



# DPharp EJX DPharp EJA

Differential Pressure and Pressure Transmitters

# DPharp

FOR THE DIGITAL WORLD

DPharp Digital Transmitters  
A new standard for

*HIGH PERFORMANCE*  
*SAFETY*  
and  
*ROBUSTNESS*

## *HIGH PERFORMANCE*

Unmatched precision and real world accuracy.  
Unconditional long term stability with lowest Total Cost of Ownership (TCO).  
Multi-sensing functionality.

## *SAFETY*

Inherently fail-safe sensor with no undiscovered failure modes.  
Certified to IEC61508 as standard for single use SIL2 and dual use SIL3.

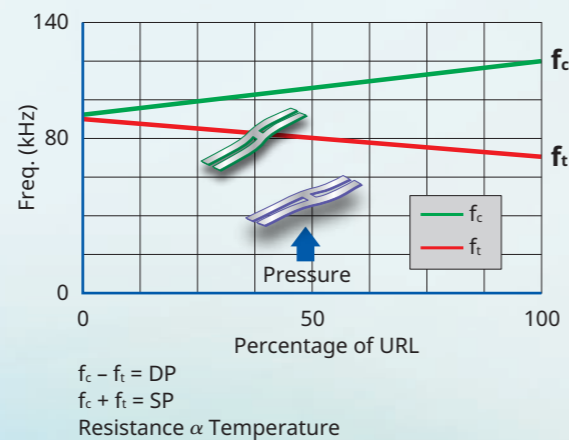
## *ROBUSTNESS*

Rugged, yet compact construction.  
Multiple material options for harsh industrial environment.

# DPharp

# WORKING PRINCIPLE

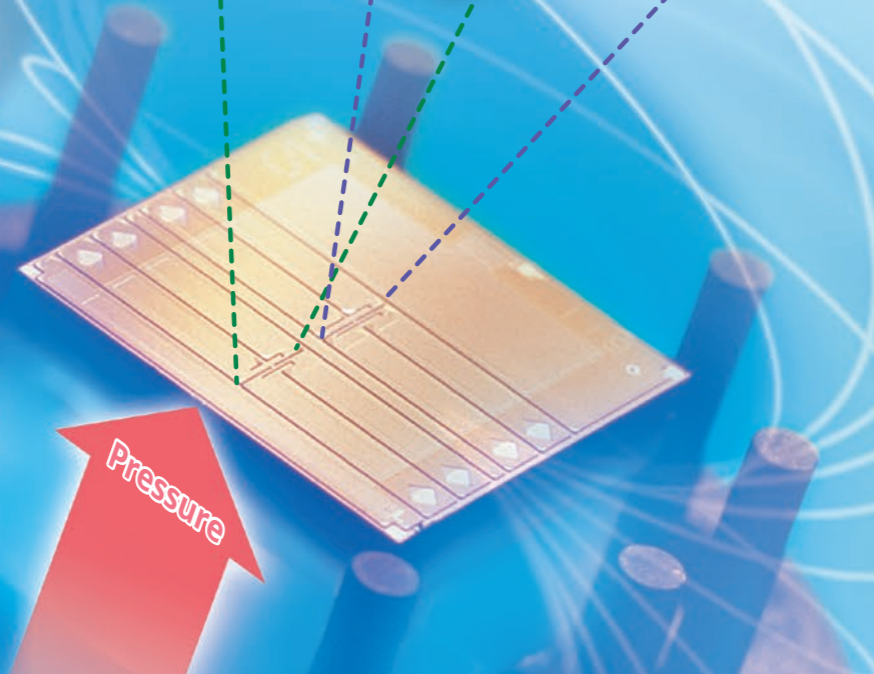
DPharp digital sensor uses two single crystal silicon resonators vibrating at their natural frequencies. When pressure is applied, one of the resonators goes into tension, while the other goes into compression mode. The CPU directly counts the sensor output frequencies without any additional A/D conversion. Due to the excellent elastic properties of silicon material, the DPharp sensor exhibits greater linearity and repeatability, with no inherent hysteresis. Resonant sensor also provides a large output signal resulting in greater sensitivity and higher turndown.



