Nr.1128gb
Rev.060518

CEMB

VIBRATIONS CONTROL EQUIPMENT

T1-D / 2

T1-EV / 2

INSTRUCTION MANUAL

CEMB S.p.A. - 22054 MANDELLO DEL LARIO (LC) I - Via Risorgimento 9
Tel. 0341-706111 - Telefax (+39-341) 735678
e-mail stm@cemb.com - www.cemb.com

CONTENTS

INTEGRATED EQUIPMENT

T1-D/2

Dual channel vibration monitoring unit

OPERATION

The T1-D/2 equipment is designed to meet needs to monitor vibrations on rotating machinery working under continuous or heavy duty conditions. Hence it also allows correct scheduling of maintenance thereby avoiding serious failures. Model T1-D/2 can control two measuring points with optimization to cater for overall dimensions, installation methods, and to costs of an instrumentation for protecting any machine whatsover provided with 2 support members (fans, pumps, motors, compressors, turbines, centrifuges, etc.).

MAIN FEATURES

Model T1.D/2 consists of one signal processing module handling the signals generated by two transducers installed on the machine supports. The easy use and great flexibility in presetting the measuring parameters represent the main characteristic of the system.

The processing module, which can be fitted on a DIN guide EN 50022 inside a control panel, features a series of settings which can be made by the customer for selecting optimum measuring parameters, delay time for the alarms, scale range, etc. The module is implemented with SMD technology to compact size and improve reliability.

TECHNICAL FEATURES

Composition

- One processing module fitted with special card holder for mounting on DIN guide, complete with terminal board (size 45 x 115 x 220 mm)
- two velocity transducers

Standard transducers (choose from:)

- T1-40 (10 to 1000 Hz in all directions)
- T1-40V / -38V (10 to 2000 Hz vertical)
- T1-40BF / -38BF (30 to 2000 Hz horizontal)
- T1-38 (15 to 2000 Hz in all directions)

Power supplies

- 110/220 VAC - 50/60 Hz - 7.5 VA
- 24 VDC - 8 W

External connections

- through terminal board (see enclosed wiring diagram)

Analog outputs (measurements)

- two analog current or voltage outputs for channel A and channel B

Digital outputs

- two SPDT contacts for 1st alarm level regarding channel A and channel B
- two SPDT contacts for 2nd alarm level regarding channel A and channel B
- one SPDT contact for self-diagnositics common to channel A and channel B

Contact characteristics

- max voltage 300 Vdc, 250 VAC
- max current 5A

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INTEGRATED EQUIPMENT

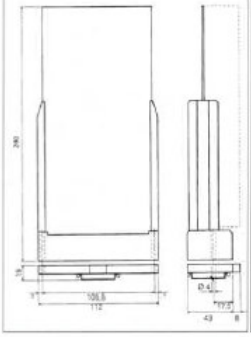
Settings which can be made by the customer

- Supply voltage 110 or 220 VAC
- Selection of measuring parameter (displacement or velocity)
- Measuring range (one of 3 ranges to be specified when ordering)
- Time delay for alarms (1 s or 10 s)
- Latching or non latching alarms

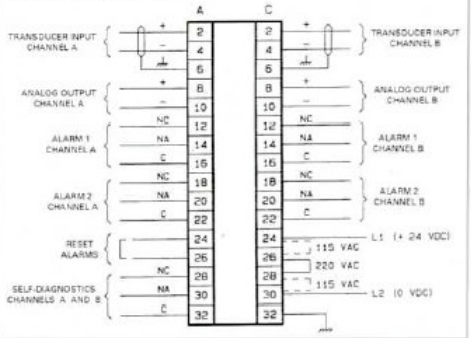
Settings which can be specified when placing the order

- AC or DC power supply
- Type of output signals
- Measuring range
- Alarm 1 relays (channel A and B), normally energized or de- energized
- Alarm 2 relays (channel A and B), normally energized or de- energized
- Or voting alarm 1 relays for channels A and B
- Or voting alarm 2 relays for channels A and B
- Temperature range: -10° C to +65° C

