

Enabling switches

Product range



Enabling switches

Background information

Application

If a machine is running in a special operation mode an entire or partial bypass of the protective devices might be required. In such conditions manually operated enabling switches – possibly together with other safety measures – serve to protect the operator from hazardous situations.

Although safeguards are designed to provide appropriate protection in all operating modes, exceptions are admissible if it is otherwise not possible to operate a machine practically. These exceptions will typically include the setting up of a machine, service work or observing operating processes, so-called process observation.

In these cases additional actions must be taken to guarantee personal protection of individuals even in special operating modes. Enabling switches are frequently used in such situations.

They serve to permit commands (for example for hazardous movements) from other control stations. Start signals for hazardous movements must not be triggered by an enabling switch alone.

If the operator releases the pushbutton, or in the case of the 3-position version, the operator overpresses the trigger point of the pushbutton then the “Go” signal is interrupted by a forced open NC contact.

Depending on the risk assessment of the respective application and/or the respective regulations (in the EU these are the harmonised type C EN standards) additional safety measures may need to be taken when using enabling switches. “Safe” signal processing will be required in all instances.



Although the field of application for enabling switches is relatively clear, there is no universal solution because specific functional and ergonomic requirements in particular may differ from case to case or may be weighted differently.

Elan therefore offers various solutions when an “enabling mode” is required.

Enabling switches are available in different versions:

- as grip switch
- incorporated in a mobile control housing, with optional additional functions
- as stand-alone version.

Three-position devices are the most common.



2 or 3-position device versions

Deciding which solution of the two, i.e. 2 or 3 position, is the most appropriate will depend on the individual application.

From the safety point of view, a 3-position enabling switch will always be the better solution. However, there are ergonomic reservations when working with these devices for a longer period of time.

The advantage of 3-position enabling switches is that the operator has two options (releasing or pressing down) to switch off the machine reliably in the case of an emergency situation caused by a sudden hazardous movement. It should be remarked that empirical studies have shown that in panic situations a person will tend to freeze, i.e. will be more likely to press the button down rather than to release it.

Regulations and standards

The subject of enabling switches is addressed in the following standards and regulations.

- **EN 292-1:** Safety of machinery – Basic concepts, general design principles – Part 1: Basic terminology and methods
- **EN 292-2:** Safety of machinery– Basic concepts, general design principles – Part 2: Technical principles and specifications
- **EN 60204-1:** Safety of machinery – Electrical equipment of machines – Part 1 General requirements.
- **EN 775:** Industrial robots, safety
- **prEN 11161:** Industrial automation systems – Safety of integrated production systems – Basic requirements.
- **GS-ET-22/03.03 – BG** Principles for the testing of moving electromechanical enabling switches.



A distinction is made between 2- and 3-position enabling switches

	2-position enabling switch	3-position enabling switch
Position 1	OFF function (actuator not depressed)*	OFF function (actuator not depressed)*
Position 2	Enabling function (actuator depressed)	Enabling function (actuator depressed)
Position 3	– not existing –	OFF function (actuator pressed down exceeding the middle position)**
Additionally:	EMERGENCY-STOP push-button in direct vicinity	– not applicable –

* The reset of the actuator may be spring powered (cf. EN 292-1)

** When resetting the actuator from position 3 through position 2 to position 1 this must not generate a restart pulse..



Enabling switches

Scope

Enabling switch, 3 positions, performed as grip switch

Technical data/further information:
Refer to Elan catalogue ZB/03

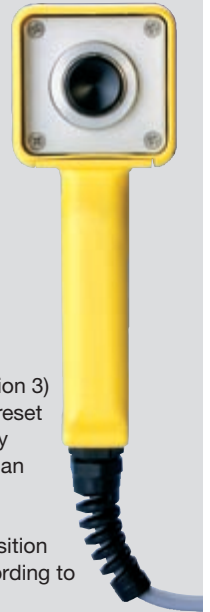
- Type ZSD 5
- 3 positions (OFF – ON – OFF)
- 2 contacts (NO)
- Positive opening (position 2 -> position 3)
- Contacts do not close during reset (position 3 -> position 1)
- Redundant contact configuration permits signal processing with commercially available safety relay modules in control category 3/4 according to EN 954-1
- 1 auxiliary contact (NC), position 2 -> 3
- Class of protection IP 65
- Especially suitable for robot application in compliance with ANSI Robotics Standard
- BG prototype testing
- Option: mounting bracket
- Upon request: with cable set



