



Beijer Ref India – Danfoss Industrial Automation (IA) Training-(2022)

Danfoss Facts

63 
FACTORIES IN 19 COUNTRIES


HEADQUARTERS
NORDBORG
DENMARK

TOTAL NET SALES / bn DKK

34.4 
EBIT **4.4**  FREE CASH FLOW **3.4** 

TOP **3** MARKETS **USA**
GERMANY
CHINA

24,000 
EMPLOYEES WORLDWIDE

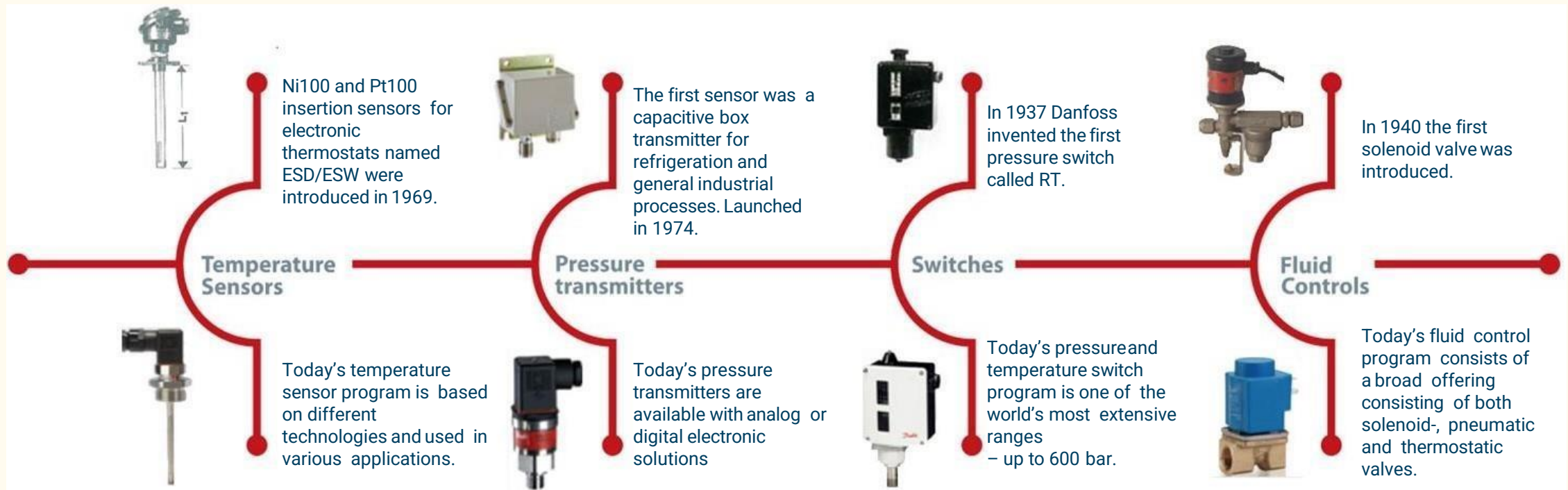
NUMBER OF COUNTRIES IN
WHICH OUR PRODUCTS
ARE SOLD

100



History

- Founded in 1933 by Mads Clausen in Nordborg, Denmark
- Grown from a solo enterprise into a world-leader
- Made possible by clear focus on innovative engineering and early entry on emerging markets



Product Overview

- Temperature sensors
- Pressure transmitters
- Fluid controls
- Switches

Temperature Sensors

When it comes to temperature, even the slightest imprecision can have big consequences, such as lifetime reduction of your equipment if overheated by just a few degrees.

Danfoss offers a wide range of temperature sensors built for accuracy and durability, helping you make a difference to the bottom line. Our temperature sensors provide constant temperature monitoring of the system, even under harsh working conditions.

Our temperature sensor range is based on different element technologies covering a wide range of industrial applications.

- RTD - PT 100/1000 resistance elements
- Thermistors
- Thermocouples

Product range:

- Low temperature sensors (below 200°C)
- High temperature sensors (above 200°C)



Low Temperature Sensors

Temperature sensors from Danfoss Industrial Automation deliver accurate temperature measurements in a wide range of industrial processes.

Product Range:

The low temperature sensors are used to measure the temperature in many applications within industries like Marine, Hydraulic, Wind turbines and many others.

