CEMB
BALANCING MACHINES

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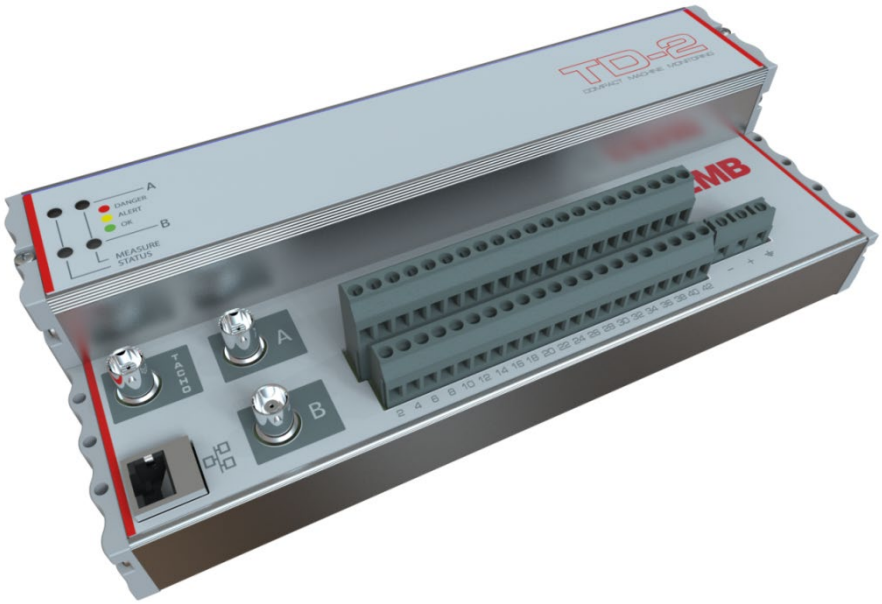


TD-2

MULTIFUNCTIONAL MONITORING SYSTEM

Vibration & Key Phasor
Axial displacement
Velocity (Zero, Over, Reverse)
USER MANUAL

Rev. 11/2020 EN
Translation of original instruction

Index

Chapter 1

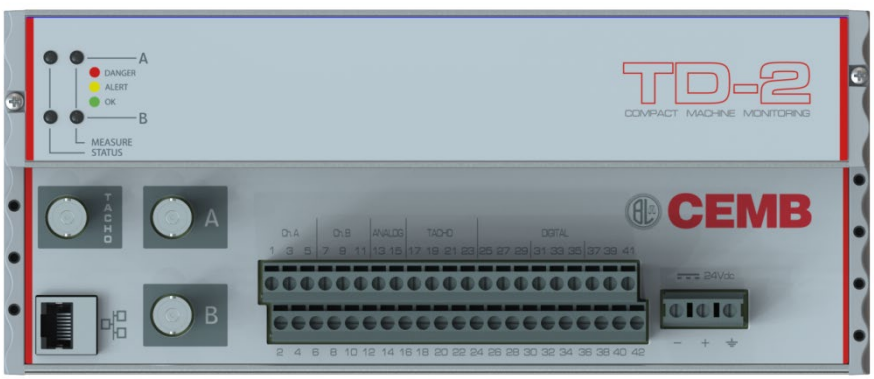
GENERAL DESCRIPTION

The TD-2 monitoring system is designed for applications where it is necessary to control and measure the values of vibration, phase, imbalance, speed or axial displacement. This system allows you to keep under control the information the machine provides on working conditions.

Thanks to the flexibility of functions offered by the system, it can be adapted to any situation, helping maintenance technicians to recognize the problems the machine is going to face, allowing them to plan a maintenance program aimed to costs reduction.

The TD-2 monitoring system is dual-channel type with a key phasor incorporated. Its terminal board allows connection to measuring transducers and analogue and digital inputs/outputs. The Ethernet port is used for board configuration and for communication via MODBUS TCP / IP protocol.

The TD-2 can be used for continuous monitoring of quantities such as: vibrations amplitudes with phases, expansions, eccentricity, rotation speeds on the most varied industrial machines such as motors, fans, pumps, compressors, steam turbines or hydraulic turbines.



Chapter 2

STRUCTURE OF TD-2 SYSTEM

Interface

TD-2 is equipped with a terminal block for the connection of:

- Signal from transducers
- Digital inputs for bypass and trip multiplier settings
- Alarm contacts to guarantee the safety of the machine
- Signals proportional to the measured quantities for communication with external DCS via analogue outputs (4 ÷ 20 mA or 0 ÷ 10 V)
-

Through the dedicated BNC channels the system is able to replicate the measurements from the sensors allowing analysis by the use of portable equipment (N130, N330, N600):

- 2 BNC channels for the signals coming from the measurement channels
- 1 BNC channel for the signal coming from the TACHO system, for the rotation speed and the phase reference

Thanks to the Ethernet port, the system performs advanced functions as described in paragraph Communication & advanced functions: ANALISYS & BALANCING.

Input

In order to guarantee a complete overview of the machine conditions, the system is designed to acquire signals from:

- Accelerometers
- Velocimeters
- Proximity sensors
- Photocells (PNP or NPN)
- Process sensors with analogue output (4 ÷ 20 mA or 0 ÷ 10 V)

The system is equipped with Binary INPUT inputs, for alarm thresholds inhibition or multiplication:

- BYPASS (see chapter dedicated)
- TRIP MULTIPLIER (see chapter dedicated)

Output

The TD-2 system provides the following interfaces in order to guarantee the signal monitoring and machine protection:

- 2 analogue output proportional to the detected measure (4 ÷ 20 mA or 0 ÷ 10 V)
- 6 configurable alarm relays
- status of the channel and measurement (see chap. 10)

Communication & advanced functions: ANALISYS & BALANCING

Through the Ethernet port the system performs the following functions:

- Configuration of the card device using the dedicated TDSP_SETUP software;
- Communication via Modbus TCP / IP protocol with external Supervisors, PLCs and DCS systems;
- Interface with CEMB systems for monitoring, data export and off-line vibration analysis via ADS Software;
- Interface with CEMB systems for static (one plane) or dynamic (multi-planes) rotor balancing using Software B11;
- Interface with CEMB systems for cloud storage and analysis;

Basic Functions

Il sistema TD-2 può essere configurato per svolgere le seguenti funzionalità:

Code	Functionality	See charter
TD-2/A1	**Vibration + Phase (with Key Phasor)**	5
TD-2/A2	**Absolute and relative displacement and expansion**	6
TD-2/A4	**Eccentricity**	7
TD-2/A5	**Zero speed / Reverse Rotation / Overspeed**	8

A specific section of the manual is dedicated to each function.
The technology used for the TD-2 system guarantees high reliability and performance, making the system autonomous and capable of performing the following functions:

- Acquiring and conditioning the signal coming from two transducers
- Detection of phase through dedicated channel
- Sampling and digital conversion of the signal for processing operation
- Checking the exceeding of settable thresholds and intervention to guarantee the safety of the machine
- Self-diagnosis due to anomalous conditions (board faults, sensor malfunctions, no phase reference)
- Input signals replicated on the frontal BNCs
- Managing the communication via Ethernet with external PLC and plant supervisors

Chapter 3

TECHINCAL SPECIFICATION

The main features of the TD-2 monitoring system are the maximum flexibility, speed and computing power, in order to maintaining the high reliability required for the machine protection, combined with compactness and ease of installation.

Electrical

Input

- Power supply 24 Vdc / 400 mA max
- 2 sensor inputs (including power supply where applicable)
  Bandwidth: 2Hz - 10KHz for vibration measurements (with accelerometers and proximitors)
- 1 Key Phasor sensor input (including power supply where applicable)
- 2 digital inputs per channel (bypass and trip multiplier)

Output

- 2 insulated analogic outputs 0÷10 V o 4÷20 mA
- 1 input for aux Key Phasor
- 6 relays with SPDT contacts
  2 BNC connectors for analysis with external instruments
- Bandwidth: 2Hz - 10KHz for vibration measurements
- 1 x 100 Mbps ethernet port
- 4 multi-colour LEDs

Ambiental condition

- Temperature range -20°C ÷ +70°C
- Humidity 95% non-condensing

Mechanical conditions

- Weight 800 g
- Dimensions 247x58.5x105.3 mm
- Installation on DIN rail, or in IP65 die-cast aluminum case

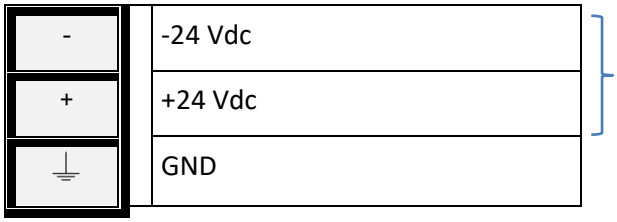
Chapter 4

EXTERNAL CONNECTIONS

The main terminal board of the TD-2 is organized according to the following scheme:

	TERMINAL BOARD – TOP ROW			TERMINAL BOARD – BOTTOM ROW	
Auxiliary function	ByPass A	1	2	IN channel A SIGNAL	IN ch A
	GND	3	4	IN channel A COM	
	TRIP multiplier A	5	6	IN channel A SUPPLY	
Auxiliary function	ByPass B	7	8	IN channel B SIGNAL	IN ch B
	GND	9	10	IN channel B COM	
	TRIP multiplier B	11	12	IN channel B SUPPLY	
- Analogue OUT	Negative analogue OUT channel A	13	14	Analogue OUT channel A	+ Analogue OUT
	Negative analogue OUT channel B	15	16	Analogue OUT channel B	
IN/OUT Phase referance	IN AUX TACHO	17	18	IN channel TACHO +	IN TACHO
	GND	19	20	IN channel TACHO -	
	OUT AUX TACHO	21	22	Power supply TACHO - 24 V	
	GND	23	24	Power supply TACHO + 24 V	
OUT relay 1	Relay 1 COM	25	26	Relay 4 COM	OUT relay 4
	Relay 1 NC	27	28	Relay 4 NC	
	Relay 1 NO	29	30	Relay 4 NO	
OUT relay 2	Relay 2 COM	31	32	Relay 5 COM	OUT relay 5
	Relay 2 NC	33	34	Relay 5 NC	
	Relay 2 NO	35	36	Relay 5 NO	
OUT relay 3	Relay 3 COM	37	38	Relay 6 COM	OUT relay 6
	Relay 3 NC	39	40	Relay 6 NC	
	Relay 3 NO	41	42	Relay 6 NO	

Power supply terminal board



Chapter 5

VIBRATION AND PHASE: *TD-2/A1*

The TD-2 / A1 monitoring system is designed to monitoring relative or absolute vibrations along radial and axial directions of the rotor.