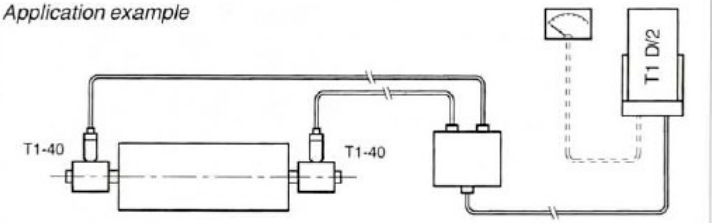
OVERALL DIMENSIONS



TERMINAL BOARD



Application example



ORDERING DATA

A	B	C	D	E	F	G	H

T1- D/2 / □ / □ / □ / □ / □ / □ / □ / □

A : Power supply

0	110/220 V - 50/60 Hz
1	24 VDC

B : Output signals

0	4 to 20 mA
1	0 to 10 V
2	0 to 20 mA
3	special to be defined

C : Entity measured

0	RMS velocity
1	displacement p-p

D : Measuring range

0	0 to 10 mm/s; 0 to 20 mm/s; 0 to 50 mm/s
1	0 to 100 µm; 0 to 200 µm; 0 to 500 µm
2	special to be defined

E : Alarm 1 relays

0	normally de-energized
1	normally energized

F : Alarm 2 relays

0	normally de-energized
1	normally energized

G : Alarm 1 relays

0	independent for channels A and B
1	or voting for channels A and B

H : Alarm 2 relays

0	independent for channels A and B
1	or voting for channels A and B

Example of an order :

T1-D/2 / 1 / 2 / 0 / 0 / 0 / 0 / 1 / 1

H : or voting relays, alarm 2, channels A and B;
G : or voting relays, alarm 1, channels A and B;
F : alarm 2 relays, normally de-energized;
E : alarm 1 relays, normally de-energized;
D : measuring range 0 to 10, 0 to 20, 0 to 50 mm/s;
C : RMS velocity measuring;
B : output signals 0 to 20 mA;
A : power supply 24 VDC;

23826 MANDELLO DEL LARIO (LC) - ITALY
VIA RISORGIMENTO, 9 - PHONE +39 0341.706111
FAX +39 0341.735678 - E-mail: stm@cemb.com - www.cemb.com

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INTEGRATED EQUIPMENT

T1-EV/2

Dual channel vibration monitoring unit

OPERATION

The T1-EV/2 equipment is designed for continuous monitoring of the vibrations on rotating machines by supplying analog outputs (for indicators or recorders) and alarm contacts enabled upon exceeding preset thresholds.

TYPICAL APPLICATIONS

Monitoring of vibrations and protection of machines provided with two supports by simplifying the instrument installation procedures. The die-cast aluminium dust-proof housing (with protection class IP65) allows the equipment to be installed close to the machine and in industrial environments with especially severe conditions from the point-of-view of the climate, aggressive agents and electromagnetic interference.

MAIN FEATURES

The T1-EV/2 system consists of a dual channel processor module in an aluminium case and two transducers installed on the supports of machine under test. The system features a series of settings which can be made by the customer (type of parameter measured, measuring range, mode of relay operation, etc.) or which can be specified when placing the order, thereby making the system flexible and easy-to-use for widely different applications. As regarding choice of parameter to be measured (displacement or velocity) and presetting of the alarm thresholds, please consult technical booklet CEMB Nr 24. "Machinery monitoring and supervisory instrumentation" which makes reference to the very latest ISO and VDI standards.

