Zumbach
SWISS PRIME MEASURING SINCE 1957

ODAC® / USYS

In-line & Off-line Dimensional & Quality Control
ODAC® – Laser Diameter & Dimension Measuring Gauges
USYS – Universal Data Acquisition, Processing & Display Systems
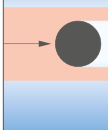
ODAC® LASER MEASURING HEADS

Highest accuracy, robustness, reliability and functionality distinguish all the laser measuring heads from ZUMBACH. Known for precision, quality and ease of use the laser measuring heads are among the best of their class.
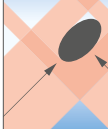
The technological basis considered for these measuring heads is always of the latest cutting edge technology combined with intelligent and powerful measured-value processors which facilitate a simple and flexible integration. Our long-standing experience as a pioneer of in-line measuring technology, combined with high production figures result in a product with an excellent price-performance ratio.
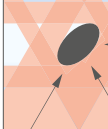
Amongst the outstanding features are features such as single scan calibration (CSS), single scan monitoring and high data rate output of up to 333* data packages per second.

The measuring heads can be used with all line speeds. Vibrations during production have no noticeable influence on measurements.

* Depending on the measuring head model, the number of transmitted measured values as well as the baud rate of the interface.

| | 240 (9.45) | 240 (9.45) | 380 - 1060 (15 - 41.7) | 560 - 1160 (22 - 45.7) | 730 - 1480 (28.74 - 58.27) | 1000 - 1650 (39.37 - 64.96) | 1320 - 2820 (51.97 - 111.02) | 1750 - 2950 (68.89 - 116.14) |
	50 (1.97)	50 (1.97)	120 - 800 (4.7 - 31.5)	200 - 800 (7.8 - 31.5)	250 - 1000 (9.84 - 39.37)	350 - 1000 (13.77 - 39.37)	500 - 2100 (19.69 - 78.74)	800 - 2000 (31.49 - 78.74)
1-axis	ODAC 2J [1]	ODAC 16J [1]	ODAC 60J [1]	ODAC 100J	ODAC 160J	ODAC 230J	ODAC 310J	ODAC 550J
Measuring field	2 mm (.079 in.)	16 mm (.64 in.)	60 mm (2.36 in.)	100 mm (3.94 in.)	160 mm (6.3 in.)	230 mm (9.05 in.)	310 mm (12.2 in.)	550 mm (21.6 in.)
Min. product diameter	0.012 mm (.0005 in.)	0.05 mm (.002 in.)	0.2 mm (.008 in.)	0.25 mm (.01 in.)	0.5 mm (.02 in.)	0.75 mm (.03 in.)	1 mm (.04 in.)	1.4 mm (.055 in.)
Scanning frequency /s	240	240 or 480	1000 / 2000	1000 / 2000	1000 / 2000	1000 / 2000	1000 / 2000	1000 / 2000
Scan speed m/s, (ft./s)	18.8 (62)	24 or 48 (79 or 158)	157.7 (517.4)	219 (718)	328 (1076)	473 (1552)	606 (1988)	1056 (3464)
Fast version m/s, (ft./s)	–	–	315.4 (1034.8)	438 (1437)	656 (2152)	946 (3104)	1212 (3976)	2112 (6929)
Repeatability* µm (in.)	0.15 (.000006)	0.15 (.000006)	0.25 (.000010)	0.35 (.000014)	0.4 (.000016)	0.6 (.000024)	1 (.00004)	3 (.00012)
Measurement error µm (in.)	± 0.3 (± .000012)	± 0.5 (± .00002) ± 0.1 ‰	± 2 (± .00008)	± 2 (± .00008)	± 3 (± .00012)	± 5 (± .0002)	± 25 (± .0001)	± 50 (± .002)
Modular design			•	•	•	•	•	•

