



# QM BACKGROUND SUPPRESSION

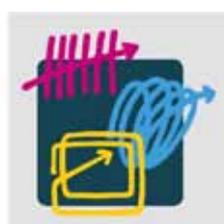
AND NEW INFRARED EMISSION MODELS



Ø4, M5, Ø6,5 & M8  
INDUCTIVE MINIATURIZED

# NEW RETRO-REFLECTIVE ULTRASONIC MODELS

M18, M18 SHORT BODY AND M30!



sps ipc drives

Nuremberg, Germany, 25–27 November 2014



Micro Detectors

Italian Sensors Technology

# EDITORIAL



They say, and we believe it to be true, that it is in hard times, when "the going gets tough", that you can spot great men and women with a good deal of heart, head and guts, and all of them in the right place. Men and women that face the future, its uncertainties and fears with courage. We believe there are many great men and women in M.D., as there is in all companies belonging to Finmasi Group.

This also applies to "true companies", which can only be seen in hard times, when we need to make the biggest efforts in terms of business, organisation, technical aspects, quality, quantity and creativity in order to be among those that will be able to stand on their own feet after the natural selection process related to the deep crisis we are confronted with. These are the times when we need to be strong enough to be different from all the others and propose a new way of doing business in order to face such a radical changes like the ones we are experiencing today. These are the times when we need the instinct and the ability to invest and to change. For all these reasons, we believe that M.D. and all other companies of Finmasi Group can be considered as "true companies".

We believe that the big economic and social crisis that has been affecting the Western World since the end of 2008 can be a great opportunity to correct mistakes and malfunctions arising from the previous economic system. We believe that this crisis allows us above all to discover, or partially re-discover, a new way of working, an innovative approach to work, matching the best current professional values with those that inspired and determined the great economic development in the '60s and '70s (when economic growth was boosted by "healthy" demand, when Italy and Europe produced "genuine" wealth, without increasing public or private debts).

For some time now, market supply has been steadily exceeding demand.

In this situation, the only companies and professional profiles that can move forward are the ones that can constantly prove their value. With facts, not words. When taking strategic decisions as well as in everyday business. Constantly producing Quality and Quantity to the same extent.

Starting from September 2011, M.D. has been changing a lot and we know there is still much room for improvement. With the objective of doing more and better – an objective we have achieved so far – we as a company have been walking on a path marked by the following milestones: Efficiency, Speed, Flexibility and Reactivity, Simplification, Enthusiasm, Technology, Quality and Service. This is the way we are, this is the way we work. We do not wait for problems to be solved, we tackle them. The first person who inspires us to this way of being and doing is our President Marcello Masi.

We want our people to feel tired and satisfied when they go home after work. We want them to start work every day with enthusiasm and motivation. We want them to see their job as an opportunity to do something important for themselves and for others. We want them to actively participate in the creation of an ambitious and challenging project.

In M.D. as well as in all other companies belonging to Finmasi Group, people with responsibilities have to be the first to arrive and the last to leave, they have to be always on the front line and lead their teams and they have to be ready to take risks every day. They have to act first, and then delegate.

In the first nine months of 2014 M.D. Micro Detectors has continued growing, from all points of view. All indicators are positive and constantly improving. The remarkable efforts made by our people are being re-enforced and supported by results, the most important evidence of a company's performance. Our results have been obtained not by accident but thanks to the constant and determined

work of our people. Then of course a little bit of good luck is always useful.

There is no doubt that the integration of all company processes inside the company (from the development of new products and the customization of existing products to shipping), with a focus on manufacturing processes, allowed us to remarkably increase our production capacity, our productivity, our flexibility and our performances in general.

We want to give a contribution for a steady and long-term development of industrial activities in Italy. We want our company to grow and develop in a healthy way. We want that M.D. style (see Editorial in M.D. News no. 4) can be something that makes us always proud of belonging to this company, something that can guarantee everyone working with us – customers, suppliers, financial institutes, consultants or public authorities – that we are a serious, qualified and highly motivated business partner. We want to be there. We believe we can do it. We act and fight everyday to implement our Plan and our Strategy. We want to be a company and business reference model.

Also in this issue you will find news and novelties about M.D. and Finmasi Group. Enjoy the read. Our team is at your disposal for any further information you may need.

**Giacomo Villano**  
Chief Executive Officer

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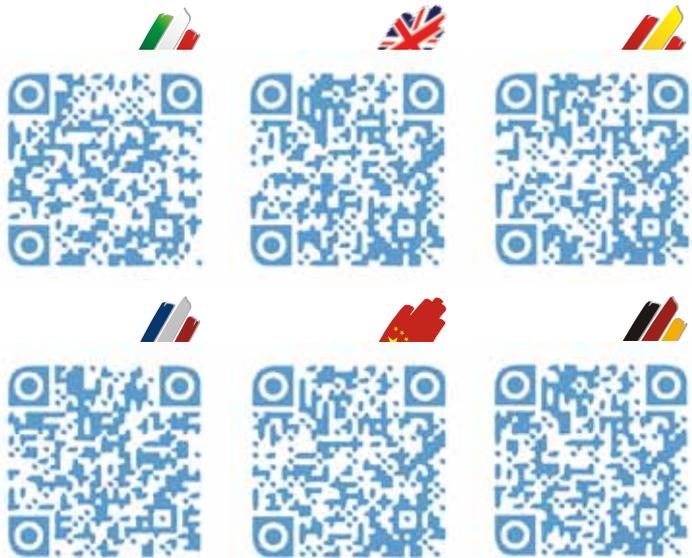
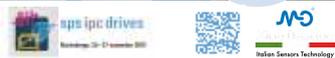




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info@microdetectors.com



# FOLLOW US!



For the very first time since its beginning, in 2015 M.D. Micro Detectors will attend four Exhibitions.

In addition to the German and Italian edition of SPS, MD will take part in SIAF in China and will attend Hispack Exhibition in Barcelona Spain from 21<sup>st</sup> to 24<sup>th</sup> of April for the very first time.

Please contact us to arrange a meeting.



Executive Hotel

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Web: www.hotel-executive.eu



"Il Fiorano" Restaurant

Via Circondariale S. Francesco, 2  
41042 Fiorano Modenese (MO) - ITALY

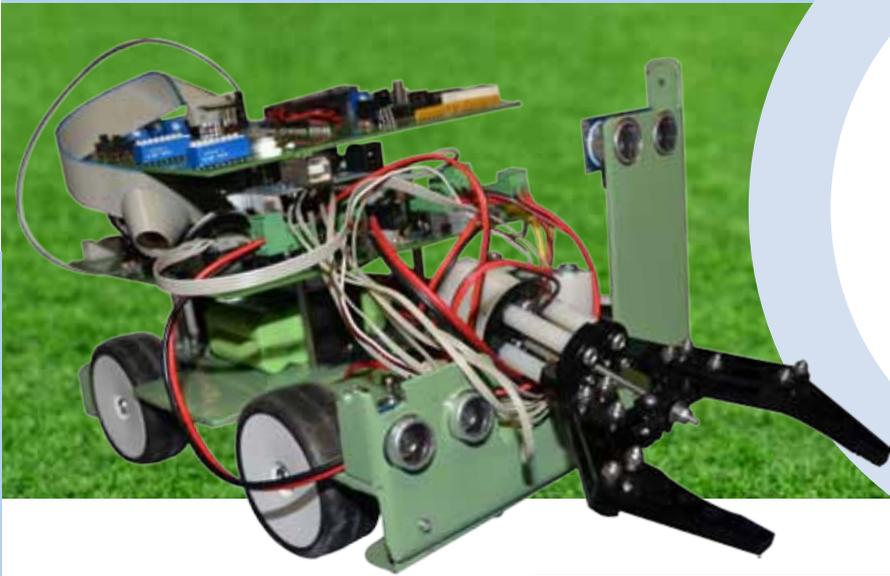
Tel.: +39 0536 030013  
E-mail: info@ristorantellifiorano.it  
Web: www.ristorantellifiorano.it

**Executive Hotel** is a 4-star-hotel, belonging to Finmasi Group, located at the feet of Modena hills, in the so called "motor valley".

It is a **Comfortable** facility and its flagships are **Reception, Service and Courteousness.**

This Hotel is provided with a restaurant open to the public, Il Fiorano, where all **Traditional Cuisine** lovers can satisfy their appetite in an **Elegant and Warm** location.

# TRAINEE PROGRAM



Last year M.D. Micro Detectors intensively collaborated with high schools and universities, giving students a chance to improve their skills and to implement what they had studied.

With its "Trainee Program", M.D. recently supported a team of young Electronics students from "Enrico Fermi" Technical Institute (Modena) who participated in the event "Robocup Jr ITALIA".

The aim of the initiative was the realisation of a robot, for which the needed PCBs were produced for free, thus allowing students to take part in the contest in the section "Rescue". This robot should quickly and accurately identify victims in artificially created disaster scenarios of different complexity levels, from simple linear paths on even surfaces (guided path) to moving among obstacles on uneven surfaces (free path).

Even though they did not win the contest, which took place in Pisa from the 9<sup>th</sup> to the 12<sup>th</sup> of April, the two participants Elia Bertani and Andrea Bertolani were very satisfied with their experience. Congratulations from all of us at M.D. Micro Detectors!

## M.D. trainee programme – The digits

Starting from October 2013, M.D. has been implementing a "Trainee Programme", featuring strong collaborative connections to several local technical high schools and to the University of Modena and Reggio Emilia. Purpose of these networking activities is to create a structured collaboration between the world of education and the company itself.

We collaborate with following technical high schools and institutes:

- I.T.I.S. Enrico Fermi
- I.T.I. Leonardo Da Vinci
- I.T.I.S. Fermo Corni
- NUOVA DIDACTICA - Confindustria Modena
- University of Modena and Reggio Emilia

Opportunities for students and schools:

- internships at M.D. Micro Detectors
- classroom seminars
- visits to M.D. Micro Detectors
- summer jobs
- support for research activities
- Introduction of students to the work environment

17 trainees - 1.500 hours in M.D.



Internships at MD with a focus on:



Please mail to:  
[info@microdetectors.com](mailto:info@microdetectors.com),  
 for attention of  
 Roberto Bosani  
 R&D Department Manager





# QM

## NEW INFRARED EMISSION AND BACKGROUND SUPPRESSION MODELS



The QM miniaturized cubic Photoelectric Sensor family has been enhanced with the introduction of the following new models:

### Infrared Emission:

- QMI7 and QMI9, diffuse, with working distance up to 1.5 m;
- QMIC, retro-reflex, with working distance up to 7 m;
- QMIG, retro-reflex for transparent objects, with working distance up to 1 m;
- QMIHD, through-beam, with working distance up to 30 m;

### Background suppression with mechanical adjustment:

- QMRS, high-intensity red emission, up to 200 mm
- QMIS, infrared emission, up to 400 mm

These new models complete the existing QM family already present in our catalogue. The QM series is characterized by ease of use, reliability and excellent reading performances, as with all M.D. Micro Detectors products. The new BGS models have a very high performance level thanks to their multi-turn mechanical adjustment and 1 kHz switching frequency, allowing an accurate and

repeatable object detection. The adjustment range is 30-200 mm for the red light emission model and 30-400 mm for infrared emission version, which makes these sensors a suitable solution for a great number of applications. This product is available with PNP or NPN output and with either a cable exit, M8 4pin plug or a pigtail fitted with an M8 or M12 plug.

Thanks to the optical triangulation technology, the "background suppression" function allows the detection of different color objects at the same distance, because it drastically reduces the sensor dependence on the amount of light being reflected by the object itself. With the introduction of these new background suppression and infrared emission models, the QM series becomes one of the most complete and high performance cubic miniaturized sensor families on the Market.

### Main features:

- Housing dimension: 21 x 12.8 x 31.2 mm
- Emission by LEDs, either high-intensity RED or INFRARED light
- Plastic housing material: PA66
- Front optical head material: PMMA
- 2 kHz switching frequency
- Connection, Cable, M8 plug or "pig-tail" (both M8 and M12)
- IP67 mechanical protection degree

- Working range: -25°C ...+70°C.

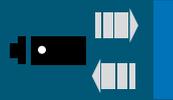
### Fields/Applications:

- Packaging
- Logistics
- Automated warehouses
- Ceramics Industry
- Textile Industry
- Wood Industry
- Glass Industry
- Industrial Automation



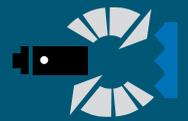
## technical specifications

direct diffuse models



## technical specifications

retro-reflective models



	QMI7/0*-0*	QMI9/0*-0*
nominal sensing distance Sn	400 mm <sup>(1)</sup>	1,500 mm <sup>(1)</sup>
sensitivity adjustment	●	
emission	infrared (850 nm)	
light-dark selection	●	
minimum detectable object	—	
differential travel	≤ 10%	
repeat accuracy	5%	
operating voltage	10-30 Vdc	
ripple	≤ 10%	
no-load supply current	≤ 45 mA	
load current	≤ 100 mA	
leakage current	≤ 10 µA	
output voltage drop	2 V max. @ 100 mA	
maximum load current	≤ 100 mA	
output type	PNP o NPN NO o NC	
switching frequency f	2 kHz	1 kHz
supply electrical protections	polarity reversal, overvoltage pulses	
output electrical protection	short circuit (auto reset), overvoltage pulses	
operative temperature range	-25 °C...+70 °C (without freezing)	
thermal drift	-30 °C...+80 °C	
interference external light	10,000 lux sunlight 3,000 lux incandescent lamp	
protection degree	IP67 (EN60529) <sup>(4)</sup>	
LED indicators	yellow (output state LO/DO), green (excess gain)	
time delay before availability	≤ 100 ms	
housing material	PA66	
optic material	PMMA	
tightening torque	1 Nm <sup>(3)</sup>	
weight (approx)	52 g cable, 10 g M8 plug	