TECHNICAL FEATURES

Composition

- One dust-proof die-cast aluminium case
- two velocity transducers

Standard transducers (choose from:)

- T1-40 (10 to 1000 Hz in all directions)
- T1-40V / -38V (10 to 2000 Hz vertical)
- T1-40BF / -38BF (30 to 2000 Hz horizontal)
- T1-38 (15 to 2000 Hz in all directions)

Power supplies

- 110/220 VAC - 50/60 Hz - 7.5 VA
- 24 VDC - 8 W

External connections

- through terminal board internal to the case (max. conductor cross section 2.5 mm^2)
- tapped holes (PG9 thread) are provided for cable outlet (see installation drawing)

Analog outputs (measurements)

- two analog current or voltage outputs regarding channel A and channel B.

Digital outputs

- two SPDT contacts for 1st alarm level regarding channel A and channel B
- two SPDT contact for 2nd alarm level regarding channel A and channel B
- one SPDT contact for self-diagnostics common to channel A and channel B

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INTEGRATED EQUIPMENT

Contact characteristics

- max voltage 300 Vdc, 250 VAC
- max current 5A

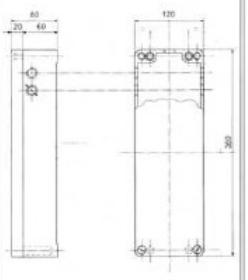
Settings which can be made by the customer

- Supply voltage 110 or 220 VAC
- Selection of measuring parameter (displacement or velocity)
- Measuring range (one of 3 ranges to be specified when ordering)
- Time delay for alarms (1 s or 10 s)
- Latching or non latching alarms

Settings which can be specified when placing the order

- AC or DC power supply
- Type of output signals
- Measuring range
- Alarm 1 relays (channel A and B) normally energized or de-energized
- Alarm 2 relays (channel A and B) normally energized or de-energized
- Or voting alarm 1 relays for channels A and B
- Or voting alarm 2 relays for channels A and B
- Temperature range: -10° C to +65° C

OVERALL DIMENSIONS



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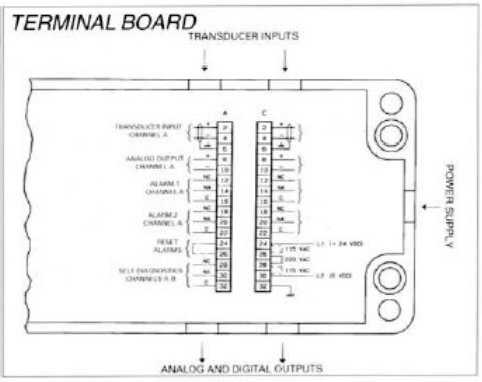
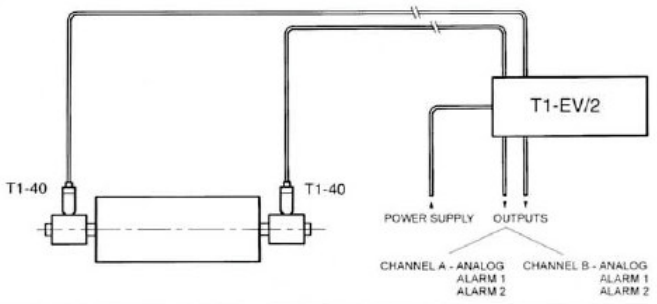


Application example



ORDERING DATA

A B C D E F G H

T1- EV/2 / □ / □ / □ / □ / □ / □ / □ / □

A : Power supply

0	110/220 VAC - 50/60 Hz
1	24 VDC

B : Output signals

0	4 to 20 mA
1	0 to 10 V
2	0 to 20 mA
3	special to be defined

C : Entity measured

0	RMS velocity
1	displacement p-p

D : Measuring range

0	0 to 10 mm/s; 0 to 20 mm/s; 0 to 50 mm/s
1	0 to 100 µm; 0 to 200 µm; 0 to 500 µm
2	special to be defined

E : Alarm 1 relays

0	normally de-energized
1	normally energized

F : Alarm 2 relays

0	normally de-energized
1	normally energized

G : Alarm 1 relays

0	independent for channels A and B
1	or voting for channels A and B

H : Alarm 2 relays

0	independent for channels A and B
1	or voting for channels A and B

Esempio di ordinazione :