Enabling switch, 3 positions built into a mobile control device PILOT 10

Technical data/further information:
Refer to Elan catalogue ZB/03

- Type ZSD 1...
- 3 positions (OFF – ON – OFF)
- 2 contacts (NC/NO combination)
- Positive opening (position 2 -> position 3)
- ATTENTION: Contacts close during reset (position 3 -> position 1). Device may only be operated in connection with an analysis module SRB-ZB-QS.
- Contact configuration permits signal processing in control category 2 (position 1 <-> 2) or 4 (positions 2 <-> 3) according to EN 954-1
- Class of protection IP 65
- BG prototype testing (in connection with SRB-ZB-QS)
- With 5 m cable set
- Upon request: electrically monitored "parking position" with safety switches TZG, actuator mounted in PILOT housing (for illustrative example refer to page 2).



Enabling switch, 3 positions performed as grip switch additionally with 1 pushbutton

Technical data/further information:
Refer to Elan catalogue ZB/03

- Type ZSD 6
- Design features: see above
- With additional pushbutton (1 NO contact) in device head
- Upon request: optionally with cable set, equipped with other command and indicating devices in the device head



Enabling switch, 3 positions, additionally 2 pushbuttons, built into a mobile control device PILOT 20

Technical data/further information:
Refer to Elan catalogue ZB/03

- Type ZSD 2...
- Design features: see above
- With 2 additional pushbuttons (1 NO each) in operating panel
- Upon request: optionally with different cable length, equipped with other command and indicating devices in the operating panel



Enabling switch, 2 positions, additionally with 1 Emergency STOP pushbutton plus 1 pushbutton, built into a mobile control device PILOT 20



Technical data/further information:
Refer to Elan catalogue ZB/03

- Type ZSD 4...
- Enabling function (with commercially available pushbutton, 1 NO contact)
- 2 positions (OFF – ON)
- 1 Emergency STOP pushbutton to EN 418 (as a substitute for position 3 = STOP with positively opening effect)
- ATTENTION: Device may only be operated when connected to a suitable follow-up circuit with restart prevention.
- With 1 additional pushbutton (1 NO contact) in operating panel
- Upon request: optionally with cable set, equipped with other command and signalling devices in the operating panel.
- Upon request: Electrically monitored “parking position” with safety switches TZG, actuator mounted in PILOT housing (for illustrative example refer to page 2).

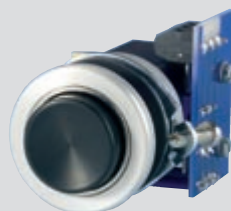
Safety relay module SRB-ZB-QS (for ZSD 1..., ZSD 2..., DTAN 5Z...)



Technical data/further information:
Refer to Elan catalogue ZB/03

- Reliable signal processing in control category 4 according to EN 954-1
- Differentiated shutdown (in position 1 and position 3)
- 2 safety enabling contacts “Enabling Mode”
- 1 safety enabling contact “Emergency STOP”
- 2 auxiliary NC contacts
- 1 auxiliary NO contact
- Cross short recognition
- Glass tube fuse cartridge
- Operating voltage 115 VAC/230 VAC
- BG prototype testing (in connection with ZSD 1..., ZSD 2... and DTAN 5Z..)

Enabling switch, 3 positions for direct front panel installation



Technical data/further information:
Refer to Elan catalogue ZB/03

- Type DTAN 5Z...
- For bore holes with 30.5 mm diameter
- 3 positions (OFF – ON – OFF)
- 2 contacts (NO/NC combination)
- Positive opening (position 2 -> position 3)
- ATTENTION: Contacts close during reset (position 3 -> position 1). Device may only be operated in connection with an analysis module SRB-ZB-QS.
- Contact configuration permits signal processing in control category 2 (positions 1<-> 2) or 4 (positions 2 <-> 3) according to EN 954-1
- Class of protection IP 65 (front side)
- BG prototype testing (in connection with SRB-ZB-QS)

Safe signal processing with commercially available safety relay modules (for ZSD 4..., ZSD 5..., ZSD 6...)