- | | |
|-----------------|----------|
| • MBT 3270 | MBT 3560 |
| • MBT 5250/5260 | MBT 5252 |
| • MBT 5310 | MBT 5410 |
| • MBT 9110 | MBT 153 |

Product features:

- High precision measurements from – 50° C to 200° C
- Precise and flawless signal transfer
- Optional transmitter for 4–20 mA output signal
- Encapsulation design and wetted parts material suitable for harsh environments and medias
- Designed for minimum radiation of heat, which results in a measurement very close to the actual media temperature
- Fixed or changeable measuring insert
- Marine products available with all relevant approvals



High Temperature Sensors

High temperature sensors are mainly used in marine and industrial engine applications. They are primarily used to measure exhaust gas in diesel, gas and dual fuel engines.

Product range:

- MBT 5111
 - MBT 5114
 - MBT 5116 Slim line
- MBT 5113
MBT 5116 with B-head

Product features:

- High precision measurements up to 800°C
- Precise and flawless signal transfer
- Versions with B-head
- Optional transmitter for 4–20 mA output signal
- Encapsulation design and sensor material suitable for harsh environments: high temperature combined with high vibration levels
- Minimum radiation of heat, which results in a measurement very close to the actual temperature of the media
- Fixed or changeable measuring insert
- Available with all relevant marine approvals



Pressure Transmitters

Danfoss pressure transmitters deliver highly competitive solutions for all application requirements. Today the pressure transmitters are used in as different applications as Marine engines, mobile hydraulic equipment, wind turbines and Air/water applications.

The pressure transmitter range is based on three different measurement technologies:

- Piezo resistive sensor technology
- Thin film technology

Product features

- Market-leading performance
 - Pressures from -1 bar to 2200 bar and low pressure from -70 mbar to 250 mbar
- Suitable for analog or digital electronicsolutions
- Long life and stable operation
- Sturdy and shock-proof
- Application dedicated performance on accuracyand reliability
- Wide range of output signals available
- Available with protection against pressure peaks and cavitation
- Marine products available with all relevantapprovals



Piezo Resistive Pressure Transmitters

The Piezo resistive pressure transmitters have a long and proven history at Danfoss. It is used in demanding industrial applications such as Marine Engines, Refrigeration, wind turbines and Air/Water applications

Product range:

- MBS 1900 (Air & Water) MBS 30XX/MBS 31XX (Main program)
- MBS 42XX/47XX (ATEX approved range) MBS 3300 (Marine approved flange version)
- MBS 51XX (Marine approved block design) MBS 92XX/93XX (mbar)
- MBS 82XX (Heavy duty)

Product features:

- Market-leading performance
- Pressure ranges from 1 bar to 600 bar
 - mbar: pressure ranges from 40 to 250 mbar, (bi-directional ranges available, e.g. -30 to 30 mbar)
- Robust designs with outstanding vibration and shock resistance
- Very resistant towards over pressure
- Wide range of products covering numerous electrical and process connections
- Application dedicated performance on accuracy and reliability
- Wide range of output signals available
- Marine dedicated products available with all relevant approvals
- Self-diagnostics on demand, output clipping and failure signals



Thin Film Pressure Transmitters

The Danfoss thin film pressure transmitters are ideal when you need a compact design combined with high durability. Applications are typically in the Mobile Hydraulic segment, but our thin film transmitter is also commonly used inside the Air and the Industrial Hydraulic segments.

Product range:

- MBS 12XX (Main program)
- MBS 13XX (Dual output transmitter – Pressure and Temperature output)
- MEP 22XX/26XX (Electronic pressure switch)

Product features

- Pressure ranges from 10 to 2200 bar
- Reliability data for functional safety(MTTFd and B10d)
- Safe against burst pressures of up to 40 times full scale
- Overall sturdy and shock-proof design for use in even the most severe application
- A wide range of pressure-, electrical- connections and output signals available
- EMC protection made to survive in the harsh Mobile Hydraulic environment
- Application dedicated performance on accuracy and reliability
- Electronic pressure switch – giving all the advantages from the world of pressure transmitters (no leakage or drift)



Fluid Controls

Danfoss Industrial Automation offers a broad range of fluid control valves, all intended to provide precise and easy control and regulation of fluids and gases.