<sup>(1)</sup> White target 100 x 100 mm

<sup>(2)</sup> White target 200 x 200 mm

<sup>(3)</sup> White target 400 x 400 mm

<sup>(4)</sup> Protection guaranteed only with plug cable well mounted

	QMIC/0*-0*
nominal sensing distance Sn	7 m <sup>(1)</sup>
sensitivity adjustment	●
emission	infrared (850 nm)
light-dark selection	●
minimum working distance	0,02 m @ RL 110
differential travel	≤ 10%
repeat accuracy	5%
operating voltage	10-30 Vdc
ripple	≤ 10%
no-load supply current	≤ 45 mA
load current	≤ 100 mA
leakage current	≤ 10 µA
output voltage drop	2 V max. @ 100 mA
maximum load current	≤ 100 mA
output type	PNP o NPN NO o NC
switching frequency f	2 kHz
supply electrical protections	polarity reversal, overvoltage pulses
output electrical protection	short circuit (auto reset), overvoltage pulses
operative temperature range	-25 °C...+70 °C (without freezing)
thermal drift	-30 °C...+80 °C
interference external light	10,000 lux sunlight 3,000 lux incandescent lamp
protection degree	IP67 (EN60529) <sup>(4)</sup>
LED indicators	yellow (output state LO/DO) green (Excess gain)
time delay before availability	≤ 100 ms
housing material	PA66
optic material	PMMA
tightening torque	1 Nm <sup>(3)</sup>
weight (approx)	52 g cable, 10 g M8 plug

<sup>(1)</sup> White target 100 x 100 mm

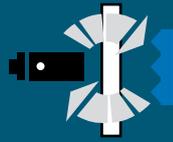
<sup>(2)</sup> White target 200 x 200 mm

<sup>(3)</sup> White target 400 x 400 mm

<sup>(4)</sup> Protection guaranteed only with plug cable well mounted

## technical specifications

retro-reflective models  
for transparent objects



## technical specifications

through beam models



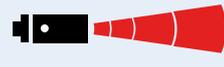
	QMIG/0*-0*
	
nominal sensing distance $S_n$	1 m <sup>(1)</sup>
sensitivity adjustment	●
emission	infrared (850 nm)
light-dark selection	●
minimum detectable object	0.05 m @ RL 110
differential travel	≤ 10%
repeat accuracy	5%
operating voltage	10-30 Vdc
ripple	≤ 10%
no-load supply current	≤ 45 mA
load current	≤ 100 mA
leakage current	≤ 10 μA
output voltage drop	2 V max. @ 100 mA
maximum load current	≤ 100 mA
output type	PNP or NPN NO or NC
switching frequency $f$	2 kHz
supply electrical protections	polarity reversal, overvoltage pulses
output electrical protection	short circuit (auto reset), overvoltage pulses
operative temperature range	-25 °C...+70 °C (without freezing)
thermal drift	-30 °C...+80 °C
interference external light	10,000 lux sunlight 3,000 lux incandescent lamp
protection degree	IP67 (EN60529) <sup>(4)</sup>
LED indicators	yellow (output state LO/DO) green (excess gain)
time delay before availability	≤ 100 ms
housing material	PA66
optic material	PMMA
tightening torque	1 Nm <sup>(3)</sup>
weight (approx)	52 g cable, 10 g M8 plug

<sup>(1)</sup> White target 100 x 100 mm

<sup>(2)</sup> White target 200 x 200 mm

<sup>(3)</sup> White target 400 x 400 mm

<sup>(4)</sup> Protection guaranteed only with plug cable well mounted

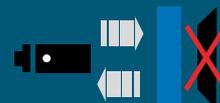
	emitter	reciever
	QMIIH/0*-0*	QMID/0*-0*
		
nominal sensing distance $S_n$	30 m <sup>(1)</sup>	
sensitivity adjustment	●	—
emission	infrared (850 nm)	—
light-dark selection	—	●
time delay before availability	≤ 100 ms	
differential travel	≤ 10%	
repeat accuracy	5%	
operating voltage	10-30 Vdc	
ripple	≤ 10%	
no-load supply current	≤ 45 mA	
load current	—	≤ 100 mA
leakage current	—	≤ 10 μA
output voltage drop	—	2 V max. @ 100 mA
maximum load current	—	≤ 100 mA
output type	—	PNP or NPN NO or NC
switching frequency $f$	2 kHz	
supply electrical protections	—	polarity reversal, overvoltage pulses
output electrical protection	—	short circuit (auto reset), overvoltage pulses
operative temperature range	-25 °C...+70 °C (without freezing)	
thermal drift	-30 °C...+80 °C	
interference external light	10,000 lux sunlight 3,000 lux incandescent lamp	
protection degree	IP67 (EN60529) <sup>(4)</sup>	
LED indicators	yellow (output state LO/DO) green (excess gain)	
housing material	PA66	
optic material	PMMA	
tightening torque	1 Nm <sup>(3)</sup>	
weight (approx)	52 g cable, 10 g M8 plug	

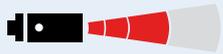
<sup>(1)</sup> White target 100 x 100 mm

<sup>(2)</sup> White target 200 x 200 mm

<sup>(3)</sup> White target 400 x 400 mm

<sup>(4)</sup> Protection guaranteed only with plug cable well mounted



	QMRS/O*-O*	QMIS/O*-O*
nominal sensing distance Sn	 30...200 mm <sup>(1)</sup>	 30...400 mm <sup>(1)</sup>
sensitivity adjustment	● (4 turns)	
emission	red (880 nm)	infrared (880 nm)
light-dark selection	●	
minimum detectable object	—	
differential travel	≤ 10%	
repeat accuracy	5%	
operating voltage	10-30 Vdc	
ripple	≤ 10%	
no-load supply current	≤ 30 mA	≤ 45 mA
load current	≤ 100 mA	
leakage current	≤ 10 µA	
output voltage drop	2 V max. @ 100 mA	
maximum load current	≤ 100 mA	
output type	PNP or NPN NO or NC	
time delay before availability	200 ms	
supply electrical protections	olarity reversal, overvoltage pulses	
output electrical protection	short circuit (auto reset), overvoltage pulses	
operative temperature range	-25 °C...+70 °C (without freezing)	
thermal drift	-25 °C...+80 °C	
interference external light	10,000 lux sunlight 3,000 lux incandescent lamp	
protection degree	IP67 (EN60529) <sup>(4)</sup>	
LED indicators	yellow (output state LO/DO)	
housing material	PA66	
optic material	PMMA	
tightening torque	1 Nm <sup>(3)</sup>	
weight (approx)	52 g cable, 10 g M8 plug	

<sup>(1)</sup> White target 100 x 100 mm

<sup>(2)</sup> White target 200 x 200 mm

<sup>(3)</sup> White target 400 x 400 mm

<sup>(4)</sup> Protection guaranteed only with plug cable well mounted

## detection of coffee pods on conveyor



Market Field: PRODUCTION OF COFFEE

Solution: thanks to the optical triangulation technology, it is possible to obtain an accurate object detection despite its colour.

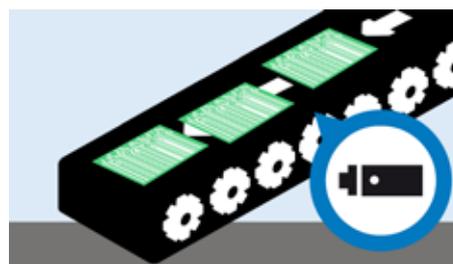
## case detection



Market Field: AUTOMATIC MACHINES

Solution: thanks to the optical triangulation technology, it is possible to obtain an accurate case detection despite its colour.

## detection of PCBs



Market Field: PCB PRODUCTION

Solution: The sensor is installed below the conveyors and it can accurately detect the presence of PCB despite its color.

# MD HISTORY



Among the secrets of a successful company is finding the right balance between the union and the excellence of the products, the organization and the people who belong to it. M.D. Micro Detectors has built its business assets and their fortunes on products and on an excellent level of service, as well as an organization consisting of a multitude of men and women inspired by the passion for the work, challenges and technology.

Attilio Bugamelli, Head of Engineering and Industrialization Department, is an absolute level technician and an excellent professional who has a deep-rooted in his DNA work culture. He is a person of great depth that thrives on passions, values, sense of the challenges and the teamwork. It is a pragmatic man, with an extreme sensitivity, always willing to help others.

Attilio Bugamelli is one of the pillars of our company and is at the same time the embodiment of Emilian Model of economic development. Emilia Romagna is a region with a high rate of economic development, in which the quality of life stood at high levels. For many decades, this part of Italy has been breeding ground for thousands of entrepreneurs and inventors, large and small, as well as prominent personalities, known throughout the world for their businesses. It was also the breeding ground for tens of thousands of skilled technicians

and workers of the highest order. Here, people have a strong work ethic, are open, generous, friendly and welcoming. They are in love with life and always looking for new challenges. They are able to combine a strong sense of duty with the propensity to enjoy the pleasures of life.

Moreover, people have very strong skills concerning the industrial automation: in fact, this area is famous all around the world for its Technological patrimony.

We meet Attilio Bugamelli in his "kingdom": the new M.D. Micro Detectors factory, which he helped to build up, inch by inch, both from the design and executive point of view.

## Who is Attilio Bugamelli?

I was born on September 8, 1955 in an area of the Bolognese Apennines, "Monte delle Formiche". Mine was a family of farmers used to working hard, faithful to their ideas even when it meant going against the established order (and thus paid during the Fascist period). The war had taken away a lot of material things and also my grandfather (who died in an air raid) and so is my family found itself in a state of great destitution. My father, the youngest of five brothers, decided to go and seek his fortune elsewhere, moving in 1958 to Cadriano, in the countryside near the

city of Bologna. Farming continued to be the source of livelihood of my family.

Thanks to the efforts of my parents, I was able to undertake a course of study that led me to achieve in 1974, the diploma in electronics at Aldini Valeriani Professional Institute of Bologna, one of the oldest technical schools in Europe, which since 1844 has baked whole generations of engineers who have made the fortunes of our industrial areas.

## How did your passion for electronics?

In my day the most popular address was mechanics. At the end of two years, I chose electronics because I was attracted by its higher level of difficulty (to access it needed a 8/10 GPA), and because I was curious about this discipline. Finally, I must admit that even the significant presence of female students had helped to guide my choice.

My natural interest in Electronics greatly increased thanks to the professionalism and expertise of my professors at school. I particularly remember with great pleasure Professor Pezzi, who introduced me, like many other students, the use of semiconductors in an age where valves were much more "popular" and used.

## When and how did you start working for M.D. Micro Detectors?

Since the age of fifteen, during the summer, I went to work by local artisans, and I learned to use the machine tools. Then, as soon as I graduated high school, I was fortunate to find a job in a local company that produces machines for ceramics, the BBG. Thanks to this company I got in touch with the world of applied electronic, and above all, with the technicians of the company Diell that was supplying to us the photocells, in the persons of Mauro Del Monte and Professor Iori.

Ever since when they TFT was founded in Modena, Professor Iori asked me to join in their team. The TFT was established to produce circuits in thick film technology, the unique capable to guarantee the miniaturization level required for the production of M18 tubular photocells. At the time, it was 1981, I was not yet 26 years old and I had just married. Attracted by brilliance and competence and of those people, I accepted the challenge and decided to deal with the inconvenience of distance. At the time I was traveling with my Autobianchi A112. The distance traveled to go to work did not bother me since, traveling in the car, I could grow another of my great passions: rock music.

## You have been collaborating with M.D. for many years: could you please describe which positions you have covered inside the company during last years?

From 1981 to 1990, at first, I was a technician of the production area, then I became the Production Manager in TFT. I held this role even after 1990, when TFT merged in M.D..

In 1996, for purely personal reasons, I took a radical decision: I resigned and went to farm the family land. The ever-recurring cycles of human history? Return to the roots? Of course for almost 10 years, electronics and industrialization concepts completely abandoned my daily life and my thoughts.

In 2005 I returned to M.D. returning to industrialization world.

## What's your role today into M.D. company?

Since the end of 2010, I am the Engineering and Industrialization Manager. The first task involves the management of the team in charge of new products and new special versions/cutoms products industrialization process. This is my passion. My daily job involves many "on-the-field activities": this is M.D. style. Testing a new product just released by R&D department is the best way to "try" it. It's a fundamental activity to improve the product and to develop the production processes.

Furthermore, I have the responsibility of maintenance and security team and activities.

## What are the activities you have undertaken in this long period of which you should be most proud of?

From my personal point of view, the Lean Activity has been very satisfying (*Editor's note: Attilio Bugamelli was one of the prominent elements in the design and the practical implementation of all 15 new production lines, as well as the complete makeover of the factory lay-out*). Changing everything in such a short time and with these results: a huge satisfaction!

Embracing Lean Manufacturing principle was at the beginning a real hurricane because he questioned the way and the organization of work we have implemented over the years. I'm not ashamed to say that at first it was a setback for me. Accepting the concept of totally producing one piece at a time (following the one piece flow methodology) was something difficult, even just to think about. Working without the end products warehouse that got behind you? Something unbelievable.

Going back into the years, I remember with pleasure that since 1986, inside TFT company, we started to create a workgroup that, thanks to technical skills and working approach, gave us and the whole company great satisfactions. The most individuals of that group still shape the spine of our production plant.

## What do you like the most about your work from a professional and personal point of view?

From the professional point of view, I feel gratified all the times I see our work put in place. The introduction of a new product inside the factory in a linear, efficient and effective way is something really fulfilling.

From the personal point of view, for me it is important to establish solid and durable relationship with all my colleagues. I like sharing professional values and the way to deal with all our common daily challenges.

## Do you remember any particular episode of your past?

There is not any particular episode, I mean, there are so many episodes marked in my mind. If I described only one of them I would lessen all the others. I would anyway underline that there is a special person I owe so much under professional point of view: Mr. Mauro Del Monte. During the years an excellent relationship has grown with him, from both professional and human point of view.



Attilio Bugamelli

Manufacturing Engineering and Maintenance Services Manager

In your opinion, in what does M.D. excel and for what reasons you should buy M.D. products?

It's a company that has been able to get back into the game and start again almost from scratch. Relying on solid technical and human heritage, we have not been afraid to challenge them and change much, with the goal of starting a new growth path that, in this difficult market environment, takes on even greater value.

I also like the fact that we have changed a lot in a short period of time. The times from decision to execution, have become increasingly shorter.

In your opinion, how is technology evolving in this sector? Where are we heading?