**Unequalled precision and long term stability for your measurements!**

**Key**  
 $f_c$  = Frequency Compression  
 $f_t$  = Frequency Tension

**Compression ( $f_c$ )**  
**Tension ( $f_t$ )**



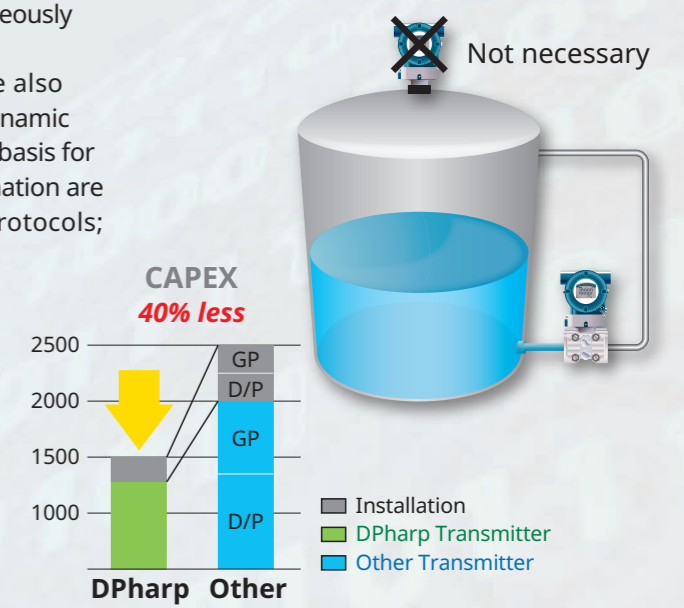
## ARC Statement

" Proprietary sensors that offer real added value to a customer are expected to increase in the market. With the exception of Yokogawa, however, not many suppliers are expected to invest the time and money into development of super-sophisticated new age pressure sensors. . . " Automation Research Corporation (April 1995)

# MULTI-SENSING

DPharp digital sensor has the unique ability to simultaneously measure static pressure and differential pressure. Additionally capsule and housing temperatures are also measured. Multi-sensing platform enables real-time dynamic compensation for unmatched precision and forms the basis for implementation of advanced diagnostics. These information are available through various digital communication protocols; providing additional insight into your process. Multi-sensing functionality with guaranteed accuracy of static pressure signal allows the process to operate with fewer devices delivering reduced lifecycle costs.

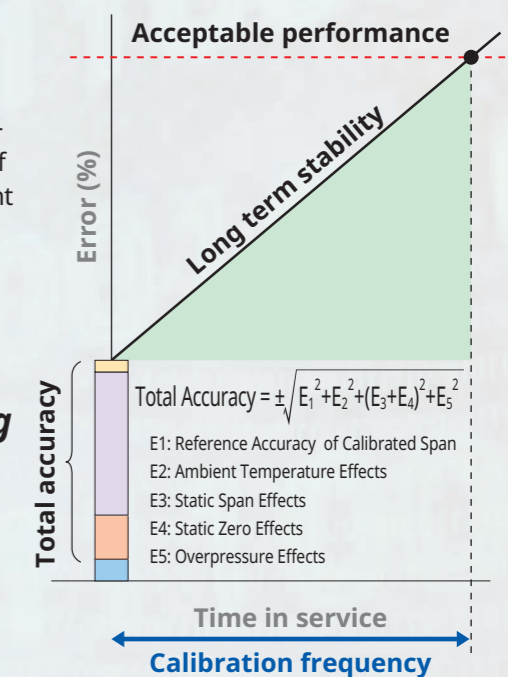
**More really does mean less!**



# HIGH PERFORMANCE

Long term, accurate and stable measurement in real world conditions is fundamental to realize reliable and efficient plant operation. Transmitters in the field are subjected to continuous variations of ambient and process temperature, static and over-pressure conditions affecting the accuracy. Long term stability of the transmitter is a measure of performance drift and dependent on the sensor technology. Total accuracy and long term stability determine the recalibration interval for the devices according to the acceptable performance level.