T1-EV/2 / 1 / 2 / 0 / 0 / 0 / 0 / 1 / 1

- H : or voting relays, alarm 2, channels A and B
- G : or voting relays, alarm 1, channels A and B
- F : alarm 2 relays, normally de-energized
- E : alarm 1 relays, normally de-energized
- D : measuring range 0 to 10, 0 to 20, 0 to 50 mm/s
- C : RMS velocity measuring
- B : output signals 0 to 20 mA
- A : power supply 24 VDC

CEMB SPA
22054 MANDELLO DEL LARIO - ITALY
VIA RISORGIMENTO, 9 - TEL. 0341/731.384
TLX 380440 CEMB I - FAX (+39-341) 735.678

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1.2 - EXTERNAL CONNECTIONS

The measuring equipment must be connected using the terminals shown on the external connections diagram illustrated in paragraph 1.1.

The various different types of transducers must be connected as shown in the drawings in paragraph 1.4.

All the external elements (transducers, users etc.) MUST be wired using cable that is resistant to the atmospheric agents to be found in the workplace where they are to be used (oils, corrosive acids, high or low temperatures etc.).

Wherever indicated, YOU MUST use protected cable, remembering that the protection must be connected to the mass of the framework (earth) at only one of the two ends of the cable (we recommend you connect the equipment end).

All the power conductors must have a minimum cross-section of 1 mm^2; the maximum cross-section possible is 2.5 mm^2. The maximum distance that the transducers can be installed from the equipment is about 800 metres, using cable with the maximum cross-section.

We recommend that you ensure that all sections of the cables that run outside installed protection ducts are protected independently with metal sheathing, in order to avoid any mechanical damage to the connections.

The measuring transducers set in the field are made with IP65 or IP66 environmental protection, in conformity with CEI standard 70-1. To maintain this degree of protection, you must check that the external transducer housing and the component parts of the connector do not undergo any alteration during the installation, fixture and connection operations.

N.B.1: To make the field connections for HT (high temperature) transducers, you must use a high temperature (> 300°C) soldering alloy.

1.3 - USE AND MAINTENANCE

ATTACHED DRAWINGS

Drawing N° 33416/1 = Computer pcb serigraphy with significant points detailed in the following explanations (the numbers in brackets are the technical back-up service references for the pcbs).

SETTINGS DEFINED WHEN ORDERING

The following selections are set by CEMB during the equipment's preparation phase, on the basis of the specifications provided by the Customer. They can be identified by following the order of the information used to make up the equipment's logo (see paragraph 1.1.: Information for ordering).

A) Power supply: It is NOT possible to transform from V AC to V DC or vice-versa.

B) Outlet signals: All variations must be made by the CEMB laboratory.

C) Dimension picked up: Channel A = jumper **µm-g** (B6) = p-p displacement
jumper **mm/sec** (B7) = RMS speed
Channel B = jumper **µm-g** (B11) = p-p displacement
jumper **mm/sec** (B12) = RMS speed

D) Range of measurement: Channel A = jumper **FS1-A** (B3) = 0 to 100 µm / 0 to 10mm/sec.
jumper **FS2-A** (B4) = 0 to 200 µm / 0 to 20mm/sec.
jumper **FS3-A** (B5) = 0 to 500 µm / 0 to 50mm/sec.
Channel B = jumper **FS1-B** (B8) = 0 to 100 µm / 0 to 10mm/sec.
jumper **FS2-B** (B9) = 0 to 200 µm / 0 to 20mm/sec.
jumper **FS3-B** (B10) = 0 to 500 µm / 0 to 50mm/sec.

E) Alarm 1 relays: For variations, call the CEMB after-sales service.
(B18 = A-NE).
(B19 = A-NR).
(B22 = B-NE).
(B23 = B-NR).

F) Alarm 2 relays: For variations, call the CEMB after-sales service.
(B20 = A-NE).
(B21 = A-NR).
(B24 = B-NE).
(B25 = B-NR).

