Capetti ELETTRONICA
DAL 1973



PRODUCT CATALOGUE



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WINECAP™ MONITORING SYSTEMS

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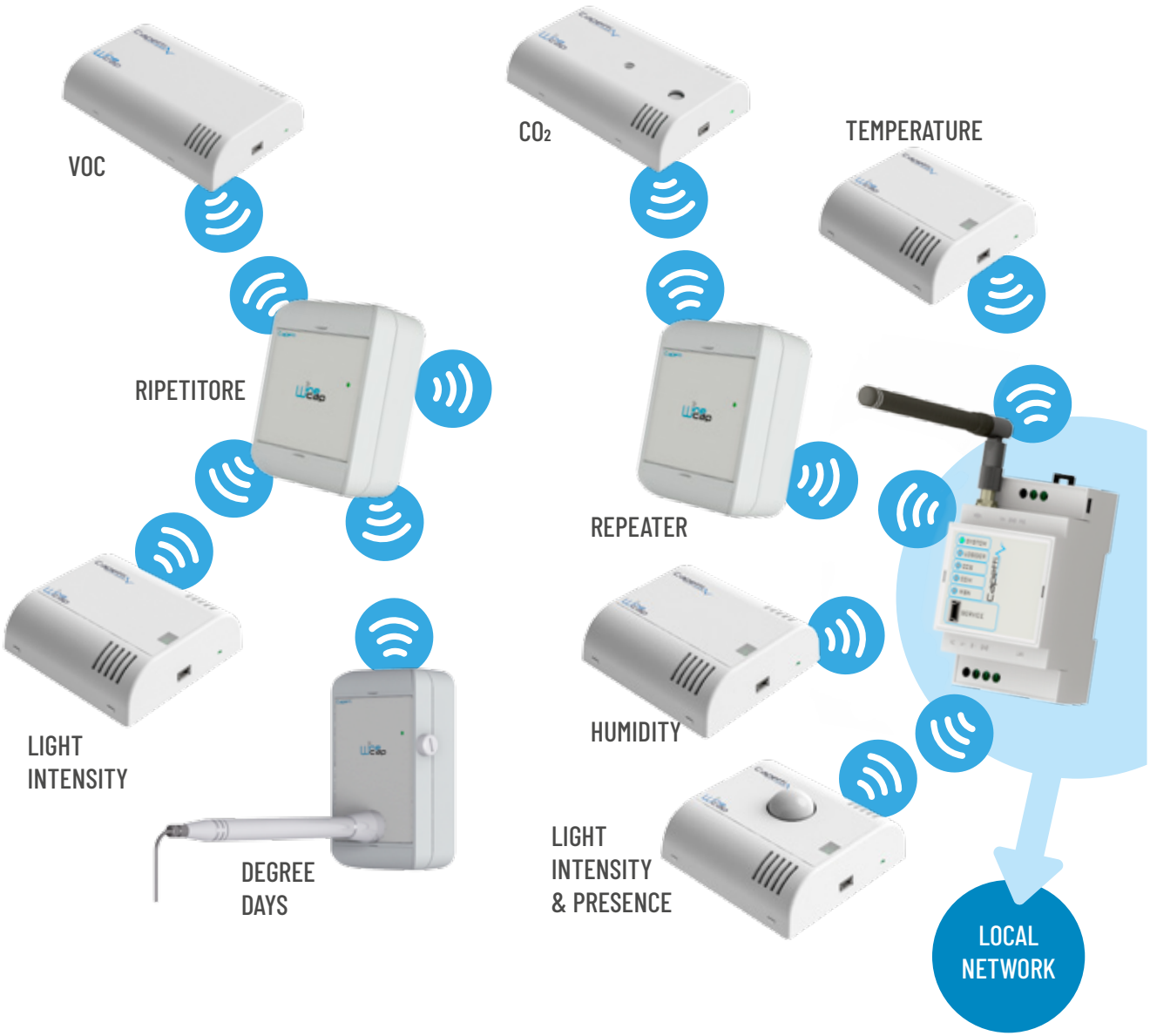
WINECAP™ MONITORING APPLICATIONS

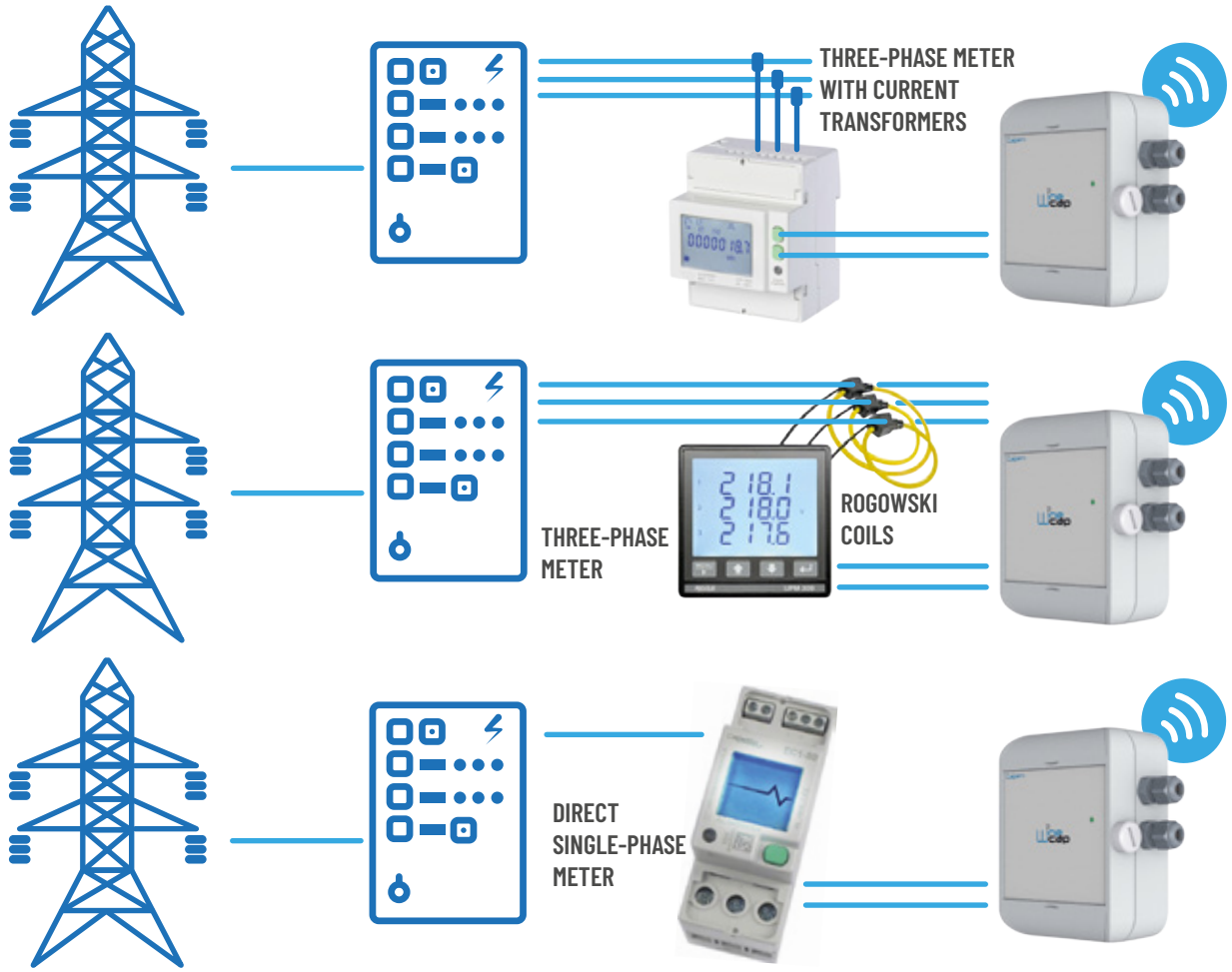
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ENVIRONMENTAL & ENERGY MONITORING

The flexibility and modularity of **Capetti's wireless monitoring systems** make the **WineCap™** data logger network the best solution for environmental and energy monitoring.

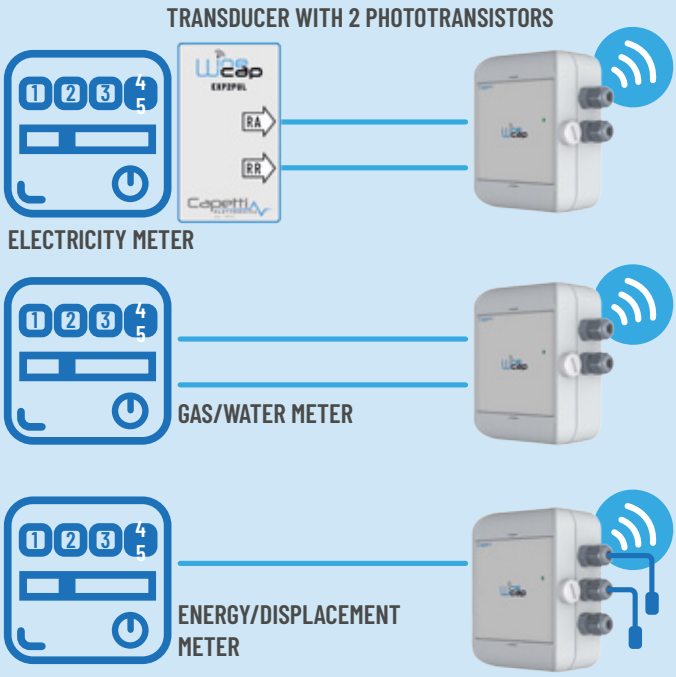
The Capetti solution is one of a kind and offers users numerous exclusive benefits, thanks to the possibility of using **internal or external temperature sensors**, a choice of **indoor** or **outdoor** solutions, a **variety of quantities** measured and logged, **radio coverage** which can be increased as required via self-powered repeaters, the **two-way nature of the network**, the **interoperability** of the gateways with **Modbus PLCs**, the selection of **alarm thresholds** and safe, **remote data access** via the Service Centre.





Capetti metering systems are ideal for any **wireless energy monitoring application:** direct **single and three-phase metering**, indirect metering via closed/open **current transformers,** and indirect metering using **Rogowski coils**. This approach enables an accurate view of consumption relating to each section considered.

