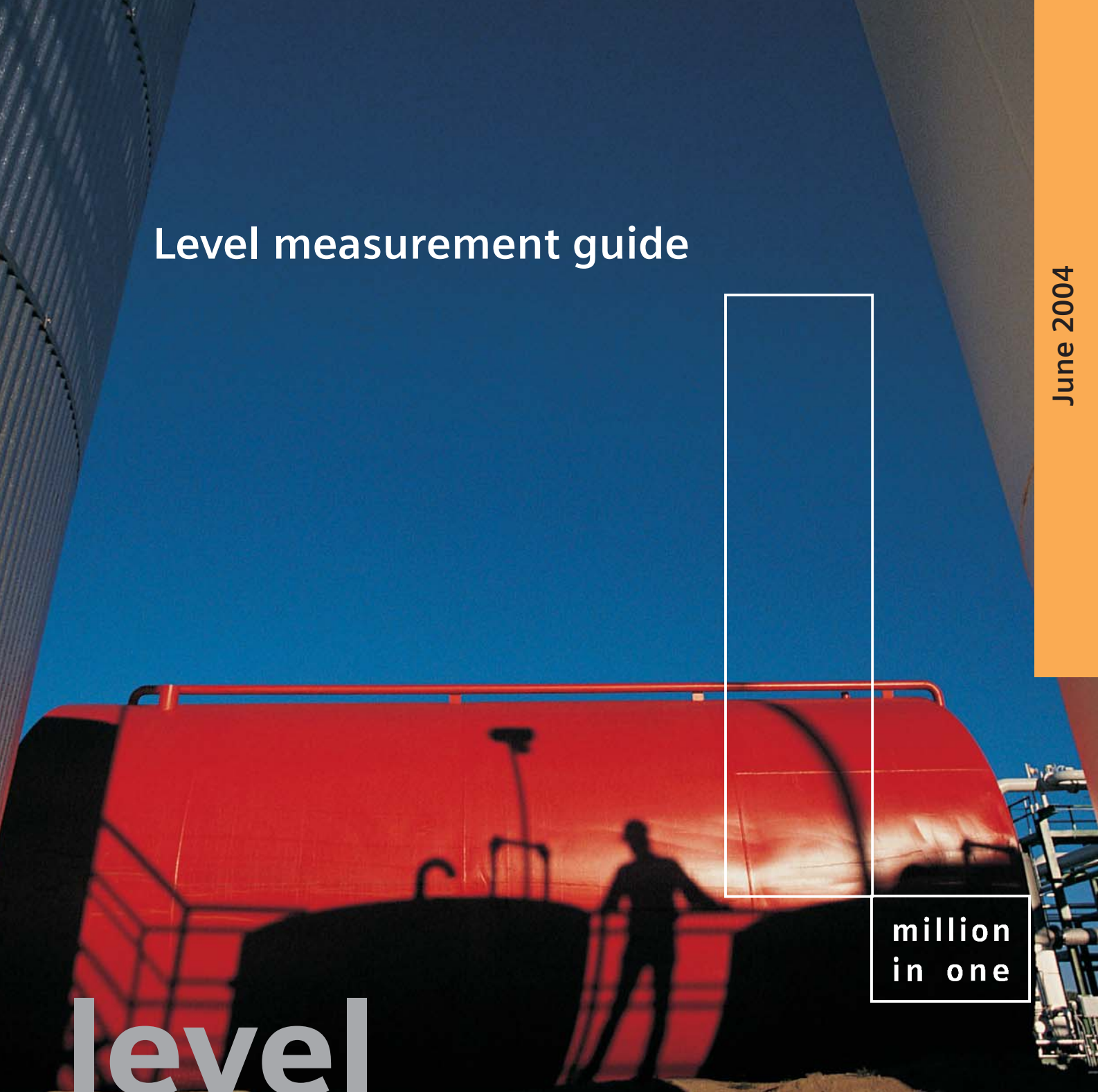
Level measurement guide



million in one

level

June 2004

SIEMENS

Global network of innovation

Reliable level measurement

It's reliable. That's what customers say about Siemens Milltronics technology installed in hundreds of thousands of industrial process applications worldwide.

Siemens Milltronics is the global center for level measurement technology within Siemens Process Instrumentation. You can rely on our instruments for high performance; they provide cost-effective measurement of continuous level, point level, and interface in a wide range of applications, such as water and wastewater, chemical, petrochemical, pharmaceutical, mining, cement, aggregates, and bulk solids.

This guide provides an overview of level measurement instruments to help you select the equipment and solutions that best meet your needs.

For the latest product information or to find a representative near you, visit our web site at www.siemens.com/milltronics

million in one

Million in one

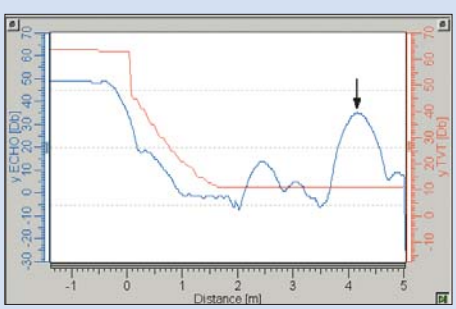
Signal processing with field experience

Siemens level measurement instruments come with extensive field experience. Siemens Milltronics developed the signal processing technology for level instruments based on the experience of a million instruments in industrial applications.

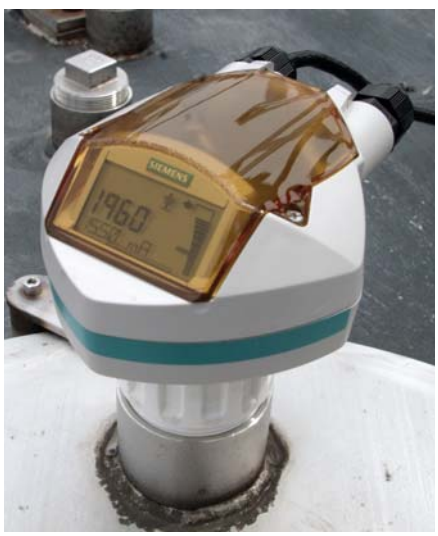
With this experience we understand the importance of reliability, and we know what it takes to make a trusted and accurate level instrument for demanding applications. That's why our engineers invented Sonic Intelligence® and Auto False-Echo Processing, and that's why these instruments carry so many patents. With Siemens Milltronics you get the experience of a million applications in one instrument.

