

DASTEC S.R.L.

Representantes / Distribuidores Exclusivos

Buenos Aires, Argentina Tel.: (54 - 11) 5352-2500 Email: info@dastecsrl.com.ar Web: www.dastecsrl.com.ar



HE KLAY-INSTRUMENTS



"ALL STAINLESS"
PRESSURE AND LEVEL
TRANSMITTERS

About KLAY Instruments

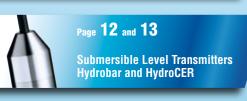
















Klay Instruments is a Dutch manufacturer of All Stainless Steel Process Instrumentation. Founded in 1978 Klay has built up a long history in development, production and sales of Process Instrumentation. Our company is ISO 9001-2008 certified.

We produce a wide range of Pressure and Level transmitters in "All Stainless Steel design", both Analog and "Intelligent" series are available with HART® Protocol and Profibus PA. Many certificates are available, like ATEX Ex, IECEx, SIL2, EHEDG and 3A food approvals, Marine Type approvals like DNV, BV, Lloyds, GL and RINA. All industrial process connections are available (more than 50!).

Always a Stainless Steel Electronics Housing:



Besides our pressure and level transmitters we also manufacture level switches, like our All Stainless Steel "Tuning fork" level switch type "Vibra-Switch". Also a range of pressure switches and PT-100 temperature sensors are produced. All instruments are developed and produced in our factory in Dwingeloo, The Netherlands. Klay Instruments has a world wide sales and service network in more than 45 countries.

Specialist in Flush Diaphragm Transmitters

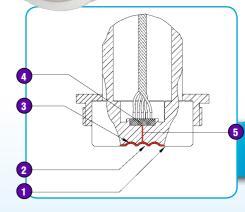
Klay Instruments is specialized in manufacturing Pressure and Level transmitters with a strong Flush mounted diaphragm. All Klay transmitters with a flush diaphragm are equipped with the unique Klay Flush Diaphragm Technology.

All transmitters are fully temperature compensated. We offer the following features with our F.D.T. system:

- Advanced laser welding techniques of diaphragm
- ✓ Strong diaphragm material. Standard polished (Ra < 0.15µm) 2
 </p>
- Backup wave structure behind diaphragm (protection against overpressure)
- Pressure and temperature sensor integrated right behind diaphragm 4
- Minimum oil filling between sensor and diaphragm 5
- 100% Helium leak tested and Full vacuum resistant.
- Active Temperature compensation
- Diaphragm materials: SS 316L (standard), options: Hastelloy C, Tantalum or Gold plated.

(Detailed brochure from Klay Flush Diaphragm Technology available)





Klay advantages against oil filled capillary systems & remote seals

With our proven Flush Diaphragm Technology we have some big advantages against transmitters with oil filled capillaries and remote seals. Instead of using oil filled capillaries for remote electronics we use our strong Hytrel cable (with venting tube inside) between the process connection and our Stainless steel electronics housing. This gives even more advantages than the above mentioned points.

Our major advantages are:

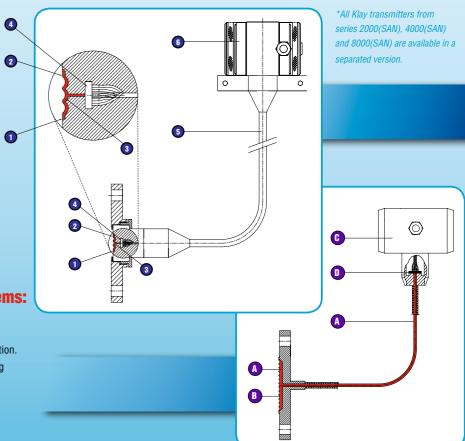
- Strong and small diaphragm
 - Laser welded
 - Standard polished
- 2 Minimum oil filling by using our Flush Diaphragm Technology
- 3 Backup Wave structure behind diaphragm equal to our diaphragm structure
- Pressure sensor near process
 - Built-in Temperature sensor
 - Active temperature compensation
 - No mounting position effect
- 5 Strong "vented" cable
- 6 Stainless steel Electronics housing

Dis advantages capillary systems:

Large amount of oil filling;

Sensitive for temperature fluctuations; No temperature compensation; Expensive solution.