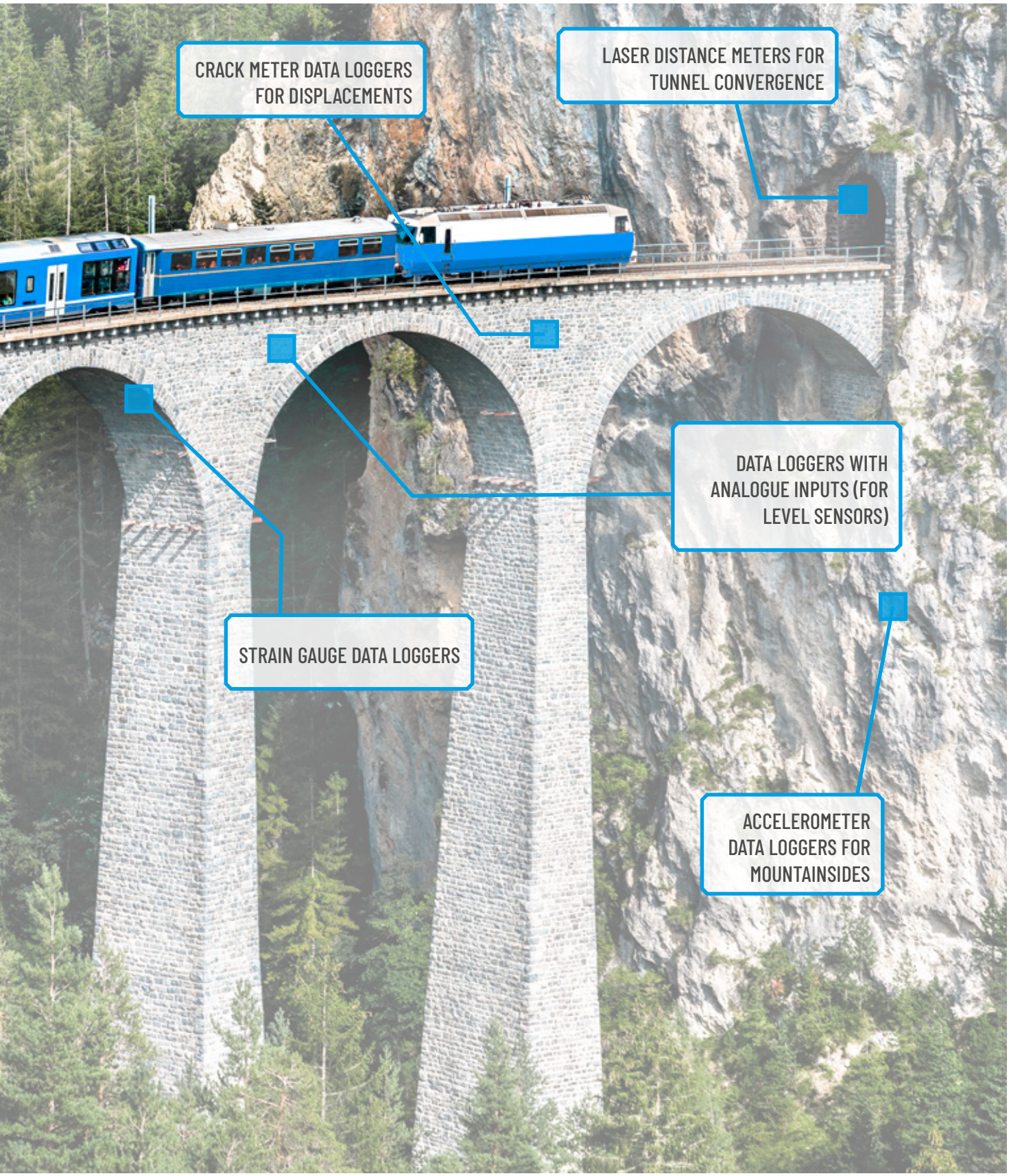
With Capetti's wireless metering data loggers you can read the pulse output from electricity meters (via specific **WineCap™** transducers with phototransistors), gas meters (downstream of suitable safety barriers), water or energy and displacement meters (with specific inputs for supply/return temperature sensors, to ensure high sensitivity even under minimum flow conditions).



GEOTECHNICAL & STRUCTURAL MONITORING

The flexibility and modularity of the **WineCap™** system make the Capetti Elettronica wireless solution ideal for **numerous geotechnical and structural monitoring applications**.




CRACK METER DATA LOGGERS FOR DISPLACEMENTS
LASER DISTANCE METERS FOR TUNNEL CONVERGENCE
DATA LOGGERS WITH ANALOGUE INPUTS (FOR LEVEL SENSORS)
STRAIN GAUGE DATA LOGGERS
ACCELEROMETER DATA LOGGERS FOR MOUNTAINSIDES



WINECAP™ MONITORING SYSTEMS







GATEWAYS

Gateways for collecting, storing and exporting data which can handle **up to 50 wireless data loggers** with storage equivalent to **2.500.000 samples**.
All gateways are provided along with the **WineCap™ Manager** configuration software.

CASE STUDIES:
Molinette Hospital, Turin *p. 26*







		MB	ETH	GSM
Connectivity		Modbus RS485	RS485 Modbus RTU Ethernet Modbus RTU	Modbus RS485 GSM/GPRS
Operating conditions		Temperature -20 to +60 °C Humidity 0 - 90%		
Degree of protection		IP 30		
Service Centre		-	✓	✓
Power Supply		12-24 V DC (power supply unit not included)		
Dimensions		DIN 2U	DIN 4U	DIN 6U
Codes	LuPo	**MWDG-MB** **MWDG-MB-B** (boxed, power supply unit included)	**MWDG-ETH** **MWDG-ETH-A** (America 915MHz) **MWDG-ETH-B** (boxed, power supply unit included)	**MWDG-GSM** **MWDG-GSM-A** (America 915MHz) **MWDG-GSM-B** (boxed, power supply unit included) **MWDG-GSM-M1** (2 relay outputs) **MWDG-GSM-M1-B** (2 relay outputs, boxed, power supply unit included) **MWDG-GSM-M5** (transmission to Service Centre every 5 minutes) **MWDG-GSM-M5-B** (transmission to Service Centre every 5 minutes, boxed, power supply unit included) **MWDG-GSM-M6** (for inclinometer chains) **MWDG-GSM-M6-B** (for inclinometer chains, boxed, power supply unit included)
	LoRa®	**WLRG-MB** **WLRG-MB-B** (boxed, power supply unit included)	**WLRG-ETH** **WLRG-ETH-B** (boxed, power supply unit included)	**WLRG-IOT** **WLRG-IOT-B** (boxed, power supply unit included)

Related items	
	BOX-E: Case for installation
	CV230: Power supply cable
	HDR1524: 15W - 24V DC power supply unit
	EXP4IO-00: Multi-function expansion module with 4 x NTC10K output channels
	EXP4IO-33: Multi-function expansion module with 4 x 0 - 10 V DC output channels

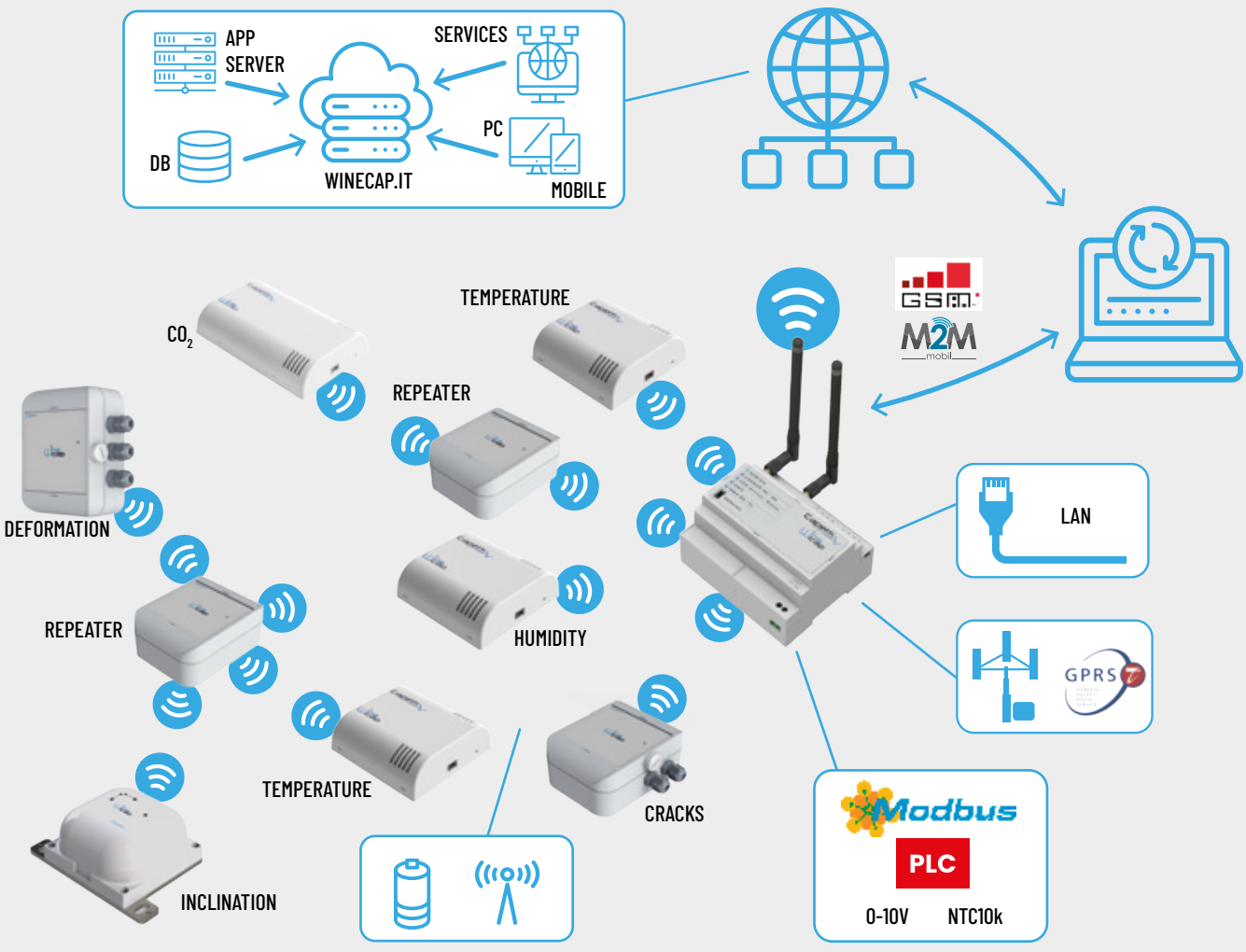
REPEATERS

Radio routers and repeaters to **increase radio range** of the wireless data loggers

Degree of protection		IP65
Operating conditions		Temperature -30 to +60°C
Lifetime		Up to 7 years
Connections		Up to 50 nodes (data loggers with maximum of 15 repeaters in a cascade configuration)
Dimensions (mm)		120x90x50
Battery type		BAT3
Codes	LuPo	WR12
	LoRa®	WLRE



SYSTEM ARCHITECTURE



SMART DATA LOGGER

FOR AIR QUALITY

Smart wireless data loggers for indoors with **integrated sensors** to monitor **air quality**.

CASE STUDIES:

Molinette Hospital, Turin *p. 26*
Dubai Mirdif Hospital *p. 28*
Eden project *p. 29*
Egyptian Museum, Turin *p. 32*
Ricci Oddi Art Gallery *p. 33*
Milan's La Scala Opera House *p. 34*



	TH	COP	COPM	VOC
Measured quantities (resolution) [range]	**Temperature** (0,01°) [-10÷60°] **Relative humidity** (0,05%) [0÷100%]	**Temperature** (0,01°) [-10÷60°] **Relative humidity** (0,05%) [0÷100%] **CO_2 concentration** (1ppm) [0÷10.000 ppm]	**Temperature** (0,01°) [-10÷60°] **CO_2 concentration** (1ppm) [0÷5000ppm] **PM2, 5 and PM10** (1µg/m³) [1÷1.000µg/m³]	**Temperature** (0,01°) [-10÷60°] **Relative humidity** (0,05%) [0÷100%] **Total VOC** (1ppb) [0÷60.000 ppb]
Degree of protection	IP30			
Lifetime	Up to 12 years	Up to 4 years	Up to 4 years (unlimited with C type USB cable)	Up to 8 years
Dimensions (mm)	120x80x33,5	120x80x33,5	155x120x43	120x80x33,5
Battery type	BAT2	BAT2	2x BAT3	BAT2
Codes – LuPo	**WSD00T_LD** (temperature only) **WSD00TH2_LD** (temperature and humidity)	**WSD00THCOP**	**WSD10TCOPM**	**WSD00TH2VOC**
Codes – LoRa®	**WLRD00T** (temperature only) **WLRD00TH** (temperature and humidity)	**WLRD00THCOP**		

SMART DATA LOGGER

FOR OUTDOOR TEMPERATURE

Smart wireless data loggers for outdoors with **integrated sensors** to monitor **temperature and CO_2**.

