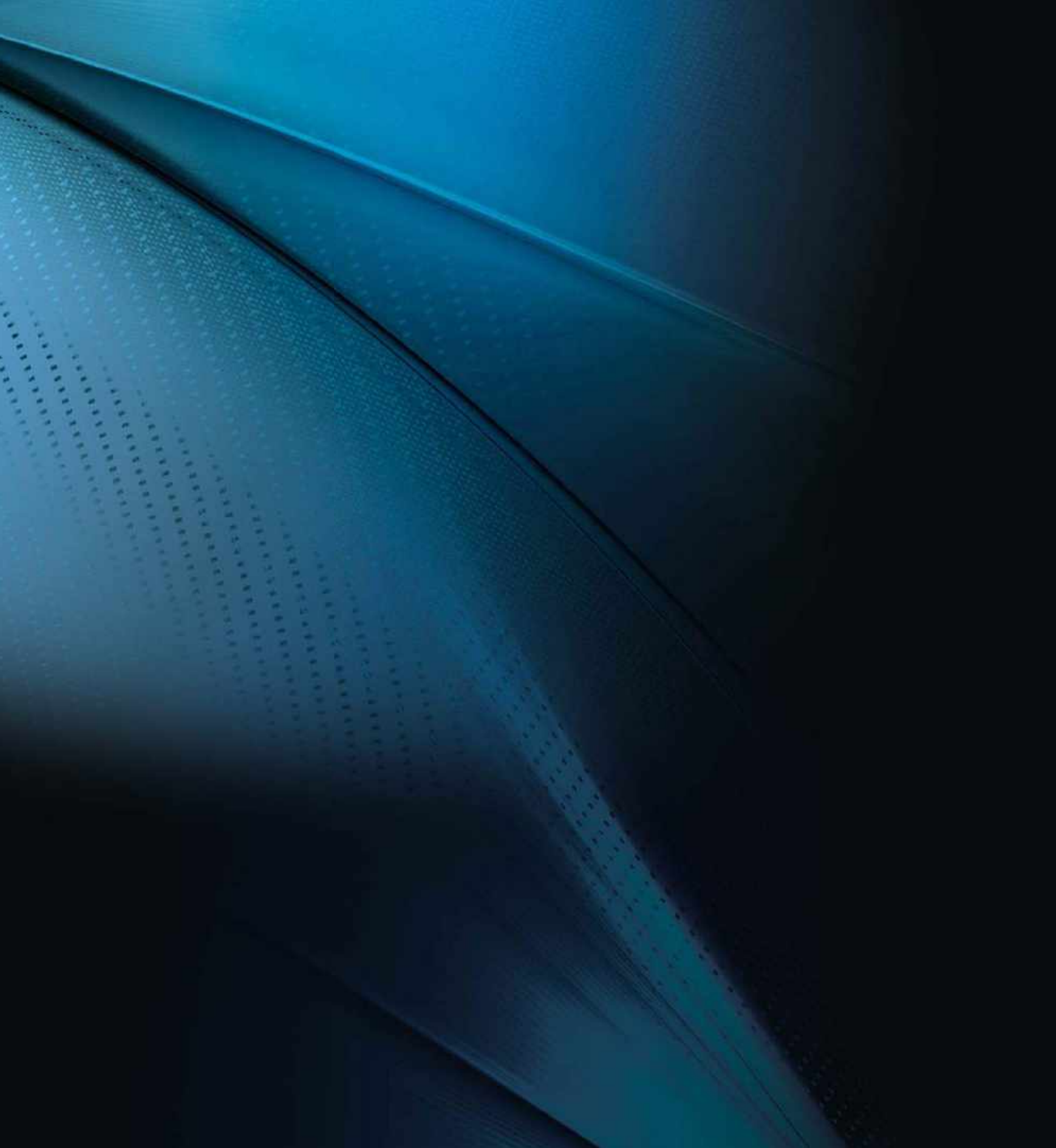


# APPLICATION HANDBOOK



*A Tradition of Quality Since 1939*

**LEVELCO**



# Application Handbook

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**10** Industry Sectors

**30** Countries Around the World

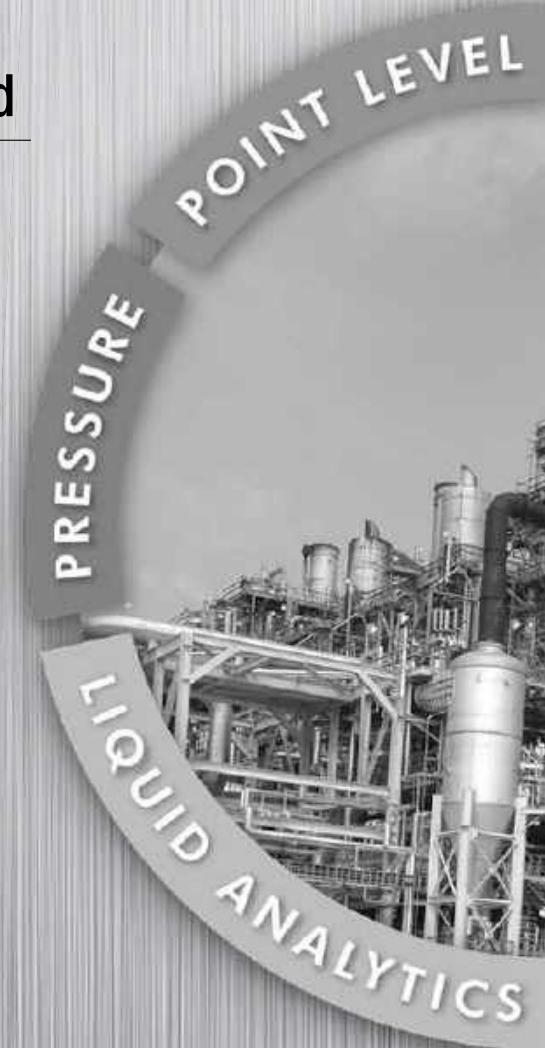
**200** References

**Who we Are?**

**What are we Manufacturing?**

**How we can Measure?**

**Where we are Measuring?**



## BASED ON 75 YEARS OF TRADITION



After training as an engineer in the ITT Standard telephone company, in 1939 Endre Szöllős started his own business designing and producing telephone systems for business and industry. While the World War II did not provide an easy period for Endre and his colleagues, the business grew and provided good training for his sons. Following their University courses in electrical engineering and economics respectively, Tamás and András Szöllős were able to lead the company forward, after the early death of Endre in 1969. By 1982, the production of a series of industrial controllers had led to a developing specialisation in level measurement and control: and NIVELCO was founded. In 1989, when International trade from Hungary became straightforward, NIVELCO had a full, proven level control product range and capability, backed by well established in-house manufacturing and engineering facilities. In 1989 the NIVELCO launch of the World's first Compact ultrasonic level transmitter had a major impact, offering a combined sensor / transmitter in one unit, leading the world market.

NIVELCO took the opportunity offered by these newly available export markets, and opened trading relationships with various identified distributors and sales agents. Building on existing sales links into neighbouring countries, NIVELCO also invested in their own sales organisations and offices in Austria

and Poland, and then later in the Czech Republic, Romania and Russia. Our success in these ventures demonstrates that by maintaining our business principles, expertise and specialist skills, NIVELCO can compete successfully with the best suppliers to the industry, by providing:

- Wide range of products to suit all applications
- Investment in advanced technology expertise and high quality product development
- High specification quality management and control systems
- Worldwide marketing, sales and service support
- Fast, flexible in-house production and customer order logistics
- Company-wide IT System to provide full product design and production data
- Fair, modest pricing, ensuring the capital for future customer support and development
- Continuing investment in our people and their working relationships

Despite that in today's globalised world, the multinational giants – set up for mass production – can rule the market, there are many medium-size companies who specialise in satisfying customer needs, and manufacture products with high intellectual added value.



The achievements of NIVELCO demonstrate that flexible, customer-led medium-size companies can find their place in the market and maintain their independence.



### NIVELCO's position in the world

Doing some business with East Bloc countries was what we had as export in the 80's, when NIVELCO was formed: the East Bloc was still its old self and markets were closed. Nevertheless NIVELCO was an export driven company, and almost a decade later, in 1990, we were able to show our muscles to the world for the first time. This was the beginning of NIVELCO's export success. Twenty years later, exporting more than 80% of its production,

NIVELCO has now proved itself to be an export oriented company. Covering over 65 countries through our own subsidiary companies and through distributors, our products reach almost all world markets. To aid distributors and our own subsidiaries, regular training programmes are organised in order for their staff to keep up with technology driving NIVELCO's high tech instruments. Sales meetings held annually provide a

vehicle for information transfer and for an exchange of ideas between people from all over the world. When our dealers participate in international exhibitions, they are supported with operational models, exhibition accessories and experts. With the success seen with the NIVELCO non-European subsidiaries (like USA, Russia and India), there is the strong intention to open further similar subsidiaries in the near future.

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## INTRODUCTION

NIVELCO Process Control Co. celebrated its 30<sup>th</sup> anniversary in 2012. Founded in 1982 to concentrate on the manufacture of industrial level measurement and control products, NIVELCO is now a world-class level specialist, based in Hungary. The NIVELCO strength originates from the solid base created by a family business, guided over 75 turbulent years by four basic principles:



- Respect for the Knowledge and Experience of the Founders
- Professional Pride in our Products
- Responsibility for our Colleagues and Customers
- Ensuring our Products and Services provide Value

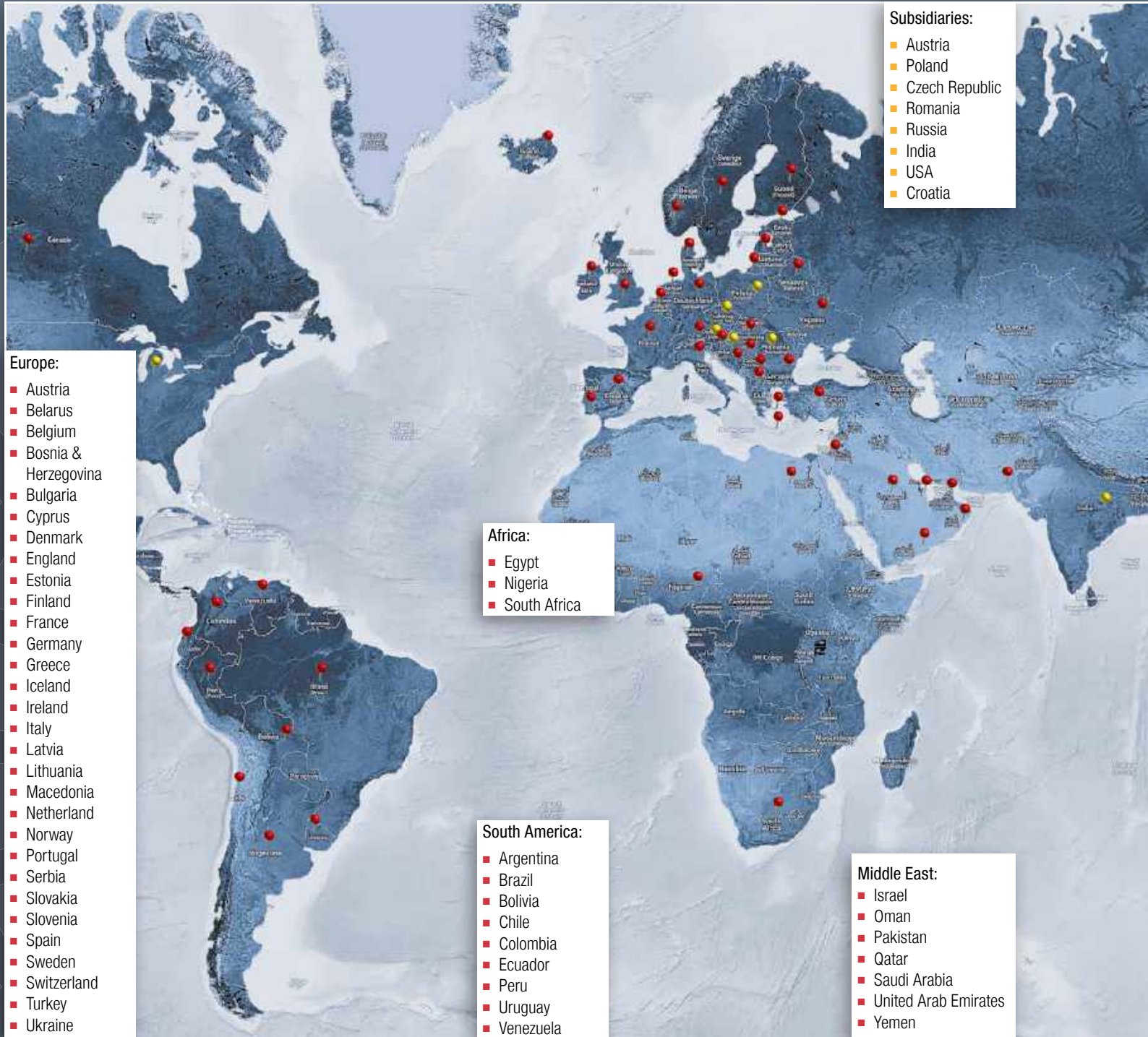
Efficient industrial production relies on the information provided by modern high technology sensors and instrumentation. In the 1980's the whole sensor manufacturing industry was radically changed by developments in microprocessors and electronics. NIVELCO achieved the significant market position it holds today by recognising these developments. Taking a note of what the market demanded, NIVELCO earned recognition primarily with its level transmitters, and gained a substantial global market share, based on its purposeful business policies and constant investment in technology.

Year by year NIVELCO produces every 20<sup>th</sup> ultrasonic transmitter sold in the world, every 50<sup>th</sup> vibration level switch, and every 100<sup>th</sup> microwave level transmitter. In this way NIVELCO has established and maintained a leading and respected world market position, and in the past 30 years has sold more than 700,000 units of level instrumentation: NIVELCO is now the 4<sup>th</sup> largest ultrasonic level transmitter producer in the world.

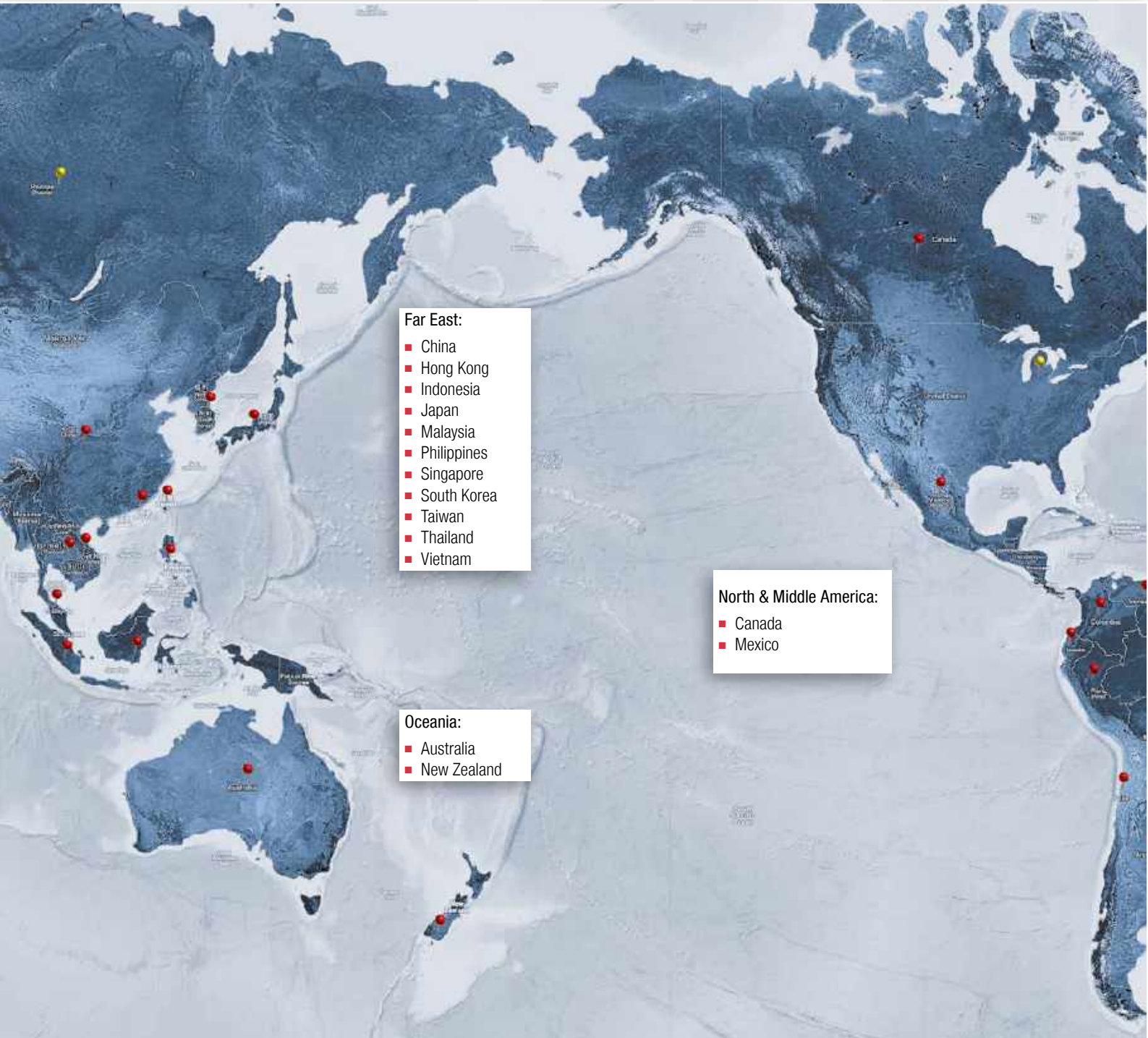
Our Application Handbook represents our 3 decades of experience in professional level measurement. The aim of this Handbook is to share our experiences we have obtained in various segments of the process control industries by means of application references.

The NIVELCO Group successfully maintained its leading position alongside other major instrument manufacturers throughout the economic crises of recent years. Indeed NIVELCO further increased the number of export markets served. The whole NIVELCO Company looks forward to applying the above basic principles, and our existing and ever-developing skills, to the future requirements of our industrial control customers, in increasingly more demanding world markets.

  
Tamás Szöllős  
CEO



## SUBSIDIARY COMPANIES AND DISTRIBUTION NETWORK



# Application Handbook

## 8 COMPANY & PRODUCT CHRONOLOGY



**1982**

- 1982 NIVELCO formed
- 1982 NIVOSONAR, the first Ultrasonic level transmitter
- 1984 NIVOCONT Vibrating rod level switch
- 1986 NIVOCAP Capacitance level transmitter
- 1989 NIVOSONAR Compact Ultrasonic level transmitter: A WORLD FIRST!
- 1991 NIVELCO Messtechnik (Austria)

**1991**

**1992**

- 1992 New factory opened in Budapest
- 1994 NIVOPOINT Float level switch
- 1994 NIVOMAG Magnetic coupling level switch
- 1995 Accreditation to ISO 9001
- NIVELCO Company in Poland
- 1996 NIVELCO Trade Center

**2002**

- 1996 NIVOSWITCH Vibrating fork level switch
- 1999 NIVOPRESS Hydrostatic level transmitter
- 2000 Budapest Factory expansion
- 2001 NIVOTRACK Magnetostrictive level transmitter
- 2002 Standardized mechanical and electronic construction
- HART Digital Communication in the transmitters

**2003**

- 2003 ATEX Hazardous Area Approvals
- 2004 MultiCONT the new system concept
- NIVELCO Bohemia (Czech Republic)
- 2005 MicroTREK Radar-based level transmitter
- NIVELCO T.M. Company in Romania
- 2007 NIVELCO Instruments (India)
- 2007 NIVELCO Company in Russia

**2013**

- 2008 NIVELCO Company in USA
- 2009 AnaCONT pH, ORP and conductivity transmitter
- the first SIL product certification
- 2010 AnaCONT Dissolved oxygen transmitter
- 2012 PilotREK Non-contact radar level transmitter
- 2013 NIVOCAP CK RF-capacitance level switch





## LEVEL TRANSMITTERS

Since its foundation NIVELCO has focused on the manufacture of industrial level measurement products. Our focus has not changed, demonstrated by our wide level transmitter portfolio employing many different types of level measurement methods. Our ultrasonic level transmitter selection is definitely the widest on the market offering integrated, compact, 2- or 4-wire transmitters for liquids or solids with remarkable number of optional choices.

The K-band PiloTREK non-contact level transmitters are regarded the most progressive non-contact level transmitters of the industrial process automation field.

The 25 GHz (K-band) PiloTREK Pulse Radars are regarded as the most progressive non-contact level transmitters of the industrial process automation field. Their accuracies are excellent and their short and narrow antennas make their installation simple and low cost. NIVELCO's K-band radar featuring  $\pm 3$  mm (0.12 inch) accuracy and short dead band excels with its versatile housing concept lining up plastic, aluminium and stainless steel versions. Its antenna range incorporates stainless steel horn and enclosed plastic tube varieties. The enclosed antenna versions can be replaced without removing the antenna enclosure from the process. Local programming of the PiloTREK is aided by a plug-in display module. If on-site reading is not desired this module may not be required thus reducing cost of ownership. The signal processing algorithm of the PiloTREK is based on NIVELCO's 30 years of experience with non-contact level measurement making it an excellent choice for applications simple and challenging alike.

The high-precision NIVOTRACK magnetostrictive level transmitters with 0.1 mm (0.004 inch) resolution are applicable for custody transfer liquid level measurements. The NIVOFLIP bypass liquid level indicators are suitable for high temperature applications and high pressure processes. The NIVOCAP capacitance level transmitters provide highly reliable measurement thanks to the well-known and accepted capacitive principle. Most of our transmitters are available with PFA coated probe for aggressive mediums, and all transmitter families have explosion-proof models applicable in hazardous environments.

### PiloTREK

### NON-CONTACT RADAR



- 25 GHz (K-band) measuring signal
- 2-wire compact transmitter
- Accuracy up to  $\pm 3$  mm (0.12 inch)
- Measuring range up to 23 m (75 ft)
- Max. 25 bar (363 psi g) and 180°C (356 °F)
- 4-20 mA + HART communication
- $\epsilon_r > 1.9$
- IP67 protection
- Explosion-proof models

### MICROTREK

### GUIDED WAVE RADAR



- 2-wire compact transmitter
- TDR principle
- $\pm 5$  or 20 mm (0.2 or 0.75 inch) accuracy
- $\epsilon_r > 1.4$
- Measuring range up to 24 m (80 feet)
- 4-20 mA + HART communication
- Max. 40 bar (580 psi g) and +200°C
- Rod or cable probes
- Plug-in graphic display module
- Explosion-proof models

The MicroTREK guided microwave level transmitter is designed for continuous level measurement of conductive or non conductive liquids, pulps and solids. MicroTREK level gauge operates based on the well known TDR (Time Domain Reflectometry) principle. Micropulses are sent along a probe guide at the speed of light. As soon as the pulse reaches the surface of the medium, it is reflected back to the electronic module. Level distance is directly proportional to the flight time of the pulse. The reflected signal is dependent on the dielectric constant of the material, the feasibility of the measurement is  $\epsilon_r > 1.4$ . The TDR technology is unaffected by the properties of the medium as well as that of the space above it. Measurement is also unaffected by the change in the physical properties of the materials such as temperature, pressure, dielectric constant.

The EchoTREK ultrasonic transmitters offer the best in liquid level measurement in a compact simple package. Developed using narrow beam angle pulse echo transducers, EchoTREK units are available with measurement ranges up to 25 meter (82 feet) - with standard plastic, PTFE or stainless steel sensor faces. Installed on the tank roof, or above the liquid level surface to be measured, the transmitter gives an analogue output proportional to liquid level. Initial set-up is achieved using the simple plug-in display module: then the intelligent QUEST+ process adaptive signal processing software system ensures that the electronics identifies and validates the liquid surface signal, giving reliable level monitoring.

### ECHOTREK FOR LIQUIDS

### ULTRASONIC COMPACT



- 2- and 4- wire compact transmitter
- Narrow 5° beam angle
- Max. 25 m (82 ft) measurement range
- PP, PVDF, PTFE and ss transducers
- 32-point linearization
- 4-20 mA + HART communication
- Explosion-proof models, IP67

# Product Selection

## 10 LEVEL TRANSMITTERS

The EasyTREK is a rugged, high performance ultrasonic level measurement transmitter, having transducer and processing electronics incorporated in a single housing. EasyTREK is a low cost transmitter unit from NIVELCO: it has all the sophisticated echo detection features of the well accepted EchoTREK measurement systems, packed into the 2-wire EasyTREK sensor housing. For multiple tank applications 2-wire transmitters are recommended using HART multi-drop systems linked to the NIVELCO MultiCONT controller, or a modem plus PC. Whether for liquid level measurement in sumps or tanks, for tank contents measurement, or open channel flow measurement, EasyTREK transmitters provide the answer. All EasyTREK transmitters use the same processing electronics and communications, the transducer itself varies only to give different range.

### EASYTREK FOR LIQUIDS

### ULTRASONIC INTEGRATED



- For liquid level measurement
- 2-wire integrated transmitter
- Narrow 5° beam angle
- Max. 25 m (82 feet) measurement range
- PP, PVDF, PTFE transducers
- 32-point linearization
- 4-20 mA + HART communication
- Open channel flow metering
- Explosion-proof models, IP68

### ECHO TREK FOR SOLIDS

### ULTRASONIC COMPACT



- For free flowing solid measurement
- 4-wire compact transmitter
- Narrow 5° beam angle
- Max. 60 m (200 ft) measurement range
- PP and aluminium sensors
- Joystick aiming device
- Plug-in display module
- 4-20 mA + HART communication
- Explosion-proof models, IP67

The EchoTREK compact level transmitters for free flowing solids featuring narrow beam angle transducers are offered for solids level monitoring - where previously only more complex, two part systems have performed.

With the high efficiency SenSonic transducers, giving superb signal transmission, plus the QUEST+ software, using advanced process adaptive signal processing for reliable echo monitoring, EchoTREK units overcome filling noise, dusting and irregular surface formations in most cases to give a high performance, compact, powder and solids level measurement transmitter.

The EasyTREK for solids includes all the capabilities and technology of higher costs separated units, such as the high efficiency SenSonic transducer, with its superb signal transmission, as well as the advanced QUEST+ process adaptive signal processing software. QUEST+ allows reliable echo monitoring to overcome filling noise, dusting and irregular surface formation.

All transmitters are HART capable, and are particularly cost effective when applied to multidrop systems, using MultiCONT or other HART based systems.

### EASYTREK FOR SOLIDS

### ULTRASONIC INTEGRATED



- For free flowing solid measurement
- 4-wire integrated transmitter
- Narrow 5° beam angle
- Max. 60 m (200 feet) measurement range
- PP and aluminium sensors
- Joystick aiming device
- 4-20 mA + HART communication
- Explosion-proof models, IP67

### NIVOTRACK

### MAGNETOSTRICTIVE



- 2-wire compact and mini compact
- 0.1 or 1 mm (0.004 or 0.04 inch) resolution
- Max. 15 m measurement range
- For liquids with min. 0.4 kg/dm<sup>3</sup> (400 oz/ft<sup>3</sup>) density
- Distance, level and volume measurement
- Rigid or flexible probes
- OIML R-85 international certification
- Explosion-proof models

The NIVOTRACK magnetostrictive level transmitters are an ideal solution for high accuracy measurement of clean fluids. Its high precision renders the NIVOTRACK suitable for custody transfer measurement of liquids such as fuels, solvents, alcohol derivatives etc. Units with flexible tube do not only make this accurate measurement for higher tanks possible, but offer a more convenient way for shipment and installation. Plastic coated versions of the NIVOTRACK substantially expand the field of application by a wide range of aggressive materials. Integrating the transmitter into a process control system is easy thanks to the intelligent signal processing and communication software as well as the wide of range of accessories offered.

## LEVEL TRANSMITTERS

The NIVOCAP 2-wire capacitive level transmitters provide an ideal solution for level measurement of conductive or non-conductive liquids. The probe of the instrument and the reference probe (which can be either the metal wall of the tank or installed separately) operate as opposing plates of a capacitor.

Between the plates of this capacitor the air is replaced by a medium with greater dielectric constant than the air during filling the tank, therefore the capacitance is changing directly proportional to the level. The incorporated electronic circuitry measures the capacitance difference and converts it to an output signal proportional to level.

### NIVOCAP

### CAPACITANCE



- 2-wire compact transmitter
- Rod or cable probes up to 20 m (65 feet)
- $\epsilon_r > 1.5$
- Fully or partly insulated probes
- 32-point linearization
- High sensitivity
- 4-20 mA + HART communication
- Explosion-proof models

### NIVOPRESS N

### HYDROSTATIC BOREHOLE



- 2 or 3-wire submersible transmitter
- Stainless steel body
- Up to 200 m (656 feet) range
- 4-20 mA + HART communication
- Linearity error: 0.25 %
- Incorporated Pt100 temperature sensor
- Venting tube in cable
- IP68 protection
- Explosion-proof models

The NIVOPRESS N hydrostatic level transmitters are designed to measure the level of clean or contaminated liquids. The pressure sensor at the bottom of the probe measures the sum of the hydrostatic pressure ( $P_{hydr}$ ) of the liquid column above it and the atmospheric pressure ( $P_{atm}$ ). The atmospheric pressure is led to the sensor through a breathing capillary which is equipped with a moisture filter that prevents the moisture reaching and damaging the electronics. This enables the atmospheric pressure to be subtracted from the measured pressure to get the hydrostatic pressure which is proportional to the height of the liquid column (h). The electronics converts the sensor's signal into an output signal. If temperature measurement (of the liquid) is needed beside the level measurement a combined (level + temperature) transmitter should be used.

The NIVOPRESS D hydrostatic level- and pressure transmitters operate in 2-wire systems and convert relative or absolute pressure (input signal) into 4-20 mA (output signal). The piezoresistive sensor measures the hydrostatic pressure and it compares the water head with the actual atmospheric pressure. The sensor is protected by a stainless steel flush diaphragm which transfers the pressure value to the piezoresistive sensor through silicon oil. NIVOPRESS D hydrostatic gauge pressure transmitters are suitable for level- and pressure measurement tasks in tanks, vessels and pipes especially in food and beverages industry (for example milk and any other food dollops) applications. The flat surface of the diaphragm avoids the risk of material build up and the maximum medium temperature of 125 °C (257 °F) allows proper (CIP) cleaning required by the regular cleaning processes of the food industry and similar hygienic applications.

### NIVOPRESS D

### HYDROSTATIC LEVEL / PRESSURE



- 2-wire compact level and pressure transmitter
- Wide pressure range selection
- High overload capability
- Accuracy: 0.25%
- Stainless steel diaphragm
- Plug-in display module
- 4-20 mA + HART communication
- Explosion-proof models

### NIVOFLIP

### BYPASS LEVEL INDICATORS



- Operation without power supply
- 500–5500 mm (1.65–18 feet) meas. range
- $\pm 10$  mm (0.4 inch) accuracy
- Stainless steel or titanium float
- Optional strap-on level switches
- Max. 100 bar g (900 psi g) proc. pressure
- DIN and ANSI flanges
- High temp. version up to +250°C (482 °F)
- PED approval

The NIVOFLIP is a bypass level indicator for pressurized vessels with up to 5.5 m (18 feet) flange distance containing liquids. The device has the international PED (Pressure Equipment Directive) approval, so it can be used for level indication of pressurized vessels up to 100 bar g (900 psi g) process pressure. The high temperature types are applicable up to 250 °C (482 °F) process temperature. The NIVOFLIP can be equipped with optional limit switches or with NIVELCO's NIVOTRACK high-precision magnetostrictive level transmitter if level transmission is needed.

# Product Selection

## 12 LEVEL TRANSMITTERS



## LEVEL SWITCHES

The most frequent level instrumentation task is level control and limit level switching whether if the measurement medium is liquid or solid. This is the reason why NIVELCO focuses on level switches in addition to the level transmitters. NIVELCO has designed and manufactures instruments that offer reliable level control and limit level switching solutions for most media from potable water to sewage, aggressive alkalis and acids, or free-flowing, powdered, bulk or granular solids.

The NIVOFLOAT NL-100 type floating level switch is suitable for level switching of various kinds of water, the NIVOFLOAT NW-100 type tilting float level switch is suitable for level switching of various liquids, especially sewage in shafts, tanks, basins or cisterns. The double-chambered float is made of injection moulded tough polypropylene that ensures good waterproof protection. The contacting microswitch is incorporated in the float.

The cable of the NIVOFLOAT level switch is fed through a waterproof sealed entry into the monolithic structure of the injection moulded plastic housing. The cable of the level switch is a flexible insulated copper cable with  $3 \times 1 \text{ mm}^2$  (AWG18) cross section and PVC or Neoprene outer insulation. Different control tasks such as liquid level monitoring and pump control can be accomplished with NIVOFLOAT.

Thanks to this very wide level switch selection we are able to provide suitable instruments for most level instrumentation applications. Most of our level switches have explosion-proof versions (in accordance to ATEX and/or IEC Ex). Moreover we offer suitable solutions for special requirements, for example the ship-building industry with a need for Germanischer Lloyd (GL), Det Norske Veritas (DNV), and Bureau Veritas (BV) or SIL approvals.

### NIVOFLOAT

### FLOAT SWITCHES



- Hermetically moulded, double chamber
- Adjustable switch differential
- Max. 20 m (65.5 feet) cable length
- Max. +50°C (122 °F) medium temperature
- Max. 2 bar (14.5 psi g) process pressure
- Level switch from potable water to sewage
- Low specific weight of the floating body
- Fail-safe indication and pump control
- Suitable also for tanks and basins

### NIVOCONT K

### CONDUCTIVE LEVEL SWITCHES



- Low cost level switch
- Limit switch or differential switch
- Adjustable sensitivity
- Adjustable time delay
- All wetted parts stainless steel
- Compact and separated types
- For liquids with min.  $10 \mu\text{S/cm}$  conductivity
- Rod probes up to 3 m (10 feet)

The NIVOCONT K level switches, based on the conductivity principle, can be applied to liquids with conductivity higher than  $10 \mu\text{S/cm}$ . For detecting the level, probes are immersed into the tank. These probes (and the tank wall if conductive) serve as contacts of an electric circuit. Probes can be of single or multiple rod versions. A maximum of 4 probe rods can fit in the multiple probe socket with an additional reference probe if tank wall is not conductive. The probe length should be in accordance with the level to be detected. When the liquid level reaches the probe, it will create a short-circuit and the output relay will be activated. The device senses the conductivity difference between the probes and the reference probe.

The NIVOMAG magnetic float level switches are used for point level detection and level control of liquids in all types of vessels. Operation principle: the permanent magnet of the float activates the output microswitch by a non-contact coupling system.

The great variety of both the top and side mounted versions makes it easy to install the switch in any tank at any location. For the simplest level switching you can select models with fixed hysteresis, while for level control application we offer NIVOMAG switches with adjustable hysteresis. Models with rubber or silicon sleeves can be applied for contaminated liquids. You can fit the NIVOMAG switch with an MMK type tester, to check the switching function even when the liquid levels aren't changing.