**Unconditional guarantee of long-term stability under complete range of operating conditions!**



## SAFETY



**IEC61508 Certified  
Safety as Standard,  
Not an Option!**

DPharp is an active pressure sensor, so even with no pressure applied the resonators oscillate at their natural frequencies. Two independent resonators are utilized. If either one or both fail, the transmitter diagnostics detects a capsule error. DPharp sensor is inherently fail-safe with no undiscovered failure modes.

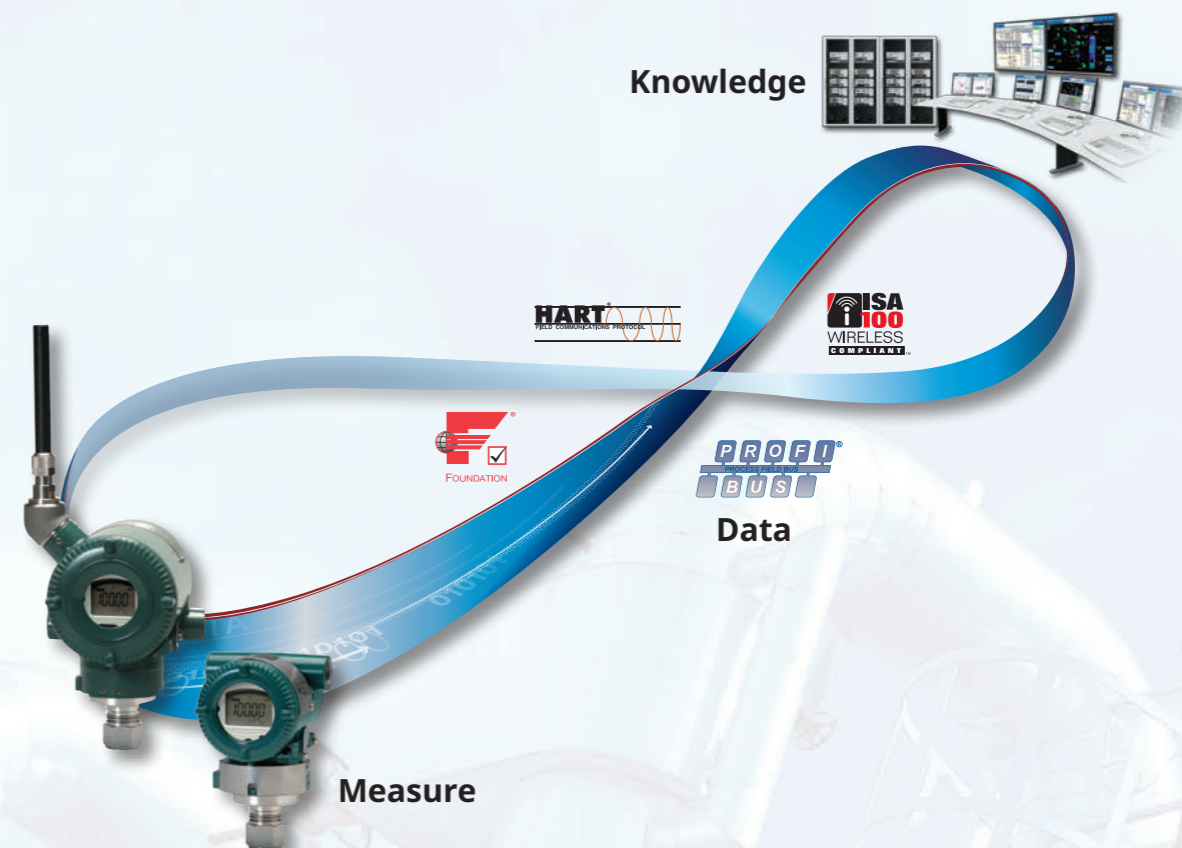
A patented reverse calculation algorithm validates internal measurements, calculations and detects any malfunction of the CPU.