CASE STUDIES:

Eden project *p. 29*
Royal Palace of Caserta *p. 35*







	10T	12T-CO	10MiGG
Measured quantities (resolution) [range]	**Outdoor temperature** (0,01°C) [-30÷+60°C]	**Outdoor temperature** (0,01°C) [-30÷+60°C] **CO_2 concentration** (1 ppm) [0÷2000 ppm]	**Outdoor temperature** (0,01°C) [-30÷+50°C]
Transducer type	NTC10KΩ		PT1000 classe A
Degree of protection	IP65		
Lifetime	Up to 10 years	Up to 5 years	Up to 10 years
Dimensions (mm)	120x90x50		157x90x50
Battery type	BAT2	BAT1	BAT2
Codes	**WSD10T**	**WSD12T-CO**	**WSD10MiGG** (temperature, average daily temperature, cumulative degree days as per Italian Decree 412, cumulative degree days at the reference temperature selected during installation)
Calibration	**RINTAR:** 3-point recalibration service for degree day data loggers -10MiGG		

Related items	**For 10MiGG**	**SCH-GG:** Radiation protection screen WSD10MiGG
	Per 12T-CO	**EE820:** Outdoor non-dispersive infrared CO2 monitor with power supply WSD12T-CO





SMART DATA LOGGER

FOR THERMOMETERS

Smart wireless data logger for **measuring temperature** via external transducers.

CASE STUDIES:

Careggi Hospital, Florence *p. 27*
Historic centre, Turin *p. 31*





	THEE	T1K TT1K		TT10K	
		WSD02	WSD12	WSD02	WSD12
Measured quantities (resolution) [range]	**Outdoor temperature** (0,01°C) [-40°C÷+80°C] **Relative humidity** (0,05%RH) [0÷100%]	PT1000 transducer input		NTC transducer input	
Degree of protection	IP65	IP30	IP65	IP30	IP65
Lifetime	Up to 5 years				
Dimensions (mm)	120x90x50	80x80x25	120x90x50	80x80x25	120x90x50
Battery type	BAT2	BAT1	BAT2	BAT1	BAT2
Codes	**WSD12-THEE**	**WSD02T-T1K** (version with outdoor temperature and 1 x PT1000 input) **WSD02-TT1K** (version with 2 x PT1000 inputs)	**WSD12-TT1K** (version with 2 x PT1000 inputs) **WSD12T-TT1K** (with outdoor temperature and 2 x PT1000 inputs)	**WSD02-TT10K** (indoor version with 2 x NTC inputs) **WSD02-TT10KB1** (indoor version with 2 x NTC inputs)	**WSD12-TT10K** (outdoor version with 2 x NTC inputs) **WSD12-TT10KB1** (outdoor version with 2 x NTC inputs)

Related items	For THEE		**EE07** (outdoor temperature and relative humidity sensor with connection cable, -40÷+80°C, 0÷100% RH, IP65) **EE07-M1** (outdoor temperature and relative humidity sensor with connection cable, -40÷+80°C, 0÷100% RH, IP65, versione tropicalizzata) **EE07 KIT** (outdoor temperature and relative humidity sensor with weather protection, flange and connection cable)
	PT1000 SENSORS (For T1K – TT1K)		**PT1000CNT** (for contact surface temperature measurement, IP68, -50÷+105°C) **PT1000CR** (for cryogenic use (IP68, -200÷+150°C) **PT1000FR** (for wall surface temperature measurement, IP65, -30-÷+60°C) **PT1000FR-NAST** (for contact point or wall temperature measurement, IP65, -50÷+160°C) **PT1000-GAS** (for ovens, IP67, -20÷+300°C) **PT1000-IP68** (for heavy-duty use, IP68, -50÷+105°C)
	NTC SENSORS	Per TT10K	**NTC10K** (for contact measurements, IP68, BETA3435, -50÷+105°C) **NTC10K-IP68** (for heavy-duty use, IP68, BETA3435, -50÷+105°C)
		Per TT10KB1	**NTC10KIM** (for groundwater, IP68, BETA3977, 0÷+60°C) **NTC10KSUP** (for surface temperatures, IP68, BETA3977, -30 to +100°C)





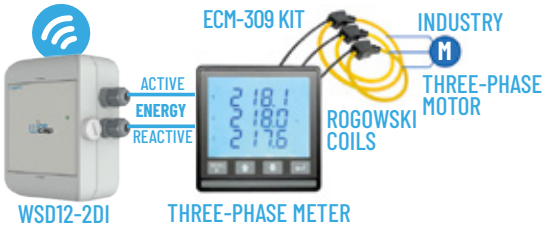
SMART DATALOGGER

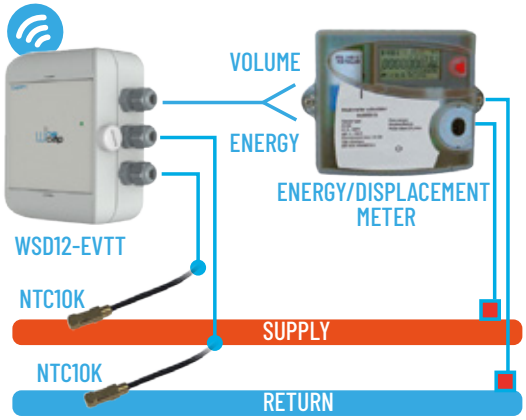
FOR PULSE COUNTS

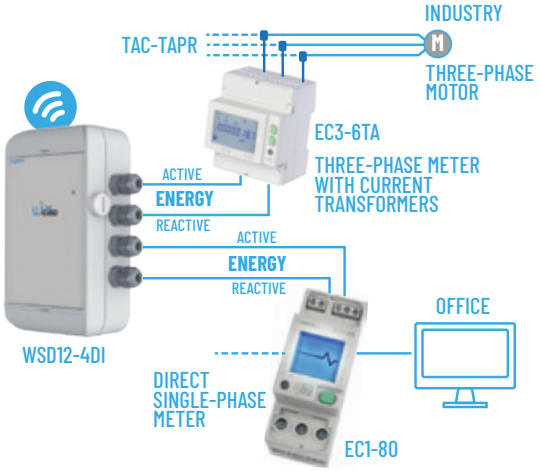
CASE STUDIES:

Royal Palace of Caserta *p. 35*







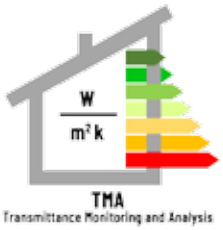


	EVTT	2DI	4DI
Measured quantities (resolution) [range]	**Heat energy in kWh** (single pulse) [0÷32768 pulses] **Volume in litres** (single pulse) [0÷32768 pulses] **Temperature** (0,01°) [-50÷105°]	**Continuous partial or cumulative count on 2 to 4 inputs** (single pulse) [0÷65535 pulses]	
Degree of protection	IP65		
Lifetime	Up to 5 years	Up to 7 years	
Dimensions (mm)	120x90x50	160x90x50	
Battery type	BAT2		
Codes – LuPo	WSD12-EVTT	WSD12-2DI	WSD12-4DI
Codes – LoRa®		WLRD12-2DI	WLRD12-4DI

Related items	For EVTT	Thermistors	**NTC10K** (NTC sensor with brass container 18x6x6 mm) for WSD12-EVTT
			NTC10K-IP68 (without container, probe ø5x20 mm) for WSD12-EVTT
	For 2DI e 4DI	Meters	**EC1-40 MID** (40A single-phase), **EC1-80 MID** (80A single-phase)
			EC3-80 MID (80A direct three-phase), **EC3-6TA MID** (three-phase with transformers)
			ECM-209 KIT (Rogowski kit DIN-standard guide), **ECM-309 KIT** (Rogowski kit screen front)
		Transformers	**TAC40/5, TAC60/5, TAC100/5, TAC200/5, TAC250/5, TAC400/5** (closed with 5 A output)
			TAPRV10/100, TAPRV10/200, TAPRV11/200, TAPRV12/300, TAPRV12/400, TAPRV13/400
			TAPRV1/500 (open with 5 A output)
		Phototransistors	**EXP2PUL** (light pulse transducer for electricity meters)
		Flow meters	**PL200**

THERMAL TRANSMITTANCE MONITORING

With **software included** in Service Center Plus.



CASE STUDIES:

Energy loss *p. 30*

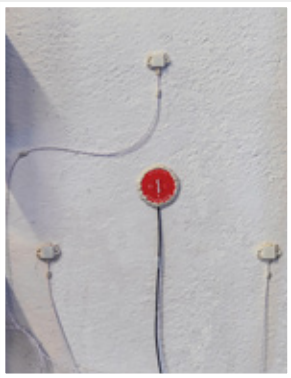


FLUX

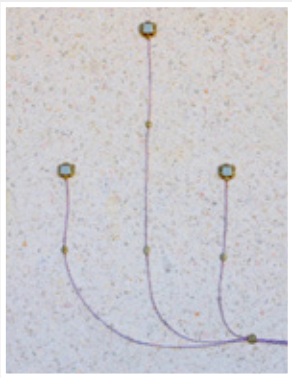
Measured quantities (resolution) [range]	**Heat flow** (0,05 W/m²) [± 35 W/m²]
Degree of protection	IP65
Lifetime	Up to 5 years
Dimensions (mm)	120 x 90 x 50
Battery type	BAT2



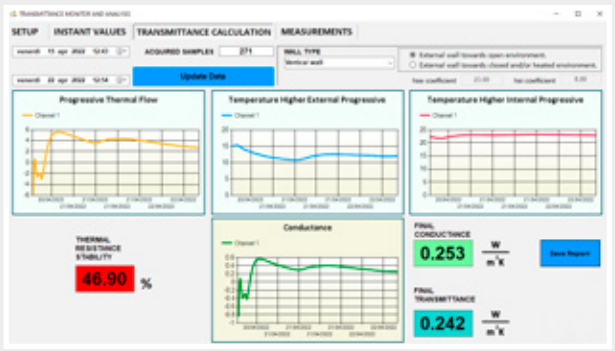
WSD12-TF KIT



INSIDE



OUTSIDE



TMA app on CS PLUS FULL500



MAPPE app on CS PLUS FULL500

Codes	FLUX	**WSD12-TF KIT** heat flow meter system consisting of: - 2 WSD12T-TTT1K (for measuring surface temperature at three contact points on the inside and outside walls of the building to be monitored) - 1 WSD12T-FLUX (measurement of heat flow on the inside wall of the building to be monitored) - 6 x PT1000 transducers and heat flow meter plate
	CS	**CS PLUS FULL** (Service Center display showing Maps, TMA - Transmittance Monitoring and Analysis, REA - environmental energy reporting)

SMART DATA LOGGER

FOR BRIGHTNESS & RADIATION

Smart wireless data logger for **environmental monitoring**.

CASE STUDIES:
Ricci Oddi Art Gallery *p. 33*







	TH2L	LP	LVD
Measured quantities (resolution) [range]	**Temperature** (0,01°) [-10÷60°] **Relative humidity** (0,05%) [0÷100%] **Light intensity** (1Lux) [0÷16kLux]	**Light intensity** (1Lux) [0÷16kLux] **Presence** (360° coverage) [Range of 12 metres]	**Solar radiation** (8W/m2) [0÷2kW/m²] **Wind speed** (0,1m/s) [0,5÷70m/s] **Wind direction** (1°) [0÷360°]
Degree of protection	IP30		IP65
Lifetime	Up to 5 years		
Dimensions (mm)	80x80x25		120x90x50
Battery type	BAT1		BAT2
Codes	WSD00TH2L	WSD00LP	WSD12-LVD

Related items	per LVD	**AN6410** (Cup anenometer with 12-metre cable)
		ANS-RSG-B (Thermopile pyranometer to calculate total radiation)