### NIVOMAG

### MAGNETIC COUPLING SWITCHES



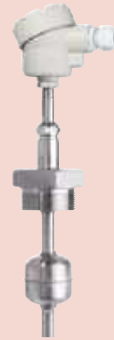
- Operation without power supply
- Micro-switch separated from the process
- All wetted parts stainless steel
- Fixed or adjustable switch differential
- Submersible versions
- For liquids with min.  $0.7 \text{ kg/dm}^3$  ( $700 \text{ oz/ft}^3$ ) density
- Explosion-proof models
- Marine approvals, SIL approval

## 14 LEVEL SWITCHES

The NIVOPOINT magnetic float level switches are suitable for single, or multipoint level controlling tasks in non-hazardous or hazardous areas. The device consists of a probe tube, a float incorporating a magnet and a housing containing the connection terminals. A maximum of 5 switches can be incorporated in the probe. A sliding sleeve on the top of the probe provides for a simultaneous  $\pm 25$  mm (1 inch) adjustment possibility of the positioning of the switches. The wetted parts of the level switch are made of stainless steel. The plastic coated versions are suitable for level detecting of aggressive liquids, and the ATEX certified versions are applicable for level switching of explosive materials. Floats and process connections can be selected according to the measured medium and the application. The mini type NIVOPOINT magnetic float level switches are suitable for maximum level indication in small tanks. The small size and easy mounting of the switch allows maximum level detection in appliances or tanks using process connections made for different other purposes.

### NIVOPOINT

### MAGNETIC TRACKING



- Operation without power supply
- Reed switches separated from process
- Stainless steel probe and float
- PFA coated probe version with plastic float
- Up to 5 switch points
- For liquids with min.  $0.4 \text{ kg/dm}^3$  ( $400 \text{ oz/ft}^3$ ) density
- Multi-point level switch in closed tanks
- Explosion-proof models

### NIVOSWITCH FOR LIQUIDS

### VIBRATING FORK



- For most liquids with min.  $0.7 \text{ kg/dm}^3$  ( $700 \text{ oz/ft}^3$ ) density and max.  $10^4 \text{ mm}^2/\text{s}$  ( $0.1 \text{ ft}^2/\text{s}$ ) viscosity
- No moving parts
- Self-cleaning for most mediums
- Stainless steel and plastic coated forks
- Rigid rod extension up to 3 m (10 ft)
- Explosion-proof models
- IP67, IP68 protection

### NIVOSWITCH FOR SOLIDS

### VIBRATING FORK



- For powdered solids with min.  $0.01 \text{ kg/dm}^3$  ( $10 \text{ oz/ft}^3$ ) density
- No moving parts
- Stainless steel forks
- Self-cleaning for most mediums
- Rigid rod extension up to 3 m (10 ft)
- IP67, IP68 protection
- Explosion-proof models

The NIVOSWITCH vibrating fork level switches are suitable for level detection of liquids or granular, powdered solids. Units with parallel vibrating fork are suitable for liquids, units with non parallel vibrating fork are suitable for solids. Mounted on pipes, silos, tanks or hopper bins it can control filling / emptying, also can generate fail-safe alarms providing overflow- or dry run protection. The operation principle is based on that the electronic circuit excites a vibration in the fork probe. When the medium reaches and covers the fork, its vibration changes or stops. The fork will start vibrating again as the medium sets it free. The electronics senses the change of vibration and gives output signal after a selected delay. The plastic coated version is recommended to use for aggressive mediums, the highly polished version is recommended to use for abrasive mediums. The PNP/NPN transistor output versions can be connected directly to PLC, or relay unit. NIVOSWITCH vibrating forks are able to solve switching tasks of high-current loads with the help of UNICONT PKK switching amplifiers. UNICONT PKK-312-8 Ex is a recommended intrinsically safe switching unit designed for Ex rated vibrating forks.

### NIVOCONT R

### VIBRATING ROD



- For granular solids with min.  $0.05 \text{ kg/dm}^3$  ( $50 \text{ oz/ft}^3$ ) density
- Rod or cable extension up to 20 m (65 ft)
- Stainless steel vibrating section
- Selectable density
- Plastic or aluminium housing
- Relay or electronic switch output
- IP67 protection
- Explosion-proof models

The NIVOCONT R series of vibrating rod level switches are robust instruments designed for low and high level indication of granules and powders with a minimum of  $0.05 \text{ kg/dm}^3$  ( $50 \text{ oz/ft}^3$ ) density. Mounted on tanks, silos or hopper bins it can control filling / emptying, or give fail-safe alarm signals. The highly polished version is recommended to use for abrasive mediums. The operation principle is based on that the electronic circuit excites a vibration in the rod probe. When the medium reaches and covers the rod, its vibration stops, when the medium leaves the rod it returns to vibrate freely. The electronics senses the change of vibration and gives output signal after a selected delay.

## LEVEL SWITCHES

The NIVOROTA rotary paddle level switch series of well-known NIVELCO design can be used for detecting the level of lumpy or powdery materials and granules. Mounted to tanks, silos and hoppers it can monitor and control level, filling and emptying of stored materials such as stone, fly ash, sand, coal, feed, beet slice, etc. A small power electric motor drives the paddle which rotates freely in the absence of the material. When the paddle is immersed by the material reaching it, the motor will be switched off the same time triggering the output contact switch. When the material level drops the paddle runs free again, the motor is reactivated and the switch returns to its original state. The NIVOROTA E-700/800 series rotary paddle level switches provide all the advantageous features of the previous series in one unit. Dust Ex versions are available for use in hazardous environments.

### NIVOROTA

### ROTARY PADDLE



- For granular solids with min. 0.1 kg/dm<sup>3</sup> (50 oz/ft<sup>3</sup>) density
- Plastic or aluminium housing
- Stainless steel wetted parts
- Motor shut-off feature
- Single or 3-vane paddles
- Rod or cable extended versions up to 3 m (10 feet)
- High temperature version
- IP67 protection
- Explosion-proof models

### NIVOCAP CK

### RF CAPACITANCE



- For solids with  $\epsilon_r \geq 1.5$  and liquids
- For adhering, sticky materials
- Easy calibration
- Selectable sensitivity
- Build-up immunity
- Rod or cable extended versions up to 10 m (33 feet)
- High temperature version
- IP67 protection
- Explosion-proof models

The NIVOCAP CK new generation capacitance level switches operate as capacitance meters in the RF (radio-frequency) range providing great immunity to build-up. NIVOCAP CK-100 is an excellent choice for those adhering, sticky substances where the rival vibrating or the other contact measurement technologies are not suited. The mechanical construction consists of a stainless steel probe and a reference probe between two insulations. The intelligent microcontroller based electronics of the NIVOCAP CK continuously evaluates the voltage level proportional to the capacitance difference between the two probes and the housing. This way it provides more stable measurement compared to the analogue capacitance switches. The units are available only with paint coated aluminium housing, because one reference point of the measurement is the housing itself. An insulated section of the probe called the guard-ring allows that the material build-up on the probe can be ignored preventing false switching. The maximum probe length of the NIVOCAP CK series is 3 meter (10 feet) for extended rod probes and the cable extended versions available up to 10 meter (33 feet) probe length. The high temperature and the Dust-Ex approved models are suitable for using in harsh environments so they can be ideal choice for power generation applications.



# Product Selection

## 16 LEVEL SWITCHES





## LIQUID ANALYTICAL TRANSMITTERS

There is a constant demand for analytical measurements in practically all industries. Analysis of fluids and reliable control over the feeding of various chemicals is especially crucial in the water and wastewater, pharmaceutical, chemical, food and beverage, power industries. NIVELCO's AnaCONT analytical range provides HART-capable transmitters for pH, ORP, dissolved oxygen (DO) and conductivity (EC) measurement. The AnaCONT LEP pH transmitters are able to cover the whole 0-14 pH scale.

The AnaCONT LER ORP transmitters measure in  $\pm 1000$  mV measuring range. The AnaCONT LED Dissolved Oxygen transmitters use 10 ppm or 20 ppm probes. The wide range of accessories is applicable for all the three transmitters both for the compact and the remote mount types. The AnaCONT LCK mini compact conductivity transmitters provide various mounting positions making possible their use in diverse industrial applications.

The AnaCONT instruments are designed to measure pH and redox potential values of liquids and aqueous solutions.

**pH measurement:** Continuous measurement of acidity ( $\text{pH} < 7$ ) and of basicity ( $\text{pH} > 7$ ) liquids can be performed by the help of AnaCONT transmitters. The necessary feeding of chemicals and other technological functions can be controlled by the processed measured values.

The potential difference between the submerged measuring and reference probe generates a voltage proportional to the concentration of the hydrogen ion in the measured fluid. This voltage is evaluated by the signal processing electronic module of the instrument.

Based on the signals of the submerged probe and the temperature sensor the smart signal processing electronic module calculates a pH value normalized to 25°C (77 °F) and generates a proportional output signal. The long term stability and accuracy of the measurement requires a periodic calibration of the sensors using the standard buffer solutions.

**Redox potential (ORP) measurement:** Similarly to the pH measurement, the measurement of the redox potential is based on the potential difference between measuring and reference probes. Oxidation or reduction occurs on the platinum surface of the measuring probe.

Redox potential is a parameter that indicates the sum of oxidants and reducers in the measured medium.

The output signals of the probes are processed by the electronic unit and it converts them into a proportional output signal. In order to get the desired medium parameters the reduction of liquids or feeding of suitable oxidant is executed based on the formerly processed values.

The constructions of the sensors on the compact and integrated versions are identical, so all accessories are applicable for both types.

The applications of the special accessories make the optimal installation of the transmitters into the technologic process easier. By using extension pipes or extension cables the remote mount versions allow the mounting of the electronics and the electrode part at any distance from each other.

### ANACONT

### pH AND ORP TRANSMITTERS



- 2-wire pH and ORP transmitters
- Compact and integrated transmitters
- PP or PDVF sensor housing
- Measuring range: pH: 0 - 14, ORP:  $\pm 1000$  mV
- Replaceable electrodes
- Temperature compensated
- 4-20 mA, HART communication
- Remote mount versions up to 10 m (33 ft)
- IP67, IP68 protection
- Explosion-proof models

### ANACONT

### DISSOLVED OXYGEN TRANSMITTERS



- 2-wire DO transmitters
- Compact transmitters
- PP or PDVF sensor housing
- Measuring range: 0 - 20 ppm
- Replaceable probes
- Temperature compensated
- 4-20 mA, HART communication
- Power relay output
- Remote mount versions up to 10 m (33 ft)
- IP67, IP68 protection
- Explosion-proof models

The dissolved oxygen (DO) measurement gives the quantity of dissolved oxygen gas in the liquid, in ppm or mg/l values. The sensor with oxygen-permeable membrane immersed in the liquid provides an electronic signal proportional to the oxygen concentration.

The intelligent electronics calculates and transmits the DO value normalized to 25°C (77 °F) on the basis of the output current of the DO sensor and the potential of the temperature sensor immersed in the medium.

## 18 LIQUID ANALYTICAL TRANSMITTERS

The AnaCONT 2-wire mini compact conductivity transmitters are designed to measure the conductivity of a liquid and convert the input signal to 4–20 mA output. They are suitable for measuring clean, non-crystallisable liquids. The design of the transmitter, the wide temperature range and various mounting positions make possible the use in diverse industrial applications. Two probes are immersed into the measured liquid. The distance between the probes and their surface define the cell constant (K) of the instrument. The cell constant defines the measuring range and thus the application area.

### ANACONT



### CONDUCTIVITY TRANSMITTERS

- 2-wire EC transmitters
- Mini compact type
- Stainless steel sensor housing
- Measuring range:
  - 1  $\mu\text{S}/\text{cm}$  – 2  $\text{mS}/\text{cm}$
- Optional plug-in
- 4-digit LED display
- 4-20 mA, HART communication
- IP68 / IP65 protection



## FLOW MEASUREMENT

NIVELCO's open channel flow metering system offers 9 different sizes, compact types of PARSHALL flumes made of plastic (PP). The flume together with EasyTREK / EchoTREK ultrasonic level transmitter and MultiCONT process controller is able to create a complete flow- measurement system.

The PARSHALL flume is a rigid structure, manufactured out of polypropylene with narrow tolerances to ensure high accuracy of metering, therefore during transport and installation great care should be taken to prevent the flume from getting deformed. The measuring flume is easy to install in new or existing channel structures.

With the PARSHALL flume applied as a reducing element, the stagnation pressure causes the liquid level to rise. This change in level is in proportion with the velocity of the liquid and the flow rate. The EasyTREK or EchoTREK ultrasonic level transmitter measures the change in level and transmits measurement data via HART communication to the MultiCONT multichannel process controller.

The ultrasonic level transmitters can be remote programmed via HART by UNICOMM HART-USB/RS485 modem or MultiCONT and data logging can be also realized besides displaying or transmitting measurement data on RS 485 line into PC.



The NIVOSONAR GPA enables flow measurements on gravitational sewers, brook channels, irrigation channels or any other open channel with the help of a PARSHALL flume.

### NIVOSONAR

### OPEN CHANNEL FLOW MEASUREMENT



- 9 different sizes, compact types of PARSHALL flumes made of plastic
- Factory calibrated dimensions
- Range: 0.28 to 1850 l/s (35.6 to 235195 ft<sup>3</sup>/h)
- Level transmitter to be ordered separately: EasyTREK or EchoTREK
- 4-20 mA, HART communication
- For open channels, treated effluent sewage measurements
- Certification of measurement



# Product Selection



## TEMPERATURE

The most frequently measured physical parameter in the modern process automation industry is the temperature. NIVELCO's THERMOCONT and THERMOPOINT product ranges are designed specially for the purpose of measuring this important parameter. The product line starts with a simple Pt100 temperature sensor and ends with heavy duty version transmitters with Ex d flameproof housing and HART communication but also lining up multipoint temperature transmitters even for average temperature measurement. Number of the order code variations and special types is very high, so NIVELCO is

able to provide suitable solution for most applications from the wide range of THERMOCONT and THERMOPOINT instruments.

The THERMOCONT TT transmitters have 4-20 mA output and as an option these devices are digital HART communication capable. The temperature sensors have a robust outer protection tube which can PFA coated.

If desired the THERMOCONT T temperature sensors can be used with the UNICONT PM series universal process controller units creating a complete temperature control system.



The THERMOPOINT 2-wire temperature transmitters are suitable for continuous multipoint temperature-measurement, -indication and -transmission of normal and hazardous liquids, powders or granular solids. Temperature of grain, feed stored in silos needs to be monitored for maintaining quality of the stored medium. Monitoring of the total volume of the silo is needed to provide information on accidental quality loss or appearance of germs or fungus. Eventual temperature increases will alert the operator to perform operation or recycling the medium. Temperature measurement is done by electronic temperature sensors placed at equal distances in a plastic coated stainless steel flexible tube. Each sensor sends the actual measured temperature of its environment to the transmitter head. The 2-wire loop-operated transmitter head communicates through HART protocol with control room devices such as a MultiCONT or a PC, for further processing or datalogging.

A salient advantage of the MultiCONT based system is that, if level measurement is required the system can be extended with a level transmitter. The advantage of using a multifunction system is that a new transmitter can easily be inserted into the existing loop, using the existing HART communication.

### THERMOPOINT

### MULTIPOINT TRANSMITTERS



- 2-wire multipoint temperature transmitter
- Temperature measurement of powdered, granular solids or liquids
- Max. 15 sensors / probe
- Max. 30 m (100 feet) probe length
- Temperature trend monitoring
- -40°C...+125°C (-40°F...+257°F) range
- HART communication
- Explosion-proof models

### THERMOCONT TT

### TEMPERATURE TRANSMITTERS



- -40°C... +600°C (-40°F... +1112°F) range
- Plug-in display module
- 4-20 mA + HART communication
- Integral A or B class Pt 100 probe
- Probe length up to 3 m (10 feet)
- Stainless steel or PFA coated probes
- Heavy duty field mountable housing
- Multiple head positions
- Explosion-proof models

The THERMOCONT TT field devices incorporating Pt100 sensor are 2-wire temperature transmitter with 4 20 mA analogue output or transmitter/indicator if equipped with plug in display. Intrinsically safe version of each model is available in ordinary or flame-proof housing. The measured temperature can also be transmitted by HART communication. The THERMOCONT TT temperature transmitters are suitable for temperature measurement of liquids in tanks and pipes and free flowing or powdered solids, but also applicable for gases. Wall mounted versions are available for ambient temperature measurements. The PFA coated stainless steel probe makes measurement of very aggressive materials also possible. The reinforced temperature probe version is an ideal solution for meeting the requirements of the oil-, gas- and heavy chemical industries, but also a good choice when robustness of the probe is advantageous. As special version of the unit a remote transmitter is also available which can be connected to a standard Pt 100 sensor through a simple 4-wire cable.

The wide range of THERMOCONT T temperature sensors is able to cover almost all demands in the area of industrial temperature measurement. The numerous versions and multiple kinds of applicable probes make THERMOCONT suitable choice for all industries. PFA coated probe versions with teflon inserted steel flange are applicable for chemical and petrochemical applications where aggressive mediums could damage steel probes.

The vibration-resistant versions are suitable for special applications where the measurement is exposed to high vibrations. Suited for unique technologies and industrial processes, special versions are also available along with the standard models.

### THERMOCONT T

### TEMPERATURE SENSORS



- -40°C... +600°C (-40°F... +1112°F) range
- Resistance Temperature Detectors
- A or B accuracy class
- 2- or 4-wire types
- Probe length up to 3 m (10 feet)
- Stainless steel or PFA coated probes
- Explosion-proof models

### THERMOCONT TN / TX

### TEMPERATURE SENSORS



- Heavy duty, strengthened version
- Pt100 or thermocouple sensor
- Drilled stainless steel thermowell
- 2- or 4-wire types
- Probe length up to 1000 mm (3.3 feet)
- Vibration-resistant construction
- Temperature sensors for gases
- Explosion-proof models

The UNICONT PM-400 and -500 series universal controllers are 1/16 DIN (48x48 mm) process controllers with relay and analogue outputs or PID algorithm supporting versatile functions. The universal analogue PID-controllers can be used with a Pt-100 resistance thermometer and with different thermocouples for temperature measurement, control as well as processing the signals of transmitters with 4–20 mA and 0–5 V DC or 0–10 V DC output. The output signal of the controller can be a relay, continuous 4–20 mA process current signal or SSR-driver. Additional alarm relay provides for limit monitoring. The unit is microprocessor based, has an auto-tuning software, automatic and its PID controller is able to find the optimum of the P-I-D constants. The UNICONT PMM-500 series are able to communicate on RS485 line and also able to provide power supply for transmitters.

### UNICONT PM-400/500

### UNIVERSAL CONTROLLERS



- Dual line 4-digit LED display
- Pt 100, Ni100, J, K, S type. sensor,
- 4-20 mA or 0-10 V input
- Up to 3 power relays
- ON-OFF, PD or PID control
- Auto tuning
- Transmitter power supply
- Heating / cooling control

### UNICONT PM-300

### UNIVERSAL CONTROLLERS



- Programmable inputs
- 4 digit LED display
- Relay contacts or analogue output
- 4-20 mA output
- ON/OFF, PD or PID control algorithm
- Auto tuning feature
- Relay outputs up to 4 pcs
- 32 point linearization
- Window comparator differential metering

The UNICONT PM-300 is a universal, one or two-channel process controller with relay and analogue outputs and PID algorithm supporting versatile functions. It can be used from standard to extraordinary temperature control (cooling, heating) tasks. Beside the usual inputs, practically all generally used temperature sensors can be connected.

Due to its auto tuning feature the controller can successfully handled by technicians unaccustomed to the process control. The dual 4-digit lighting displays allow viewing even from greater distances.

The UNICONT PM-300 is highly accurate and easy to handle, thus suitable for applications as panel instrument both in laboratory and industrial process control applications.

## INDUSTRIAL SENSORS

Another important non-electrical quantity of the industrial process automation is pressure.

The NIPRESS D mini compact type gauge / absolute pressure transmitters offer wide selection of models and provide possibility to complete almost all relative or absolute pressure measurement tasks requiring different accuracy. Their design, high overload capability and the possibility to install the units in any physical position allows for a wide range of industrial applications.

The NIPRESS pressure transmitters working in 2- or 3-wire systems convert pressure (input signal) to direct current or voltage (output signal) proportional with the pressure. The wide selection of models provides possibility to complete almost all relative or absolute pressure measurement tasks requiring different accuracy.

Their design, high overload capability and the possibility to install the units in any physical position allows for a wide range of industrial applications. All NIPRESS transmitters can be equipped with the loop powered, programmable, plug in display UNICONT PLK-501 to be ordered separately.

Non-contact proximity switches are also very popular devices of the industrial process automation. The MICROSONAR ultrasonic proximity sensors provide ideal choice for simple applications where the use of higher performance units such as EasyTREK or EchoTREK is not needed. The MICROSONAR proximity sensors use non-contact ultrasonic principles to detect and measure the position of an object. They act as proximity switches, or transmit the measurement of the distance from sensor face to the target.

### NIPRESS

### PRESSURE TRANSMITTERS



- Gauge or absolute pressure transmitters
- Wide pressure range selection
- Piezoresistive or ceramic sensor
- High accuracy: 0.25 %, or 0.5%
- Mini compact 2- or 3-wire transmitters
- Stainless steel housing
- Sanitary process connections
- 4-20 mA, 0-10 V DC output

### MICROSONAR

### ULTRASONIC PROXIMITY SENSORS



- Non-contact distance metering
- Narrow 5° beam angle
- Max. 6 m (20 feet) measuring range
- Position, distance detection
- Local programming with magnet or cable
- 4-20 mA, 0-10 V, PNP or NPN switch output
- Short circuit and reverse polarity protection

The MICROSONAR proximity sensors use non-contact ultrasonic principles to detect and measure the position of an object.

They act as proximity switches, or transmit the measurement of the distance from sensor face to the target. For transmitter models the output signal is either 4–20 mA or 0–10 V, which can be assigned to any part of the nominal range. Switching points of the proximity switch option can be set to any point within the range.







## SYSTEM ACCESSORIES

The wide product portfolio of NIVELCO requires many types of system accessory components. These devices facilitate the integration of NIVELCO's level instruments to process control systems.

The system component range consists of process controller units, universal displays, loop displays, interface and other expanding modules, time relays, etc. The UNICONT PGK intrinsically safe isolator power supply modules provides

intrinsically safe power for 2 wire transmitters operating in hazardous locations and ensure galvanic insulation between input and output. The special feature of the unit is its high accuracy signal conversion. The UNICOMM SAK-305 communication modules are able to communicate between the HART-capable field transmitters and the process controller PC-s or PLC-s, via USB or RS485 communication line.

The MultiCONT unit is a universal interface between NIVELCO's HART-capable intelligent level transmitters and the other elements of the process control system like the PC-s, PLC-s, displays and the actuators. Besides its role as an interface, the MultiCONT ensures the powering of the 2-wire transmitters while being capable of complex control tasks. The MultiCONT unit supports communication with a maximum of 15 standard or 4 Ex ia certified NIVELCO's HART-capable 2- and / or 4-wire transmitters. Remote programming of the transmitters and downloading of the parameters and measured data is possible using the MultiCONT. The various outputs such as 4–20 mA, relays and digital outputs can be controlled using measured values and new values calculated from the measured values. The large dot-matrix display allows visualisation of a wide range of informative display functions. One special feature is the Echo-Map visualisation when communicating with NIVELCO's EchoTREK and EasyTREK transmitters.

### MULTICONT

### MULTICHANNEL PROCESS CONTROLLER



- Programmer, display and controller for transmitters with HART protocol
- 1 to 15 input channels
- 4-20 mA, HART, RS485 output
- Datalogger function
- SD card slot
- Expandable with interface modules
- Highly informative Dot-Matrix display
- Explosion-proof models

### UNICONT PJK

### UNIVERSAL INTERFACE MODULE



- MultiCONT expanding module
- RS485 communication
- Output variations:
  - 2x current outputs
  - 2x relay outputs (250 V AC, 8 A)
  - 1x current output and 1x relay
- DIN rail mountable
- Galvanic isolation
- Level controlling and limit level indication

The UNICONT PJK series is a universal interface module that can be controlled via RS485 line, and (depending on type) provides relay(s) and/or 4–20 mA current output(s).

The UNICONT PJK-100 universal interface modules provide essential solution if the number of relays or current outputs of MultiCONT process controller is not enough in a system.

The device can be used also as a peripheral unit for PLC or PC controlled process control systems communicating via MODBUS protocol.

There is a universal module with both relay and current output in the variety of the UNICONT PJK series.

The UNICONT PKK-312 series is a 4–20 mA current controlled limit switch featuring galvanic isolation also available as an intrinsically safe unit.

The input 4–20 mA signals can be transferred from passive or active outputs of 2- or 4-wire transmitters. The value of the input signal will be compared in the unit with the set (taught) value and the state of the galvanically isolated relay changes in accordance with the comparison mode programmed.

The UNICONT PKK-312-8 Ex is a special version, designed to cooperate with Ex rated NIVOSWITCH vibrating fork level switch, as an intrinsically safe power supply and amplifier unit.

### UNICONT PKK

### CURRENT CONTROLLED SWITCHES



- 4–20 mA input
- DIN rail mountable
- Able to power 2-wire transmitters
- Galvanic isolation
- Power relay (SPDT) output
- Switching amplifier for vibrating forks
- Wire state monitoring
- Explosion-proof models

The UNICONT series 2-wire passive loop-indicators are universally scalable process value indicators, they find their use where the process value has no control function. The 3-wire HART converter type UNICONT devices offer the optimal solution where local displaying is needed besides the remote data processing and the field transmitters having 4–20 mA output are needed to be integrated into HART multidrop system.

The devices are applicable not only for NIVELCO transmitters, but for all transmitters which use standard 4–20 mA output. Robust enclosure makes applications under harsh conditions also possible. The UNICONT PDF-600 series with flameproof (Ex d approved) stainless steel housing meets the special requirements of certain industry segments, such as Food and Beverage, Marine, Oil and Gas.

### UNICONT PLK

### LOOP INDICATORS



- 4 - 20 mA input
- 4-digit LED indicator
- Rotatable display
- Operation without external power
- PNP switch output
- IP 65 protection

The UNICONT PGK-301 intrinsically safe isolator and power supply modules are suitable for providing power supply for transmitters operating in hazardous applications, isolating the input, output and supply voltage galvanically. Moreover the device perform high accuracy signal transmission with 4-20 mA or HART communication between Ex and non-Ex areas.

The UNICONT PGK-301 intrinsically safe isolators perform signal transmission to the non-Ex Zone with microprocessor controlled digital signal processing, which provides transmission accuracy up to 1  $\mu$ A.

### UNICONT PD

### LOOP INDICATORS



- 4–20 mA loop operated
- Operation without external power supply
- 6-digit plug-in LCD display
- 20 mm (0.75 inch) digit height
- Universal field indicator for any transmitters
- 4-20 mA / HART converter version
- Stainless steel flameproof housing
- Explosion-proof models

The UNICONT PLK-501 type plug-in displays with 4 digit LED indicator can be connected to the 2-wire transmitters with its DIN 43650 connector (such as NIPRESS pressure gauge / transmitter, AnaCONT LCK conductivity transmitter).

The displayed numerical values can be freely scaled to the current input by the user, setting the maximum and the minimum value.

### UNICONT PGK

### EX ISOLATOR POWER SUPPLY



- Isolated power supply for intrinsically safe transmitters
- For transmitters operating in hazardous applications
- 4-20 mA, HART communication
- For high precision transmitters
- Up to 5 ms response time
- Up to 1  $\mu$ A transmission accuracy
- Explosion-proof models

### NIPOWER

### POWER SUPPLY



- Output voltage: 12 / 24 V DC
- Output current: 2500 mA / 1250 mA
- Stabilized DC output
- Switching-mode power supply
- Short-circuit protection
- Overload protection
- Overvoltage protection
- DIN rail mountable

The rail mountable NIPOWER switching-mode power supply modules provide 12 V or 24 V stabilized DC output for low power consumption devices.

## SYSTEM ACCESSORIES

The low-cost UNICONT PSW pump control unit is designed for fully automatic level control of small domestic or communal sewage shafts, sumps or wetwells. An IP68 protected ultrasonic level transmitter performs continuous level measurement and delivers 4–20 mA level data to the UNICONT PSW unit featuring a user programmable controller. This controller featuring relay output incorporated in the UNICONT PSW directly controls the single phase pump acting in the sump, well, etc. The current controlled switch operates in differential level switch mode as default, the low and high levels are programmable.

### UNICONT PSW

### ULTRASONIC PUMP CONTROL SYSTEM



- Low cost automatic pump control system
- Ultrasonic level measurement
- 0.4 - 3 m (1.3 – 10 ft) measurement range
- Programmable pump cycling
- Controlling of one-phase pumps
- Incorporated circuit breaker
- IP68 protected sensor

### NITIME

### TIME RELAY



- 2 and 10 function types
- Wide time range: from 0.1 sec ... 100 days
- Small size
- Universal power supply voltage
- DIN rail mountable
- Relay output

The NITIME time relays are suitable for all kinds of timing tasks of technological equipments.

Microprocessor controlled operation, many functions, universal power supply voltage, and slim module width are the main characteristics making NITIME time relays applicable also for automation tasks of lights, pumps, heating, coolers, fans or motors.

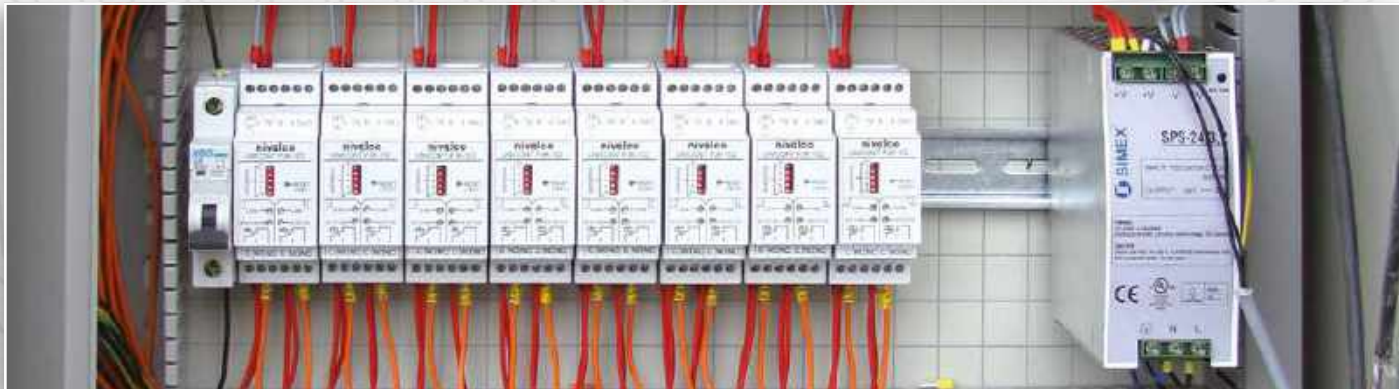
The UNICOMM interface modules are able to establish communication line between HART-capable field devices and process controller computer. The UNICOMM HART modems are applicable not only for NIVELCO transmitters, but for all HART-capable transmitters which use standard HART communication. The UNICOMM SAK-305 modules can be connected into a suitable device with RS485 interface input, used as a HART-RS485 modem. The communication protocol is HART on the RS485 line. In this case the device needs external power supply. The Ex versions can be connected to transmitters placed in hazardous areas.

### UNICOMM

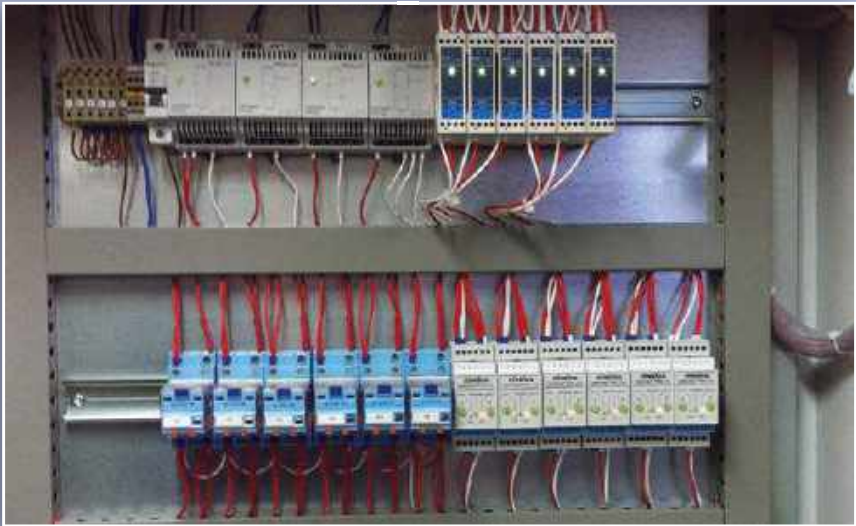
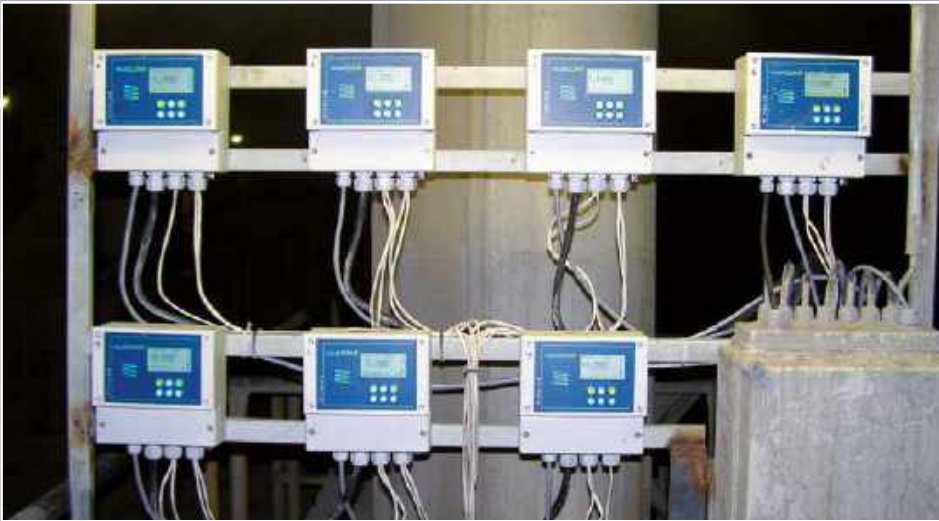
### HART MODEM



- HART - USB/RS485 modem
- DIN rail mountable version
- Test clip connector version
- No need for power supply
- Galvanic isolation
- Explosion-proof models



# Product Selection



## SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

NIVELCO earned recognition primarily with its level transmitters, and gained a substantial global market share, based on its 3 decades of constant investment in technology. Supported by our wide base of level know-how, we wish to share our experiences in the field of applications with our readers. The chart below is not complete but covers a fairly wide spectrum of mediums typical for the most important industry segments. Please always take into consideration the local measurement environment conditions and the technical parameters. The content of the chart is only informational, please regard it as a recommendation.