| | 285 (11.22) | 285 (11.22) | 260 (10.24) | 310 (12.2) | 390 (15.35) | 530 (20.87) | 800 (31.49) |
	18 (.7)	18 (.7)	18 (.7)	25 (.98)	60 (2.36)	102 (4.02)	165 (6.49)
Dual axis	ODAC 14XY-JM	ODAC 14XY-J	ODAC 18XY-J	ODAC 34XY-J	ODAC 64XY-J	ODAC 110XY-J	ODAC 160XY
Measur. field (mm/in.)	3 x 3 (.12 x .12)	10 x 10 (.64 x .64)	18 x 18 (.71 x .71)	34 x 34 (1.34 x 1.34)	64 x 64 (2.52 x 2.52)	110 x 110 (4.33 x 4.33)	160 x 160 (6.3 x 6.3)
Min. product diameter	0.015 mm (.0006 in.)	0.060 mm (.0016 in.)	0.08 mm (.003 in.)	0.15 mm (.006 in.)	0.25 mm (.01 in.)	0.5 mm (.02 in.)	1.5 mm (.06 in.)
Scanning frequency /s	2 x 500	2 x 500	2 x 1200 / 2500	2 x 1200 / 2500	2 x 1200 / 2500	2 x 1200 / 2500	2 x 500
Scan speed m/s (ft./s)	65.8 (215.8)	65.8 (215.8)	67.8 (222.4)	117.9 (386.8)	207.5 (680.8)	354.6 (1163.4)	328 (1076)
Fast version m/s, (ft./s)	–	–	141.3 (4636)	245.6 (805.8)	432.3 (1418)	738.8 (2423.8)	–
Repeatability* µm (in.)	0.1 (.000004)	0.1 (.000004)	0.05 (.000002)	0.05 (.000002)	0.08 (.0000032)	0.25 (.0001)	0.6 (.000023)
Measurement error µm (in.)	± 0.3 (± .000012)	± 0.5 (± .00002) ± 0.01 ‰	± 0.5 (± .00002) ± 0.1 ‰	± 1 (± .00004) ± 0.08 ‰	± 2 (± .00008) ± 0.1 ‰	± 5 (± .0002) ± 0.05 ‰	± 3 (± .00012)

| | 300 (11.8) | 320 (12.6) | 420 (16.54) | 630 (24.80) |
	15 (.59)	30 (1.18)	51.75 (2.04)	110 (4.33)
Triple axis	ODAC 13TRIO	ODAC 33TRIO	ODAC 63TRIO	ODAC 113TRIO
Measur. field (mm/in.)	3 x 16 (3 x 0.63)	3 x 34 (3 x 1.34)	3 x 64 (3 x 2.52)	3 x 110 (3 x 4.33)
Min. product diameter	0.06 (.0024)	0.15 (.006)	0.25 (.01)	0.5 (.02)
Scanning frequency /s	3 x 600 / 1500	3 x 600 / 1500	3 x 600 / 1500	3 x 600 / 1500
Scan speed m/s (ft./s)	52.6 (172.6)	98.3 (322.5)	173 (567.5)	295.5 (969.5)
Fast version m/s, (ft./s)	131.6 (431.6)	245.6 (805.9)	432.5 (1418.9)	738.8 (2324.9)
Repeatability* µm (in.)	0.12 (.000005)	0.12 (.000005)	0.3 (.000012)	0.5 (.000018)
Measurement error µm (in.)	± 0.40 (± .000016) ± 0.01 ‰	± 1 (± .00004) ± 0.08 ‰	± 2 (± .00008) ± 0.1 ‰	± 5 (± .0002) ± 0.05 ‰

Flexible communication integration

- RS (-232 /-422 /-485)
- DP (Profibus DP)
- EN (Ethernet TCP/IP)
- PN (Profinet IO)
- J (digital, for connection to USYS processors)
- Local display
- Analog interface

* For 3 Sigma and 1 s averaging time

[1] Available only in ODAC J versions

All dimensions in mm and (inches) resp. (µm) 1µm = 0.001mm

ODAC® Laser Scanners

- Very high scan rate (measuring frequency) up to 2500/s
- High precision measurement
- Permanent calibration
- Integrated fault detection function
- Insensitive to dirt
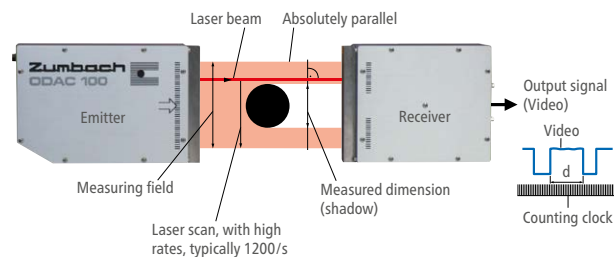- No safety problems
- High insensitivity to dirt and dust

USYS Processors

- For each application and each budget the optimal model
- Extremely fast and powerful thanks to ZUMBACH hardware and real-time software
- Industrial, easy to operate
- Rugged and stable evaluation and processing system
- Programmes on flash disc (no hard disc)
- Process specific configuration and software packages
- Flexible for extension

MEASURING PRINCIPLE AND TECHNOLOGY

A focused laser beam at a high rate is scanning the object. The time of obscuration is captured with a resolution of 0.00001 mm (.0000004 in.) as a dimension (shadow) and then further processed.