DPharp transmitters are capable of SIL2 single use and SIL3 redundant use, as standard. Same transmitter can be used in control and safety applications which reduces spares inventory and simplifies maintenance.

Yokogawa transmitters have undergone complete assessment of hardware for SIL2 and development processes for SIL3 capability to IEC61508 safety standards.

**Plant safety & reliability assured!**

## FIELD DIGITAL SOLUTIONS



Open your eyes to a world of new opportunities... Release the trapped intelligence in your field assets to get greater insight into your process.

Yokogawa's Field Digital Solutions add new value to your instrumentation assets and plant operations by establishing a reliable digital communications infrastructure to effectively utilize the multi-sensing and advanced diagnostic capabilities offered by our intelligent devices.

Yokogawa fully supports open standards like HART, FOUNDATION fieldbus, Profibus, ISA100 Wireless\* and enabling technologies like FDT/DTM, EDDL to fully ensure customer's freedom of choice by proven and tested interoperability with process automation and asset management systems.

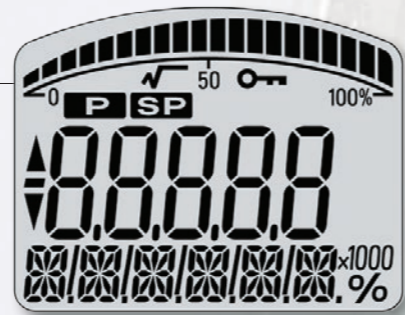
**Maximize asset intelligence for operational excellence and reduced lifecycle costs!**

(\* Available on EJX - B series)

# DPharp

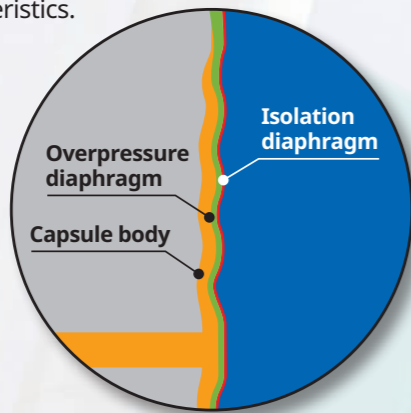
## DISPLAY CAPABILITY

Intelligent indicator clearly displays multiple process variables, user configurable engineering units, communication protocol, output status and diagnostics by alpha-numeric and bargraph display. When using digital protocol, details of instrument model, protocol version and device revision are indicated at start-up. Descriptive alarm messages display abnormalities clearly to simplify troubleshooting.



## OVERPRESSURE

Overpressure event may occur due to incorrect operation of valve manifold or process upsets during plant start-up. DPharp transmitters incorporate an additional overpressure diaphragm to protect the sensor from abnormal pressure surges. Yokogawa has a published overpressure specification, based on DPharp superior sensor characteristics.

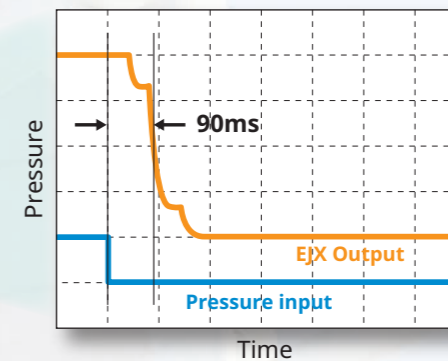


## ROBUSTNESS

Robustness of installed instrumentation greatly impacts their reliability and thereby plant availability. DPharp transmitters are designed for harsh industrial environments with rugged dual compartment enclosures. Multiple options are available for housing material, painting, wetted parts and bolting to enhance durability. Transmitters use Hastelloy C-276 isolating diaphragms as standard for improved corrosion resistance.