TD-2 / A1 is compatible with all the vibration sensors available on the market: accelerometers, velocimeters, and proximitors, both of CEMB and third parties.

Range and measurement scale of the sensor can be configured through TDSP SETUP SW provided with the system.

The bandwidth for processing the vibration measurement on which the intervention thresholds are calculated extends from 1 Hz up to 5 KHz:

- STANDARD: 2÷1000 Hz
- LSB: 1÷100 Hz
- HF: 2÷5000 Hz

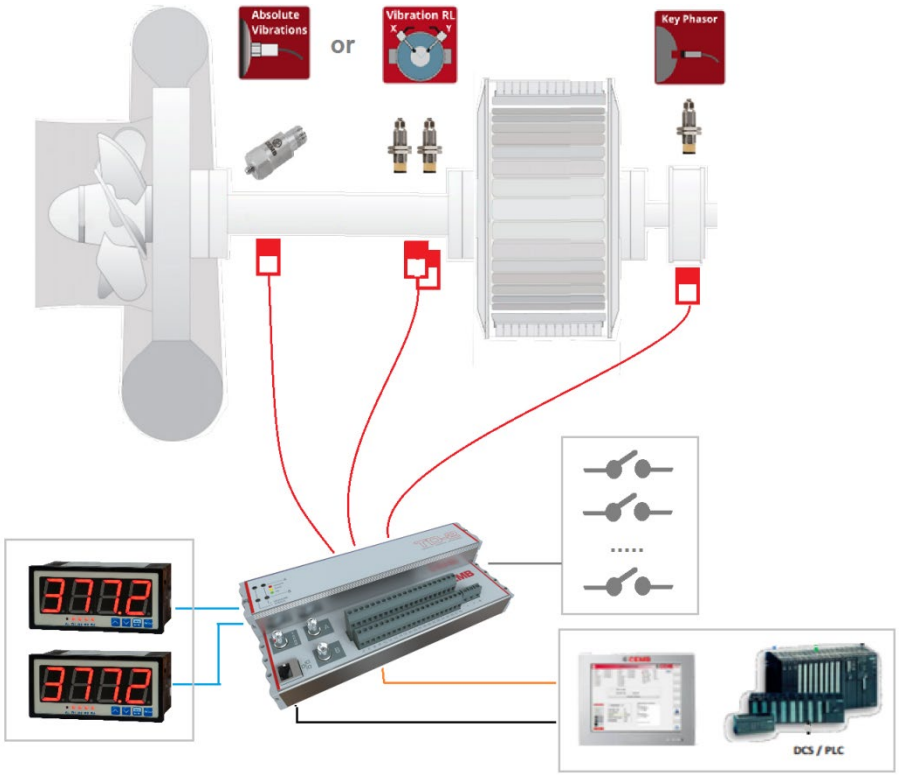
TD-2 / A1 can be connected to a Key Phasor sensor for phase and harmonic vibration components analysis.

Only for the HF version, it is possible:

- manually enter the rotation speed of the machine for the analysis of the harmonic components of the machine
- choose up to 4 additional harmonic components for data transmission via MODBUS TCP-IP

The rotor speed measured through the phase sensor is available via MODBUS TCP-IP, along with information on harmonic components.

Application example



Order code : TD-2 / A1 / Bx / Cx

Bx Type of sensor

The TD-2 / A1 system is able to process signals from transducers for the measurement of absolute or relative vibrations such as:

	Debscription	CEMB sensors	Examples of thirds parties
B1	Electrodynamic velocimeter	T1-40	(Bently Nevada)9200 (Meggit)CV213 (Bruel&Kjaer)VS 068
B2	IEPE (accelerometer / velocimeter) sensors	TA-18/S TA-8 TA-28 TV22 TV32	(Bently Nevada)330400 (Meggit)5220B-100 (Bruel&Kjaer)8341
B3	Proximity	T-NC/8-API	(Bently Nevada)3300 XL (Meggitt)TQ 402 (Bruel&Kjaer)DS-1051

Cx Type of output

The analog outputs from the monitoring system can be configured with the order as:

C1	4-20 mA
C2	0-10 V

Order example

TD-2 / A1 / B1 / C1: Absolute vibration monitoring system, through electrodynamic velocimeter (e.g. T1-40) with analogue 4-20 mA output.

TD-2 / A1 / B3 / C0: Relative vibration monitoring system, via proximitor (e.g. T-NC / 8-API) with 0-10V analogue output.

Key Phasor setting

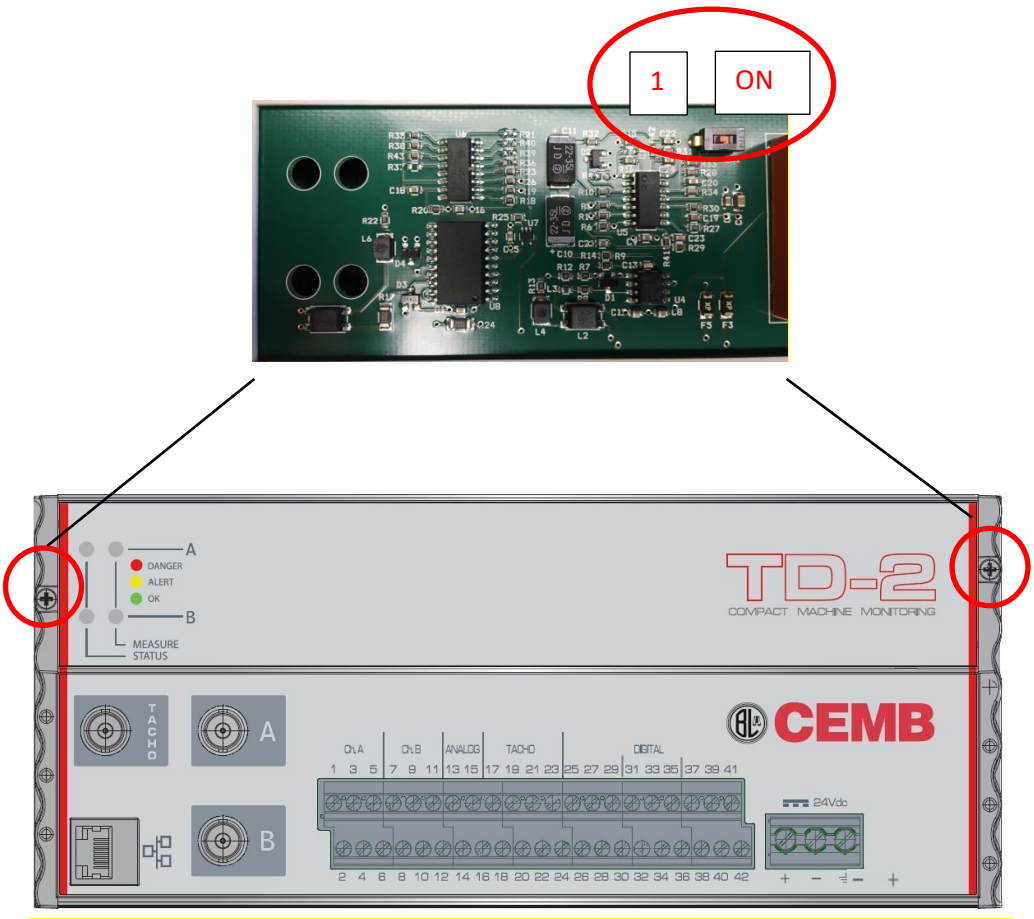
The speed and phase measurement with Key Phasor requires a sensor among those indicated in the following table:

Description	CEMB sensors	Thirds parties sensors	Polarity setting ON **1 (default)**	
Proximity	T-NC/8-API Thread M10x1	(Bently Nevada)3300 XL (Meggitt)TQ 402 (Bruel&Kjaer)DS-1051	NOTCH	HOLLOW
Generic sensor (digital proximity or photocell) PNP o NPN		P+F U-Bero (PNP): NRN10-12GS40-E2-V1 Thread M12 Siemens Simatic (NPN): PXI 200 Thread M12 (Italsensor)TK121(PNP/NPN)	Normally low signal with reset pulse upwards	Normally high signal with reset pulse downwards

The polarity setting of the signal depends on a hardware parameter that can be set with a dip-switch on the TD-2.

The factory default is indicated as 1 and corresponds to a normally high signal with reset pulse downwards (hollow on the shaft if a proximitor sensor is used).

The dip-switch is easily settable: remove the upper part of the TD2, unscrewing the two screws as shown in the following figure below.