SMART DATA LOGGER

FOR EVENT & STATUS DATA

Smart wireless data logger for recording **water/electrical/HVAC events.**

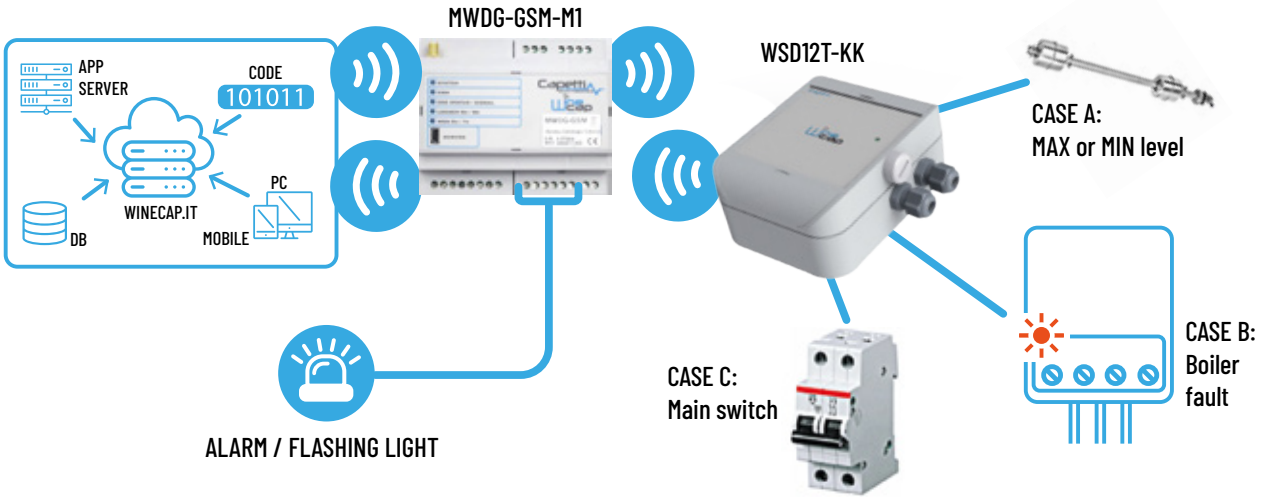
CASE STUDIES:

Service stations *p. 51*





	T-KK	
	WSD02	WSD12
Measured quantities (resolution) [range]	**Status change** on 2 digital inputs (1 change / 30sec) [open collector]	**Status change** on 2 digital inputs (1 change / 30sec) [open collector]
Degree of protection	IP30	IP65
Lifetime	Up to 5 years	Up to 7 years
Dimensions (mm)	80x80x25	120x90x50
Battery type	BAT1	BAT2
Codes	**WSD02T-KK** (for indoor applications)	**WSD12T-KK** (for outdoor applications)



Wireless status/level monitoring kit	**WSD12T-KK + MWDG-GSM-M1-B** (GSM gateway with two relay outputs for activating the alarm and/or flashing light when a status change is recorded on data logger WSD12T-KK)

SMART DATA LOGGER

FOR POTENTIOMETERS

Smart wireless data logger for potentiometers with external transducers to **monitor cracks and linear displacements**.

CASE STUDIES:

Royal Palace of Caserta *p. 35*
Temple of Segesta *p. 36*
TELT (Tunnel Euralpin Lyon Turin) *p. 38*
RFI - Exilles tunnel *p. 39*
Monitoring bearings *p. 46*
Ipo Dam - Norzagaray *p. 50*





	T-DD	4D
Measured quantities (resolution) [range]	**Temperature** (0,01°) [-30÷60°] **Linear deformation** at 2 inputs maximum (6µm) [preset: 0-25mm 0-50mm 0-100mm 0-400mm]	**Temperature** at 1 input maximum (0,01°) [-30÷60°] **Linear deformation** Linear deformation at 4 inputs maximum (0.01% of the FS) [0-100% of the FS]
Degree of protection	IP65	
Lifetime	Up to 10 years	
Dimensions (mm)	120x90x50	160x90x50
Battery type	BAT2	
Codes	**WSD12T-DD** Can be combined with potentiometers with useful electrical stroke of 25 50 100 400 mm	**WSD12-4D** Can be combined with potentiometers with any electrical stroke

Possibility of receiving data loggers already wired to transducers

Related items	LINEAR TRANSDUCERS	With spring	**PY2-F-025** (0÷25mm) **PY2-F-050** (0÷50mm) **PY2-F-050IP65** (0÷50mm IP65) **PY2-F-100** (0÷100mm)
		With loop	**PZ12-A-025** (0÷25mm IP65) **PZ12-A-050** (0÷50mm IP65) **PZ12-A-100** (0÷100mm IP65) **PZ12-A-200** (0÷200mm IP65)
	WIRE TRANSDUCER	GSF (wire potentiometer with full scale 4,800 mm)	
	BRACKETS	**FIX-PY2** (bracket for securing spring-loaded linear transducers to the wall)	
		GSF-FLA033 (bracket for securing the wire transducer at 90°)	
	TEMPERATURE TRANSDUCER	**NTC10KSUP** (for surface temperatures, IP68, BETA3977, -30 to +100°C)	







SMART DATA LOGGER

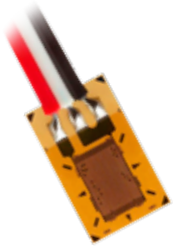
FOR STRAIN GAUGES

Smart wireless strain gauge data logger which **can be connected to any type of Wheatstone bridge.**

CASE STUDIES:

TELT (Tunnel Euralpin Lyon Turin) *p. 38*
Val Senales *p. 45*
Villa Italia - Lake Como *p. 47*
Ipo Dam - Norzagaray *p. 50*





	EX1-EX2	EX3-EX4	EX5	EX6
Measured quantities (resolution) [range]	**Temperature** (0,01°) [-30÷60°] **Deformation** on 3 inputs (2,5µV/V) [0÷4.950µV/V]	**Temperature** (0,01°) [-30÷60°] **Deformation** on 3 inputs (2,5µV/V) [0÷4.950µV/V]	**Temperature** (0,01°) [-30÷60°] **Deformation** on 3 inputs or load cell (2,5µV/V) [0÷4.950µV/V]	**Temperature** (0,01°) [-30÷60°] **Deformation** on 3 inputs or load cell (1,2µV/V) [0÷2.480µV/V]
Bridge impedance	120 OHM	350 OHM	Full bridge	
Degree of protection	IP65			
Lifetime	Up to 10 years			
Dimensions (mm)	120x90x50			
Battery type	BAT2			
Codes	**WSD12T-EX1** (half bridge 120Ω) **WSD12T-EX2** (quarter bridge 120Ω)	**WSD12T-EX3** (half bridge 350Ω) **WSD12T-EX4** (quarter bridge 350Ω)	**WSD12T-EX5** (full bridge with full scale 4,950µV/V) **WSD12T-EX6** (full bridge with full scale 2,480µV/V)	

Related items	For EX5-EX6	**CAP120CE** (Electrical load cell for tie rods, FS 1000 KN))
		CAP165CE (Electrical load cell for tie rods, FS 1500 KN))



SMART VIBRATING WIRE DATA LOGGERS

Smart wireless data logger **for vibrating wire sensors.**

CASE STUDIES:
Grand Paris Express *p.37*



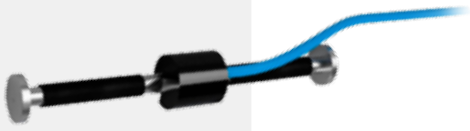


	VW	4VW
Measured quantities (resolution) [range]	**Temperature** (0,01°C) [-20÷70°C] **Frequency** on 2 inputs max (0,1 µs/0,1Hz) [500÷4.000Hz]	**Temperature** (0,01°C) [-20÷70°C] **Frequency** on 4 inputs max (0,1 µs/0,1Hz) [500÷4.000Hz]
Degree of protection	IP65	
Lifetime	Up to 4 years	
Dimensions (mm)	120x90x50	160x90x50
Battery type	BAT2	
Codes	**WSD12-VW** (868MHz version) **WSD12-VW-A** (America 915MHz version)	**WSD12-4VW** (868MHz version) **WSD12-4VW-A** (America 915MHz version)

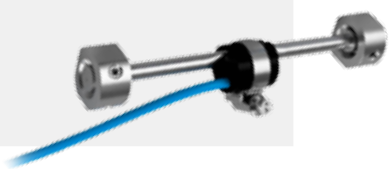
Possibility of receiving data loggers already wired to transducers

Related items

CAP155VW
(155 mm vibrating wire embedment strain gauge, range ± 1500 microeps)



CAP165VW
(165 mm vibrating wire weldable strain gauge, range ± 1500 microeps)



SMART INCLINOMETER DATA LOGGERS

Smart wireless data logger for **dual-axis inclinometers**.

CASE STUDIES:

Metro 5 - Milan *p. 40*
Porto Marghera *p. 41*
Ontario-Canada *p. 42*
Railway line Asti-Nizza Monferrato *p. 43*
Sant'Agata De' Goti *p. 44*
Valtournenche *p. 48*
Valsusa *p. 49*

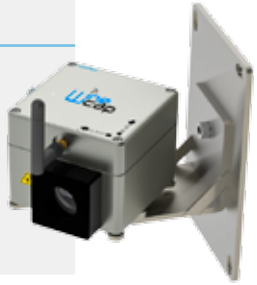






	TII	DIST	DGII
Measured quantities (resolution) [range]	**Temperature** (0,01 °C) [-30 °C÷+60 °C] **Dual-axis inclination** (0,0002°) [±6,5000°]	**Dual-axis inclination** (0,0002°) [-6,5000°÷+6,5000°] **Temperature** (0,01 °C) [-30 °C÷+60 °C] **Relative distance** (0,1 mm) [±3200 mm] **Absolute distance** (1 mm) [50÷65000 mm]	**Deformation** (1mm) [0÷4.800mm] **Acceleratione** (peak) (100mg) [-16g÷16g] **Inclination on 2 axes** (0,1°) [-90°÷90°]
Degree of protection	IP69	IP67	
Lifetime	Up to 5 years		Unlimited
Dimensions (mm)	131,6x153,8x60	100x100x80	78x78x82
Battery type	BAT3		BAT5 (integrated photovoltaic cell)
Codes	**WSD10TII**	**WSD15IIDIST** **WSD15IIDIST-FX** (Laser distance meter/inclinometer with two-way bracket)	**WSD10DGII**

Related items	for TII	**FIX-WSD10TII** (Kit with fixing plate and screws for WSD10TII «glue» applications) **FIX-MAG-WSD10TII** (Magnetic kit for securing WSD10TII to metal surfaces)
	for DIST	**FIX-DIST** (Fastening kit for WSD15IIDIST with 2 degrees of freedom) **SCH-DIST** (Protective screen against direct light) **TARG-L10** (Adhesive target 10x10cm for distances over 40 m)



SMART DATA LOGGERS

FOR EXTERNAL TRANSDUCER INTEGRATION

Smart wireless data logger for **connection with external transducers** and option of powering them.