## RESPONSE TIME

Small form factors and powerful electronics enable a fast response time of 90 milliseconds. Fast response allows the transmitter to react quickly to process changes. Together with superior performance, it enables tighter control and reduces process variability. Fast response is also critical for SIS and anti-surge applications to maintain plant safety and prevent equipment damage.



**DPharp**

**EjX™** **EjA™**

## PREMIUM PERFORMANCE

EJX Series transmitters deliver premium performance up to 0.025% precision. Industry leading stability guarantee of 0.1% URL for 10 years means reduced maintenance with extended recalibration intervals.

EJX differential pressure transmitters also provide a static pressure measurement with 0.2% accuracy enabling greater insight into your process with fewer devices.

## HIGH PRESSURE CAPABILITY

EJX600 series pressure transmitters with direct screwed connection enable compact inline installation. It is suitable for measurement of absolute and gauge pressure up to 10,000 PSI with a superior accuracy and 10-year long term stability.

## CONTACT OUTPUT

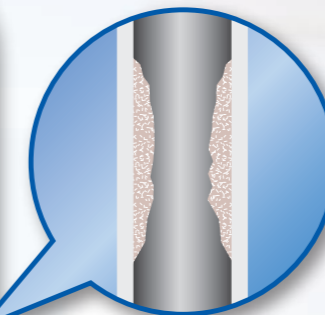
EJX Series transmitters provide a unique open collector contact output in addition to the analog signal, enabling easy local alarm annunciation for process measurements or diagnostic triggers.

The contact output is included in the safety certification of the transmitter by TÜV.



## ADVANCED DIAGNOSTICS

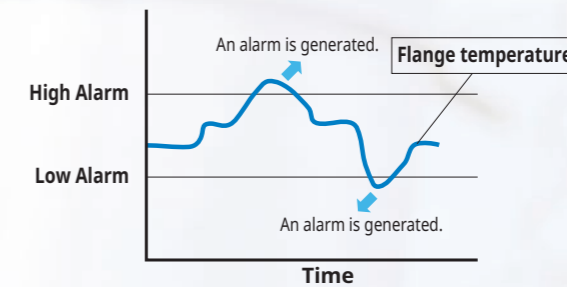
EJX Impulse Line Blockage Detection (ILBD) and heat tracing diagnostics increase plant availability by enabling predictive maintenance. The fluctuation of differential and static pressure, capsule and ambient temperature signals from the multi-sensing DPharp sensor are continuously monitored. By statistical calculations and comparison to reference condition, the blockage of high, low or both impulse lines can be determined.