Sonic Intelligence

Our patented Sonic Intelligence signal processing technology was developed using knowledge provided by our field service engineers from data from bins and tanks in real applications. Siemens Milltronics' instruments offer the unique advantage of this technology. Sonic Intelligence differentiates between true echoes from the material and false echoes from obstructions or electrical noise. The sophisticated software is continuously updated and supported by field data gained from more than 500,000 ultrasonic and radar level applications. This in-depth knowledge and experience is built into the software's advanced algorithms to provide intelligent processing of echo profiles. The result is repeatable, fast, and reliable measurement you can trust.



SITRANS Probe



NEW

SITRANS Probe

2-wire ultrasonic and radar level transmitters

SITRANS® Probe LU and SITRANS Probe LR set the new standard for ultrasonic and radar continuous level measurement. These transmitters offer you superior reliability for level, volume, and flow applications in the water and wastewater, food, chemical, and hydrocarbon processing industries.

SITRANS Probe is the award winning Milltronics® The Probe® taken to a higher level with innovative transducer and antenna designs, communications capability, and nineteen patents. The result is greater accuracy and reliability for your continuous level measurement applications.

		
	SITRANS Probe LR 2-wire, 5.8 Ghz (6.3 in North America) radar transmitter for level/volume monitoring of liquids and slurries in storage and process vessels	**SITRANS Probe LU** 2-wire, loop powered ultrasonic transmitter for level/volume/flow monitoring of liquids in storage vessels, simple process vessels, and open channels
Range	20 m (65 ft)	6 m (20 ft) or 12 m (40 ft)
Process temperature	-40° to 80°C (-40° to 176°F)	-40° to 85°C (-40° to 185°F)
Process pressure	Up to 3 bar (43.5 psi)	ambient, vented to atmosphere
Key features	■ High signal-to-noise ratio, comparable to a 4-wire device ■ Sonic Intelligence ■ Auto False-Echo Suppression ■ Level and volume measurement ■ 5.8 GHz (USA 6.3 GHz) ■ Infrared Intrinsically Safe hand-held programmer ■ Patented, shielded and hermetically sealed polypropylene antenna/process connection; 100 mm (4") shield standard ■ Rotating head aligns with conduit for easy wiring **Options:** ■ 250 mm (10") shield length	■ High signal to noise ratio ■ Sonic Intelligence ■ Auto False-Echo Suppression ■ Level, volume and flow measurement ■ Infrared Intrinsically Safe (IS) hand-held programmer ■ Built-in temperature compensation ■ Choice of threaded connections ■ ETFE or PVDF copolymer transducer ■ Rotating head aligns with conduit for easy wiring
Output	■ 4-20 mA ■ Intrinsically safe	■ 4-20 mA ■ Intrinsically safe
Communications	■ HART® ■ SIMATIC® PDM for remote configuration and diagnostics	■ HART ■ SIMATIC PDM for remote configuration and diagnostics
Power specifications	4-20 mA, 24 Vdc nominal with max. 550 Ohm, 30 Vdc maximum	4-20 mA, 24 Vdc nominal with max. 550 Ohm, 30 Vdc maximum
Approvals	CE, CSA$_{US/C}$, FM, ATEX, Industry Canada, FCC, R&TTE	CE, CSA$_{US/C}$, FM, ATEX

Electro-mechanical point level switches

Electro-mechanical switches are rotating or vibrating point level switches for a cost-effective solution for basic applications on powders, grains, and other dry solids.

Pointek® PLS 200

Electro-mechanical rotary paddle switch for level detection of powder and granular solids with bulk densities as low as 35 g/l (2.19 lb/ft³)

Pointek VLS 200

Electro-mechanical vibratory switch for level detection of powder and granular solids with bulk densities as low as 20 g/l (1.3 lb/ft³)

Milltronics Tilt Switch

Electro-mechanical tilt switch for point level detection, plug chute detection, belt tracking and feed loss detection on conveyor belts

	Pointek® PLS 200	Pointek VLS 200	Milltronics Tilt Switch
Range	10 m (30 ft)	4 m (13 ft)	Switch changes state at approximately ±17° from vertical
Process temperature	■ -20° to 80°C (-4° to 176°F) ■ -20° to 220°C (-4° to 428°F) HT model	-25° to 150°C (-13° to 302°F)	■ Low temperature: -40° to 90°C (-40° to 194°F) ■ High temperature: -40° to 150°C (-40° to 302°F)
Process pressure*	Up to 0.5 bar (7 psi)	Up to 10 bar (146 psi)	Not rated
Key features	■ High or low level alarm ■ Densities as low as 100 g/l (6.25 lb/ft³) standard ■ Hinged paddle for densities as low as 35 g/l (2.19 lb/ft³) ■ Switch selectable power supply ■ Rotatable enclosure ■ Installation through process connection 1¼" NPT or BSP ■ Compact, extended models and cable extension up to 10 m (30 ft) ■ High temperature model	■ High or low level alarm ■ Compact design ■ Top, side, angle mount ■ Rotatable enclosure ■ Self-cleaning fork ■ Extended model up to 4m (13 ft) ■ Interface model (solids in liquids)	■ High or low alarm ■ 304 Stainless steel ■ Total encapsulated mercury switch ■ Easy installation and operation **Optional probe extensions:** ■ Flat and cross paddles ■ Anti wear ■ Float
Output	Microswitch 5A at 250 Vac, non-inductive	SPDT relay 8A at 250 Vac, non-inductive	Single N.C. contact 5 ohms max., 2A at 24 Vdc
Communications			
Power specifications	■ Jumper selectable ■ 115 Vac, ±15%, 50/60 Hz, 4VA 230 Vac, ±15%, 50 Hz, 6VA 24 Vdc, ±15%, 2.5W	19 to 230 Vac, +10%, 50/60 Hz, 8VA 19 to 55 Vdc, +10%, 1.5W	30 Vdc (max.)
Approvals	CE, CSA, FM, ATEX (dust ignition approvals)	CE, CSA, FM, ATEX (dust ignition approvals)	CE