Our valves are designed to serve thousands of different applications. Combinations of connection sizes, voltages plus housing and seal materials are in place to meet media from water and air to oil and steam. The technologies are ready to be the best match to closed or open systems, cold or hot media or even explosion-risk areas.

Product range:

- Solenoid valves
- Pneumatic valves
- Thermostatic valves



Solenoid Valves

Danfoss Industrial Automation range of solenoid valves offer a flexibility that helps our customers to obtain the combination of valve and coil needed in the individual application.

Product range:

Solenoid valves for media with limited dirt and low to high flow volume.

- Direct-operated
- Indirect-operated
- Servo-operated

Product features:

- Very broad product program
- Optimum sealing
- Optimum flow coefficients maximizing the flow through the orifice.
- Long lifetime due to the circular shaped armature that minimizes internal wear
- Stainless steel orifices that provides excellent resistance against corrosion and cavitation
- High armature tube wall thickness and a unique spring design ensures a long lifetime for the pilot system with minimal maintenance.
- Insensitive to dirt, deposits and limestone
- Wide range of segment specific approvals within water and marine.
- Innovative clip on coil system



Pneumatic Valves

Danfoss Industrial Automation offers pneumatic valves designed for specialized and demanding applications.

Product range:

These robust valves are the right choice for media with high dirt content, high viscosity, high ambient and media temperatures and large flow volumes – it is often referred to as “The trouble shooter valve”.

- AV 210 NC versions – closing against and with flow direction
- AV 210 NO versions – closing against the flow direction

Product features:

- Very dirt resistant
- Can operate from 0 bar differential pressure
- High Kv-values
- Can operate at high viscosities
- Can operate at high temperatures
- Can operate in Eex areas
- High capacity
- Optimized internal shape for improving flow capacity.
- The design of the stem section (connecting the control head and valve body) reduces the wear dramatically increasing lifetime
- Optimum range of control head sizes
- Floating valve plate to compensate for minor deviations



Thermostatic Valves

Danfoss Industrial Automation offers a broad range of thermostatic valves for simple and reliable temperature control without control air or electricity

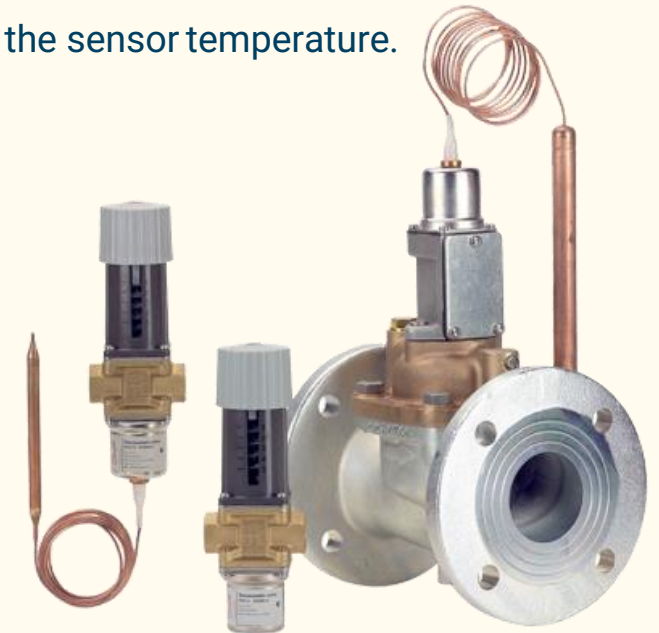
Product range:

Thermostatic valves are used for proportional regulation of flow quantity, depending on the setting and the sensor temperature.

- AVTA – Direct cooling valve with remote sensor
- FJVA – Direct cooling valve with built in sensor
- WVTS – Indirect servo cooling valve with remote sensor

Product features:

- Unique hand knob regulation in AVTA and FJVA, no need to use tools to change the setting – save time
- Step-less, proportional regulation of flow volume
- Self-acting – needs no electricity
- Exact temperature control – very low hysteresis (difference between opening and closing points)
- Insensitive to dirt – the reliable fit and forget valve
- Manual flush option allowing cleaning of the valve - reliable construction and low maintenance costs
- Insensitive to water pulsating pressure
- Operates from 0 to 10 bar differential pressure with no impact on the functionality
- Modular design - easy to customize



Pressure & Temperature Switches

Pressure and temperature switches from Danfoss offer high accuracy, repeatability and stability with fixed or adjustable settings. Danfoss has been producing switches for industry applications for more than 75 years and today, we offer one of the world's most extensive ranges. All accurate, robust and built for long life, our switches perform flawlessly day after day, even under harshest conditions.