CASE STUDIES:
Grand Paris Express *p.37*





	AV	PS-4AI (external transducer power supply)
Measured quantities (resolution) [range]	**Current** (7µA) [4÷20mA] **Voltage** (3mV) [0÷10Vdc] **Outdoor temperature** (0,01°C) [-30°C÷+60°C]	**Values in % of the full scale** (12 bit) [0÷10V, 0÷25mA]
Warm-up time	No power supply to sensors	From 1 sec. to 32 sec.
Degree of protection	IP65	IP65
Lifetime	Up to 10 years	Up to 3 years
Dimensions (mm)	120x90x50	160x90x50
Battery type	BAT2	2X BAT4
Codes	**WSD12T-AV** (input voltage 0-10V) **WSD12T-AV2_5** (input voltage 0-2.5V)	**WSD12PS-4AI** (4 proportional inputs) **WSD12PS-4AIM4** (with Goretex valve and 4 proportional inputs) **WSD12PS-4AIM8**(with 1 temperature input and 3 proportional inputs) **WSD12PS-4AIM9** (for ultrasound level) **WSD12PS-4AIM10** (4 current inputs)

Possibility of receiving data loggers already wired to transducers

ULTRASOUND LEVEL SENSOR





HOT WIRE ANENOMETER

PIEZOMETERS





CLASS 2 SOUND LEVEL METER

Related items	
For WSD12PS-4AI	**EE576VA1** (Anenometer with output 0-5 V, range 0-1 m/s cable 0.5m)
For WSD12PS-4AIM4	**CAP190PZ** (Piezometer, level measurement, diam. 22 mm)
For WSD12T-AV2_5	**CAP130FO** (Sound level meter, range 35-130 dB)

GATEWAY INSTALLATION & POWER SUPPLY BOXES

CASE STUDIES:

Temple of Segesta *p. 36*

Valtournenche *p. 48*



BOX EM



BOX PPS

	E	PPS
Power supply provided for gateway	12-24V	12V
Degree of protection	IP33 (E) IP65 (EM)	IP68
Internal battery	-	12V-9Ah (PPS) 12V-18Ah (PPS-Plus)
Cell dimensions (mm)	-	337x205 (PPS) 670x540 (PPS-Plus)
Box dimensions (mm)	200x150x100	380x280x130 (PPS) 400x300x200 (PPS-Plus)
Codes	**BOX-E** (IP33 version) **BOX-EM1** (IP65 version with internal heater for temperatures up to -30°) **BOX-EM2** (IP65 version) **BOX-EM6** (IP65 version for MWDG-GSM-M6)	**BOX-PPS** (version with 10 W panel and 12 V - 9 Ah battery) **BOX-PPSM1** (with supplementary circuit for 10 W photovoltaic/mains power supply) **BOX-PPS-PLUS** (version with 50 W panel and 12 V - 18 Ah battery)

BOX EM1



BOX PPSM1





BOX PPS PLUS

WINECAP™ MONITORING APPLICATIONS





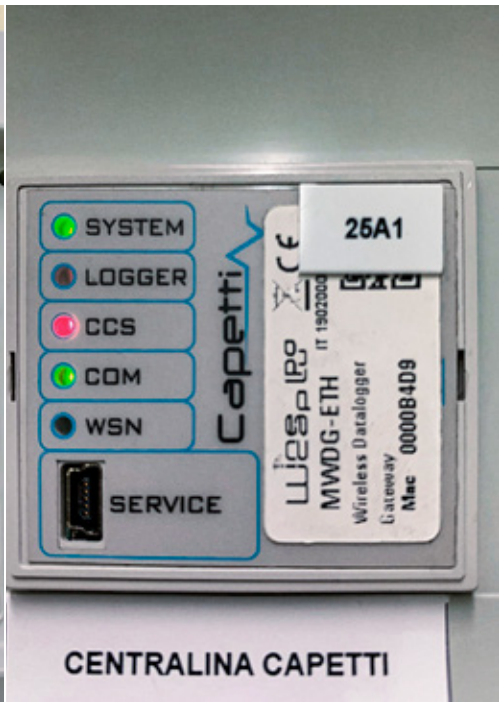


HOSPITAL MONITORING

MOLINETTE HOSPITAL IN TURIN







BACKGROUND

With almost 3000 hospital, school and university premises benefiting from its wireless systems, CAPETTI Elettronica is now a major player in energy monitoring for public buildings.

THE SOLUTION

The S. Giovanni Battista Hospital in Turin, commonly known as Le Molinette, is the fourth largest public hospital in Italy. Its 25 wings cover an area of 150,000 sq. m., and they are monitored with hydrothermal **WineCap™** systems. After studying the layout and in specting the facility, Capetti engineers were able to suggest the ideal position for data loggers.

THE RESULT

Data on temperature, humidity and CO2 concentration is now used for the temperature regulation systems for the entire hospital complex, and to monitor air quality.



THE WINNING CHOICE

> **WSD00TH2_LD** (air temperature and humidity)

> **WSD00TH2CO** (carbon dioxide concentration)

> **MWDG-ETH** (ethernet gateway)

HOSPITAL MONITORING

CAREGGI HOSPITAL IN FLORENCE



BACKGROUND

Cryogenic liquids, typically liquid nitrogen, are used for sensitive cold chain applications, such as preserving blood, vaccines and organs and freezing biotechnological products. Even some chemical reactions in the fields of medicine and pharmacology require temperature of less than -180°C.

THE SOLUTION

In 2016 Florence's Careggi Hospital needed to implement a temperature monitoring system in various wings at the facility. However the requirement was not just to log the temperature in various rooms with the usual temperature and humidity data loggers, but also to monitor micro-environments in the haematology and genetics departments, and in some medical laboratories. In these rooms the temperature to be monitored could fall well below -20°C, in some cases reaching -200°C.

THE RESULT

Using the **WineCap™** technology it was possible to view all temperature data with the same user account through the CAPETTI Service Centre. Precision platinum resistance thermometers were provided already cabled to the respective data loggers and the data was stored in the cloud.



THE WINNING CHOICE

> **WSD02-TT1K** (temperature on two channels with external thermoresistances)

> **PT1000CNT** (brass thermoresistance)

> **PT1000CR** (stainless steel thermoresistance)

HOSPITAL MONITORING

DUBAI - MIRDIF HOSPITAL



BACKGROUND

The **WineCap™** data loggers for measuring temperature and humidity guarantee line-of-sight radio range greater than 5 km and, thanks to CAPETTI's Ultra Low Power technology, long-life batteries enable autonomy of up to 12 years with temperature and humidity samples every 10 minutes. The measurements recorded by the data loggers are stored locally and sent to gateways at scheduled intervals.

THE SOLUTION

In hospitals such as Dubai's Mirdif Hospital, with large windows, the WSN (wireless sensor network) can propagate uniformly along the structure by positioning the gateway antenna on one of the low buildings external to the system. Moreover, battery repeaters make it possible to redirect the signal from increasingly remote data loggers (thanks to intelligent routing that autonomously selects the best route), thereby increasing radio coverage by up to 16 times. As a result, it is even possible to capture data from the sensors when they have to be installed in a very shielded location (typically departments further inside, basement departments such as operating theatres and casualty departments).

THE RESULT

By means of a CONFIRM and ACK mechanism, the application profile guarantees that data is definitely received (true data logging). Data are captured a second time and also stored by the gateway. **The WineCap™** system reliably manages the concentration and transmission of temperature and humidity data relating to the rooms and corridors in the various departments, regularly sending it to the BEMS (Building Energy Management System) via MODBUS protocol.

WSD00TH2_LD



THE WINNING CHOICE

> **WSD00TH2_LD** (temperature and relative humidity measurements)

MONITORING SCHOOLS
EDEN PROJECT







BACKGROUND
EDEN – Energy Data ENgagement – is a project that transpired from the idea of using the Internet of Things model to facilitate the spread of awareness of energy consumption within schools. The multi-utility IREN was one of the organisations also involved.

THE SOLUTION
3 schools in Turin signed up to the project (Gambaro Elementary School and Nigra and De Sanctis Middle Schools). Using the **WineCap™** sensor equipment to measure and send quantities to the cloud, such as temperature, humidity and CO2, makes it possible to collect and analyse data in order to create communication strategies that enable users to make practical energy choices designed to reduce consumption.

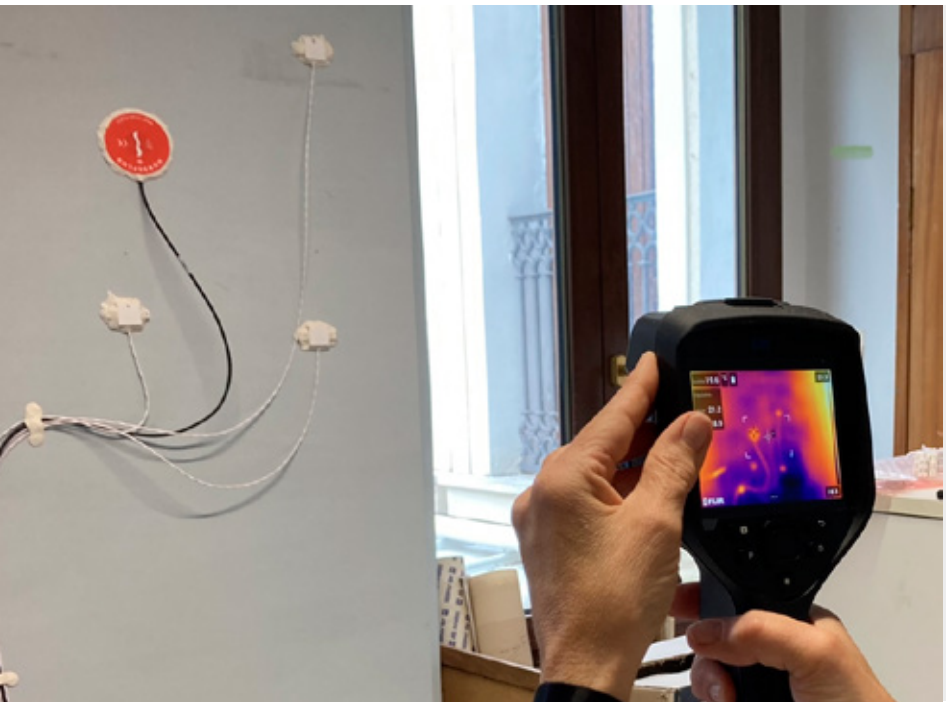
THE RESULT
The Internet of Things has become an information vehicle that can generate ethical behaviour not just in terms of urban system management, but also in individuals. The Eden project won the Smau 2015 award in the energy effciency sector.
The full video entitled Progetto Eden, per una scuola sostenibile is available at **www.capetti.it.**

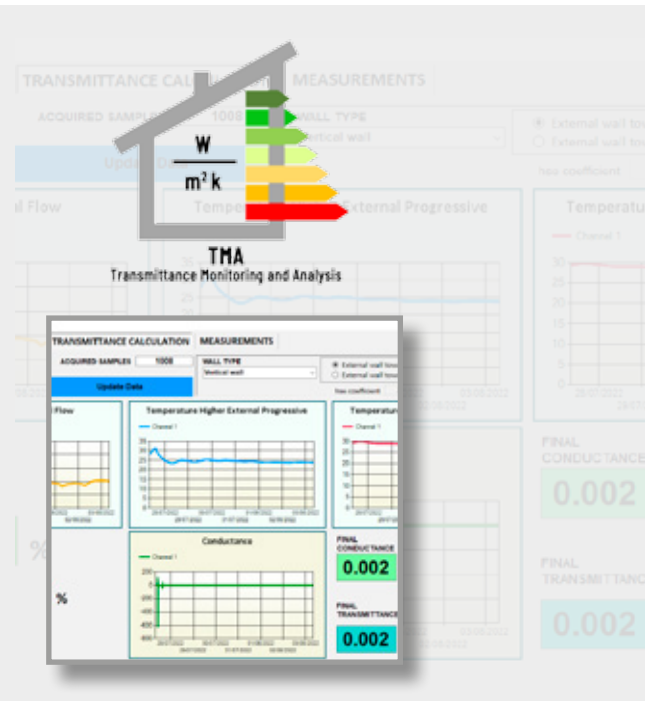


THE WINNING CHOICE
> **WSD00TH2_LD** (air temperature and humidity)
> **WSD00TH2CO** (carbon dioxide concentration)
> **WSD10MiGG** (day degrees measurer and certifier)

MONITORING BUILDINGS

ENERGY LOSS





BACKGROUND

CAPETTI Elettronica has always been mindful of climate change and the need to reduce polluting emissions, and ever since the company was established it has set the market standard when it comes to electronic instrumentation for capturing physical quantit***ies.*** ***"You only know what you meas***ure" was a saying by Lord Kelvin and CAPETTI has made it its own, employing this spirit to become a leader in measurements via temperature transducers - wireless data loggers with Pt1000 sensors and integrated NTC delivering high precision, resolution, repeatability and reliability.

THE SOLUTION

CAPETTI Elettronica designed the WSD12-TF wireless system to measure the thermal transmittance of the walls, which enables convenient, non-invasive calculation of the conductance using the heat flow meter method. This system is excellent assistance for building energy certification, as it enables the quick and easy measurement of external and internal surface temperatures, correlating them with heat flow linked to the dispersion of the wall itself.

THE RESULT

All measurements are recorded on the wireless data loggers, sent to the WSN control unit and sent to the cloud where, via the **WineCap™** Service Centre, the user can view graphs, print reports and export data through transmittance monitoring & analysis (TMA) software made available by Capetti with algorithms developed in collaboration with ENEA - nothing could be simpler!