* Pressure ratings are in bar (psi) gauge, relative

Capacitance point level switches

				
	Pointek CLS 100 Compact 2-wire capacitance switch for level detection in constricted spaces, interfaces, solids, liquids, slurries, and foam using inverse frequency technology	**Pointek CLS 200** Versatile capacitance switch with a high level of chemical resistance; ideal for level detection of interfaces, solids, liquids, slurries, and foam, and for simple pump control	**Pointek CLS 300** Capacitance level switch for detecting interfaces, solids, liquids, slurries and viscous materials in demanding conditions of low/high pressure, high temperatures, and corrosive and abrasive materials	**Pointek CLS 500** Capacitance point level switch for detecting interfaces, solids, liquids, slurries and viscous materials in critical conditions of extreme temperature and extreme pressure
	100 mm (4”)	Rod: 5.5 m (18 ft) Cable: up to 35 m (115 ft)	Rod: 1 m (40”) Cable: 25 m (82 ft)	Rod: 1 m (40”)
	-40° to 100°C (-40° to 212°F)	-40° to 125°C (-40° to 257°F)	■ -40° to 200°C (-40° to 392°F) ■ -40° to 400°C (-40° to 752°F) HT version	■ -40° to 200°C (-40° to 392°F) ■ Up to 400°C (752°F) HT version
	Up to 10 bar (146 psi)	■ Up to 25 bar (365 psi) ■ Up to 10 bar (150 psi) cable version	■ Up to 35 bar (511 psi) ■ Up to 100 bar (1460 psi) HP version	■ Up to 50 bar (725 psi) ■ Up to 525 bar (7665 psi) HP version
	■ Inverse frequency technology ■ Sensitivity adjustment **Options:** ■ Intrinsically Safe ■ Dust-ignition proof ■ Non-hazardous general purpose ■ SensGuard for abrasive applications ■ PPS or PVDF probes ■ IP 68	■ Inverse frequency technology ■ Level detection independent of tank wall/pipe ■ High/low gain switch ■ Suitable for hazardous areas ■ Universal power supply ■ Multiple outputs ■ Fully adjustable hysterisis **Options:** ■ Rigid, cable and sanitary ■ SensGuard for abrasive applications ■ Thermal isolator ■ Non-hazardous general purpose ■ IP 68	■ Patented Active-Shield technology ■ Universal power supply ■ Universal transmitter ■ Multiple outputs ■ 5 dipswitches for special adjustments e.g. fail safe, high/low **Options:** ■ Extensions up to 25 m (82 ft) ■ Thermal isolator ■ High temperature (HT version) ■ High pressure (HP version)	■ Patented Active-Shield technology ■ Integrated local display ■ 2-wire loop signal ■ Push-button calibration ■ Full-function diagnostics **Options:** ■ One-point calibration in % ■ High temperature (HT version) ■ High pressure (HP version)
	■ 4-20/20-4 mA 2-wire current loop ■ Solid-state or relay switch ■ Relay output (all plastic versions)	■ 1 form C (SPDT) relay ■ Solid-state switch	■ 1 form C (SPDT) relay ■ Solid-state switch	■ 4-20/20-4 mA 2-wire current loop ■ Solid-state switch
		■ Digital model: PROFIBUS PA optional ■ Analog model: 3 LED indicators		■ HART ■ SIMATIC PDM compatible
	■ Standard: 12-33 Vdc ■ Intrinsically Safe: 10-30 Vdc	12-250 Vac/dc, 50/60 Hz, 2VA /2W max.	12-250 Vac/dc, 50/60 Hz, 2VA / 2W max.	■ 12-33 Vdc, (30 Vdc for IS) at 3.6 mA 9.5-33 Vdc, (30 Vdc for IS) at 22 mA ■ 3.6-22 mA/22-3.6 mA (2-wire current loop)
	CE, CSA, FM, ATEX Lloyd’s Register, WHG	CE, CSA, FM, ATEX, 3A Lloyd’s Register, WHG	CE, CSA, FM, ATEX Lloyd’s Register, WHG	CE, CSA$_{NRTL/C}$, FM, ATEX Lloyd’s Register, WHG Current signaling according to NAMUR NE 43

Capacitance level measurement

			
	SITRANS LC 300 Capacitance level instrument for liquids and solids, high accuracy applications such as food and beverages, pet food and bulk solids; ideal for challenging processes involving vapor and dust	**SITRANS LC 500** Capacitance level and interface monitor/controller for extreme and critical process conditions, such as oil and "liquid gas", toxic and aggressive chemicals and vapors	**SITRANS PD 500** Capacitance 2-wire switch for interface and product presence detection, even in extreme and critical process conditions; suitable for use on any ferrous or non-ferrous piping system
Range	Rod: 5.5 m (18 ft) Cable: 25 m (82 ft)	Rod: 5.5 m (18 ft) Cable: 35 m (115 ft)	Fitting length: 55 mm (2.1")
Process temperature	-40° to 200°C (-40° to 392°F)	-40° to 200°C (-40° to 392°F) optional: up to 400°C (752°F) down to -200°C (-328°F)	-40° to 200°C (-40° to 392°F) optional: up to 400°C (752°F) down to -200°C (-328°F)
Process pressure*	Up to 35 bar (511 psi)	Up to 200 bar (2920 psi) **Option:** Up to 525 bar (7665 psi)	Up to 50 bar (725 psi) **Option:** Up to 200 bar (2920 psi)
Key features	■ Push-button calibration ■ Patented Active-Shield technology ■ Integrated local display	■ Pre-detection alarm ■ Pump control ■ Patented Active-Shield technology ■ Push-button calibration ■ One-point calibration ■ Integrated local display ■ Full-function diagnostics **Options:** ■ High temperature ■ High pressure ■ Sanitary ■ Customized application design ■ Process connections and sensor options ■ Custom materials	■ Flange and sandwich mounting, according to ANSI and DIN standards ■ Integrated local display ■ Full-function diagnostics ■ Stainless steel AISI 316L process connection **Options:** Process connections: Carbon steel C35
Output	4-20/20-4 mA 2-wire current loop	■ 4-20/20-4 mA 2-wire current loop ■ Solid-state switch ■ 4/20 mA or 20/4 mA	■ 4-20/20-4 mA 2-wire current loop ■ Solid-state switch
Communications		HART	■ HART ■ SIMATIC PDM compatible
Power specifications	9-32 Vdc any polarity, 2-wire current loop circuit (9V at 22 mA)	■ 12-33 Vdc, (30 Vdc for IS) at 3.6 mA, 9.5-33 Vdc, (30 Vdc for IS) at 22 mA ■ 3.6 to 22 mA/22 to 3.6 mA (2-wire current loop)	■ 12-33 Vdc, (30 Vdc for IS) at 3.6 mA, 9.5-33 Vdc, (30 Vdc for IS) at 22 mA ■ 3.6-22 mA/22 to 3.6 mA (2-wire current loop)
Approvals	CE, $CSA_{NRTL/C}$, FM, ATEX Lloyd's Register Current signaling according to NAMUR NE 43	CE, $CSA_{NRTL/C}$, FM, ATEX Lloyd's Register, 3A Current signaling according to NAMUR NE 43	CE, FM/CSA, FM, ATEX Lloyd's Register Current signaling according to NAMUR NE 43