### Legend

- L = Liquid      = excellent      = applicable with restrictions (contact NIVELCO for details)
- S = Solid        = excellent with plastic coated probe      =  $\epsilon_r$  of the medium should be considered
- = not applicable      = consult NIVELCO for details      = applicable with restrictions and only with plastic coated probe

Industry	Medium to be measured	State	Relative Dielectric Constant ( $\epsilon_r$ )	Continuous Level Measurement								Point Level Detection									
				PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFELIP	NIVOTRACK	EasyTREK EchoTREK for liquids	EasyTREK EchoTREK for solids	NIVOFLOAT	NIVOCONT K	NIVOMAG	NIVOPOINT	NIVOSWITCH	NIVOCONT R	NIVOROTA	NIVOCAP CK	
Agriculture	Corn, cereals, grain, sunflower	S	2.0–5.0																		
	Seed-corn, Granulated fodder mixture	S	2.0–3.0																		
	Granule fertilizers (Nitrates, Phosphates)	S	1.6–6.4																		
	Fertilizer (watered solution)	L	conductive																		
	Manure	L	conductive																		
Construction Materials	Calcium carbonate aqueous solution	L	conductive																		
	Cement	S	1.5–10																		
	Ground, stone, sand, gravel	S	2.5–5.0																		
	Powdered lime (CaO)	S	1.6–2.2																		
Chemical industry	Slacked lime (lime hydrate) / Lime milk (Ca(OH) <sub>2</sub> )	L	conductive																		
	Ammonia (NH <sub>3</sub> )	L	17–25																		
	Ammonium hydroxide (NH <sub>4</sub> OH)	L	conductive																		
	Ammonium chloride (NH <sub>4</sub> Cl) aqueous solution	L	conductive																		
	Boric acid (H <sub>3</sub> BO <sub>3</sub> ) aqueous solution	L	conductive																		
	Carbon tetrachloride (CCl <sub>4</sub> )	L	2.3																		
	Ether, diethyl-ether (CH <sub>3</sub> CH <sub>2</sub> ) <sub>2</sub> O	L	3.1–4.4																		
	Formaldehyde (HCHO) in H <sub>2</sub> O, Formalin	L	23																		
	Fluorosilicic acid ((H <sub>2</sub> SiF <sub>6</sub> ) in H <sub>2</sub> O)	L	conductive																		
	Glycerol (glycerine, glycerin) (HOCH <sub>2</sub> CH(OH)CH <sub>2</sub> OH)	L	42.5–47																		
	Ethylene Glycol ((CH <sub>2</sub> OH) <sub>2</sub> )	L	37–41.2																		
	Hydrochloric acid (HCl)	L	conductive																		
	Ferric chloride ((FeCl <sub>3</sub> ) in H <sub>2</sub> O)	L	conductive																		
	Nitric acid (HNO <sub>3</sub> )	L	conductive																		
	Formic acid (HCO <sub>2</sub> H)	L	conductive																		
Phosphoric acid (H <sub>3</sub> PO <sub>4</sub> )	L	conductive																			

Industry	Medium to be measured	State	Relative Dielectric Constant ( $\epsilon_r$ )	Continuous Level Measurement										Point Level Detection								
				PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFILIP	NIVOTRACK	EasyTREK EchoTREK for liquids	EasyTREK EchoTREK for solids	NIVOFLOAT	NIVOCONT K	NIVOMAG	NIVOPPOINT	NIVOSWITCH	NIVOCONT R	NIVOROTA	NIVOCAP CK		
Chemical industry	Sodium chloride ((NaCl) in H <sub>2</sub> O )	L	conductive	✓	✗	NA	✗	NA	NA	✗	✗	NA	NA	✓	✗	✗	✗	✗	NA	NA	✗	
	Sodium carbonate, Soda (Na <sub>2</sub> CO <sub>3</sub> )	S	5.3-8.4	✗	✗	✗	NA	NA	NA	NA	NA	NA	✗	✗	NA	✓	✗	✗	✗	NA	NA	✗
	Sodium hydroxide, Caustic soda ((NaOH) in H <sub>2</sub> O )	L	conductive	✓	✗	NA	✗	NA	NA	✗	✗	NA	NA	✓	NA	NA	✗	✗	✗	NA	NA	✗
	Sodium bicarbonate, Baking soda (NaHCO <sub>3</sub> )	S	5.7	✗	✗	✗	NA	NA	NA	NA	NA	NA	✗	✗	NA	✓	✗	✗	✗	NA	NA	✗
	Sodium hypochlorite ((NaOCl) in H <sub>2</sub> O ), Bleach	L	conductive	✗	✗	✗	✗	NA	NA	✗	✗	NA	NA	✓	NA	NA	✗	✗	✗	NA	NA	✗
	Potassium permanganate ((KMnO <sub>4</sub> ) in H <sub>2</sub> O ), Permanganate of potash solution	L	conductive	✗	✗	✗	✗	NA	NA	✗	✗	NA	NA	✓	✗	✗	✗	✗	✗	NA	NA	✗
	Potassium hydroxide ((KOH) in H <sub>2</sub> O )	L	conductive	✓	✗	✗	✗	NA	NA	✗	✗	NA	NA	✗	✗	✗	✗	✗	✗	NA	NA	✗
	Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> )	L	84	✓	✓	✗	✗	NA	NA	✗	✗	✓	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Sodium hydroxide (NaOH) in H <sub>2</sub> O )	L	conductive	✗	✗	NA	NA	NA	NA	✗	✗	NA	NA	NA	NA	NA	✓	✗	✗	NA	NA	✗
	Sodium bisulfite ((NaHSO <sub>3</sub> ) in H <sub>2</sub> O )	L	conductive	✗	✗	✗	✗	NA	NA	✗	✗	✓	NA	NA	✗	✗	✗	✗	✗	NA	NA	✗
	Sulphuric acid (H <sub>2</sub> SO <sub>4</sub> ), concentrated	L	84	✓	✗	✗	✓	NA	NA	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Sulphuric acid (H <sub>2</sub> SO <sub>4</sub> ) (low concentration)	L	conductive	✓	✗	✗	NA	NA	NA	✗	✗	✗	NA	NA	NA	NA	✗	✗	✗	NA	NA	✗
	Chloroform (CHCl <sub>3</sub> )	L	3.7-5.5	✗	✓	✗	✗	NA	NA	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Cyclopentane (C <sub>5</sub> H <sub>10</sub> )	L	2	✗	✓	✗	✗	NA	NA	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Cyclohexane (C <sub>6</sub> H <sub>12</sub> )	L	2	✗	✓	✗	✗	NA	NA	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Hexane (C <sub>6</sub> H <sub>14</sub> )	L	1.8	✗	✓	✗	✗	NA	✗	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Dichloroethene (CH <sub>2</sub> CCl <sub>2</sub> )	L	2.1-10.3	✗	✗	NA	NA	NA	NA	✗	✗	✗	NA	NA	NA	✓	NA	✓	✗	NA	NA	✗
	Trichloroethane (CH <sub>3</sub> CCl <sub>3</sub> )	L	7.2	✗	✗	NA	NA	NA	NA	✗	✗	✗	NA	NA	NA	✓	NA	✓	✗	NA	NA	✗
	Dichloromethane / methylene chloride (CH <sub>2</sub> Cl <sub>2</sub> )	L	8.9-9.1	✓	✓	NA	NA	NA	✗	✗	✗	✗	NA	NA	NA	NA	✗	✗	✗	NA	NA	✗
	Acetic acid (CH <sub>3</sub> COOH), Vinegar	L	conductive	✓	✓	✓	✓	NA	NA	✓	✗	✗	NA	NA	NA	✓	✓	✓	✗	NA	NA	✗
	Painting and varnish agents diluted with water (non-ex)	L	conductive	✓	✓	✗	✗	NA	NA	✗	✗	✓	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Painting and varnish agents diluted with explosive agents	L	conductive	✗	✓	✗	NA	NA	NA	✗	✗	✗	NA	NA	NA	NA	✗	✗	✗	NA	NA	✗
	Benzene, benzol (C <sub>6</sub> H <sub>6</sub> )	L	1.9-3.2	✗	✗	✗	✗	NA	NA	✓	✗	✗	NA	NA	NA	✓	✓	✓	✗	NA	NA	✗
	Styrene / ethenylbenzene (C <sub>8</sub> H <sub>8</sub> )	L	2.3	✗	✗	✓	✗	NA	NA	✓	✗	✗	NA	NA	NA	✓	✗	✓	✗	NA	NA	✗
	Xylene (C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub> )	L	2.3	✗	✗	✓	✗	NA	NA	✓	✗	✗	NA	NA	NA	✓	✗	✓	✗	NA	NA	✗
	Chlorobenzene (C <sub>6</sub> H <sub>5</sub> Cl)	L	6	✗	✗	✓	✗	NA	NA	✓	✗	✗	NA	NA	NA	✓	✗	✓	✗	NA	NA	✗
	Acetone ((CH <sub>3</sub> ) <sub>2</sub> CO) Dimethylketone	L	21.5	✗	✗	✓	✗	NA	NA	✓	✗	✗	NA	NA	NA	✓	✗	✓	✗	NA	NA	✗
	Propanone (C <sub>3</sub> H <sub>6</sub> O)	L	17-20.4	✗	✗	✓	NA	NA	NA	✓	✗	✗	NA	NA	NA	✓	NA	✓	✗	NA	NA	✗
	Lactic acid (CH <sub>3</sub> CH(OH)COOH)	L	conductive	✓	✓	✗	✗	NA	✗	✗	✗	✗	NA	NA	NA	✗	✗	✗	✗	NA	NA	✗
	Ethyl alcohol (CH <sub>3</sub> CH <sub>2</sub> OH)	L	24.3	✗	✓	✓	✓	NA	NA	✓	✗	✓	NA	NA	NA	✓	✓	✓	✗	NA	NA	✗
	Ethyl acetate (CH <sub>3</sub> COOCH <sub>2</sub> CH <sub>3</sub> )	L	6	✗	✓	✓	✓	NA	NA	✓	✗	✓	NA	NA	NA	✓	✓	✓	✗	NA	NA	✗
	Methyl alcohol (CH <sub>3</sub> OH)	L	33-56.6	✗	✓	✓	✓	NA	NA	✓	✗	✓	NA	NA	NA	✓	✓	✓	✗	NA	NA	✗

## SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

Industry	Medium to be measured	State	Relative Dielectric Constant ( $\epsilon_r$ )	Continuous Level Measurement								Point Level Detection							
				PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFILIP	NIVOTRACK	EasyTREK EchoTREK for liquids	EasyTREK EchoTREK for solids	NIVOFLOAT	NIVOCONT K	NIVOMAG	NIVOPPOINT	NIVOSWITCH	NIVOCONT R	NIVOROTA
Chem. indust.	Isopropyl alcohol ((CH <sub>3</sub> ) <sub>2</sub> CHOH)	L	18.3	✓	✓	✓	✓	NA	✓	✓	NA	NA	NA	✓	NA	✓	NA	NA	✗
	Toluene (C <sub>6</sub> H <sub>5</sub> -CH <sub>3</sub> )	L	2.0-2.4	✗	✓	✓	✓	NA	✓	✓	NA	NA	NA	✓	✓	✓	NA	NA	✗
Food and beverage	Malt (dry)	S	2.2-3.0	✗	✓	✓	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓	✓
	Beer	L	conductive	✓	✓	✓	✓	NA	✗	✗	✓	NA	NA	✓	✓	✓	NA	NA	✓
	Citric acid ((C <sub>6</sub> H <sub>8</sub> O <sub>7</sub> ) in H <sub>2</sub> O)	L	conductive	✓	✓	✓	✓	NA	✗	✗	✓	NA	NA	✓	✓	✓	NA	NA	✓
	Coconut oil	L	2.9	✓	✓	✓	✓	NA	✗	✓	✓	NA	NA	✓	✓	✓	NA	NA	✓
	Palm oil	L	1.75	✗	✓	✓	✓	NA	✓	✓	NA	NA	NA	✓	✓	✓	NA	NA	✓
	Animal fat	L	2.7	✓	✓	✗	✓	NA	NA	NA	✓	NA	NA	NA	NA	NA	NA	NA	✓
	Lumpy fruit or vegetable	S	conductive	✗	✓	✓	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Cream, yoghurt	L	conductive	✓	✓	✓	✓	NA	NA	NA	✓	NA	NA	NA	NA	NA	NA	NA	✗
	Milk	L	conductive	✓	✓	✓	✓	NA	✗	✗	✓	NA	NA	✓	NA	NA	✓	NA	✗
	Powdered milk	S	1.6-2.2	✗	✓	NA	NA	NA	NA	NA	NA	NA	NA	✗	NA	NA	NA	NA	✓
	Flour	S	2.4	✗	✓	NA	NA	NA	NA	NA	NA	NA	NA	✗	NA	NA	NA	NA	✓
	Grain	S	2.3-4.4	✗	✓	NA	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Powdered sugar	S	1.8	✗	✓	✓	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Granulated sugar	S	2.1-2.28	✗	✓	✓	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Sugar syrup	L	conductive	✓	✓	✗	✗	NA	✗	✗	✓	NA	NA	NA	NA	NA	NA	NA	✓
	Margarine	L	2.8-3.2	✗	✓	✓	✓	NA	NA	NA	✗	NA	NA	NA	NA	NA	NA	NA	✓
	Confectionery coating pastes, honey, jam, marmalade, liquid chocolate	L	2.4; 24; ∞; 3	✓	✓	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	NA	NA	NA	✓
	Edible oil	L	3.9	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	✓	✓	✓	NA	NA
	Fruit juice	L	conductive	✓	✓	✓	✓	NA	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA	✗
	Potato (whole)	S	conductive	✗	✗	✗	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Sodium chloride (NaCl), Table salt, rock-salt	S	3.3	✗	✓	✗	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
	Wine	L	conductive	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA	✗
	Power Plants	Coal dust	S	2.3	✗	✓	✓	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA	✓
Fly ash		S	1.5-3.3	✗	✗	✗	NA	NA	NA	NA	NA	NA	✗	NA	NA	NA	NA	✓	
Fuel oil		L	2.1	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	✓	✓	✓	NA	NA	
Heated pakura (mazout)		L	2.2	✓	✓	✓	✓	NA	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA	
Hot water in high pressure vessels		L	conductive	✓	✓	✓	NA	NA	✓	✗	NA	NA	NA	✓	✓	✓	NA	NA	
Carbon black		S	1.5-3	✗	✓	NA	NA	NA	NA	NA	NA	NA	NA	✗	NA	NA	NA	NA	
Water in condensing vessels		L	80	✓	✓	✓	✓	NA	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA	
Water level in supply water pool	L	conductive	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA		

# Application Guide

## 32 SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

Industry	Medium to be measured	State	Relative Dielectric Constant ( $\epsilon_r$ )	Continuous Level Measurement								Point Level Detection									
				PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFLIP	NIVOTRACK	EasyTREK EchoTREK for liquids	EasyTREK EchoTREK for solids	NIVOFLOAT	NIVOCONT K	NIVOMAG	NIVOPOINT	NIVOSWITCH	NIVOCONT R	NIVOROTA	NIVOCAP CK	
Mine	Coal, coal powder, metal ore, ground stone, gravel, sand	S	2.3-15	🚫	✅	👉	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	NA	✅	✅	✅
Oil Industry	Crude oil	L	1.7-2.2	👉	👉	👉	✅	NA	👉	✅	✅	NA	NA	NA	✅	✅	✅	NA	NA	👉	
	Petrol, gasoline	L	1.7-2.2	🚫	👉	👉	✅	NA	👉	✅	🚫	NA	NA	NA	✅	✅	✅	NA	NA	👉	
	Kerosene	L	1.7-2.2	🚫	👉	👉	✅	NA	👉	✅	🚫	NA	NA	NA	✅	✅	✅	NA	NA	👉	
	Butane (C <sub>4</sub> H <sub>10</sub> ) liquefied	L	1.4	🚫	👉	NA	NA	NA	🚫	👉	NA	NA	NA	NA	👉	NA	NA	NA	NA	NA	
	Butanol (C <sub>4</sub> H <sub>9</sub> OH)	L	17.1	👉	👉	NA	NA	NA	🚫	👉	NA	NA	NA	NA	👉	NA	NA	NA	NA	NA	
	Butyl acetate	L	5	👉	👉	NA	👉	NA	🚫	✅	🚫	NA	NA	NA	👉	👉	👉	NA	NA	NA	
	Butanone, methyl ethyl ketone (CH <sub>3</sub> C(O)CH <sub>2</sub> CH <sub>3</sub> )	L	18.5	👉	✅	👉	👉	NA	👉	✅	👉	NA	NA	NA	👉	👉	👉	NA	NA	NA	
	LPG	L	1.4-1.6	🚫	✅	NA	NA	NA	NA	NA	NA	NA	NA	NA	🚫	👉	✅	NA	NA	NA	
	Shale oil	L	2.1	🚫	✅	👉	👉	🚫	👉	👉	👉	NA	NA	NA	✅	✅	✅	NA	NA	NA	
	Grease (lubricant)	L	3.15	🚫	👉	🚫	NA	NA	NA	NA	👉	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Diesel oil	L	2-2.5	👉	👉	👉	👉	👉	👉	✅	👉	NA	NA	NA	✅	✅	✅	NA	NA	NA	
	Lubricant oil	L	2-2.5	👉	👉	👉	✅	🚫	👉	✅	👉	NA	NA	NA	✅	👉	✅	NA	NA	NA	
	Transformer oil	L	2-2.5	👉	👉	👉	✅	👉	👉	✅	👉	NA	NA	NA	✅	✅	✅	NA	NA	NA	
Paper Mill	Paper pulp	L	conductive	🚫	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	NA	NA	NA	NA	👉	
	Water	L	conductive	✅	✅	✅	✅	✅	✅	✅	✅	NA	✅	✅	✅	✅	✅	NA	NA	✅	
	Wood chips, saw dust (wet)	S	2.0-2.6	🚫	👉	NA	NA	NA	NA	NA	NA	✅	NA	NA	NA	NA	👉	✅	✅	👉	
Recyc.	Municipal waste, debris, household trash in silos	S	conductive	🚫	🚫	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	🚫	👉	👉	NA	
Plastic Industry	Granulated plastic	S	1.1-2.8	🚫	🚫	🚫	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	👉	✅	✅	👉	
	Polyvinyl chloride (PVC)	S	3.4	🚫	✅	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	👉	✅	✅	👉	
	Polyethylene pellet	S	1.5-1.8	🚫	NA	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	👉	✅	✅	👉	
	Polystyrene	S	2.2-2.6	🚫	NA	NA	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	✅	✅	✅	👉	
	Plastic pulver	S	1.3-1.8	🚫	🚫	👉	NA	NA	NA	NA	NA	👉	NA	NA	NA	NA	✅	✅	✅	👉	
	Silicone oil	L	2.7	👉	👉	👉	👉	👉	👉	✅	✅	NA	🚫	NA	✅	✅	✅	NA	NA	👉	
Water Works	Drinking water in reservoirs	L	conductive	✅	✅	✅	✅	✅	✅	✅	✅	NA	✅	✅	✅	✅	✅	NA	NA	✅	
	Thermal water in cooling reservoirs	L	conductive	👉	👉	👉	✅	👉	✅	✅	👉	NA	👉	✅	✅	✅	✅	NA	NA	✅	
	Travelling bar screen control with diff. measurement	L	conductive	NA	NA	NA	NA	NA	NA	NA	✅	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Water level in rivers for flood control	L	conductive	👉	NA	NA	NA	👉	NA	NA	👉	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Water level in well	L	conductive	NA	NA	NA	NA	✅	NA	NA	👉	NA	✅	✅	NA	NA	NA	NA	NA	NA	
Marine	Seawater	L	conductive	👉	👉	👉	NA	👉	👉	👉	✅	NA	👉	NA	✅	✅	✅	NA	NA	NA	
Waste Water	Rainwater reservoir	L	conductive	✅	✅	✅	👉	✅	👉	NA	✅	NA	✅	👉	👉	👉	NA	NA	NA		
	Waste water in reservoirs or channels	L	conductive	✅	👉	👉	NA	👉	NA	NA	✅	NA	✅	👉	👉	NA	👉	NA	NA	NA	



# References on 5 Continents

WIDE APPLICATION POSSIBILITIES IN VARIOUS INDUSTRY SEGMENTS

INDUSTRY SECTORS 33

Water & Wastewater



More than 700 000 level instruments were sold all over the world by NIVELCO Process Control Co. over the last 30 years.

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NIVELCO's unique 3 year warranty policy which was made feasible to be introduced by the fact that our instruments are operating reliably most of the times even in extremely harsh environments in a great number of technologies of the industries we are serving. Almost no matter what level you need to measure – whether it is sewage in the USA, animal feed pellets in Hungary, palm oil in Malaysia, cement, sand and building materials in the Czech Republic – trust NIVELCO instruments to do the job.

Food & Beverages



Construction Materials



Chemical & Pharmaceutical



Petrochemical



Aggregates & Mining



Energy Production



Plastic Industry

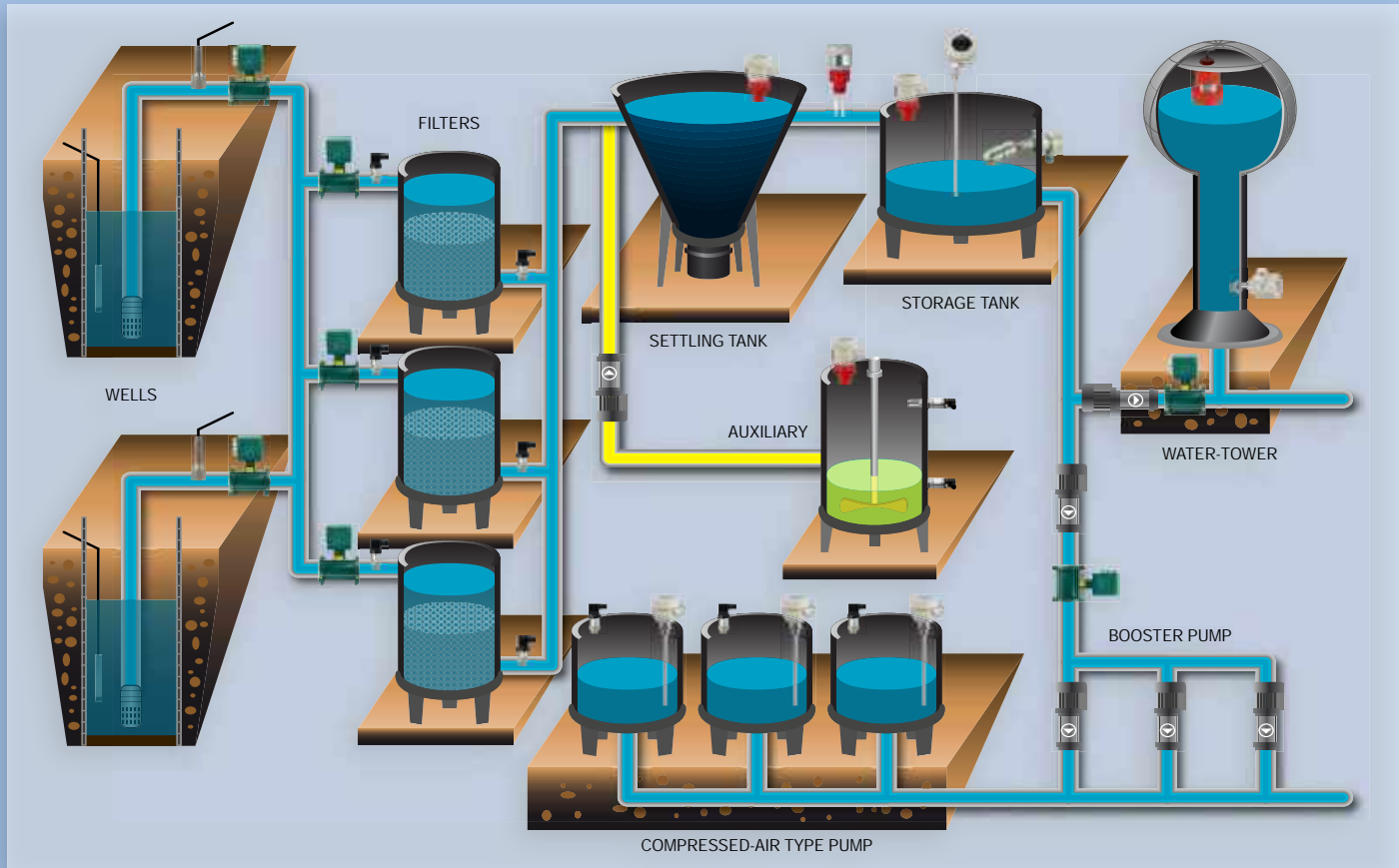


Metallurgy



Mechanical Engineering





The process of water production can be divided into 3 major parts:

- production wells
- water treatment
- water distribution system

#### Production wells:

The production wells can be found in ground layers rich in water, the pumps lowered into wells pump the raw water to the central water treatment facilities.

#### Measuring tasks:

- continuous level measurement of the well
- temperature measurement of the water
- hydrostatic pressure of the production well
- yield of the produced water
- draw-down protection of the well

#### Suggested instruments:

- analogue level measurement with hydrostatic level transmitters that measure the water temperature beside the level: NIVOPRESS NPK-400 transmitter family
- analogue pressure measurement with piezoresistive pressure transmitters: NIVOPRESS NZK-400 types

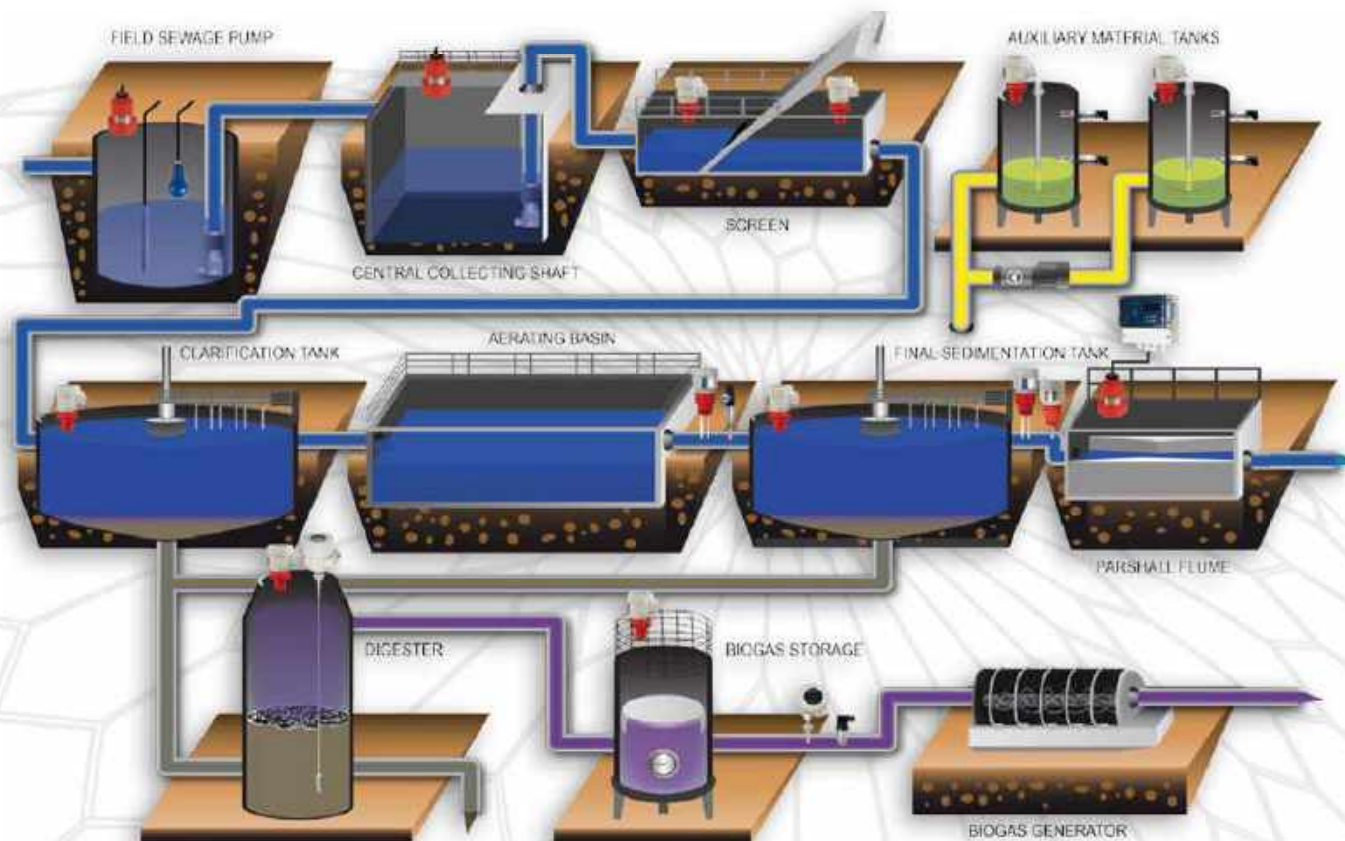
#### Water treatment:

The raw water coming from the production wells contains different organic and non-organic materials. These materials have to be cleaned from the water. Cleaning is done either by mechanical filters or by adding coagulant materials to the water which reduce the contaminating materials. The resulting slurry is separated in settling basins.

- pressure measurement with NIPRESS DRC-300 pressure transmitters, level measurement with EchoTREK STA-300 ultrasonic level transmitters
- pH measurement of the clean water with AnaCONT analytical instruments
- low/high level switching with NIVOSWITCH or NIVOMAG level switches

#### Water distribution system:

- pressure control at the compressed-air pumps with NIPRESS pressure transmitters and UNICONT PMM-300 controllers
- water level control at the compressed-air pumps with NIVOCAP level transmitters and UNICONT PMM-300 controllers
- water level measurement in the water tower with EasyTREK ultrasonic level transmitters or borehole transmitters



### Field sewage pumps

The sewage is collected in underground wells and is transmitted to the sewage treatment plant with the help of the pumps.

#### Measuring and control tasks:

Very reliable analogue level measurement is necessary to control the starting and stopping of pumps. Fail safe switching points to avoid the dry run of the pumps.

#### Recommended instruments:

The EasyTREK SPA-300 type non contact ultrasonic level transmitter models with IP68 ingress protection are the most reliable devices for this measurement task. Another popular choice is the flush mounted NCK-200 type hydrostatic borehole transmitter as well as the NPK-400 series with internal membrane and a sewage adapter working on the principal of the diving bell.

A PLC or an UNICONT PMM-314 is an ideal device to process the analogue signal and control the switching points. For fail-safe protection the robust NIVOFLOAT NWP-100 float level switches are recommended.

### Central sewage treatment facility, water treatment process:

The sewage coming from the field pumps contains a lot of organic and non-organic materials in solid form as well as in the form of solvents. The solid particles are filtered with a mechanical screen. The purified sewage can be streamed to any natural water after chemical inspection and yield measurement.

- Ultrasonic transmitters for level measurements
- For the control of the mechanical screen a system with 2 ultrasonic level transmitters and a dual channel PMM-323 is recommended.
- The AnaCONT analytical measurement devices are ideal for the chemical analysis of the cleaned water.
- The yield of the water output can be measured in a NIVOSONAR GPA Parshall flume

### Central sewage treatment facility, slurry treatment process:

ATEX certified ultrasonic level transmitters (EchoTREK or EasyTREK) and ATEX certified temperature transmitter for measuring the temperature of biogas, THERMOCONT TTJ-500-Ex.

The Aqua Technology Group LLC is an experienced representative of NIVELCO USA LLC, representing NIVELCO products in Ohio, Kentucky, Indiana and West Virginia. ATG has had a working relationship with ECCI-Afghanistan engineering company thanks to their experience with bulk fuel level transmitters. Due to this relationship they were contacted when one of their contacts had an urgent need for open channel flow measurement, because the contractor had neglected to include that equipment in the package. When ATG were contacted they were in the final stage of sign off and the construction almost finished. The instrumentation project's most interesting aspect for the American (and of course for the European) eyes was the installation place which is the 215th Camp of the ANA (Afghan National Army) at Shorabak in Helmand Province, Afghanistan.

■ **NIVELCO durability and Aqua Technology Group's Rapid Response Programming Setup**

Of chief concern in this application was operational durability. The first challenge here was that the client had an existing Grundfos chemical feed setup that did not have any of the proper flow pacing equipment. While this application is fairly simple, the second challenge was that the technical team had already left the site and the project manager and locals were all that was left to install the level measurement instruments. The wastewater treatment plant is to be operated and maintained by Afghan National Army personnel, which means that the equipment has to be easy to operate and durable in a difficult environment. We discussed via Skype the situation and after several photographs of the location designed a simple solution using an analog to pulse controller that we could acquire locally and integrate with NIVELCO's MultiCONT controller and EasyTREK ultrasonic level transmitter we had in stock.



NIVELCO's EasyTREK was selected due to the IP68 rated construction and long durability in many other field installations that Aqua Technology Group has completed over the years.



■ **Open Channel Flow Measurement with Ultrasonic Level Transmitter**

NIVELCO representative Aqua Technology Group provided a new ultrasonic flow meter and level measurement solution using the durable EasyTREK SPA-39N-4 type ultrasonic level transmitters with the MultiCONT PRD-214-1 universal display and controller. The system was pre-setup, wired and calibrated to read the flow across the weir and utilized the additional output of the MultiCONT to flow pace chemical injection at the final contact chamber with a pulse converter they provided to match the existing chemical injection pump.

■ **Durability and Rapid Response**

While the equipment was being assembled, ATG sent the instruction manuals to a translator so that the local operational staff would have complete documentation in their native language, took final measurements and fabricated a mounting bracket that would meet the installation needs. ATG then assembled, programmed and tested the units, boxed as a single shipment and arranged for drop off at the closest AFB for delivery. The flight occurred the next day and by the end of the week, the unit was installed and fully operational, with local sign off happening just a day after installation. Because Aqua Technology Group kept stock of a MultiCONT and EasyTREK, they were able to work with the project manager to provide detailed installation drawings and overnighted the equipment to the base, instead of the typical 6 weeks. This meant the greatest success, since the project manager was able to come back home that same week.

Count on NIVELCO and Aqua Technology Group LLC to provide a durable and time sensitive solution for all your flow meter and challenging wastewater applications.

*Dave Miller  
Managing Director  
NIVELCO USA LLC*

NIVELCO and our company in Austria have been partners and selling NIVELCO instruments since 1995. This close cooperation between the two companies was reborn in 2007 under the banner of Göth Solutions GmbH. Since that date this relationship with NIVELCO has been better than ever, which has enabled us to keep up with our major competitors.

In 2010, after much discussion a great wastewater treatment project came out to tender. We did not hesitate, and won the instrumentation project for NIVELCO. Many years ago, in 1997-98, we delivered several devices to the sewage works in Vienna, but after the successful trial period, we were crowded out by E+H or NIVUS products, despite our competitive prices. However, the new VEXAT regulations involving the pumping stations for sewage works fortunately brought NIVELCO back into contention.