WSD12-TF

THE WINNING CHOICE

> **WSD12-TF** (thermoflowmetric kit)

> **CS PLUS FULL** (TMA on Service Center)

ENERGY MONITORING
HISTORIC CENTRE OF TURIN





BACKGROUND
Calculating heat consumption is crucial for managing corporate and public buildings. Heat energy is often monitored using meters, which can be challenging, require maintenance, and most of all are invasive in terms of installation on pipes in existing systems.

THE SOLUTION
The **WineCap™** solution used by Eurix in a historic building in Turin consists of temperature data loggers with two inputs for external thermistors. Every 10 minutes the sensors installed wirelessly monitor the change in temperature of the heat-transfer fluid that supplies each user. The data captured from the sensors are then sent to the Capetti Elettronica gateways.

THE RESULT
Eurix designed and developed an alternative system for calculating heat consumption, achieving an efficient, cost-effective solution. The use of **WineCap™** temperature sensors, along with machine learning algorithms developed by Eurix, enables the calculation of heat distributed to each individual user in the building. This solution makes it possible to monitor and efficiently manage the most energy-intensive users.



THE WINNING CHOICE
> **WSD02-TT10K** (temperature data logger on two channels with external thermistors)

> **NTC10K** (external temperature transducer)

MONITORING MUSEUMS

EGYPTIAN MUSEUM IN TURIN





BACKGROUND

The Egyptian Museum in Turin is the oldest museum in the world dedicated to ancient Egyptian civilisation, and second only to the Egyptian Museum in Cairo in terms of exhibition quality. In 2015 the site was refurbished, resulting in exhibition space doubling, among other things.

THE SOLUTION

During the work, and in view of the inauguration of the new setup, the organisation Fondazione Museo delle Antichità Egizie di Torino decided to install a modern hydrothermal monitoring system to accurately measure and log temperature and humidity parameters in the exhibition rooms. **The WineCap™** systems were selected, to enable accurate reliable and clear supervision of all necessary environmental parameters.

THE RESULT

The data is captured, logged and displayed in the Service Centre according to the sampling timescales selected during the installation phase, but these can be changed by the customer at any time. The same applies to settings for alert thresholds; it is sufficient to access the cloud using the protected login details to set new thresholds or change existing thresholds, remotely, reliably and conveniently.



THE WINNING CHOICE

> **MWDG-GSM** (gateway)

> **WSD00TH2** (indoor temperature and relative humidity)

MONITORING MUSEUMS
RICCI ODDI ART GALLERY



BACKGROUND
In April 2022 the exhibition entitled Klimt - The Man, the Artist, his World was set up in the Ricci Oddi Modern Art Gallery and the XNL – Piacenza Contemporanea cultural centre. It illustrates one of the most riveting periods in the history of early 20th century art, through the life, creative journey and collaborations of the Father of the Vienna Secession.

THE SOLUTION
Capetti Elettronica had already used its museum monitoring systems in facilities such as the Gran Guardia Palace in Verona, the Palace of Venaria, the Poldi Pezzoli Museum in Milan, Goethe House in Rome, the Casa Romei Museum in Ferrara and the Oriental Art and Egyptian Museums in Turin. Having seen Capetti's extensive experience in this field, the organisers of the exhibition therefore decided to put their trust in the **WineCap™** systems to measure and log environmental data.

THE RESULT
Hydrothermal data loggers were selected to measure the temperature and humidity in the various exhibition rooms, in addition to data loggers with illuminometers for works particularly sensitive to light intensity, such as original drawings by the Austrian artist.



WSD00TH2L

THE WINNING CHOICE
> **WSD00TH2L** (light intensity measure)

> **WSD00TH2_LD** (temperature and relative humidity measure)

THEATRE MONITORING

LA SCALA OPERA HOUSE





BACKGROUND

Milan's La Scala Opera House is one of the most prestigious theatres in the world, and has been hosting leading artists in opera, ballet and classical music for almost 250 years. The multi-service company that manages environmental monitoring at the venue chose Capetti data loggers, with the aim of having one partner to monitor air quality, and measure and store the indoor temperature in various rooms on these magnificent premises.

THE SOLUTION

Hydrothermal **WineCap™** data loggers with integrated sensors were used to measure actual ambient temperature inside the theatre, whereas hydrothermal data loggers with an additional sensor capable of also measuring CO_2 concentration were used to monitor air quality.

THE RESULT

The Capetti monitoring operations have led not only to a considerable improvement in air quality, but also to an increased awareness of actual energy consumption, thanks to ongoing remote temperature monitoring in the various indoor areas.



THE WINNING CHOICE

> **WSD00TH2_LD** (thermo-hygrometric monitoring)

> **WSD00TH2CO** (temperature, humidity and carbon dioxide concentration)

MONITORING HISTORIC SITES

ROYAL PALACE OF CASERTA





BACKGROUND

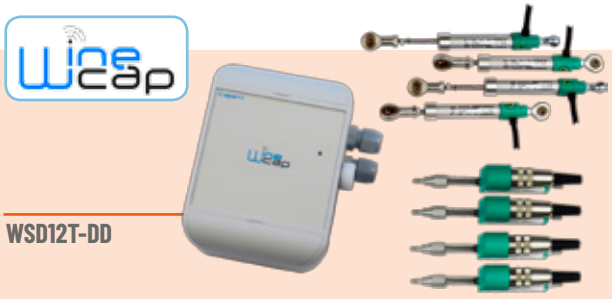
The Royal Palace of Caserta has been a UNESCO heritage site since 1997, and is one of Italy's most visited historic sites. Atmospheric pollution and water infiltrations had caused the structure to deteriorate through time, especially the external and internal façades, and this had never been suitably resolved through maintenance operations aimed at achieving appreciable results.

THE SOLUTION

Major restoration works involving 70,000 sq. m. were finally carried out between 2014 and 2017. During these works it was of primary importance to measure and record numerous physical quantities, such as temperature, wall inclination, the displacement of stone materials and the extent of cracks. Capetti Elettronica's wireless instrumentation, consisting of **WineCap™** control units and data loggers, was used to ensure maximum precision with minimum visual impact.

THE RESULT

The original two-tone colour was restored on the magnificent façade, split between grey travertine at ground level and the ocra of the bricks on the upper level, making it stand out once more to capture the admiration of tourists. Thanks to continuous structural and environmental monitoring, essential waterproofing work was also possible, which will ensure the longevity of this historic majestic site.



THE WINNING CHOICE

> **WSD10T** (outdoor temperature)

> **WSD12T-IIDR** (biaxial inclination)

> **WSD12-4D** (displacement measure)

> **WSD12T-DD** (cracks extension)

MONITORING ARCHAEOLOGICAL SITES

TEMPLE OF SEGESTA





BACKGROUND

This spectacular Doric temple was built in the 5th century BC and is situated in the province of Trapani. A structural monitoring system was optimised in agreement with the works management, to log any temple movement or subsidence.

THE SOLUTION

The system installed has pairs of transducers positioned at the height of the architrave on the inside, to monitor movement in the horizontal axis, and additional potentiometers on the inside and outside at the second front column to the east. These sensors are connected to **WineCap™** data loggers, which carry out sampling every 10 minutes, and send the data wirelessly to a control unit located near the temple. All CAPETTI data loggers have internal temperature probes to be able to relate the measurements obtained to environmental conditions.

THE RESULT

The control unit is self-powered via a photovoltaic panel, and the data is logged within it and sent to the online Service Centre, enabling the clear, convenient and continuous monitoring of the archaeological site.



WSD12-4D

THE WINNING CHOICE

> **WSD12-4D** (displacement measures)

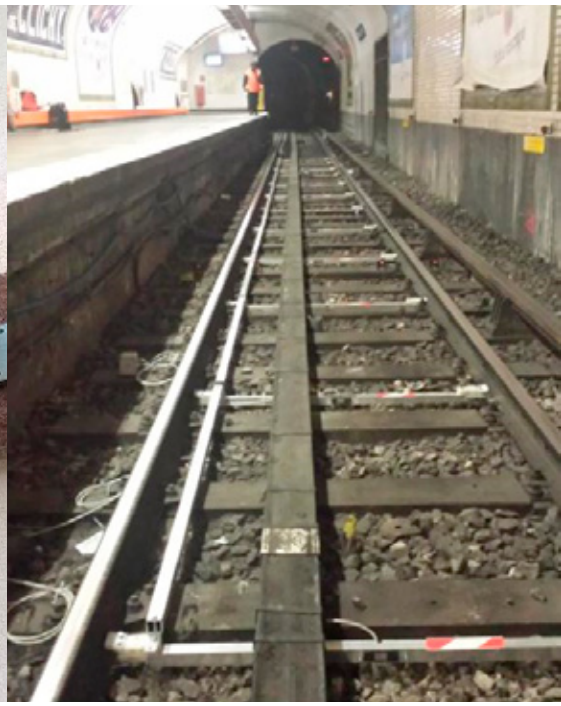
> **WSD12T-DD** (cracks extension)

> **MWDG-GSM** (gateway)

> **BOX-PPS** (photovoltaic power supply)

MONITORING TUNNELS
GRAND PARIS EXPRESS





BACKGROUND
The main aim of the Grand Paris Express project is to reinforce the Paris underground network. With approximately 200 km of new interconnecting lines, the extension of two existing lines and the implementation of four completely new lines, this ambitious infrastructure project snaking through the French capital and its urban areas will also involve the creation of 68 new railway stations.

THE SOLUTION
Capetti Elettronica wireless instrumentation was chosen to monitor the impact of excavation works on existing urban structures and on the construction works. Equipment included MEMS dual-axis inclinometers on the buildings within the area of geotechnical interference, single-axis inclinometers on electrolevel tilt meters positioned in stations and on tracks, vibrating wire strain gauges on temporary counter struts in sites and pre-cast segments, or even in the launching structure for the tunnel boring machine (TBM).

THE RESULT
The customer was able to view the relevant measurements continuously thanks to the GSM **WineCap™** gateway, and completed the monitoring with sound level meters to check the noise generated.

WSD12-4VW



THE WINNING CHOICE
> **WSD12-4VW** (contrast struts)

> **WSD12-VW** (TBM's segments and thrust)

> **WSD15TIIDR** (buildings inclination)

> **WSD12T-IDR** (electrolevels)

> **WSD12T- AV** (noise monitoring)

MONITORING TUNNELS

LYON-TURIN RAILWAY TUNNEL







BACKGROUND

TELT - Tunnel Euralpin Lyon Turin is the dual-national developer, 50% owned by the French government and 50% by the Italian government through the state railway network, Ferrovie dello Stato Italiane, responsible for implementing and managing the future cross-border Lyon-Turin railway line. The base tunnel is an essential element for the future rail connection, and is located between Susa in Piedmont and Saint-Jean-de-Maurienne in Savoie.

THE SOLUTION

Capetti Elettronica wireless instrumentation was chosen to measure strain and deformations generated by tunnel excavations. The **WineCap™** data loggers capture data coming from multipoint borehole extensometers and load cells positioned at the base of the ribs.

THE RESULT

The customer can continually monitor the development of phenomena caused by the penetration of excavations, accurately measuring what can become significant displacements in the structure, especially in the tunnel section, in addition to loads in the most critical areas.

WSD12T-EXn



THE WINNING CHOICE

> **WSD12T-DD** (cracks extension and temperature)

> **WSD12-4D** (displacement measure)

> **WSD12T-EXx** (strain gauge data loggers / for load cells and temperature)

MONITORING TUNNELS

RFI – EXILLES TUNNEL





BACKGROUND

Tunnels are an integral part of railway infrastructure. The mechanical deformation that can transpire over time in a tunnel represents a considerable risk to safety, during the tunnel construction phase and when it is operational. It is essential to always have up-to-date information on the stability and reliability of the structure.