* Pressure ratings are in bar (psi) gauge, relative

Our unique inverse frequency-based approach to capacitance technology ensures accurate, reliable and repeatable measurement, even in dusty, turbulent, and vaporous environments, or in situations with product build-up. Because even a small level change creates a large change in frequency, our instruments provide better resolution and consistently outperform conventional devices. With special features such as tip-sensitive probes, Active-Shield technology and modular probe options available on various models, they offer practical solutions to a wide variety of point level, continuous level, and interface measurement challenges.

> SITRANS LC 500

SITRANS LC 500 capacitance probe configurations and types

Probe version	Series S	Series S Interface	Series S Sanitary	Series D	Series SD	Series DD	Series HP
Application	General level, interface or detection applications	General interface detection applications	Level, interface or detection in food applications	Applications that combine high temperatures, pressures and corrosive chemicals	Turbulent and toxic chemical applications	Applications that combine high temperature, high pressure and toxic chemicals	Extreme pressures
Process connection types	• Threaded NPT, BSPT, JIS • Flange ANSI, DIN, API	• Threaded NPT, BSPT, JIS • Flange ANSI, DIN, API	Tri-clamp	Sanitary thread	PTFE flange ANSI, DIN, API	Flange ANSI, DIN, API	PTFE flange ANSI, DIN, API
Process seal	Single gland seal	Single gland seal	Single gland seal	Single gland seal	Double gland seal	Double gland seal	Redundant double gland seal
Process connection materials	Stainless steel AISI 316L Optional: • Hastelloy® B2®* • C22®.8N • Monel® 400	Stainless steel AISI 316L	Stainless steel AISI 316L	Stainless steel AISI 316L Optional: Carbon steel C22.8N	Stainless steel AISI 316L Optional: Carbon steel C22.8N	Stainless steel AISI 316L Optional: Carbon steel C22.8N	Stainless steel AISI 316L Optional: Duplex steel
Wetted parts	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel	PFA standard Options: PTFE or enamel
Rod length (max.)	5.5 m (18 ft)	N/A	5.5 m (18 ft)	5.5 m (18 ft)	5.5 m (18 ft)	5.5 m (18 ft)	2.5 m (8.2 ft)
Cable length (max.)	35 m (115 ft)	35 m (115 ft)	N/A	35 m (115 ft)	35 m (115 ft)	35 m (115 ft)	N/A

* Flange is made of AISI 316L stainless steel with a 5 mm welded Hastelloy plate.

Hastelloy and C22 are registered trademarks of Haynes International. Monel is a registered trademark of Special Metals Corporation.

Radar level measurement

SITRANS LR 200

2-wire loop powered pulse radar level instrument for liquid bulk storage or simple process vessels

SITRANS LR 300

Pulse radar level instrument for liquids and slurries in process vessels and extreme or hazardous process conditions

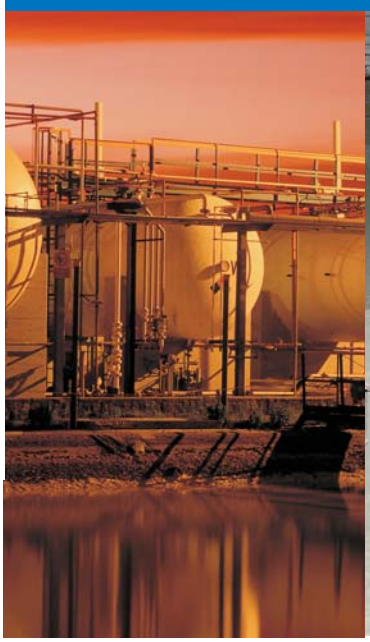
SITRANS LR 400

Long-range FMCW radar level instrument for solids and liquids storage; ideal for extreme dust or low dielectric liquids

	SITRANS LR 200	SITRANS LR 300	SITRANS LR 400
Range	20 m (66 ft)	20 m (66 ft)	45 m (147 ft)
Process temperature	-40° to 200°C (-40° to 392°F)	-40° to 200°C (-40° to 392°F)	-40° to 200°C (-40° to 392°F) optional: up to 250°C (482°F)
Process pressure*	Up to 40 bar (580 psi) process connection type dependent	Up to 40 bar (580 psi) process connection dependent	Up to 40 bar (580 psi) process connection dependent
Key features	■ Level, space, distance and volume measurement ■ Infrared Intrinsically Safe (IS) hand-held programmer ■ Auto False-Echo Suppression ■ 5.8 GHz (USA 6.3 GHz) ■ Patented, shielded and hermetically sealed polypropylene antenna / process connection; 100 mm (4") shield standard **Options:** ■ 250 mm (10") shield length ■ Process connections and antenna options (see page 13)	■ Level, space, distance and volume measurement ■ Infrared Intrinsically Safe (IS) hand-held programmer ■ Auto False-Echo Suppression ■ 5.8 GHz (USA 6.3 GHz) **Options:** ■ Stainless steel enclosure ■ Explosion proof ■ Sanitary ■ Purging (self-cleaning) ■ Process connections and antenna options ■ Higher frequency	■ Level and volume measurement ■ Infrared Intrinsically Safe (IS) hand-held programmer ■ Auto False-Echo Suppression ■ Self-calibration with internal reference ■ 24 GHz FMCW and high signal-to-noise ratio **Options:** ■ High temperature extension ■ Explosion proof ■ Easy Aimer mounting ■ Purging (self-cleaning)
Output	4-20 mA 2-wire current loop	4-20 mA	■ 4-20 mA ■ 1 Relay
Communications	■ HART ■ SIMATIC PDM compatible	■ Modbus® ASCII / RTU ■ HART ■ Dolphin ■ SIMATIC PDM compatible **Option:** PROFIBUS PA	■ HART ■ SIMATIC PDM compatible **Option:** PROFIBUS PA
Power specifications	4-20 mA loop, 24 Vdc nominal, 30 Vdc max. Minimum voltage depends on total loop resistance	■ Universal ac/dc ■ 24-230 Vac, ±15%, 40-70Hz, 28VA / 11W ■ 24-230 Vdc, ±15%, 9W	■ 120-230 Vac, ±15%, 50 / 60 Hz, 12VA / 6W ■ 24 Vdc, +25/-20%, 6W (optional)
Approvals	CE, CSA$_{NRTL/C}$, FM, ATEX, Lloyd's Register, 3A, Industry Canada, FCC, R&TTE	CE, CSA$_{NRTL/C}$, FM, ATEX, Lloyd's Register, 3A, Industry Canada, FCC, R&TTE	CE, CSA$_{NRTL/C}$, FM, ATEX, Lloyd's Register, Industry Canada, FCC, R&TTE, BZT

