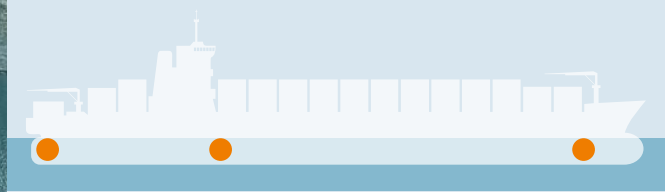

Sensors and systems for ship automation.
Automation solutions from ifm.
TYPE APPROVED PRODUCT
DNV
DNV.COM/AF
ifm.com

Monitoring of drives and rudder propellers

During operation, gears and motors are exposed to high mechanical forces which cause continuous wear, for example to gears and rolling element bearings. Rotating machine parts of gears and motors generate vibrations during operation.

The wear of bearings and toothed wheels as well as unbalance and misalignment lead to an increased oscillation amplitude, which is a good measure of the machine condition.



Unbalance, bearing or gear conditions can be monitored by means of systems for vibration monitoring and are used for condition-based maintenance of machines and installations. This helps to detect machine damage in good time and prevent costly consequential damage.

Because the lubricity of oil is determined by its temperature, the oil temperature is continuously monitored in the recirculating oil lubrication system of the gear by means of compact transmitters in order to ensure high machine uptime. In particular the oil temperature difference between the flow and return lines is a reliable long-term indicator of the gear condition and the expected lifetime.

Housing temperature

Just like the vibration behaviour, the housing temperature is indicative of the condition, quality and life expectancy of a drive motor, bearing or gear. A bolt-on temperature probe measures the temperature and transmits the measured values to a display and evaluation unit.

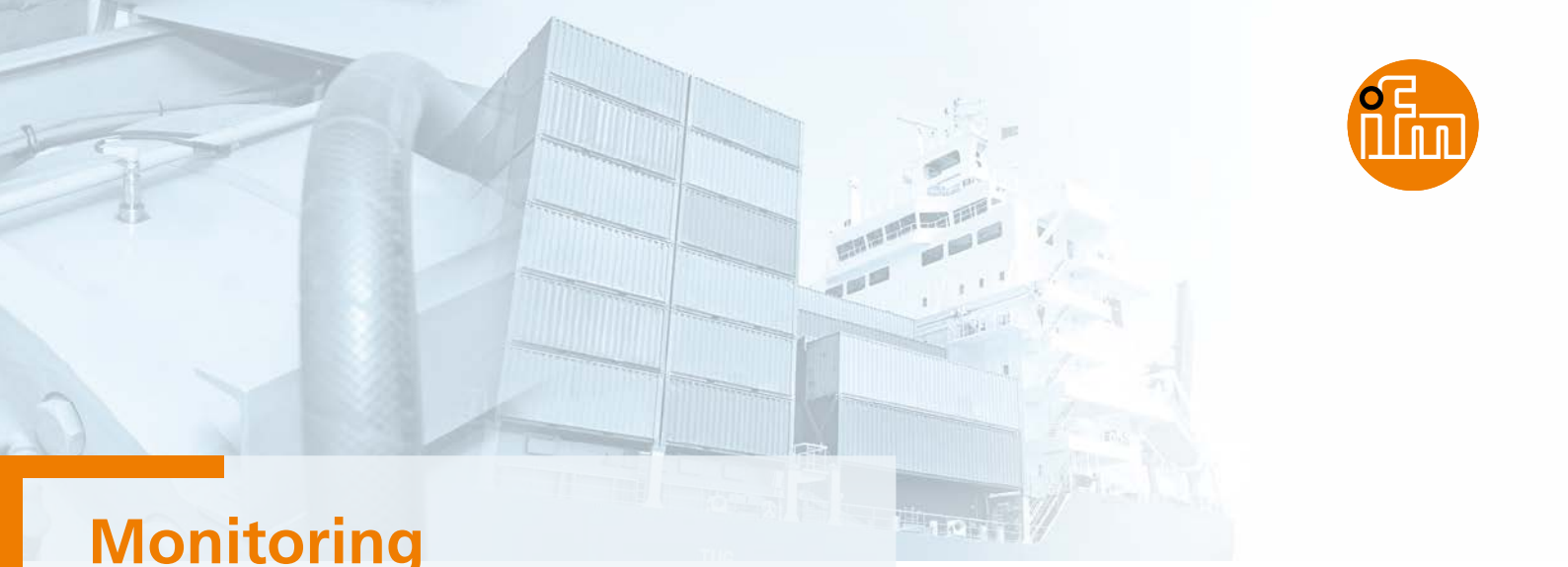
Vibration monitoring

Vibration transmitters and sensors detect damaged bearings and unbalance in drives and rotating machine parts. Acceleration sensors in combination with diagnostic electronics are used for vibration monitoring of large drives.