Danfoss pressure and temperature switches are offered with a high grade of enclosure, and are thus well-suited for moist or dusty applications. Should your application encounter severe shocks and vibrations, we have switches that will perform unaffected - purpose-designed, built tough.

Product range:

- Pressure & differential pressure switches
- Temperature switches



Pressure & Differential Pressure Switches

Pressure and differential pressure switches from Danfoss offer high accuracy, repeatability and stability with fixed or adjustable settings.

Product range:

Pressure and differential pressure switches are used to control and monitor pressure levels in a variety of industrial applications.

- MBC
- RT
- KP, KPI, KPS, CAS
- CS
- BCP

Product features:

- Outstanding vibration stability gives flawless operation even in heavy-duty applications
- Snap-action contacts
- Excellent readability
- Welding-free bellows for long life and 100% tightness
- Diaphragm types and versions with integrated pulse snubber – resistant to pulsations
- Wide range of marine approvals
- One of the world's most extensive ranges – up to 400 bar
- Suitable for different contact loads (silver and gold plated contacts)



Temperature Switches

Danfoss temperature switches cover a wide temperature range offering high accuracy, repeatability and stability with fixed or adjustable differential settings.

Product range:

The temperature switches are used for control and monitoring of temperature levels in a wide range of industrial applications

- MBC
- RT
- KP, KPS, CAS

Product features:

- Wide temperature range covered – from -30°C to 300°C
- Excellent readability
- Advanced bellow technology, without any welding points, which makes them stress free and completely tight.
- Outstanding vibration stability ensures flawless operation even in heavy-duty applications
- Available with brass and stainless steel sensor pockets for easy mounting in the application
- Marine approvals



Market Segment Overview

1. Marine
2. Industrial Engines
3. Mobile Hydraulics
4. Water Applications
5. Air Compressor
6. Wind Power
7. Cooling

Marine



CUSTOMER MAIN NEEDS

- Safe operation
- Mastering tough emission requirements
- Increased need for efficiency and lowering operational costs
- Reliability and quality
- Marine approvals
- Customizations



APPLICATION OPERATING CONDITIONS (Typical)

- Temperature Range: -50-800°C
- Pressure Range: -1-600 bar
- Heavy vibrations
- Harsh environment



OUR MAIN OFFERING

Pressure transmitters

- MBS 2100-series (compact, high temperature)
- MBS 3100-series (compact)
- MBS 3300-series (compact, high temp. cartridge)
- MBS 5100-series (block design)
- MBS 9300-series (low pressure)
- EMP (box design)

Temperature sensors

- MBT 153-series (cable)
- MBT 511x-series (exhaust gas)
- MBT 5250-series (compact with plug)
- MBT 5252-series (standard with connection head)
- MBT 5253-series (compact cable)
- MBT 5260-series (compact plug design)
- MBT 5310-series (bearing)
- MBT 5410-series (room temperature)
- MBT 5560-series (compact transmitter)
- MBT 5722-series (stern tube)
- MBT 9110-series (transmitter)

Pressure and Temperature switches

- MBC 5100-series (pressure block design)
- MBC 8100-series (temperature block design)
- KPS-series (pressure and temp. box design)
- CAS-series (press. and temp. box design)
- RT-series (pressure and temperature)

Test valves

- MBV-series

Industrial Engines



Customer main needs:

- Reliability
- Quality
- Lifetime
- Customizations



Applications operation conditions

- Heavy vibrations
- IP65
- Harsh environment
- Mechanical robustness
- Hermetic seals
- Operating temperature >135 °C
- Resistance against over-pressure and spike pressure



Our main offering

Pressure transmitters

- MBS 2100-series (compact, high temperature)
- MBS 3100-series (compact)
- MBS 8200-series (heavy duty)
- MBS 9000-series (low pressure)