* Pressure ratings are in bar (psi) gauge, relative

Radar's sophisticated pulse and Frequency Modulated Continuous Wave (FMCW) radar technologies provide reliable continuous level measurement for short- to long-range applications, even in harsh process conditions such as temperature and pressure extremes, aggressive chemicals, agitation, turbulence, encrustation, and extreme dust.



> SITRANS LR 200

> SITRANS LR 300

SITRANS LR 200 and SITRANS LR 300 radar antenna configurations

Antenna version	Flat faced flange with rod and integral process seal	Threaded rod for vessels without a nozzle	Shielded rod eliminates nozzle interference	Sanitary rod (1-piece construction) for food and pharmaceutical applications	Horn (4", 6", 8" sizes available) for high temperature isolation, long nozzles	Waveguide for low dielectric products
Process connection types	Nominal pipe sizes 50, 80, 100, 150 mm (2, 3, 4, 6")	1½" and 2" sizes, NPT, BSP, G	• 2" threaded NPT, BSP, G • Flat face flange nominal pipe sizes 80, 100 mm (3", 4")	Sanitary tri-clamp 2", 3", 4" sizes	Flat face flanges ANSI, DIN, JIS	Flat face flanges ANSI, DIN, JIS
Wetted parts †	PTFE	• PTFE • 316 stainless steel • FKM O-ring	• PTFE • 316 stainless steel • FKM O-ring	• UHMW-PE or • PTFE	• 316 stainless steel • PTFE	• 316 stainless steel • PTFE
Insertion length (max.)	41 cm (16.3")	41 cm (16.3")	Variable	41 cm (16.3")	Variable	Variable
Extensions / options	50 or 100 mm (2 or 4") PTFE	50 or 100 mm (2 or 4") PTFE	100, 150, 200 or 250 mm (4, 6, 8 or 10") standard shield length, or longer by request	N/A	Variable waveguide extensions Option: Sliding waveguide for digester applications	Two sections (max.) can be connected together

* Maximum pressure 0.5 bar at 60°C.
† Alternative materials are available upon request by special order, consult your local Siemens Milltronics representative.

Ultrasonic level measurement

				
	MultiRanger® 100/200 Versatile short- to medium-range ultrasonic single- and multi-vessel level monitor/controller for virtually any application in a wide variety of industries	**SITRANS LU**** Ultrasonic long-range level monitoring system for liquids and solids LU 01: single point LU 02: dual point LU 10: 10 point	**HydroRanger 200** Ultrasonic level controller for up to six pumps – control, differential control, and open channel flow monitoring	**EnviroRanger® ERS 500** Complete ultrasonic level controller for monitoring and control of water distribution and wastewater collection systems, with energy-saving algorithms
Range	15 m (50 ft) Transducer and material dependent	60 m (200 ft) Transducer and material dependent	15 m (50 ft) Transducer and material dependent	15 m (50 ft) Transducer and material dependent
Process temperature	Transducer dependent	Transducer dependent	Transducer dependent	Transducer dependent
Process pressure	Transducer dependent	Transducer dependent	Transducer dependent	Transducer dependent
Key features	**100 version:** ■ Simple pump control **200 version:** ■ Enhanced pump control ■ Differential control ■ Open Channel Flow monitor ■ Volume conversion ■ One mA input **Both versions:** ■ Single or dual point ■ ac or dc ■ Digital input for back-up level override from a point level device (e.g. Pointek CLS 200) ■ Two discrete inputs ■ Wall or panel mount	■ High/low alarm ■ Multi-point measuring: 2 (LU 02) 10 (LU 10) ■ Differential or average measurement ■ Volume conversion ■ Priority scanning (LU 10) ■ Programmable with hand-held programmer or PC **Options (LU 10):** ■ LU AO Analog Output Module ■ LU SAM Satellite Alarm Module	■ Single or dual point ■ Fixed and rotating pump rosters ■ Ratio pump runtimes ■ Controls up to 6 pumps ■ Screen rake automation ■ Influent and effluent monitor ■ Open Channel Flow monitor ■ Remote collection monitor ■ Sampler control ■ Volume conversion ■ Scum line reduction ■ High level back-up alarm input ■ One mA input ■ Two discrete inputs ■ ac or dc ■ Wall or panel mount	■ Fixed and rotating pump rosters ■ Ratio pump runtimes ■ Time based control options ■ Screen rake automation ■ Influent and effluent monitor ■ Remote collection monitor ■ Sampler control ■ Open channel flow monitor ■ RTU and data logger ■ Volume conversion ■ Discrete inputs for pump interlocks/pump faults feedback ■ Report by exception ■ Combined Sewer Overflow (CSO) logging **Options:** ■ VS 100 Velocity Sensor ■ Wall, rack or panel mount
Output	■ 3 relays standard ■ 6 relays (option) ■ Two 4-20 mA outputs (isolated)	■ 4 relays (LU 01, LU 02) ■ Up to 40 relays (LU 10) ■ 4-20 mA (isolated)	6 relays standard, two 4-20 mA outputs (isolated)	5 relays, 4-20 mA (option)
Communi-cations	Built-in Modbus RTU or ASCII via RS-485 **Options:** ■ Dolphin Plus ■ SmartLinx® (see page 14) - PROFIBUS DP - Allen-Bradley® RIO - DeviceNet™ ■ RS-485 External Modem Kit	■ Dolphin RS-232/RS-485 (LU 01, LU 02) ■ Dolphin via infrared (LU 10) **Option:** SmartLinx (see page 14) - PROFIBUS DP - Allen-Bradley RIO - DeviceNet	Built-in Modbus RTU/ASCII via RS-485 **Options:** ■ Dolphin Plus ■ SmartLinx - PROFIBUS DP - Allen-Bradley RIO - DeviceNet ■ RS-485 External Modem Kit	Telemetry capability with Modbus RTU/ASCII via RS-232/RS-485 **Options:** ■ Dolphin Plus ■ SmartLinx - PROFIBUS DP - Allen-Bradley RIO - DeviceNet ■ External Modem Kit ■ ECT EnviroRanger Tool software
Power specifications	■ ac version: 100-230 Vac ±15%, 50/60 Hz, 36VA/17W ■ dc version: 12-30 Vdc 20W	■ LU 01, LU 02: ac version: 100/115/200/230 Vac or dc version: 18 to 30 Vdc, 25 W ■ LU 10: 100/115/200/230 Vac	■ ac version: 100-230 Vac ±15%, 50/60 Hz, 36VA/17W ■ dc version: 12-30 Vdc 20W	■ ac version: 100-230 Vac ±15%, 50/60 Hz, 36VA/17W ■ dc version: 12-30 Vdc 20W
Approvals	CE, CSA$_{NRTL/C}$, UL Listed, FM	CE, CSA$_{NRTL/C}$, FM Lloyd's Register	CE, CSA$_{NRTL/C}$, UL Listed, FM	CE, CSA$_{NRTL/C}$, UL Listed

