

TERMOREG

industrial automation

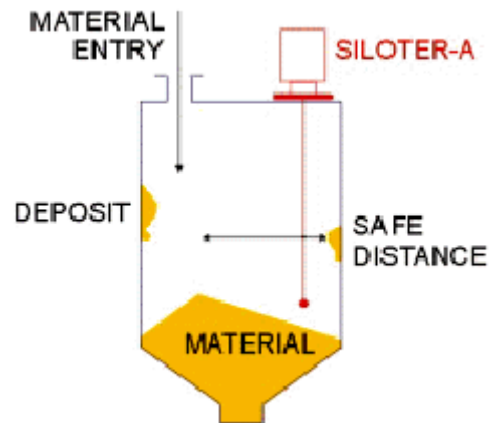
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Electromechanical Level Meter

SILOTER - C SILOTER - MB



Description:

The SILOTER-C is an electromechanical level metering system for bulk solids such as cement, wheat, flour, plastic granules and powder. The sensor probes amount of material in silos and tanks of selectable height. This device has the wide use from food industry to heavy chemistry.

SILOTER C – metering up to 50m and pressure up to 3 bars in silo

SILOTER MB – portable battery-operated device with metering up to do 50m

Measuring principle:

A sensing weight, hanged on a stainless rope, is lowered into the silo. When the sensing weight reaches the surface, direction is reversed and sensing weight returns back to the initial position. Measured distance is stored in memory and can be sent to the control system by the RS-485 digital interface (in ASCII protocol) or in a form of current 4-20mA. Another possibility is to send it as pulses for a counter. Measuring range max. 52 meters.

Mechanical construction:

The Siloter-C meter has stainless steel cylindrical case. The covers are sealed by clamp joints for perfect stuffing and simple one screw mounting and dismantling. The case is internally divided into two parts. One part is for a drum with sensing rope and the second part is for electric drive, control electronic board and connecting terminals. The Siloter is mounted on the silo roof by the DN100 PN6 flange. The sensing probe can be made in different forms according to application (high temperature, density, hygienic demand on measured medium etc.)

Dust ignition risk environment

The Siloter-C has an ATEX certificate for systems intended for use in potentially explosive atmosphere (EC directive 94/9/EC).



Operating voltage:

Supply voltage is 230VAC (SILOTER-C) or internal 12 Volt battery (Siloter-MB)