These sewage shafts became classified as potentially hazardous Ex Zones, so replacement of all the instruments became necessary. Thanks to two years of negotiation and numerous product demonstrations, NIVELCO's new generation MultiCONT process controllers were installed to monitor the level of liquids in Vienna's sewer system. This system is famous for its starring role in 'The Third Man' film.



The instrumentation tender demanded many requirements:

- Universal control units with up to 8 relay outputs in contrast to the old ones with only 1-2 relays
- Minimal necessity for replacement components
- IP68 rated sensors
- Transmitters with up to 100 m (330 ft) cable length
- Easily expandable relay outputs
- Replacement units free of charge in case of service
- Provision of on-site technical support



According to the preliminary surveys and the test operations, the MultiCONT PRC-220-6 Ex type multi-channel process controller was installed and expanded with UNICONT PJK-102-4 and PJK-120-4 universal interface modules. Level measurement is done by EasyTREK SPA-380-8 Ex type integrated ultrasonic transmitters with 50 m (165 ft) and 100 m (330 ft) cable lengths.

The previously used E+H and NIVUS equipments were replaced with the MultiCONT controller system thanks to its flexibility because it is easily expandable with UNICONT PJK relay and current output modules. Moreover the possible troubleshooting became easier and more cost-effective. With NIVELCO's solution the number of the installed devices could be reduced to only 5.

Two meters (6 feet) under the famous Karlsplatz of Vienna, an instrument rack hides a MultiCONT unit. The location is at the other side of the square's famous tourist sightseeing point, given the name 'The Third Man'. The entrance to the drain system and the MultiCONT units is only 60 cm (2 ft) wide. The ultrasonic transmitters with their 50 m (165 ft) and 100 m (330 ft) cable lengths provide a reliable source of information for the controller about the level in Vienna's sewer system. Shortly after the instruments were put into operation, some failures had been detected in the HART communications link between the transmitters and MultiCONT.



Göth Solutions made an immediate on-site diagnosis and replaced the MultiCONT PRC-220-5 Ex process controller with another similar model, powered by 230V AC. We also examined the electrical system, but did not find any abnormality which could have resulted in this kind of communication problem.

With our many years of experience of industrial measurement technology we were able to realise the source of the problem. The electrical system in the Viennese underground was producing interference in the HART communications. The solution was to replace the MultiCONT with a galvanically isolated 24V DC model. With this MultiCONT PRC-220-6 Ex model the HART communication has become reliable, and not shown any further problems.

Summarising this successful project, we have to be aware of the environment in a metropolis like Vienna, and we have to consider that reliable HART communication near a high current underground system can be performed only with galvanically isolated units. We are proud that co-operating and using our professional knowledge, coupled with high-quality NIVELCO products enabled us to achieve such success as in Vienna's sewer system.



Harald Göth  
CEO  
Göth Solutions GmbH

The Belgrade based INDAS software and engineering company and NIVELCO have been partners for over 15 years. During this long cooperation INDAS has instrumented many plants and factories with NIVELCO manufactured devices, especially in the field of water and wastewater treatment. The excellent and reliable ultrasonic transmitters have been applied in the instrumentation project of the wastewater treatment plant in Bileća.

The following NIVELCO measurement instrumentation is used in this plant:

- NIVOFLOAT NLN-120 float switches (3 units)
- EasyTREK SCA-360-2 integrated ultrasonic transmitter (2 units)
- EasyTREK SCB-360-2 integrated ultrasonic transmitter (9 units)
- UNICONT PMM-312 universal controller (4 units)

This plant is controlled completely by three PLC and all measurement instruments are connected to the PLCs digital/analogue inputs.

In the applied wastewater treatment process the retention basin is equipped with an EasyTREK SCB-360-2 ultrasonic level transmitter that has PVDF transducer. This is used for continuous measurement of water level and the measured value is shown on the SCADA application.

The bioreactor is a pool where the following cycles are present: mixing, aeration, inaction, clearing, settling and decantation of wastewater.



This pool is never empty, and the water level is always maintained between the two border levels. These minimum and maximum levels in the bioreactors are measured with using two EasyTREK SCA-360-2 ultrasonic level transmitters with PP transducer.

In the tertiary treatment the wastewater retention basin accepts water from the bioreactor and forwards it to the gravity filters. This pool is also equipped with EasyTREK SCB-360-2 level transmitter besides two valves which drain the water to the gravity filters. On the gravity filters there are two EasyTREK SCB-360-2 ultrasonic level transmitters. The measured values are displayed on a UNICONT PMM-300 universal controller and the SCADA application.

The operator launches the process of washing the filter and it takes place in the following three stages: washing with air, washing with water and air and washing with water. At the stage of washing the filter with water, pumps take water from the filtered water pool. This pool with filtered water is equipped also with an EasyTREK SCB-360-2 level transmitter and the measured value is displayed on the SCADA application and UNICONT PMM-300 universal controller. From the same pool, the filtered water is discharged into Lake Bilećko.

According to the demands of the technology the thickened sludge from the bioreactor is periodically transported by sludge pumps into the pool for homogenization of sludge. The sludge is homogenized using mixers.



Homogenization basin, the sludge pumping station as well as the basin for reception of concentrated sludge is equipped with EasyTREK SCB-360-2 integrated ultrasonic level transmitters.

The concentrated sludge is then transferred to a compactor where its dehydration takes place. Excess water is returned to the purification process, while the sludge is taken to the landfills.

Measurement data of all EasyTREK transmitters are displayed on the SCADA application. Dry-run protection of the pumps is provided by NIVOFLOAT NLN-120 level switches. Implementation of this project has achieved excellent quality of treated water which has reduced pollution of Lake Bileća. Thanks to this water quality improvement, all users who are supplied from the lake can get cleaner and healthier water also in the downstream cities such as Trebišnjica, Trebinje, and Dubrovnik or Herceg Novi.

*Majda Trnjakov  
Sales Engineer  
INDAS d.o.o.*

The Brazilian NIVETEC Instrumentação e Controle is the most successful distributor of NIVELCO for many years. In 2014 people from all over the world focus on Brazil not only for the FIFA World Cup, but also for the upcoming Olympic Games held in 2016. This way it is not a big surprise that the number of infrastructure investments just growing and growing throughout the country. One example is the modernization of the wastewater treatment plant in São Paulo State, (the south-eastern part of the country) in Pinhalzinho city.



The instrumentation task was to provide automatic flow control system at the inlet and outlet of the sewage treatment plant allowing storage and collection of data with notebook. In accordance to the customer requirements the system should use 'green' power, without producing waste of any kind and therefore not polluting or assaulting the nature meeting the Environmental Management Policy of SABESP.

Main features of the realized measurement system:

- Security against vandalism
- Specifying the most suitable channel for the accuracy required
- Autonomous Power System
- Flow Measurement System with Data-Logger
- Low cost solution and maintenance
- Possibility of expanding the measurement system with more instruments and integrating into a process control system



Two EchoTREK SGP-380-3 type 2-wire ultrasonic level transmitters – featuring logging capability – are parameterized to perform open channel flow measurement.



Both units measure the instantaneous flow rates and also the total flow values, one with the help of a Parshall flume at the inlet side and one with the help of a V-notch weir at the outlet side.

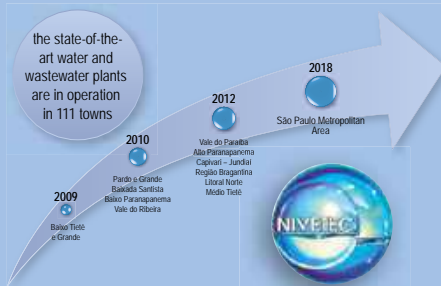
The Parshall flume at the inlet side of the wastewater treatment plant is surrounded by a small 3 meter (10 feet) high brick house with the area of 3×2 m (10×6.5 ft). On the top of the building there is a solar panel with orientation to the north at the optimal 23° angle providing the required 'green' energy for the measurement equipment.

At the outlet side there is an outside V-notch weir made from concrete which is surrounded by high metal railings.

The installed ultrasonic level transmitter also comes with a solar panel, which is also installed on top of a small brick building, hiding the electronics for the solar panels.

*Herasmio Marques*  
Sales Engineer  
NIVETEC Instrumentação e Controle Ltda.

NIVELCO is represented worldwide through its distributors. We are especially delighted when our instruments are actors of a success story in a remote country.



The Brazilian legislation adopted a new binding regulation concerning potable water and sewage management. In this framework they started the Onda Limpa (Clean Wave) project aiming at the modernization of potable water and sewage treatment plants in order to meet the requirements of hygiene and water management.

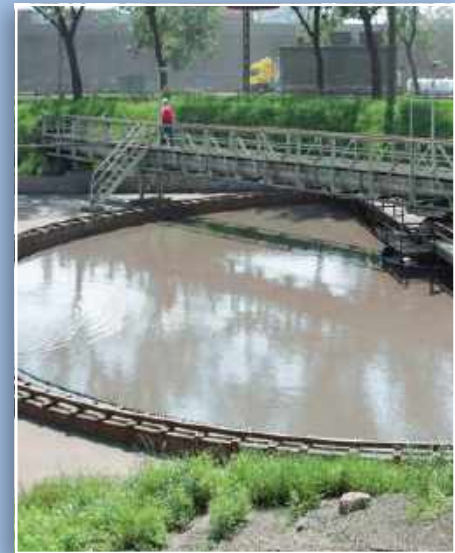
The forty one million inhabitants of San Paulo take 22% of the entire population of the country, no doubt the said project is an important step for the development of the whole country.

NIVETEC, our Brazilian distributor was competing with several of our great competitors to obtain the task of supplying instruments to the project.



EchoTREK  
SGP-380-2

Thanks to well-known reliability and reasonable prices of NIVELCO instruments NIVETEC won the tender and in the first phase got an order for 250 ultrasonic instruments which were intended to fulfill the tasks of level and flow measurement.



In the framework of the project by 2018 on the whole territory of Sao Paulo a modern water management system will be implemented.

Relying on the long-term and fruitful co-operation between NIVELCO and NIVETEC we hope to be part of many similar water management success stories.

Alpár Kovács  
Export Sales Engineer  
NIVELCO Co.



C2Plus was established in 2010 in Saint Laurent Blangy, located near Arras in the north of France. As the director of this company I have many years of experience in the field of process control, acquired in world-class leading companies of this area.

I joined ABB in 1997 for 5 years as a technical and commercial assistant, and then Mobrey for 7 years as a sales engineer. C2Plus is an expert instrumentation company, targeted at the design and specification of a project until its completion. We always highlight the best quality solutions as our main focus, so NIVELCO products and the 'know-how' of C2Plus create an excellent team.

The quality and reliability of the NIVELCO instruments, and especially the flexible manufacturing capability for unique product versions mean that we can offer a suitable solution to satisfy most customised applications. This is really advantageous in the area of industrial process automation, including the water & wastewater segment, a market of particular interest for C2Plus. We received an enquiry requiring liquid analytical transmitters for a water quality control process. Our customer wanted to optimize the aeration process, which was controlled with simple cyclic timers.

Independently from the Redox-potential and the dissolved oxygen values the aeration turbines started each hour and worked for 15 minutes.

It is obvious that this solution requires a remarkable amount of energy and costs a great deal of money.

We proposed NIVELCO's AnaCONT water-analytical transmitters to provide a solution for control of the aeration process, based on actual DO and ORP values.

Therefore the aeration starts only if it is necessary, and lasts only until the water quality recovers to the required state. So AnaCONT LGR-100 ORP & AnaCONT LGD-100 DO transmitters with graphic display and tube extended probe were installed in the water containing pools. Each transmitter communicates with MultiCONT process controllers using the HART protocol. The MultiCONT PEW-229-1 displays the measurement data of the ORP transmitter, and a MultiCONT PEW-226-1 displays DO values and temperature data from the DO transmitter.

Now the aeration process is controlled directly by the relay outputs of the MultiCONT units. When the Redox potential value reaches the preset low value, the turbines start to work.



The turbines stop when dissolved oxygen value exceeds the optimal high level.

The most advantageous feature of the system is that the control process is dependent on both the DO and the ORP values.

Our customer was able to realise a significant increase of efficiency thanks to this instrumentation investment. The considerable cost savings resulting from the lower energy consumed produced a payback for the instrumentation project within a few months. Therefore our customer satisfaction was extremely high, just like the reliability of the measurement system.

*Christophe Carreira*  
CEO  
C2Plus

C2Plus – the French distributor of NIVELCO Process Co. can share a new success story, an interesting application case study starring NIVELCO's EasyTREK integrated ultrasonic level transmitters.

The European Union regulations impose the users to measure the volume of wastewater crossed in natural area. This has high importance in case of a heavy thunderstorm when the water level in the drainage channels increase significantly and there is a risk of overflow. Most of the time, the less expansive possibility is to measure the overflow with an open channel flow metering system including an ultrasonic transmitter.

Veolia Eau – who provides delegated management of water and wastewater services for municipal and industrial clients – applied an EasyTREK ultrasonic level transmitter together with a MultiCONT controller in the water monitoring system. The EasyTREK SPA-380-4 integrated ultrasonic level transmitter measures the level in the drainage channel and transmits the measurement data to the MultiCONT PEW-216-2 process controller.



A linearization table with 20 points is programmed in the MultiCONT to convert level value to flow with the help of Manning Strickler Formula (relation between level and flow in a circular pipe). The 4-20 mA output and pulse relay are wired to a small GSM transmitter (RTU – Remote Terminal Unit) which sends the measured flow data to the central computer system. The most interesting part of this smart measurement system is not only the wireless data transmission, but the powering.



The DC powered MultiCONT process controller and the connected GSM transmitter unit are powered by battery reloaded by a solar panel. The solar panel continuously charges the battery pack and it provides 12 V DC power supply for all the devices placed in the instrument rack.

The commissioned measurement system resulted remarkable energy and cost savings compared to the standard 230 V network operated systems.

During the 10-month test operation there was not raised a single objection to the reliability of the measurement system.



This successful project is again a very good example showing that the expertise of C2Plus and the excellent instruments of NIVELCO complementing each other and creating efficient instrumentation solutions.

*Christophe Carreira*  
CEO  
C2Plus

In the South-Pest Wastewater Treatment Plant of Sewage Works of Budapest, complex purification, sewage-processing and recovery technologies are used.

Daily wastewater treatment capacity of the plant is 80 thousand m<sup>3</sup> (100.000 yd<sup>3</sup>), and 22 million m<sup>3</sup> (30 million yd<sup>3</sup>) a year. The plant successively treats the wastewater of approximately 300 thousand inhabitants of four district as well as businesses working in these districts.

Filtering of the incoming raw wastewater is performed with rotary drum screens. In the past screens were controlled by hydrostatic pressure transmitters, which had become out-dated and operated unreliable. Unnecessary operation of the drum screens resulted energy-loss. In several instances the drums did not start to operate on time. NIVELCO Co. was ready to provide solution for this problem. The project had two phases. During the first phase two drum screens were equipped with instruments. After the positive response four further drum screens were fitted with NIVELCO made instruments. NIVELCO has recommended ultrasonic transmitters for this task. The control of the drum screens is based on the level difference between the waste water inflow and the water effluent. The obvious choice was our EasyTREK SPA-380-4 type integrated compact ultrasonic level transmitter with IP 68 protection.



The 4-20 mA output signals of the level transmitters are sent to the input of our UNICONT PMM-324-2 universal controllers. The relay outputs of the controllers function depending on the difference of the water level measured by the level transmitters before and after the drum screens.



Power supply voltage for the transmitters is provided by our NIPOWER PKK-331-1 rail mounted power supply units. This drum screen controlling system designed by NIVELCO starts the working cycles of the screen at the rising edges of the controlling signals. In case of large amount of sudden water flow (for example rain, snow-melt) controlling signals are generated by NITIME JEL-111 type rail mounted multifunction timers operating in impulse generator mode.



Thanks to this solution, working of the screens had become reliable and energy-saving, drum screens operate only when it is needed.

Moreover not just significant energy-savings can be achieved, but reducing the operation time of the screens results decreasing maintenance costs proportional to time.

*Tibor Asztalos  
Domestic Sales Engineer  
NIVELCO Co.*

**WATER-WORKS**

**KENÉZLŐ**

Level control in sewage pit using EasyTREK SCA-360 transmitter and open channel flow measurement with a V notch weir using EasyTREK SPA-380 ultrasonic level transmitter.



- Installed instruments:
- EasyTREK SCA-360
  - EasyTREK SPA-380

**WATER-WORKS**

**BODORFA**

Level measurement in outside sewage stations. The water level changes rapidly in this plant and one of the measurement place is very narrow. The EasyTREKs measure perfectly both inside and outside.



- Installed instruments:
- 3 x EasyTREK SPA-360-4

**WATER-WORKS**

**BUDAPEST**

Continuous quality monitoring of the produced and treated water is the most important task in the Budapest Sewage Works. Quality of the produced potable water is continuously monitored at several pipe-stages of the pipe-network with AnaCONT pH, ORP and DO transmitters.



- Installed instruments:
- AnaCONT LEP-111-2
  - AnaCONT LED-121-2
  - AnaCONT LER-141-2

**ZSÓRY SPA**

**MEZŐKÖVESD**

One of the 140 m deep wells at the Zsóry Spa is equipped with NIVOPRESS NPP-58A-6Ex borehole hydrostatic level transmitters with integrated Pt100 temperature sensor. The measurement values are transferred to a MultiCONT PRD-22A-5Ex and stored in an SD card which is read out regularly.



- Installed instruments:
- NIVOPRESS NPP-58A-6 Ex
  - MultiCONT PRD-22A-5 Ex
  - UNICONT PTF-401-4
  - NIPOWER PPK-331-1

In today's world water is a very precious substance as the water resources on Earth are reducing drastically.

This is well understood in industry all over the world and leads to the necessity of accurate measurement of water levels. This is especially true for measurements in open reservoirs, and the importance of automation is increasing significantly in the Indian water industry.

In the past, here in India, mechanical float operated level instruments were used, like 'Float & Board' or 'Float & Tape' type level gauges, etc. Due to practical limitations in the installations, these can be provided up to 3 to 5 meter (10 to 16.5 feet) of range and have considerable problems when the floats become stuck, caused by objects flowing with the water – like pieces of cloth/paper which can be present in raw water reservoirs.

Level measurement systems using general pressure or a differential pressure transmitter is not normally possible in practice, in open reservoirs like dams, lakes, rivers, ponds, fore-bays, bore-wells, sumps or under-ground reservoirs. For automation a continuous signal is preferred and hence people started to use low cost capacitance level transmitters for these applications. Unfortunately there are practical difficulties for bigger reservoirs in the calibration of such instruments.

Also these types of transmitters are not suitable for use in bore wells because they do not provide good practical accuracy.

The ultrasonic level transmitters like our EasyTREK and EchoTREK instruments are very popular nowadays in the water industry due to the non-contact measurement method and easy installation. For open reservoirs these transmitters have limited use as there can be very strong wind effects which divert the ultrasound waves, resulting in undetectable echoes. This problem is greater when the range to be measured is much more and the transmitter is installed in an extremely open location. The use of radar / microwave level transmitters is increasing now in the water industry, because with no moving parts, non-contact sensors, good accuracy and easy installation.

But in India the difficulty for the user is the high cost for non-contact radars and the non-availability of proper trained manpower at the remote installation sites like dams and rivers. Providing such manpower calls for considerable investment. In India we have had several enquiries from some of our clients like Andhra Pradesh State Electricity Board (APSEB), VA-TECH WABAG, etc, for non-contact radars for 70 and 100 meter (230 and 330 feet) ranges. They found the cost of the instruments for water applications too high, and the well-trained man power for installation and maintenance of such high-tech instruments was not available from the client. Another solution was needed.

Consequently the NIVELCO India sales team offered NIVOPRESS N insertion type hydrostatic level transmitters as the best option for an affordable solution for such open reservoir applications, such as in the Red Sea coast at Aden city in Yemen. These transmitters are very effective as they are available for up to 200 meter (656 feet) range. The special models are popular instruments of the water/wastewater industry and provide excellent alternatives for ultrasonic transmitters where ultrasonics are not suitable, for example for open sea water applications. Special adaptors are also available for protecting the sensor from muddy water, and its installation is very easy as they are pre-calibrated. HART capable versions can be remotely programmed via standard HART communications. Still there were a few hurdles to be challenged successfully by the team of NIVELCO India.

For the longer range devices with more than 10 meter (33 feet) of cable length in open reservoirs, the sensor movement can be like a pendulum, and the sensor can possibly getting stuck or snapped. This may require proper counter weight/fixing to restrict such movement, like the NMW-100 counterweights of NIVOFLOAT NL float switches. In the case of reservoirs like dams, rivers, ponds etc. there is the possibility that big pieces of cloth, paper etc can get wrapped around the sensor, (even though it is provided with special adaptors) leading to malfunction.

So we decided to overcome such problems by using a fabricated cage along with stainless steel multi strand wire ropes.



*Measurement arrangement under testing at India*

Here the cage acts like a good counter weight and the wire rope takes the entire weight avoiding any weight on the instrument's integral cable. The cage also works effectively to fend off floating objects. With such additional accessories we have provided our NIVOPRESS NPK hydrostatic level transmitters that were able to meet all the requirements of our customer and the measurement circumstances. VA-TECH WABAG also requested a remote display of the level transmitter information. This task was solved by using MultiCONT multichannel process controllers installed in the control room. Intrinsically safe (Ex ia) type NIVOPRESS NPK-541-5 Ex transmitters with piezo sensor, HART communication and 5 meter (16.5 feet) cable length along with MultiCONT PEW-215-6 Ex process controllers are performing their borehole measurement duties very well, to the great satisfaction of the customer.

*Shrikrishna N. Deshpande*  
CEO

*NIVELCO Instruments India Pvt. Ltd.*

Trout farming looks back to a history of one hundred years in Romania and nowadays became a dynamically developing industry. The growing demand of the hospitality industry or the hobby and sport fishing for this noble fish requires new farming technologies to apply. More and more contractors see beneficial opportunity in establishing trout farming fishponds thanks to the more efficient farming methods and the expanded professional background of this segment. In addition to this, European Union funds - nearly 230 million EUR - are available for the participants of trout farming sector.

The essential condition of the trout farming is the proper amount and quality water. The water supply system of the fishponds has to provide the refreshment of the water several times a day. The water should be pH 7 (neutral), or slightly alkaline, with low iron and min. 7 mg/l (7 ppm) oxygen concentration at 18°C (64.5 °F) temperature.



Usage of modern measurement instruments is essential in order to monitor and control the operation parameters. In NIVELCO's portfolio there are suitable pH, dissolved oxygen, temperature and ultrasonic flow transmitters.

Our customer, the ERHAL Kft. has more than 10 fishponds and in this first phase they asked for an offer on proper water flow measurement which meets the requirements of the Romanian Water Authority.

In accordance to the local environment we offered an open channel ultrasonic flow measurement solution. Since accurate information about the yield was not available, first we had to make proper measurements in order to select the suitable size Parshall flume. For this purpose we used a SEBA type hydrometer in the channel network which feeds the lake. Based on the results and the required water amount for trout farming we offered P5 size Parshall flume with EasyTREK SPA-390-4 ultrasonic level transmitter and MultiCONT PEW-210-1 process controller and display unit.

This flow-metering system with Parshall flume has the necessary certification for custody transfer measurements of the Romanian Metrology Authority.

After the first test phases many partner companies of our customer were interested about such a complete flow measurement solution for fishponds. In accordance to the yield (defined by the Authority) we offered similar solutions with great success, so NIVELCO T.M. counts with several fishpond instrumentation projects in the future.

Our customers are also interested in the expanding of the measuring system with further parameters to monitor such as pH, DO and temperature. For these tasks we can offer AnaCONT analytical transmitters and THERMOCONT TT temperature transmitters.

*Antal Máthé*  
Technical Consultant  
NIVELCO Tehnica Măsurării SRL

## INSTRUMENTATION OF A SEWAGE WORKS

Aquaserv, the regional public drinking water supplier and sewerage treatment servicer of Marosvásárhely town chose NIVELCO to supply the instruments for the renewal of the sewage treatment plant.

Within the framework of this renewal the following sewage measuring instruments were applied:

- NIVOPRESS NCK-200 hydrostatic level transmitters (10 units)
- NIVOFLOAT NWP-100 sewage level switches (30 units)
- EchoTREK SBP-380-6 ultrasonic level transmitters (9 units)



I would like to emphasize the EchoTREK level transmitter family, which works with ModBus protocol. The communication module was the result of the cooperation of Probit, SVT Electronics and NIVELCO T.M., who adjusted the instruments together to the system.

EchoTREK transmitters are connected to a Schneider PLC in SLAVE mode. Because of the averaging measurement method of ultrasonic level transmitters, the PLC could lose the measured values in normal mode, so the PLC was programmed to a special mode, when only 1 measured value is allowed to be valid from every 10 measured values. With the help of this special mode the dropouts of the measured values were avoided and as the process is slow this does not affect the evaluation.



8 EchoTREK transmitters are tracking the levels of the grids and control the sludge-lifting pulley-system. One EchoTREK is installed to a P9 Parshall flume to measure flow.



The EchoTREK transmitters communicate with the industrial computer via RS485/ModBus protocol. The ultrasonic transmitters were built into pipes to cover them from water, when the room is under washing-up. The measured values can be also displayed by the built-in SAP-100 local graphic display.

*András Olteán-Péter*  
Managing Director  
NIVELCO Tehnica Măsurării SRL

The next member of our series – introducing NIVELCO's distributors and their successful instrumentation projects – is the Flotron Instrumentation Services (Pty) Ltd established in 1990.

Thanks to Flotron in South Africa – which is famous for its diamond-mines and the vuvuzela from the FIFA World Cup 2010 – there are now several NIVELCO instruments operating.

Located in Stellenbosch – not far from Cape Town at the south-west corner of Republic of South Africa – our distributor is dealing mainly with level and flow measurement solutions for water and wastewater industry. In the African continent Flotron Instrumentation was the first who used AnaCONT liquid analytical transmitters for an instrumentation project started in 2011.

Their customer was Molapong aquaculture, (their name is a Sotho word for fresh water well) specialist of fish farming and the biggest producer of quality rainbow trout in South-Africa. The trout are not only raised for their meat but primarily for their much more valuable reddish ova so-called red gold. Since the spawning-season of the fish is different depending geographical circumstances the Molapong aquaculture is in a fortunate situation to guarantee fresh red gold for the market when the Northern Hemisphere cannot.



Thanks to this favourable situation and the achieved growing market share there was a development project started last year to increase their ova production from 1 million to 10 million in a year. A trout usually become mature at the age of three so reaching the 10 million ova number can be considered as a 3-year investment. Losing just only one fish is considered as a failure of the 3-year investment therefore it is important to provide suitable living environment for the fish to maximize the coveted red gold.

In framework of the instrumentation project a complex dissolved oxygen monitoring system for the fishpond was implemented based on NIVELCO's AnaCONT LED dissolved oxygen transmitter. The transmitters are connected to MultiCONT process controller with HART communication so the results of the measurements are not only followed with the local SAP-300 display of the transmitter but from the remote control room.

The transmitter continuously measures the dissolved oxygen level of the fishpond and triggers an alarm when the level drops below the low alarm set point.

The Danish designed re-circulation plant is unique in this field in South Africa would operate even in a European country because it meets all European regulations to provide the required high quality of the produced ova to allow the export. Added to this, the secondary aerators –used in the system which is connected to the AnaCONT dissolved oxygen transmitter – are controlled in accordance to the measured DO values.

According to the measurement results the aeration starts only if necessary and last only until the water quality recovers to the required state so the system enables significant energy savings.



Furthermore the new investment had a favourable effect on the reproduction efficiency.

The recirculation plant was presented on an agricultural TV programme and was set to be an example for other plants of its kind being planned in South Africa.

Thanks to Flotron Instrumentation hopefully they will also chose NIVELCO liquid analytical transmitters and a few years later there will be more red gold worldwide coming from South-Africa.

*Jacobus M. Vosloo  
Managing Director  
Flotron Instr. Services (Pty) Ltd.*



The Aqua Technology Group LLC is one of the most experienced representatives of the NIVELCO USA LLC, representing NIVELCO products in Ohio, Kentucky, Indiana and West Virginia. ATG is an Ohio based provider of meters, controls, instruments, equipment and 24/7 service for the customers in the water, wastewater, agriculture, pharmaceutical and industrial sectors.

The City of Fairborn is located in Southwest Ohio and serves a population of over 32,000 residents. The Water and Sewer Division provides Sanitary Sewer Collection and Treatment along with Water Treatment, Pumping and Distribution. Thanks to the Aqua Technology Group, they are now equipped with NIVELCO manufactured products.

Liftstation level control is a common application that can be accurately measured with the NIVELCO ultrasonic level transmitters or even radar level transmitters. But sometimes other challenges exist like screening equipment, wetwell conditions and operational preferences.

### ■ Ultrasonic Level Transmitter and Bubbler Controls

The wastewater operations of Fairborn, Ohio had recently undergone some operational changes and the original screening equipment had been reinstalled into two of their liftstations in order to make the removal of the solid particles from the incoming wastewater more efficient.



From these wetwells the collected wastewater is pumped through force mains to the wastewater treatment plant.

One liftstation had an existing ultrasonic level transmitter and controller and the other had a bubbler controller.

The operators found that the newly installed screening equipment was blocking the ultrasonic beam of the 2 part E+H level meter in the wetwell and the old bubbler system was becoming prone to failures. They needed a reliable way to control the pumps when the screens were both in and out of service.

### ■ Hydrostatic Level Measurement

NIVELCO representative Aqua Technology Group provided a new level measurement solution using the reliable NIVOPRESS NPK-400 series borehole level transmitters with NAW-104 sewage adapters and NAA-101 junction boxes. They also implemented a level switchover / backup circuit so operations could easily change from the hydrostatic to the ultrasonic if ever desired.

### ■ Reliability and Flexibility

Count on NIVELCO to provide a customer centric solution for all your level applications.

*Dave Miller*  
Managing Director  
NIVELCO USA LLC

George Paris Company is in its 34<sup>th</sup> year making them one of the most experienced representatives of NIVELCO USA LLC, representing NIVELCO products in the states of Tennessee, Arkansas and the northern part of Alabama. GPC is a Knoxville, TN based company representing world-class manufacturers in the United States with a diverse portfolio offering sensors, automation, controls, power and system solutions in the water and wastewater industry, petro-chem, food, dairy & beverage, pulp & paper, research labs and more. Our customer is a well-know American beauty-care, cosmetics and all-natural home and body cleansing agents producer. Most of their products are water-based. Consequently to this profile, the plant is a great water consumer whose wastewater portion of their utility bill is based on the total gallons of water supplied to the plant.

Thus, the wastewater bill the client was paying was not representative of the fractional amount of wastewater actually being discharged for treatment. Rather, the total gallons was more representative of the water being shipped to their customers in water-based products. The local utility — like other utilities — allow for wastewater credit for water being used, evaporated or shipped out so the producer is only billed for metered wastewater being discharged back to the city.



In this case, our client chose to meter using an existing 2" (P2-sized) PARSHALL flume outside their fence. Thanks to the George Paris Company an EchoTREK compact ultrasonic level transmitter was provided for the open-channel flow measurement with a custom-designed meter panel providing a digital display of cubic feet/sec. and cubic feet total. The utility checked the calibration in comparison to their portable 'reference' bubbler, and approved the installed measurement system and calibration.

The result is a continuous \$500 – \$700 monthly savings on the client's wastewater bill, and a payback for the discharge metering system in less than 6 months.

The ultrasonic open channel flow measurement system was operating reliably since 2009 until the utility had a pipe break recently that flooded the underground discharge, so the EchoTREK was submerged and was ruined. Since our client was very satisfied with the ultrasonic level transmitter he chose again a NIVELCO product and George Paris Company replaced the EchoTREK with the IP68-rated waterproof (and submersible) EasyTREK integrated ultrasonic level transmitter and connected it to the original meter panel.

*Dave Miller*  
Managing Director  
NIVELCO USA LLC

### WATER-WORKS

CZECH REPUBLIC

NIVOCAP CK-100 type RF-capacitance level switches are detecting the foam at wastewater treatment facility in Mnichovo Hradiště. The NIVOCAP CK, mounted on the aeration tank prevents the foam to flow out from the aeration tank and contaminate nearby river.



Installed instruments:  
■ NIVOCAP CKM-106-1

### WATER-WORKS

PORTUGAL

Open channels flow meters of treated effluent sewage measurement in a local waste water treatment plant in the city of Alcanena. All these effluents have to be measured and registered. Depending of the installation there are Parshall flumes and Thomson (90°-notch) weirs.



Installed instruments:  
■ EasyTREK SPA-380-4  
■ MultiCONT PED-210-1

### HYDROELECTRIC POWER STATION

ROMANIA

In order to provide the minimum required water amount in the stream an open channel flowmeter system with EasyTREK ultrasonic level transmitter, NIVOSONAR GPA Parshall flume and MultiCONT is used. This system controls a dam gate (open-close) to provide the specified minimum yield.