Allen-Bradley is a registered trademark of Rockwell Automation.
DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA).

EnviroRanger, SmartLinx and MultiRanger are registered trademarks of Siemens Milltronics Process Instruments Inc.
**Also available as Milltronics AiRanger® with similar specifications

OCM III

High accuracy ultrasonic flow monitor for open channels

Ultrasonic products are the cost-effective choice for monitoring and control in short- to long-range applications for liquids, slurries and solids in a wide range of industries. Non-contacting technology offers low-maintenance advantages. Siemens Milltronics is the world leader in ultrasonic level technology, with many models available and strong applications experience to support you.

	3 m (10 ft)
	Transducer dependent
	Transducer dependent
	■ Influent and effluent monitor ■ Sampler control ■ Low power remote monitoring ■ Data logger ■ Remote connection via modem ■ Dual power input **Option:** VS 100 Velocity Sensor
	3 relays, 4-20 mA
	Via RS-232 **Options:** ■ Flow Reporter software ■ External Modem Kit
	■ 100/115/200/230 Vac, ±15%, 50/60 Hz, 15VA and/or ■ 9-30 Vdc 8W
	CE, CSA$_{NRTL/C}$, FM

Echomax® transducers

	Liquids	Liquids and solids						Solids		Aggressive chemicals
		Standard				High temperature		High temperature		
	XRS-5	XPS-10	XPS-15	XPS-30	XPS-40	XCT-8	XCT-12	XLT-30	XLT-60	ST-H
Max. range	8 m (26 ft)	10 m (33 ft)	15 m (50 ft)	30 m (100 ft)	40 m (130 ft)	8 m (26 ft)	12 m (40 ft)	30 m (100 ft)	60 m (200 ft)	10 m (33 ft)
Min. range	0.3 m (1 ft)	0.3 m (1 ft)	0.3 m (1 ft)	0.6 m (2 ft)	0.9 m (3 ft)	0.6 m (2 ft)	0.6 m (2 ft)	0.9 m (3 ft)	1.8 m (6 ft)	0.3 m (1 ft)
Max. temp.	65°C (149°F)	95°C (203°F)	95°C (203°F)	95°C (203°F)	95°C (203°F)	145°C (293°F)	145°C (293°F)	150°C (300°F)	150°C (300°F)	73°C (164°F)
Min. temp.	-20°C (-4°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)
Typical applications	•Wet wells •Open channels	•Dusty solids •Slurries	•Deep wet wells •Solids	•Powders •Pellets •Solids	•Powders •Pellets •Solids	•Hot acids •Slurries	•Hot acids •Slurries	Clinker	Clinker	•Chemical storage •Liquid tanks
Frequency	44 kHz	44 kHz	44 kHz	30 kHz	22 kHz	44 kHz	44 kHz	22 kHz	13 kHz	44 kHz
Beam angle -3dB	10°	12°	6°	6°	6°	12°	6°	5°	5°	12°
Thread size	1" BSP/NPT	1" BSP/NPT	1" BSP/NPT	1.5" universal thread (BSP/NPT)	1.5" universal thread (BSP/NPT)	1" BSP/NPT	1" BSP/NPT	1" NPT	1" NPT	1" & 2" NPT
Housing	•PVDF Copolymer •CSM Optional: Flange with PTFE facing	•PVDF Optional: •Foam facing •Flange with PTFE facing	•PVDF Optional: •Foam facing •Flange with PTFE facing	•PVDF Optional: •Foam facing •Flange with PTFE facing	•PVDF Optional: Foam facing	•PVDF Optional: Flange with PTFE facing	•PVDF Optional: Flange with PTFE facing	•Aluminum •304 stainless steel •Polyester •Silicone	•Aluminum •304 stainless steel •Polyester •Silicone	ETFE
Compatible with:										
SITRANS LU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EnviroRanger ERS 500	✓	✓	✓			✓	✓			✓
HydroRanger 200	✓	✓	✓			✓	✓			✓
MiniRanger Plus	✓	✓	✓			✓	✓			✓
MultiRanger 100/200	✓	✓	✓			✓	✓			✓
OCM III	✓									

All Siemens Milltronics transducers have one or more of the following approvals: CE, CSA, FM, ATEX, SAA and Lloyd's Register. For details, specifications and a full list of approvals (Intrinsically Safe, Explosion Proof, Hazardous Locations, Sanitary), see www.siemens.com/milltronics.
Echomax is a registered trademark of Siemens Milltronics Process Instruments Inc.

Basic ultrasonic level measurement

Milltronics simple ultrasonic level measurement instruments are the right choice when you need reliable, accurate cost-effective level measurements.