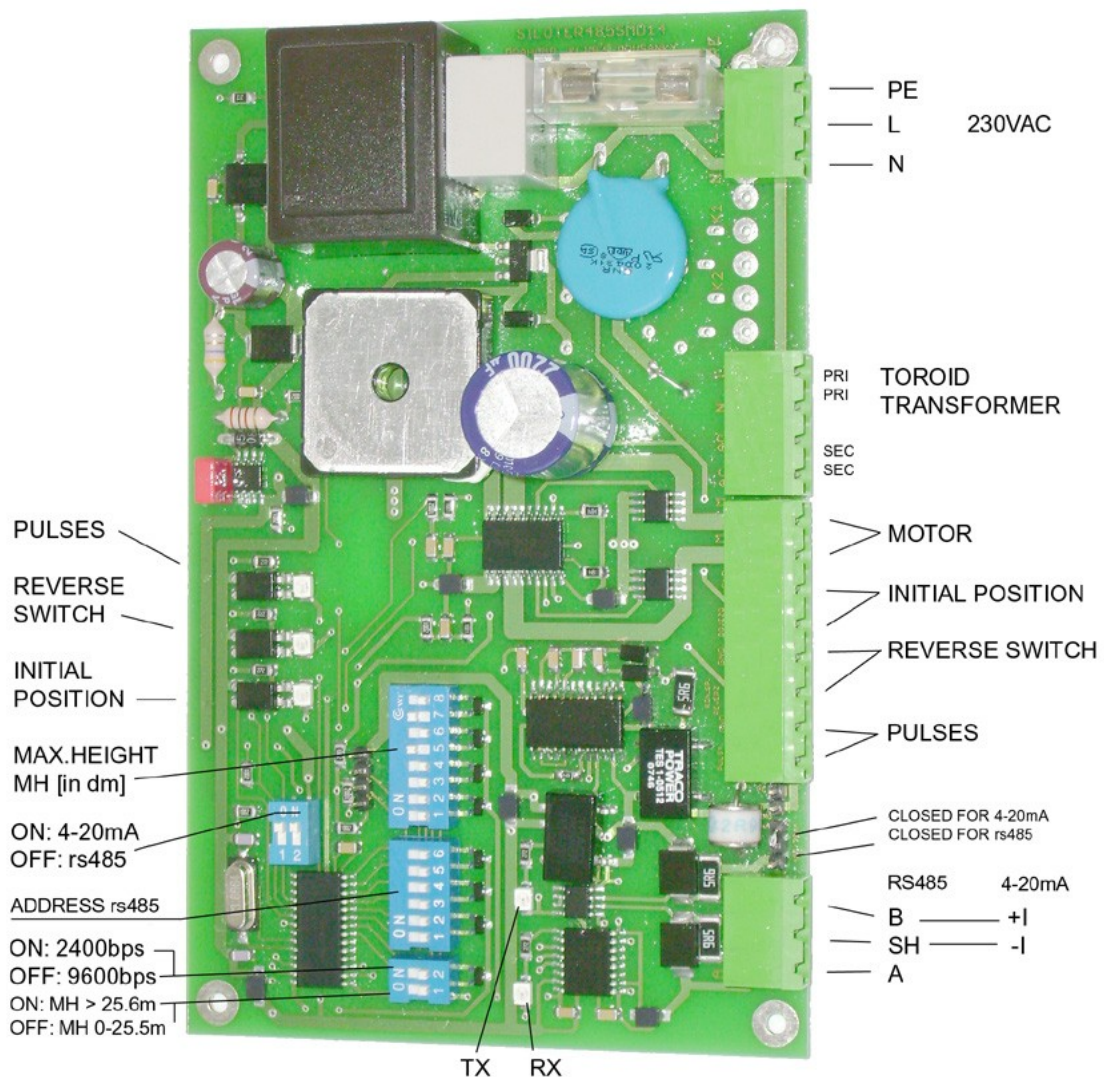
VERSIONS:

a/ **SILOTER-485 with ASCII interface** - serial RS-485 digital interface, measured distance and status are send via ASCII interface, see the description of protocol. The SILOTER is restarted by START command via the RS-485 interface.

b/ **SILOTER-pulse** - pulse output for a counter. Number of pulses correspond to distance from the SILOTER to surface in the bin. Relay output 250V AC/1A, one pulse for each 0.1 meter, period 1s (500 ms pulse/ 500 ms space). The SILOTER is restarted by interrupt of power supply for 2 seconds.

c/ **SILOTER 4-20mA** - current loop 4-20mA. Empty bin is 4mA, the full is 20mA. It is necessary to set maximum height at DIP8 switches, see the picture below. The SILOTER is restarted by interrupt of power supply for 2 seconds.

Terminals layout, indication and setting:



Control and data evaluation:

The Siloter-C has no internal display. The measured distance can be displayed on simple external display (Siloter-X, one display per one Siloter) or on the Siloter-Y, for up to six Siloters. These displays can show distance to the material surface (in meters), percents of occupied space in the silo and weight of material in the silo (in metric tons).

The Siloter-X and -Y displays are connected with Siloter-C meter by RS-485 digital interface.

The Siloter-MB is special battery-powered version with internal display (similar to Siloter-X).

Control systems:

a/ RS-485 serial interface. The RS-485 interface has isolated ground. Up to 31 Siloters can be connected to the control systems by one twisted pair cable in this configuration. Each Siloter has its own address. No additional signal is required.

b/ 4-20mA current loop. In this case 4mA corresponds to empty bin (maximal distance to surface), 20mA to full bin (no distance to surface). One additional relay output is required in this configuration, to restart the SILOTER by disconnection of supply for 2 seconds.

c/ Pulse output is designed for systems without RS-485 or 4-20mA interface. It require one logical input to count pulses and one relay output to restart the measuring cycle.