Chapter 6

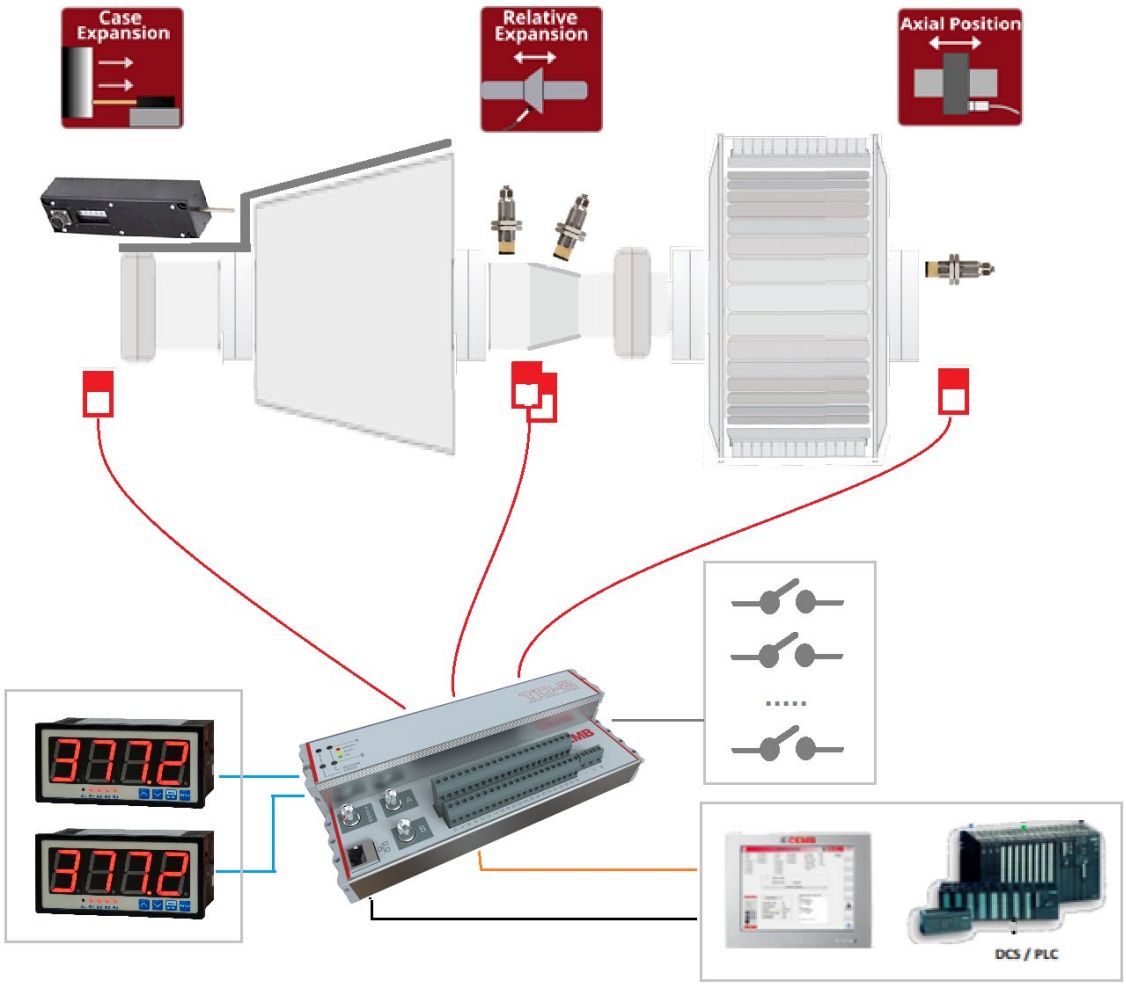
AXIAL DISPLACEMENT, ABSOLUTE AND DIFFERENTIAL EXPANSION: *TD-2/A2*

The TD-2 / A2 monitoring system is designed to monitoring differential and absolute expansion or axial displacement.

TD-2 / A2 is compatible with all the displacement sensors (e.g. proximitors) or expansion sensors with 0-10V output available on the market, both of CEMB and third parties.

Range and measurement scale of the sensor can be configured through TDSP SETUP SW provided with the system.

Application example



Order code: TD-2 / A2 / Bx / Cx

Bx Type of sensor

The TD-2 / A2 system is able to process signals from transducers for the measurement of displacement such as:

	Descrizione	CEMB sensors	Thirds parties sensors
B3	Proximity	T-NC/8-API (axial Displacement, absolute and differential expansion)	(Bently Nevada)3300 XL (Meggitt)TQ 402 (Bruel&Kjaer)DS-1051
B7	General 0-10V	T-NC/16-20-30 (axial Displacement, absolute and differential expansion) T5-LVDT/25/50/100 (case expansion)	(Bruel&Kjaer)SD161 (Epro)PR6424

Cx Type of output

The analog outputs from the monitoring system can be configured with the order as:

C1	4-20 mA
C2	0-10 V

Order example

TD-2 / A2 / B3 / C1: Monitoring system for axial displacement control through proximitor T-NC / 8-API with analogue output 4-20 mA.

TD-2 / A2 / B7 / C1: Differential expansion monitoring system with T-NC / 16 probe and 4-20 mA analogue output.

Note:
Choice between axial displacement, absolute expansion or differential expansion is made by software configuration - see chap. 12

Chapter 7

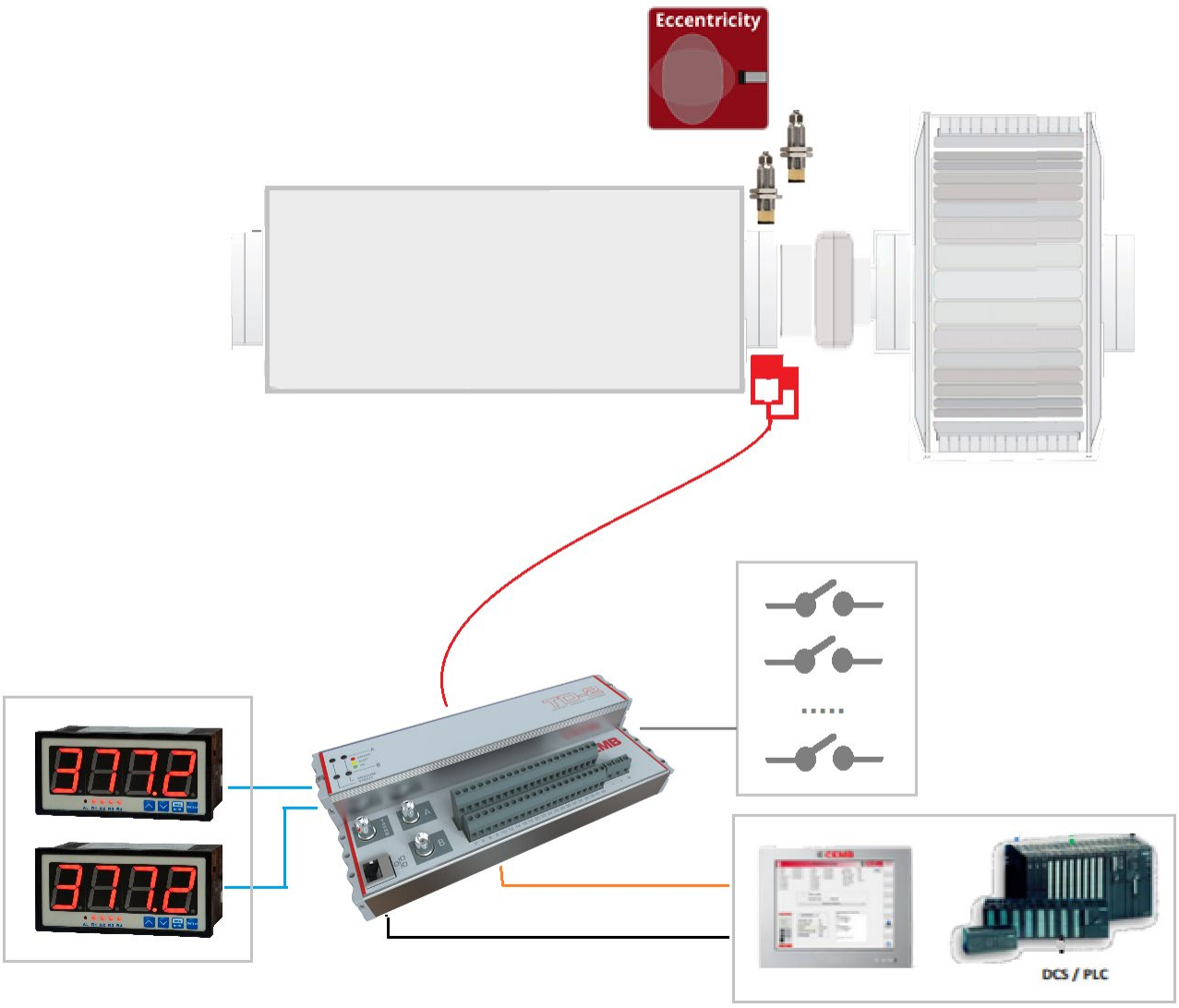
ECCENTRICITY: *TD-2/A4*

The TD-2 / A4 monitoring system is designed for eccentricity control, normally applied to large rotors.

TD-2 / A4 is compatible with all the displacement sensors (e.g. proximitors) or expansion sensors with 0-10 V output available on the market, both of CEMB and third parties.

Range and measurement scale of the sensor can be configured through TDSP SETUP SW provided with the system.

Application example



Order code : TD-2 / A4 / Bx / Cx

Bx Type of sensor

The TD-2 / A4 system is able to process signals from transducers for the measurement of eccentricity such as:

	Description	CEMB sensors	Thirds parties sensors
B3	Proximity	**T-NC/8-API** (axial Displacement, absolute and differential expansion)	(Bently Nevada)3300 XL (Meggitt)TQ 402 (Bruel&Kjaer)DS-1051
B7	General 0-10V	**T-NC/16-20-30** (axial Displacement, absolute and differential expansion)	(Bruel&Kjaer)SD161 (Epro)PR6424

Cx Type of output

The analog outputs from the monitoring system can be configured with the order as:

C1	4-20 mA
C2	0-10 V

Order example

TD-2 / A4 / B3 / C1: Monitoring system for eccentricity control through T-NC / 8-API proximitor with 4-20 mA analogue output.