- B Large diaphragm, more sensitive for damaging
- Mounted on standard transmitter; No active temperature compensation:
 - Large mounting position effects
- Pressure sensor too far from process



Selection Guide Klay Transmitters



	Pressure and Level transmitters. Zero and span adjustable by two potentiometers Accuracy: 0.2%			Intelligent Easy adjustable b	Pressure and Level transmitters by 3 pushbuttons and display with Accuracy: 0.1%	Pressure and level transmitters With Unique "One button" calibration and graphic display. Accuracy: 0.075%		
Transmitter overview							2.980	264.50
Туре	CER-8000	8000	8000-SAN	CER-2000	2000	2000-SAN	4000	4000-SAN
Process	Threaded	G1" threaded	Hygienic connections,	G½" or ½" NPTm	G1" threaded	Hygienic connections,	G1" threaded	Flanges, threads, etc.
connections	G½" or ½" NPTm	Pulp & paper connections Flush mounted diaphragms	Flanges, threads, etc. More than 40! Flush mounted diaphragms		Pulp & paper connections Flush mounted diaphragms	Flanges, threads, etc. More than 40! Flush mounted diaphragms	Pulp & paper connections Flush mounted diaphragms	Hygienic connections, More than 40! Flush mounted diaphragms
Accuracy		0.2% of calibrated span			0.1% of calibrated span	0.075% of calibrated span		
Turn down		4:1		10:1			20:1	
Span	0.2350 bar	0.1 100 bar	0.04100 bar	0.2350 bar	0.1 100 bar	0.04100 bar	0.1 100 bar	0.03100 bar
minmax					(option: till 1000 bar)			
Output		4-20 mA			Option: HART Protocol or P	4-20 mA Option: HART Protocol		
Diaphragm	Ceramic sensor SS 316L flush diaphragm.			Ceramic sensor SS 316L flush diaphragm.			SS 316L flush diaphragm.	
material	Options: Hastelloy C, Tantalum or Gold plated					Tantalum or Gold plated	Options: Hastelloy C, Tantalum or Gold plated	
Process			-20° +100°C (145°C /45min)	-20° +80°C		-20°+100°C (145°C /45min) (option: HT max. 300°C)	-20° +80°C	-20° +100°C (145°C /45min)
temperature		(option: HT max. 300°C)		2	04 Stainlage steel (Option: SS 2:	(option: HT max. 300°C)		
Electronics housing	316 Stainless steel			ა	04 Stainless steel (Option: SS 3	304 Stainless steel (Option: SS 316)		
Calibration		By zero and span potentiometer	8	Rv 3 nush	buttons and display (without te	By 1 pushbutton and graphic display (without testpressure)		
Certificates /	ATEX Ex ia , IECEx		ATEX Ex ia, IECEx	ATEX Ex ia,		ATEX Ex ia	ATEX Ex ia (pending)	
Approvals	Lloyds, DNV, GL, RINA (Marine)		3A and EHEDG (Food)	Lloyds, DNV, GL, RINA (Marine)		3A and EHEDG (Food)	SIL 2 (pending)	
	Gost, SIL2		Lloyds, DNV, BV, RINA,	-	, SIL2	Lloyds, DNV, BV, RINA,	, o	
		,				GL (Marine), Gost, SIL2		
Applications	Pressure on gas, steam,	Pressure on fluids, pulp &	Pressure- and Level on fluids,	Pressure on gas, steam,	Pressure on fluids, pulp &	Pressure- and Level on fluids,	Pressure on fluids, pulp &	Pressure- and Level on fluids,
	vapour and clean fluids	paper, starch, oil, etc	pastes and sludges in all industries	vapour and clean fluids	paper, starch, oil, etc	pastes and sludges in all industries	paper, starch, oil, etc	pastes and sludges in all industries
Features		Housing All Stainless steel (Compact and Rugged)			ttons and display	Easy calibration by 1 pushbutton and graphic display		
		ctions, flanges and threaded conn	ections	Housing All Stainless steel (,	 Housing All Stainless steel (Compact and Rugged) All industrial process connections 		
	Active Temperature compen			• •	tions, flanges and threaded conr			
	• Flush Diaphragm Technolog	У		Active Temperature compens		Active Temperature compensation Fluck Displayers Technology		
				 Flush Diaphragm Technology 		Flush Diaphragm Technology		