Technical data/further information:
Refer to Elan catalogue ZB/03

For example with PROTECT-SRB modules:

- Safe signal processing in control category 4 according to EN 954-1 for all versions
- With cross short monitoring
- Plug-in terminals
- Comprehensive visualisation
- Electronic control
- Suitable for all types of protective devices
- BG prototype testing



Agencies Germany

- K.A. Schmersal GmbH
Industrielle Sicherheitssysteme
Postfach 24 02 63, 42232 Wuppertal
Möddinghofe 30
42279 Wuppertal
Telephone: +49-(0) 2 02-64 74-0
Facsimile: +49-(0) 2 02-64 74-1 00
E-Mail: info@schmersal.de
Internet: www.schmersal.de
- 01 Hamburg**
K.A. Schmersal GmbH
Geschäftsstelle Hamburg
Zunftstraße 8
21244 Buchholz i.d.N.
Telephone: +49-(0) 41 81-9 22 0-0
Facsimile: +49-(0) 41 81-9 22 0-20
E-Mail: gshamburg@schmersal.de
- 02 Berlin**
KSA Komponenten der Steuerungs-
und Automatisierungstechnik GmbH
Buchholzer Str. 62-65
13156 Berlin
Telephone: +49-(0) 30-47 48 24 00
Facsimile: +49-(0) 30-47 48 24 05
E-Mail: info@ksa-gmbh.de
Internet: www.ksa-gmbh.de
- 03 Hanover**
ELTOP GmbH
Robert-Bosch-Straße 8
30989 Gehrden
Telephone: +49-(0) 51 08-92 73 20
Facsimile: +49-(0) 51 08-92 73 21
E-Mail: eltop@eltop.de
Internet: www.eltop.de
- 04 Münster**
K.A. Schmersal GmbH
Geschäftsstelle Münster
Am Vechte Ufer 22
48629 Metelen
Telephone: +49-(0) 25 56-9 38 30
Facsimile: +49-(0) 25 56-93 83 73
E-Mail: gsmuenster@schmersal.de
- 05 Cologne**
Stollenwerk
Technisches Büro GmbH
Scheuermühlenstraße 40
51147 Köln
Telephone: +49-(0) 22 03-9 66 20-0
Facsimile: +49-(0) 22 03-9 66 20-30
E-Mail: info@stollenwerk.de
- 14 Ruhr area**
K W S Elektronik Schumacher
Saarstr. 19a
53919 Weilerswist
Telephone: +49-(0) 22 54-33 80
Facsimile: +49-(0) 22 54-18 58
E-Mail: k-w-s-@t-online.de
- 12 Siegen**
Siegfried Klein
Elektro-Industrie-Vertretungen
Schloßblick 38
57074 Siegen
Telephone: +49-(0) 2 71-67 78
Facsimile: +49-(0) 2 71-67 70
E-Mail: info@sk-elektrotechnik.de
- 16 Frankfurt**
K.A. Schmersal GmbH
Geschäftsstelle Frankfurt
Kilianstädter Straße 38
61137 Schöneck
Telephone: +49-(0) 61 87-9 09 56-0
Facsimile: +49-(0) 61 87-9 09 56-6
E-Mail: gsfrankfurt@schmersal.de