Material, colour, temperature etc. of the object has no influence on the measurement.

Laser beam / Absolutely parallel / Emitter / Receiver / Output signal (Video) / Video / Measuring field / Measured dimension (shadow) / Laser scan, with high rates, typically 1200/s / Counting clock

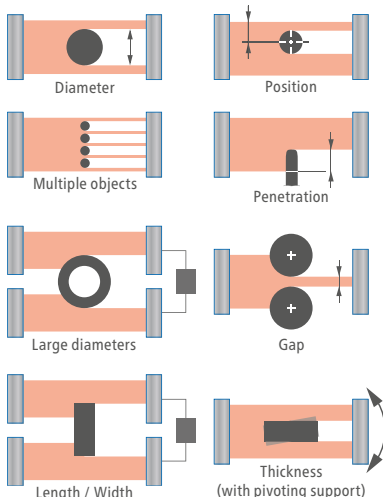### Adaptive signal processing in the measuring units increase accuracy

All the measuring heads of the ODAC® series have adaptive signal processing (patent DE3111356), which makes subsequent regular re-calibrations superfluous. Only in instances of component exchange or compliance to calibration regulations ISO 9000/9001 etc would re-calibration be required.

All the relevant parameters for accuracy are continuously monitored by the measuring system and automatically compensated. This is valid in particular also for possible long-term changes of the behaviour of the scanner motor or the measuring electronics.

A Complete Line of USYS Processors

A complete line of devices for the data processing, display, statistics, process control and networking is available for any specification and budget. All USYS processors are industrial, stable, easy to operate and extendable. They can process multiple ODAC® heads plus other sensors, speed and event inputs.

Typical measuring modes

Diameter

Position

Multiple objects

Penetration

Large diameters

Gap

Length / Width

Thickness (with pivoting support)

Fast Real Time

The unique CP XX pre-processors in ODAC® sensors or USYS processors enable, at the same time, fast, accurate and consistent readings thanks to sophisticated filter and computation algorithms.
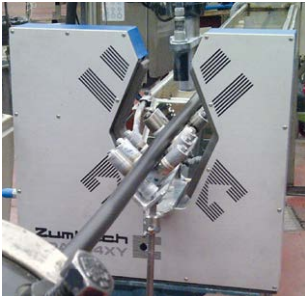Up to 2500 measurements/s can be processed, depending on the measuring head.

The SIGMA EXPERT Controller

Most USYS processors are available with this self-adapting controller type, which guarantees tighter product tolerances and considerable material savings.