G) Alarm 1 relays: For variations, call the CEMB after-sales service.
(B15, B16 = OFF = independent)
(B15 = ON = A+B)
(B16 = ON = B+A)

H) Alarm 2 relays: For variations, call the CEMB after-sales service.
(B13, B14 = OFF = independent)
(B14 = ON = A+B)
(B13 = ON = B+A)

OTHER SETTINGS

I) Storing alarms in the memory: the equipment is normally supplied with the settings inserted, in other words the relays and the visual alarms will stay activated after the cause of the alarm has disappeared and until the terminals **A24**/**A26** on the terminal board are short-circuited for at least one second. If you do not want these alarms to be stored in the memory, you must short-circuit the above-mentioned terminals A24/A26 permanently.
(B17 = OFF = MEM)
(B17 = ON = FUG)

L) Alarm cut-in delay: Channel A, alarm 1 = jumper **RIT1-A** (B26): OFF = 1 sec, ON = 10 sec.
Channel A, alarm 2 = jumper **RIT2-A** (B27): OFF = 1 sec, ON = 10 sec.

Channel B, alarm 1 = jumper **RIT1-B** (B28): OFF = 1 sec, ON = 10 sec.
Channel B, alarm 2 = jumper **RIT2-B** (B29): OFF = 1 sec, ON = 10 sec.

NORMAL EQUIPMENT FUNCTIONING

When the power supply is on and the settings have been made correctly, if vibrations are detected whose value is lower than the alarm threshold calibrations, the equipment will have all four red LEDs off and the green LED on.

On the terminal board, each analogical out supplies a signal in current or voltage (see setting B) directly proportional to the signal detected in the field by the transducer and corresponding to the range of measurement set. *For example, if the range of measurement set is 0 to 100 µm and the out is from 4 to 20 mA, a reading of 4 mA corresponds to 0 µm, 12 mA corresponds to 50 µm and 20 mA corresponds to 100 µm, with a maximum linearity error on the scale end of ±2%.*

If the intensity of the vibrations exceeds the Alarm 1 (and later also the Alarm 2) threshold calibration level on one or both of the measuring channels, the equipment will call the operator's attention to the fact by lighting up the relative red LED, after the delay set using setting L: **AL1-A** (LED 1), **AL2-A** (LED 2), **AL1-B** (LED 3), **AL2-B** (LED 4), or in any case by switching over the SPDT outlet contacts because of the variation in the condition of the relative relay.

When the vibrations return to the normal functioning conditions, the equipment will return to the condition described at the beginning of this section, on the basis of the settings made using the alarm memory setting facilities as at point I of the settings.

A self-diagnosis device constantly monitors the efficiency of:
- the computer pcb power supply circuits.
- the electric circuits of the field transducers.
- the connection between the transducer and the computer pcb.

If any anomalous situation arises, the operator's attention is called to the fact by the green **ON-AUTO** LED (LED 5) going off and by the self-diagnosis relay contacts switching over because the relay is deprived of power.

The power supply circuits are protected by a 1A - ø5x20 fuse (F1).

CONTROL AND CALIBRATION DEVICES

All the devices necessary for controlling and calibrating the equipment are situated on the opposite side of the computer pcb from the connector:

Yellow **GND** Test Point (TP1) = detects the circuit mass

Green **IN-A** Test Point (TP2)
Green **IN-B** Test Point (TP4) = these detect the signal supplied by the respective transducer. This signal is not rectified, not integrated and with impedence uncoupled. It is detected by inserting an oscilloscope or an analyser between one of these test points and the GND test point.

Red **10V-A** Test Point (TP3)
Red **10V-B** Test Point (TP5) = these detect the signal being elaborated by each measuring channel as a function of the 0 to 10 V DC range of measurement. This signal is detected by inserting a voltmeter between one of these test points and the GND test point.