International agencies

- Argentina – Argentinien**
Hellermann Tyton
Monteagudo Street # 760 (B1672 AFP)
Villa Lynch
1672 Buenos Aires
Telephone: +54-11-47 54 54 00
Facsimile: +54-11-47 52 03 74
E-Mail: gianowski@hellermanntyton.com.ar
- Australia – Australien**
NHP Electrical Engineering
Products Pty. Ltd.
43 - 67 River Street
PO Box 199
Richmond 3121
Melbourne, Victoria
Telephone: +61-(0) 3-94 29 29 99
Facsimile: +61-(0) 3-94 29 10 75
E-Mail: products@nhp.com.au
Internet: www.nhp.com.au
- Austria – Österreich**
AVS-Schmersal Vertriebs Ges. m.b.H.
Biróstraße 17
1232 Wien
Telephone: +43-(0) 1-6 10 28
Facsimile: +43-(0) 1-6 10 28-1 30
E-Mail: info@avs-schmersal.at
Internet: www.avs-schmersal.co.at
- Belgium – Belgien**
Schmersal Belgium NV/SA
Nieuwlandlaan 16B
Industriezone B413
3200 Aarschot
Telephone: +32-(0) 16-57 16 18
Facsimile: +32-(0) 16-57 16 20
E-Mail: info@schmersal.be
- Brazil – Brasilien**
ACE Schmersal
Eletroeletrônica Industrial Ltda.
Rodovia Boituva – Porto Feliz, Km 12
CEP 18550-000
Boituva – SP
Telephone: +55-(0) 15-2 63-98 66
Facsimile: +55-(0) 15-2 63-98 90
E-Mail: export@aceschmersal.com.br
Internet: www.aceschmersal.com.br
- Chile – Chile**
NDU Ingeniería
Santa Elisa 498
7160269 La Cisterna
Santiago de Chile
Telephone: +56-2-5 26-66 46
Facsimile: +56-2-5 26-50 46
E-Mail: matelec@ndu.cl
- Colombia – Kolumbien**
Cimpex Ltda.
Apartado Aereo 2429
Medellin
Telephone: +57-4-2 51-59 72
Telephone: +57-4-2 51-59 87
Facsimile: +57-4-2 51-46 08
E-Mail: cimpex@supernet.com.co
- Costa Rica – Costa Rica**
Euro-Tec, S.A.
Apartado Postal 477
1250 Escazú
San José
Telephone: +5 06-3 84-78 69
Telephone: +5 06-2 31-41 01
Facsimile: +5 06-2 96-15 42
E-Mail: eurotec@sol.racsa.co.cr
- PR China – VR China**
Schmersal Industrial Switchgear
(Shanghai) Co. Ltd.
Central Plaza 1001
Huang Pi Bei Road 227
200003 Shanghai
Telephone: +86-21-63 75 82 87
Facsimile: +86-21-63 75 82 97
E-Mail: sales@schmersal.com.cn
Internet: www.schmersal.com.cn
- Czech Republic – Tschechische Republik**
Mercom Componenta spol. s.r.o.
Ruská 67
100 00 Praha 10
Telephone: +4 20-(0) 2-67 31 46 40
Telephone: +4 20-(0) 2-67 31 46 41
Facsimile: +4 20-(0) 2-71 73 32 11
E-Mail: mercom@bohem-net.cz
- Denmark – Dänemark**
Schmersal Danmark A/S
Lindegårdsvej 17A
2920 Charlottenlund
Telephone: +45-70 20 90 27
Facsimile: +45-70 20 90 37
E-Mail: info@schmersal.dk
Internet: www.schmersal.dk
- Finland – Finnland**
Advantecet Oy
Malminkaari 10B
PO Box 149
00701 Helsinki
Telephone: +3 58-(0) 9-3 50 52 60
Facsimile: +3 58-(0) 9-35 05 26 60
E-Mail: advantecet@advantecet.fi
Internet: www.advantecet.fi
- France – Frankreich**
Automatisme et Contrôle
8, rue Raoul Follereau
BP 18
38180 Seyssins
Telephone: +33-4 76 84 23 20
Facsimile: +33-4 76 48 34 22
E-Mail: info@automatisme-et-contrôle.fr
Internet: www.automatisme-et-contrôle.fr
- Greece – Griechenland**
Kalamarakis Sapounas S.A.
Ionias & Neromilou
PO Box 46566
13671 Chamomilos Acharnes
Athens
Telephone: +30-(0) 1-2 40 60 00-6
Facsimile: +30-(0) 1-2 40 60 07
E-Mail: kalamarakis.sapounas@ksa.gr
- Honduras – Honduras**
Lusitana Int'l
Distribuciones – Representaciones
Apdo. Postal # 783
San Pedro Sula
Telephone: +5 04-5 57-66 35
Facsimile: +5 04-5 57-66 35