	AT 4	WIREMASTER	USYS 20	USYS 200	USYS IPC 1e	USYS IPC 2e	Features	
Description	Low cost system for 1 measuring head LED display	Low cost system for 1 measuring head LED display	Economic system for 1 head LCD display	System for 1 head. Colour TFT LCD screen	Processor for OEM's or flexible system integration. Separate display unit	Processor for OEM's or flexible system integration. Separate display unit	Nomenclature: • = Standard, o = Option, ▲ = Only 1 feature at once	
	•	•					LED Display	Operation / Peripherals
			4.2" • monochrome	6.4" • LCD colour	Separate 19" touch screen •	Separate 19" touch screen •	Screen	
	•	•	•	•	•	•	System editor	
					•	•	Terminal for SPC charts	
	▲	▲	•	•	•	•	Remote display	
		•	•	•	•	•	Input external start/stop	
		•	•	•	•	•	Input external pause	
				•	•	•	Input external keyboard	
		•	•	•	•	•	Input line speed detection	
		•	•	•	•	•	Start/Stop / Pause	
	0.1 µm	0.1µm	0.1µm	0.01µm	0.01µm	0.01µm	Resolution	Measurement Data Processing
					•	•	Wall thickness meas. with 2 ODAC heads	
			•		•	•	Wall thickness measurement with ultrasonics	
	•	•	•	•	•	•	Capacitance measurement	
		•	•	•	•	•	Measurement gap width	
			•	•	•	•	Penetration depth	
					•	•	Hot/cold measurement	
		▲	•	•	•	•	Serial communication	Kommunikation
			•	•	•	•	Ethernet (TCP/IP protocol)	
				•	•	•	Web Server	
		•	•	•	•	•	Data Log	
				•	•	•	Report Manager	
				•	•	•	OPC UA	
				3 •	6 •	8 •	USB	
		▲	•	•	•	•	Serial printer, RS-232	
				•		•	Parallel printer	
				•	•	•	Ethernet printer	
		1 •	2 •	2 •	6 •	6 •; 4 o	Serial outputs	
		1 •	2 •	2 •	2 •; 4 o	2 •; 8 o	Analog outputs	
				•	•	•	Product library	
	1 •	1 •	1 •	1 •	2 •	5 •	Number of connectable measuring heads	
		1 •	1 •	2 •	2 •	2 •	Number of event inputs for sparks, lumps etc.	
	•	•	•	•	•	•	Alarm + / Alarm –	Diagnostics and Alarms
	•	•	•	•	•	•	General alarm	
	•	•	•	•	•	•	Pre-alarm	
	•	•	•	•	•	•	Self diagnosis	
				•	•	•	Statistic alarm	
					•	•	Hot/cold controller	Controller
			o	o	•	•	Static controller (SRD)	
				o	•	•	SIGMA EXPERT	
				o	•	•	Cpk pilot	
		•	•	•	•	•	Simple statistics	Statistics
				o	•	•	SPC with control charts	
		•	•	•	•	•	Package report	
				•	•	•	Data Log	
				•	•	•	Job Report	

The list of all possible applications and specific benefits of the various ZUMBACH systems is practically endless. The following represents some of the most typical applications:

Cable industry
- **Diameter & ovality measurement / control**
- **Average wall thickness**
- **Width / Height**
– Bare wire
– Cores
– Bundles
– Fillers
– Jackets
– Sectors
– Flat cables
– MV and HV cables
– Automotive cables
– Data cables
– Optical fibres
– Coatings

Wire Drawing
- **Diameter & ovality measurement / control**
- **Turbo Air Guard for dry lubrication**
– Wet lubrication
– Dry lubrication
– Copper wire
– Steel wire
– Steel cord
– Special wires
– Profile wires

Medical, Food, Cosmetic, Packaging
- **Diameter & Ovality**
- **Multi strand**
– Hoses
– Rods
– Tubes
– Blown film diameter
– Sausage casings

Plastic & rubber extrusion
- **Diameter & ovality measurement / control**
- **Width / Height**
- **Multi strand**
– Tubing
– Tubes
– Hoses
– Large tubes / pipes
– Profiles
– Ribbons
– Multi strands
– Blown Film Diameter

## Measurement of Insulations or Jackets on Cables

For the extrusion of cores or jackets the USYS IPC WALLMASTER system offers many possibilities thanks to its flexibility and easy handling. All parameters, thickness, eccentricity, diameter and ovality, can be controlled.

- For core insulation
- For jackets, also when loose or non-round
- For co-extrusion
- Automatic calibration with DIACAL system
- Hot / cold compensation
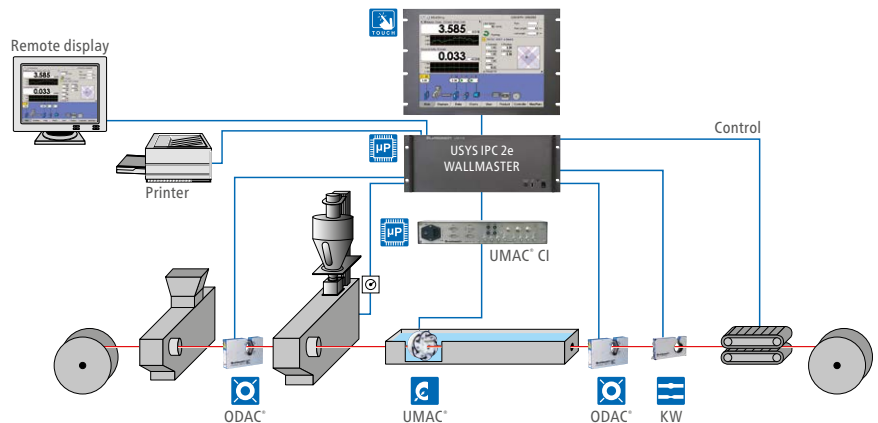
Steel & Metal Industry
- **STEELMASTER SMR, SMO or SMS systems**
- **1 to 6 measuring axes** (ODAC® measuring heads)
– Hot rolled long products
– Wire rod, Bar
– Profiles
– Tubes / seamless pipe
– Cold rolled and drawn products
- **EPM – "Enhanced Profile Measurement"** (patent pending) **The Measuring Method for Special Product Geometries**