M.D.'s products quality is, since years, unquestionably recognized on the Market. In the last three years we have worked to combine this fundamental characteristic with a flawless service level that distinguishes us from our competitors. Excellence and speed have become the "Trademarks" in all company areas, are competitive and fundamental elements on which we play the survival and development of the next few years.

Develop and industrialize in few time a huge number of new and customized products, as M.D. did and does, is for us reasons of proud and, at the same time, a need that born from the competitive panorama.

What in your opinion does M.D. excel in and why buy M.D. products?

M.D. products quality is indisputably recognized on the Market. Over the past three years we have worked to accompany this fundamental characteristic with a flawless service level which distinguishes us from our competitors. Excellence and speed have become the "Trademarks" in all company areas, are competitive and fundamental elements on which we play the survival and development of the next few years.

Develop and industrialize in such a short time a large number of new products and customs, as it has done and will continue to do M.D., is for us reasons of proud and, at the same time, a need that born from the competitive scenario.

What does Attilio Bugamelli suggest to young people approaching the world of work for the first time?

The world of work is changed so much in the last five years. Young people should learn to live with less certainty than the ones my generation had. They need to get used to a great mobility.

I recommend them to experience work as one of the most important things in their life like, for example, the family. The work is an important part of human life. The time you spend at work is the greatest part of your day: it is important to work with passion and satisfaction. There's no material thing that can give to you a similar satisfaction as your job.

Referring to my life, my father passed down to me the work value very soon, independently from its contents. My father has settled inside me the passion for work, whichever it was: independently from the work done, he has transmitted to me the approach of finding and developing the positive side and solving and mitigating the negative one.

What does Attilio Bugamelli suggest to a youth approaching the sensors world?

The world of sensors and in general the industrial automation sector is extremely professional, interesting and lively. Moreover, it is a constantly growing sector, especially in our regions. That provides a lot of job opportunities for young people. So I'd suggest that they approach this sector with enthusiasm.

Allow me also to suggest that they approach this like any other job, with a lot of passion and professionalism, while maintaining a "working well" approach rather than aimed "to make a career."





# Q50 NEW COMPACT SENSORS



The new series of **Photoelectric Sensors Q50**, size of **50 x 50 mm**, includes a wide range of versions: **Direct Diffuse model with working distance up to 2 m**, **Background Suppression model up to 500 mm**, **Polarized Retro Reflective model up to 6 m** and a **through-beam version (emitter and receiver) with sensing range of 20 m**.

Q50 series is available with different configurations:

- **VDC models with NPN/PNP selectable logic and NO+NC complementary outputs** meets all customer's needs related to the output state thanks to a single extremely flexible product; at the same time they are the ideal solution to reduce number of versions to optimize stock management.
- **VDC/VAC multi-voltage models with relay output NO/NC**, thanks to its compact dimensions, equipped with **M12 rotating connector or pre-cabled version** allow installation in extremely narrow spaces.

The clearly visible red LED spot enables an easy alignment and quick installation.

The IP67 Mechanical Protection degree as well as CE and UL approvals, profile the product. The introduction of this new series en-

larges the photoelectric sensors family confirming M.D. Micro Detectors as ideal partner for the automation field.

## Main features:

- Housing dimensions: **50 x 50 x 17 mm**
- Diffuse reflection of **up to 2 m**
- Background suppression **120 ... 500 mm**
- Polarized retro-reflective version **up to 6 m**
- Through-beam (emitter/receiver) **up to 20 m**
- Both **red** and **infrared LEDs** emission versions available
- Plastic case material: **PC/ABS**
- Front optical face material: **PMMA**
- Switching frequency of up **500 Hz**
- Both **pre-cabled** and **M12 rotating connector** exit types available.
- Models with **NPN+PNP, NO+NC outputs** or **SPDT relay, NO/NC outputs**
- **IP67** mechanical protection degree
- Working temperature range: **-25°C ... +60°C**

## Fields/Applications:

- Packaging Industry
- Material Handling/Logistics
- Automated Warehouses
- Woodworking Industry
- Glass Industry
- Manufacturing

Q50	
dimensions	17 x 50 x 50 mm
background suppression	120... 500 mm
diffuse long distance	2,000 mm
polarized	6 m
barrier	20 m
switching frequency	20 Hz - 500 Hz
LED emission	IR / red
axial optic	•
radial optic	•
Vdc power supply	•
Vca power supply	•
output type	NPN - NO + NC or PNP - NO + NC or SCR
temperature range	-25 °C...+60 °C
protection degree	IP67
housing material	PC / ABS
active head material	PMMA
output	cable or M12 plug
certifications	CE, UL



# INDUCTIVE MINIATURIZED SENSORS



M.D. Micro Detectors, always in the continuous development and widening its Proximity Sensor Family, is introducing the new miniaturized inductive sensors:

- AC1 series = Ø4
- AD1 series = M5
- AHS series = Ø 6.5
- AES series = M8

Through the introduction of these new models, today the M.D. Micro Detectors Proximity product portfolio is established as one of the most competitive and complete in the Industrial Automation Market. M.D. Micro Detectors is one of the few companies able to develop directly a complete range of miniaturized inductive sensors. The new miniaturized inductive sensors are now available as shielded versions, with both standard and long distance extended sensing range. Their working distances are as follows:

- AC1 and AD1 series: 0.8 mm (standard detecting range versions) and 1.5 mm (long distance detecting range versions)
- AHS and AES series: 1.5 mm (standard detecting range versions) and 2 mm (long distance detecting range versions)

All models are supplied with stainless steel housings, which makes them an ideal solution for any harsh application environment; the extremely

small dimension and high switching frequency (up to 7 kHz) make these models particularly precise and repetitive during the detection phase. Available with NPN or PNP outputs, NO or NC logic and either 2 m cable or M8 plug; all models are available with CE and UL certification. These products are completely "Made in Italy", as they have been developed and manufactured in our Modena facilities.

## Main features

- Extremely reduced dimensions, easy to install in applications where space is a premium
- Cable or M8 plug versions, suitable for all connection needs
- Stainless steel housing, high torque tightening for a safe installation
- IP67 protection degree, no way for dust and liquid to penetrate inside the sensor
- Switching frequency up to 7 KHz, precise and repeatable detection of small and fast moving objects
- Single or double sensing distance
- UL certified models

## Typical applications

- Industrial robots
- Machines for metal working
- Textile Industry
- Packaging Industry
- Manufacturing



# technical specifications

## inductive miniaturized sensors



	AC1/**-1*	AC1/**-3*
nominal sensing distance $S_n$	0.8 mm	1.5 mm
hysteresis	1 ÷ 20%	
standard target	4 x 4 mm	4.5 x 4.5 mm
repeatability	5% @UB=20 ÷ 30 V; Ta = 23°C ±5°C	
operating voltage	10...30 Vdc	
ripple	≤ 10%	
output current	≤ 100 mA	
output voltage drop	≤ 1.5 V @ 100 mA	
no-load current	≤ 10 mA	
leakage current	≤ 10 µA	
switching frequency	7 kHz	
time delay before availability	≤ 50 ms	
temperature range	-25°C ÷ +70°C	
thermal drift	≤ 10%	
supply electrical protection	polarity reversal	
output electrical protection	short circuit (auto reset), overvoltage pulses	
EMC compatibility	conforming to EC Directive 2004/108/EC requirements according to EN60947-5-2	
protection degree	IP67	
housing material	stainless steel AISI 303	
active head material	PBT	
reduction factor	—	
LED indicators	on (yellow LED)	
weight	30 g (cable); 4 g (M8 plug)	

	AD1/**-1*	AD1/**-3*
nominal sensing distance $S_n$	0.8 mm	1.5 mm
hysteresis	1 ÷ 20%	
standard target	5 x 5 mm	
repeatability	5% @UB=20 ÷ 30 V; Ta = 23°C ±5°C	
operating voltage	10...30 Vdc	
ripple	≤ 10%	
output current	≤ 100 mA	
output voltage drop	≤ 1.5 V @ 100 mA	
no-load current	≤ 10 mA	
leakage current	≤ 10 µA	
switching frequency	7 kHz	
time delay before availability	≤ 50 ms	
temperature range	-25°C ÷ +70°C	
thermal drift	≤ 10%	
supply electrical protection	polarity reversal	
output electrical protection	short circuit (auto reset), overvoltage pulses	
EMC compatibility	conforming to EC Directive 2004/108/EC requirements according to EN60947-5-2	
protection degree	IP67	
housing material	stainless steel AISI 303	
active head material	PBT	
reduction factor	—	
LED indicators	on (yellow LED)	
weight	30 g (cable); 4 g (M8 plug)	

# technical specifications

inductive miniaturized sensors

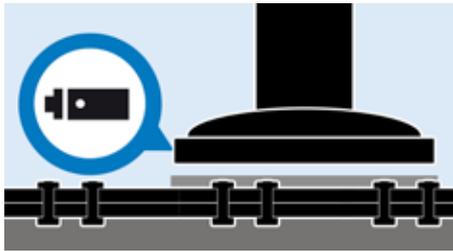


**INDUCTIVE MINIATURIZED SENSORS**

	AHS/**-1*	AHS/**-3*
nominal sensing distance Sn	1.5 mm	2.0 mm
hysteresis	1 ÷ 20%	
standard target	6.5 x 6.5 mm	
repeatability	5% @UB=20 ÷ 30 V; Ta = 23°C ±5°C	
operating voltage	10...30 Vdc	
ripple	≤ 10%	
output current	≤ 100 mA	
output voltage drop	≤ 1.5 V @ 100mA	
no-load current	≤ 10 mA	
leakage current	≤ 10 µA	
switching frequency	7 kHz	
time delay before availability	≤ 50 ms	
temperature range	-25°C ÷ +70°C	
thermal drift	≤ 10%	
supply electrical protection	polarity reversal	
output electrical protection	short circuit (auto reset), overvoltage pulses	
EMC compatibility	conforming to EC Directive 2004/108/EC requirements according to EN60947-5-2	
protection degree	IP67	
housing material	stainless steel AISI 303	
active head material	PBT	
reduction factor	—	
LED indicators	on (yellow LED)	
weight	30 g (cable); 4 g (M8 plug)	

	AES/**-1*	AES/**-3*
nominal sensing distance Sn	1.5 mm	2.0 mm
hysteresis	1 ÷ 20%	
standard target	8 x 8 mm	
repeatability	5% @UB=20 ÷ 30 V; Ta = 23°C ±5°C	
operating voltage	10...30 Vdc	
ripple	≤ 10%	
output current	≤ 100 mA	
output voltage drop	≤ 1.5 V @ 100mA	
no-load current	≤ 10 mA	
leakage current	≤ 10 µA	
switching frequency	7 kHz	
time delay before availability	≤ 50 ms	
temperature range	-25°C ÷ +70°C	
thermal drift	≤ 10%	
supply electrical protection	polarity reversal	
output electrical protection	short circuit (auto reset), overvoltage pulses	
EMC compatibility	conforming to EC Directive 2004/108/EC requirements according to EN60947-5-2	
protection degree	IP67	
housing material	stainless steel AISI 303	
active head material	PBT	
reduction factor	—	
LED indicators	on (yellow LED)	
weight	30 g (cable); 4 g (M8 plug)	

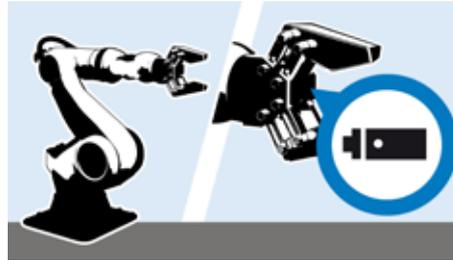
detection of correct positioning of all mould parts



Market field: PRINTING INDUSTRY

Solution: detection of positioning metallic guides.

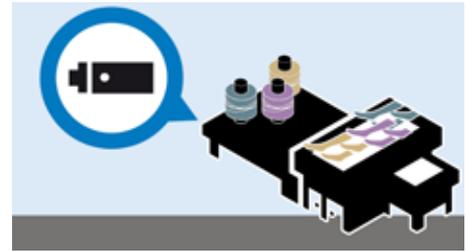
object detection between the robot pincers



Market field: INDUSTRIAL ROBOTS

Solution: direct detection of metal targets; thanks to their small dimensions it is possible to install the sensors inside the pincers.

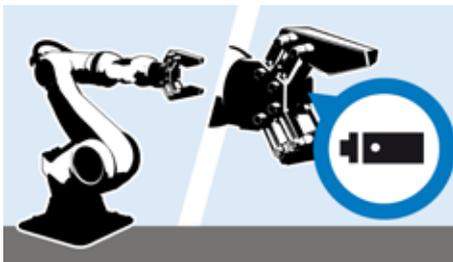
detection of needles and wire cutter position as well as spool speed on sock making machines



Market field: TEXTILE INDUSTRY

Solution: the inductive sensors can detect the target position and the rotation speed of gear wheels.

detection of maximum opening of pincers



Market field: INDUSTRIAL ROBOTS

Solution: the inductive sensors installed on the pincers directly can detect the maximum opening position.

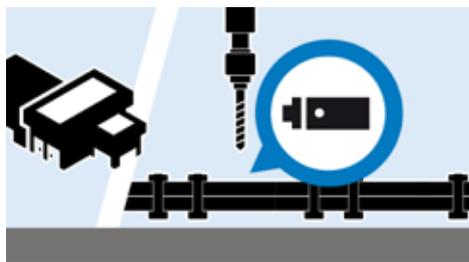
detection of revolutions of an engine / gear by means of a toothed wheel



Market field: MECHANICAL INDUSTRY

Solution: the inductive sensors can directly detect the gear transit of a toothed wheel.

detection of working tool



Market field: AUTOMATIC MACHINES

Solution: the inductive sensors can detect the presence of tools on spindles

# OUR ORGANISATION: AN OVERVIEW OF OUR MARKETING COMMUNICATION DEPT.



Francesco Zappardino

Marketing Communication

Giacomo Villano

C.E.O.

Federica Sala

Marketing Communication

Efficient Marketing Communication is fundamental to promote a company's products, services and organisation.

M.D. Micro Detectors strength is also due to the powerful combination of tangible results we are proud of (a strong entrepreneurial and industrial strategy, a new organisation, several new products, an excellent service, a high technological level and plenty of technical solutions, as well as the fact of belonging to a Group made of very different and dynamic companies) and a Marketing Communication service which, after abandoning its long-time conservative approach to work, in the last three years has been tackling problems and finding solutions to them by means of a new, offensive strategy.