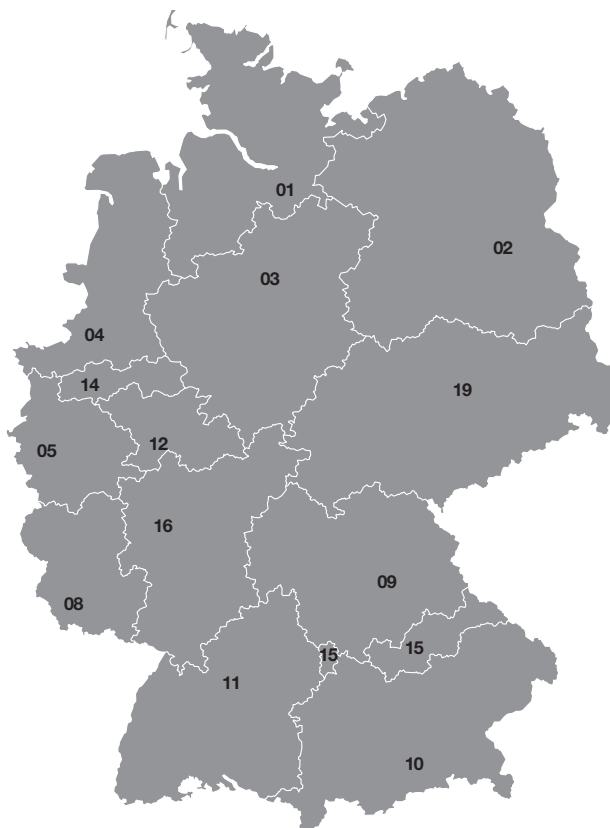
08 Saarland
Herbert Neundörfer
Werksvertretungen
Saargemünder Str. 68a
66130 Gündingen
Telephone: +49-(0)6 81-87 54 54
Facsimile: +49-(0)6 81-87 54 53
E-Mail: info@herbert-neundoerfer.de
Internet: www.herbert-neundoerfer.de

19 Leipzig
K.A. Schmersal GmbH
Geschäftsstelle Leipzig
Nonnenstraße 11c
04229 Leipzig
Telephone: +49-(0) 3 41-4 87 34 50
Facsimile: +49-(0) 3 41-4 87 34 51
E-Mail: gsleipzig@schmersal.de

09 North Bavaria
K.A. Schmersal GmbH
Geschäftsstelle Nürnberg
Beethovenstraße 14
91074 Herzogenaurach
Telephone: +49-(0) 91 32-73 70 00
Facsimile: +49-(0) 91 32-73 48 44
E-Mail: gsnuernberg@schmersal.de

10/ South Bavaria
15 Ing. Adolf Müller GmbH
Industriervertretungen
Elly-Staegmeyr-Str. 15
80999 München
Telephone: +49-(0) 89-8 12 60 44
Telephone: +49-(0) 89-8 12 60 45
Facsimile: +49-(0) 89-8 12 69 25
E-Mail: info@ingam.de

11 Stuttgart
Gerhard Schützing
Labor-Schütz GmbH Industriervertretungen
Postfach 81 05 69, 70522 Stuttgart
Eichwiesenring 6
70567 Stuttgart
Telephone: +49-(0) 7 11-7 15 46-0
Facsimile: +49-(0) 7 11-7 15 46-18
E-Mail: hv@schuetzinger.de
Internet: www.schuetzinger.de



Hungary – Ungarn
NTK
Ipari-Elektronikai és
Kereskedelmi KFT.
Kodaly Z.u. 1
9023 Győr
Telephone: +36-(0) 96-52 32 68
Facsimile: +36-(0) 96-43 00 11
E-Mail: info@ntk-kft.hu

Italy – Italien
Schmersal Italia s.r.l.
Via Molino Vecchio, 206
25010 Borgosatollo (BS)
Telephone: +39-0 30-2 50 74 11
Facsimile: +39-0 30-2 50 74 31
E-Mail: info@schmersal.it
Internet: www.schmersal.it

Japan – Japan
Elan Japan Branch Office
3-39-7-207 Shoan
Suginami-ku
Tokyo 167-0054
Telephone: +81-(0) 3-32 47-05 02
Facsimile: +81-(0) 3-32 47-05 37
E-Mail: safety@elanjp.com

Korea – Korea
Mahani Electric Co. Ltd.
576-8, Bisan-2dong
Dongan-Ku
Anyang-City
Kyungki-do 431-821
Telephone: +82-(0) 31-4 63-33 30
Facsimile: +82-(0) 31-4 63-33 98
Facsimile: +82-(0) 31-4 63-33 99
E-Mail: yskim@hanmec.co.kr

Netherlands – Niederlande
Elan Nederland
Fahrenheitsstraat 42-44
3846 BN Harderwijk
Telephone: +31-(0) 3 41-43 25 25
Facsimile: +31-(0) 3 41-42 52 57
E-Mail: elan-nl@planet.nl

New Zealand – Neuseeland
NHP Electrical Engineering
Products (N.Z.) Ltd.
7 Lockhart Place
PO Box 6 20 09
Mt Wellington
Auckland
Telephone: +64-(0) 9-2 76 19 67
Facsimile: +64-(0) 9-2 76 19 92