TD-2 / A4 / B7 / C1: Monitoring system for eccentricity control with T-NC / 16 probe and 4-20 mA analogue output.

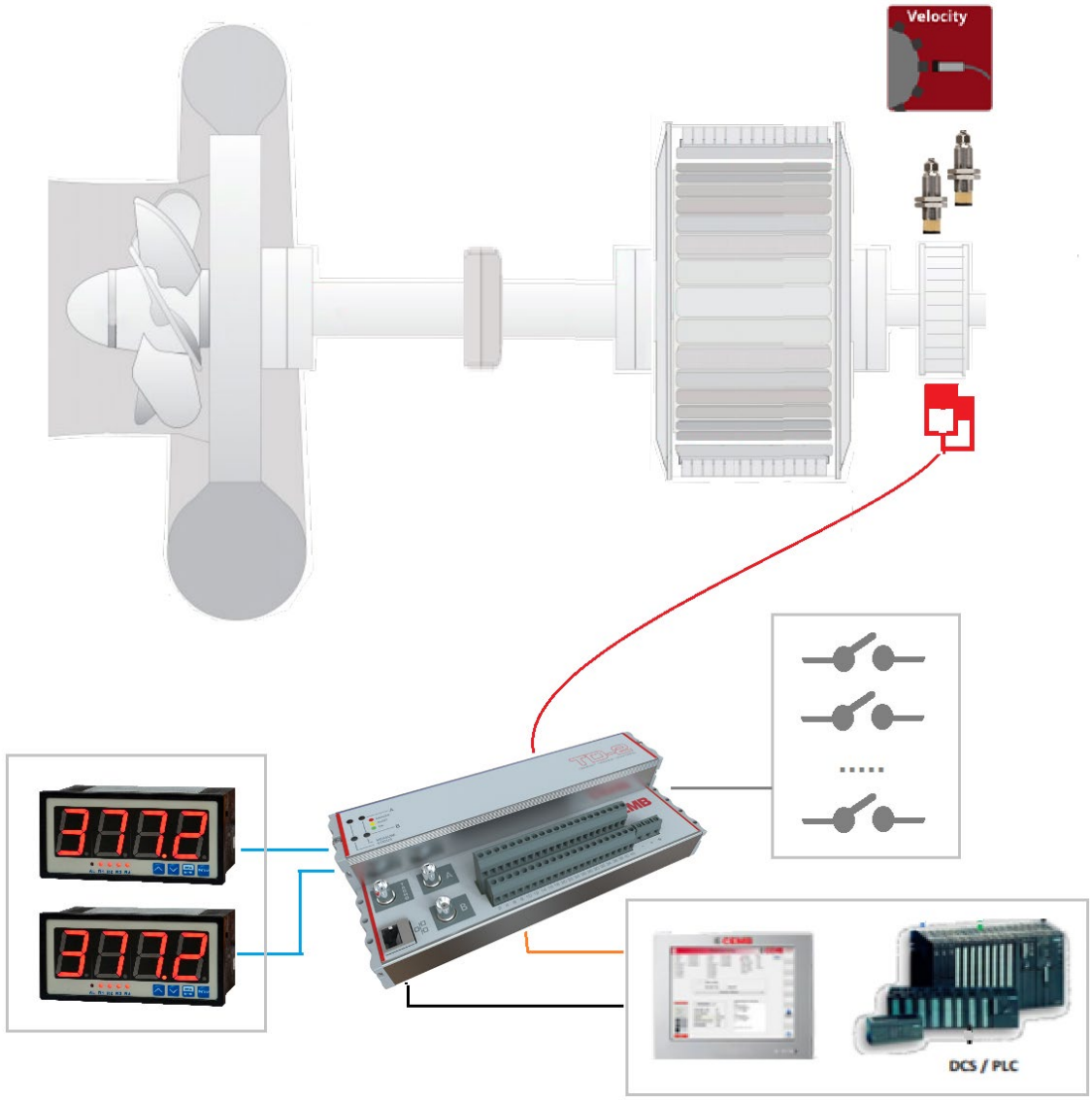
Chapter 8

OVERSPEED, 0-SPEED, REVERSE: *TD-2/A5*

The TD-2 / A5 monitoring system is specifically designed for the control of rotation speed, zerospeed and reverse rotation.

TD-2 / A5 is able to interface with proximitors or speed sensors of CEMB or third parties production, including generic proximity with PNP or NPN output, as shown in the table below.

Application example



Order code : TD-2 / A5 / Bx / Cx

Bx Type of sensor

The TD-2 / A5 system is able to process signals from transducers for the measurement of velocity such as:

	Description	CEMB sensors	Thirds parties sensors
B3	Proximity	T-NC/8-API Thread M10x1	(Bently Nevada)3300 XL (Meggitt)TQ 402 (Bruel&Kjaer)DS-1051
B4(*)	Electromagnetic sensor(*)	T6-R Thread M22x1	(Bruel&Kjaer)MM-0002
B5	Hall effect sensor	T6-H Thread M14x1.5	(Braun) A5S
B8	Generic digital sensor NPN		(Siemens) Sismatic PXI 200 Thread M12 (Italsensor)TK121(NPN)
B9	Generic digital sensor PNP		(PEPPERL+FUCHS) U-Bero: NRN10-12GS40-E2-V1 Thread M12 (Italsensor)TK121(PNP)

Note:
(*) the electromagnetic sensor is not suitable for Zero speed and Reverse rotation applications.

Cx Tipo di uscita

Le uscite analogiche dal sistema di monitoraggio possono essere configurate al momento dell'ordine come:

C1	4-20 mA
C2	0-10 V

Order example

TD-2 / A5 / B3 / C1: Monitoring system for speed control (overspeed / 0 / Reverse) via proximitor T-NC / 8-API with 4-20 mA output.

TD-2 / A5 / B8 / C1: Monitoring system for speed control (overspeed / 0 / Reverse) with U-BERO probe NRN10-12GS40-E2-V1 and 4-20 mA output.

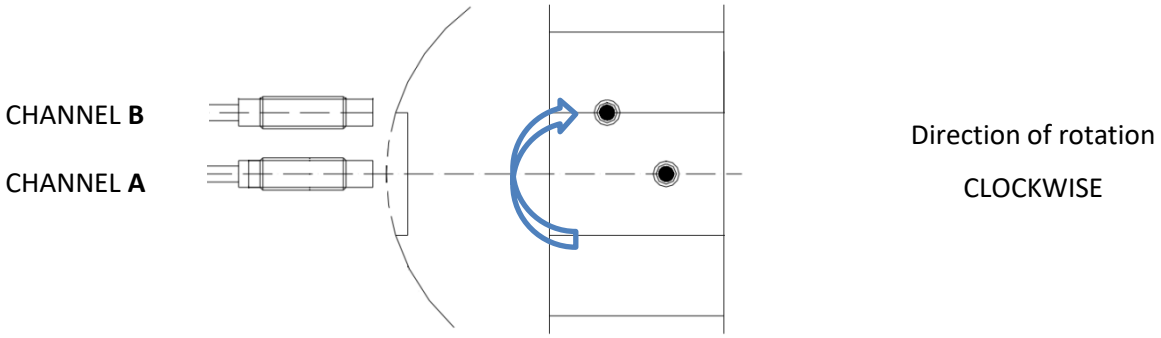
Note:
choice between 0 speed, Overspeed and Reverse Rotation is made by software configuration - see chap. 11.

Correct sensors placement on thoothed wheel

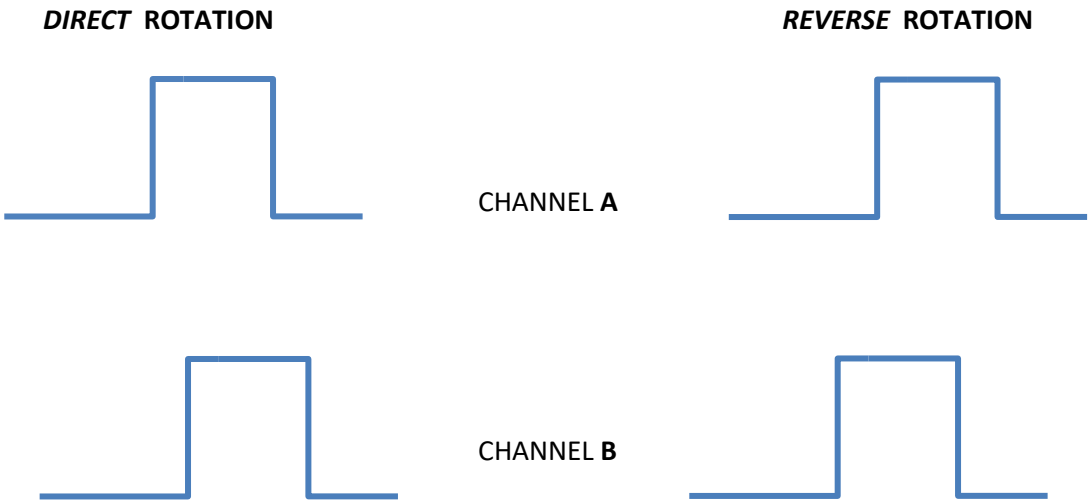
In addition to the placement specifications described in the sensors manuals, some important precautions are indicated below:

Inverse rotation – 2 sensors needed

In order to be able to verify the correct rotation of the shaft it is necessary to position the two sensors with an offset equal to about 2 times their diameter, as shown in the following figure.



TD-2 monitoring system to be able to process in correct way the sense of rotation of the rotor needs necessary that the signal coming from channel A and the signal coming from channel B overlap for an instant. In the following image are reported the signals that the system must receive to check if the rotation is DIRECT or REVERSE.