Installed instruments:  
■ NIVOSONAR-GPA-1P4  
■ EasyTREK-SPA-380-4  
■ MultiCONT-PEW-210-1

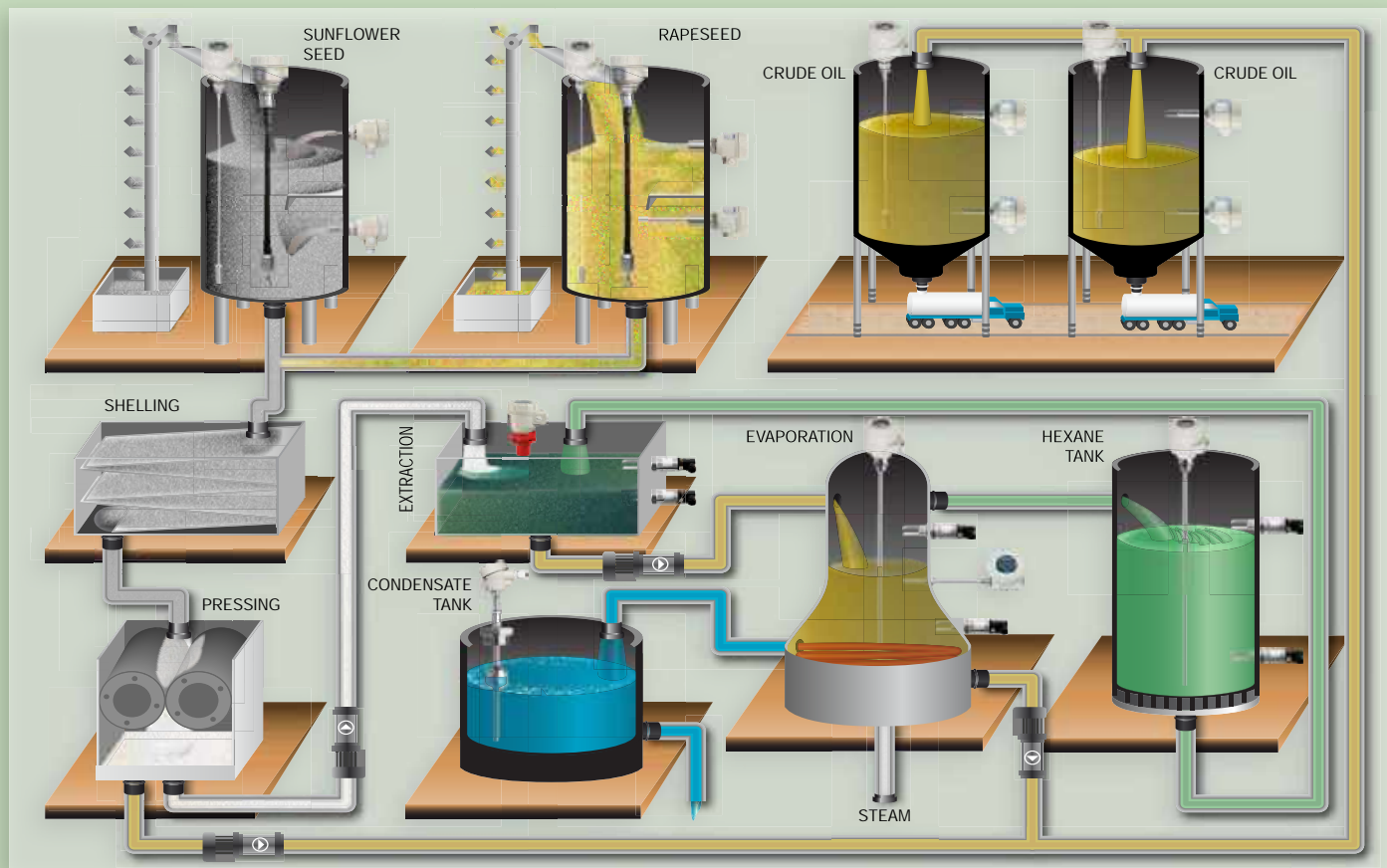
### NYÁRÁDSZEREDA WATER-WORKS

ROMANIA

The two outside water tanks are located 2 km (1.25 mile) faraway from the control station using wireless communication. The tanks have 500 m<sup>3</sup> (17650 ft<sup>3</sup>) capacity and act as communicating vessels so only one tank is equipped with NIVOPRESS NPK hydrostatic borehole level transmitter.



Installed instruments:  
■ NIVOPRESS-NPK-44-05  
■ UNICONT-PMG-411-1  
■ NIPOWER-PPK-331-1



Edible oil is produced from oil-seeds (for example sunflower- or rapeseed). The main parts of the edible oil production process are the following: raw material storage, shell (removing the husk), press (cold and hot), crude-oil storage, extraction, evaporation.

During the primary pressing approximately 70% of the oil content can be extracted from the oil-seeds which are stored in crude-oil storage tanks. The pressed seed-cakes are treated with solvents (usually hexane) in the Extractor and then the solvent oil mixture is transferred to evaporation. This evaporation process separates the oil from the solvent resulting that the remaining seed-mud has only 1-2 % oil content. The solvent is filled to the hexane storage tank and the processed oil is filled into the crude-oil storage tank.

#### Finished product storage silos:

- Continuous level measurement with MicroTREK HTN-400-4 guided microwave level transmitters
- Low/high level indication:
- Selectable level switches:
- NIVOSWITCH RCM-401-3 or
- NIVOSWITCH RFM-401-0

#### Instruments of the evaporator:

- The most important parameter to be measured and controlled is temperature:
- It is done by THERMOCONT TTJ-511-6 Ex temperature transmitter and UNICONT PMM-311 universal controller.
- NIVOSWITCH-401-8 Ex vibrating fork level switch is recommended for low/high level limit indication.

#### Other instrumentation tasks:

The extractor, the evaporator and the hexane storage tank are in hazardous environment, the applied instruments should be Ex approved. The level measurement in the hexane storage tank is performed with the following devices.

#### Recommended instrumentation:

- MicroTREK HTS-400-8 Ex type guided microwave level transmitters with rod probe
- Additional devices: NIPOWER PPK-331 power supply, UNICONT PDF-401-2 loop display, UNICONT PMM-311 universal controller
- NIVOSWITCH RCM-401-8 Ex type vibrating fork level switch with
- UNICONT PKK-312-8 Ex isolator switching amplifier

### SUGAR PLANT

BELGIUM

Glycerine, liquid sugars, and syrups are produced in the plant of Belgosuc. The following challenges had to be solved in the measurement of 4 tanks: very sticky media, high hygienic requirements, high temperature CIP (Cleaning in Place) process. The solution is the EchoTREK SGS-362-2 with stainless steel transducer face.



Installed instruments:  
 ■ EchoTREK SGS-362-2

### SUGAR PLANT

BRAZIL

The effluent industrial wastewater level is measured with 2-wire EchoTREK ultrasonic level transmitter in a Brazilian sugar plant. The instrument is protected by sun-shade provided by NIVETEC to prevent overheating of the transmitter.



Installed instruments:  
 ■ EchoTREK SEP 380

### JUICE FACTORY

HUNGARY

EchoTREK transmitters measure the lumpy tomato in a ketchup factory. The grinded tomato juice and then the processed pure juice are measured with NIVOPRESS D hydrostatic level transmitters placed in the bottom of the tanks. The measured values are displayed with UNICONT PMG indicators.

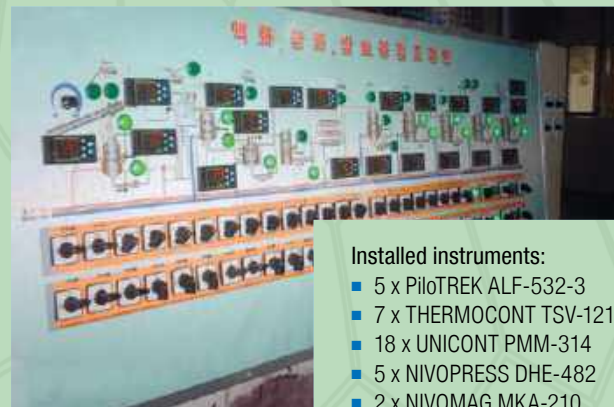


Installed instruments:  
 ■ 3 x EchoTREK SEA-380  
 ■ 5 x NIVOPRESS DTF-531  
 ■ 9 x UNICONT PMG-411

### DISTILLERY AND FINERY

KOREA

The 5 ethyl alcohol tanks are measured by PilotREK 'A' non-contact level transmitters and THERMOCONT T vibration-proof Pt100 thermo sensors. A panel system built from UNICONT PMM-300 controllers display the measured values. The dosing vessels are equipped with NIVOMAG magnetic float level switches.



Installed instruments:  
 ■ 5 x PilotREK ALF-532-3  
 ■ 7 x THERMOCONT TSV-121  
 ■ 18 x UNICONT PMM-314  
 ■ 5 x NIVOPRESS DHE-482  
 ■ 2 x NIVOMAG MKA-210

Thanks to the Falcon Electronic, – our most remarkable Croatian partner – NIVELCO has won an instrumentation project involving free-flowing solid material measurement in the Croatian town called Velika Pisanica, located near to the borders of Hungary. The successful project - described in details in the following - is a result of a fruitful cooperation over two years. In the framework of this continuous multipoint temperature measurement and transmission was required in four 15 m (50 ft) high silos.

Temperature of grain stored in silos needs to be monitored for maintaining quality of the stored medium. Monitoring of the total volume of the silo is needed to provide information on accidental quality loss or appearance of germs or fungus. Eventual temperature increases alert the operator to perform operation or recycling the medium.

There are 3 transmitters in each silo in a triangular arrangement along an arc, so totally 12 THERMOPOINT TMH-56F-8 Ex multipoint temperature transmitters was installed.

Every instrument has 6 temperature sensors providing temperature information from overall 72 measurement points at the same time.



The antistatic PE coated flexible cable probe of the transmitter is 15 m (50 feet) long and the digital thermo-sensors are placed inside the probe in every 2.5 m (8.2 inch).

The measurement data is collected, processed and displayed in the control room by a MultiCONT PEW-2MA-1 type multichannel process controller / display unit.

The measured temperature results are transmitted to the SCADA system via RS485 line using MODBUS protocol.

During the commissioning the biggest problem was the very thin (only few millimetres (0.04 – 0.05")) tank roof. Therefore it was necessary to strengthen the roof installing a supporting structure which stabilises enough the roof to resist the tensile force occurred by the filling / emptying cycles.

The complete installation and the configuration of the transmitters were performed by the experts of our Croatian partner, the Falcon Electronic.

*Marin Štefanac*  
Managing Director  
NIVELCO Mjerna Tehnika d.o.o.

## LEVEL METERING THROUGH THE TANK WALL

Among the several excellent features of the non-contact microwave level measurement, the most attractive one is that radar signals can penetrate through various plastic materials. These plastic materials with low dielectric constant allow measurement without losing the impulse strength of the emitted signals and allow detecting the reflected microwave impulses. Therefore it is possible to cover the stainless steel horn antenna with plastic enclosure to protect against fumes and vapors of chemically aggressive mediums. Another way to protect the antenna from the aggressive mediums is to measure the stored chemicals through the plastic tank wall. This application possibility was used by NIVELCO Bohemia to provide suitable measurement solution for chemical storage tanks in a local dairy plant. The customer, a creamery in the Czech Republic produces dairy products and uses some types of corrosive chemicals for example in the cleaning process where the level measurement of these mediums are really challenging for all instrument manufacturers.

The chemicals are stored in 2 closed 1 m<sup>3</sup> (35.3 ft<sup>3</sup>) sized plastic tanks.

The customer's demand was to continuously measure the level of the chemicals using non-contact radar measurement and NIVELCO Bohemia offered the PiloTREK as the best choice for high accuracy and highly reliable level measurement through the plastic tank wall.



Despite the excellent features of the pulse burst radar principle and PiloTREK itself, the metal construction around the tanks was a serious problem to be solved, since the tanks are kept in metal constructions to keep them upright. This metal construction is a disturbing object in the aspect of non-contact microwave measurement, so we decided to provide a free test where we could find answer for the question that is it possible to measure accurately in such an extraordinary measuring arrangement. The test was made using a PiloTREK WEM-150-4 with DN 50 stainless steel horn antenna. The unit was mounted approximately 1 m (3.3 feet) above the top of the tank. It was necessary to find the best place between the bars of the metal construction otherwise false signals could be detected.

The set-up and parametering was made by the brand new Eview2 configuration software aided with intuitive and user-friendly interface.

It provides quick and easy setting of any NIVELCO instrument using HART communication.

During the test PiloTREK did extraordinarily well reaching 3 mm (0.12 inch) accuracy. The results were satisfying also when the level was decreased rapidly in very short time, though it was just a simulation, since under normal operating conditions the level will never decrease so fast. The customer was very satisfied with the test results and also with the approach of NIVELCO as well with the purchased units. Our instruments likewise the provided services once again proved NIVELCO's high quality and NIVELCO Bohemia accomplished again a challenging measurement task.

Vojtěch Samec  
Managing Director  
NIVELCO Bohemia s.r.o.

The Hungarian EISPRO Kft. produce many types of ice cream in its factory located in Törökbálint, near to Budapest. They are leading players of the ice cream market in Hungary, they have over 100 employees. This article allows detailed insight into the production of ice cream and presents the applied NIVELCO instruments.



#### Steps of the ice cream production:

- Storage of the raw materials and other components
- Blending the ingredients and create mixture
- Heat treatment (pasteurization)
- Cooling
- Aging
- Frozen foaming
- Batching, forming and hardening
- Packaging
- Storage and distribution

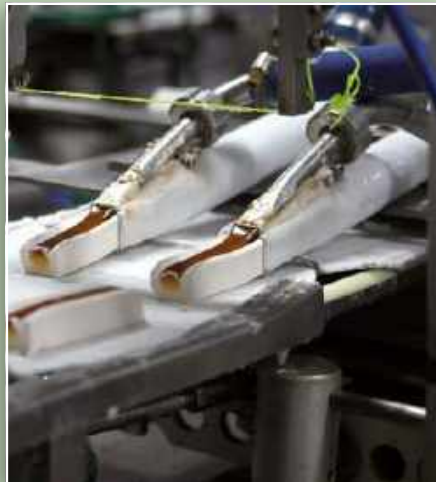
The EISPRO Kft. has a long-period cooperation with NIVELCO, therefore there are no any process in their ice cream production technology where we could not find NIVELCO instruments.

#### Ingredients (liquid and dry) storage:

- The main ingredient of the ice cream is milk which is stored in outside silos. These dual-wall silos are continuously measured by NIVOPRESS DTO-561 hydrostatic level transmitters at the bottom and THERMOCONT TSP-121 resistance thermometers. The measurement values are displayed with UNICONT PMM-311 universal controllers.
- The additive powdery materials are stored in open containers.

Blending: Based on the proper recipe the ingredients are mixed then the mixture is forwarded into closed tanks. In this phase the level and temperature of the mixture is measured similarly to the previously described: NIVOPRESS D hydrostatic level transmitters and THERMOCONT TSP temperature sensors are used.

Heat treatment: The main purpose of the pasteurization is to create suitable microbiological state for the ice cream. The pasteurization is performed by a heat exchanger at minimum 80.6 °C (177 °F) temperature for 20 seconds. After the pasteurization the mix is homogenized by means of high pressure (100-120 bar g / 1450-1740 psi g) and then it is passed across a double type heat exchanger for the purpose of cooling the mix to refrigerated temperatures.



The temperature is controlled by a UNICONT PMM-311 device. The temperature sensor is a fast response THERMOCONT TSG-111 Pt100 sensor. Cooling and aging: In this phase the additional components – which are less tolerant to the heat treatment – such as fruit pieces and juices are added to the mix as well the other auxiliary materials. Then the ice cream is filled into 2.5 m (8.25 ft) tall tanks and frozen to -25 °C (-13 °F) for 24 hours. These tanks are equipped with MicroTREK HTS-425-4 guided microwave level meters which transmit 4-20 mA output signal proportional to the mass of the stored ice cream.



Of course the temperature is also measured and controlled by UNICONT PMM-311 instruments.

Cleaning: Technological equipments are cleaned with CIP (Clean-in-Place) process. The level in the CIP tanks is measured by EchoTREK SEA-380 compact ultrasonic transmitters. Temperature control of the washing liquids is done by UNICONT PMM-311 universal controller. NIPRESS DRC-2A22 transmitters are used for pressure measurement in the washing system.

Waste management: During the production many unwanted by-products and waste are generated. It was an interesting task to measure the dense impurities resulted by the cleaning process and the remaining organic waste which accumulate at the bottom of the tanks. From all technological processes the mentioned slurry-like material is pumped into two 4 m<sup>3</sup> (141 ft<sup>3</sup>) concrete pools where it is thickened. This sludge waste – waiting for annihilation – is pumped into mobile metal outside containers. The containers have lids that can be opened so the measurement solution was an EasyTREK SPA-360 ultrasonic level transmitter mounted on a NIVOSONAR SAA-108 console.

This way the transmitter measures the level through the open lid. Further signal process is done by a UNICONT PMG 411 universal controller which indicates the fullness in percentage and stops the pump in case of reaching the high fail safe level.

The EISPRO Kft. is very much satisfied with the NIVELCO instruments and this was proven by letting our Marketing team to shoot pictures and videos about the ice cream production and of course our instruments in action.

*István Horváth*  
Head of Domestic Sales  
NIVELCO Co.



The equipments used in the technology of beverage manufacturing (containers for raw materials, grinders, presses, containers of the end product, ingredients, cleaning devices etc.) offer numerous opportunities for the application of instruments developed and produced by NIVELCO. We would like to inform you about these applications citing one of Hungary's largest beverage manufacturers as an example.

We have provided assistance in solving a number of problems concerning measurement and control such as the level measurement of alkali and corn syrup tanks, the recycling of industrial wastewater, quantitative measurement in water-treatment, temperature measurement and control.

### Level measurement of alkali tanks

The level measurement of the 6x3 m (10 ft) double-wall horizontal alkali tank located outdoors is done by an EchoTREK SBA-380-2 ultrasonic compact level transmitter, the data is received by our PMM-313-1 universal control panel which indicates the quantity measured in litres.



The alkali tank is responsible for securing the transition of fresh alkali to the bottle-cleaner.

### Level measurement of corn syrup

Corn syrup is the concentrated aqueous solution of a compound of glucose and fructose which is widely used in the food and beverage industry in great quantities as sweeteners. To store corn syrup 5 pieces of 4.5 x 3.5 m (32 m<sup>3</sup> / 1130 ft<sup>3</sup>) vertical tanks are used.



The level measurement of the tanks is provided by NIVOPRESS DTE-651-2 two-wire, programmable hydrostatic level transmitters. 3 components are contained in the tank: concentrate, water and sugar. A mass flow meter is in charge of dosage, stirring is done by the method of circulation. The pressure transmitter constantly measures the level in the tanks and according to this undergoes the dosage of syrup onto the production line.

### The recycling of industrial wastewater

The purpose of recycling is to use the industrial wastewater from the cleaning of the aseptic production line as technological cooling water. The wastewater is gathered in a puffer-tank, where NIVOSWITCH RCM-400-3 vibrating fork level switches monitor 3 levels.



Upon reaching the lowest emergency level the pumps stop, at mid-level the first pump starts, and at the top level the second pump is activated. The pH and conductivity levels of the water pumped from the puffer-tank is measured by AnaCONT LGP-211-2 and AnaCONT LCK-232-2 instruments.

### Flow measurement in the water-treatment system

8 pieces of ISOMAG MS-2500 magnetic induction flowmeters which can be built in pipelines and the adjacent ML 110 programmable signal processor measures the quantity of water running through the ion exchangers in the water handling system.

### Thermometers and controls

The regulation of temperature of the water contained in the melting tank melting syrup concentrate is secured by THERMOCONT TSP-221-0 resistance temperature detector and our UNICONT PMM-313-1 universal controller and display.

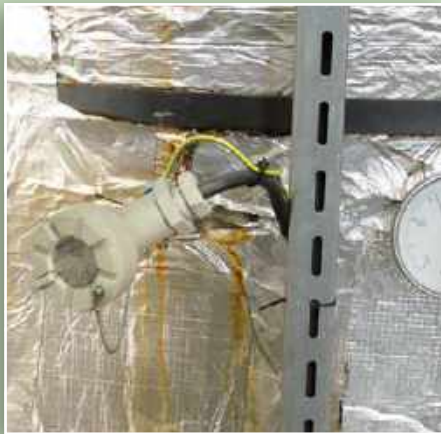
*Tibor Asztalos  
Domestic Sales Engineer  
NIVELCO Co.*

The NT Food Kft. in Kiskunfélegyháza town produces hot pressed, extracted, raw and refined sunflower cooking oil. A modernisation project was began in order to equip the plant with most efficient technology to be capable to extract the highest oil content from the raw materials.

During the primary pressing most of the oil content can be extracted from the oil-seeds such as sunflower or rapeseed.

The remained seed dollop contains much oil that can be extracted. In order to this the dollop is treated with solvents which releases the desired final product.

The extraction procedure is used where the oil-content is required to reduce fewer than 20%. The extraction can be used as a single process, but usually it is combined with pre-pressing.



This way the oil content can reduced to 15-20%. Combined usage of the two processes has the advantage in significant efficiency increasing with cost savings of the pressing and achieving better oil yield.

After the proper preparation the solvent oil mixture is stored in an extraction tank. Then the soluble components will be removed and the solvents will be dissolved from the bleached medium, separating the extracted oil from the reusable solvents.

The solvent dissolving is performed by multi-level vacuum and steam distillation under vacuum. The high difference between the boiling points of the solvent and the oil, the process can be regarded as a distillation.



The NIVELCO instruments were installed at the extraction hall. The main measurement task here is the level and temperature monitoring of 4 tanks containing solvent-oil mixture. In contrast to the pressing, the entire extraction system should be equipped with ATEX approved devices which means remarkable costs.

The other important parameter, the temperature is in direct proportion with the diffusion. The higher is the temperature, the faster will be the diffusion. At high temperature the solubility of the oil will increase and its viscosity will be reduced. Both phenomenon results faster extraction so this process is recommended to perform at high temperature. The optimal temperature for the oil extraction process with hexane is +150°C (302 °F). Therefore the high medium temperature, low dielectric constant of the medium and the explosion-proof environment were considered in the instrument selection.



NIVELCO temperature sensors track the complete extraction process with 15 THERMOCONT TSP-211-0 and 42 THERMOCONT TSP-215-0.

The 4 distillation tanks are equipped with 4 MicroTREK HHS-410-8 Ex high temperature and ATEX approved type guided microwave level transmitters with coaxial probe.



Since inside the tank there is a heat-steamed coil it is not possible to mount the probe the usual way. The transmitters are mounted to a bypass chamber. The coaxial probe was necessary because the measurement range is only 1 m (3.3 ft) and the coaxial probe has no dead band. The transmitters measures within 5 mm (0.2 inch) accuracy and transmit 4–20 mA output signal to control variable-frequency drive which operates the pumps.

Measured level data are displayed on 6 UNICONT PMG-400 universal controllers. Supply voltage of the loops is provided by NIPOWER PPK-331 power supply modules.

The NIVOPRESS DTE-651-2 and NIVOPRESS DTE-551-8 Ex hydrostatic level transmitters are mounted at two vacuum measuring points. One of these units measures the actual vacuum value of the extractor, the other measures the pressure of the extraction process above 100 °C (212 °F). The vacuum values are controlled by PLC based on the 4–20 mA output signals of NIVOPRESS transmitters. Local displaying and programming of the instruments can be done with the help of SAP-203 plug-in displays.

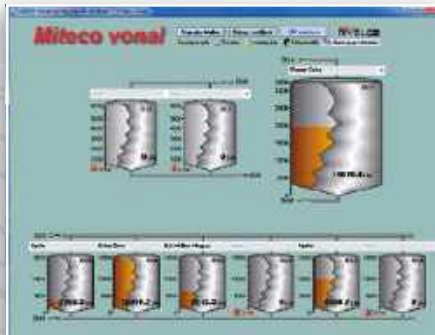
The half-year test phase of the measurement system was very successful and our customer asked for an offer on expanding the instrumentation. Moreover the process visualization system covering the entire production process is already under progress.

*Tibor Asztalos  
Domestic Sales Engineer  
NIVELCO Co.*

## LEVEL MEASUREMENT OF A TANK FARM IN BEVERAGE PRODUCTION



The Coca-Cola Company is the world's leading beverage retailer. The Hungarian site of Coca Cola Company in Dunaharaszti operates 2 bottling and 10 regional distribution centres, its annual production capacity of one billion litres. Thanks to the previous successful instrumentation projects of NIVELCO we received a new request for providing further instrumentation solutions for other tasks.



Regarding the customer demands and the needed measurement accuracy, we made an offer for a continuous level measurement solution, for 17 standing stainless steel tanks, after a careful site-survey. We offered for this task our guided microwave MicroTREK radar transmitters.



Further demands were the local display of the measured values and centralised parameterisation possibility of the transmitters. The obvious choice for this purpose is the MultiCONT multichannel process controller. Summarisation and displaying of the measurement data is performed by a PC running the NIVISION process visualisation software. The main advantage of microwave (radar) level measurement is the  $\pm 5$  mm (0.2") accuracy along with the maximal operational safety. Moreover the measurement is independent from dielectric constant, temperature, pressure and density changes and applicable for mediums with turbulent surface, and capable of ignoring dense dust, vapour or pressurized gas layers above the product surface.

It is a key feature that MicroTREK transmitters are suitable for using in and with CIP (Clean-In-Place) procedures which involves a 90 °C (194 °F) alkaline and acidic cleaning process.

In the aspect of the demand for a local display, the 17 tanks can be divided into 3 sections:

- MicroTREK HTF transmitter (8 units) communicating with a MultiCONT PEW-18B-1 process controller
- MicroTREK HTF transmitter (7 units) communicating with a second MultiCONT PEW-18B-1 process controller
- MicroTREK HTD twin-probe transmitter (8 units) connected to two UNICONT PDF-501 loop indicators. The UNICONT units provide local display of the measured data and transfer the HART signals to a MultiCONT placed in the control room.

In order to be able to use the whole capacity of the tanks, a special mechanical solution was necessary to be constructed on the top of the tanks. The special narrow standpipe facilitates that dead-zones of the transmitters are 'shifted' outside of the tanks so even the highest level of the filling does not reach the instrument dead-zone.

Therefore it was essential to increase the measurement accuracy because the contents data is indicated in litres via a linearization table. Along with the level measurement there are also frequent laboratory tests checking the compliance of the ratio between each component. After the step-by-step measurement and the blending, the finished carbonated products pass into the bottling-line. The accuracy needed to keep to the required formula of the recipe is achieved by a 20-point linearization table. With the help of the MultiCONT multichannel process controller it is very easy to specify a linearization table, in this case we assigned the measured value in millimetres to volume in litres. The MicroTREK transmitters transfer measurement signals to the MultiCONT controllers by HART communication. The MultiCONT units collect the data of the three sections of the tank-farm per groups and communicate with the central control computer using an RS 485 communication line. On the PC our NIVISION process visualization software performs reliable visual indication of the tank-farm.

*Tibor Asztalos*  
Domestic Sales Engineer  
NIVELCO Co.

## EDIBLE OIL PLANT

KISKUNFÉLEGYHÁZA

The cold press vegetable oil is stored in tanks before the chemical extraction. The environment is hazardous; the level measurement is done in outdoor tanks and monitored with 2-wire NIVOPRESS D hydrostatic level transmitters installed into the drain.



**Installed instruments:**

- NIVOPRESS DEF-551-8 Ex
- NIVOPRESS DTF-551-8 Ex

## EDIBLE OIL PLANT

KISKUNFÉLEGYHÁZA

The level of the highly explosive hexane is performed in a bypass tube with guided microwave transmitters. The dosing control is based on the transmitted level values. The special characteristics of the measurement is that dielectric constant of hexane is only 1.9.



**Installed instruments:**

- 3 x MicroTREK HHR-410-8 Ex

## BEER FACTORY

BUDAPEST

Level measurement in 3 m (10 ft) high beer tank using capacitance level transmitter without local display. The NIVOCAP transmitter has special pipe-coupling sanitary process connection and fully PFA coated rod probe. Around the probe there is a coaxial reference probe.



**Installed instruments:**

- NIVOCAP CTR-330
- NIVOCAP CAF-130

## DISTILLERY AND FINERY

GYŐR

The distillery in Győr use EchoTREK compact ultrasonic level transmitter in the alkaline tank of the fermentation process. The measured values are displayed on the outside UNICONT panel instrument. The overfill protection is performed by PFA coated NIVOSWITCH vibrating fork level switch.



**Installed instruments:**

- EchoTREK SGP-370-2
- UNICONT PMG-411-1
- NIVOSWITCH RAM-402-1

## ULTRASONIC LEVEL TRANSMITTERS FOR MILK APPLICATIONS

The safety and wholesomeness of dairy products is highly dependent upon the effective control of unwanted micro-organisms in the dairy plants.

One method is Pasteurization which destroys disease-causing bacteria and significantly reduces the number of spoilage organisms.

As everybody knows, food industry products like milk demands high hygienic requirements and it has to be handled with uttermost care against contamination.



Hence in such cases contact type level transmitters like NIVOCAP capacitance (due to insulated sensor as well as counter weight) or float operated NIVOTRACK (due to contamination around float) cannot be used for this application either with PFA plastic coating, because bacteria can adhering on the probes. Conventionally in milk applications the differential pressure (DPT) transmitters or flush diaphragm based hydrostatic level transmitters like NIVOPRESS D are used. In this second case the devices are equipped with sensor filled with food industry compatible oil (as pressure transmitting medium) and DIN 11851 pipe coupling or Tri-Clamp sanitary process connection.

But still as the density of the milk varies batch to batch there can be effect on the accuracy of these transmitters. Also the cost of needed regular maintenance is quite high in these cases. Hence more and more users prefer the non contact measurement solutions. In the milk plant in Mangalore, India there are three milk storage tanks with 15000 litre (530 ft<sup>3</sup>) capacity which should be continuously measured.



We have offered our ultrasonic level transmitter EchoTREK SGV-380-2 for these applications suggesting the specific type of installation as there were criticality of CIP process where there can be steam and the temperature can go up to 90-95 °C. C.I.P. stands for cleaning-in-place generally done with specific chemicals in first stage and then hot water /stem is used for defined time for sterilization depending on silo structure. But in certain cases it may shoot up to 90-95 °C (194-203 °F). Also due to the temperature factor and the acid/caustic used for tank/silo cleaning it was necessary to use PVDF transducers, which is more resistive than the standard PP plastic.



Another really important aspect of the application which made ultrasonic principle suitable is that the milk is cooled in the tank and the filling is performed very slowly from the bottom to avoid foaming. Milk usually tends to foaming which could make ultrasonic level measurement impossible. Because of the temperature factor as well as steam, it should be ensured that the flange / transducer surface temperature does not exceed 90 °C (194 °F) and the steam should not get condensed on the transducer surface causing functional difficulties.

To reduce the temperature at flange / transducer a perforated nozzle was used. This also helped to drastically reduce the possibility of settling down the steam on transducer face and getting condensed on it. It is true that this arrangement is not possible in all the applications where perforated nozzles cannot be allowed. But at the majority places the solution was well accepted in order to provide suitable circumstances for reliable and accurate level measurement with EchoTREK ultrasonic transmitters.

Shrikrishna N. Deshpande  
CEO  
NIVELCO Instruments India Pvt. Ltd.

Smart solution of a challenging solid level measurement task for grains, ground grain derivatives, chemicals and animal food pellets in extremely slim silos with ultrasonic transmitters involving HART multidrop system. A success story for NIVELCO's EchoTREK as well as for its partners in Japan.

Being past the peak of the radar boom the time has apparently arrived to give reasonable answers in each case to the following question: ultrasonic or microwave. NIVELCO has always been one of the few manufacturers successfully coping with challenging solid level measurement tasks. At the same time it has been ready to adopt the new radar technology and is now having microwave devices in its production range.

The problem above reared its head in a project in Japan involving the extremely slim silos of 14.5 m (47.5 ft) height and 2.3 m (7.5 ft) diameter in one of the plants belonging to Minami Nihon Kumiai Feed Co. Ltd. The application was to measure the level of grains, ground grain derivatives and chemicals as well as 2...5 mm (0.075"... 0.2") pellets (cattle food). The issue was the transmission of measured data via a digital communication system.



Bitter experiences years back resulting from the fact that some distributors had not been ready to devote themselves to the adjustment procedure needed with peculiar solid applications made NIVELCO recommend the MicroTREK A model GWR (Guided Wave Radar) level transmitter for its Japanese distributor. Surprisingly the Japanese distributor Towa Seiden Industry Co., Ltd. was reluctant to accept the higher priced contact radar and pointed NIVELCO towards the cheaper non-contact ultrasonic solution. The EchoTREK STD compact ultrasound level transmitters for solids (with its outstanding narrow beam angle especially suited for slim vessels) have proven their worth in several hundreds of applications similar to this one. Consequently, NIVELCO did not think twice before offering these units, knowing quite well that these devices were going to replace unsatisfactory ultrasonic units of a well known manufacturer.

Within a matter of days an order was received for 80 EchoTREKs plus 10 MultiCONT controllers that were to gather measured data via HART and transfer the data to the Central Process Control System of the plant through an RS485 link. Within a few weeks, one unit of the newly developed MultiCONTs along with communication protocol was shipped as a sample. The communication software was created by a Japanese System Integrator without a single question asked.



The total set of 80 EchoTREKs and 10 MultiCONTs was shipped out late 2004 to be installed early 2005. The final commissioning had been foreseen for April 2005. Although the project was regarded as a medium sized one in Japan, at NIVELCO it was large enough to deserve our special attention. Upon checking satisfaction around the end of April NIVELCO was pleasantly surprised to hear the short answer of its Japanese distributor: "The installation and commissioning went relatively easily". This relatively small animal food producer still has about 200 silos equipped with unsatisfactorily functioning older ultrasonic units and furthermore, there are a good number of animal food producers in Japan to be targeted with EchoTREKs made by NIVELCO.

Constanze Lengyel  
Export Sales Engineer  
NIVELCO Co.

## NIVELCO'S TDR ON 80 PALM-OIL SILOS

Level metering of palm oil is not an easy task to handle with TDR because of its low dielectric constant ( $\epsilon_r = 1.75$ ). 73 very tall tanks represent however an attractive target for anyone having this technology in the bag to make a try. Level and temperature monitoring was the task at PALMAJU Sdn. Bhd. in Malaysia and transferring measurement data to the central process control system.

The MicroTREK ABM-A16-3 units featuring dual cable probe have been tested and found absolutely reliable to perform level metering in the 18 m (60 ft) tall vessels containing palm oil and fluids of all kinds used in the process of production.



The temperature monitoring was achieved by using THERMOCONT TTH-512-4. The level and temperature transmitters were hooked on to a MultiCONT Universal Controller. The HART data collected by the MultiCONT PRC-12A-2 was relayed through its RS485 port to the Process Control System of the plant. What enhanced NIVELCO's chance to win this attractive business was the system integration capability of Perdana, NIVELCO's exclusive distributor in Malaysia. Perdana has supplied all the software needed for communication while NIVELCO took care of measuring level by MicroTREK, temperature by the Thermocont and collecting and communicating data by MultiCONT.

*Ágnes Gyenes  
Export Sales Engineer  
NIVELCO Co.*

Nivotherm B.V. – based in Hendrik Ido Ambacht located near to Rotterdam – represents NIVELCO and its product portfolio in The Netherlands for more than 10 years. Our company is dealing with industrial process automation products, especially level sensors, transmitters and level switches which are popular instruments in many industry segments used in various processes. Our primary targets are the water / wastewater, marine or the food & beverage industry, but we are continuously searching for new opportunities and new markets for the represented manufacturers.

This application success story is about an instrumentation project where we had to supply continuous measurement solution for our food-processing partner. The task was level measurement in edible oil storage tanks, so it was no question that we should offer NIVELCO's ultrasonic level transmitters.

Our customer Maro Elektro Service is the process automation supplier for Van Schelven B.V., a trader and processor company of grains, seeds and pulses. Bio Perserij Flakkee (subsidiary of Van Schelven Company Group) is located in the western part of the Netherlands in Nieuwe-Tonge village, near to the Northern-sea coast and they are specialized for manufacturing cold pressed edible oil.



In 2013 an expanding project was started and 4 new oil storage tanks were installed only 100 meter (330 feet) away from the older 4 oil tanks, so they have now 8 tanks in total. Besides the level measurement in the 10 meter (33 feet) high stainless steel tanks Van Schelven required an inventory control system completed with a local display at the bottom of the tanks.

We offered 2-wire EchoTREK SEP-362-4 ultrasonic level transmitters with MultiCONT PRC-240-1 multichannel process controller / display units. The customer ordered the recommended instruments for all 4-tank systems, so totally 8 EchoTREK transmitters and 2 MultiCONT controllers were delivered. The 4 older tanks will be equipped in the near future.