Description of ASCII protocol for SILOTER-485:

Communication in ASCII code, parameters 8/N/1 (i.e. 8 data bits, none parity, 1 stop bit), bitrate 9600 bps. The bitrate can be switched also to 2400bps by a DIP switch at electronic board (see the picture at page 3).

1. Request from the control system:

(AA 0>

(- initial character (ASCII code 28h)
A - address (tens)
A - address (ones)
 - space (ASCII code 20h)
0 - zero (ASCII 30h)
> - terminator (ASCII 3Eh)

2. Answer of the Siloter:

~SSS0AAHHH>

~ - initial character (ASCII code 7Eh)
S - status (hundreds)
S - status (tens)
S - status (ones)
0 - zero (ASCII 30h, reserved)
A - address of the Siloter
A - address of the Siloter
H - distance from the Siloter to the material surface in decimeters (hundreds)
H - (tens)
H - (ones)
> - terminator (ASCII 3Eh)

Example: request from PC: (01 0>
answer from Siloter: ~129001103>

the first 3 characters after the '~' is STATUS, in the example '129' decadic, '10000001' binary, the SILOTER is in quiet state, sensing weight is at its initial position, details see below.

the next 3 characters is own address, '001' in decadic

the next 3 characters is measured height to the material surface in decimeters (0.1m), 103 dm = 10.3 meter

the last character is terminator '>'

The STATUS value can be from 000 to the 255 and after conversion to binary number it presents:

bit 7 - Siloter in quiet state /without activity/
bit 6 - sensing weight is going down to the silo
bit 5 - sensing weight is returning up to the initial position
bit 4 - sensing weight is returning up to the initial position after power restart
bit 3 - surface has not found (measuring distance is larger than maximum set by switches)
bit 2 - sensing weight is returning up, slowing phase (last 2 meters)
bit 1 - mechanical error (broken rope, blocked drum)
bit 0 - sensing weight in initial position /on magnetic sensor/

3. Start of metering

(AA 1000000>

(- initial character (ASCII code 28h)
A - address (tens)
A - address (ones)
 - space (ASCII 20h)
1000000 - start command (ASCII 31303030303030h)
> - terminator (ASCII 3Eh)

notes 1/ SILOTER doesn't answer for this command, just restart and make measurement
2/ start of metering also can be done by disconnecting power for about 2 seconds

for example: we want to restart the Siloter No.#05, then we send "(05 1000000>" to the RS-485 interface.

Other examples:

command from PC: (01 0>

answers from Siloter:

~064001008> the answer of Siloter #01, sensing weight running down, actual distance from the initial position is 0.8m, the value increases up to the surface or setup maximum height
~032001102> Siloter #01, sensing weight going up to initial position, measured distance is 102dm = 10.2m
~032001012> the same, but measured distance is 12dm = 1.2m
~002001102> Siloter #01 has some mechanical problem
possible causes of the problem:
a/ sensing weight didn't left its initial position after restart (the drum is blocked by a rope mess, error of motor etc)
b/ sensing weight did not return in 150 seconds back to the initial position after restart (the rope is broken by accident or blocked somewhere inside the silo or initial position magnetic sensor is broken or the magnet on sensing weight is broken)

Restart of the Siloter - "(01 1000000>" command - is possible in any state, sensing weight return to the initial position and new metering will begin.

A protective period of 30s is set between two subsequent restarts, in this case Siloter do not restart and just answers according to the last measurement.

Maximum measured distance setting:

There is a risk if the bin has conical bottom shape and a connected transporter. When the silo is empty, the sensing weight can meet the transporter and cause its damage. To prevent this situation, please measure the distance between initial position of sensing weight and bottom of the silo and set it on internal Siloter DIP8 switches. If the height is more then 25.6 m, please switch DIP2.1 ON and set the rest above 25.6m at the DIP8 switch (see the picture at page 3 of this manual). Please turn the Siloter off and on after DIP2.1 change. The Siloter stops in this distance and return to initial position even if does not find material surface. Always set the maximum height if you have 4-20mA version. This value is used to calculate output value. Empty bin is 4mA and the full bin is 20mA.