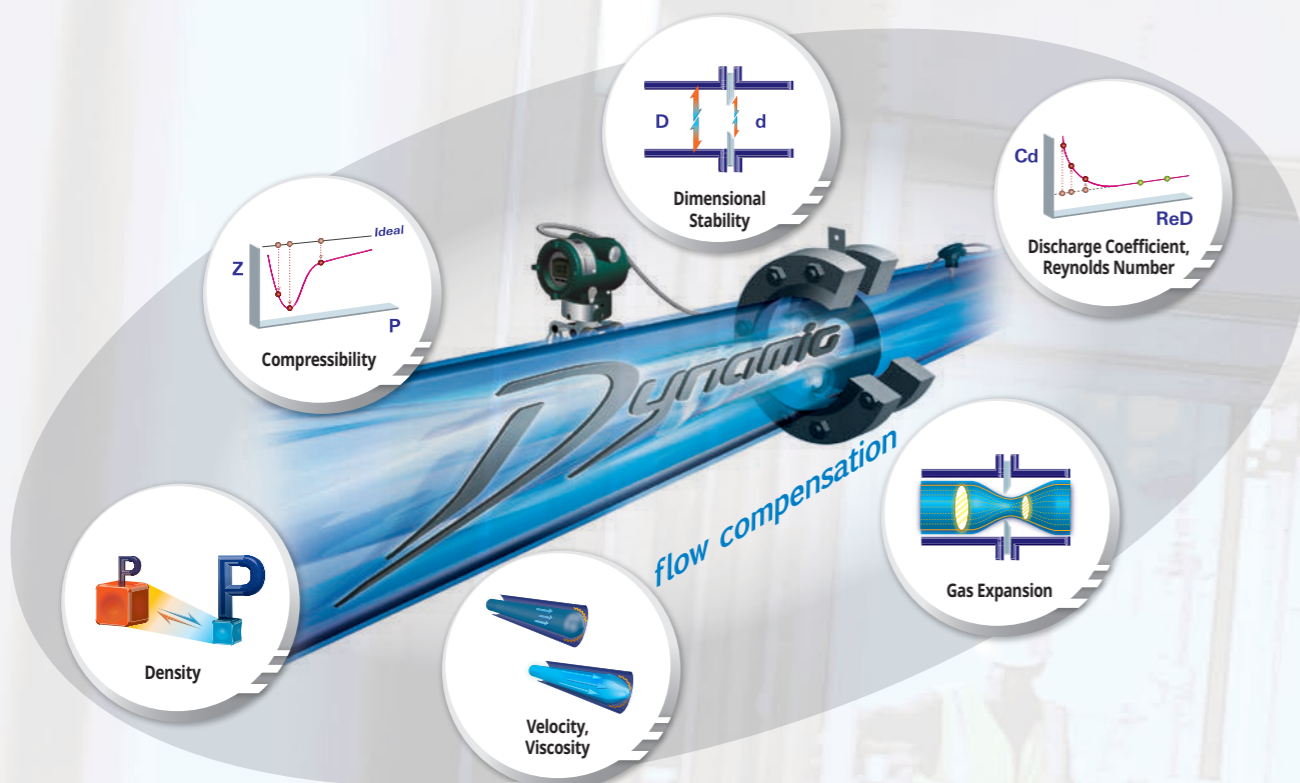
Blockage

	High Pressure Side Blockage
DP (Differential Pressure)	
HP (Static Pressure H side)	
LP (Static Pressure L side)	
Outcome	Low fluctuation on HP side

Flange temperature monitoring provides diagnostics of heat trace or enclosure heater failures.



## MULTI-VARIABLE TRANSMITTER



EJX900 multi-variable transmitter successfully integrates the DPharp multi-sensing capability with an onboard flow computer and can be configured for multi-variable (DP, SP, T) or dynamically compensated massflow outputs. Dynamic flow compensation allows the EJX900 multi-variable transmitter to eliminate inherent errors in the DP flow calculations at actual operating condition and to model the flow profile more precisely.

Extensive range of primary elements and process fluids are supported. EJX900 is compliant to ISO5167, IAPWS, DIPPR, AGA 3, AGA 8 and ISO12213 Standards.

FOUNDATION fieldbus and HART 7 communication protocols are supported. EJX900 also offers advanced diagnostics such as ILBD and flange temperature monitoring. It is IEC61508 certified for safety by TÜV as standard.

**Maximizing the full potential of DP flow measurement!**

## WIRELESS



EJX-B series of transmitters extend the benefits of DPharp digital sensing technology to the wireless world, enabling advanced high precision digital sensing with all other benefits of wireless deployment.

Yokogawa EJX-B series is the world's first wireless device based on customer driven ISA100 Wireless, offering customers with a secure, reliable and flexible plant wide wireless solution for monitoring and control applications.

EJX-B series wireless products enable long distance, stable communication with fast update rates of up to 0.5 second. They also feature a unique battery pack solution with standard lithium cells for easy of maintenance and reduced operating costs.