Until 2010, as in many companies which are of a similar size to ours, Marketing Communication was a complementary activity, carried out by some employees as a side job, mainly consisting in arranging exhibitions, preparing editorials and updating the company's web-site from time to time with some new information. This has also been the case at M.D. until the end of 2010, when the Company Management decided to appoint Mr. Francesco Zappardino with a new specific function inside M.D. Sales' and Marketing Dept.. The task was to efficiently communicate new products and solutions offered by M.D. and provide new tools for marketing and sales' promotion.

The real turning point was at the end of 2011. While the rest of the company was experiencing a deep change by the implementation of Lean principles, Marketing Communication became a part of M.D. Support Services, headed by Mr. Giacomo Villano, who was and is still M.D. Chief Executive Officer. Therefore, Marketing Communication function was completely changed. Afterwards, the service could also count on the contribution of another highly competent professional, Ms. Federica Sala, who was previously in charge for Marketing and Communication at Cistelaier S.p.A., M.D.'s sister company.

Finmasi Group Marketing Communication was thus created with the aim of supporting each company belonging to the Group: not just M.D. (Industrial Sensors) or Cistelaier (Printed Circuit Boards), but also Techci Rhône-Alpes (Printed Circuit Boards), Metalsider and Sidermed (Steel Service centres), and Hotel Executive (Hotel and Restaurant).

Giacomo Villano, M.D. C.E.O., states: *"From the very beginning, our strategic project was to become autonomous also regarding this function, appointing somebody inside the company who could provide tools and instruments to get good results, without depending from any kind of outside collaboration. We can therefore give a quick response to our company's needs, with more flexibility, more creativity and less costs. The*

*fruitful decision to match Federica Sala's organisational skills with Francesco Zappardino's creativity has been producing several tangible results which clearly prove their high professional level together with a strong company commitment and a true passion for challenges."*

Beside traditional and digital print, our Marketing Communication takes care of all aspects related to Finmasi Group's image and communication, such as short and long-term brand promotion campaigns, catalogues, leaflets, press service, newsletter, website updating on a regular basis and on special occasions, posters, panels and roll-up, arranging exhibitions and events, gadgets.



During these four years, our Marketing Communication has started a complete renewal of our company image by means of a long-term, offensive communication strategy.

Francesco and Federica say that *"It's not just about creating something nice. We actually need to re-think our marketing communication tools, just like we did with our catalogues: in the past, they were meant just for users with high technical competences; now they can be very useful also to those having not so much of a technical as rather a commercial knowledge. For example, we tried to show how our products can be used, their applications, their target markets."*

*"We did our best to put our products in a real context and to highlight their specific technical features."*

In 2011 we started from zero to renew our Marketing Communication. The changing process became faster because it was strongly supported by the new Company Management, that decided to invest more and more in this important company area. An example of this was the increase in M.D.'s participation to international exhibitions: in 2010 the company exhibited only at SPS in Nuremberg, in 2011 at SPS both in Parma and in Nuremberg, and in 2014 M.D., beside participating in the 2 SPS exhibitions, was also at SIAF. Furthermore, a new professional profile with strong competences in graphics joined our Marketing Communication Team in October 2014. All this clearly shows that M.D. and the whole Finmasi Group are investing their resources and energies to implement a completely new Marketing Communication strategy.

For years, an unflattering image of M.D. had been sent to the world. The market considered M.D. as being a static company, offering a limited range of reliable but old-fashioned products. The company was also known as "Diell", the old brand under which M.D. had been producing its sensors before.

Today, the company is seen as dynamic, innovative and modern thanks to the work of a strong, collaborative and enthusiastic team, ready to take up any challenge and, above all, the company is now known worldwide as M.D. Micro Detectors.

A lot of things have changed and you can actually see that, but what is even more interesting is that this is just the be-

ginning of our revolution!

Just to give you an idea of what our work has been all about recently, without of course being exhaustive, we list some of the new communication tools we have been introducing in the last years, divided into two big categories (on paper and on the web).

## ON PAPER:

**MD NEWS Magazine:** M.D. Micro Detectors magazine is issued twice a year, when SPS, the most important European exhibition in the field of electronics, is held in Parma and Nuremberg. The magazine has plenty of technical and commercial contents, industry focus articles, interviews, news and updates on the M.D. world.

**SHORT FORM CATALOGUE:** a quick overview of all M.D. products divided by range. If you want to have a general idea of what M.D. offers, without going into detail, our short catalogue is what you need.

**LEAFLET:** a 4-page leaflet in Italian, English, Spanish, French, Chinese and German for you to have a quick look at our products.

**MD GUIDE:** an insight into our product range and a support to help you choose the best solution for your needs. It integrates the short catalogue with more detailed information.

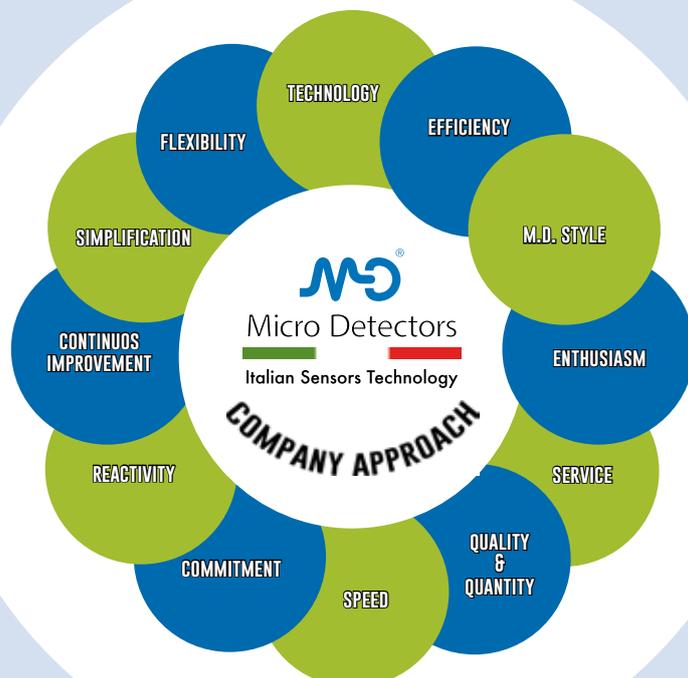
**APPLICATION NOTES:** this tool shows how our sensors can solve every-day as well as extraordinary problems related to specific market fields.

## ON THE WEB:

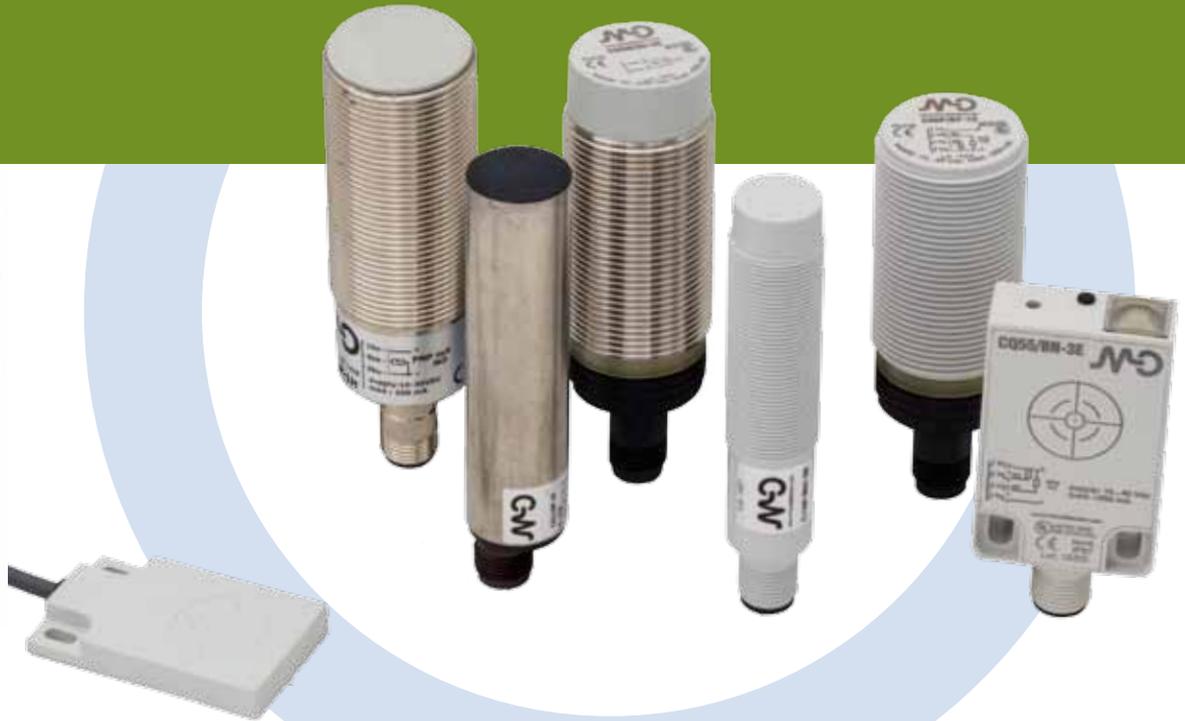
**MD NEWS:** a monthly newsletter with all news about M.D. Micro Detectors in Italian, English, Chinese, Spanish and French.

**WEBSITE:** totally renewed in summer 2013, it gives you an excellent overview of the company and its products (if you don't have a chance to make a factory tour at M.D., check it out!).

**LINKEDIN:** you will find M.D. also on this social network. Our links are constantly updated with our latest news!



# CAPACITIVE SENSORS



Our capacitive sensors allow detection of any material type (solid, liquid, granular, powder) regardless of its colour and transparency. The actual working distance depends on material type and on its dielectric constant: those materials with high dielectric constant (water, metal) are detected at the maximum distance, while the ones with a small dielectric constant (oil, powdery materials) are detected at shorter distances.

It is really easy to adjust the sensitivity of a capacitive sensor by means of its trimmer. This function can be used to enable a level detection (e.g. water) inside a container (glass, plastic) without any direct contact between sensor and liquid: the sensor face is mounted against the external container wall, the sensitivity is set in a way the container is not detected and therefore the sensor switches only in the presence of liquid.

Capacitive sensors are suitable for many industrial sectors: plastic industry for printing machines (level detection of plastic grains in hoppers), animal feeding machines (food level inside the mangers), alternative energies (detection of solar panels at manufacturing plants), vending machines (detection of coffee powder, milk or tea level, snacks; detection of detergent or soap level in supermarket bulk product vending machines), etc..

M.D. Micro Detectors introduces a complete range of capacitive sensors:

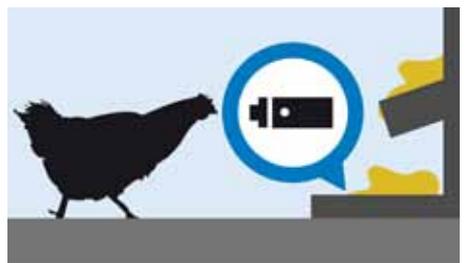
- M18 plastic housing: **C18 series**
- Ø20 stainless steel housing: CE series
- M30 both plastic and metal housing (nickel plated brass and stainless steel): CT series and **C30 series** new versions
- Cubic housing: CQ50 series (50 x 30 x 7 mm) without adjustment, **CQ55 series** (55 x 35 x 15 mm) with adjustment

The main features of these new models are: long sensing distance and high immunity to electrical interferences, which allow their use in various working conditions.

Market Field: VENDING MACHINE

Solution: vending machines offering hot drinks, such as milk, coffee or tea, need to detect the powder level to mix with hot water.

## detection of fodder in automated mangers



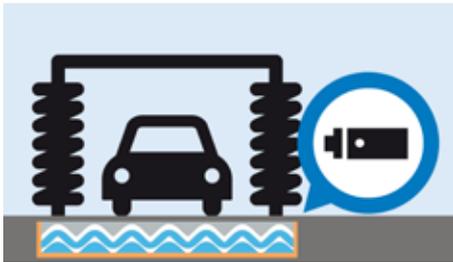
Market Field: AGRICULTURE

Solution: when feeding farm animals, it is essential they do not fight. In fact, if the mangers are not replenished at the same time, the animal's concentration at the same point might cause the death for some of them. M.D. capacitive sensors can detect the presence of pelleted feeds inside the automated mangers.

## detection of lyophilized products inside the vending machines



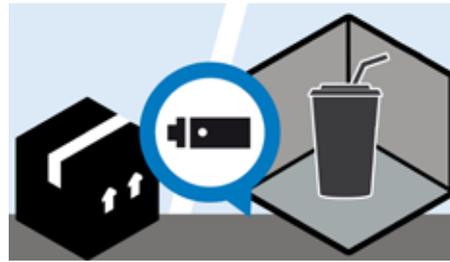
### detection of reused water level in automated car washes



Market Field: CAR WASH

Solution: after some washings it is necessary to fill in the tank below the car wash structure again. The capacitive sensors can detect the water level inside the tank, thus allowing a fast reaction of operators.

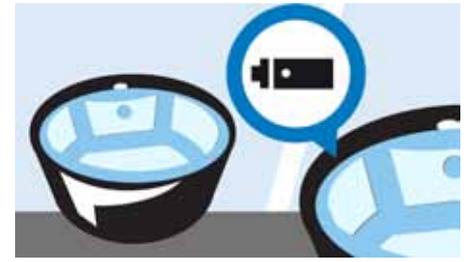
### detection of objects inside the boxes



Market Field: PRODUCTION AND GOODS DISTRIBUTION, POST OFFICES

Solution: during packaging processes it is necessary to detect objects inside boxes, to avoid the presence of wrong material inside them. M.D. capacitive sensors can detect the presence of goods through their walls.

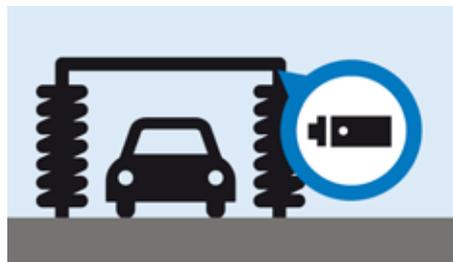
### detection of water level in whirlpools



Market Field: CONSTRUCTION INDUSTRY AUTOMATION

Solution: pumps and water jets must be started only when the water level has reached a certain value. The capacitive sensors can detect water level through the plastic tubes.