Thanks to this successful process instrumentation project new doors were opened in front of us. Recently 6 new silos were built to expand the storage capacity for a new oil pressing facility at the same location. Our customer is counting on Nivotherm's expertise in the realization of the instrumentation and we are planning to install 6 MicroTREK guided wave radar level transmitters into the new silos for inventory control of the seeds.

Oscar Bijl  
CEO  
Nivotherm B.V.



BRESIMAR Automação was founded in 1982 exactly in the same year as NIVELCO, so both companies have more than three decades of experience in the field of industrial automation. We are representing NIVELCO products in Portugal for almost 20 years. Our headquarters is located in Aveiro, only 80 km south of Porto, close to the Atlantic Ocean seacoast.

In the southern corner of Portugal in Faro city the pumping station of greenhouses use NIVELCO manufactured liquid-analytical instruments in the irrigation system thanks to BRESIMAR. The liquid what is used for irrigation – for the plants produced in the greenhouses – is a mixture of water and fertilizers which requires continuous measurement of level, pH value and electrical conductivity.



In case of greenhouse plant production the irrigation system is very important to provide the suitable components with well-chosen intensity of irrigation and fertilizing. The tanks of the fertilizer dosage system contain soluble fertilizers dissolved in water which is pumped into the mixing tank, where it is diluted with water, and then sprayed to the crops.

The optimal concentration of the water diluted fertilizer is continuously checked redundantly by two AnaCONT LCK mini compact electrical conductivity transmitters and two AnaCONT LGP compact pH transmitters equipped with SAP-300 graphic displays. The water amount to be mixed with the fertilizers is measured with NIPRESS DRC-400 series mini compact hydrostatic level transmitters mounted on the input pipe-network.

The transmitted 4-20 mA measurement values of the NIVELCO instruments are handled by a process controller computer which is responsible for the entire process control of the irrigation system.

The applied units are the following:

- AnaCONT LCK-232-2 mini compact EC transmitter – 2 units
- AnaCONT LGP-121-2 compact pH transmitter + LAP-120 probe protection tube – 2 units
- NIPRESS DRC-432-2 hydrostatic level transmitter – 2 units

*Pedro Marques*  
Technical Director  
BRESIMAR Automação S.A.

SOLAREX S.R.L is a leading animal feed producer in Romania, their annually produced amount of different type poultry feed reaches significant share on the market. The main players of this industry segment require economic and safe processes for the feed's raw material manufacturing. Moreover the produced materials should be suitable for animal consumption approved by International and European feed safety certifications.

The most important instrumentation task for our customer was to provide stock management and monitoring solution of the stored raw materials – such as grains, cereals and additives – needed for the feed receipts. The process control system and the operating personnel should always have proper information about the amount of the stored materials in order to be able to keep the needed amount of raw materials prepared and available for meeting the regulations of the strict receipts.



The accuracy requirement and the extremely dusty environment were the two main aspects for the instrument selection.

We usually recommend ultrasonic level transmitters for such dusty media for example flour or grinded cereals.

We had to provide continuous measurement solution for overall 29 closed tanks filled with various grain flours, soybean flour, sunflower flour, and other additives. The measurement data is processed by central control system, so local displaying was not needed.

The ideal choice was the EasyTREK integrated ultrasonic level transmitter.



14 concrete silos with 13.5 metre (45 feet) height are equipped with low (30 kHz) frequency EasyTREK SCD-33J-8 Ex type Dust-Ex approved ultrasonic level transmitters. The instruments provide 4-20 mA output proportional with the measured level. The 4-20 mA output signals are processed by a SIEMENS process control system, which controls all technological processes.

#### Installed instruments:

- EasyTREK SCD-33J-8 Ex ultrasonic transmitter (14 units)
- EasyTREK SCD-34J-8 Ex ultrasonic transmitter (15 units)

In the other 15 silos with 10 metre (33 feet) height highly adhering powdery materials are stored. To provide reliable and accurate measurement solution for this application again the ultrasonic level transmitters had been chosen.

The applied EasyTREK SCD-34J-8 Ex type Dust-Ex approved ultrasonic level transmitters also send the measurement data to the process control system.

In accordance to the demand of our customer not only the supplying, but the complete commissioning of the whole measurement system was done by the team of NIVELCO Tehnica.

The measurement system was realised in the framework of a successful NIVELCO-Siemens cooperation, proving that our instruments are able to face all challenges of this food industry segment.

*András Olteán-Péter*  
Managing Director

NIVELCO Tehnica Măsurării SRL



## SHORT REFERENCES

### ANIMAL FEED PLANT

JAPAN

The processed animal feed is stored in tall 9 m (30 ft) and 15 m (50 ft) high outside silos. The level is measured with  $\varnothing$  8 mm (0.3 inch) mono cable probe 'A' series MicroTREK guided wave radars. The measured values are processed with MultiCONT multichannel process controllers.



#### Installed instruments:

- 32 x MicroTREK ABL-H09-2
- 3 x MicroTREK ABL-H15-2
- 3 x MultiCONT PEW-1MA-1

### CORN MILL

POLAND

The processed corn flour is stored in 15 m (50 ft) high silos. The 2-part ultrasonic system consist of SenSonar SID sensors, these are connected to NIVOSONAR SLM multiplexer modules and the data processing / display is done with NIVOSONAR SMM units.



#### Installed instruments:

- SenSonar SID-330
- NIVOSONAR SLM-308
- NIVOSONAR SMM-330

### GRAIN STORAGE PLANT

ROMANIA

In Piskolt, Romania 17 THERMOPOINT temperature transmitters with 5 or 7 sensors are used in the 300, 500 and 1000 tonne silos. The measured temperature values are processed and displayed with two MultiCONT multichannel process controller units.



#### Installed instruments:

- 5 x THERMOPOINT TMH-559-8 Ex
- 12 x THERMOPOINT TMH-57D-8 Ex
- 2 x MultiCONT PRW-2MA-1

### DISTILLERY AND FINERY

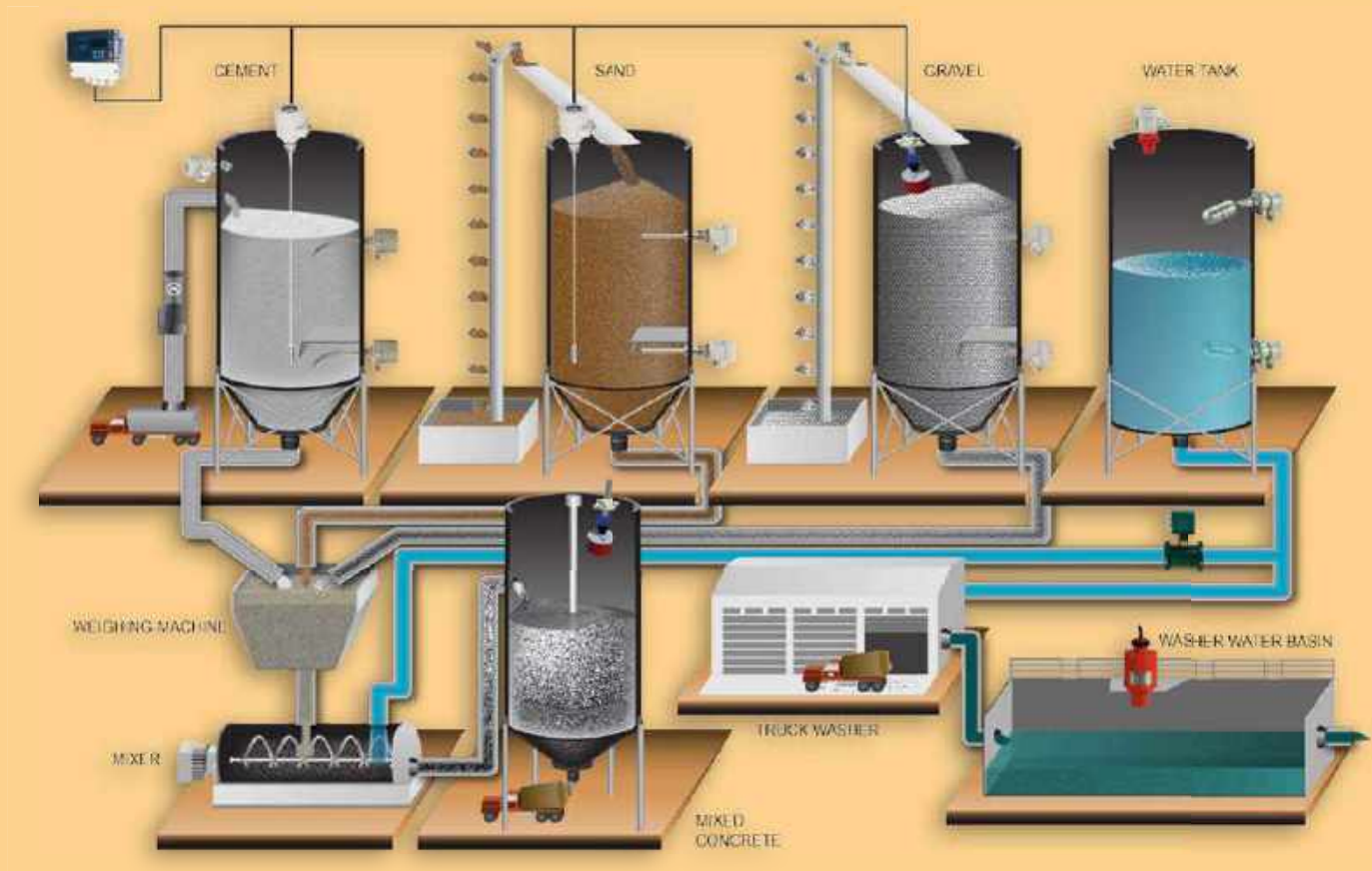
SERBIA

The high temperature version MicroTREK guided wave level transmitters with mono-rod probe measure demineralised water in a feed tank of a steam boiler. The instrument operates with reliability in the steamy environment application.



#### Installed instruments:

- MicroTREK HPR-418-4



The demand for high quality concrete is growing rapidly, due to the changing requirements of the construction industry. Extreme construction conditions and tougher regulations are the main driving forces behind this change. To satisfy the demand, production of high quality concrete requires state of the art instrumentation and computerized control.

The main production units of the plant are:

- Cement storage silos
- Sand, gravel storage silos
- Auxiliary storage tanks
- Water tanks
- Weighing system
- Mixer
- Mixed concrete storage tank
- Truck washer system

#### Instrumentation of the cement storage silos:

The cement arrives at the plant by truck and it is transferred into the silo by pneumatic filling. It is important to continuously monitor the level of the cement, the air pressure above the cement level and provide an indication of high and low fail safe levels.

MicroTREK HTN-400 guided microwave level transmitters are recommended for level measurement, NIVOROTA EKH-400 rotary paddle level switches for low/high fail safe switching and NIVOPRESS DTF-500 pressure transmitters are recommended for pressure measurement, with the UNICONT PMG-411 type display and controller.

#### Instrumentation of sand, gravel storage silos:

The level measurement of these silos can be

done with MicroTREK guided microwave radars or EasyTREK SCD-300 type ultrasonic level transmitters.

For low/high level switching vibrating rod or vibrating fork level switches are recommended. The low level switches always have to be mechanically protected from damage by a plate mounted above them.

#### Instrumentation of the water storage tanks and dirty water tanks:

For level measurement, ultrasonic level transmitters are recommended (EchoTREK or EasyTREK) while level switching can be done by NIVOMAG MKA-200 type magnetic coupling level switches. The flow measurement of the water used in concrete production is done by ISOMAG magnetic flowmeters which have dosing/control functions.

Refrasil s.r.o., based in the city of Třinec, is one of the leading manufacturers in the field of temperature-resistant materials in Czech Republic. Their main profile is the manufacturing of fire clay bricks, insulating materials, mortars, cements, concrete etc. In the middle of last year, the management of Refrasil decided to expand their tank farm with 21 brand new silos containing various construction raw materials, as free flowing solids.

There were numerous requirements on the instrumentation project, such as non-contact continuous measurement, high level indication, high reliability and minimum 2-year full warranty.



The project was entrusted to a subcontractor company to design and document the complete project, including all technological processes and automation. The demands from the instrumentation section were sent out to NIVELCO along with many of our German competitors.

After the technical evaluation of the offers supplied, only 2 companies, NIVELCO Bohemia and Endress+Hauser qualified into the final stage. Both companies, as level experts, presented a similar measurement solution at the same technical level, so it was a difficult choice for Refrasil.

On the positive side for NIVELCO Bohemia, that we had perfectly operating reference installations at Refrasil. Despite this advantageous situation, both companies had to prove, during a test phase, their statements about reliable level measurement in an extremely dusty environment.



### Installed instruments for test:

- NIVOCONT RKK-502-1 vibrating fork level switches (4 units)
- EchoTREK STD-34J-4 ultrasonic transmitters (4 units)

The joystick aiming feature of the ultrasonics for solids provides an easy approach to finding the optimal sensor positioning. This is a very important aspect of solid material measurements because the coning or arching caused by the medium filling / emptying process.

NIVELCO has a remarkable amount of experience in this field, so the success of the test phase was not in question.

Thanks to the successful test and our good relationship with the subcontractor and with Refrasil, we gained a significant advantage against our competitor. Moreover we offered the same technical solution at a competitive price.

Providing professional technical support along with the 3-year full warranty – effective since September 2010 – produced the expected result, as NIVELCO won the instrumentation project.

A local display of the measurement was not of interest, so 21 EasyTREK SCD-34J-4 integrated ultrasonic transmitters were installed. The high level limit indication is performed by 21 NIVOCONT RKK-502-1 vibrating rods. Measurement data for all silos is supplied to a PLC which controls the emptying / filling process in accordance with the levels measured by the transmitters.

NIVELCO again showed its power and benefited from decades of experience in ultrasonic level measurement of powdered solids.

Since the project has been commissioned, the instruments have operated flawlessly, and our customer is satisfied, that his choice of NIVELCO equipments has been justified.

*Vojtěch Samec  
Managing Director  
NIVELCO Bohemia s.r.o.*

Producing of concrete requires storing, gauging and material management of raw materials, for example cement, sand, gravel or chemical admixtures.

So the process of the manufacturing has a great need in knowing the accurate amounts of materials in the storage silos. This need for accurate measurement and the unfavourable circumstances require deliberate selection of the instruments.

We recommended guided microwave level transmitters for measuring dusty materials, and non-contact ultrasonic level transmitters for the strongly sticking materials.

There are 14 open tanks containing various grain-sized materials between 0.4 and 16 mm (0.015 and 0.6 inch), like cement, sand, and other chemical admixtures, which have to be measured with high accuracy despite the dusty industrial environment. Because of the strong dusting we offered MicroTREK HTN-413-4 guided microwave radar transmitters in the seven 13 m (42.5 ft) tall cement storage silos, the transmitters transfer analogue 4-20 mA current signals proportional to the level in the silos, which were sent directly to the process control system.



Another seven 10 m (33 ft) tall sand storage silos were instrumented with non-contact ultrasonic transmitters because of the reliable and accurate measuring of strongly sticking sand.

The analogue signals of the EasyTREK SCD-34J-4 ultrasonic level transmitters were also processed directly by the process control computer.

#### Installed instruments:

- MicroTREK HTN-413-4 microwave transmitter (7 units)
- EasyTREK SCD-34J-4 ultrasonic transmitter (7 units)



Fulfilling the demands of our customer NIVELCO has not only delivered the instruments but also commissioned the whole system.

*Vojtěch Samec  
Managing Director  
NIVELCO Bohemia s.r.o.*

Villas Hungaria Kft is a manufacturer of bituminous felts. Different technologies are used for coating the carrying sheet bands using different bitumen tubs. The constant level in these tubs is an essential technologic parameter. Level measuring is done by high temperature type MicroTREK H-200 series guided microwave radars in a special location.

Because of the intense mixing the 8 mm (0.3 inch) diameter cable version was installed with bottom fixing of the cable along with a special tool to fasten the cable probe. The measurement is aggravated by the high temperature and coke formation but despite these problems the instruments work perfectly.



The 4-20 mA signals coming from the transmitters are processed by PID controllers thus controlling the amount of bitumen carried by the pumps. Level measuring in the bitumen mixer tanks is also done by MicroTREK H-200 series transmitters.



The manufacturing of bituminous felt requires various solid materials. During the manufacturing process these materials must be constantly accessible along the production line. The materials are stored in 7 m (23 ft) high, standing cylindrical tanks, with conical bottoms. The monitoring of tank level and refilling of tanks is the responsibility of the service personnel. Specialists from NIVELCO suggested installation of an ultrasonic measurement system instead of the age-old visual and manual level checking procedures applied at the facility. The task to be solved is the level measurement of materials with different grain size and spreading properties.



EchoTREK STD-33J-3 ultrasonic level transmitters, installed in the tanks, provided for very reliable measurements in case of limestone dust, talc and grinded slate.

In the sand silos however, the angle of repose can cause uncertainty problems. The adequate solution to achieve reliable measurement was the installation of MicroTREK HTN-207-4 guided microwave level transmitters.

The signals from the transmitters are sent to a MultiCONT PEW-18A-1 unit via HART Communication. The instrument shows the level of the materials in the various tanks, service parameters can be queried, or programming of the transmitters changed. The MultiCONT uses RS485 port to communicate with the process control computer, making stock and material management ever more easier.

*Ákos Noll*  
Domestic Sales Engineer  
NIVELCO Co.

One of our prospective customers asked for a quotation for replacing an out-of-date level metering system (produced by one of our competitors) for controlling the level of sand, cement and different types of gravel in segmented silos. In addition to this, the system has to ensure safety with a fail-safe high level indication, even in the case of a failure of the level measurement.



Experts from NIVELCO-Poland proposed the well known ultrasonic level meters for solids, the EasyTREK SCD-340-4 type with HART communication.



Additional elements of the system included a MultiCONT process controller unit expanded with UNICONT PJK universal interface modules for control of filling and emptying the chambers of the silo as well as to generate a high level alarm.

Measurement of sand, cement and different sized gravel is performed in 10 m (33 ft) tall silos in extremely dusty environments.



Stones are loaded directly into the silos, producing quite high acoustic noise and strong vibrations.

The operational processes became more fluent and the control process for filling and emptying became fail-safe with the overfill protection added by the additional EasyTREK SCD. In a very important benefit for the working environment, the system helps to improve working conditions, the safety at work, and the health of employees, previously exposed to extreme dusty and unhealthy conditions.

All instruments work in HART Multidrop loops, which allows remarkable cost-savings on the installation. During the mounting of the instruments the proper location had to be considered carefully, especially for the high level alarm sensor, because the mounting console is above the filling apparatus. All of the control and alarm signals were integrated with the existing control system on the plant.

All delivered instruments work reliably and provide credible sources of information about level in the silos.

Mechanical and electrical installation was done by the NIVELCO-Poland team, in addition to commissioning, configuration and optimization of the instrument settings. The whole system operates flawlessly, since it has been brought into use for the great satisfaction of the customer.

*Dariusz Piszcz*  
CEO

*NIVELCO Poland Sp. z o.o.*



Saint Gobain Weber Group is one of the world's leading producers of plasters, bonding and other coating materials, with a vocation of developing new solutions for the construction industry in 35 countries. The Group has two plants in Romania: one in Torda (Transylvania) and the other nearby Bucharest. In these two factories, permanent developments were carried out in the recent years among others in the establishment of measurement systems for basic materials' registry and inventory management.



The Romanian subsidiary of NIVELCO Co. was also requested to solve the latter problem. Considering the instruments most appropriate for the application, the technical solution and price, the Weber Group found the NIVELCO's offer to be the most favourable. The task was to measure the level of six silos of 57 m<sup>3</sup> (2020 ft<sup>3</sup>) for storage of raw material and to display the measured values in the control room. Transmission, display and data logging are carried out by NIVISION software program running on a PC.

Taking into consideration the characteristics of cement, sand and dross granulate used in the technology, we have chosen the MicroTREK HTN-408-4 microwave level transmitter.

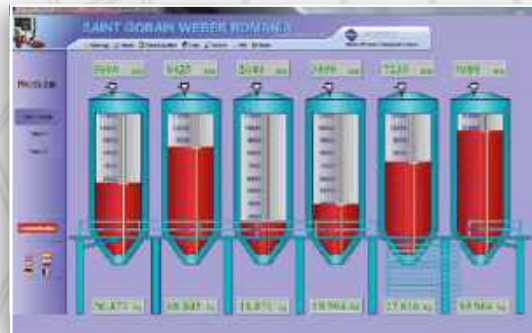


Taking into account transmitting distances and the high level of electrical noise and the local problems of electricity supply, we used the 4-20 mA analog outputs of the transmitter.

We connected the output signal of the transmitter in pair to three UNICONT PMM-324-1 universal control panels, programmed and scaled the display scale within the range of the given level.

We connected the RS485 output of UNICONT controllers via ADAM 4520 serial industrial communicator to the computer.

Upon Weber's request in the NIVISION project, we visualized the level changes of the silos, the level value and mass of the materials stored in the silos.



The specialty of mass measurement in this case is that the lower part of the silos is cone-shaped and it contains the 1/4 part of the stored mass; therefore, this mass should be registered together with the level changes. We have solved this problem with the help of a mathematical function that performs the needed calculation from the measured level value.



Also part of our task was the setup of data logging. The current measured level and calculated mass values of raw materials have to be stored every 15 minutes.

This system works only in the Bucharest Plant; in the Torda Plant, only level transmitters and NIVOROTA level switches are installed.

The establishment of a SCADA-controlled system will be part of further developments.

*Antal Máthé*  
Technical Consultant  
NIVELCO Tehnica Măsurării SRL

Recently NIVELCO has achieved a great success by developing its own K-band pulse burst radar level transmitter, the PilotREK W-100 series and became one of few companies in the world disposing this advanced non-contact level measurement technology. The 25 GHz non-contact PilotREK W-100 transmitters were introduced in the end of 2012 and until now (the first quarter of 2014) hundreds of units have been commissioned since the product launch and proved that we can count with them in level measurement tasks of liquids, masses, emulsions and other chemicals.

In the following we offer to read about a pilot project, where the PilotREK transmitters were tested in a challenging application in our partner thanks to NIVELCO Tehnica Masurarii, the Romanian subsidiary of NIVELCO.



The instrument was connected to a data logging capable MultiCONT PRD-210 process controller unit to monitor the measurement data.



The spring season in 2013 was started for us with an enquiry coming from the company SARGEANT MARINE ROMANIA S.R.L. about continuous level transmitters. The subject of the measurement task was 160 °C (320 °F) bitumen in different diameter silos in order to proper stock management. Since this tank farm instrumentation project was a long-term plan in customer's strategy, we offered the PilotREK W-100 series for testing. After the brief discussion about the mounting possibilities and conditions, a smaller 7.9 m (25.9 feet) high tank had been prepared for the test. According to the provided technical drawings the customer took care about the suitable mounting nozzle where the PilotREK WHS-150-4 high temperature type unit was installed.

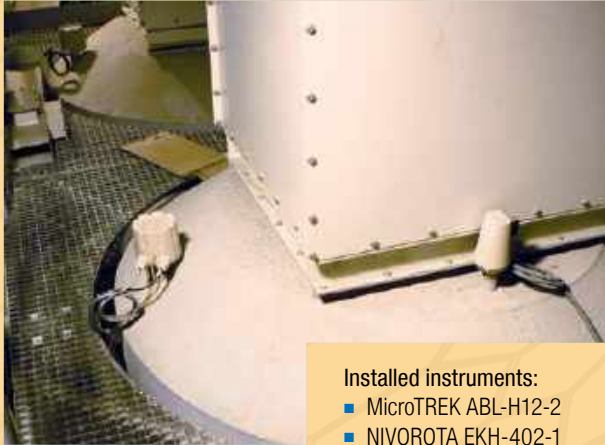
The test was performed between June and the middle of September, 2013 and in this time period we collected 11,220 measurement data by logging in every 10 minutes. The measured values have been perfectly matched with the controlling measured values made by the customer in the meantime with the traditional manual method. The customer was very satisfied with the test results and purchased the equipment used for the test. The similar tanks are now under consideration to be equipped with following PilotREK transmitters.

*Antal Máthé  
Technical Consultant  
NIVELCO Tehnica Măsurării SRL*

### CERAMICS MANUFACTURING PLANT

CZECH REPUBLIC

In the ceramics manufacturing plant the very fine, dusty sand is stored in 12 m (40 ft) high silos. These are equipped with MicroTREK guided wave radars and overfill protection is done by NIVOROTA rotary paddle level switches.



- Installed instruments:
- MicroTREK ABL-H12-2
  - NIVOROTA EKH-402-1

### PLASTER PRODUCTION PLANT

HUNGARY

Continuous level metering of outdoor dolomite silos and solvent tanks in Pilisvörösvár with MicroTREK TDR guided radars and ultrasonic transmitters. Signal processing is done by MultiCONT and UNICONT controllers.

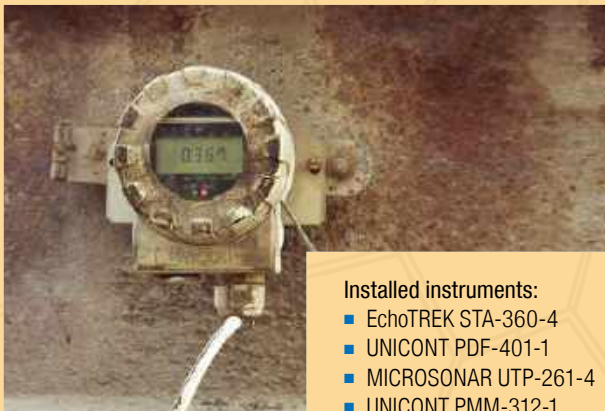


- Installed instruments:
- 10 x MicroTREK HTN-204-4
  - 1 x MultiCONT PRW-1MA
  - 5 x EchoTREK SEP-380-4
  - 5 x UNICONT PMM-314-1

### CEMENT PRODUCTION PLANT

HUNGARY

Level measuring of slurry mixer silo of the cement plant of Lábatlan with EchoTREK and displayed by UNICONT PDF loop indicator. The unit is installed to a rotating bridge and operates in extreme conditions. Sensing of the rotation of the furnace of the cement burner with MICROSONAR ultrasonic proximity sensors.



- Installed instruments:
- EchoTREK STA-360-4
  - UNICONT PDF-401-1
  - MICROSONAR UTP-261-4
  - UNICONT PMM-312-1

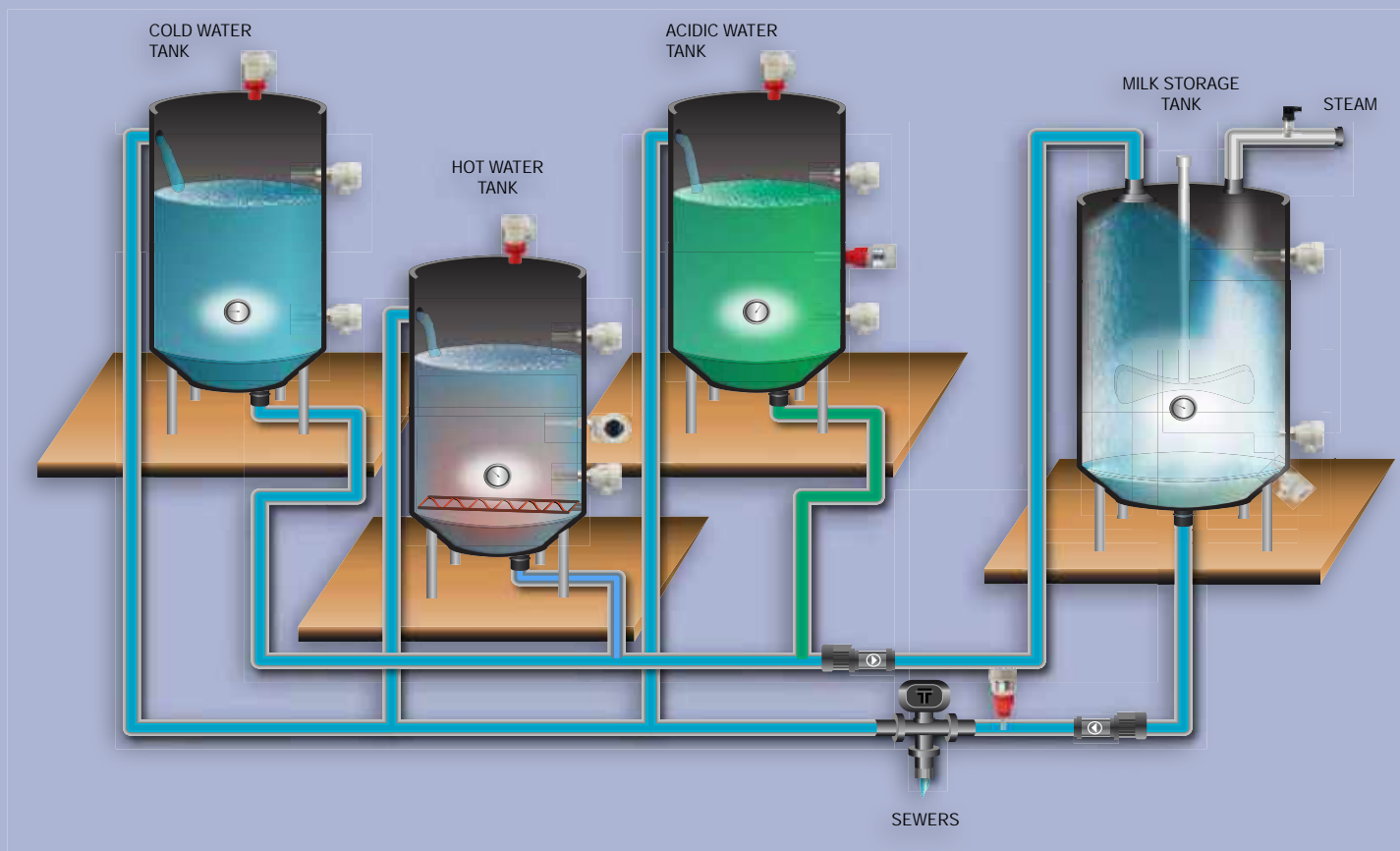
### BITUMEN FACTORY

SERBIA

The high temperature version MicroTREK guided wave level transmitters with mono rod probe measure bitumen in a feeding tank. The instrument operates with high reliability in the high temperature (180 °C / 356 °F) environment and sticky medium application.



- Installed instruments:
- MicroTREK HPS-410-4



Strict regulations of the food industry require that food production plants regularly clean the tanks, pipes and pumps of a technological process. The standardized cleaning procedure insures that all residual material is removed after finishing a production process.

**Main stages of the cleaning process are:**

- Washing with cold water
- Washing with hot water +82°C (180 °F)
- Washing with a slightly acidic solution (concentration: 2...5 %)
- Disinfection with +130°C (266 °F) steam

These technological steps should be repeated if necessary. This so called CIP program is controlled by a PLC. The needed cleaning solutions are prepared in a CIP washing centre.

The washing solution that is used several times gets contaminated and it is drained to the sewer.

**Cold water tank:**

For analogue level measurement EchoTREK SGA-300 type 2-wire ultrasonic level transmitters are recommended; for low / high level switching NIVOSWITCH vibrating fork level switches are the best choice. Dosing of the supplementary water is controlled by a PLC and an ultrasonic level transmitter.

**Hot water tank:**

Similar instruments are used for level measurement and low / high level switching as for the cold water tanks. The temperature measurement and control system consists of a THERMOCONT TTJ-500 temperature transmitter and a UNICONT PMM-300 universal controller.

**Acidic water tank:**

**Recommended instruments:**

- EchoTREK SGA-300 type ultrasonic level transmitters for level measurement
- Coated NIVOSWITCH vibrating forks
- Adjusting the pH value of the water can be done by using the following instruments, AnaCONT pH meter, UNICONT PMM-300 controller, JEL-111 dosing timer and a dosing valve.

**Steam cleaning phase:**

Measuring and controlling the pressure of the steam is done by a NIPRESS DRC-300 pressure transmitter and a UNICONT PMM-300 controller.

**Detection of the dirty cleaning water:**

Water contamination is measured by an AnaCONT conductivity transmitter and the 4-20 mA output signal is led to a PLC which controls a 3-way valve.

### PAINT FACTORY

BELGIUM

Two compact NIVOSWITCH vibrating rods perform overflow and high-fail safe level protection in each chemical storage tanks at Akso Nobel's factory in Belgium. One unit has 300 mm (12") and the other has 125 mm (5") insertion length, the threaded vibrating forks are mounted in DN80 flanges.

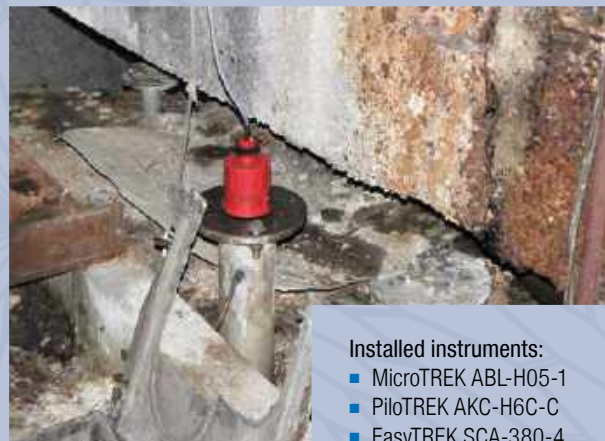


- Installed instruments:
- NIVOSWITCH RFM-401-0
  - NIVOSWITCH RFM-403-0

### CITRIC ACID PLANT

CZECH REPUBLIC

The citric acid plant in Kaznějov has numerous types of liquid storage tanks in heavy-duty environment. MicroTREK guided wave radar is used in a spherical tank, PilotREK non-contact radar is used in an open-top vessel, and EasyTREK ultrasonic unit measures in a tube.



- Installed instruments:
- MicroTREK ABL-H05-1
  - PilotREK AKC-H6C-C
  - EasyTREK SCA-380-4

### PESTICIDE PRODUCTION PLANT

HUNGARY

In the chemical plant in Sellye the pesticide storage batch-tanks are measured by NIVOTRACK magnetostrictive level transmitters with 95 mm (3.75") diameter float and two tanks are equipped with NIVOSWITCH vibrating fork level switches for overflow protection.



- Installed instruments:
- 2 x NIVOTRACK MTC-527-4
  - 1 x NIVOTRACK MTC-529-4
  - 2 x NIVOSWITCH RCM-400-3

### INSULATION BOARDS FACTORY

HUNGARY

The raw material tanks are measured with coaxial probe MicroTREK guided radars. The measured data is displayed by UNICONT PMM units which are responsible for the batch controlling. An additional high fail-safe protection done by a NIVOSWITCH mini compact vibrating fork level switch. All the units are intrinsically safe types.



- Installed instruments:
- 2 x MicroTREK HTA-426-8 Ex
  - 1 x NIVOSWITCH RCM-405-8 Ex
  - 2 x UNICONT PMM-311-1

GlaxoSmithKline is one of the world's leading research-based pharmaceutical and health-care products supplier companies. GSK was intended on replacing the capacitive level transmitters on the vaccine fermentors so they were searching for new instruments on the market.