The ISA100 Wireless of open standards ensures interoperability of Yokogawa's reliable wireless systems with various third-party products to expand the range of wireless solutions for your plant.

ISA100.11a is a communication protocol of ISA100 Wireless. ISA100.11a is approved as an International Standards (IEC 62734) by International Electrotechnical Commission (IEC).

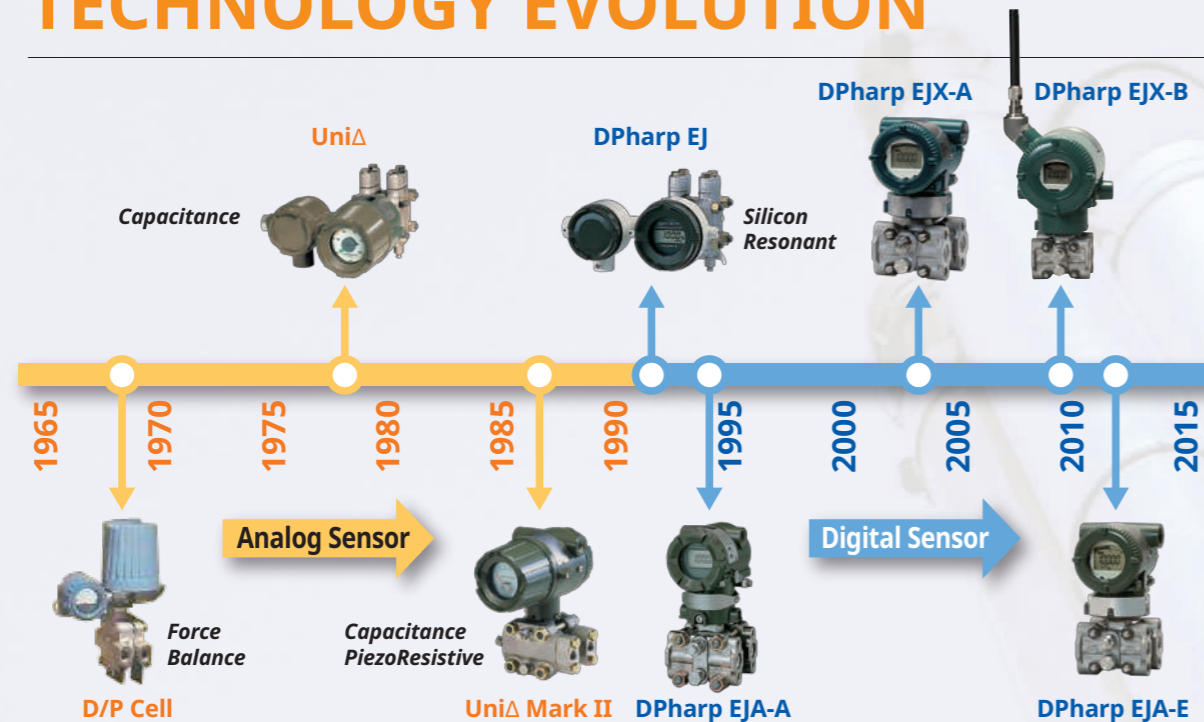
The fusion of DPharp and ISA100 Wireless leading technologies deliver sustainable lifecycle benefits to meet your most demanding requirements.