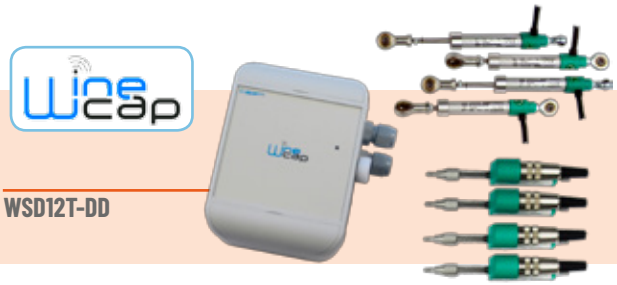
THE SOLUTION

A wireless Capetti Elettronica system consisting of a GSM control unit and **WineCap™** data loggers connected to potentiometer crackmeters was chosen to measure crack conditions in tunnel walls.

THE RESULT

A twofold benefit was achieved with this system:

> ongoing supervision of the relevant parameters during excavations and on completion of the tunnel;
> precise monitoring, thanks to a flexible, automatic data capture system, for optimal monitoring of the structural condition of the works, and prompt, accurate diagnosis of all events that could transpire.



THE WINNING CHOICE

> **WSD12T-DD** (cracks extension)
> **WSD12-4D** (displacement measure)
> **MWDG-GSM** (gateway)

TUNNEL MONITORING

METRO 5 - MILAN







BACKGROUND

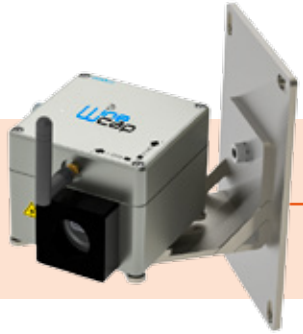
Milan's M5 subway line winds along approximately 25 km of tunnels and connects the Bignami Parco Nord station to San Siro stadium, providing a public transport service that radically reduces road traffic and optimises the urban environment.

THE SOLUTION

A building with underground levels was to be constructed in an area corresponding to the tunnels. Monitoring potential deformation in tunnels is essential for keeping the subway running.
The tunnel was therefore split into cross-sections and five **WineCap™** inclinometer data loggers installed in each.

THE RESULT

The laser distance meters/inclinometers in the **WineCap™** monitoring system checked for deformation via essential convergence measurements in tunnel sections.



WSD15IIDIST-FX

THE WINNING CHOICE

> **WSD15IIDIST-FX** (laser distance meter/inclinometer with multi-way bracket kit)

MONITORING RAILWAYS
PORTO MARGHERA



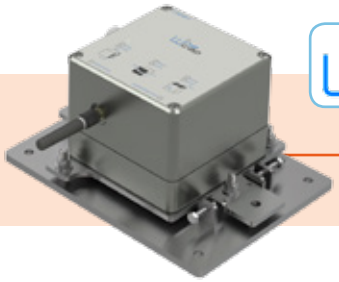




BACKGROUND
As part of Venice's urban regeneration RE.MO.VE project, a system was planned to monitor the stability of bridge beams that support the tracks in the railway section situated in the vicinity of the Porto Marghera station.

THE SOLUTION
The **WineCap™** dual-axial inclinometer data loggers were chosen to monitor the stability of the structure. The sensors are positioned on the vertical walls of the steel beams just beneath track level, and enable the X and Y axes to be checked continually and the temperature measured. Captured data are stored in line with strict railway network standards, and sent continually to the GSM control unit situated in the station offices. The gateway sends the data to the cloud and makes it available to the end user, who has the access credentials.

THE RESULT
The CAPETTI wireless data logging techniques have optimised factors such as data reliability, access to measured values and the cost of taking them.



WSD15TIIDR

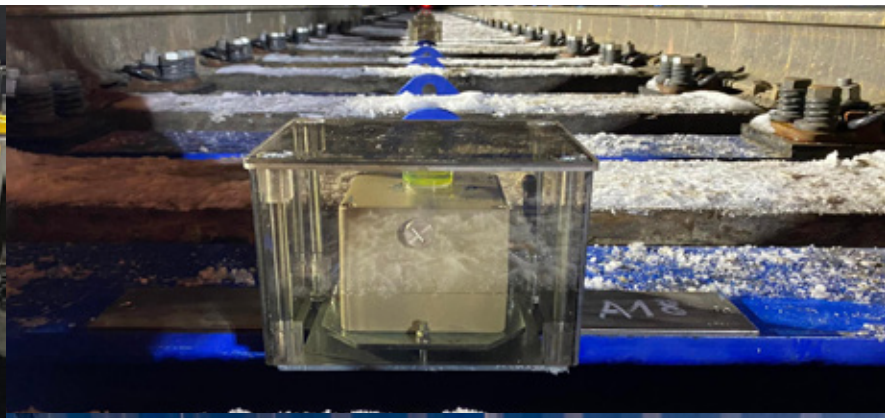
THE WINNING CHOICE
> **WSD15TIIDR** (dual-axis inclination)

> **MWDG-GSM-M5** (railway gateways)

MONITORING RAILWAYS

ONTARIO - CANADA







BACKGROUND

The construction of a Verona System by the company Petrucco required a series of checks to be carried out during the thrust phase involving the underpass beneath a railway section, implemented without interrupting the traffic. One such check involves continually monitoring track skew.

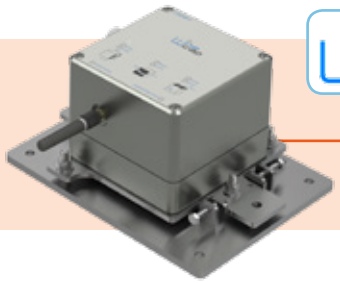
THE SOLUTION

Synthesis offered Petrucco a solution that included **WineCap™** inclinometer data loggers, to continually check the X and Y axes and send the data to the collection gateway.

THE RESULT

The results monitored are displayed on a computer directly on site, for maximum safety control of the railway section. A dedicated web platform was also developed, which can easily be accessed by everyone involved in the operation. In the event of data outside the threshold, the bridge is raised temporarily by a dedicated hydraulic circuit and the correct track geometry is restored.

THE WINNING CHOICE



WSD15TIDR

> **WSD15TIDR** (inclinometer data logger)

MONITORING RAILWAYS

ASTI – NIZZA MONFERRATO RAILWAY LINE





BACKGROUND

Monferrato Piemontese is an area of Italy that features uplands and valleys, with landscapes that are known especially for various vineyards. The Asti-Nizza Monferrato railway line runs through these landscapes from east to west. The company GD Test was commissioned to monitor the tracks potentially affected by embankment movement as a result of operations to create an underpass using a pipe jacking technique. It was deemed appropriate to set up a particularly versatile system of wireless sensors suited to the morphological context and the absence of an electricity supply line.Furthermore, the technical specifications stipulated by RFI (railway operator) required a monitoring system with readout intervals and thresholds handled as quickly as possible, to guarantee safe train operation.

THE SOLUTION

GD Test put its trust in a **WineCap™** monitoring system made up of 21 wireless dual-axis inclinometers, battery-powered and installed on the sleepers to monitor longitudinal and transversal levels, skew at 3 and 9 metres, and other crucial parameters of interest to RFI. Data are transmitted by the system thanks to a gateway that can also be powered by photovoltaic panels, and operates with readout intervals of 5 minutes and customer-defined thresholds. Once monitoring commences, the precision and reliability of the data are very useful and enable prompt decisions if displacement exceeds set threshold values.

THE RESULT

Precision and reliability are two essential factors for a successful railway monitoring system. These two parameters have never been neglected in the relationship between Capetti Elettronica and GD Test that spans decades.



WSD10TII

THE WINNING CHOICE

> **WSD10TII** (IP69 dual-axis inclinometers with zero-point position)

> **MWDG-GSM-M5** (gateway with transmission to Service Centre every 5 minutes)

MONITORING VIADUCTS

SANT'AGATA DE' GOTI





BACKGROUND

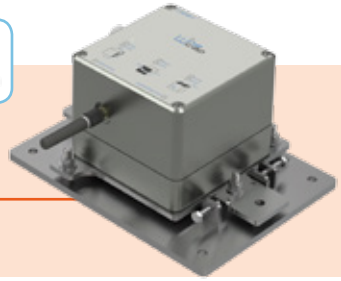
At the beginning of 2019, the Sant'Agata de' Goti (BN) District Council signed up to a project that focuses on innovative technologies to monitor areas under threat from environmental risks (TISMA), through a partnership with an association of industry players and research partners coordinated by Pegaso Open University. Even in the first meeting, the council identified the main subject of analysis and monitoring as the bridge over the Martorano watercourse, which accesses the historic centre.

THE SOLUTION

The site is of particular importance in terms of cultural heritage (the bridge over the Martorano watercourse is the ideal location for observing the historic town perched on the highest wall of tuff). The **WineCap™** dual-axis inclinometers were the instrumentation selected, which have a metal enclosure and guaranteed IP67 grade of protection.

THE RESULT

By means of a remote control unit equipped with a SIM, the information from the data loggers is logged continuously and sent to the cloud. The data can be easily accessed by personnel and maintenance operations can be scheduled in a timely manner.



WSD15TIIDR

THE WINNING CHOICE

> **WSD15TIIDR** (vertical biaxial inclination)

> **MWDG-GSM-B** (constant cloud reporting of the measured quantities)

BRIDGE MONITORING

VAL SENALES





BACKGROUND

There were many objectives - measure existing compression on the bridge beams in question, check maximum beam deflection under load, and subsequently monitor the stress conditions continually.

THE SOLUTION

Tensile testing was chosen to measure current residual prestress conditions, however not by taking the usual core sample of concrete, but rather by using a truncated pyramid sample appropriately set up by means of strain gauges connected to CAPETTI **WineCap™** data loggers. The graphs produced during the strain caused/applied when taking the sample and the με value measured after taking the sample enabled a fairly precise evaluation of beam compression. Static strain gauge testing was then carried out, by measuring deformation with three sensors positioned at the centre and edges of the beam, and applying the weight of lorries, first one and then two (load test). Therefore the calculation did not focus on strain in terms of σ, but on deformation in terms of ε (to understand the compression limit for the part under strain with a certain accuracy).

THE RESULT

In order to monitor the condition of the structure over time, values on the three strategic points are now captured regularly, so that the data can be viewed remotely with automatic alerts. The deterioration of a reinforced concrete bridge is never a sudden phenomenon (sagging cables, corrosion etc.). Techniques such as the one described above are long-term solutions that can avoid costly tomographic investigations.



WSD12T-EX2M3

THE WINNING CHOICE

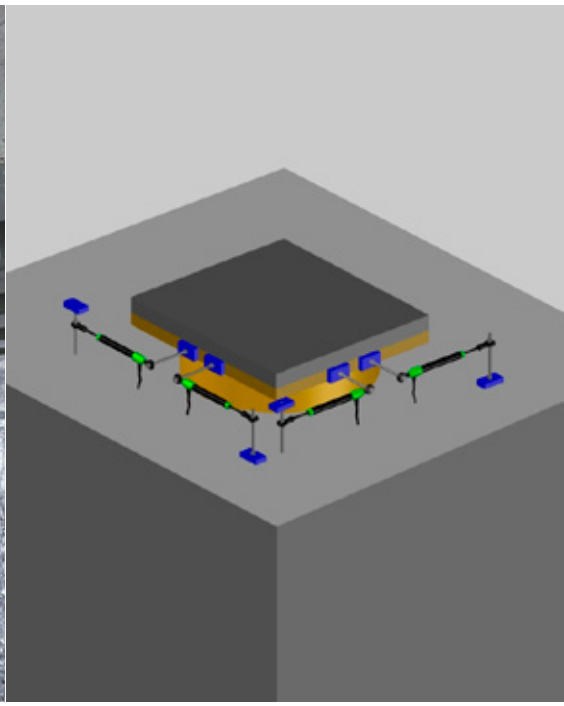
> **WSD12T-EX2M3** (strain gauge datalogger)

> **MWDG-GSM-M3** (load tests gateway)

MONITORING VIADUCTS

MONITORING BEARINGS





BACKGROUND

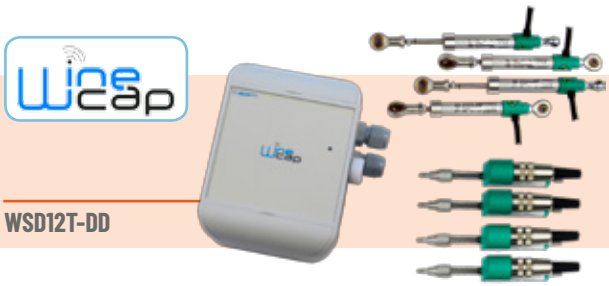
A fundamental aspect in the maintenance of large works is checking the structural integrity of bridges and viaducts. Deciding to carry out effective monitoring is the key to accurately identifying areas to focus on for restoring the overall functionality of infrastructure in good time.