The fermentors play central role in the vaccine production process and considering the fact that the production system consists of one-week long cycles the primary demand was the highest possible reliability. Any measurement error or failure might result unsuccessful one-week production cycle generating significant losses.

The strict requirements were the following against the level transmitters:

- Continuous level measurement of different pH and density liquids for example high purity water, washing liquid, fermentation liquid
- At least  $\pm 1\%$  accuracy
- 4–20 mA analogue output
- Linearization table for volume calculation
- The fermentors are regularly sterilized with steam and decontaminated so the instruments have to bear 150 °C (302°F) medium temperature for the heating up to 30–45 minutes
- The fermentors have vibrating motors so the instruments have to measure reliably during strong vibration, along with the medium movement caused by the mixing

The main demand was not only the high accuracy and highly reliable measurement in the high temperature production process. The other essential requirement was the easy integration to the existing automation system and the high hygienic requirements involving special demands of the pharmaceutical environment:

- The physical and the geometric dimensions of the old rod probe type capacitive level transmitter should match with the new replacement instrument
- At the end of the rod probe there should be no closing element due to cleaning consideration



- The instrument should fit into the existing connect nozzle process connection of the fermentor
- All wetted parts should be made from Ra < 0.4 surface roughness 316Ti stainless steel and full PFA coating
- All wetted part should have Material Document and Product Assessment Report of all applied parts in accordance to the EN 10204 standard

NIVELCO's MicroTREK HHO-412-4 type guided microwave level transmitters meet all these requirements, so GSK decided to replace the capacitive level transmitters. The fully PFA coated rod probe instruments have 1 ½" Tri-Clamp process connection.

This special type was uniquely manufactured for the first time for this project. After the first operational experiences small mechanical and electrical modifications were done together with the engineers of GSK after multiple site visits and consultations with experts of NIVELCO in order to achieve the best possible accuracy.

At the moment there are 4 MicroTREKs operating on the fermentors and there are other 4 MicroTREKs as safety backup units. Thanks to this successful project and fruitful cooperation in the following season there are many other special instrumentation tasks waiting for us to be solved by a suitable, NIVELCO manufactured level transmitter.

*Tibor Asztalos  
Domestic Sales Engineer  
NIVELCO Co.*



In the chemical and pharmaceutical industries the accurate measurement of materials in the stock-storage silos is regulated by ISO standards, so the applicable measurement instruments have to satisfy increased requirements in this industrial area.

The primary demand is high accuracy, independently from the measurement range. The minimal accuracy needed is 5 mm (0.2 inch), but in several cases measurement values have to be provided within a measurement error of 1–2 mm (0.04–0.08 "). In parallel with high accuracy, the long-term operational stability required is even more stringent. The applicable regulations define several calibration procedures to be undertaken on an annual basis, without the possibility of transporting the instruments to the factory for any repair or adjustment. In most cases the special mediums to be measured require explosion-proof instruments. Moreover the instruments have to be suitable for the measurement of materials with a low dielectric constant ( $\epsilon_r$ ).

There are two product families of level transmitter solutions developed and produced by NIVELCO Process Control Co. which satisfy these requirements:



- NIVOTRACK M-500/600 magnetostrictive level transmitters: Typically we offer rigid rod probe versions of NIVOTRACK transmitters up to 3 m (10 ft) probe length, and flexible probe versions are recommended above 3 m (10 ft) because of easier packaging, transporting and handling. The wide range of the applicable floats provide reliable solutions for low density (below 0.85) mediums up to 0.4 g/cm<sup>3</sup> (400 oz/ft<sup>3</sup>) viscosity. Moreover this measurement method is independent from the relative dielectric constant ( $\epsilon_r$ ) of the measured medium. Stainless steel probes are not applicable for use in chemically aggressive mediums, in this case we offer a PFA plastic coated probe version with a plastic (PP or PVDF) float.
- MicroTREK H-400/500 microwave level transmitters: MicroTREK guided microwave level transmitters are very popular, especially for high temperature applications.
- Flange temperature of the stainless steel probe versions can reach 200 °C (392 °F), moreover the measurement is not affected by physical parameter changes of the medium, such as temperature or pressure. Since the reflection of the microwave signals is highly dependent on the relative dielectric constant ( $\epsilon_r$ ) of the measured medium, it is essential for microwave measurement to have  $\epsilon_r > 1.4$ .

In the case of hazardous substances it is necessary to use intrinsically safe devices.

In the applications where transparent HART communication is needed to provide remote parametering, NIVELCO offers its new development, the UNICONT PGK-301-B Ex isolated power supply modules.

*Sándor Ujjaludi*  
Domestic Sales Engineer  
NIVELCO Co.

A major player of the domestic chemical segment is Agrokémia Zrt. based in South-North Hungary. Main profile of the company is the production of pesticides which are essential for the modern agriculture industry. They also produce many types of chemicals, antifreeze and even starch.

In 2011 a major instrumentation project began in the Emulsion Concentrate and the Colloid plant. In this project NIVELCO acted as a prime contractor and designed the entire monitoring system. This included the instrumentation of the chemical equipments and the storage tanks as well the unified computer based controlling system. On-site service needed professional experience of NIVELCO sales engineers because many instruments are operating in hazardous area.

#### Emulsion Concentrate plant:

- In this plant they change the properties of the pesticide agent by adding emulsifiers and auxiliary materials which make it soluble in water. This process – called EC formatting – enables pesticide agent to be solved in water and the final result is what we known as sprayable pesticide. The organic solvents of the plant are stored in 10 outside laying tanks equipped with NIVOTRACK MTC-522-8 type magnetostrictive level transmitters with 1mm resolution. Output signals of the transmitters are displayed in a MultiCONT PRC-24A-5 Ex multichannel process controller which transfers the measurement data on RS485 line to the NIVISION process visualization software. The software performs stock management and fills the calibration report after the comparison with the stored receipt.



- Mixing of the emulsions is done in a 10 m<sup>3</sup> (353 ft<sup>3</sup>) vacuum tank. The filled material is measured by load cells under the tank. The temperature is measured by THERMOCONT TBC 521-8 Ex ATEX certified temperature transmitter mounted into the bottom of the tank. The solved medium from the mixing tank is forwarded to 2 pieces of 20 m<sup>3</sup> (706 ft<sup>3</sup>) so called batch tanks to be able to provide equal quality. Level measurement of the tanks is done by EchoTREK SGF-380-8 Ex compact ultrasonic level transmitters as well temperature is measured by THERMOCONT TBC-521-8 Ex temperature transmitters.



A sample from this tank is examined for quality control reasons and when the laboratory approves the quality of the semi-finished product then it is allowed to go packaged.

- In the next process the processed material is assigned with a batch number and dosing machines with multiple heads fills it into 1, 5, 10 or 20 litres containers made from PE or PA.

- Further demands about the process controlling system were the average filling weight and tolerance monitoring, the solvent usage monitoring, controlling of the EX formatting, batch volume measurement and accurate filling weight measurement. Number of the containers passing through the filling line was counted by NIREN IRV-111-1 infrared sensors.



#### Colloid plant:

In the Colloid plant a base-suspension is produced which means that agents – which are immiscible in water – are mixed in accordance to the receipt and ground it to powder. The dosing is also based on weight and NIREN IRV-111-1 infrared sensors count the passing containers.



All transmitters, infrared sensors and even the load cells are connected to the controlling server. This computer is running a NIVISION process visualization software which enables the unified data management of the measurement values, visual displaying of each process and batch tracking with receipt logging. The system stores and archives all relevant production data such as raw material consumption or the number of filled containers. All events can be searched back meeting the requirement of the quality control.

The finished instrumentation project provides a cost-effective manufacturing process and increases productivity.

*Ákos Noll  
Domestic Sales Engineer  
NIVELCO Co.*



The Incineration Plant of the North-Hungarian Chemical Works in Sajóháony provides a very good example of high-technology instrumentation. Thanks to intensive development and investment activities, the total tank-farm has reached 4000 m<sup>3</sup> total storage capacity with 17500 tons/year waste-to-energy capacity. This energy-content is sold in steam or hot-water form. The industrial and communal wastewater is treated by the wastewater works which has a 6200 m<sup>3</sup>/day hydraulic capacity and the Chemical Oxygen Demand (COD) capacity is 55000 kg/day.

The successful instrumentation project has involved:

- 6 m (20 ft) tall standing xylol (4 tanks)
- 3 m (10 ft) tall lying boric acid (3 tanks)
- xylol distillation (4 tanks), with a temperature rating of 130°C (266 °F), and pressure of 3 bar g (43.5 psi g)

The low relative dielectric constant ( $\epsilon_r$ ) and high temperature of the measured mediums made the measurement more difficult. The average temperature xylol and boric acid tanks have been equipped with magnetostrictive transmitters, and the high-temperature xylol distillation tanks use guided microwave transmitters.



The applied instruments are the following:

- NIVOTRACK MTK-560-8 Ex (4 units) magnetostrictive transmitter with flexible probe, measuring range: 6 m (20 ft). Accuracy: 2 mm (0.075"), Output: HART
- NIVOTRACK MTC-530-8 Ex (3 units) magnetostrictive transmitter with rigid probe, measuring range: 3 m (10 ft). Accuracy: 1 mm (0.04"), Output: HART
- MicroTREK HHR-428-8 Ex (4 units) guided microwave transmitter, measuring range: 2.6 m (8.5 ft). Accuracy: 3 mm (0.11"), Output: HART
- UNICONT PGK-301-B Ex (11 units) 4-20 mA / 4-20 mA analogue isolated power supply module with HART interface
- NIPOWER PPK-331 power supply (3 units)
- 1 x MH-02 type HART modem
- 1 x process controller PC with NIVISION software

The system component modules are placed in a common instrument rack. The three power supply modules supply the level transmitters via the intrinsically safe isolator modules.

The HART signals of the transmitters are transferred to a process controller PC. The PC processes the measurement data and visualizes the flowchart of the tank-park with the actual measurement results.

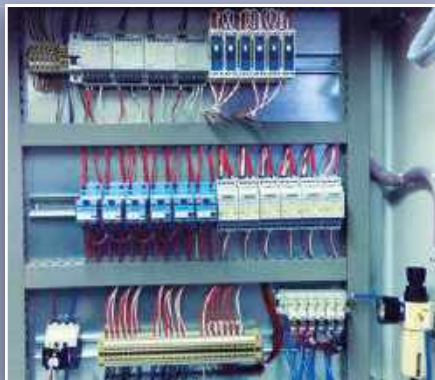
Furthermore the processed data was archived. NIVISION software determines the low- and high level limit values from the measured levels and provides reliable data for the filling and emptying processes.

Sándor Ujjaludi  
Domestic Sales Engineer  
NIVELCO Co.

Multiplex Engineering Ltd. is based in Drogheda, on the east coast of Ireland, 55 km (35 mi) north of Dublin. We specialize in the supply of instrumentation, process automation equipment and steam valves, plus we have been representing NIVELCO and its products since 2007 throughout the island of Ireland. We stock hundreds of "off the shelf" items in order to respond to customer needs as fast as possible and minimize their plant down time. Amongst our many services we provide replacements that can usually be delivered immediately from our extensive replacement stocks. We have an excellent reputation in Irish industry including the Power, Water / Wastewater, Dairy, Brewing, Chemical and Pharmaceutical sectors.

This application case study describes an instrumentation project for 6 newly installed chemical storage tanks that needed to be continuously measured with a high level alarm indication and completed with a complex controlling system.

Our customer, Soltec (Ireland) Ltd. is a hazardous waste recycling company that specialises in the recovery of environmentally hazardous waste materials. Their plant is located in Mullingar, 80 km (50 mi) west of Dublin. The solvent storage tanks are located outside the main building. They are horizontal cylindrical tanks and are regarded as ATEX, hazardous environment, therefore all the elements of the measurement system must be intrinsically safe versions. Amongst the wide product portfolio of NIVELCO we could choose all the devices needed for creating the complex measuring and the related controlling system that meets all requirements.



#### The installed devices are the following:

- MicroTREK HTA-430-8 Ex (6 units)
- UNICONT PGK-301-A Ex (6 units)
- UNICONT PMG-411-1 (6 units)
- NIVOSWITCH RCM-401-8 Ex (6 units)
- UNICONT PKK-312-8 Ex (6 units)
- NIPOWER PPK-331-1 (4 units)

The MicroTREK HTA-430-8 Ex guided wave radar level transmitters have 3 m (10 ft) coaxial rod probes and are manufactured with special FFKM sealing. These transmitters are connected to UNICONT PMG-411-1 universal controllers via UNICONT PGK-301-A Ex type intrinsically safe isolator / power supply modules.

The UNICONT PGK modules galvanically isolate the analogue 4-20 mA current signals and transmit to the UNICONT PMG units. These controllers display the measurement data in the central control room. They also monitor the measured level and control a solenoid valve through the relay outputs allowing the tanks to be filled and close the valve when set point is achieved. Besides the continuous measurement, mini compact NIVOSWITCH RCM-401-8 Ex vibrating fork level switches perform additional overflow protection. The level switches are powered through UNICONT PKK 312 8 Ex type current controlled switch modules which isolate the output signals of the vibrating forks. The switching signal of the top mounted units will energise a high level strobe and indicator which must be acknowledged by the personnel in the event of a high level event in the tank. The PGK-301 and the PKK-312 isolator modules are powered with 24V DC voltage by NIPOWER PPK-331-1 power supply modules. Space on bottom right of face of panel today is blank providing available space for two more panel instruments. Our customer intends expanding to 8 tanks in the future with the similar NIVELCO instrumentation and this space will allow for two more tank controls to be installed and commissioned by Multiplex Engineering Ltd.



*Declan Coughlan*  
CEO

*Multiplex Engineering Ltd.*

## FUEL STATION LEVEL MEASUREMENT SYSTEM WITH NIVISION

NIVELCO has been present in Australia for more than a decade and the sales of level measurement instruments have been continuously increasing during these years. Year 2009 is another corner stone because our distributor in co-operation with a local oil industry instrument company offers and installs complex NIVELCO level measurement systems with great results.

MicroTREK, the guided microwave level transmitter from NIVELCO is a highly popular solution world wide for the level measurement of various fuels. Level measurement with  $\pm 5\text{mm}$  accuracy, built in linearization table and long-term reliable operation are the key elements of the success. Display of ullage as well as the volume of the fuels is a requirement at Australian fuel stations. With the help of MultiCONT multi-channel controller connected to the MicroTREKs one can display simultaneously the measured level, the measured distance, the calculated volume and ullage.



Furthermore, 4-20 mA current output and relays can be assigned to every measured and calculated value. The RS485 output of the MultiCONT allows the querying of measured data by a PC which together with NIVELCO's NIVISION process visualization software results in the implementation of a complex but flexible and transparent level visualization and data storage system.



NIVISION software continuously displays the current level in the tanks in real time. Moreover the screen shows numerically the level, the volume, the distance and the ullage in units defined by the user and also the level of fuel in percentage. The program stores the measured and calculated values of every tank in a database in a time frame defined by the user. The stored data can be easily exported to an Excel file or displayed in a trend-window for analysis. Sound and visual signals can be linked to any alarm level and all alarm events are stored in a log file. Australia with its area of 7,741,220 km<sup>2</sup> is the sixth largest country of the world. Probably this is why the option of NIVISION's web access is especially attractive. The process visualization software is available in a version that allows the user to have access to a running NIVISION project with any web browser over the Internet if the host computer is connected to the web.



You can connect several NIVISION projects into a network and access summarized data of several sites from any corner of the world. During the second half of the year 10 complete systems were sold on the remote continent in different configurations.

Based on the experience and feedback so far it is sure that the NIVELCO's software solution for a level measurement and visualization system can be expecting growing interest.

### The components of the system:

- Ex-version MicroTREK guided microwave level transmitter to measure fuel level
- Ex-version MultiCONT multi-channel controller for processing the HART signals of the transmitters (with optional relay and current output for each channel)
- NIVISION process visualistaion software

Gábor Horváth  
Export Sales Engineer  
NIVELCO Co.

Central European Gas Terminal Co. chose NIVELCO to conduct the instrumentation of their site, in the first phase starting with two vessels.

The trade of LPG is strictly regulated by excise law in Hungary. Excise tax is to be paid by the vendor after the sold LPG quantity. Before this development project the company, which is one of the largest LPG dealers in Hungary, paid excise tax after the incoming LPG quantity, and not after the effectively sold quantity of LPG. The main motivation behind their instrumentation project at the Dunaalmás site was to install measurement instruments that will precisely measure the outgoing LPG quantity.

The Hungarian Customs and Finance Guard (HCFG) is the supervisory body for excise tax. They only accept mass or volume values derived from level measurements validated by the NMI (National Metrology Institute of Hungary). The NMI validates level measurements if the accuracy of the measurement is higher than 2 mm (0.075 inch).

The level transmitters have an NMI test certificate as well as a custom laboratory calibration certificate. The accuracy of the level measurement is 1 mm.

The officers of the HCFG can read the measured value from the display on the electronic module. From the linearization table of the tank and the measured level value the volume can be determined, and from the temperature dependant density the mass of LPG in the tank can be accurately calculated.



The missing quantity is the basis for excise tax calculation. For high alarm indication vibrating forks have been installed.

**Parameters:**

Tanks: 2 lying cylindrical tanks above the ground with a total capacity of 10 m<sup>3</sup> (353 ft<sup>3</sup>), Ø 2.5 m (8.2 ft)

The nominal pressure of the stored LPG is 16 bar g (232 psi g). The effective pressure is lower, typically 12-14 bar in summer and 6-7 bar in winter. When pressure test is conducted the pressure is 21 bar g (305 psi g) for 5 minutes. Temperature values of the stored LPG: Ambient: winter -20°C (-4°F), summer +35°C (95°F). Specific gravity of the stored LPG: min. 0,51 g/cm<sup>3</sup> (510 oz/ft<sup>3</sup>) The instruments are installed in hazardous environment.

**Installed instruments:**

- NIVOTRACK MBA-325-A Ex magnetostrictive level transmitter (2 units)
- THERMOCONT TBC-527-A Ex temperature transmitter (2 units)
- NIVOSWITCH RCM-406-8 Ex vibrating fork level switch (2 units)
- NIPRESS DRC-382-6 Ex pressure transmitter (2 units)
- NIPOWER PPK-331-1 power supply (2 units)



József Kaplonyi  
Domestic Sales Engineer  
NIVELCO Co.

Today's modern drilling technologies use special technologic liquid – for drilling of hydrocarbon wells – so-called drillingmud. This is usually a mixture of milled bentonite and water providing hydrostatic pressure to maintain the wellbore stability and help the drilling assembly to be brought in and out of the hole, or help the removing of excavated soil by making circulation. In the drilling fluid plant different quality, aged for average 24 hours drilling mud are produced with suitable thixotropic properties for different composition of soil structures. These materials were produced at the place of the drilling and after the usage they were transported to slurry deposits or let into an infiltration trench.

Rotary Drilling Co. decided to phase in new German model technologies, where producing and processing of drilling mud are not performed at the place of the drilling, but in a site for this special purpose to provide higher efficiency for this technology, including regeneration – re-adjusting the properties – of drilling fluid.

In addition to these advantages, the used drilling mud does not contain explosive components, when got back to the site, so Ex-technology or application of Ex approved instruments is not necessary.

On the site of the Industrial Park in Algyó has been established:

- 2000 m<sup>3</sup> containers
- 20 m<sup>3</sup>/h saltwater filtering
- 4 m<sup>3</sup>/h capacity chemical separation technology drilling fluid plant,
- 17 pieces of 120 m<sup>3</sup> temporary tanks,
- 20 m<sup>3</sup>, shared 20+10 m<sup>3</sup> mixing tanks.

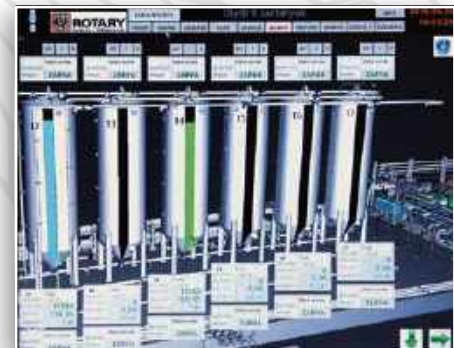


The outside tank-park contains different quality, density, or diverse doped mud. Level transmitters and switches control the pumps through the process automation system and provide information for the operators, who can interrupt the processes.



NIVELCO's EchoTREK SEP-325 ultrasonic level transmitters were installed for level metering of the tanks. These units are 2 wire, loop powered versions with HART communication, working from 24 V DC. Measurement of the tanks of 15 m (50 ft) height with a relatively small diameter is very difficult, so accurate installation of the ultrasonic sensor and specialized programming was necessary. 4–20 mA signals of the transmitters are processed by a PLC system. The data are recorded and used for making trends following the production and the procession of drilling mud. The system generates maximum and minimum signals from the output data to control the motored cut-off valve in the top of the tank and the pumps. NIVELCO's EchoTREK SEP-380-2 ultrasonic level transmitters were installed in the centrifugal and the mixer tanks.

Taking into consideration the heavier foaming occurred by the stronger mixing, one mixer tank was equipped with MicroTREK HTR-425 microwave level transmitter.



The double chambered NIVOFLOAT NWP-110 float level switches sense the minimum and the maximum level in the top and the bottom of all the 17 tanks. They are applied for fail-safe indication. As they indicate in the site of the tank park rainwater is collected to underground tanks. Rainwater tanks are instrumented with NIVOSWITCH RCM-400-3 vibration fork level switches. Emptying of the rainwater tanks are performed by hand-intervention based on the signals of the level switches. The whole tank park system is controlled by VISION process visualizing system.

Ákos Noll  
Domestic Sales Engineer  
NIVELCO Co.

## *BIODIESEL PLANT*

## *MÁTÉSZALKA*

Level measuring of outside, insulated, horizontal cylindrical biodiesel storage tanks with NIVOTRACK high precision magnetostrictive transmitter. The high fail-safe protection is done by NIVOSWITCH vibrating fork level switches.



- Installed instruments:
- 3 x NIVOTRACK MTA-334
  - 9 x NIVOSWITCH RFM-412

## *GAS STATION*

## *BUDAPEST*

The significant amount of fuel consumption of the vehicles of Budapest Water-works is supplied from their own petrol station. These small stations use NIVOTRACK level transmitters to monitor the fuel level and the measured data are processed by MultiCONT process controllers.



- Installed instruments:
- 1 x NIVOTRACK MTA-514-7
  - 1 x NIVOTRACK MTA-516-7
  - 1 x NIVOTRACK MTA-518-7
  - 1 x NIVOTRACK MTA-520-7
  - 1 x NIVOTRACK MTA-522-7
  - 2 x MultiCONT PEW-21A-5
  - 2 x MultiCONT PEW-24A-5

## *BIODIESEL PLANT*

## *HALMAJUGRA*

Continuous level measuring and control of raw vegetable oil used in biodiesel production with MicroTREK guided wave radar level transmitters. The 4-20 mA outputs of the 4 transmitters are processed by PLC control system.



- Installed instruments:
- 4 x MicroTREK HTK 201-4

## *GAS STATION*

## *BODASZŐLŐ*

The certified level measurement system of fuel tanks use NIVOTRACK magnetostrictive transmitters featuring flexible probes. High alarm switching is performed by NIVOPOINT level switches.



- Installed instruments:
- 14 x NIVOTRACK MTK-370-8 Ex
  - 14 x NIVOPOINT MRA-115-7 Ex
  - 14 x UNICONT PMM-311

## NIVELCO TRANSMITTERS IN GAS STATIONS

The stock management of Nigeria's largest oil retailer has been monitored on-line thanks to a Hungarian development, a complex remote object-monitoring system. This solution was born from the close cooperation of two company groups – Lambda-Com Kft. and NIVELCO Process Control Co. – which is able to provide continuous and accurate level monitoring. In addition to this the system facilitates the more efficient stock management and the organization of the fuel-delivery. The most important advantage of the remote monitoring system is that fuel losses, such as leakages or possible attempts of unauthorized takeouts can be detected immediately from any point of the world.

NIVELCO and Lambda-Com started the project with the cooperation of the exclusive Nigerian distributor of NIVELCO, Smartflow Technologies Ltd.

OANDO, the largest oil retailer of Nigeria tests the monitoring service at 10 fuel plants in the framework of the pilot project. Expanding the system to the whole network with over 400 stations throughout the African country is among the future plans of OANDO.

The operation of the complex service - developed by the two Hungarian companies - is based on the measured levels of the fuel storage tanks equipped by suitable NIVELCO level transmitters.



Thanks to Lambda-Com's remote object-monitoring solution the measurement data are continuously monitored on-line and can be stored at the headquarters of the customer. This way the oil company can receive more accurate information – than ever before – about the fuel amount in each station. Moreover the system provides information about when to fill the tanks to minimize the costs and time loss. Now the system is able to handle data coming from hundreds of petrol stations and fuel plants thanks to the applied innovative technology. The larger is the network of the stations connected into the on-line system, the more is the remarkable cost-savings for the client oil company achieved by the reasonable operation. Level measurement data of the NIVOTRACK magnetostrictive transmitters are transmitted to a central management server with the help of special software. The system prevents possible stealing attempts which are unfortunately still frequent in Nigeria as well leakages resulting serious losses can be detected immediately. The custom development device, called NivEye uses GSM/GPRS technology to provide up-to-date real-time information 24 hours a day about the measured levels of NIVOTRACK transmitters. Data are traceable from all over the world through a simple browser, without the need of any installed special software.

To achieve the final result, the following requirements should be met:

- Accurate and reliable level measurement.  
The NIVOTRACK magnetostrictive transmitters are suitable for custody transfer measurements. The linearity of the 0.1 mm high-resolution devices is only 0.25 mm in the total range. Temperature changes or any gas layer above the liquid does not affect the proper level measurement. Ex ia intrinsically safe versions can be used in ATEX explosion proof zones.
- Reliable and continuous data transmission  
The level transmitters are HART communication capable and they transmit digital data to the MultiCONT multichannel process controller and display unit. The digital communication provides that data accuracy of the high-resolution measurement is not limited by analogue current output.



The communication between MultiCONT and the GSM/GPRS module is performed on RS485 serial line. The GSM/GPRS modem is embedded into a complex electronics, so data loss cannot happen even in case of any connection loss between the gas station and the server, or any possible failure of the APN network, because measured data are stored on the internal memory of the GSM/GPRS module until the reconnection. When the connection is on-line, data will be sent immediately to the remote server.



- Transparent user interface, continuous availability  
Lambda-Com has decades of experience on the management and maintenance of large databases. The 98% availability and safety backup are provided with redundant server network as well with efficient archiving protocols.

*Dolapo Adeyeye  
Managing Director  
Smartflow Technologies Ltd.*

The company named BRILLIANT establishes and operates gasoline stations in Romania, in the eastern part of the Moldva region. They are intended in the establishment of 22 new (small, container type) gasoline stations in the near future and they have been searching for a suitable level transmitter on the market.

The essential requirement for the operation of a gasoline station is a certified high-precision measurement system which should be approved for custody transfer measurements meeting the regulations of the Romanian Bureau of Legal Metrology and Customs Administration. Many companies were competing in the tender with their own products where finally NIVELCO Tehnica Masurarii won with the offered high-precision, highly reliable and cost-effective NIVOTRACK M-500 series magnetostrictive level transmitters. NIVELCO T.M. was entrusted with the commissioning along with the delivery of the transmitters. In 2012 we solved the instrumentation of gasoline and diesel oil tanks in two stations.

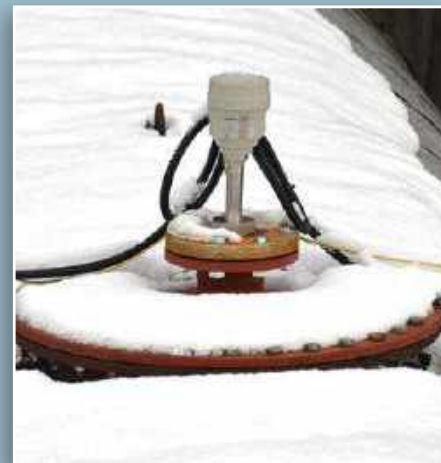
In accordance to the regulations of the Romanian Bureau of Legal Metrology and Customs Administration the measured tanks should have calibration certifications. This requirement can be met if the level measurement instruments are able to perform volume calculation.

The high-precision NIVOTRACK magnetostrictive transmitters are suitable for the custody transfer measurements and have linearization table in order to perform volume calculation.



During the installation we programmed the VMT table of the transmitters with the level – volume point pairs of the calibration certifications. In the year 2013, BRILLIANT has ordered the instrumentation for two further gasoline stations.

Unfortunately the Romanian Bureau of Legal Metrology and Customs Administration created more strict regulations in 2013 and according to this all instruments shall be approved by the Romanian Authority which are involved in any kind of custody transfer measurement. Since the NIVOTRACK magnetostrictive level transmitters have the internationally accepted OIML R85 (International Organization for Legal Metrology) certification which attests that an equipment is complying with



the relevant international recommendations so we had a very easy task to receive the local certification in the related bodies of the Romanian Authorities.

We are very looking forward for the further gasoline and diesel oil tanks to be established in the near future where we will facing with instrumentation tasks to be solved successfully, resulting maximal satisfaction to our customer.

*Antal Máthé*  
 Technical Consultant  
 NIVELCO Tehnica Măsurării SRL





## INSTRUMENTATION FOR WATER TREATMENT IN OIL REFINERY

Natural waters in most cases are not suitable for communal or industrial applications.

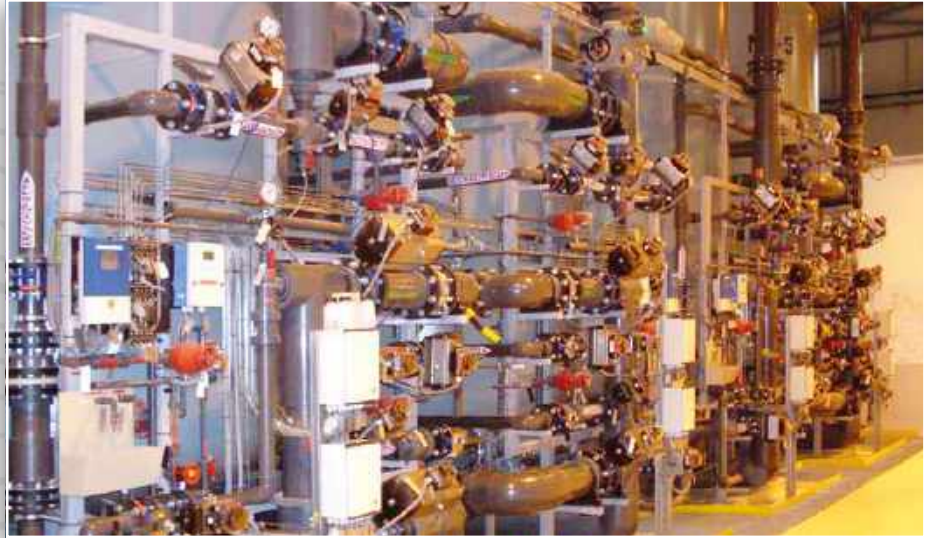
The parameters of these waters are influenced by the organic and non-organic components as well as the mineral content.

NIVELCO Co. has a long lasting relationship with Hidrofilt Ltd. This company is known as a specialist in water treatment technologies, they have great experience in system design, production and installation. The custom designed systems are constructed according to the properties of the local water resources as well as the customers' specific needs. Devices in their technology are mechanical filters, ion exchange columns, reverse osmosis filters (RO), electro deionisation devices (EDI) and accessories and supplementary instruments.

These devices perform reliably only under controlled pressure, temperature and flow conditions. For this reason automated supervision of the systems is a must.

The monitoring of these parameters is done by NIVELCO's instruments. In the bigger systems intelligent transmitters are applied to measure physical and electro-chemical parameters.

The digital HART signal superposed on the 4-20 mA current loop allows the users to program the devices or to set any service parameters remotely with the use of the appropriate software.



For temperature and pressure measurement THERMOCONT T-500 and NIVOPRESS D-400 type transmitters are installed respectively. Supplementing these technologies are other storage tanks usually containing raw or purified water. The transmitters of EchoTREK ST-300 family are applied for the level measurement in these tanks. To ensure reliable operation of the water treatment technologies from time to time chemical treatment of the system is necessary.

Hidrofilt designs fully automated systems, so it is important to continuously monitor the level in the tanks containing various chemicals. The measurement principle most suitable for a given application depends on the kind of chemical stored and its properties. For mediums likely to produce foam usually NivoTRACK M-500 or MicroTREK H-400 type instruments are applied.

According to regulations chemical tanks must be equipped with both high and low level switches. This function is realised with RF-400 type vibrating fork switches.

The quality of high purity waters can be tested by measuring water conductivity. AnaCONT LCK compact conductivity transmitters are used for this purpose. To check acidity or alkalinity of the fluids we offer AnaCONT LEP pH transmitters.

In this project was installed nearly 200 pcs different kind of NIVELCO instruments.

Ákos Noll  
Domestic Sales Engineer  
NIVELCO Co.

The Germany based Basalt-Actien-Gesellschaft group is a leading European company of grinded aggregate materials. Their Czech subsidiary, Basalt s.r.o is one of the major manufacturers in the field of construction aggregates in the Czech Republic.

They operate three quarries where mainly whinstone is mined. The most important site is located in the north-west region in Měrunice city. This facility of 17 hectares has an annual production of 750.000 tonnes, the aggregates are mined there with modern technology and stored in the huge silos. In the middle of the 90's NIVELCO Bohemia supplied 2-part NIVOSONAR ultrasonic system for 13 storage silos of various aggregates at Basalt s.r.o.



However the harsh and highly dusty environment was not really ideal for proper level measurement, the ultrasonic system measured precisely and the units worked flawlessly since the installation, long after exceeding their life expectancy. The replacement of the old instruments was made only with precautionary purpose to avoid a possible costly operation failure or a worst case complete shutdown.

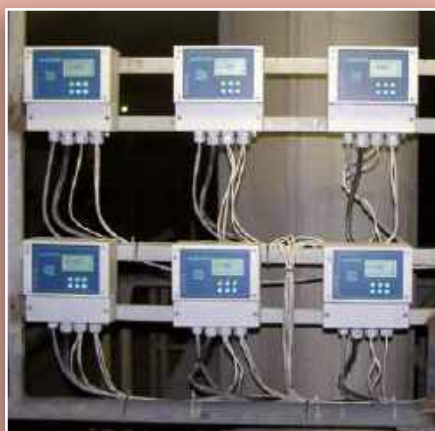
Since our customer has been very satisfied with NIVELCO ultrasonic system, there was no question about choosing new ultrasonic level transmitters from NIVELCO.

#### Requirements for the instrumentation project:

- Replacement of 13 ultrasonic units for the 8 m (26 ft) high silos containing various aggregates
- Dual channel process controller and display units with MODBUS communication protocol
- Process visualization software

Considering the previous experiences and the local conditions, team of NIVELCO Bohemia offered the 4-wire high-efficiency EasyTREK SCD ultrasonic transmitters for solid materials with the special aimer joystick mounting.

