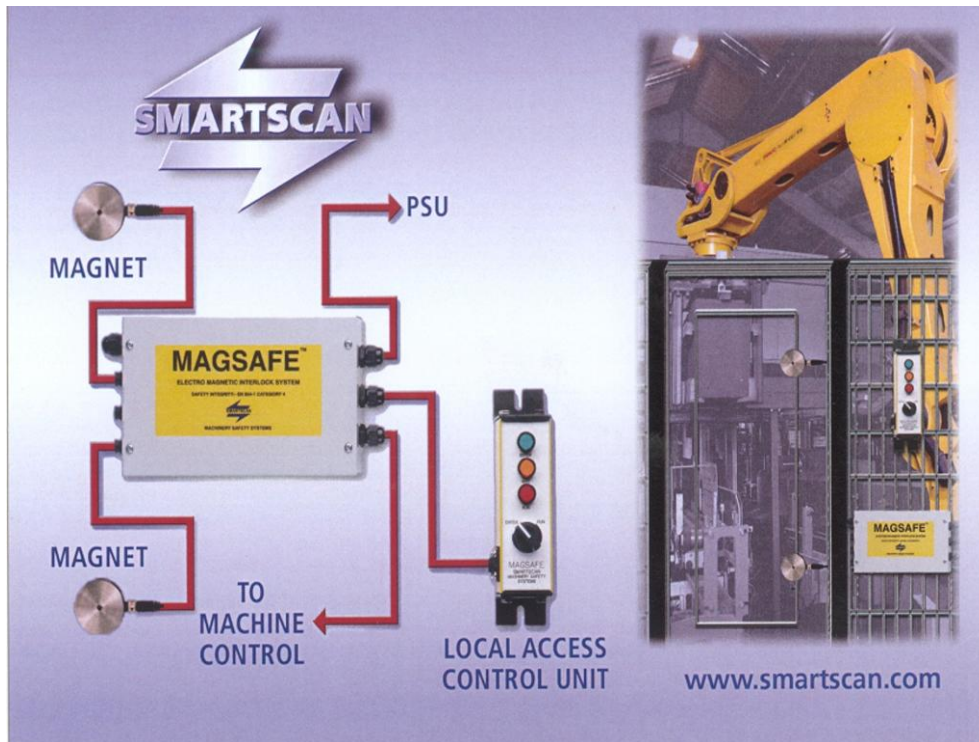
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Features

- ❑ Control system continuously monitors the on and off state of the magnets to ensure detection of gate open or closed condition
- ❑ Monitors up to 8 magnetic locks from one controller
- ❑ Output display LEDs and output signals for driving PLC input
- ❑ Low maintenance, no moving parts
- ❑ Simple installation and alignment
- ❑ Self contained control system
- ❑ Safety output relay contacts (dual channel)
- ❑ Diagnostic and status indicators
- ❑ Multiple control options
- ❑ Magnets totally sealed (IP67)
- ❑ Holding force up to 500 N per magnet
- ❑ Selectable run down timers for gate release
- ❑ System comprises of magnets, controller and local access control unit with 'traffic light' entry condition indication
- ❑ Safety monitoring, External Device Monitoring (EDM)
- ❑ E-Stop relay included reduces overall cost of installation

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MAGSAFE SYSTEM



A typical system comprises electromagnetic gate locks, control unit, local access controller and connection cables.

Magnets

The circular electro magnets consist of the magnet coil unit and the armature. The magnets are furnished with a 4 pin M12 connector. Each magnet comes with a pre-tapped M8 hole for mounting. The armature is supplied with a flexible mounting kit as standard to facilitate easy mounting and alignment.

Armature



Magnetic Coil

The magnets are available in 36mm and 63mm diameter plated mild steel offering a locking force of 100 N and 500 N. Each electro-magnet provides a holding force for 'soft' holding the gate in a closed position and a locking force that prevents the gate being opened.

There is a magnet coil and a sensing coil inside the magnet. All magnets are continuously monitored ensuring the safety integrity of the control system meets a level of performance to Category 4 as defined in EN954-1. The faces of the magnet and armature are profiled, so when they come into contact with each other the 'closed' sensor cannot be defeated with a simple piece of steel.

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Control Units

The control units come in 2 options, offering the facility for up to 4 monitored magnets from a single controller or up to 8 monitored magnets from a single controller. The control unit contains all the control electronics for the Magsafe system.



Both boxes come with a standard 8 way connection for the Local Access Controller, Run down timers for gate release, E-Stop inputs, External Device Monitoring (EDM) and LED output display with output signals for driving a PLC input. The box can be used in conjunction with the standard Smartscan Local Access Controller or the user can configure their own access control interface. The control units come in IP40 boxes with glanded connectors for the magnet cable connections, power supply input and the interface cable to the machine control panel.

Local Access Controller

The controller is designed to complement the Magsafe system by offering a local access controller with 'traffic light' entry condition indication. Connection is made via a standard 8 way connection provided on the Magsafe control units. Mounting is provided via M6 bolts in the end brackets top and bottom.



The controller has a selector switch for Enter and machine Run. Above the selector switch is the 'traffic light' system that provides the operator with the entry status indication. The red LED indicates that the magnets are closed / door locked and the machine is running. To open the door / release the magnets the selector switch is turned to the Enter position. The amber LED will come on during the machine stopping time / run down timer setting. When this is completed the green LED will come on to indicate that the magnets have been released / the door is unlocked and the operator can enter.

Cable X

This cable connects the magnet to the Magsafe Control Unit. It has a 4 way circular, bayonet locking connector at one end for connection to the magnet and open wires at the other for connection via a gland into the control unit.

Cable Y

Connects the Local Access Controller to the Magsafe Control Unit. The cable comes with 8 way circular, bayonet locking connectors at either end for simple connection to both the Local Access Controller and the Magsafe Control Unit.