Diagnostic electronics

Temperature sensors of types TA and TS

Systems for vibration monitoring of types VSE, VSA and VSP



Monitoring of hydraulic power pack

Usually, hydraulic drive solutions are used to lift heavy loads and operate knuckle boom cranes and telescopic booms. A hydraulic power pack is the heart of a hydraulic system and provides energy for the operation of hydraulic cylinders: the most important drive elements in hydraulics.

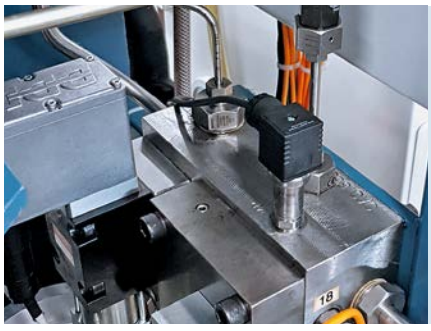
ifm sensors ensure reliable, uninterrupted low-maintenance operation of the hydraulic system.

Level sensors are used to continuously monitor the level in the reservoir and make an important contribution to environmental protection by guaranteeing reliable overflow protection.

Pressure sensors monitor the system pressure. Temperature sensors monitor the temperature of the hydraulic oil.

IO-Link modules collect the sensor signals on the hydraulic power pack and transmit them to a controller. This reduces wiring costs and makes complex cable trees obsolete.

Temperature sensors of type TA
Level sensors of type LMC
Pressure sensors of type PT
Oil humidity sensors of type LDP
Oil particle monitors of type LDH
IO-Link modules of type ALxxxx



Pressure and temperature under control

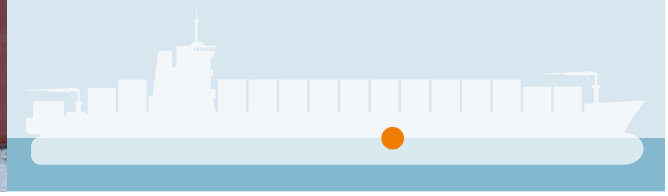
Pressure transmitters of type PT supply data on the system pressure in the hydraulic circuit needed to control the valves.

Oil quality monitoring

The quality of the hydraulic oil is continuously monitored by oil humidity sensors and particle monitors.

Monitoring of the ballast water system

Ballast water systems are indispensable for safe operation of ships, as they serve to stabilise the vessel. The system mainly consists of ballast water tanks, pumps, distribution pipes, raw water inlets, screens and a water treatment system as well as valves, sensors and controllers to operate these devices.



ifm sensors ensure reliable, uninterrupted low-maintenance operation. Level sensors reliably monitor the limit levels of the ballast tanks, pressure and flow sensors provide important data for operating the pumps and protect them against running dry.

Pneumatically actuated valves and shut-off valves are used to control the water flow in pipes. Dual inductive sensors provide reliable position feedback for pneumatic valve actuators and valves.
They are operated in combination with a switch target (also called 'puck') and detect the "open" and "closed" positions of the valve.

Run-dry protection of pumps

Flow sensors detect the current flow and ensure safe switch-off of the pump if the minimum flow is not reached.

Continuous position feedback

Thanks to the continuous position feedback of the smart MVQ valve sensor, different wear conditions can be identified. The seal monitoring helps to detect deposits or wear of the seal by indicating a change of the closed position.

Pressure sensors of type PN
Pressure sensors of type IS
Flow meters of type SM
Level sensors of type LMC
Sensors for valve actuators of types MVQ and IN

Your start into the industrial revolution – IO-Link solutions for ship automation