The characteristics of the units, such as the 0.6...15 m (2...50 ft) measurement range and the 5° narrow beam angle was ideal for the application.



The perfect solution for the controlling and displaying task was the MultiCONT multichannel process controller with two input channels and optional RS485 output as per the requirements.

Through the RS485 line the MultiCONT use MODBUS RTU protocol to communicate with the PLC. The additional simple process visualization software was developed as a customised solution based on the customer demands.

#### The installed instruments are the following:

- EasyTREK SCD-34J-4 (13 units)
- MultiCONT PEW-22A-1 (7 units)

NIVELCO Bohemia is very proud on announcing again a successful application story thanks to the great reliability of NIVELCO manufactured ultrasonic level transmitters.

We know that good customer care is a key element for success in every field and we proved that we are able to provide smart and simple solutions for our customers.

*Vojtěch Samec*  
Managing Director  
NIVELCO Bohemia s.r.o.

## SCREENING PLANT OF LIMESTONE

NIVELCO's Polish distributor has supplied EchoTREK STD-33J-1 – our flagship ultrasonic level transmitter for solids – to Nordalk, one of our customers in Miedzianka, for solving measurement tasks in a limestones screening plant in Poland.

After positive trials NIVELCO has delivered six pieces of such instruments which allow full automation of processes in the screening plant.



All signals from the level measuring EchoTREK-s go directly to central control and visualization room and help to optimize efficiency of screening without presence of employees in this highly dangerous and dusty environment. Mechanical and electrical installation was done by a contractor and NIVELCO-Poland's specialists optimized and adjusted settings of the instruments.



All delivered instruments work reliably and are credible source of information about level in bins. This allows the personnel to minimize time and number of operations required to control filling and emptying processes and what is very important, also helps to enhance work conditions and safety which ultimately means improved overall health of employees.

As a proof of perfectly satisfied customer, they have chosen NIVELCO EchoTREK instruments once again to handle level measurement in their raw lime-stone buffer tanks.

*Dariusz Piszcz*  
CEO  
NIVELCO Poland Sp. z o.o.

A 15 million cubic meter landfill operation is controlled by NIVELCO's NIVOSONAR in Korea. The 4 square kilometer area to be reclaimed from the sea will serve as expansion space for Seoul Airport after the landfill operation will be completed. The filling material is aggregates, excavated from a sandstone quarry on a hilltop a few hundred meters from the border of the landfill area.



The aggregates are transported from the quarry by conveyor belts to the ten groups of Dispensing Plants, each containing 3 silos. The filling and emptying of the silos is automatically controlled by a computer system receiving level information from the Nivosonars.



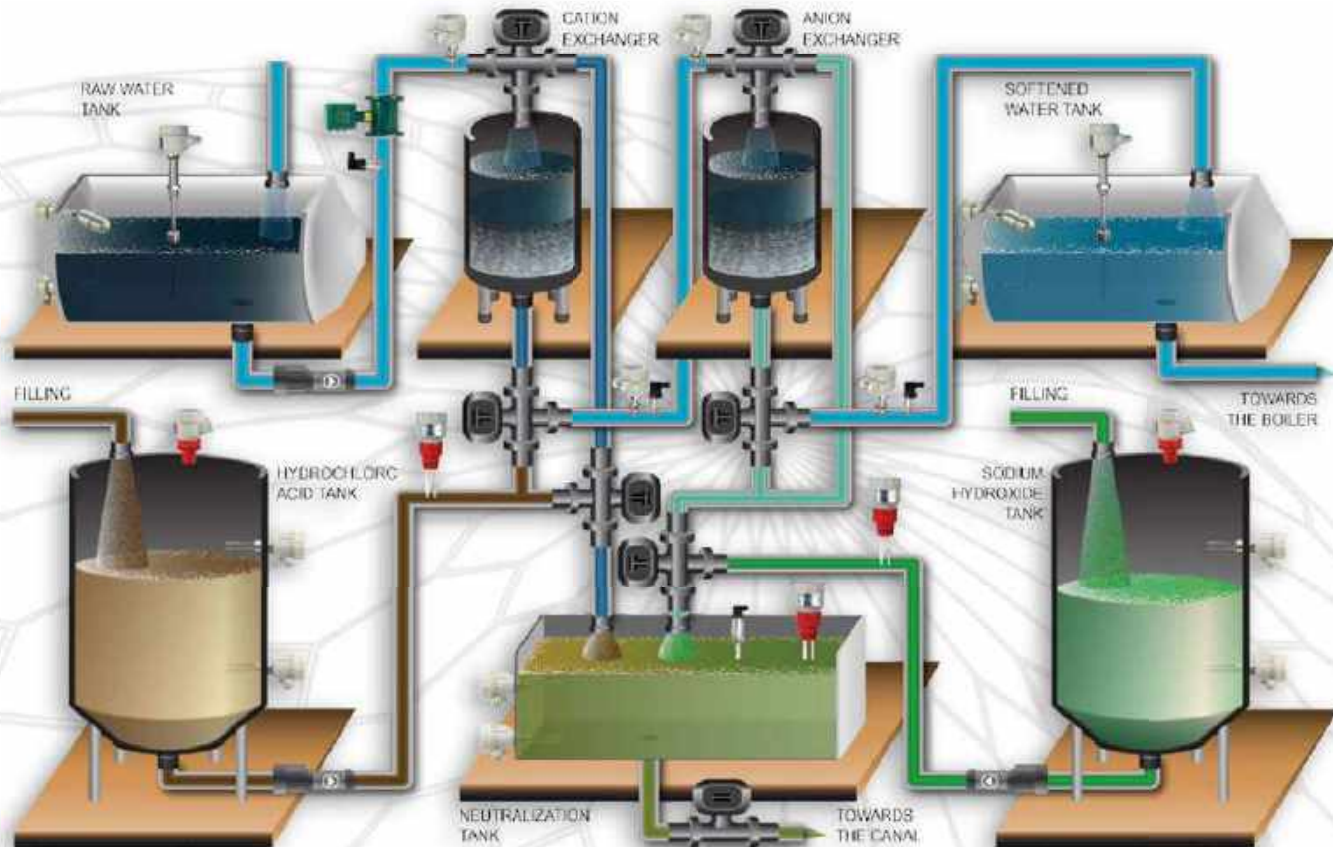
The silos are used as buffers, their contents are emptied into large trucks, which then ferry the aggregates to the site of the fill. The SID-33J sensors monitoring the level in the 12 m (40 ft) tall silos are hooked on to an SMM controller, communicating with the process computer system of the Dispensing Plant.



The system was installed at the satisfaction of the customer at the end of 2004 by Hitrol, NIVELCO's Korean distributor.

*Tibor Winkler  
Business Development Manager  
NIVELCO Co.*





### Water softening (softened water production):

The received raw water from the wells contains calcium and magnesium salts, as well nitrates at ionic form. These materials can result deposits, which may be harmful for the process industrial equipments such as boilers, exchangers, so the water should be cleaned.

The harmful salt ions can be removed by bonding them with suitable natural and synthetic ion-exchanger media, while hydrogen ion (cation exchanger) and hydroxyl ion (anion exchanger) are released at the same amount.

The raw water is flown through the two ion-exchangers which produce descaled (softened) water. The cation and anion exchangers have a given

ion-exchanging capacity which became saturated during the process. To return to active state, the ion-exchanger media should be regenerated.

The cation exchanger media are regenerated with hydrochloric acid (HCl), the anion exchanger media are regenerated with sodium hydroxide (NaOH). Regeneration materials are gathered into a common storage tank, then after a proper neutralization they are let into the canal system.

### Instrumentation:

#### Raw water and softened water tanks:

- Level measurements with NIVOTRACK MTC-500-2 magnetostrictive level transmitters
- Low/High level indications with NIVOMAG MKA-210-0 magnetic coupling level switches

Hydrochloric acid and sodium hydroxide storage tanks, neutralization tank:

- Level measurements with EchoTREK SEA-380-2 ultrasonic level transmitters
- Low/High level indications with NIVOSWITCH RDM-400 plastic coated
- vibrating fork level switches
- pH measurements with AnaCONT LEP-100-2 compact analytical transmitters

### Water softening process:

- AnaCONT LCK-222-2 electric conductivity transmitter
- NIVOPRESS DTE-500 hydrostatic pressure transmitter
- ISOMAG flow meters

The NIVOMAG magnetic coupling level switch is a perfect choice for limit level measurement especially in harsh industrial applications.

Thanks to NIVELCO Bohemia, our Czech subsidiary company we can present a case study of a power industry application where the high-reliability NIVOMAG level switches are responsible for level monitoring of cooling liquid of turbo generators.

The operation specifications such as the up to 250 °C (482 °F) temperature and pressure up to 25 bar g (362 psi g), the SIL1 (Safety Integrity Level) approval and Ex atmosphere versions makes this unit required e.g. for energy industry. Mounting of NIVOMAG is available either from side or top of the tank. Also wide variety of process connections is offered including thread, square flange or DIN flanges made of steel or stainless steel.

For electricity produced in nuclear and heat power stations turbo generators with high power (more than 100 MW) are used. To cool such generators it is not possible to use standard air-based cooling system. The most demanding parameters of the medium used for cooling high power generators are low viscosity ( $\rho$ ), high heat capacity ( $C$ ) and high thermal conductivity ( $\lambda$ ). For example hydrogen is a medium meeting the required parameters.



#### Hydrogen used for cooling

To improve cooling efficiency, stator of generator is filled with gaseous hydrogen with pressure higher than in the surroundings. Both sides of the rotor shaft are sealed with labyrinth seal. Turbine oil flows in the system with higher pressure than hydrogen pressure inside and protects the leaking of gaseous hydrogen from the stator.

At the end of the process the turbine oil it is split up to two parts, the oil saturated with air and the oil saturated with hydrogen. These two media cannot be mixed because this will create dangerous explosive mixture. Therefore the oil from hydrogen side is directed to the vacuuming tank which is equipped by vacuuming pump.

This pump creates vacuum above the level surface and skims off hydrogen from oil. To monitor the emergency levels of oil 2 NIVOMAG MKA-210-9 Ex float level switches are used. The separated, magnetic coupling construction of the NIVOMAG level switch is really advantageous in order to avoid any leaking in the system.

#### Adverse humidity

The next adverse factor is humidity or more precisely the water in hydrogen inside the stator. This humidity devalues hydrogen content and may cause corrosion and arcing in the high voltage windings, which reduces lifetime of the generator. For this reason a desiccant-based dryer is used.

The desiccant-based dryer – which was manufactured by our partner, called Servis-Energo – is installed in gas circulation loop and allows desiccation of water in hydrogen.

All parts of the dryer are made of stainless steel consisting of a tank with vaporizer, a refrigeration condensing unit and a water collector.



The water in hydrogen freezes on the cooling fins of vaporizer then after 23 hours of running the condensing unit switches off for 1 hour. The warm hydrogen melts the ice, which flows into water collector tank.

The maximum level in water collector is controlled by NIVOMAG MKA-210-9 Ex.



NIVELCO Bohemia is very proud on announcing again a successful application story thanks to the great reliability of NIVELCO instruments.

We know that good customer care is a key element for success at every time and we proved that we are able to provide smart and simple solution for our customers.

*Vojtěch Samec*  
Managing Director  
NIVELCO Bohemia s.r.o.

## INSTRUMENTATION OF A BIOGAS PLANT

Existing environmental regulations in Hungary require livestock farms to dispose of the manure produced in dedicated underground tanks. Since that is not a really efficient method, biogas plants are used throughout the European Union as the optimal solution for this task.

So Farmers Cooperative in Jászapáti made the decision to establish a biogas plant, and they won financial support from the European Union to realise this project. The biogas plant produces methane from the livestock manure which is burnt to power a gas-motor to generate electric energy.

The finished biogas production plant uses the neighbouring livestock litter and liquid manure, as well as corn-silage and other types of organic waste. Along with the generated electric energy the other useful by-product is the bio-manure, which can be used in the fields as compost, after phase-segmentation and treatment.

The actual biogas production is done in 3 fermentors, where anaerobic (in the absence of oxygen) digestion takes place. This controlled biological breakdown of the input materials into components is performed by bacteria. During this process primarily methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) are released. Biogas fermentation technology requires many measurement tasks which should be controlled continuously.



Biogas technology is instrumented by the following NIVELCO instruments:

- The input livestock manure is stored in a pre-silo, where it is turned into liquid manure by adding water. The level in this silo is measured by an EasyTREK SPA-360-4 integrated ultrasonic transmitter. The instrument is IP68 protected to protect it from accidental submersion.
- This liquidised manure is transferred into the fermentors.
- Temperature measurement of the digestion process is monitored by THERMOCONT TTJ-521-6 Ex type intrinsically safe temperature transmitters, which incorporate a Pt100 sensor.
- Process pressure is measured by a NIVOPRESS DTF-501-6 Ex hydrostatic pressure transmitter.
- Solving the high level fail-safe alarm indication of the fermentors created a quite rare application for our capacitive level transmitter. Our experts offered a NIVOCAP CTR-206-6 Ex mounted unusually in the horizontal position. With this special solution programmed properly for this application – eliminating the relative dielectric constant of the air in the tank – foam detection was successful in the fermentors.
- After the fermentation process the remaining sludge is dewatered in a screw press, and the water is let into the drain after degassing. Level measurement of this degassing tank is done by a standard vertically mounted NIVOCAP CTR-206-6 Ex capacitive level transmitter.



The completed biogas plant demonstrated its economical and efficient operation during the first trials. The biogas plant is able to generate 3.2 MWh of electric energy from the manure produced in only one day at the farm. In this way the farm can cover the running costs of the plant, while the amount of dry sludge generated is less than one cubic meter. After this successful project, NIVELCO looks forward to the future possibilities of cooperation on similar investments for complete biogas instrumentation, particularly for efficient renewable energy production.

József Kaplonyi  
Domestic Sales Engineer  
NIVELCO Co.

The company ZTF Lāsma is a very important player in the industrial automation segment in Latvia. Our company is already more than 20 years old having even longer experience in this field. Our headquarters is located in the capital city Rīga where our young and agile team is dealing with a wide variety of the industrial areas along with representing NIVELCO and its products for more than 10 years. The company has highly qualified employees which help not only to sell and produce the automation devices, but we are also able to provide the required knowledge, which is important for the customers.

Historically water in all of its forms is very important for Latvia. The seacoasts and the Daugava River, that splits it in two parts as transport ways, small rivers and lakes for food and nature. Also for economics it is important, because there are a lot of hydroelectric power plants, which produce the so-called "green energy". Lāsma is also in this part of market with different kind of solutions to control these processes. The town of Bēne is located in the western part of Latvia and there is the Auce River which is used in the local hydroelectric power plant.



Thanks to Lāsma the installed measurement equipments are NIVELCO's hydrostatic submersible level transmitters:

- NIVOPRESS NPD-42-05 - 1 unit
- NIVOPRESS NPK-42-05 - 2 units
- NIVOPRESS NAW-104 sewage adapter - 3 units

The NIVOPRESS NPK-400 series level transmitters provide important river level and temperature information to the power plant. The units are connected to the central switchboard to control the equipments of the plant. Usually there are 3 sensors for one plant or turbine, because it depends on the water inlet channels.

The first sensor is installed in the upper part of the river, in front of the inlet filter - bars, to get the actual information about water level. The second sensor is placed right after the filter - bars, to get the actual information about the water level after the bars, to check if they are clean enough and the water can freely flow through them. This is also an important signal for operators at the switchboard to clean the filter - bars.

The third sensor is installed downstream to control the level of the river after the plant, to protect it from low or high level, which can destroy some flora and fauna. These three sensors together are like three "hands" for the PLC, to check the actual level and control the power plants' "heart" - turbines with generators and inlets sluice. The applied units have two-meter ranges and all of the units are equipped with NAW-104 sewage adapters protecting the piezoresistive stainless steel membrane from the possible solid particles of the water. The probes are installed in plastic pipes, to protect them from some physical damages or ice in winter time. The incorporated temperature sensor in the NIVOPRESS NPD type unit is giving actual information about temperature in the river, which also in some cases is forwarded to general accounting system. This system is public and shows actual level and temperature for almost all of the biggest rivers in the country.

*Mārtiņš Kāns  
Automation Product Engineer  
ZTF Lāsma*



## ULTRASONIC LEVEL TRANSMITTERS IN THE COAL BUNKERS

Coal is very common material used in many branches of industry like power generation, coke production, chemical and many, many others. In some countries like in Poland black coal burn corresponds to majority of energy used by industry and households.

In a typical coal burned power plant most of coal is stored in outside stockpiles, from where it is transported with various methods for example by conveyor belt. Then the processed coal is finally loaded into coal bunkers as last step before grinding and burning. To keep proper amount of coal in the coal bunkers is critical for the flawless, safe and continuous power production. For this reason level measurement equipment used in coal bunkers have to ensure reliable and basically maintenance free operation preferably in non-contact manner. Thanks to its exceptional construction and reliability NIVELCO's EasyTREK SCD is an ideal choice for these harsh applications.



### Main tasks for EasyTREK level transmitters:

- Ensure continuous supply of coal
- Prevent overfilling
- Prevent lack of coal supply to the coal pulverizer
- Guarantee proper layer of coal inside bunker to block eventual explosion in the grinder
- Observation of material movements

### Typical application requirement where EasyTREK SCD is used:

- Height up to 15 m (50 ft)
- Often not regular shape
- Often sophisticated filling systems
- Dusty environments, high acoustic noises and strong vibrations

Result of proper match of requirements and superior EasyTREK SCD features is well over 100 units successfully installed and working flawlessly in last few years by NIVELCO-Poland Sp. z o.o.

Due to its construction there is no housing with connections above bunker which made installation easy and economical.

The EasyTREK is programmed via HART protocol from PC or MultiCONT universal controller.

*Dariusz Piszcz*  
CEO  
NIVELCO Poland Sp. z o.o.



The most important mechanical element of all industrial manufacturing units is the boiler-house, which produces the necessary technological heat energy especially in the food and beverages, chemical- and the pharmaceutical industry. Heating of the stem boiler can be performed with coal, oil, gas, fissile material, or any alternative energy source. The process flow diagram shows the instrumentation of a coal powered steam boiler.

#### Instrumentation of the coal-line:

- Monitoring the coal hopper bin with EchoTREK SCD-34J type ultrasonic level transmitter, full state indication
- Continuous level transmitting of the coal bunkers with MicroTREK HTN-400-Ex guided radar transmitter, low and high level switching with NIVOROTA rotary paddle level switches

#### Instrumentation of the steam boiler:

- Continuous level transmitting with MicroTREK HHR-400 instrument, which controls the feed water pump
- Continuous temperature measurement with THERMOCONT TBJ-500 type temperature transmitters
- Continuous pressure transmitting with NIPRESS DRC-400 pressure transmitter, which controls the burning
- Low and high level switching with NIVOMAG MKA-210 magnetic coupling level switches, which stop the boiler

#### Instrumentation of the steam boiler:

- Optical level gauging with NIVOFLIP bypass liquid level indicator and continuous

- level transmitting with NIVOTRACK MTL-500 type magnetostrictive level transmitter (mounted on the NIVOFLIP), which controls the feed water supplement
- temperature measurement with THERMOCONT TBJ-500 type temperature transmitters
- Low and high level switching with NIVOSWITCH RCM-400 type vibration fork level switches
- Conductivity measurement with AnaCONT LCK-200 compact conductivity transmitter

#### Instrumentation of the condensate water tank:

- Continuous level transmitting with NIVOCAP CTR-200 conductive level transmitter
- Multipoint level switching with NIVOPOINT MRC-400 magnetic tracking level switch, which controls the filling / emptying of the tank

## NIVELCO MEASUREMENT SYSTEM IN SPONGE PRODUCTION

Spumotim is an automotive supplier company manufacturing multiple kinds of sponge for car-seats. Moving the production plant closer to the Romanian car manufacturer Dacia (a subsidiary of the French carmaker Renault), Spumotim established its second plant in Pitesti. The first plant in Temesvár, built in 2006, was instrumented with NIVELCO transmitters, where they were very satisfied with the NIVELCO products - especially in terms of the product quality and the support service - so they again chose NIVELCO instruments. The shape and the durability of a sponge are only two from the numerous aspects that manufacturers have to take into consideration during the design of car-seats.



It is essential in terms of comfort and safety to achieve the proper composition of the compounding materials. That's why continuous level measurement is needed in the tanks of the raw materials for the production process. The instrumentation tasks include level measurement, level switching and continuous stock management on 4 polyol and 4 isocyanate tanks.

### The following instruments were installed:

- EasyTREK integrated ultrasonic transmitter (8 units)
- NIVOSWITCH compact vibrating fork level switch (8 units)
- MultiCONT expandable multichannel process controller
- UNICONT PJK universal interface module (4 units)
- NIVISION process visualization software, with accessories



The complexity of the instrumentation task was increased by the requirement to provide access for the centralized stock management of the two plants from one common control centre.

For the level measurement task, the best-known EasyTREK integrated ultrasonic transmitters were chosen, following experience in the plant in Temesvár, because its accuracy and reliability fully meet the requirements of this measurement task. Measurement signals are processed by a MultiCONT PR-200 expandable multichannel process controller. With the help of HART communication the process values are transferred via an RS485/Modbus serial line to the process controller PC. The MultiCONT is also responsible for the high alarm indication which is realized with UNICONT PJK-100 universal interface modules.



The low-level switching is performed by NIVOSWITCH RFM-400 compact vibrating fork level switches and the relay outputs of the switches are connected to an indicator panel.

The NIVISION process visualization software receives the measurement data from the MultiCONT and visualizes the actual level on the tank-farm. The controller PC in Temesvár and the central management PC are also connected via a remote desktop connection to this PC running NIVISION. The complete installation, programming and configuration tasks for the NIVISION were done by NIVELCO Romania's team.

*András Olteán-Péter*  
Managing Director  
NIVELCO Tehnica Măsurării SRL

## 100 NIVOFLIP BYPASS LEVEL INDICATOR IN THE STEEL INDUSTRY

In this success story our readers can read about an application in the steel industry for monitoring and controlling the liquid level in a small vessel using NIVOFLIP bypass liquid level indicator and NIVOTRACK magnetostrictive level transmitter.

The end-user is one of the leading steel producers in France having wide customer-base primarily from the players of the automotive industry. In their factory in Northern-France they use innovative manufacturing technology to produce the so-called grain-oriented electrical steel.



In the form of laminated, wound or punched sheets, it is the essential core material of energy-efficient transformers and generators. Grain-oriented electrical steel is an important material in the production of distribution transformers, power transformers and small transformers used in so many equipments wherever motion is transformed into electrical energy or electrical energy is transformed into motion and where electrical energy is transmitted across large distances.

Prior to rolling the steel sheets to huge spools they are cleaned with demineralised water which is stored in a small vessel. The installed NIVOFLIP bypass level indicator has 550 mm (1.8 feet) flange to flange distance and the unit provides clearly visible optical display. The bypass chamber is equipped with a NIVOTRACK magnetostrictive level transmitter which performs high accuracy level measurement and displays the level on the SAP-300 plug-in display module and transmits the measurement data to the central control room.

The bypass chamber is also equipped with 3 units MAK-100 level switches performing high limit, low limit, and low fail-safe level alarm indications. The temperature of the stored demineralised water is 80 °C (176 °F) and the process pressure is atmospheric. The next step of the manufacturing process after cleaning is the heat treatment. Before the end-user has found the suitable NIVELCO level measuring system offered by C2Plus, he had some troubles with other conventional bypass units, suffering from not only the insufficient accuracy, but also the unreliable performance. The complete measuring system based on the NIVOFLIP device proved to be an excellent solution for our steel industry partner since it performs highly reliable operation thanks to the MAK-100 limit level switches and provides high accuracy level measurement solution by the NIVOTRACK magnetostrictive level transmitter.

*Christophe Carreira*  
CEO  
C2Plus

## NIVELCO INSTRUMENTS IN THE DANUBE STEELWORKS

Steelworks in Dunaújváros. A factory-city inside the city. Those who have been there, know, those who have not been there need strong imagination to be able to imagine the milieu of this factory, the only one steel and coke production plant of Hungary, which is also famous throughout Europe and all over the world. This corner of Hungary puts both human, machine and technology to the test. Workers are giving testimony to the perseverance and commitment of their profession in Dunaújváros.

NIVELCO is present in almost every section of the plant with instrumentation solutions. Within this in the coke works NIVELCO provides unique measurement possibilities in many areas contributing mutual success to each other.

Pyrolysis of coal means the heating of the coal in oxidation-free medium producing gases, liquids and solid residues (coke or char). High-temperature pyrolysis of coal is called to carbonization.

Temperature of the flue gases is 1150-1350 °C heating the coal indirectly to 1000-1100 °C producing furnace and foundry coke. In the furnace coke is the primary reducing material, cannot be fully replaced by other materials such as coal.



Coke is an auxiliary material which helps the gas to circulate in the process material. Coke dust is an important raw material in several branches such as chemical industry. Only certain coals can be transformed into coke and numerous types can be mixed into compound, for example coking or bituminous coals having statuesque properties.



Processes of coke production can be divided into several subclasses, one of these is the coal treatment and the coal charging between the block operations, classification of the finished product of the coking. Instrumentation of the coke-works and controlling of the processes are the connection points to NIVELCO.



Coal is placed into open tanks or closed coal bunkers. Closed coal bunkers mean a group of huge concrete silos with 34 m (111 ft) height and 9 m (29 ft) diameter. Coal inside them is in divers forms, in blocks with diameter up to 30 cm (1 ft), as a wet dollop, or very fine dusty particular material caving or arching, regularly sticking up even to the vertical walls of the silo.

Filling level of the closed tanks is very important information for the technology. Measurement in this and in similar areas is one of the strengths of NIVELCO. Excellent and suitable instrument offered by our specialists is the EchoTREK SBD-31J-8 Ex ultrasonic level transmitter. This instrument has a range up to 60 m (200 ft) with a narrow beam angle. Well-chosen mounting place guarantee measurement even during the filling of the tank. Efficient signal processing and noise suppression, temperature compensation in the whole range and 'Dust Ex' type makes our EchoTREK to the best choice. Unique console setting of the instrument complies with the arching resulted by the different grain-size pieces. Presently 14 of these instruments are operating perfectly in the coal bunkers. During the classification of the finished product of the coking process, vast amount of very fine dust is issued.

Separation of this dust is made by the static dust cleaning section with high-voltage. In this process, the collected dust are stored in dust-tanks, filling and emptying control of these tanks is done by NIVOSWITCH RLH-304-E Ex vibrating fork level switches in 4 tanks in each floor. These switches with non-parallel fork tines make possible a reliable switching even in case of sticky dust.

THERMOCONT temperature transmitters and NIPRESS pressure transmitters are also applied in the coke-works for gauging temperature and pressure of the gases used and produced during the coking process.

*József Kaplonyi*  
Domestic Sales Engineer  
NIVELCO Co.

## 102 MICROTREK LEVEL TRANSMITTERS IN THE STEELWORKS OF ÓZD

Steel production technology is based on: melting the raw material (scrap steel); adding slag-forming materials for purification; adding alloying materials in order to achieve the required steel quality.

An important part of steelmaking technology is the formation of slag, and its main component is limestone. Since limestone is lighter than the steel, it floats on the surface of the molten steel. Slag usually acts as a destination for oxidised impurities, and as a protective layer it prevents oxidation. The composition of the slag impacts on the quality of the processed steel.

The steelmaking traditions in Ózd look back on over one hundred years of history. In the steelworks of Ózd modern electro-steelmaking technology is used. Scrap steel is fed into the electric arc furnace where melting and alloying, then pouring processes are performed. Along with the limestone, there are other auxiliary materials such as coal powder, and manganese or silicon based alloys. These materials are stored in standing silos and the process control system feeds the required amounts into the electric arc furnace. The control system and its personnel have to be properly informed about the quantity of materials in storage to be able to supervise the delivery amount required from each auxiliary material. The steelworks of Ózd chose NIVELCO instruments for these important measurements.



The installed measurement system was designed for solving the following tasks:

- Providing continuous level measurement in the silos and overcoming the harsh environment. The 8 meter tall silos sometimes stores fistful-sized pieces of manganese or silicon. The 8 mm (0.3 inch) diameter stainless steel cable probes of the MicroTREK HTN-408-4 guided microwave level transmitters have to withstand the effects of such abrasive materials.
- Measurement of the sticky limestone powder level is done by MicroTREK HTN-412-4. These transmitters have a 12 m (40 ft) long stainless steel cable probe.
- The coal powder is not just a sticky material, but is a Dust Ex product, which is stored in 10 m (33 feet) tall silos. The levels of these silos are regarded as very important data for the process, and it is measured with the MicroTREK HTN-410-6 Ex cable probe, Dust Ex version.
- Measurement data transmission to the process control system is not the only requirement: there was a demand for a local display of the measured levels. UNICONT PDF-401-2 type loop displays were installed to solve this task.

- Along with continuous level measurement, low and high level switches provide alarm signals to allow intervention in case of an empty silo, or overfilling. Low level indication is performed by side mounted NIVOROTA EKH-702 standard versions, high level indication is done by top mounted NIVOROTA EKK-710 cable extended rotary paddle level switches.
- Temperature measurement and display of the secondary produced fumes are essential to provide secure production operations. THERMOCONT TLJ- 513 type temperature transmitters are able to measure, display and transmit the temperature data of the furnace fumes.

The extreme dusty environment produces extraordinary challenges for the instruments, usually there is more than a centimetre thickness of a powder layer on the devices, after only a few days operations. Despite these harsh circumstances all NIVELCO products operate reliably and perfectly, with rarely needed maintenance.

NIVELCO is proud to prove its 'know-how' in extremely dusty solid level measurement, in such a heavy industry segment.

*Sándor Ujfaludi*  
Domestic Sales Engineer  
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Linamar Hungary is the Hungarian subsidiary of Canada's leading automobile parts manufacturer. One of its production halls is the PPM (Precision Part Manufacturing) in Békéscsaba. Linamar produces steel automotive parts in four main phases: casting, machining, purification by a high pressure cleaning system, then coating on request. The high pressure cleaning system was instrumented with NIVELCO products.

### Instruments of the technology

Each workpiece comes under high pressure when it is inserted in the cleaner. Then the machine performs the needed filtering-cleaning wash and finally rinses the workpiece before repeating the cycle. This washing procedure is under 200 bar (2900 psi) pressure, done with a high purity mineral oil. The filtering-cleaning Common Rail equipment removes any possible small (0–3 µm) particles or pollution remaining from the machining process. The washing-liquid storage tank of the Common Rail equipment is instrumented with two intrinsically safe mini compact type NIVOTRACK MMA-504-6 Ex transmitters. These models are the same as the standard version except for the 8 mm (0.3") diameter probe tube and the small 28 mm (1") diameter magnetic float.



The 1" process connection provides a suitable solution for the small tanks used in this application. The highly precise magnetostrictive transmitters are responsible for continuous level measurement of the washing liquid and perform level control of the tank, controlled by the 4–20 mA output signals.



A PLC receives the output signals and controls the filling-emptying pump. The accuracy of the NIVOTRACK transmitter is 1mm which fully meets the requirements of the measurement. Along with the level measurement instruments, some additional NIVELCO devices have been installed as well. The local display of the measured levels is done by UNICONT PDF-501-6 Ex loop displays. The UNICONT PDF-s are in the local control room, quite far from the technological processes, so the measurement results can be read easily outside the production hall. Sensing, monitoring and displaying of the washing pressure is an essential parameter of the cleaning process.



For this task, NIVOPRESS DBC-5H1-6 Ex hydrostatic transmitters with a SAP-200 display have been chosen as an excellent solution.

Since the applied transmitters are explosion-proof versions it was necessary to use 4-20 mA isolated power supply units for the transmitters. The newly developed UNICONT PGK-301-B Ex modules were offered for this purpose. NIPOWER PPK-331-1 power supply modules give supply voltage for the UNICONT PGK-s and thus for the transmitters.

Thanks to these accurate measurements, continuous operation is ensured for the cleaning system and the efficiency of the whole production operation increased significantly. In the framework of a future project, all measured data from the instruments will be integrated and processed by NIVELCO's NIVISION process visualization software.

*Ferenc Dékány  
Domestic Sales Engineer  
NIVELCO Co.*

In the Industrial Park of Szentgotthárd, the Hungarian subsidiary of the American-based Allison Transmission Inc. (the world's largest manufacturer of fully-automatic transmissions) established a new production hall.

The key element of the production line is the oil container tank-farm with its complex instrumentation and electrical installation tasks.

NIVELCO had to provide a complete solution, to include material specifications for the electrical system, and including wiring tasks, instrumentation and all accessories for the process automation system. Finally the customer has chosen NIVELCO thanks to the high technical level of the offered solutions, especially the level instrumentation, the stainless steel control panels, and the galvanized cable mounting structures. Moreover NIVELCO was being proven as a reliable partner in the design of the complete technological implementation along with the provided great price/value ratio. As a standard task, the continuous measurement of lubricant oil and emulsion tanks, and the control of filling-emptying pumps was also designed and commissioned by NIVELCO. Since the facility operates in a JIT (Just In Time) production strategy, any failure of the process control system hinders the production seriously, so indication of alarm and warning signals for the monitoring system was necessary.



### Measurement solutions

- MicroTREK HT-400 series guided radar transmitters measure the level in oil and oil-emulsion tanks. The control system continuously monitors the quantity of the homogeneous media, the level of each specific tank and the total quantity of the tank-farm, providing a reliable source of information for the filling and emptying processes
- Overfill protection on the tanks is achieved by NIVOMAG 210 4L magnetic level switches. To avoid the possibility that any leakage may happen when using side-mounted equipment, the L-arm type NIVOMAG was chosen for this reason. In addition to this, the required switching differential parameters were easy to provide with this version.
- Leakage detection on the double-walled tanks is achieved by NIVOSWITCH RCM-400 vibrating forks. Thanks to the vibrating forks, the process control system is able to indicate any negligible (compared to the size of the tank) quantity (even a decilitre) of leaking oil.

- Measurement signals are processed by a MultiCONT multichannel process controller in a HART multidrop loop. HART communication facilitates centralized signal processing and provides easy access to change the parameter-base of the product-specific technology. The local personnel decide which incoming material should be stored in which tank, based on the displayed values on the MultiCONT.
- Two UNICONT PJK-100 universal interface modules are connected in the RS485 line, determining low and high fail safe level from the measured values, and these modules provide quick intervention if necessary.

The filters and pumps used in the production plant are controlled by differential pressure switches, the measurement signals from these instruments are also integrated into the process controller system, therefore they are able to indicate alarm signals.

Also NIVELCO delivered the 2 butterfly-valves which provide alternating filling for the emulsion-collecting tanks. Local electrical wiring and the stainless steel control panels were installed by a subcontractor partner. The end users were fully satisfied with the quality of the finished project regarding as a great success for NIVELCO's local engineering team.

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# Application Handbook

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