Features series 8000





- ✓ TURN DOWN 4:1
- ✓ ZERO AND SPAN INTERNALLY ADJUSTABLE
- STAINLESS STEEL HOUSING
- ✓ ACTIVE TEMPERATURE COMPENSATION
- ✓ RANGES FROM 80 MBAR TO 350 BAR
- ✓ ALL INDUSTRIAL PROCESS CONNECTIONS
- ✓ STRONG FLUSH DIAPHRAGMS





Pressure transmitters with a ceramic sensor for Pressure measurement on clean fluids, gases and vapours. Process connections: G½" or ½" NPT. Available ranges: from 0-0.2 bar to 0-350 bar

8000

Pressure transmitters with a small and strong flush mounted diaphragm for pressure applications on sticky fluids where a flush diaphragm is necessary like pulp & paper, starch, etc. Process connections: G½", G1" and special pulp & paper connections (PMC, PASVE, etc). Available ranges: 0 - 0.1 bar to 0 - 100 bar

8000-SAN

Pressure- and Level transmitters with strong flush mounted diaphragms for all kind of fluids, pastes and sludges. They are specially designed to use in the Food, Pharma and (Petro)chemical industry. There is a wide selection of process connections available (more than 50!) among them there are many hygienic process connections, most of them are EHEDG and 3-A certified. The 8000-SAN transmitters are both CIP and SIP cleanable.

Separate housing / remote electronics

With a "separate housing" version you are able to mount the electronics housing at a distance from the process connection. The process connection and electronics housing are joined by a special "vented" cable (IP68). Applications could be on locations with: difficult access, wet area, high process vibrations, high process temperatures, etc. All 8000 and 8000-SAN types are available with the separate housing. Cable length must be specified at the order.

Type: 8000-SAN-Cable(..m)-range-...(See detailed product brochure).























8000-SAN









Features series 2000







- ✓ ACCURACY: 0.1% FROM ADJUSTED SPAN
- **V** TURN DOWN 10:1
- ✓ EASY CALIBRATION WITHOUT TESTPRESSURE BY 3 PUSHBUTTONS
- ✓ STAINLESS STEEL HOUSING
- ACTIVE TEMPERATURE COMPENSATION
- ✓ RANGES FROM 40 MBAR TO 350 BAR
- ✓ ALL INDUSTRIAL PROCESS CONNECTIONS AVAILABLE
- ✓ STRONG FLUSH MOUNTED DIAPHRAGMS
- **V** EASY TANK LINEARISATION



CER-2000/"Peramic"

Pressure transmitters with a ceramic sensor for pressure measurement on clean fluids, gases and vapours. Process connections: G ½"or ½" NPT.

Available ranges: from 0-0.2 bar up to 0-350 bar

2000

"Intelligent" Pressure transmitters with a small and strong flush mounted diaphragm for pressure applications on sticky fluids where a flush diaphragm is necessary like pulp & paper, starch, etc. Process connections: G½", G1" and special pulp & paper connections (PMC, PASVE, etc). Available ranges: 0 - 0.1 bar up to 0 - 100 bar.

2000-SAN

"Intelligent" Pressure and Level transmitters with strong flush mounted diaphragms for all kind of fluids, pastes and sludges. They are specially designed to use in the Food, Dairy and Pharma industries, pulp & paper and (Petro)chemical industry. There is a wide selection of process connections available (more than 50!) among them there are many **hygienic process connections**, most of them are **EHEDG and 3-A certified**. The 2000-SAN transmitters are CIP and SIP cleanable. Available ranges: 0 - 0.04 bar up to 0 - 100 bar

Separate housing / remote electronics

With a "separate housing" version you are able to mount the electronics housing at a distance from the process connection. The process connection and electronics housing are joined by a special "vented" cable (IP68). **Applications** could be on locations with: difficult access, wet area, high process vibrations, high process temperatures, etc. All 2000 and 2000-SAN types are available with the separate housing. Cable length must be specified at the order. Type: 2000-SAN-Cable(..m)-range-...



