As it is possible to see from the image above, the TD-2 system in order to read the DIRECT rotation needs to receive first the channel A signal and then, superimposed, the channel B signal; for REVERSE rotation it needs to receive first the channel B signal and then, superimposed, the channel A signal.

Note:
The electromagnetic sensor (configuration B4) is not suitable for reverse rotation applications.

Note:
The reaction time of the TD-2 system became better with the increase of number of teeth on the thoothed wheel.

Overspeed – 1 sensor needed

The overspeed function requires only one sensor.
It is possible to use a second sensor to increase the redundancy of the system and obtain 1oo2 redundancy.

Zerospeed – 1 sensor needed

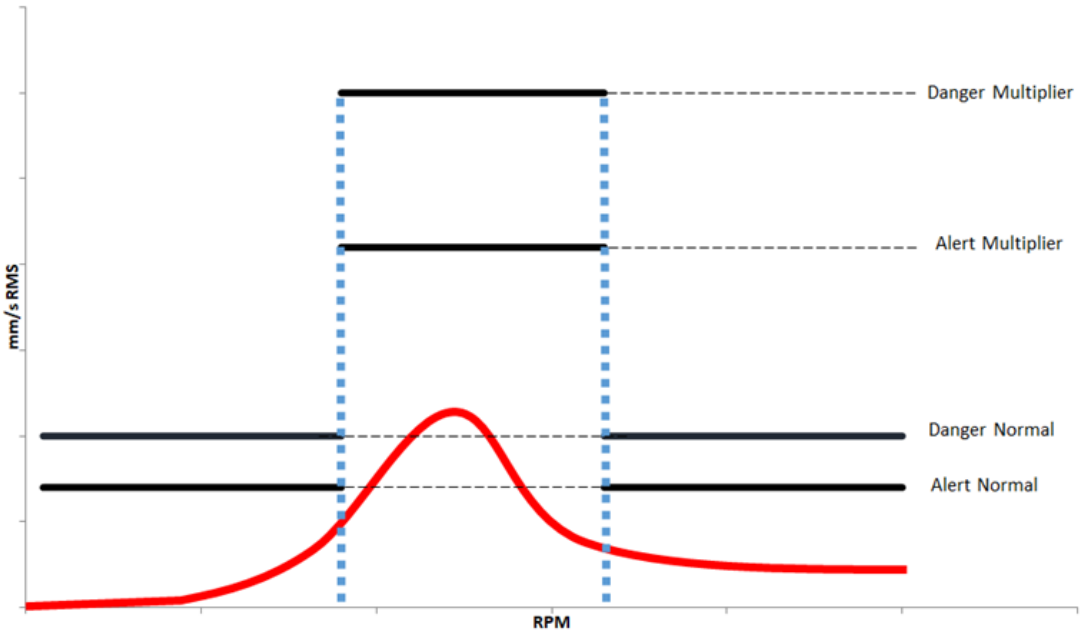
The 0-speed function requires only one sensor.
It is possible to use a second sensor to increase the redundancy of the system and obtain 1oo2 redundancy.

Chapter 9

AUXILIARY FUNCTIONS

TRIP Multiplier

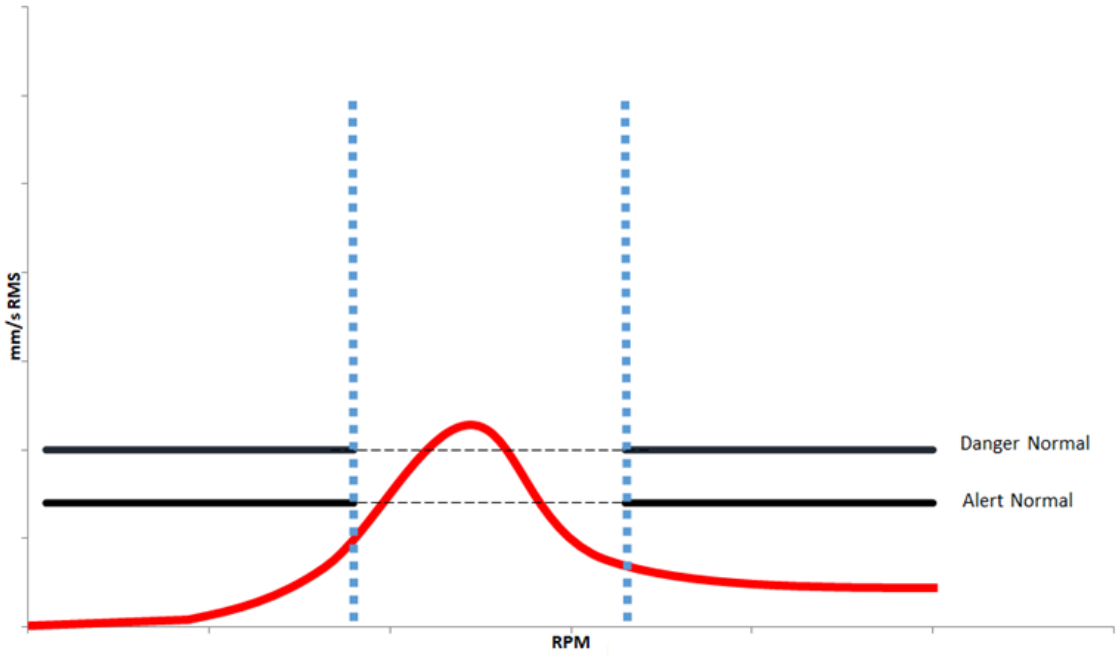
TRIP Multiplier function is used to temporarily raise the alarm values of the monitored machine (multiplying the normal thresholds up to 5 times). This function allows to maintain an alarm level at all stages of machine operation, preventing the machine from remaining unprotected.



This function can be activated in 3 different ways (see manual "TDSP-Setup" - 4.7). When it is necessary to activate the Hardware contact, the TRIP Multiplier contacts must be closed towards GND in order to have the protection values of the machine multiplied by the values entered (exclusion of relays).

ByPass

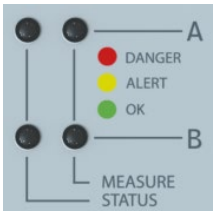
The BYPASS function is used to temporarily inhibit the alarm values of the monitored machine. This function does NOT allow to maintain an alarm levels at all stages of machine operation, so that the machine remains WITHOUT protection.



In order to activate this function it is necessary to close the BYPASS contacts towards GND, during the phases in which it is NOT desired to have protection on the machine (exclusion of the relays).

Chapter 10

SELF-DIAGNOSTIC



The panel has 4 channel and measurement status LEDs.

Meaning of the LEDs on the front panel:

CHANNEL A and B STATUS LEDs:

- green on fixed: normal operating condition
- green flashing fast: KEYPHASOR self-diagnostic (no KEYPHASOR signal --> impossible to execute synchronous measurements)
- yellow/green flashing slowly: Trip-multiplier active
- yellow flashing slowly with MEASURE on: BYP on (the relays of the corresponding channel are maintained in rest condition)
- yellow flashing slowly with MEASURE off: the relays are deactivated during board initialization (at power on or exiting from self-diagnostics)

MEASUREMENT A and B STATUS LEDs:

- green on fixed: measurement below the PRE-ALERT threshold
- yellow on fixed: measurement above the PRE-ALERT threshold but below the DANGER threshold
- red on fixed: measurement above the DANGER threshold
- red flashing slowly: AC signal above the maximum board dynamics
- red flashing fast: sensor in self-diagnostic condition. Sensor not connected or not working

Particular conditions (board not working):

- all the LEDs red flashing fast: one of the voltages required for board operation is lacking
- all the LEDs red flashing intermittently: impossible to read a valid configuration for the board --> board configuration must be repeated
- all the LEDs yellow flashing slowly: measurement suspended by command from the PC

When all the operating parameters are correct, the configuration is as follows:

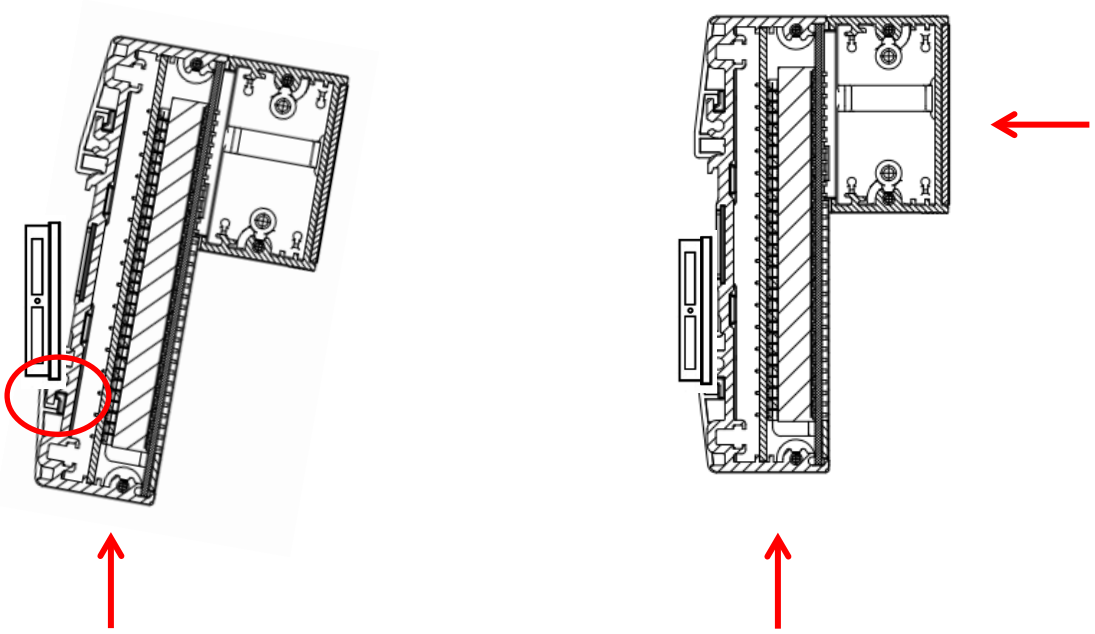
- **CHANNEL** STATUS LEDs on fixed (green)
- **MEASUREMENT** STATUS LEDs on fixed (green, yellow or red depending on the measurement level)