Norway – Norwegen
Schmersal Nordiske
Hoffsveien 92
0377 Oslo
Telephone: +47-22 06 00 70
Facsimile: +47-22 06 00 80
E-Mail: info@schmersal.no
Internet: www.schmersal.se

Paraguay – Paraguay
Brasguay
Ruta Internacional, 07
Mingua Guazu
Telephone: +5 95-6 44-2 00 18
Facsimile: +5 95-6 44-2 05 77
Facsimile: +5 95-6 44-2 04 18
E-Mail: kuntz@foznet.com.br

Poland – Polen
Schmersal - Polska Sp.j.
ul. Kremowa 65A
02-969 Warszawa
Telephone: +48-(0) 22-8 16 85 78
Telephone: +48-(0) 22-8 16 85 79
Facsimile: +48-(0) 22-8 16 85 34
E-Mail: office@schmersal.pl

Portugal – Portugal
K. A. Schmersal GmbH
Sucursal em Portugal
Av. das Descobertas, 15-2° D
Quinta do Infanteado
2670 Loures
Telephone: +3 51-21-9 83 92 83
Facsimile: +3 51-21-9 83 19 37
E-Mail: info@schmersal.pt
Internet: www.schmersal.pt

Singapore – Singapur
Tong Sim Marine & Electric Co.
46 Kaki Bukit Crescent
Kaki Bukit Techpark 1
Singapore 416269
Telephone: +65-67 43 31 77
Facsimile: +65-67 45 37 00
E-Mail: tongsim@mbox4.singnet.com.sg

Slovenia – Slowenien
Tipteh d.o.o.
Ulica Ivana Roba 21
1000 Ljubljana
Telephone: +3 86-1-2 00 51 50
Facsimile: +3 86-1-2 00 51 51
E-Mail: info@tipteh.si

Spain – Spanien
Matelco Automatismos Y Control S.L.
Avenida Tibidabo, 23
08022 Barcelona
Telephone: +34-9 34-34 08 77
Facsimile: +34-9 34-34 05 41
E-Mail: mac@matelco.com

South Africa – Südafrika
A+A Dynamic Distributors (Pty) Ltd.
3 Ruarch Street
Park Central
Johannesburg
2016 Booyens
Telephone: +27-11-4 93 50 22
Facsimile: +27-11-4 93 07 60
E-Mail: awkayser@iafrica.com

Sweden – Schweden
Schmersal Nordiska AB
Klockarns Väg 1
43533 Mölnlycke
Telephone: +46-(0) 31-3 38 35 00
Facsimile: +46-(0) 31-3 38 35 35
E-Mail: info@schmersal.se
Internet: www.schmersal.se

Switzerland – Schweiz
Schmersal Schweiz AG
Freilagerstrasse 25
8047 Zürich
Telephone: +41-(0) 43-3 11 22 33
Facsimile: +41-(0) 43-3 11 22 44
E-Mail: info@schmersal.ch

Taiwan – Taiwan
Leader Camel Enterprise Co., Ltd.
No. 453-7, Pei Tun Rd.
Taichung
Telephone: +886-4-2 41 32 92
Facsimile: +886-4-2 41 29 23
E-Mail: camel88@ms46.hinet.net
Internet: www.leadercamel.com.tw

UK – Großbritannien
Schmersal UK Ltd.
Unit 1, Beauchamp Business Centre
Enigma Park
Malvern
Worcs WR14 1GL
Telephone: +44-(0) 16 84-57 19 80
Facsimile: +44-(0) 16 84-56 02 73
E-Mail: support@schmersal.co.uk
Internet: www.schmersal.co.uk

USA – USA
Schmersal Inc.
100 Grasslands Road, Suite 110
Elmsford
New York 10532
Telephone: +1-(0) 9 14-347-47 75
Facsimile: +1-(0) 9 14-347-15 67
E-Mail: info@schmersalusa.com
Internet: www.schmersalusa.com

Venezuela – Venezuela
Petro System C.A.
Av. La Salle, Qta. Beatriz
Los Caobos
Caracas
Telephone: +58-2 12-7 82 47 27
Telephone: +58-2 12-7 82 51 06
E-Mail: ventas@petrosystem.com



Elan Schaltelemente GmbH & Co. KG
Im Ostpark 2
D-35435 Wettenberg
Telephone: +49-(0)6 41/98 48-0
Facsimile: +49-(0)6 41/98 48-420
E-Mail: info@elan.schmersal.de
Internet: www.elan.de