Features series 4000

- ✓ TURN DOWN 20:1
- ✓ UNIQUE ,ONE TOUCH PROGRAMMING BUTTON"
- STAINLESS STEEL HOUSING
- ✓ GRAPHIC DISPLAY INCL. BARGRAPH AND BACKLIGHT
- ACTIVE TEMPERATURE COMPENSATION
- ✓ RANGES FROM 30 MBAR TO 100 BAR
- ✓ ALL INDUSTRIAL PROCESS CONNECTIONS AVAILABLE
- STRONG FLUSH MOUNTED DIAPHRAGMS
- **V** EASY TANK LINEARISATION



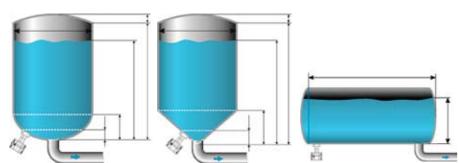






Easy Tank linearisation

Various tankshapes are already pre-programmed in the series 4000(SAN) which ensures a very easy tank linearisation.



The standard tank shapes are:

- Horizontal tank with flat end
- Horizontal tank with parabolic end
- Vertical tank with a spherical bottom
- Vertical tank with a conical bottom

In addition, a free linearization curve of up to 50 points is adjustable.

4000

"Intelligent" High-end Pressure transmitters with a small and strong flush mounted diaphragm for pressure applications on sticky fluids where a flush diaphragm is necessary like pulp&paper, starch, oil, etc. Process connections: G½", G1", special pulp & paper connections (PMC, PASVE), etc.

Available ranges: 0 - 0.1 bar up to 0 - 100 bar

4000-SAN

"Intelligent" High-end Pressure- and Level transmitters with strong flush mounted diaphragms for all kind of fluids, pastes and sludges. They are specially designed to use in the Food, Dairy and Pharma industries, pulp & paper, (Petro)chemical and oil & gas industry. There is a wide selection of process connections available (more than 50!) among them there are many hygienic process connections, most of them are **EHEDG and 3-A certified**. The 4000-SAN transmitters are CIP and SIP cleanable. Available ranges: 0 - 30 mbar up to 0 - 100 bar

Separate housing / remote electronics

With a "separate housing" version you are able to mount the electronics housing at a distance from the process connection. The process connection and electronics housing are joined by a special "vented" cable (IP68). Applications could be on locations with: difficult access, wet area, high process vibrations, high process temperatures, etc. All 4000 and 4000-SAN types are available with the separate housing. Cable length must be specified at the order. Type: 4000-SAN-Cable(..m)-range-...



















Hydrobar and HydroCER

Submersible level transmitters

Features Series Hydrobar

Selection Table	1 Hydrobar-Cable-FR	2 Hydrobar-Cable-Range	Hydrobar-EXTD-Range	Hydrobar-'l'	5 2000-Hydrobar-Cable	6 2000-Hydrobar-EXTD	7 HydroCER-Cable-FR	8 HydroCER-'I'	AquaCER-Cable
StSt 316L Diaphragm									
Ceramic sensor									
Fixed Range									
Adjustable range									
Accuracy 0.2%									
Accuracy 0.1%									
Output 4-20 mA									
HART®Protocol (option)									
Local display (option)									
ATEX Ex ia (option)									
Marine Type Approvals									
Sensor Diameter (mm)	38 or 50	38 or 50	38 or 50	38 or 50	38 or 50	38 or 50	38 or 50	38 or 50	22
Klay Drawing No.	8000-13	8000-14	8000-35	2000-13	2000-14	2000-35	8000-113	2000-113	

Cable material:

- PE (Polyethylene) diam. 10 mm = standard
- Hytrell (code: G10) diam. 10 mm (option / extra price)
- PUR (Polyurethane) (option) diam. 8 mm

Mounting possibilities (topmounting):

- a. Cable clamp (Option: Art. No.: 20636)
- b. Wall mounting bracket (standard with all adjustable types)
- c. Flange (topmounted) according to Klay drawing no.: 8000-15 / 2000-15
- d. Threaded connection (1½" or 2" BSP)



Cable clamp



JunctionBox FMD(IP67) Art. no. 20636 Art. no. 20069

HYDROBAR

HYDROBAR 'I' OR 'S'



Klay Instruments offers a wide range of submersible Level transmitters with a cable or SS tube extension, to be used as topmounted level transmitters in water and waste water, deep wells, underground tanks, concrete bunkers, etc. All transmitters are fully temperature **compensated** and most of them are internally adjustable on zero and span. The output is 4-20 mA / 2-wire. The SS 316L diaphragms from series **Hydrobar** are very strong and laser welded, this results in a Perfect Long term stability. The series **HydroCER** are made with a strong **capacitive ceramic sensor.** Options include HART® Protocol and ATEX Ex ia Intrinsic safety.

Types with Stainless Steel diaphragm:

- 1 Hydrobar-Cable-FR (Fixed range, not adjustable)
- Accuracy: 0.2% from adjusted span

2 Hydrobar-Cable-Range

Adjustable on zero and span by potentiometers

Accuracy: 0.2% from adjusted span

3 Hydrobar-EXTD-Range (SS tube extension)

Adjustable on zero and span by potentiometers

Accuracy: 0.2% from adjusted span

"Intelligent" types:

4 Hydrobar-'I'-Cable-range

Intelligent level transmitter

Adjustable by HART® Protocol or PC. Accuracy: 0.1% from adjusted span

- 5 2000-Hydrobar-Cable-range
- 6 2000-Hydrobar-EXTD-range

Easy adjustable by 3 pushbuttons and display without testpressure.

Accuracy: 0.1% from adjusted span. For all Features see series 2000 on page 9.

The display can be used during programming and can also indicate the process temperature or the measured level. A tanklinearisation can be done and a 4-20 mA current simulation can be performed. Mounting can be done by cable clamp, wall mounting bracket, Flange (DIN or ANSI) or a threaded connection G1½" or 2" BSP or NPT).

Types with Capacitive Ceramic sensor:

- 7 HydroCER-Cable-FR (Fixed range, not adjustable)
- Accuracy: 0.2% from adjusted span
- 8 HydroCER-'I'-Cable-range

HART Intelligent level transmitter

Adjustable by HART® Protocol or PC.

Accuracy: 0.1% from adjusted span

9 AquaCER-Cable-range

Sensor diameter 22 mm



✓ ACCURACY 0.2% OR 0.1% FROM ADJUSTED SPAN

✓ ACTIVE TEMPERATURE COMPENSATION

PERFECT LONG TERM STABILITY

STRONG FLUSH DIAPHRAGMS

V ZERO AND SPAN ADJUSTABLE

✓ ATEX II1G Ex ia (OPTION)

















Specialist in "Specials"

In the past 35 years we have made Pressure and Level transmitters in many creative constructions. Most of them have become a standard in our factory now, like the versions mentioned on this page. If you have a special process connection and you need to replace an existing transmitter, do not forget to ask the **Specialist in "Specials"!**

Extended diaphragms:

The series 2000- and 8000-SAN-EXTD are Flange mounted Level transmitters with an extended diaphragm. The extension length and diameter must be specified, always refer to our drawing no. 8000-61.

The transmitters do have a strong flush mounted diaphragm and are fully temperature compensated. Technical specifications are equal to the standard series 2000-SAN and 8000-SAN.

High Temperature (HT) Versions:

For High temperature applications we manufacture the series 8000-SAN and 2000-SAN with special cooling fins or with separated electronics.

The compact versions with cooling fins can measure up to 180°C and with cooling fins and separated electronics we can measure up to 300°C. The lowest span range for these high temperature versions is 0.5 bar.