Change of communication speed from 9600 to 2400bps

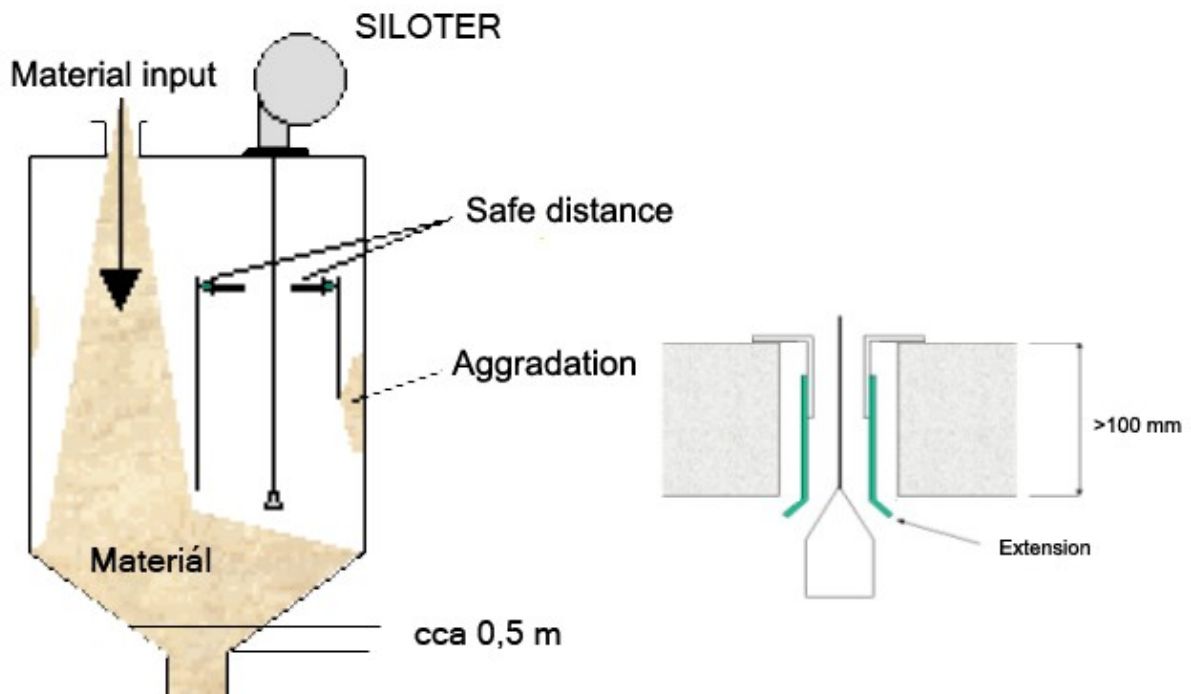
For older Siloter version compatibility issue it is possible to change communication speed from 9600 to 2400bps (switch DIP2.2). Please turn the Siloter off and on after this change.

Installation instructions:

The Siloter is mounted on a silo roof on a flange DIN100 PN6. This flange must be exactly horizontal. The roof adapters are made for non-horizontal roof, as option. Height of flange throat is about 100 mm. For using with a thicker ceiling (e.g. concrete) we supply the special throat extension. Please indicate length of the extension in order.

The position of the flange should not be so close to the silo wall, but not so close to the way of falling product during filling. Before the installation please check reinforcements and aggradations in the silo and select an ample distance from these obstacles.

Do not forget to remove transportation fixing tapes after the installation of the Siloter. Now connect the power supply. The Siloter goes to the upper end position and immediately start first metering cycle. Don't push on sensing weight by hand. Sensing rope could fall from the reel inside the Siloter and make "rope-mesh" in this case. Close both lids after the electric installation.



The measurement can be executed also during filling. The meter must be turned on during filling to not burying the weight and subsequently its avulsion.