### detection of soap and polish level in car wash facilities



Market Field: CAR WASH

Solution: to guarantee a perfect car washing it is necessary to monitor the level of liquids, such as soaps and polish in a car wash. M.D. capacitive sensors can detect the liquid level in plastic tanks, allowing the operators to replace them when exhausted.

### detection of the presence and position of solar panels



Market Field: SOLAR INDUSTRY

Solution: during production of panels it is necessary to detect their presence or position. The photoelectric sensors may have some troubles of detection due to their capacity of light absorbing. M.D. capacitive sensors can detect the panel (glass and metallic coating) without any problem.

### detection of position of buckets, dumps, loading backboards of earth-moving machines



Market Field: EARTH-MOVING MACHINES

Solution: working conditions, such as building yards, need a specific detection by means of tools able to accurately locate any moving objects, such as buckets, dumps and loading backboards even in critical environments with dust, vibrations or steam. M.D. capacitive sensors are completely filled with resin, as to withstand any severe working conditions.



# ULTRASONIC SENSORS APPLICATIONS



The Ultrasonic Sensor can detect different material types (solid, liquid, granular) regardless of their colour, transparency or shine. The detection is based on the activation of an ultrasonic signal emitted by the sensor and reflected back by the object itself. Since the detection is not optical, the sensor can be used in all those applications where the presence of smoke, dust, etc., makes it impossible to use an optical sensor to solve the application. All ultrasonic sensors of M.D. Micro Detectors have the **IP67** protection rate and they are, therefore, protected from the dust and liquids infiltration, moreover they are **thermally compensated** on all the work range, so they can be used outdoors.

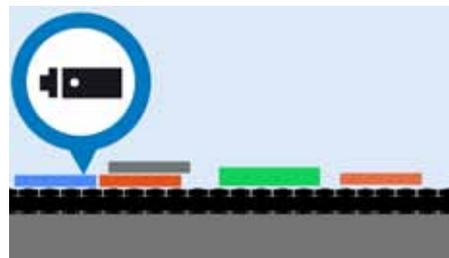
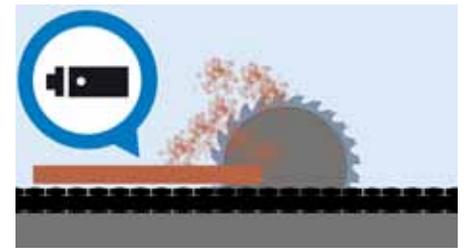
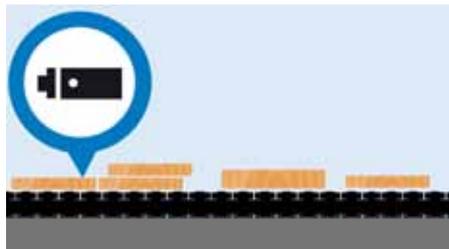
Ultrasonic sensors series **UK6** (M18 with short body), **UK1** (M18 with standard body), **UT1** (M30) and **UT2** (M30 with large front) are available both in cable and connector versions, plastic housing or steel AISI 316L (UT2F apart). The available outputs are: digital output (single or double, NPN or PNP), analogue output (current or voltage) and mixed (analogue and digital output).

The adjustment is made by a **Teach-in** button (**UK1** and **UT** series) or by wire (**UK6** series).

The detectable distances start from **40 ... 300 mm** (for the model **UK6A**) up to **350 ... 6,000 mm** (for the model **UT2F**).

detection of presence of the surface in glass, wood and plastic industry

production of blocks and polyurethane foam slabs



Market Field: CHEMICAL INDUSTRY

Solution: in the production of blocks and polyurethane foam slabs used for thermal and acoustic insulation of buildings, during cutting and shaping phases, it produces a very fine dust which normally makes "unusable" the standard optical sensors (the dust attaches to lenses and reflectors, not allowing the correct detection). Ultrasonic Sensors M18, **UK** series, are the right solution, since they work properly also when the active part is not clean. The UK series sensors are fully resin bonded and ATEX category 2 areas 2/22 certified.

Market Field: GLASS, WOOD AND PLASTIC INDUSTRY

Solution: the sensors of the **UK6A** series (with reduced blind zone) can be used to detect the presence of the surface. Since the detection is not optical, it is always accurate regardless of the colour or transparency of the panel.

detection of the level of asphalt in the machine and the height level on road surface



Market Field: ASPHALT MACHINES

Solution: In the asphalt machines, the **UK1** series is used both to detect the level of asphalt in the machine and to detect the height level deposited on the road surface.

detection of powders, granular materials and fluids inside the vaults / tanks



Market Field: STORAGE FACILITIES / TANKS

Solution: Ultrasonic sensors M30 **UT** series with analogue output can be used to detect the level of powders, granular materials and fluids inside the vaults / tanks.

detection of the level of the waste collected and the presence of the container



Market Field: REFUSE COLLECTION VEHICLES

Solution: in the refuse collection vehicles, the ultrasonic sensors have different applications. The M30 sensors, **UT** series are used both to detect the level of the waste collected in the tank, and the presence of the container in vehicles with side collection. These sensors are also used to detect the presence of persons in the work area before lowering the empty dumpster. The M18 **UK** series of sensors detect the presence of people on the platform, before putting the vehicle in motion, regardless of the colour of the uniform and the weather conditions.

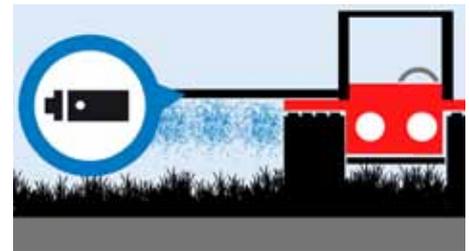
detection of height of the brushes and distance from the pavement



Market Field: ROAD SWEEPERS

Solution: Ultrasonic sensors M18 series **UK** are used to define the height of the brushes to the ground and the distance from the pavement.

detection of height from the ground of the sprays or the presence of the plant



Market Field: AGRICULTURAL MACHINES

Solution: on crop sprayers, the **UT** series sensors (long range, up to 6 m) are used to detect the height, from the ground, of the sprays or the presence of the plant, to ensure the maximum effectiveness in the product diffusion. The sensors have the IP67 protection rate and thus can be used in outdoor application without any problems.

# RETRO-REFLECTION ULTRASONIC SENSORS



24 RETRO-REFLECTION ULTRASONIC SENSORS

The Retro-reflection Ultrasonic sensors are the latest additions to the M.D. Micro Detectors range which makes it even more complete and performing.

Generally speaking, the ultrasonic technology presents important advantages compared to other sensors types, since they can detect:

- Any type of material (metal, plastic, wood, glass, etc.).
- Any type of color (both matt and shiny);
- The state (liquid, solid or powder).

These advantages mean that the use of ultrasonic sensors has increased in recent years.

Due to the current status of the technology, however, the ultrasonic sensors may be affected from some performances drops coming from absorption or deflection of the ultrasonic beam, in the presence of sound-absorbing materials, or if the target is angled in respect to the axis of the sensor. Moreover, they have a blind area close to the sensor, in which you it is impossible to detect reliably.

The above-mentioned limitations of ultrasonic technology have been overcome by the retro-reflection versions that M.D. Micro Detectors recently introduced in its catalogue. In fact, the new range of retro-reflective ultrasonic

sensors, having a very reduced blind area, can be used in different technological application where normally ultrasonic sensors were not used. For example, they can be used in the packaging industry, where the objects to be detected pass very close to the sensor and / or have some highly irregular surfaces.

Considering the particularity of some applications, this sensor type has been designed in a way that its use is also easier compared to the standard ultrasonic sensors. In fact it is sufficient to fix the "reflector" (any firm, flat and fixed surface) and with a single operation, to adjust the sensor using the Teach-in button or cable, to acquire the background.

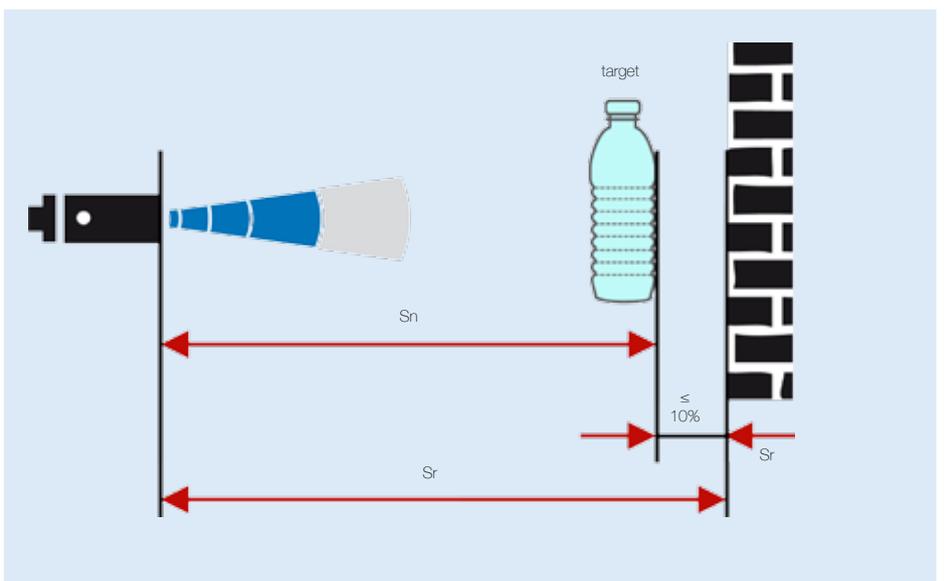
Once this operation is performed, any object passing between the sensor and

the reflector is detected inside the working area, regardless of the position and inclination of the ultrasonic beam.

The models available are:

- UKR6: M18 with short body, max. Distance up to 800 mm
- UKR1: M18 standard body, max. Distance up to 2,000 mm
- UTR1: M30, max. Distance up to 3,500 mm
- UTR2: M30 with large front, with a capacity of up to 6,000 mm

The sensors are available with PNP/NPN output and selectable NO / NC.



# technical specifications

## UKR1 series

	UKR1A/**_**	UKR1C/**_**	UKR1D/**_**	UKR1F/**_**
				
maximum working distance	400 mm <sup>(1)</sup>	800 mm <sup>(1)</sup>	1,600 mm <sup>(1)</sup>	2,000 mm <sup>(1)</sup>
minimum working distance (blind zone)	60 mm	130 mm	170 mm	200 mm
sensing range	60 - 400 mm	130 - 800 mm	170 - 1.600 mm	200 - 2,000 mm
beam angle	± 8°	± 7°	± 8°	± 7°
switching frequency (digital output)	10 Hz	4 Hz	2 Hz	1 Hz
response time (digital output)	500 ms	≤ 125 ms	250 ms	500 ms
hysteresis	1%			
repeat accuracy	0.5%			
linearity error	1%			
temperature range	-20°C ...+60°C			
temperature compensation	●			
operating voltage	15 - 30 Vdc			
thermal drift	5%			
ripple	≤ 7%			
leakage current	10 µA @ 30 Vdc			
output voltage drop	2.2 V max. (IL=100mA)			
no-load current	≤ 50 mA			
output current (digital output)	100 mA <sup>(2)</sup>			
minimum load resistance (analog voltage output)	3 k Ω			
adjustment set point	pulsante di Teach-in			
time delay before availability (digital output)	≤ 500 ms			
commutation range	≤ 10% of background distance			
output electrical protections	short circuit (auto reset), overvoltage pulses			
digital output electrical protections	overvoltage pulses			
EMC	conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2			
analog output electrical protections	overvoltage pulses			
protection degree	IP67 (EN60529) <sup>(4)</sup>			
housing material	PBT			
front end material	Epoxy-Glass resin			
tightening torque	1 Nm			
weight	26 g			
storage temperature	-35°C...+70° without freezing			

M18



M18 short housing



M30



<sup>(1)</sup> Metallic target 100 x 100 mm  
<sup>(2)</sup> Metallic target 200 x 200 mm  
<sup>(3)</sup> Models Available without cULus certification for following output configurations: 500mA (for both single and double digital output); 300mA (for mixed output: digital+ analog)  
<sup>(4)</sup> Protection guarantee only with plug cable well mounted

To avoid possible interferences caused by electromagnetic field, the use of shielded cables is highly recommended according to common practice in industrial application..