Homogenizer transmitters:

For high pressure applications on Homogenizers in the Food- and Dairy we manufacture an "Intelligent" high pressure transmitter with the typical homogenizer process connection. These transmitters are executed with an ,unbreakable SS flush diaphragm"! Biggest problem by measuring pressure with pressure gauges or pressure transmitters on homogenizers is the stability and the damage of the flush diaphragm. With our series 2000 Homogenizer transmitters a broken diaphragm is history! The 2000-Homogenizer transmitters are available in compact version or in a version with separate electronics. Many different homogenizer block process connections are available.

Valve Pressure transmitters "exchangeable during process"

The series 8000-Valve and 2000-Valve are a combination of a level transmitter and a special ball-valve. The design permits flush installation of the diaphragm and a transmitter that can be removed without shutting down the process.

Process connections are DIN or ANSI Flanges, a G1½" threaded connection or special weld-on nipples in various diameters. Ranges are available from 100 mbar to 16 bar. For lower ranges we use a 1½" valve size and for pressure ranges we can use a smaller 1" valve size.





















Level Switches for fluids

Klay Instruments offers a wide range of "All Stainless" levelswitches mainly for use in the Food & dairy and Pharmaceutical industries and the Water & waste water industry.

The offered measuring principles are:

- Tuning Fork series Vibra-Switch, type VSC and VSS
- Conductivity based levelswitch, type FLX
- Electromagnetic wave, type KMW

Tuning Fork levelswitch "Vibra-Switch"

The "Vibra-Switch" levelswitches are available in 2 versions. The compact version with connector or cable connection, type **VSC** and the rugged and compact version with a complete **Stainless Steel electronics housing** type **VSS**.

Both versions are based on the tuning fork principle. They are available in various sanitary process connections such as Tri-clamp, milkcoupling or a threaded version (G1"). All flange sizes (DIN / ANSI) are available too. Insertion lengths vary from 47 mm to extended versions of 2.5 metre. Both types are CIP and SIP cleanable.

Conductivity based FLX

The "FLX" leveswitch is based on the principle of conductivity and is a very rugged designed "All stainless steel" levels witch. All standard process connections, like G1" thread, milkcoupling, Tri-clamp and Flanges are available. Insertion lengths are starting from 30 mm to 2 metre.

Electromagnetic waves: KMW

The hygienic level switch KMW is microprocessor based and can be installed in any position in tanks or piping systems. The measuring principle is an electromagnetic wave (100...180MHz). A high frequency signal sweep is radiated from the sensor tip into the tank or pipe.

The medium acts as a virtual capacitor, which together with a coil in the sensor, will form a circuit creating the switching point. Therefore the KMW is suitable for almost all liquids and paste-like medias.

To adjust the sensitivity there are two possibilities, by internal dipswitch or via PC with software. For viscous and adhesive medias the KMW is available with an extended PEEK sensor (see photo). Applications are high and low level detection in tanks and dry run protection of pumps in the Food & Beverage and Pharmaceutical industry.

All common hygienic process connections are available.











EK KLAY-INSTRUMENTS WORLD WIDE



In this brochure we show an overview of our complete production program. From each described product there is a detailed technical brochure available.

Visit our website **www.klay.nl** to download these brochures or call one of our inside sales engineers at (+31)521 591550. On request we can send you our complete general catalog with all detailed brochures.

Approvals

A lot of approvals/certificates are available for several transmitters and industries. If you require an approval/certificate which is not mentioned please contact us.



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KLAY-IHSTRUMENTS BX.









Manufactured by:

KLAY-INSTRUMENTS B.V.

Nijverheidsweg 5 P.O. Box 13 T: +31 521-591550 7991 CZ Dwingeloo 7990 AA Dwingeloo F: +31 521-592046

The Netherlands info@klay.nl www.klay.nl

Our representative in your area is:



Representantes / Distribuidores Exclusivos

Buenos Aires, Argentina Tel.: (54 - 11) 5352-2500 Email: info@dastecsrl.com.ar Web: www.dastecsrl.com.ar