Chapter 11

DIN RAIL HOUSING

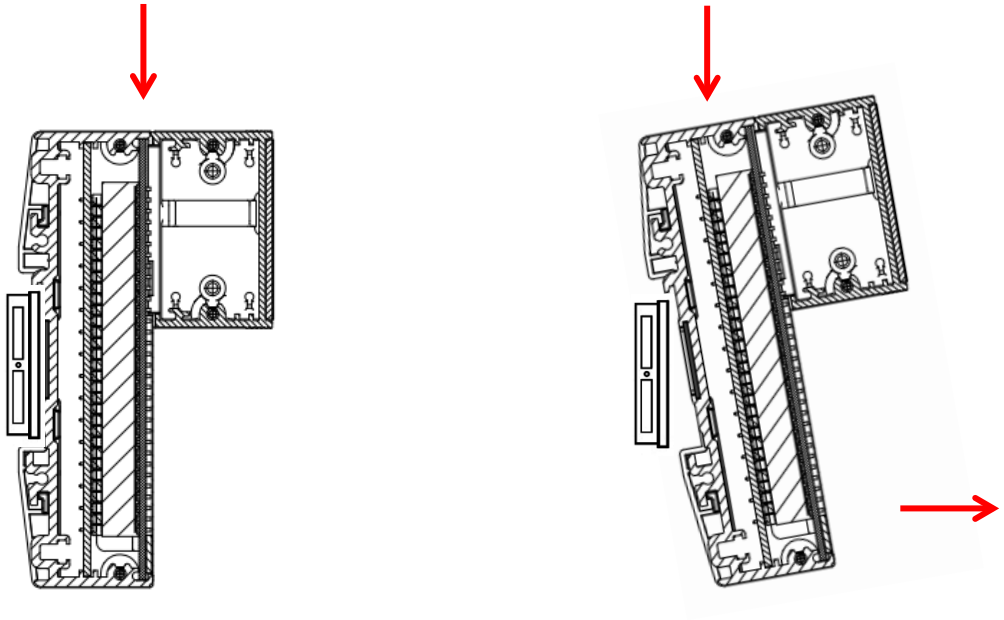
Mounting

In order to place the TD-2 monitoring system on the DIN rail it is first necessary to place the bar in the lower part of the groove in the rear part of the device (see the red circle in the figure below) and then push the upper part of the TD-2 system towards the rail in order to trigger the spring-loaded clips.



Dismounting

In order to release the TD-2 system from the DIN rail, it must be pushed downwards to snap the clips and then, keeping it pressed down, pull the lower part of the device in the opposite direction of the rail.



Chapter 11

HOUSING

IP65 aluminum case

In order to protect the TD-2 monitoring system, a metal case made in die-cast aluminum painted for an IP65 environment is available, with dimensions of 360x160x95 mm.
The order code is different depending on the power supply of the system:

TD-E / Ax

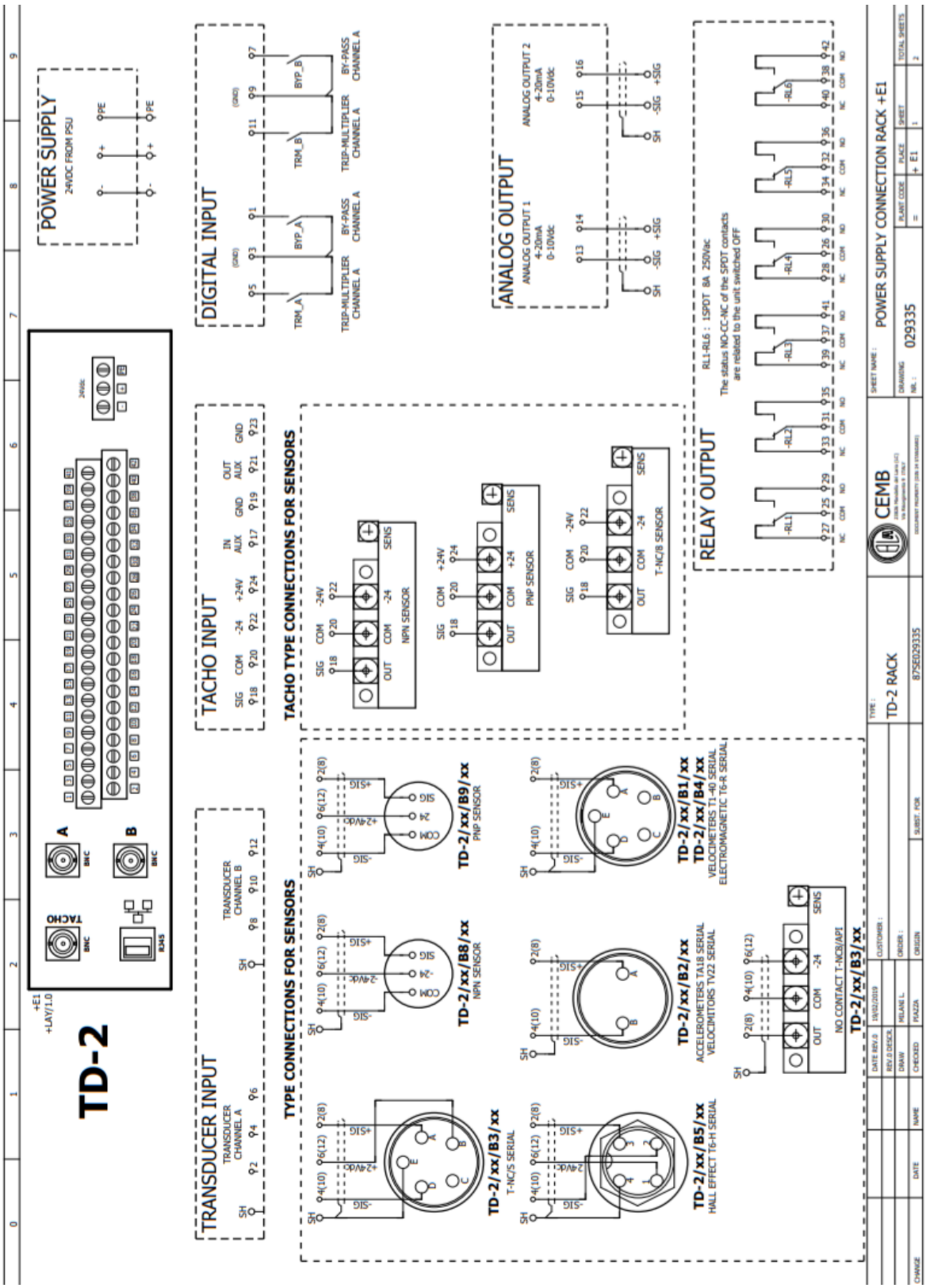
Ax Type of power supply

- A0 110/220 Vac (50/60 Hz)
- A1 24 Vdc

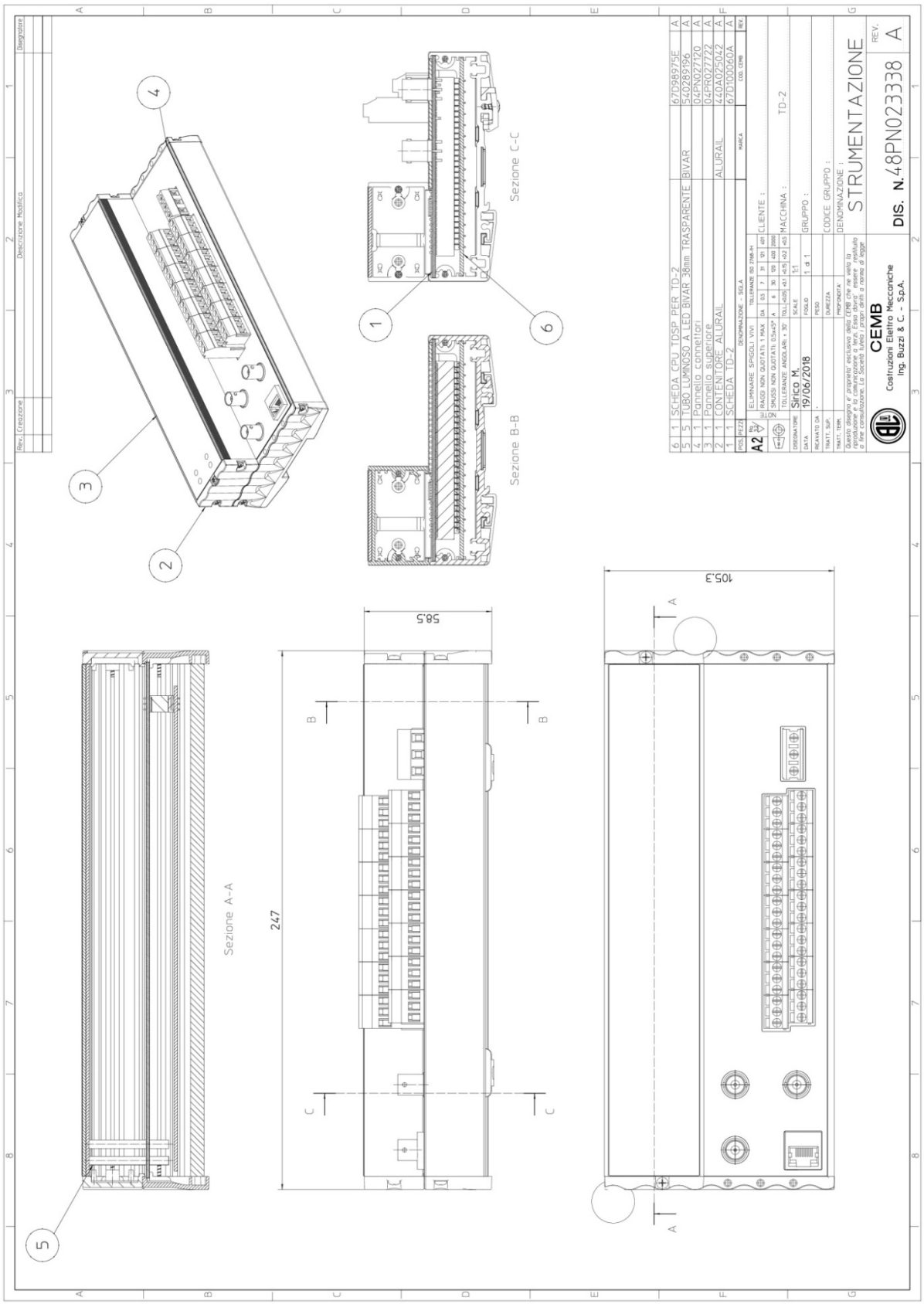
Description

A DIN rail is contained inside the enclosure, where the TD-2 monitoring system is housed with the power supplier (if it is present). In order to allow to the connections to pass through the case, 7 holes with 7 PG9 cable glands to optimize the wiring are present in the front part of the enclosure. The case is provided with 4 PG9 caps to maintain the IP65 rating if the respective cables are not assembled.
In the mechanical drawings on the following pages the correct wiring inputs through the case are shown.

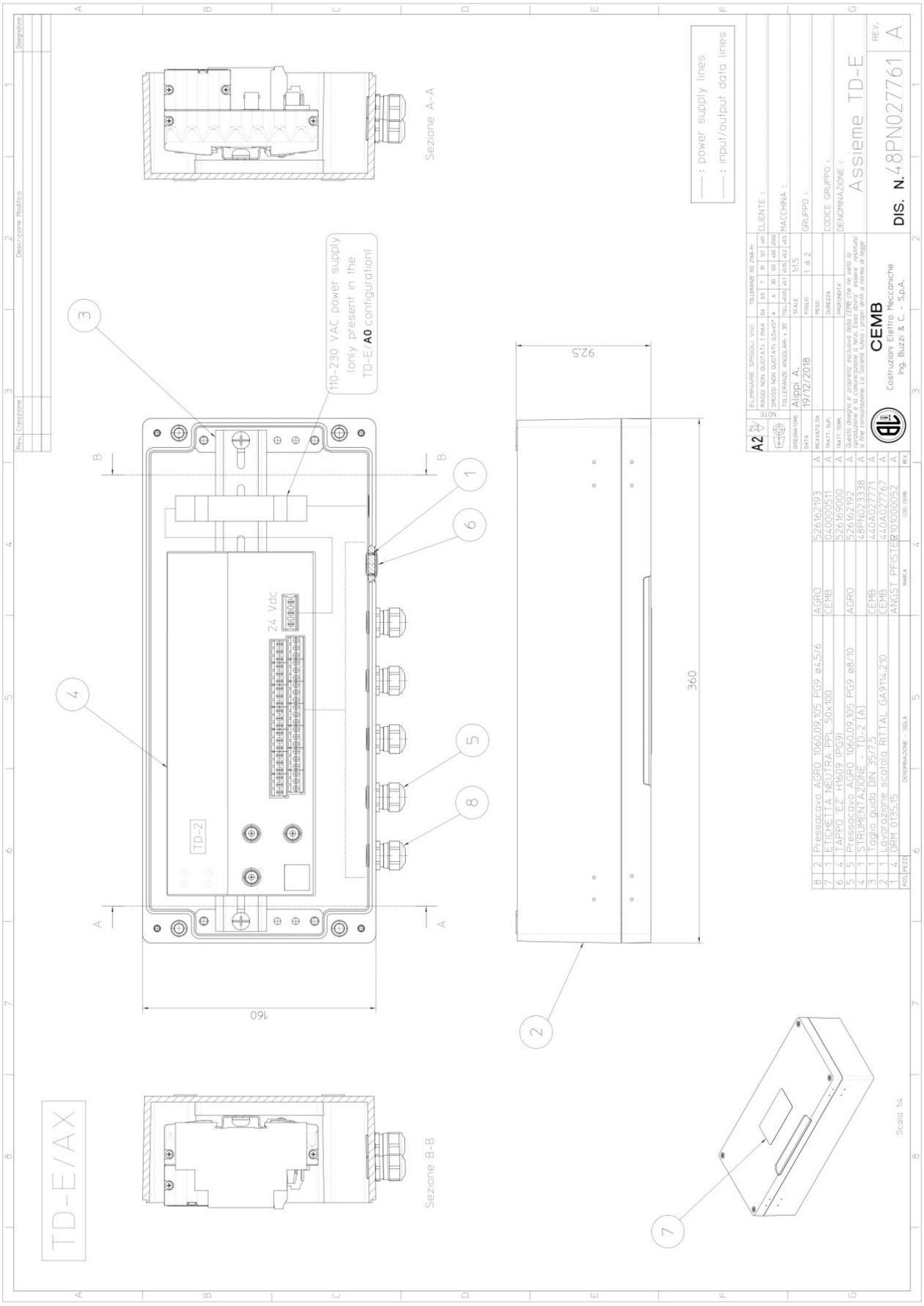
ELECTRICAL LAYOUT



MECHANICAL LAYOUT



TD-E ENCLOSURE – MECHANICAL LAYOUT

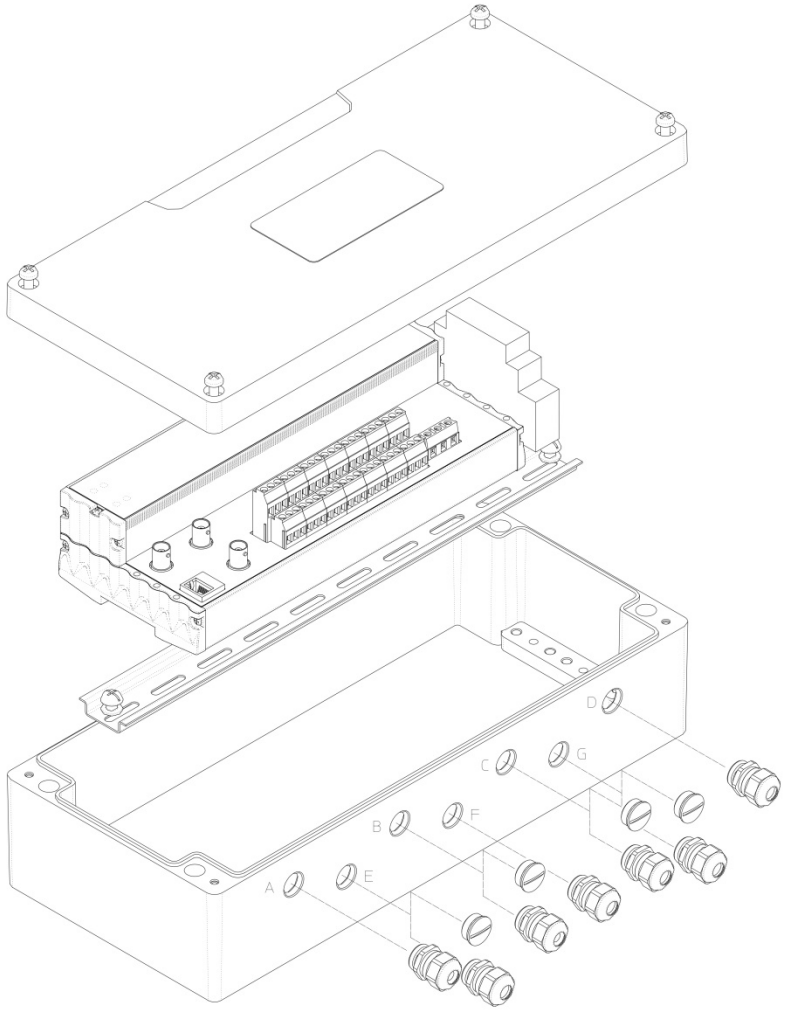


38- TD-E ENCLOSURE – MECHANICAL LAYOUT

Rev.	Creazione	Descrizione Modifica	Disegnatore

TD-E/AX

A0: with integrated power supply,
IN: 110/230 VAC 50/60 Hz
A1: without integrated power supply,
IN: 24 Vdc



Port:	Suggested use:	Gland:
A	Input channel A	ø4.5-6mm cable gland
B	Input channel B / None	ø4.5-6mm cable gland / Cap
C	Relay output / None	ø8-10.5mm cable gland / Cap
D	Power supply line	ø8-10.5mm cable gland
E	Binary input A - B / None	ø8-10.5mm cable gland / Cap
F	Analogue output A - B	ø8-10.5mm cable gland
G	Relay output / None	ø8-10.5mm cable gland / Cap

The instrument comes with 2 ø4.5-6mm cable glands, 6 ø8-10.5mm cable glands and 4 caps. Specific port-by-port configurations can be pre-installed on request.

A2	NOTE: ELIMINARE SPIGOLI VIVI	TOLLERANZE ISO 2768-fH	CLIENTE :
	RAGGI NON QUOTATI: 1 MAX	DA 0,5 / 7 / 31 / 121 / 401	
	SMUSSI NON QUOTATI: 0,5x45°	A 6 / 30 / 120 / 400 / 2000	MACCHINA :
	TOLLERANZE ANGOLARI: ± 30'	TOLL. ±0,05 / ±0,1 / ±0,15 / ±0,2 / ±0,5	
DISEGNATORE	Alippi A.	SCALE 1:1,5	
DATA	19/12/2018	FOGLIO 2 di 2	GRUPPO :
RICAVATO DA	-	PESO	
TRATT. SUP.		DUREZZA	CODICE GRUPPO :
TRATT. TERM.		PROFONDITA'	DENOMINAZIONE :

Assieme TD-E

CEMB
Costruzioni Elettro Meccaniche
Ing. Buzzi & C. - S.p.A.