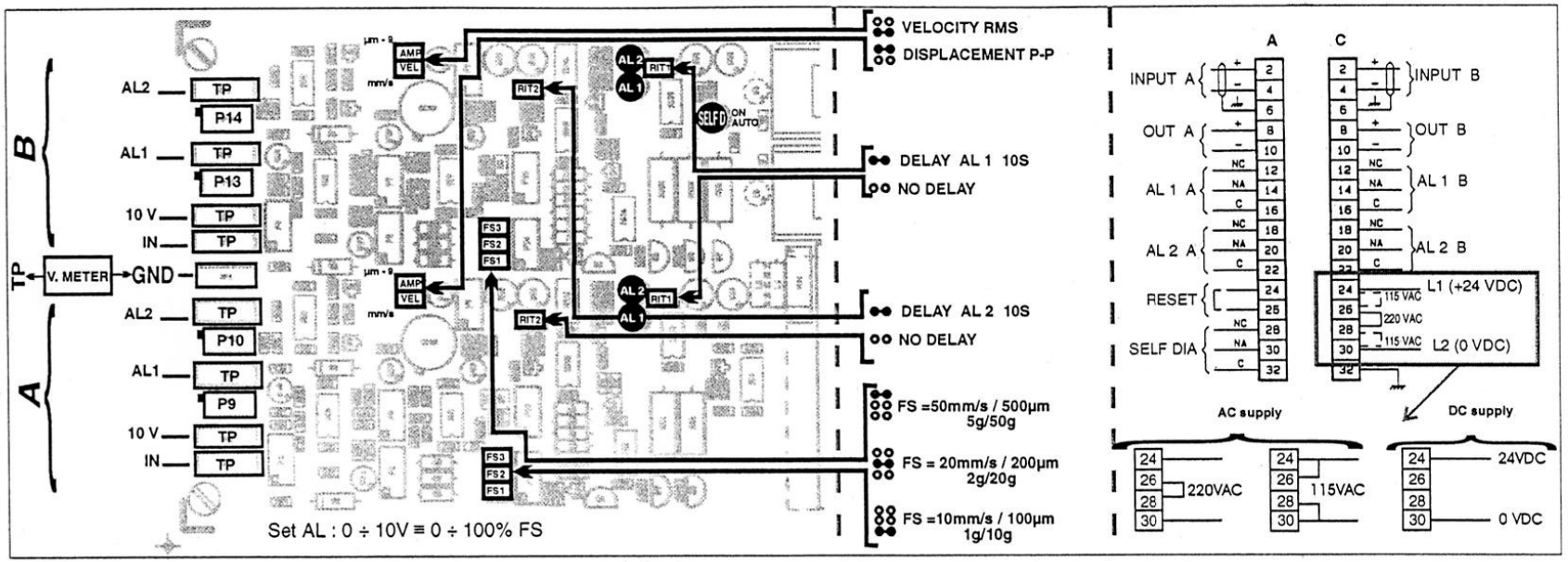
Black **AL1-A** device (TP6-P9)
Black **AL1-B** device (TP8-P13)
Black **AL2-A** device (TP7-P10)
Black **AL2-B** device (TP9-P14) = these read and calibrate the alarm 1 and 2 thresholds of each measuring channel. See next paragraph.

READING THE ALARM THRESHOLD CALIBRATION LEVELS
For each alarm on the two measuring channels, a voltmeter is inserted between the relative BLACK test point and the YELLOW test point and the calibration of the alarm threshold is read off as a function of the 0 to 10 V DC range of measurement.
Example:
For a range of measurement of 0 to 20 mm/sec (0 mm/sec = 0 V DC, 20 mm/sec = 10 V DC), 1 V DC corresponds to 2 mm/sec, so if the voltmeter reads 4 V DC, the alarm threshold calibration is 8 mm/sec.