	UKR6A/**-**	UKR6C/**-**
		
maximum working distance	300 mm <sup>(1)</sup>	800 mm <sup>(1)</sup>
minimum working distance (blind zone)	60 mm	150 mm
sensing range	60 - 300 mm	150 - 800 mm
beam angle	± 8°	± 7°
switching frequency (digital output)	10 Hz	4 Hz
response time (digital output)	500 ms	≤ 125 ms
hysteresis	1%	
repeat accuracy	0.5%	
linearity error	1%	
temperature range	-20°C ...+60°C	
temperature compensation	●	
operating voltage	15 - 30 Vdc	
thermal drift	5%	
ripple	≤ 7%	
leakage current	10 µA @ 30 Vdc	
output voltage drop	2.2 V max. (IL=100mA)	
no-load current	≤ 50 mA	
output current (digital output)	100 mA <sup>(3)</sup>	
min. load resistance (analog voltage output)	3 kΩ	
adjustment set point	Teach-in button	
time delay before availability (digital output)	≤ 500 ms	
commutation range	≤ 10% of background distance	
output electrical protections	polarity reversal, transient	
digital output electrical protections	short circuit (auto reset), overvoltage pulses	
EMC	conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2	
analog output electrical protections	overvoltage pulses	
protection degree	IP67 (EN60529) <sup>(4)</sup>	
housing material	PBT	
front-end material	Epoxy-Glass resin	
tightening torque	1 Nm	
weight	15 g	
storage temperature	-35°C...+70° without freezing	

	UTR1/**-**	UTR2F/**-**
		
maximum working distance	400 mm <sup>(1)</sup>	900 mm <sup>(1)</sup>
minimum working distance (blind zone)	50 mm	100 mm
sensing range	100 - 400 mm	100 - 900 mm
beam angle	± 8°	± 7°
switching frequency (digital output)	10 Hz	4 Hz
response time (digital output)	500 ms	≤ 125 ms
hysteresis	1%	
repeat accuracy	0.5%	
linearity error	1%	
temperature range	-20°C ...+60°C	
temperature compensation	●	
operating voltage	15 - 30 Vdc	
thermal drift	5%	
ripple	≤ 7%	
leakage current	10 µA @ 30 Vdc	
output voltage drop	2.2 V max. (IL=100mA)	
no-load current	≤ 50 mA	
output current (digital output)	100 mA <sup>(3)</sup>	
min. load resistance (analog voltage output)	3 kΩ	
adjustment set point	Teach-in button	
time delay before availability (digital output)	≤ 500 ms; ≤ 900 ms (double digital exit)	
commutation range	≤ 10% of background distance	
output electrical protections	polarity reversal, transient	
digital output electrical protections	short circuit (auto reset), overvoltage pulses	
EMC	conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2	
analog output electrical protections	overvoltage pulses	
protection degree	IP67 (EN60529) <sup>(4)</sup>	
housing material	PBT	
front-end material	Epoxy-Glass resin	
tightening torque	1 Nm plastic housing	
weight	104 g	130 g
storage temperature	-35°C...+70° without freezing	

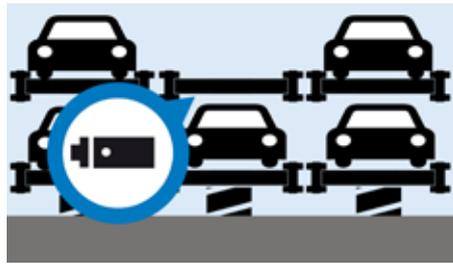
### detection of rectangular bottles in fill monitoring lines



Market Field: FILL MONITORING LINES

Solution: a rectangular bottle while moving can have the surface not perpendicular to the beam and therefore not be detected correctly. A retro-reflective ultrasonic sensor from M.D. Micro Detectors detects these types of shapes without problems. In this case, a fixed and flat part of the machine can be used as the reflector.

### detection of cars in multi-level car parks



Market Field: MULTI-LEVEL CAR PARKS MANAGEMENT

Solution: the retro-reflective sensor fixed on the ceiling can detect whether the parking is free or busy regardless of the type and location of the vehicle. As background, you can use the surface of the parking space.

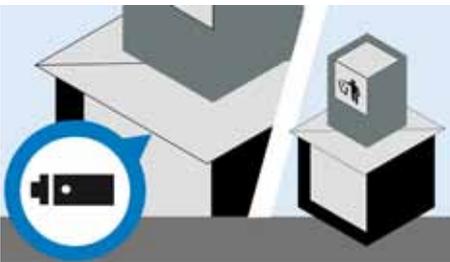
### detection of operator in operating machineries



Market Field: OPERATING MACHINERIES

Solution: the sensor positioned on the roof of the cab detects if the operator is seated properly in his place. Only when this happens, the machine controls are active. As background, you can use the seat base.

### controlling the fill level in underground bins for the waste collection



Sector: REFUSE COLLECTION MANAGEMENT

Market Field: the underground bins for the waste collection, require a system to control the fill level. Since the waste can fall into any position and with any inclination, the retro-reflective ultrasonic sensors can properly detect the overflow level. In this case the opposite wall of the container can be used as background.





# FALS NEW BACKGROUND SUPPRESSION MODELS



The FAL Family is now complete with the new FALS and FALW models of M18 Photoelectric Laser Sensor with Background Suppression.

The product is available with either axial or radial optics. The Class I Laser models have an adjustable 25 to 100 mm range, while the Class II Laser Axial models have an increased range of 30 to 150 mm.

Adjusting range for radial version of the Class II Laser is from 25 mm to 130 mm. Thanks to the small, focused bright SPOT and the 1,5 kHz switching frequency, this model grants a very accurate and stable detection performance of the object.

The sensitivity adjustment trimmer allows an easy and quick setup phase, making possible the high speed detection of small objects. The sensor is available both in with either NPN or PNP Complementary Outputs.

## Main Characteristics:

- M18 tubular sensor with RED Laser emission
- Diffused up to 200mm (radial optic) and 300mm (axial optic)
- Polarized up to 30m
- Through Beam up to 50m
- 10-30Vdc power supply
- Metal or plastic body
- Axial or radial optic models

- Sensitivity adjustment by push button
- Mechanical protection IP67
- Operating temperature range from -15 to 55 °C

## Main Characteristics of Background Suppression models:

- Metal body
- RED Laser emission
- Axial models:
  1. FALS (Class I) from 25 to 100 mm
  2. FALW (Class II) from 30 to 150 mm
- Radial model:
  1. FALS (Class I) from 25 to 80mm
  2. FALW (Class II) from 25 to 130mm
- Switching frequency 1,5KHz
- PNP or NPN output
- Lo + Do selectable
- Distance adjustment by trimmer
- Mechanical protection IP67
- External light immunity 15Klux
- Laser marking
- UL certified models

The radial model is the ideal solution for applications with reduced space and M.D. Micro Detectors offers an unique optic design on the Market.

With the introduction of the Background Suppression models the FAL series becomes one of the most complete family of M18 Laser emission of the Market.

## Main Application

- Packaging
- Automotive
- General process production
- Automatic Machines



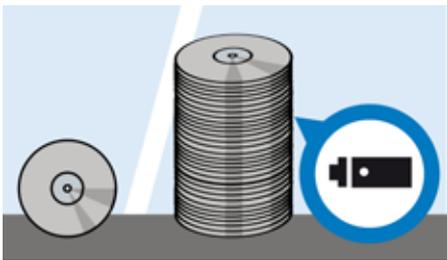
# technical specifications

background suppression



	FALS/**-** Axial	FALS/**-** Right angle	FALW/**-** Axial	FALW/**-** Right angle
nominal sensing distance (Sn)	25 ÷ 100 mm	25 ÷ 80 mm	25 ÷ 150 mm	25 ÷ 130 mm
sensing range (Sd)	30 ÷ 100 mm	30 ÷ 80 mm	30 ÷ 150 mm	30 ÷ 130 mm
emission	Red laser diode (650nm)			
Laser Protection Class EN60852-1	1		2	
adjustment	Trimmer (270°)			
differential travel	≤ 10%			
repeat accuracy	≤ 10%			
operating voltage	10-30 Vdc			
ripple	< 10%			
No-Load current	< 40 mA			
output current	≤ 100 mA			
leakage current	≤ 10 µA (Vdc max)			
output voltage drop	2 V max. I <sub>L</sub> = 100 mA			
output type	NPN o PNP; NO +NC o LO/DO selectable			
switching frequency	1.5 kHz			
time delay before availability	250 ms			
supply electrical protections	polarity reversal, transient			
output electrical protections	short circuit (auto reset)			
temperature range	-10 °C...+50 °C (without freezing)			
thermal drift	10% Sn			
interference to external light	15,000 lux (incandescent lamp)			
protection degree	IP67 (EN60529)			
LED indicator	Yellow (output state); Red (77 special version: warning shiny object)			
massimo carico capacitivo	500 nF			
housing material	nickel plated brass (metallic)			
optical head	PMMA			
exit plug	Grilamid (PA12)			
weight	35 g			
tightening torque	40 Nm (metallic housing)			

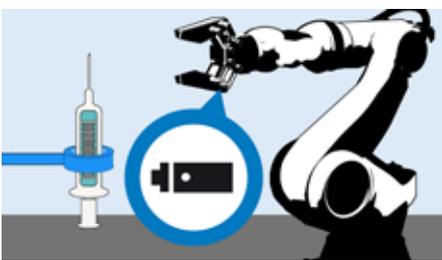
### reading and counting of CDs on packaging machines



Market Field: PACKAGING MACHINES

Solution: the background suppression sensor – our FAL – is used to read CDs on packaging machines. Thanks to the optical triangulation technology and to the very small and precise SPOT obtained by using red LASER emission, it can guarantee an accurate and reliable reading.

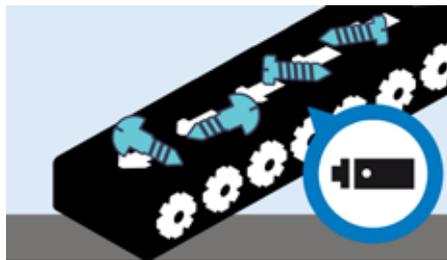
### detection of needle on syringe in packaging machines



Market Field: PHARMACEUTICAL IND.

Solution: the background suppression sensor – our FAL – is used to detect the presence of needles on respective syringe before packing phase. Thanks to the optical triangulation technology and to the very small and precise SPOT obtained by using red LASER emission, it can detect any objects with reduced diameter in an accurate and repetitive way.

### detection of small objects on conveyors



Market Field: MANUFACTURING IND.

Solution: the background suppression sensor – our FAL – is used to detect the presence of small objects on conveyors. Thanks to the very small and precise SPOT obtained by using red LASER emission, it can detect small object with a less than 1mm diameter. In addition, thanks to the optical triangulation technology, the detection is stable even in the presence of objects with different colors.

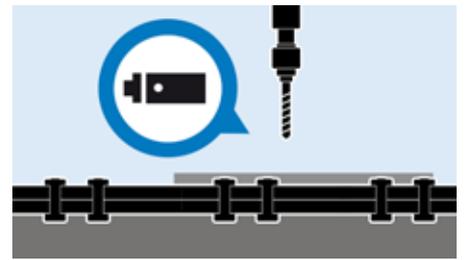
### detection of cardboard boxes on roller conveyors



Market Field: PACKAGING INDUSTRY

Solution: the background suppression sensor – our FAL – is used to detect the presence of cardboard boxes moving on rollers. The sensor is installed below the roller conveyor, between two rolls, and through that space it can detect the box passing by. Thanks to the optical triangulation technology, the detection is accurate even in the presence of boxes with different colors.

### position of objects on assembling machines



Market Field: ASSEMBLING MACHINES

Solution: the background suppression sensor – our FAL – is used to detect the presence of objects on assembling machines. Thanks to the optical triangulation technology, the detection is accurate even in the presence of objects with different colors.

In addition, the combination of a small SPOT and a high switching frequency guarantees an accurate reading repeatability.



# BX80 THE SOLE IP69K AREA SENSOR



## Area Sensors for harsh environments

BX products are the first area sensors designed for machines which must be cleaned with high-pressure water jets, for example in the food and beverage industry, thus assuring the best protection of these devices without the traditional accessories used today, such as PMMA tubes.

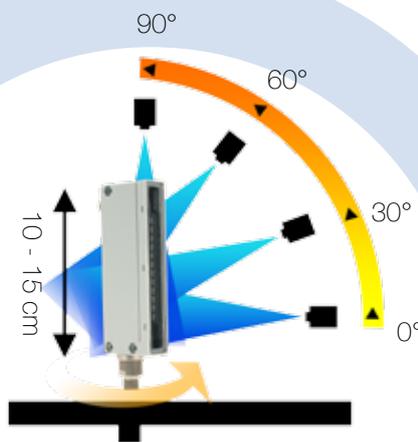
Enduring water jets at 100-bar pressure and 80°C-temperature, these sensors are extremely sturdy and suitable for applications in harsh environments.

Complete water-tightness is guaranteed by a totally resin-filled body and ultrasonic welding between front glass and sensor housing, while laser marking assures a perfectly clean housing. Models in an aluminum housing and with air-cooling systems are also available and ideal for use in ovens and furnaces as well as in the metal processing industry.

Cat. 2 and cat. 3 ATEX-certified models for use in explosive areas can also be provided upon request.

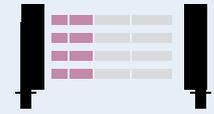
## Main features:

- Controlled area height from 70 mm to 90 mm
- Working distance up to 6 m
- Small object detection down to  $\varnothing$  2 mm
- Sensitivity adjustment by trimmer
- Extremely sturdy rectangular housing
- IP67 / IP69K protection degree
- Full protection against electrical damages



- IP69K
- 30-second cycle
- 14 - 16 liters per minute
- water at 80 ° C
- 80-100 bar

BX80\*/1\* -\*\*



nominal sensing distance Sn	2 m
response time	max. 10 ms
controlled area height	70 mm
beams quantity	12
beam's pitch	6 mm
minimum detect. object	$\varnothing$ 6 mm (BX80A*)
min. operating distance	0 (BX80A*)
histeresys	max. 15%
repeat accuracy	5%
tolerance	0/20% of the nominal sensing distance Sn
operating voltage	12-24 Vdc
ripple	10%
output Current (no load)	50 mA (receiver), 100 mA (emitter), 100 mA (receiver analogue output)
load current	100 mA max.
leakage current	10 $\mu$ A (at max operating voltage)
output Voltage	1.2 V max. ( $I_L = 100$ mA)
output	NPN o PNP - NO/NC
connections	M12 plug 4 poles cable 2 m
excess gain	2° (at nominal sensing distance Sn)
aperture angle	3° (emitter) - 6° (receiver) at Sn distance
light emission	infrared (880 nm)
POWER ON Delay	500 ms
power supply protection	reversal polarity and voltage transient
output protection	short cuircuit (auto reset)
operating temperature	-25°...+50°C (no condensation)
storage temperature	-40°...+80°C
temperature drift	10% Sr
ambient light	1.500 lux max. (incandescent lamp), 4.500 lux max. (sunlight)
protection degree	IP67 (EN 60529) / IP69K
emitter LEDs	green (supply), red (synchronization alarm), yellow (area state)
receiver LEDs	green (supply), red (alignment), yellow (output state)
lens material	PC
tightening torque	25 Nm max.
weight (approx)	0.26 kg...0.30 kg (plug)

# LEAN ACADEMY THE KAN BAN SYSTEM



Marianna Di Iorio

Purchasing Dept.

Alessandro Lillo

Purchasing Dept.