STEELMASTER measuring unit
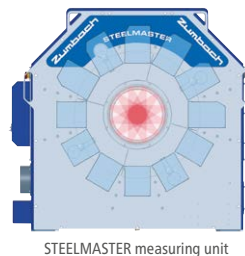
Typical configuration of a combined Bar / Rod mill with 3 STEELMASTER measuring units and 1 common STEELMASTER processing and display unit.
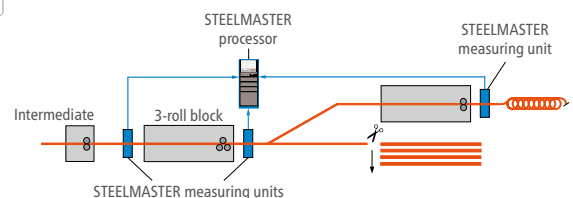
Scanning a multitude of shadow edges around the entire periphery captures the product shape. This is achieved with several ODAC® measuring heads, scanning synchronously with high accuracy. Also polygonal faults or other irregular geometries are accurately detected.

ODAC® / STEELMASTER – SYSTEMS FOR THE STEEL AND METAL INDUSTRY

Hot Processes

For heavy operating conditions in the area of steel and metal industry, in particular for hot rolling, ZUMBACH offers the special STEELMASTER program.

1 up to 6 ODAC® scanners form the heart of the measuring units SMS (static), SMO (oscillating) or SMR (rotating). The STEELMASTER electronics and software process the measuring data for display, process monitoring, statistics and for the data exchange with the customer's network.

Cold Processes

For cold processes, including cold rolling, drawing, peeling, grinding and for quality control (NDT) and sorting, ODAC® scanners with respective protection and USYS or STEELMASTER processors are used, depending on the case.

► Ask for special literature for above applications.

COMMUNICATION AND NETWORKING

Today, the ability of sensors or processors to communicate with other computers or networks is essential. ZUMBACH offers a variety of ODAC versions, interface units and USYS software to satisfy almost any need and concept.

ODAC® Manager

User-friendly software kit for easy configuration, calibration and verification using a PC. Versions for serial or ETHERNET communication.
– Minimises set-up time
– Easy access
– Graphic / numeric visualisation at a glance
– Easy, safe to retrieve configuration to/ from the PC

USYS Data Log

The USYS Data Log is a WINDOWS™ based software for easy data collection from one or several ZUMBACH processors and for saving the data in text or Excel™ files.

USYS Data Log talks to the ZUMBACH processors via a serial RS-232 port or an ETHERNET TCP/IP connection.

™WINDOWS and Excel are trademarks of Microsoft Corporation

USYS Web Server

With this new option an USYS processor with an IP address can be addressed over a local area network (LAN, Intranet) via an ETHERNET PCB, using a browser like Internet Explorer or other.

USYS Report Manager

The USYS system can store in a local or remote disc the detailed statistics calculated for the Piece, Lot and SPC periods. In this way it is possible to recover and visualize the data of previous productions and reproduce the quality control printed reports.

OPC UA*

Communication protocol for Windows. The OPC UA technology is a standard in the area of process control such as SCADA or HMI. It defines a common interface for accessing data of peripherals. The application "Zumbach OPC Server" provides the measured values and enables editing product recipes. The software operates with Windows 2000, XP, Vista or 7.

* For USYS 200, USYS IPC 1e/2e.
   (OPC version for USYS 20).

• All technical data are subject to change without notice.

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