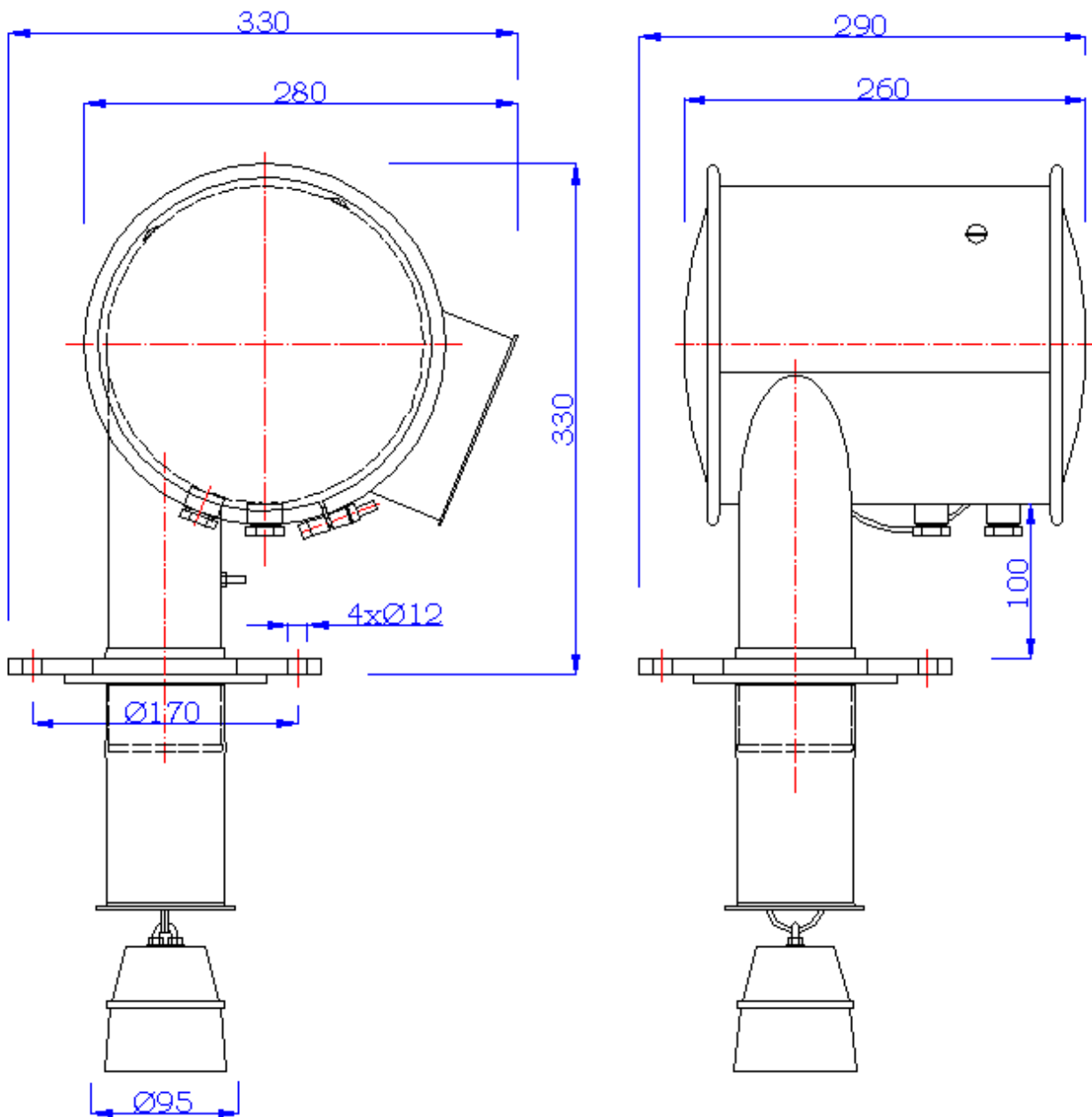
It is recommended initializing the metering in cycle 1:1. There is SW protective time interval 30s against repeated start in shorter time.

The Siloter does not require any maintenance except occasional cleaning and checking of state of sensing rope.