Carla Bazzi

Purchasing Dept. Manager

Stefano Marchi

Goods In Manager

*M.D. Micro Detectors firmly believes in Lean Thinking principles and successfully applies them to its everyday work. Starting from MD News' previous issue, we decided to dedicate an article in our company magazine to our experience with the application of these principles, knowing that this work methodology is a key factor for the survival and the development of European manufacturing companies.*

The radical transformation of M.D. Micro Detectors S.p.A.'s Operations has been realised introducing Lean Manufacturing principles and organisation techniques since October 2011. Three years later, M.D. Micro Detectors is completely satisfied with what has been achieved: our Operations are now a very efficient support for sales and, even better, an authentic sales' argument themselves. In this article we will focus on the introduction of a Kan Ban-based procurement system.

## Before introducing Lean Manufacturing

Before our Operations were completely re-organised according to Lean Manufacturing principles, Production Planning and Manufacturing Process Control as well as Procurement Management were supported by information systems which were complicated and expensive in terms of both economic costs and

management inefficiencies. We had to pay very high costs for implementing those information systems, both Hardware and software, not to mention the costs for their management and maintenance, which were even higher.

Those tools did not allow us to get rid of all complicated maths and checks. On the contrary, our Manufacturing Dept. was a "slave" to information systems which hindered and reduced our efficiency, rather than supporting our flexibility. Since those systems were based on sales' forecasts, they had huge limits from several points of view, especially on such an ever-changing and unpredictable market situation like the one we have been confronted with in recent years.

Before Lean revolution, raw material procurement and the manufacturing of semi-finished products were managed according to the following procedure:

1. Launch of a monthly MRP procedure based on forecasts and on previous order intake, without considering orders received during the month;
2. Weekly Production Planning and Check of missing raw materials and semi-finished products to guarantee the manufacturing of already received orders. It sometimes happened that missing materials were signalled too late.

Average manufacturing lead time was 3 working weeks.

In addition to that, monthly launch in production did not consider the orders that would actually be received during that month and the weekly manufacturing progress advised about missing materials too late. Our manufacturing Dept. was not able to offer the performances requested by the market.

## Lean Manufacturing implementation

In order to understand the deep change in our Procurement Management System, we need to explain how we managed to create a completely new way of processing and manufacturing orders. For that, we went through the following steps:

- Setting objectives regarding Quality, Service and Costs;
- Assessing current procedure for Orders' processing, from order intake up to shipping;
- Defining the ideal state of Orders' processing, reducing non-value added activities to minimum;
- Defining the future state, that is to say the best possible procedure for Orders' processing to be implemented in 12 months, always trying to get as near as possible to the Ideal State;
- Defining a new Lay-out of our Production Plant as well as of our Raw

Material and semi-finished products' warehouse which should be consistent with our Future State;

- Defining an Organisation to support the implementation of our Future State.

According to the Future State we defined and agreed upon in theory, we organised the plant in a first Pre-Production, producing the semi-finished products that have to be available at any time, and Production, where finished products are manufactured, assembling semi-finished products from the Pre-Production with all other electronic and mechanical components. All intermediate semi-finished products were cancelled from our Bill of Materials, except for the basic semi-finished products mentioned above. This change in our Bill of Materials led to a remarkable reduction of our stock, both dimensional and economic. That helped us to better match the financial and the manufacturing aspects of our activity inside the company. More precisely, we divided semi-finished products and finished products into product families according to their manufacturing process in order to define how many productive areas, Pre-Production and Production lines and productive resources (machines, equipments and people) were actually needed to meet Customers' demand. Then we divided our finished products into the following categories according to sales' volumes and stock rotation:

- Runners: finished products with high sales' volume and very frequent rotation;
- Repetitive: finished products with small sales' volume and very frequent rotation;
- Strangers: finished products with small sales' volume and not frequent rotation

Based on these three categories, it was very easy for us to classify also our raw materials and semi-finished products as Runners, Repetitive or Strangers. Then we agreed on how to re-order semi-finished products and raw materials based on their category:

- Runners: Kan-ban system;
- Repetitive: Re-Order Point (very similar to Kan-Ban);
- Strangers: Manufacture to Order (semi-finished products) or Buy to Order (raw materials),

Semi-finished products' and raw materials' Kan-Ban stock was physically moved on-board of each manufacturing

line. The operators themselves take the material needed to manufacture each production order exactly when they need it. This also made our warehouse operators' job simpler and smoother. In fact, with the materials just next to them, they were able to control it much better, without wasting any time. Therefore we would not interrupt production anymore just because we were out-of-stock and we could also reduce and optimise the use of space.

## Runners - Kan-ban re-order technique

Kan-ban technique consists in re-ordering the semi-finished or raw materials only when a quantity which is sufficient to cover the supply lead time is available in stock, taking the average daily consumption into consideration. Re-Ordered Quantity coincides with the quantity at Re-Order Point, covering the supply lead time.

To make an example, if average daily consumption of a certain component is 100 pieces and supply lead time is 5 working days, that component will have to be re-ordered when 500 pieces are left in stock. Kan-Ban actually coincides with those 500 units which will be re-ordered.

Kan-ban can be increased according to consumption changes, to the reliability of a supplier in terms of delivery times, quality of the last deliveries and, more generally, according to the risk level a company can accept.

In the case mentioned above, the stock level and therefore the re-order quantity can be increased from 500 up to 600 pieces to reduce the risk of running out of stock. Kan-ban best performances are to be seen when a product has consumption levels which only slightly change compared to the average. Kan-ban can and must of course be adjusted from time to time according to increasing or decreasing consumption of a certain component. One can easily understand that Simplification and Improvement of performances are the key drivers of this system. In fact, one of the main objectives of a company's Operations is typically to reduce stock by increasing the rotation of stored goods and by pushing suppliers to guarantee shorter lead times. All this is easier after implementing Kan-ban. To actually run our daily business according to the new Kan-ban system, our first step was to explain our suppliers what we would do and to agree with them on how to implement the new process.

The new system was put into practice after that explanation and after taking an agreement with them on implementation procedures, of course respecting their autonomy, but at the same time discussing with them and clearly indicating the objectives and the way to proceed. This was easier for us thanks to a well-established Supply System and long-time, stable professional partnerships between M.D. Micro Detectors and its suppliers. What physically proves the implementation of Kan-ban system is the so-called Kan-ban Card, which, together with the Planning Board, has replaced our expensive Manufacturing and Procurement Planning. The Kan-Ban Card is our re-order tool, which the operator holds in his/her hands when re-order level has been reached. Now, hundreds of Kan-Ban cards are used every day in our plant to manage our new re-order system. The introduction of Kan-Ban allowed us a better control of material consumption, an adjustment of our stock according to our actual needs, and a quick response in case of remarkable and sudden changes in our stock needs. Our management is now Visual: when Kan-Ban boxes get suddenly empty, this is a clear and immediate sign for our operators that consumption is different than expected, which means that some items must be carefully checked, also with the help of our Sales Department.

## Conclusions

The radical change in our Order Processing system, together with a new Procurement Management, allowed us to reduce our average manufacturing lead time to 1 week, with an average On Time Delivery rate of 99% for all production lines.

Within reasonable limits, we can receive and manufacture orders on the same day and ship them to our Customers the following day at the latest.

Orders of small volumes, which were difficult to manufacture with the previous system, are now flexibly managed. No Minimum Order Quantity is set for our Customers' purchase orders, therefore no minimum volume is set for orders in our manufacturing system.

Facts have replaced words: also in case of orders of unexpected volumes, we are now dynamic enough to always find the best possible solution for our customers. The deep change in our Organisation allowed our people to express their potential and thus satisfy their professional ambitions.

# CX

# NEW AREA SENSORS



M.D. Micro Detectors, top-quality designer and manufacturer of **AREA SENSORS**, confirms its market leadership for this product type introducing the **new CX series**.

## A NEW MARKET STANDARD!

New **CX series** includes **three product families: CX0 series with basic functions and remote teach-in, CX1 Series** equipped with external **sensitivity adjustment TRIMMER** and **CX2 Series with advanced functions**.

With their **20 x 36 mm** aluminum profile, the new CX models are **among the smallest area sensors available on the market**.

The **crossed beams function on CX0 models** allows to detect objects with an accuracy up to **ø 1 mm**. Models with controlled area height up to **320 mm** and operating distance from **3 up to 6 m** are available. Emitter and receiver units are wired synchronized whilst automatic or manual teach in is selectable through a dedicate wire.

Thanks to the **crossed beams technology, CX1 models** can detect objects down to **ø 1 mm**. Models with up to **480 mm** controlled area height and working distance from **3 up to 6 m** are available. **CX1 items** are provided with **optical synchronization, thus making installation and connection easier**.

Resolution can be **adjusted by means**

**of a separate external module using a TRIMMER**, which can be disconnected once the adjustment has been completed, to be then re-used for other area sensors.

**CX0 and CX1 models** are available with **PNP+NPN digital outputs** and **NO/NC state** selectable by connection wire.

The full range of functions and outputs of **CX2 series** permit this family to rationalize the number of available models and make this product extremely flexible to perfectly meet Customers' requirements.

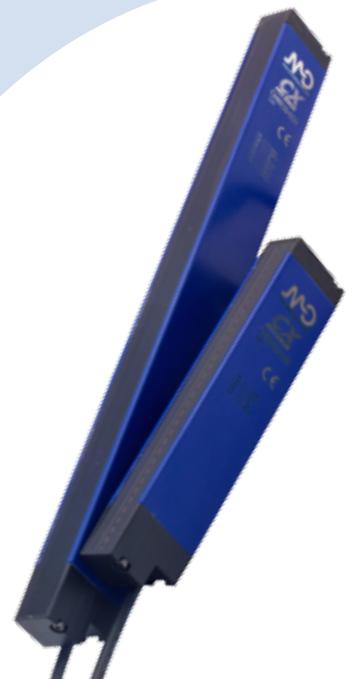
Just two versions can satisfy all output logics, both digital and analogue: the **double analogue output 0-10 V and 4-20 mA** model, which is invertible, and the model with **PNP and NPN double digital output with the possibility to select the NO/NC state**.

**CX2 Area Sensors** can either detect the presence of objects, versions with crossed beams and **PNP/NPN NO/NC outputs**, or measure their height or positioning, models with parallel beams and analogue outputs **0-10 V/4-20 mA**, within a **controlled area height of up to 980 mm and a working distance up to 6 m**.

Thanks to the self-adjustment function, models with crossed beams configuration can detect objects of up to **1 mm**; the maximum resolution of models with parallel beams is of **5 mm** instead.

M.D. pays much attention to the manufacturing details of its new products in order to meet Customers' specific needs and find the best solutions for their applications. In this case, for example, a blanking function has been developed **to guarantee proper functioning of area sensors even on machines with mechanical constraints**.

If this function is used, the analogue outputs will be rescaled according to the number of free optical beams and the digital outputs will allow detection by means of parallel beams depending on sensor pitch: either **5, 10 or 20 mm**.



## Main features:

- Compact aluminum housing **20 x 36 mm**
- Controlled Area height from **160 mm** up to **960 mm**
- LEDs optic interaxis: **5 mm, 10 mm, 20 mm**
- Wire or optical synchronization
- Crossed and parallel beams versions
- Minimum detectable object **≤ 1 mm** (crossed beams)
- Measuring resolution **≥ 5 mm** (parallel beams)
- Blanking function
- Models with external sensitivity adjustment TRIMMER
- Models with self-adjustment set up or remote Teach-in
- Models with **NPN+PNP** double digital output, **NO/NC** selectable
- Models with **0-10 V** and **4-20 mA** double analogue output

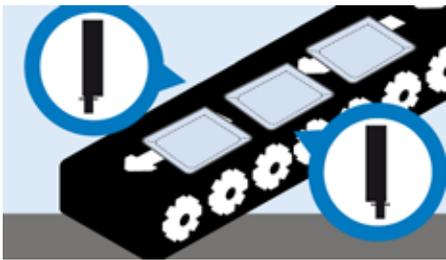
## Industries and Applications:

- Packaging industry
- Material handling
- Automated warehouse
- Ceramic industry
- Woodworking industry
- Manufacturing industry



	CX0E*R*/**_***	CX1E*R*/**_***	CX2E*R*/**_***
nominal sensing distance Sn	0,3 ... 3 m (beam pitch 5 mm, controlled area 160 mm), 0,5 ... 6 m (beam pitch 10 mm, controlled area 160 mm), 1 ... 6 m (beam pitch 10 mm, controlled area 320 mm)	0,3 ... 3 m (beam pitch 5 mm) 0,3 ... 6 m (beam pitch 10 mm)	0,1 ... 3 m (beam pitch 5 mm) 0,1 ... 6 m (beam pitch 10 mm)
light Emission	850 nm (beam pitch 5 mm) / 880 nm (beam pitch ≥10 mm)		
power supply voltage	16,8...30 Vdc		
ripple	< 1,2 Vpp		
power consumption (receiver)	1...1,5 W		1...2,5 W
power consumption (emitter)	1...1,5 W		1...3 W
output	1 x PNP, 1 x NPN (solo modello CX0RB)	1 x PNP, 1 x NPN	1 x PNP ; 1 x NPN; 1 V <sub>ANA</sub> + 1 I <sub>ANA</sub>
output current (With load)	< 100 mA		
minimum Resistance Load	280 Ω		
leakage current	10 μA		
capacitive load	< 0,7 μF		
delay ON	0,05 μs		
delay OFF	> 10 μs		
POWER ON Delay	200 ms		< 3 s
Teach-In procedure duration	< 15 s		
operating Temperature	-10°C...55°C		
storage temperature	-25°C...55°C		
artificial Light Rejection	IEC 61496-1		
ambient Light Rejection	IEC 61496-1		
standard Protection Models	IP67		
Humidity (no condensation)	95% max.		
vibrations	IEC 61496-1		
shocks	IEC 61496-1		
max. Cable Length	< 20 m		
cables	1 x M12, 4 poles, male (CX0E), 1 x M12, 5 poles, male (CX0R)		
housing material	Painted Aluminium RAL5002		
front Glass Material	PMMA		

### detection of bowl dimension on packaging lines of food & beverage industry

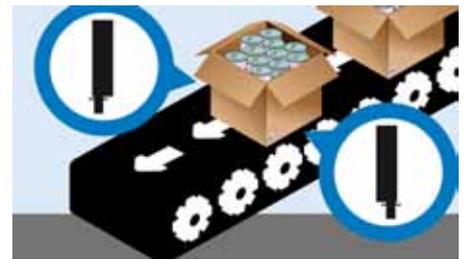


Market Field: PACKAGING INDUSTRY

Solution: CX series AREA sensor is used on packaging machines of food & beverage industry for detecting the presence and length of transparent plastic bowls. Thanks to the "cross beam" and "signal equalization" functions (automatic adjustment system, optimizing the reading resolution on the whole front reading surface), the Area sensor can accurately detect any object of irregular shapes with reliability, even transparent ones.