THE SOLUTION

Sacertis Ingegneria designed a system to measure relative bearing-pillar and loadbearing slab-bearing movements, for the purpose of checking for the correct behaviour of the bordering elastomer disc bearings and relevant fittings connected to the structure. More specifically, a pair of linear displacement transducers was installed for each degree of freedom permitted by the bearing (one joined to the pillar and the other to the loadbearing slab), in combination with the **WineCap™** data loggers.

THE RESULT

Consequently it was possible to measure relative movement and obtain the bearing displacement value..



WSD12T-DD

THE WINNING CHOICE

> **WSD12T-DD** (measurement of relative movement)

MONITORING EXCAVATIONS

VILLA ITALIA – LAKE COMO





BACKGROUND

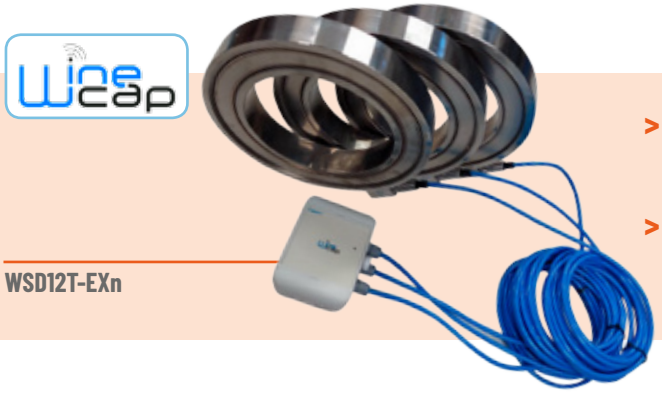
The work was to renovate and extend a historic building in an extremely panoramic position on the shores of Lake Como. The Villa Italia building was built in the first half of the 19th century in the council district of Carate Urio.

THE SOLUTION

Excavations were carried out, with a maximum face of approximately 12 metres, to construct an underground private garage. The load cells were installed on pre-tensioned carbon spring steel tie rods included in the work to support the excavation face, consisting of a retention system of piles and tie rods.

THE RESULT

Thanks to the use of a toroidal load cell and the **WineCap™** monitoring system, it was possible to measure the workload variations undergone by the tie rods and anchoring. This equipment enabled the excavations to be completed safely, by evaluating and monitoring soil forces on the containment structures.



WSD12T-EXn

THE WINNING CHOICE

> **WSD12T-EX6** (strain gauge data logger for load cells)

> **CAP165CE** (electric load cell for tie rods, full scale 1500 KN)

MONITORING TOWERS AND MASTS

VALTOURNENCHE



BACKGROUND

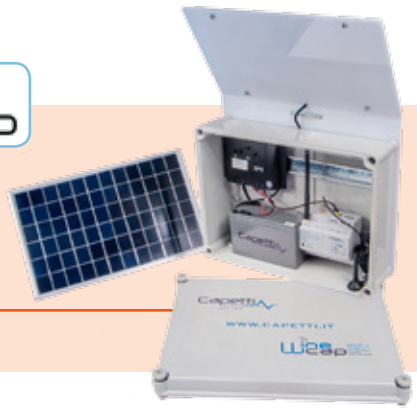
The requirement was to monitor a mast (radio base station) positioned on a slope in a valley in the province of Aosta, because of suspected subsidence of the foundations on the valley side. Aside from widespread oxidation, the structure had actually lost verticality equivalent to 1/186 of the total height of the tower.

THE SOLUTION

The **WineCap™** solution has two components - dual-axis inclinometers with MEMS technology, offering IP67 grade protection, and the MWDG-GSM data collection control unit placed inside the PPS box. The kit is equipped with a 10 W solar panel, lead/calcium battery and 6 A charge regulator, and can therefore operate without a mains power supply.

THE RESULT

The verticality pattern over time is conveniently monitored remotely, by viewing the data through the Service Centre. Furthermore, thanks to the two-way nature of the **WineCap™** protocol, sampling frequency can be changed at any time.



BOX-PPS

THE WINNING CHOICE

> **BOX-PPS** (photovoltaic power supply)

> **WSD15TIIDR** (vertical biaxial inclination)

MOUNTAINSIDE MONITORING
VALSUSA





BACKGROUND
Guaranteeing service continuity for installations in remote areas, where maintenance is difficult to carry out, presents particular challenges. CAPETTI ELETTRONICA can even provide its systems in conditions such as these, thanks to its «SENTINELLA» WSD10DGII data logger. This is powered by an integrated photovoltaic panel to avoid battery replacements, and provides potentially infinite autonomy and excellent performance even with indirect external light conditions.

THE SOLUTION
The **WineCap™** monitoring system for rockfall protection mesh, snow-barriers and general banking protection systems has 4 channels - linear wire strain, peak acceleration and inclination on two axes. In normal conditions inclination and deformation (wire elongation) is transmitted, however if one of the set thresholds is exceeded, the data logger sends the values captured for the 4 channels to the control unit immediately.

THE RESULT
Even customers with the most challenging requirements are satisfied. Thanks to numerous installations with this type of instrumentation, GD Test can monitor important national and international infrastructure with the CAPETTI systems and their own technical expertise.

WSD10DGII

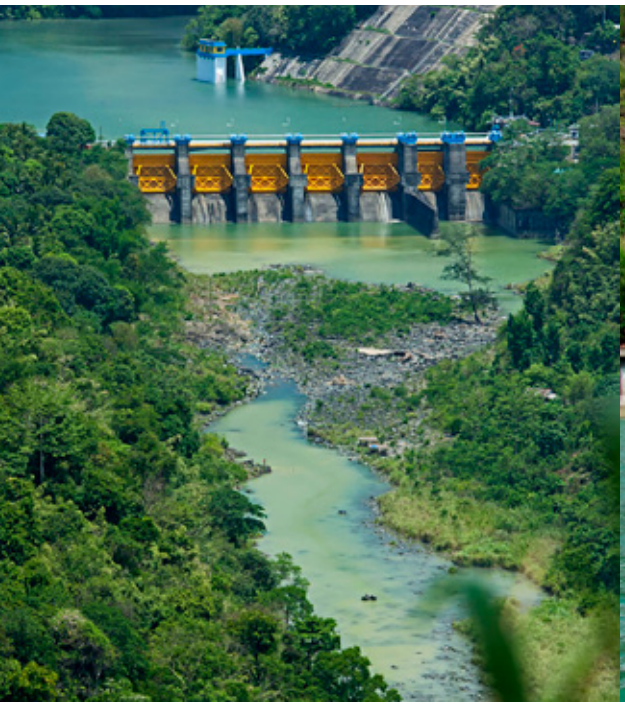


THE WINNING CHOICE

> **WSD10DGII** (biaxial inclination + peak acceleration + linear deformation)

MONITORING DAMS

IPO DAM, NORZAGARAY - PHILIPPINES





BACKGROUND

Ipo Dam is a gravity dam with a concrete water reservoir situated at approximately 7.5 kilometres downstream of the Angat dam within the Angat Watershed Forest Reserve in the Philippines. It was completed in 1984 and has a maximum storage capacity of 7.5 million cubic metres. The spillway level of the dam, which has seven radial gates, is at an altitude of 101 metres. The dam water is diverted to the Novaliches Portal and La Mesa dam.

THE SOLUTION

During the construction of dam protection and containment structures, various structural checks were required to ensure safe working conditions. GD Test put its trust in the **WineCap™** data loggers, installing a monitoring system that could obtain a comprehensive and detailed real-time picture of the situation in terms of displacements and loads.

THE RESULT

Dams are situated between engineering works which are potentially very dangerous, therefore the need to continually monitor their behaviour is recognised universally and accepted in all countries. In the construction and testing phases, checks are designed to meet immediate safety requirements. During operation, monitoring provides information that is useful for identifying the behaviour of the system in its entirety and at particular critical points, and focusing on their evolution over time.

WSD12-4D



THE WINNING CHOICE

> **WSD12T-DD** (size of cracks)

> **WSD12-4D** (measurement of displacement)

> **WSD12T-EX6** (strain gauge data logger/for load cells)

LEVEL MONITORING
SERVICE STATIONS



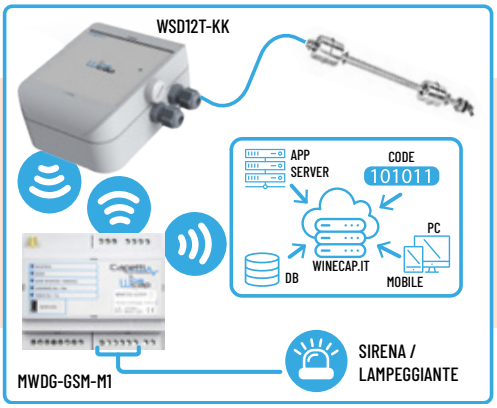




BACKGROUND
For more than 40 years Autogrill has been a world leader in catering services for travellers, with the slogan Feeling Good on the Move. Established in 1977, this Italian multinational operates in 30 countries, manages approximately 3300 outlets, and boasts a portfolio of over 300 brands owned and licensed.

THE SOLUTION
The distribution of domestic water in the network of service stations is managed by hydraulic pumps and tanks, whose level must be monitored continuously to detect operational issues and potential water leaks. The **WineCap™** solution enables system status to be monitored remotely by connecting the gateway to the Service Centre, and locally with the installation of an alarm/flashing light installed in the technical room.

THE RESULT
Capetti Elettronica's wireless system adapts perfectly to monitoring requirements on the motorway network and in town outlets, as it promptly detects status and events changes involving water and electricity.



THE WINNING CHOICE
> **WSD12T-KK** (Outdoor temperature and 2 NC/NO inputs for status and alert integration)

> **MWDG-GSM-M1** (Gateway for local management of system FAIL status and ALERT thresholds with 2 output relays)

Summary of the competitive advantages offered by WineCap™ technology

Ultra-low power (lifetime up to 12 years)

Once installed, no need to replace batteries every year.

Excellent radio range (6 km in line-of-sight)

Extraordinary cover in the field with LuPo technology, even more with LoRa® technology.

Self-powered repeater

Network can be further extended if necessary.

Automatic routing

The system self-configures, seeking the best radio route.

Network listening every second

Even when setting a low sampling time or alert threshold, timely data can be requested or received.

Low-latency battery-powered wireless actuators

Two-way communication, so commands can be sent remotely.



WSA02Rx

Zero electromagnetic pollution

Maximum antenna power of just 10 mW

Combines the best technologies to ensure security and service continuity, such as FHSS, GFSK, CRC16, FEC and DATA WHITENING

If a channel is saturated or disrupted, frequency hopping guarantees data integrity and security.

Access to the WineCap™ Service Centre

Data access and sharing may be local or remote with the appropriate credentials.

Technical courses

CAPETTI ELETTRONICA regularly delivers technical trainings on the use of **WineCap™** wireless technology. Sessions cover the architecture of the monitoring system, sensors and data logging functionality, gateway configuration and customisation, displaying data on the web portal at **www.winecap.it**.

The course calendar is available at **www.capetti.it**, and courses can be attended in person at the Capetti headquarters or online via webinar.

Booking is required by sending an e-mail to **ufficiocommerciale@capetti.it** or calling (+39) 011-9819811.

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Capetti ELETTRONICA DAL 1973





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