Power supply: 230V/50Hz
Power consumption: 5VA in quiet state/ max. 25VA when metering
Signal output: RS-485 or pulses (relay contact 250VAC/0,2A)

Recommended RS-485 cable:
standard twisted-pair cable for RS-485 interface or LAN network (Ethernet) cable

Mounting proportions



ES DECLARATION OF CONFORMITY

According to Par. § 13 Law Nr. 22/1997 Collection of Laws in Statutory Text No. 71/2000

Manufacturer

DRAHOMIL KLIMEŠ
TERMOREG
Prušánky 352
696 21 Prušánky
IČO 49425927

Hereby declares on his own exclusive responsibility that the product:

**CONTINUOUS LEVER METER SERIES SILOTER-A
SILOTER-B
SILOTER-C
SILOTER-M**

Description:

The lever meter designed for level detection of loose materials and liquids.

It fulfils the essential requirements of the Government regulations:

No.170/1997 Collection of Laws as amended by Government regulation
No.283/2000 Collection of Laws and Government regulation
No.168/1997 Collection of Laws as amended by Government regulation
No.281/2000 Sb.Collection of Laws and Government regulation
No.176/1997 Collection of Laws as amended by Government regulation
No.286/2002 Collection of Laws and Government regulation

For conformity examination following harmonized Czech standards were used:

ČSN EN 292-2, ČSN EN 294, ČSN EN 349, ČSN ISO 447, ČSN ISO 3746, ČSN EN 60204-1 and Czech Technical Standards ČSN IEC 38, ČSN 20 0700, ČSN 20 0723

And following tests and recommendations from FZTÚ Ostrava Radvanice:
EN 50014:1997+A1+A2, EN 50281-1-1:1998

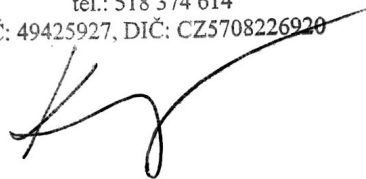
The above product is under the terms of usual (according to Producer's Operational Manual) and/or above mentioned specified utilization safe; and the precautions has been implemented to guarantee the conformity of all the products introduced to the market with the technical documentation and with the essential requirements of the above mentioned technical standards.

The conformity estimation was carried out according the statutory rules No. 170/1997 Collection of Laws in further Statutory Texts § 3 Art. 1 Letter a, and Government regulation No. 168/1997 Collection of Laws in further Statutory Texts § 3 Art. 1 subsequently amended by § 5a.

The conformity estimation was carried out by the manufacturer.

In Prušánky, 2006, August 3

Ing. Drahomil Klimeš
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tel.: 518 374 614
IČ: 49425927, DIČ: CZ5708226920



Stamp print, authorized representative name



Physical Technical Testing Institute
Ostrava-Radvanice

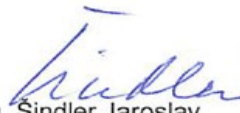


Supplement No. 1 to EC-Type Examination Certificate

- (1)
- (2) Equipment or Protective Systems Intended for use
in Potentially Explosive Atmospheres
Directive 94/9/EC
- (3) EC-Type Examination Certificate Number:
FTZÚ 02 ATEX 0009X
- (4) Equipment or protective system: **Continuous level meter, type SILOTER-C**
- (5) Manufacturer : **DRAHOMIL KLIMEŠ**
- (6) Address: **Hodonínská 352, 696 21 Prušánky, Czech Republic**
- (7) This supplement of certificate is valid for: - extension of certificate validity
- modification of certified product
- (8) Modification of certified apparatus (protective system) and any of its approved variants are specified in documentation, list of which is mentioned in schedule of this certificate.
- (9) This supplement to type examination certificate is valid only for type examination of design and construction of product sample in accordance with Annex 3 Paragraph 6) of Directive No. 94/9/EC. The Directive contains another requirements, which manufacturer shall fulfil before products are place on market or introduce in service.
- (10) Safety requirements of modified parts were fulfilled by satisfying the following standards:
EN 61241-0:2006 EN 61241-1:2004
- (11) Marking of equipment shall contain symbols:
Ex II 1/2D Ex tD A IP65 T85°C
- (12) This type examination certificate is valid till: **31. 03. 2013**

Responsible person:

Date of issue: 19.03. 2008


Dipl. Ing. Sindler Jaroslav
Head of certification body




Number of pages: 3
Page: 1/3

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