Thanks to "parallel beam" function and to the analogue output – both current and voltage ones – the Area sensor can measure the box height and supplies an analogue output proportional to the number of obscured optics; in this way it allows to verify the box dimensions before sending it to the warehouse shelf. In addition, CX series is easy and fast to install even in reduced spaces, thanks to its compact housing, to the absence of dead zones (exploitation of the whole front face for detection) and to the "Blanking" function, which allows to ignore permanent obstructions between any beams due to mounting constraints.

### detection of full load on wraparound packers



Market Field: PACKAGING INDUSTRY

Solution: CX series AREA sensor is used on conveyors of packaging machines in Food & Beverage and Cosmetics industries to monitor if the full load has been achieved. Thanks to "parallel beam" function and to the analogue output – both current and voltage ones – the Area sensor can measure and verify if the load has been completed before it is pushed into the box. In addition, CX series is easy and fast to install even in reduced spaces, thanks to its compact housing and to the absence of dead zones. At last, the "Blanking" function allows to ignore permanent obstructions between any beams due to mounting constraints and guarantees a proper functioning of Area sensor.

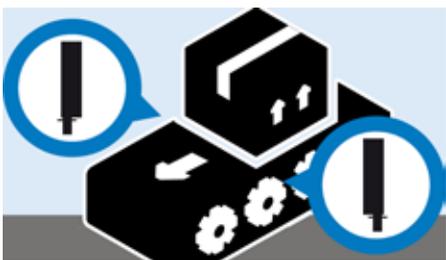
### detection of magazines / newspapers on conveyors



Market Field: PACKAGING INDUSTRY

Solution: CX series AREA sensor is used on conveyors of magazines /newspapers packaging plants. Thanks to the "cross beam" function, this sensor can detect thin objects such as magazines and newspapers in an extremely reliable and accurate way, even if wrapped in plastic film. In addition, CX series is easy and fast to install even in reduced spaces, thanks to its compact housing, to the absence of dead zones (exploitation of the whole front face for detection) and to the "Blanking" function, which allows to ignore permanent obstructions between any beams due to mounting constraints.

### detection of box dimension on conveyors

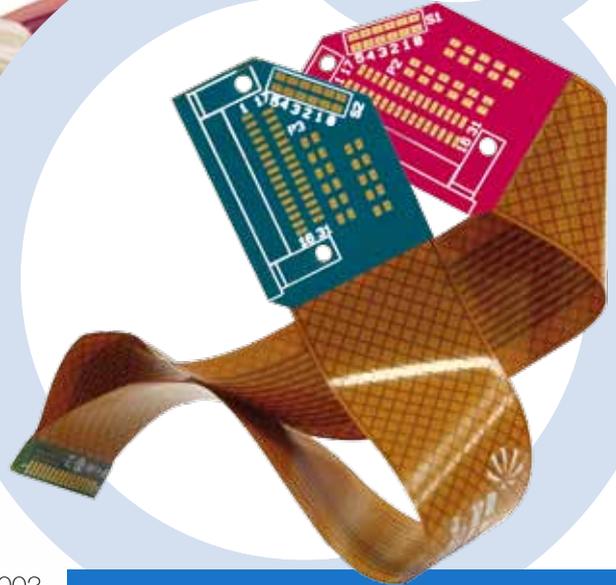
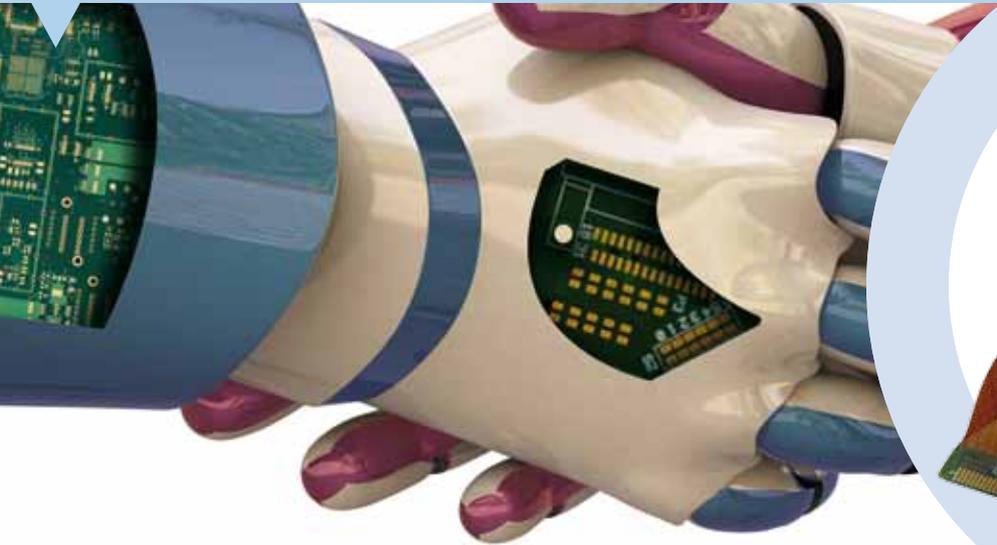


Market Field: CHEMICAL INDUSTRY

Solution: CX series AREA sensor is used on roller conveyors or conveyor belts for measuring the height of box to be stored.



# PCB DIVISION



**Tradition, Technology, Service and Quality:** these are the main characteristics of Cistelaier S.p.A. and Techci Rhône-Alpes SA, the two companies belonging to Finmasi Group PCB Division that develop and manufacture printed circuit boards. Finmasi Group PCB Division's approach to the market is based on the so-called "3M-offer":

- Multi-Product: from double layer to the most complex multilayer PCBs;
- Multi-Service: from Quick Turn Around prototypes to big series' production;
- Multi-Technology: from the standard to the most advanced ones.

## Techci and Cistelaier's strengths are:

- Excellent technical competences as a result of decades of high-level activity;
- High-quality products and service;
- Its team and organization;
- Completely reliable and stable manufacturing processes.

Cistelaier and Techci can manufacture any kind of printed circuit board, whether it's a Quick Turn Around prototype or a full series' production:

- ISO 9001 Company certification (M-SION).

- Medical devices: ISO 13485:2003 - Certificate no. DM/10/49/S;
- Automotive sector: ISO/TS16949:2009 – Certificate no. TS/22012/10;
- Railway sector: IRIS–International Railway Industry Standard – Certificate no. 39/2011/IRIS;

## Cistelaier has obtained following certifications:

- ISO 9001 Company certification (M-SION).
- Medical devices: ISO 13485:2003 - Certificate no. DM/10/49/S;
- Automotive sector: ISO/TS16949:2009 – Certificate no. TS/22012/10;
- Railway sector: IRIS–International Railway Industry Standard – Certificate no. 39/2011/IRIS;
- Aerospace sector: UNI EN 9100:2009 – Certificate no. AS/18/11/S.

## Techci has obtained following certifications:

- NadCap (National Aerospace and Defence Contractors Accreditation Programme)
- ISO 9001:2008;
- EN9100:2009;
- UL94V0.

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# METALSIDER



Filippo Vagheti

C.E.O. of Metalsider S.p.A.

Metalsider's history coincides with Marcello Masi's history as an entrepreneur and consequently with Finmasi Group's history. In fact, Metalsider can be considered as being the "seed" from which Finmasi Group grew. The company was founded in 1961 by Marcello Masi, who at the time was a young and ambitious salesman working for company Celestri (an Italian steel company belonging to Falck Group). At the very beginning, Metalsider's activity consisted in cutting and laminating steel plates in a 200-square-meter plant located on the land surrounding Ubersetto di Fiorano, a small village near Modena.

Taking advantage of industrial growth in the 60s, Marcello Masi quickly developed Metalsider activity due to the fact that he was among the first Italian businessmen that directly imported steel plates and coils from Eastern Europe, which were then delivered at Ravenna harbour. Therefore, he actively participated in the development of several activities in Ravenna harbour and he decided to invest in what would then become the most important steel harbour in Italy. In the early 70s Metalsider moved to Ravenna. At the beginning the company covered a 10.000-square meter surface, then a 50.000-square meter surface, including 30.000 square meter facilities where steel coils and plates up to 35 tons can be lifted.

The choice of Ravenna harbour as location for the plant has proved to be successful and strategic because it allowed

the growth and development of one of the most important steel service centres in Italy.

In 1990, a project started with the aim of developing steel products' distribution on the Italian market thanks to the strong partnership between Metalsider and Italian national steel company, ILVA which then became a shareholder of Metalsider. That stockholders' partnership, which continued until 1996, managed to boost Metalsider's growth. The company could therefore improve its productive performances, increase the size of plants and further develop its sales' network, continuing its partnership with ILVA, even after this had been purchased by Riva group.

A steel service centre's task is to provide steel consuming companies (end users) with steel plates, strips and with all kinds of products obtained from the transformation of laminated coils.

Working as a service center means setting the focus on customer support and being involved in the supply chain as a connection between steel products' manufacturers and end users, transforming raw material, that is to say steel coils, in specific products, such as plates, strips, blanks, according to customers' needs. It also means making sure that the products can meet customers' demand regarding shape, quality and leadtime, guaranteeing just-in-time deliveries and reducing customers' stock to a minimum, which is absolutely neces-

sary today for a proper management of a company's working capital.

Metalsider can offer one of the widest product ranges on the market. The company can supply several types of steel products for different uses, namely laser cutting, pressing, structural and press hardening steel, wear-resistant steel products, for tanks or pressure vessels.



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These products can be used for very different applications, such as steel sheet metalworking, light and heavy metal work, shelving, metal furniture, steel grates, tubes and poles for the telecommunication and energy industries. Metalsider products are also requested by the automotive industry or for manufacturing earth-moving machines, land machines and industrial vehicles.

A company policy of constant investments allows us to work in state-of-the-art plants, where innovative cutting processes have been implemented and the efficiency of each manufacturing step is guaranteed. Flattening, strip-cutting and blanking machines can work on black and pickled hot-rolled coils, from 0.8 up to 25 mm and up to 2150-mm length, produced by the most important manufacturers of steel-working machineries. We have always committed ourselves to guaranteeing operators' safety at each manufacturing step by means of continuous investments so that we could totally comply with safety norms and involve our operators and suppliers in our safety management system.

Metalsider strengths are:

- Strong professionalism and technical competence developed over 50 years' activity;
- Technological level of manufacturing plants
- Wide product range
- High quality and excellent service offered
- Plant location
- Commitment, passion and reliability always at your service

Our efficiency is supported by Quality. For over 20 years Metalsider has been one of the first steel companies to obtain ISO 9001 certification, with all manufacturing characteristics requested by the market. Attention for quality (first of all, for the selection of our partners which are among the best performing steel companies worldwide), as well as for the efficiency of our manufacturing processes, machineries and products, is one of the main keys to our company's success. Our laboratories are equipped with cutting-edge tools for the chemical and mechanical test of materials, with highly qualified technical personnel constantly supporting customers in the choice of the best materials for their specific applications.

Metalsider team is made up of valuable men and women, among whom:

- Marcello Masi (President)
- Filippo Vaghetti (CEO)
- Luca Perlini (CFO, Finance and Control)
- Paolo Zardi (Plant Manager)
- Ruggero Maraldi (Sales' Manager Coils)
- Lamberto Piccinelli (Sales' Manager Heavy Plates)
- Roberta Belli (Human Resources Manager)
- Davide Gambi (Quality Manager)
- Daniel Pirazzini (Environment, Health and Safety Manager)

*"In recent years companies have had to face extremely hard challenges on the market. Due to the economic crisis that has deeply affected Italian manufacturing industry and provoked a remarkable decrease in steel consumption, competition between steel service centres has got tougher" says Filippo Vaghetti, Metalsider C.E.O.. "We have to meet new and constantly changing customers' needs. Metalsider's action and reaction to this change has been positive. The company has adapted its organization and working methods to Customers' demand thanks to the efforts made by its highly skilled and motivated team. The company, which was actually the cradle of Finmasi Group, takes up daily challenges with determination, courage and a long-term vision. On a constantly and quickly evolving market we must solve problems on a daily basis and at the same time make plans for the future. Only in this way we will manage to be proactive and meet customers' needs."*





# Micro Detectors

Italian Sensors Technology



M.D. Micro Detectors S.p.A. has been designing and manufacturing a wide range of industrial sensors since 1971. Our company's strong commitment to future developments and innovations is based on over 40 years of knowledge.

Our product portfolio is the following:

- Photoelectric Sensors
- Proximity Sensors
- Ultrasonic Sensors
- Area Sensors
- Safety Devices
- Accessories.

Variation and customization of catalogue products are also an important part of our activity, as well as products specifically developed to satisfy our customers' needs. Moreover, we develop innovative solutions for industrial applications using our technology.

Our organization and competences allow us to manufacture our products quickly and with guaranteed results for our customers. Fast deliveries is one of our biggest strengths.

Over 1.3 million pieces are entirely manufactured in our Modena plant. Our Made in Italy production is synonymous for quality, accuracy, experience and reliability.

Since the beginning, our products have been renowned on the market for their quality, robustness, ease of use and for outstanding performance. This is the result of a manufacturing process carried out at the highest level of capacity, quality, efficiency and flexibility.

All processes, from research and development of new products to manufacturing and final shipment, are carried out by our personnel at our site. This allows us to keep all of our processes completely under control and to be flexible and reactive to customers' needs.

We are organized according to the principles of Lean Thinking. All products manufactured in our plant undergo constant controls and they are always double-checked.

The human and material assets of our Company guarantee the best results and a constant support at all times. Work ethic, customer orientation and continuous improvement, passion and commitment to excellence, search for professional challenges: the professional background of our people is made of this and more.

The quality of M.D. Micro Detectors S.p.A. has also been certified throughout the years: our Quality Management System has been certified ISO 9001:2008 and several products have obtained the CE, ATEX, UL, cULus, Diversy, TÜV and ECOLAB certification.

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