DIS. N. 48PN027761 | REV. A

Chapter 12

CONFIGURATION

The parameters highlighted in the following pages define the factory setting of the TD-2 device in the different configurations.

It is possible to indicate with the order different values by filling in and sending the relevant pages to CEMB.

It is possible to modify the configuration with the TDSP_setup SW, freely available.

TD-2/A1 (Vibration)

Measure Type Absolute Vibration (default)
Relative Vibration

Mode RMS (default)
Pk
PkPk

Modbus TCP ON (default)
OFF

Sensitivity Nominal of CEMB sensor supplied (default)
_____ (N.B. module & measure unit)

Select Unit & Range	**mm/sec** (default)	**g**	**µm**
	10	1	100
	20 (default)	5	125
	50	10	250
	_____	_____	_____

Set Thresholds *Default values are 50% and 75% of Measure range*	**mm/sec** (default)	**g**	**µm**
Alarm (H)	10		
Trip (HH)	15		

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1	0	N-DE	STD
RL2		HH CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H CH2	0	N-DE	STD
RL5		HH CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **OVERALL** **1x** (first armonic)
AO1	CH1	Overall
AO2	CH2	Overall

Key Phasor (KP) Enable No (default)

Yes

Max Rotation Speed **_____ RPM** (only if KP is enabled)

Trip Multiplier No (default)

Based on Binary Input only

Based on RPM only (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

Based on both Binary Input & RPM (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

TD-2/LSB (Vibration)

Measure Type Absolute Vibration (default)

Relative Vibration

Mode RMS (default)

Pk

PkPk

Modbus TCP ON (default)

OFF

Sensitivity Nominal of CEMB sensor supplied (default)

_____ (N.B. module & measure unit)

Select Unit & Range	**mm/sec** (default)	**g**	**µm**
	10	1	100
	20 (default)	5	125
	50	10	250
	_____	_____	_____

Set Thresholds *Default values are 50% and 75% of Measure range*	**mm/sec** (default)	**g**	**µm**
Alarm (H)	10		
Trip (HH)	15		

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1	0	N-DE	STD
RL2		HH CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H CH2	0	N-DE	STD
RL5		HH CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **OVERALL** **1x** (first armonic)
AO1	CH1	Overall
AO2	CH2	Overall

Key Phasor (KP) Enable No (default)

Yes

Max Rotation Speed **_____ RPM** (only if KP is enabled)

Trip Multiplier No (default)

Based on Binary Input only

Based on RPM only (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

Based on both Binary Input & RPM (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

TD-2/HF (Vibration)

Measure Type Absolute Vibration (default)

Relative Vibration

Mode RMS (default)

Pk

PkPk

Modbus TCP ON (default)

OFF

Sensitivity Nominal of CEMB sensor supplied (default)

_____ (N.B. module & measure unit)

Select Unit & Range	**mm/sec** (default)	**g**	**µm**
	10	1	100
	20 (default)	5	125
	50	10	250
	_____	_____	_____

Set Thresholds *Default values are 50% and 75% of Measure range*	**mm/sec** (default)	**g**	**µm**
Alarm (H)	10		
Trip (HH)	15		

ARMONICS **No(default)**

Yes: **1 _____**

2 _____

3 _____

4 _____

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1	0	N-DE	STD
RL2		HH CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H CH2	0	N-DE	STD
RL5		HH CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **OVERALL** **1x** (first armonic)
AO1	CH1	Overall
AO2	CH2	Overall

Key Phasor (KP) Enable No (default) _____ (speed)

Yes

Max Rotation Speed **_____ RPM** (only if KP is enabled)

Trip Multiplier No (default)

Based on Binary Input only

Based on RPM only (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

Based on both Binary Input & RPM (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

TD-2/A2 (Displacement)

Measure Type

Axial Displacement (default)

Shaft Differential Expansion

Absolute Case Expansion

Differential expansion vs central moving element

Range

±0.50 mm

±0.75 mm

±1.00 mm (default)

±2.00 mm

±4.00 mm

_____(other)

Logic Type

Direct (default) (gap increase > measure increase)

Inverse (gap increase > measure decrease)

Angle

0° (default)

5°

9°

_____ (other)

Modbus TCP

ON (default)

OFF

Sensitivity

Nominal of CEMB sensor supplied (default)

_____ (N.B. module & measure unit)

Set Thresholds *Default values are 50% and 75% of Measure range*	**mm**
Alarm (H)	+0.50
Trip (HH)	+0.75
Alarm (L)	-0.50
Trip (LL)	-0.75

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H/L CH1	0	N-DE	STD
RL2		HH/LL CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H/L CH2	0	N-DE	STD
RL5		HH/LL CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **DISPLACEMENT**
AO1	CH1	Displacement
AO2	CH2	Displacement

TD-2/A4 (Eccentricity)

Mode RMS (default)
Pk
PkPk

Range 0÷125 µm (default)
0÷250 µm
_____(other)

Modbus TCP ON (default)
OFF

Sensitivity Nominal of CEMB sensor supplied (default)
_____ (N.B. module & measure unit)

Set Thresholds *Default values are 50% and 75% of Measure range*	µm
Alarm (H)	62.5
Trip (HH)	93.75

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1	0	N-DE	STD
RL2		HH CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H CH2	0	N-DE	STD
RL5		HH CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **ECCENTRICITY**
AO1	CH1	Eccentricity
AO2	CH2	Eccentricity

Key Phasor (KP) Enable No (default)

Yes

Max Rotation Speed **_____ RPM** (only if KP is enabled)

Trip Multiplier No (default)

Based on Binary Input only

Based on RPM only (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

Based on both Binary Input & RPM (Max Rotation Speed must be filled in)

_____ RPM range _____ Multiplier (x2, x3, x4, x5)

TD-2/A5 (velocità, zero speed, rotazione inversa)

Measure Type

Rotation speed (default)

Zero Speed

Overspeed

Reverse Rotation

Speed Range

1500 RPM (default)

_____ RPM (other)

Polar wheel

0 (one hole on the rotor) (default)

1 (one notch on the rotor)

_____ number of teeth of polar wheel

Modbus TCP

ON (default)

OFF

Sensitivity

Nominal of CEMB sensor supplied (default)

_____ (N.B. module & measure unit)

Set Thresholds *Default values are 50% and 75% of Measure range*	**RPM**
Alarm (H)	750
Trip (HH)	1000

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1 OR CH2	0	N-DE	STD
RL2		HH CH1 OR CH2	0	N-DE	STD
RL3		ATD (Self Diagnostic) CH1 OR CH2	0	N-DE	STD
RL4		-	-	-	-
RL5		-	-	-	-
RL6		-	-	-	-

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **SPEED**
AO1	CH1	Speed
AO2	CH2	Speed

TD-2/A9 (input generico, 0-10Vdc / 4-20mA)

Input Type 4÷20 mA (default)

0÷10 V dc

Modbus TCP ON (default)

OFF

Measure type	**Measure range**	**Measure unit**
Temperature (default)	_____ (0÷250 default)	°C
Pressure	_____	bar
_____(others)		

Set Thresholds *Default values are 50% and 75% of Measure range*	**°C**
Alarm (H)	150
Trip (HH)	180

Relay *Default setting are described in the table.*	**Relay inhibition time [s]**	**Trigger Condition**	**Delay [s]** (0÷255)	**Energized Status** Select between: **NE** (normally energized) **NDE** (normally not energized)	**Contact** Select between: **STD** (standard) **MEM** (memorized) **IMP** (pulse)
RL1	15	H CH1	0	N-DE	STD
RL2		HH CH1	0	N-DE	STD
RL3		ATD CH1	0	N-DE	STD
RL4		H CH2	0	N-DE	STD
RL5		HH CH2	0	N-DE	STD
RL6		ATD CH2	0	N-DE	STD

Bypass input Bypass (default)

Reset latched only

Analog Output *Default setting are described in the table.* *Different setting might be provided*	**Channel Setting** Select between: **CH1** (Channel 1) **CH2** (Channel 2)	**Channel Setting** Select between: **MEASURE**
AO1	CH1	Measure
AO2	CH2	Measure

Chapter 14

TDSP SETUP: SW tool for TD-2 configuration

Through the Ethernet port on the system, using the TDSP-Setup software (see dedicated manual) the following configuration parameters of the boards can be easily changed:

- General board settings:
  - Board ID
  - Enable/disable Modbus TCP/IP protocol

- Analog input setting:
  - Enable/disable channel
  - Channel ID
  - Sensor model

- Phase reference settings (KeyPhasor)
  - KeyPhasor source
  - Measure unit (RPM o Hz)
  - Fullscale speed
  - Sense of ratation
  - Speed thresholds

- Measurement settings
  - Measure unit
  - Start/full scale
  - Measurements to be enabled
  - FFT parameters

- Alarm threshold settings
  - Change alarm thresholds
  - TRIP multiplier setting

- Analog output settings
    - Enable/disable outputs
    - Measure to which the analogue output is linked

- Relay settings
    - Realys inhibition time
    - Relays name
    - Relay operation (NE/NDE)
    - Activation delay
    - Activation condition
    - Operation modality (standard, memorized o impulsive)

MODBUS LIST

The system is designed for communication via Modbus TCP / IP protocol, through the Ethernet port on the front of the device.

In order to describe the Modbus TCP / IP interface for TD-2 monitoring cards, refer to the dedicated "*TDSP-Modbus*" manual.

REFERENCES

TDSP-Setup manual

TDSP-Modbus manual