CHANGING THE ALARM AND BLOCK THRESHOLD CALIBRATIONS
To change these calibrations, you must make the reading as described above and then adjust the relative trimmer until you achieve the new calibration, expressed as a percentage of the 0 to 10 V DC range of measurement. To use the same example as in the previous paragraph, let's suppose that we want to change the alarm threshold from 8 mm/sec to 6 mm/sec: all we have to do is adjust the trimmer until the voltmeter reads 3 V DC.

CALIBRATING ANALOGICAL OUTS
The module has been calibrated and tested in the CEMB laboratories to the tolerance prescribed and specified on the test certificate. Any operations to retouch or in any way alter these calibrations may be carried out ONLY by specialised staff using suitable equipment. For this reason, if you notice that the equipment is out of calibration or if you want to alter the calibration values for any reason, you must contact the CEMB after sales technical back-up service.

IMPORTANT:
Under no circumstances should you ever touch the printed circuit trimmers not indicated in these instructions and sealed with red paint: this would cause such serious functional errors that the pcb would need a complete overhaul. The same goes for all the setting bridges that are not mentioned in this booklet.



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Strumento - Instrument - Instrumentation
Instrumentation - Instrumento
Tipo / Type / Typ / Type / Tipo / af typen

T 1-D/2-AC (T1-D/1-AC)

Numero Distinta Base-Manufacturing List Number-Erstellungsliste nummer-Numéro de liste de construction
Numero de fabricacion-Fremstillingslistenummeret

980000025

alle norme sottostanti / with applicable regulations below / mit folgenden einschlägigen Bestimmungen / selon les normes ci-dessous / con directivas subaplicables/i henhold til folgende direktiver:

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73/23/CEE - 89/336/CEE

Norme Armonizzate Adottate /Applied Armonized Standards / Angewendete Harmonisierte Normen / Normes Harmonisées Appliquées / Normas Aplicadas en Conformidad/Folgende harmoniserede standarder

EN 60204-1 ☒ ☐	EN 60439-1 ☒ ☐	EN 50081-1 ☒ ☐	EN 50082-1 ☒

Data / Date / Datum / Date / Fechs/Dato

01/01/96

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Strumento - Instrument - Instrumentation
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T 1-D/2-DC (T1-D/1-DC)

Numero Distinta Base-Manufacturing List Number-Erstellungsliste nummer-Numéro de liste de construction
Numero de fabricacion-Fremstillingslistenummeret

980000026

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T 1-EV/2-AC (T1-EV/1-AC)

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Numero de fabricacion-Fremstillingslistenummeret

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I-22054 Mandello del Lario - LC

dichiara con la presente la conformità del Prodotto / herewith declares conformity of the Products / die Konformitäs desProdukts / déclare par la présente la conformité du Produit / Declare la conformidad del Producto/erklærrer hermed overensstemmelse for produktet:

Strumento - Instrument - Instrumentation
Instrumentation - Instrumento
Tipo / Type / Typ / Type / Tipo / af typen

T 1-EV/2-DC (T1-EV/1-DC)

Numero Distinta Base-Manufacturing List Number-Erstellungsliste nummer-Numéro de liste de construction
Numero de fabricacion-Fremstillingslistenummeret

980000028

alle norme sottostanti / with applicable regulations below / mit folgenden einschlägigen Bestimmungen / selon les normes ci-dessous / con directivas subaplicables/i henhold til folgende direktiver:

Direttive CEE / EC Directive / EG Richtlinie / Directive CEE / Directivas CE/EOF Direktivet

73/23/CEE - 89/336/CEE

Norme Armonizzate Adottate /Applied Armonized Standards / Angewendete Harmonisierte Normen / Normes Harmonisées Appliquées / Normas Aplicadas en Conformidad/Folgende harmoniserede standarder

EN 60204-1 ☒ ☐	EN 60439-1 ☒ ☐	EN 50081-1 ☒ ☐	EN 50082-1 ☒

Data / Date / Datum / Date / Fechs/Dato

01/01/96

Firma /Signature / Unterschrift /Signature / Firma

CEMB S.P.A.

Ing. Carlo Buzzi