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APPLICATIONS OVERVIEW



The Smartscan Magsafe™ solution is used for a variety of traditional safety gate interlocking and access control applications. These are found across many different industries including food & drink, automotive, building materials, metal working, paper industries and many others.

Typically mounted on the access doors e.g. sliding, sash and double doors providing direct access to the machines workings or gates set in the perimeter fencing around a machine.

The principle behind locking, gate interlocks is linking the opening and closing of the access door with the power supply to the dangerous machine inside. When the access door is opened the power to the machine is removed preventing it from continuing any further dangerous motion and therefore making it safe for the operator while in the danger zone.

In some applications the Magsafe™ has been used to facilitate the use of removable guarding, as the guarding has to be put back in place and locked using the electro magnetic interlocks. In other more complex applications the run down timers have been used to facilitate the robot coming to a stop at a certain position within the robot cell to help the maintenance team with their scheduled maintenance operations.

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SPECIFICATION

Model	785 - 093	785 - 111
Response times	200ms	200ms
Operating temperature	0°C to +100°C	0°C to +100°C
Enclosure rating	IP 67 Magnet & Armature IP 40 for Control Box	IP 67 Magnet & Armature IP 40 for Control Box
Power supply requirement	22-28 V DC Ripple <10% (diode protected)	22-28 V DC Ripple <10% (diode protected)
Current consumption	250mA per magnet	250mA per magnet
Status indication	Status indicator LEDs on controller	Status indicator LEDs on controller
Classification	BS EN 954-1 Category 4	BS EN 954-1 Category 4
Warranty	1 year	1 year

Outputs	785 - 093	785 - 111
Safety outputs	2 x N/O Safety relay outputs rated at 110V AC, 1A	2 x N/O Safety relay outputs rated at 110V AC, 1A
Enter	0V DC relay contact (max. rating 48V, 2A)	Electronic 24V 2A
Wait	0V DC relay contact (max. rating 48V, 2A)	Electronic 24V 2A
Run	0V DC relay contact (max. rating 48V, 2A)	Electronic 24V 2A
Output display drivers, 1 per magnet / channel	Electronic outputs each rated at 20mA per channel (driven hi/low)	Electronic outputs each rated at 20mA per channel (driven hi/low)

Inputs	785 - 093	785 - 111
Run/Enter	Dual Input +24V	Dual Input +24V
Monitored Magnets	4	8
External device monitoring (EDM)	Use voltage free switch contacts (N/C)	Use voltage free switch contacts (N/C)
Dual inputs for emergency-stop circuit	Use voltage free switch contacts - Disparity between channels = 100ms max.	Use voltage free switch contacts - Disparity between channels = 100ms max.

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PRODUCTS

Magnet and Armature



Model number	Description
785 – 070M	Magnet (Magnet & Armature) with Flexible Mounting Kit PLATED STEEL 63mm 50KG
785 – 071M	Magnet (Magnet & Armature) with Flexible Mounting Kit PLATED STEEL 36mm 10KG

Local Access Controller



Model number	Description
785 - 080	Local Access Control Unit (Selector Switch)
785 - 061	Local Access Control Unit (Single Trapped key)
785 - 064	Local Access Control Unit (4 Way Trapped key)

Control Units



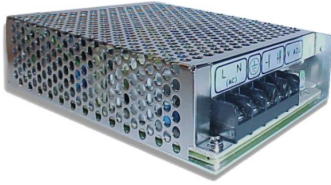
Model number	Description
785B093	Control Unit (4 Magnet 4 Monitored) I/O 1-5+7=PG9 6=8 Way with E-Stop, EDM, LED Output Display & Output Signal
785A111	Control Unit (8 Magnet 8 Monitored) I/O 1-18+20=PG9 19=8 Way with E-Stop, EDM, LED Output Display & Output Signal

Cables

Model number	Description
785 – 403	3m Cable 'X' Magnet to Control Unit
785 – 410	10m Cable 'X' Magnet to Control Unit
785 – 505	5m Cable 'Y' Local Access Controller / Control Unit
785 - 510	10m Cable 'Y' Local Access Controller / Control Unit

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ACCESSORIES Power Supplies



If a suitable stabilised 24V DC power supply is not available the following units are recommended for the 4 and 8 monitored Magsafe control units.

Model number	Description
071-050	External power supply - Input: 85 - 264V AC Output 24V DC, 2.5A
071-060	Power supply Input 85 - 264V AC Output 24V DC, 4.5A

Features

- ❑ High reliability
- ❑ High efficiency, low working temp
- ❑ Built in EMI filter, low ripple noise
- ❑ Compact size, lightweight
- ❑ Short circuit, over load, over voltage protection
- ❑ Approvals: UL, TUV, CB and CE

Specification 071 – 050 (For use with control unit 785-093)

Type	Switch mode
Input Voltage	85 - 264V AC
Input frequency	47-63HZ
Inrush current	Cold start, 24A, 115V & 50A, 230V
Output voltage/current rating	24V DC, 2.5A
Operating temperature	0°C to 50°C
Storage temperature	-10°C to +70°C
Connection	5P/9.5mm pitch terminal block
Enclosure	160x98x38mm Din rail mounting
Weight	0.5 Kg

Specification 071-060 (For use with control unit 785-111)

Type	Switch mode
Input Voltage	88 - 264V AC
Input frequency	47-63HZ
Inrush current	Cold start, 30A, 115V & 60A, 230V
Output voltage/current rating	24V DC, 4.5A
Operating temperature	0°C to 50°C
Storage temperature	-10°C to +70°C
Connection	7P/9.5mm pitch terminal block
Enclosure	199x98x38mm Din rail mounting
Weight	0.65 Kg