The Probe

Short-range integrated ultrasonic level monitor; ideal for liquids and slurries in open or closed vessels

MiniRanger Plus

Short- to medium-range ultrasonic single vessel level monitor for liquids and slurries

Pointek ULS 200

Ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries; ideal for sticky materials

	The Probe	MiniRanger Plus	Pointek ULS 200
Range	3-wire version: 8 m (26 ft) 2-wire version: 5 m (16.5 ft)	15 m (50 ft): liquids Transducer and material dependent	Liquids: 5 m (16.5 ft) Solids: 3 m (9.8 ft)
Process temperature	-40° to 60°C (-40° to 140°F)	Transducer dependent (see page 11)	■ -40° to 60°C (-40° to 140°F) ■ -20° to 60°C (-5° to 140°F) for ATEX model or if mounted in metal
Process pressure	Vent to atmosphere	Transducer dependent	Vent to atmosphere
Key features	■ Built-in temperature compensation ■ Simple 2-button programming ■ PVDF copolymer or ETFE transducer **Options:** ■ Intrinsically Safe (2-wire) ■ Sanitary	■ Simple pump control ■ Integral keypad ■ Universal power supply ■ Two alarm contacts **Options:** ■ Wall, rack or panel mount ■ Open Channel Flow measurement ■ Volume conversion	■ Built-in temperature compensation ■ Two distinct level points (high level/low level) ■ Simple 2-button programming **Options:** ■ Flange adapter ■ Sanitary mounting
Output	■ 1 relay, 4-20 mA (3-wire) ■ 4-20 mA (2-wire)	■ 2 relays ■ 4-20 mA (isolated)	■ ac version: 2 form C (SPDT) relay (5A at 250 Vac) ■ dc version: 2 form C (SPDT) relay (48 Vdc) or transistor (2 switches 100 mA at 48 Vdc)
Communications		**Option:** Dolphin Plus via RS-232 and infrared link	
Power specifications	■ 3-wire version: 18-30 Vdc, 0.2 A max. ■ 2-wire version: 12-28 Vdc, 0.1 A surge	Universal power supply ■ 9-250 Vac (9-120 Vac for the Rack and Panel versions), 40-70 Hz, 38VA/12W ■ 9-250 Vdc, 11W	■ ac version: 100-230 Vac, 15%, 50/60 Hz, 12VA/5W max. ■ dc version: 18-30 Vdc, 3W
Approvals	CE, $CSA_{NRTL/C}$, FM (ATEX, CSA, SAA, and FM 3A for Intrinsically Safe version)	CE, $CSA_{NRTL/C}$, FM	CE, $CSA_{NRTL/C}$, FM, 3A, CSA/FM, ATEX

Hydrostatic level

Hydrostatic level measurement is low cost for direct mounting or mounting with remote seals on tanks and vessels. These instruments can handle extreme chemical and mechanical loads as well as electromagnetic interference. They are widely applied in chemical and petrochemical industries.

	SITRANS P MPS	SITRANS P DSIII
	Hydrostatic level monitor for direct mounting on tanks or vessels	Hydrostatic level monitor for mounting with remote seal on open or closed vessels with corrosive or non-corrosive liquids
Range	From 0-2 m H_2O to 0-20 m H_2O	8.3–30,000 mbar and 160 bar
Process temperature	-10° to 80°C (14° to 176°F)	-40° to 100°C (-40° to 212°F)
Process pressure*	Vent to atmosphere	32 to 160 bar (2325 psi)
Key features	■ Compact stainless steel enclosure and sensor ■ Easy installation **Options:** ■ Intrinsically Safe (IS) ■ Special measuring ranges; 0-1m H_2O to 0-200 m H_2O ■ Cable length up to 200 m (656 ft)	■ With remote seals up to 400°C (752°F) ■ Self-diagnostic ■ Elements for parameterization **Options:** ■ Intrinsically Safe ■ Explosion proof ■ Flame proof ■ Corrosion-resistant probes ■ Process connections and seals
Output	4-20 mA 2-wire	4-20 mA
Communications		■ HART ■ SIMATIC PDM compatible ■ PROFIBUS PA
Power specifications	10-36 Vdc	■ Standard: 10.5-45 Vdc ■ Intrinsically Safe: 10.5-30 Vdc
Approvals	CE, ATEX	CE, ATEX, FM/CSA

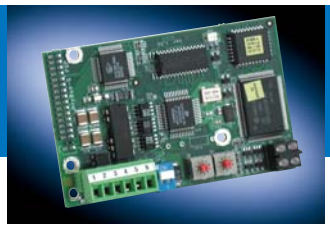
* Pressure ratings are in bar (psi) gauge, relative

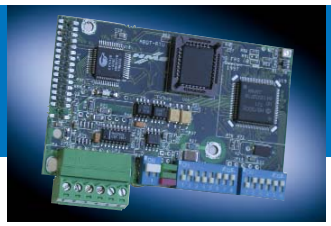
Communications solutions

SmartLinx

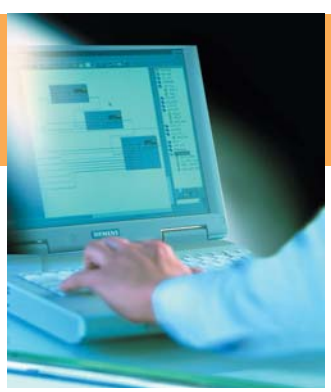
SmartLinx provides direct digital connection to commonly used industrial communications buses with true plug-and-play compatibility. SmartLinx modules are fast and easy to install, and can be added at any time.

For use with SITRANS LU, AiRanger, MultiRanger, HydroRanger and EnviroRanger.





SmartLinx module	PROFIBUS DP	Modbus RTU	Allen-Bradley Remote I/O
Access	Accessed via standard PLC programming techniques. Supports read-and-write access to all Siemens Milltronics instrument data and parameters	Accessed via standard PLC programming techniques. Supports read-and-write access to all Siemens Milltronics instrument data and parameters. For use with SITRANS LU and InterRanger	Accessed via standard PLC data transfer techniques. Using Block Transfer, the PLC can both read and write all appropriate data
Interface	RS-485 (PROFIBUS DP Standard)	RS-232 or RS-485	RIO interface
Baud rate	All valid PROFIBUS DP rates from 9600 bps to 12 mbps, auto-configured	1200, 2400, 4800, 9600, 19200, 34800 bps	57.6, 115.2 or 230.4 kb user selectable
Address	0-99	1-247	1-73, ¼ to one full rack
Connection	Slave	Slave	Slave



SIMATIC PDM software

SIMATIC PDM (Process Device Manager) is a manufacturer-independent software tool for the operation, configuration, parameterization, maintenance and diagnosis of intelligent field instruments. Based on the EDD standard, it can be used independent of a specific automation system via a PC or programming device or as an integral part of the SIMATIC PCS 7 process automation system.