Mobile Hydraulics



CUSTOMER MAIN NEEDS

- Compact design
- Reliability
- Heavy duty conditions



APPLICATION OPERATING CONDITIONS (Typical)

- Temperature Range: -50-150°C
- Pressure Range: 0-250 bar
- Accuracy: <1%



OUR MAIN OFFERING

Pressure Transmitters

- MBS 1250-series (integrated pulse-snubber)
- MBS 1350-series (dual output, pulse-snubber)

Switches

- MEP 2200-series (electronic pressure switch)
- MEP 2600-series (electronic pressure switch)

Temperature Sensors

- MBT 3270-series (compact)



Water Application



Customer main needs:

- Reliability
- Quality
- Lifetime
- Quick delivery
- Approvals



Applications operation conditions

- Humid environment IP65 and IP67 enclosure
- Temperature range: 0–80° C
- Pressure range: 0 – 25 bar



Pressure transmitters:

- MBS 1900-series (medium pressure)
- MBS 3000-series (flexible)
- MBS 3100-series (compact)
- MBS 5100-Series (block design)
- MBS 8200-series (heavy duty)

Temperature sensors:

- MBT 5250-series (compact with plug)
- MBT 5252-series (standard with connection head)
- MBT 3270-series (compact)

Pressure and temperature switches:

- MBC-series (block design)
- KP/KPI-series (pressure and temp. box design)
- RT-series (pressure and temperature)

Solenoid Valves:

- EV210A/B-series (Compact)
- EV220A/B-series (high performance)
- EV310B-series (air control valve)
- EV225B-series (steam valve)

Air Compressor



Applications operation conditions

- Used in wide range of applications
- Different operating conditions and operating pressure/temperature



Customer main needs:

- Reliability
- Quality
- Lifetime
- Customizations



Our main offering

Pressure transmitters

- MBS 3000/3100-series (compact)
- MBS 5000/5100-series (block design)
- MBS 8200-series (heavy duty)
- EMP-series (box design)

Temperature sensors

- MBT 5250-series (compact with plug)
- MBT 5252-series (standard with connection head)
- MBT 5260-series (compact plug design)
- MBT 3270-series (compact)

Pressure and temperature switches

- MBC-series (pressure block design)
- KPS/CAS-series (pressure and temp. box design)
- RT-series (pressure and temperature)

Valves

- EV210B-series (compact)
- EV220B-series (high performance)
- EV224B-series (high pressure)



Wind Power



Customer main needs:

- Compact design
- Reliability
- Quality
- Lifetime
- Easy to mount
- Customizations
- Marine approvals (offshore)



Applications operation conditions

- Heavy vibrations
- IP65 enclosure
- Harsh environment
- Operating temperatures down to -40°C
- Nacelle temperature range -20 to +60°C
- Salt mist (off-shore)
- Fluctuation of humidity



Our main offering

Pressure transmitters

- MBS 3000/3100-series (compact)
- MBS 3050/3150-series (compact with puls-snubber)
- MBS 8200-series (heavy duty)
- MBS 8250-series (heavy duty with puls-snubber)
- EMP

Pressure and temperature switches

- MBC-series (pressure block design)
- KP-series (pressure)
- KPS-series (pressure and temperature box design)
- CAS-series (pressure and temperature box design)
- RT-series (pressure and temperature)

Test valves

- MBV-series

Temperature sensors

- MBT 153-series (cable)
- MBT 5250-series (compact with plug)
- MBT 5310-series (bearing)
- MBT 5252-series (standard with connection head)
- MBT 5260-series (compact plug design)
- MBT 3270-series (compact)



Cooling



CUSTOMER MAIN NEEDS

- Quality in all components
- 10 million pulsations
- Reliability over time
- Lasting hermetic sealing



APPLICATION OPERATING CONDITIONS (Typical)

- Temperature
Range:
-70-180°C
- Pressure
Range:
-1-159 bar
- Accuracy: <0.8
%FS



OUR MAIN OFFERING

Pressure Transmitters

- AKS 32-series
- AKS 32R-series
- AKS 3000-series
- AKS 33-series
- NSK-series

Temperature Sensors

- AKS11-series
- AKS21-series
- EKS-series

Selection Criteria

Application
Media
Connection
size
Temperature
range Differential
range Pressure
range
Set point
Connection
size Sensor
length
Approvals

Thank you