**Building a wireless future to last!**

**DPharp**

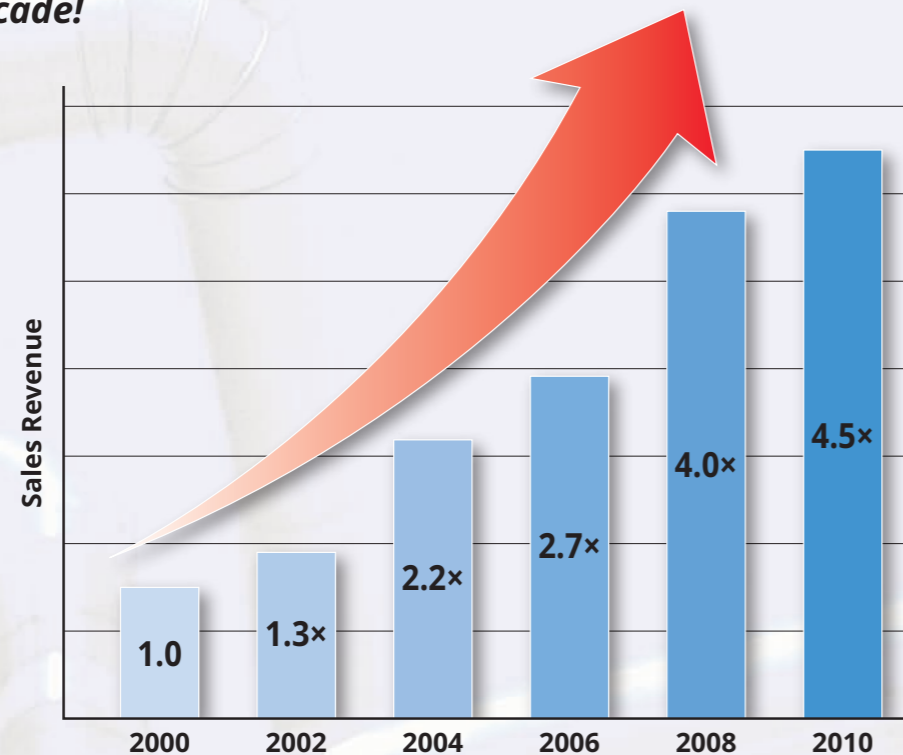
**EJX™**

# TECHNOLOGY EVOLUTION



Yokogawa have been manufacturing electronic pressure transmitters for more than four decades. We revolutionized the industry and set a new standard for pressure measurement with the introduction of the DPharp digital sensor in 1991. The superior performance of the new technology enabled exponential market expansion. As of 2011, we have delivered over 5 million DPharp transmitters operating in various industries and applications to the complete satisfaction of our diverse customer base. Yokogawa continues, the digital evolution with the enhancement of our DPharp family to deliver best in class pressure measurement solutions to our esteemed customers.

**Yokogawa DPharp transmitters achieved over 350% growth in the last decade!**



# MODEL SELECTION

	EJX-A	EJA-E
<b>Accuracy</b>		
+/- 0.025%	•	
+/- 0.040%	•	•
+/- 0.055%		•
<b>Stability</b>		
+/- 0.1% of URL for 15 years	•	
+/- 0.1% of URL for 10 years		•
<b>Maximum Working Pressure</b>		
250 bar	•	•
160 bar		•
<b>Turn down</b>		
200 : 1	•	
100 : 1		•
<b>Multi sensing</b>		
DP, SP	•	•
<b>Safety</b>		
FMEDA report	•	•
IEC61508 Certified	•	•
<b>Response time</b>		
< 90ms	•	•
<b>User Linearisation</b>		
10 points signal characteriser	•	•
<b>FF Function Blocks</b>		
AI (Analog Input)	•	•
PID (PID control)	•	•
Other *1	•	•
<b>FF Link master</b>		
Standard	•	•
<b>Advanced Diagnostics</b>		
Impulse line blockage detection	•	
Heat trace monitoring	•	
<b>Alarm output</b>		
Contact output	•	
<b>Multi-Variable</b>		
DP, SP, PT, Qv and Qm	•	
<b>Wireless Communication</b>		
ISA100 Wireless *2	•	

[\*1 Other FB include SC (Signal Characteriser), IT (Integrator), AR (Arithmetic) and IS (Input Selector) ]

[\*2 Available on EJX-B series]





Synaptic Business Automation creates sustainable value by connecting everything in our customers' organization. To realize this, Yokogawa integrates its business and domain knowledge with digital automation technologies, and co-innovates with customers to drive their business process transformation.

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