Core functions include:
- Set-up and modification of parameters
- Comparison
- Plausibility checks
- Data management
- Commissioning functions

SIMATIC PDM offers communications via HART protocol, PROFIBUS DP, PROFIBUS PA or other protocols.

See www.siemens.com for up-to-date product list.

External Modem Kit

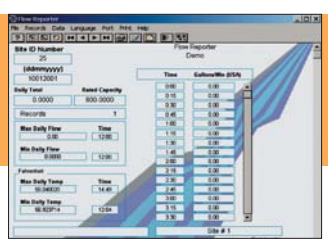
The External Modem Kit contains an external industrial modem, power supply, connection cables, and a detailed instruction manual – all the tools you need to connect many Siemens Milltronics field instruments to your control system. The industrial dial-up modem is connected through an RS-232 or RS-485 port on the product. It allows you to communicate quickly and easily with:
- SITRANS LU
- EnviroRanger ERS 500
- HydroRanger 200
- MultiRanger 100/200
- OCM III Open Channel Meter

The External Modem Kit allows quick and easy set-up and communications. The instruction manual describes how to configure the modem, saving time and frustration in trying to determine the correct modem settings. The kit can be mounted using screws or a DIN rail.
All components are industrial grade and can stand up to the industrial environment.

Dolphin Plus

Dolphin Plus is instrument configuration software for:
- EnviroRanger ERS 500
- MiniRanger Plus
- HydroRanger 200
- SITRANS LU/AirRanger
- MultiRanger 100/200
- SITRANS LR 300

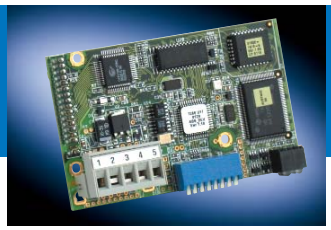
It helps you configure, monitor, tune and diagnose most Siemens Milltronics instruments either remotely from your desktop PC or connected directly in the field using a laptop. Just load the software from the CD and in minutes you can set up or modify complete parameter configurations for single or multiple instruments in the Windows® environment. After configuration, you can edit parameters on the fly, upload and download parameter sets to and from disk, and use parameter sets saved from other instruments. You can also work with echo profiles for fine-tuning without the need for special instruments.



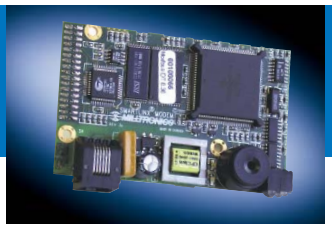
Flow Reporter

Flow Reporter is a Windows-based configuration software and data extractor for use with the Milltronics OCM III Open Channel Meter.

From a remote PC, it permits you to:
- Monitor and troubleshoot flow readings collected by the OCM III
- View and modify parameters
- Connect to OCM III either directly or with a modem – host computer can be any distance from the flowmeter
- Seek out specific data using the relational database
- Upload data logs from the OCM III
- Review past and present data logs in a database environment
- Export summary information and data to a spreadsheet program
- Print daily or monthly reports

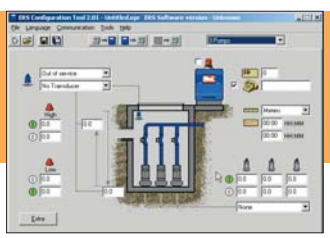


DeviceNet



Modem – Modbus RTU

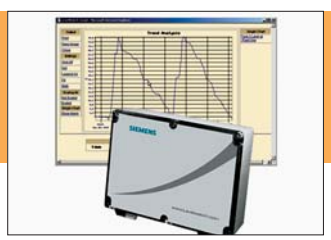
Accessed via standard PLC data transfer techniques. Using Block Transfer, the PLC can both read and write all appropriate data	Supports telephone line connections for North American and European installations. For use with SITRANS LU and InterRanger
DeviceNet physical layer	RJ-11 to phone line
125, 250, 500 kbps	1200, 2400, 4800, 9600, 19200, 34800 bps
0-63	1-247
Slave (group 2)	Slave



ECT EnviroRanger Tool

ECT is a data logging and user interface tool. It makes it easy for you to set up EnviroRanger for the nine most commonly used applications, such as pump stations, screens, gates, flumes and weirs.

ECT provides a user interface to retrieve data logs directly from EnviroRanger, for viewing in graphical format or exporting to a spreadsheet program.



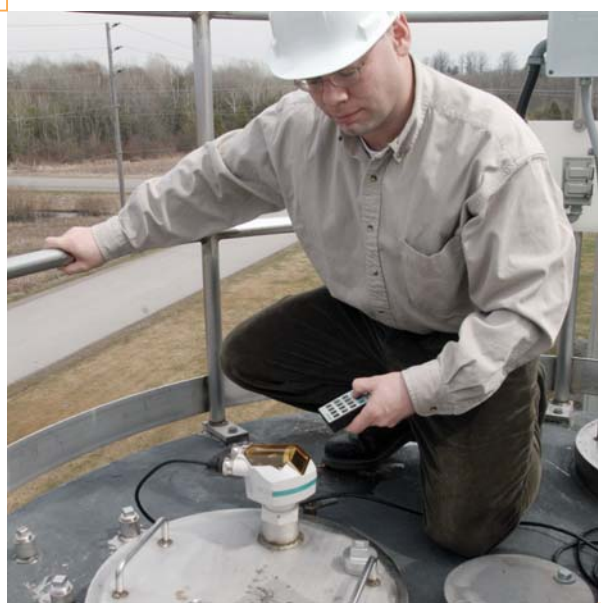
Remote monitoring with Levelwatch.com

Levelwatch.com unlocks data at remote sites and distributes it for use in making business decisions. Using measuring equipment such as ultrasonic, capacitance, radar or other instruments, readings are taken at the remote site.

A Levelwatch.com unit connects this field data using landline, wireless modem, or satellite to a secure web site. The system monitors status, tracks trends, and sends alarms directly to designated personnel by phone, fax, page, or e-mail. Alarm details are available on-line.

Levelwatch.com provides the tools for a value-added inventory management service as vendors monitor customer inventory levels and can anticipate demand and optimize delivery schedules. Manufacturers can also monitor bulk material levels to ensure a supply for continuous production, with no more running out or emergency deliveries.

Siemens Milltronics products can be connected via their Modbus ports, allowing access to key operational parameters, such as pump setpoints, and pump or flow totalizers.



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