Head start with IO-Link

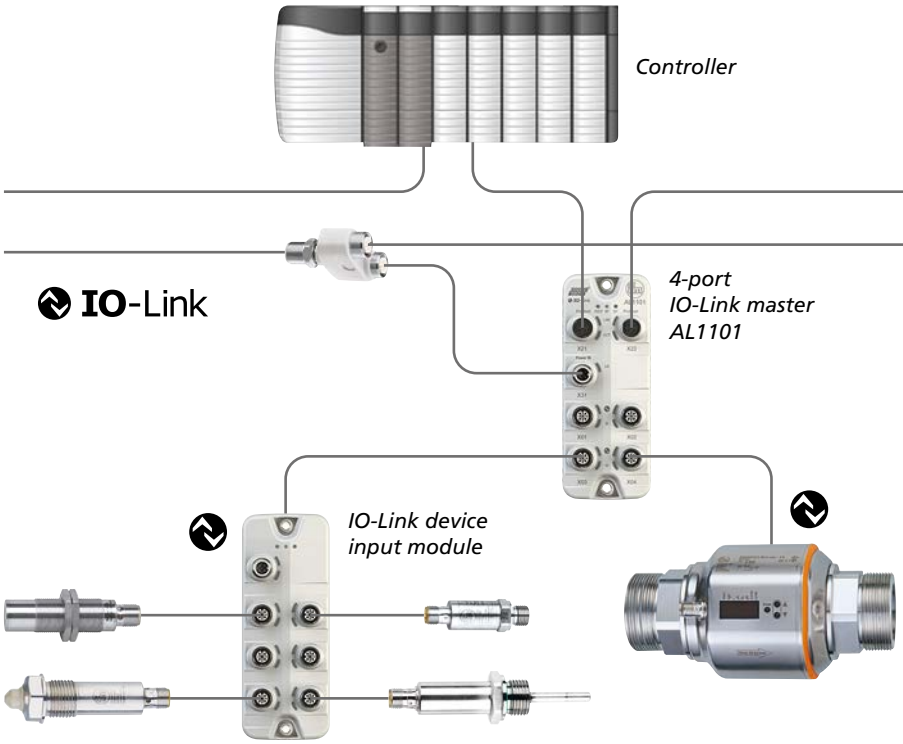
In the past binary switches usually provided simple switching signals or analogue values. Today the data from intelligent sensors is the basis for the next industrial revolution. Sensors that extract all the information from machines and equipment using the key technology IO-Link.

The sensor parameters can be set from the controller or the master. No crawling or climbing required to set the sensor.

Many sensors supply measured values to the switching signals via IO-Link. The goal is a high operational reliability with less energy and raw material consumption.

Transmission that is prone to errors and conversion of analogue signals is replaced with digital measured value transmission.

Process information, switching status and diagnostic functions are transmitted without loss via a single port to the controller. Expensive analogue signal processing is no longer needed.



Temperature sensors with IO-Link

The sensors of the TA series can be configured via IO-Link, using, for example, a USB interface.
The LINERECORDER SENSOR software is used to visualise, transfer and archive parameter sets.

Sensors and systems for ship automation – the choice is yours

Pressure transmitters

Measuring range relative pressure		DNV	Process connection	
			G 1/4 male Order no.	
[bar]	[psi]			
Analogue output			**4...20 mA**	
0...25	–	•	**PT5303**[2)]	**PT5403**
0...10	–	•	**PT5304**[2)]	**PT5404**
0...16	–	•	**PT5314**[2)]	**PT5414**
0...6	–	•	**PT5315**[2)]	**PT5415**
0...40	–	•	**PT5343**[2)]	**PT5443**
			1/4 NPT male	
–	0...1000	•	**PT2402**	
–	0...100	•	**PT2415**	
–	0...200	•	**PT2424**	
–	0...300	•	**PT2434**	
–	0...500	•	**PT2443**	

[2)] UL approval

Pressure transmitters

Measuring range relative pressure		DNV	Process connection
			G 1/4 male valve plug type A DIN Order no.
[bar]			
Analogue output			**4...20 mA**
0...6		•	**PT5015**
0...10		•	**PT5004**
0...16		•	**PT5014**
0...25		•	**PT5003**
0...40		•	**PT5043**
0...60		•	**PT5023**
0...100		•	**PT5002**
0...160		•	**PT5012**
0...250		•	**PT5001**
0...400		•	**PT5000**
0...600		•	**PT5060**

Pressure sensors with display

Factory setting measuring range relative pressure [bar]	DNV	Process connection	
		G 1/4 female Order no.	G 1/4 male Order no.
2 switching outputs or 1 switching output and 1 analogue output 4...20 mA / 0...10 V, scalable			
0...100	•	**PN2092**	**PN2592**
0...25	•	**PN2093**	**PN2593**
0...10	•	**PN2094**	**PN2594**
0...2.5	•	**PN2099**	**PN2599**
		1/4 NPT female	**1/4 NPT male**
0...100	•	**PN2292**	**PN2692**
0...25	•	**PN2293**	**PN2693**
0...10	•	**PN2294**	**PN2694**
0...2.5	•	**PN2299**	**PN2699**
With EPDM seal for water applications			
0...100	•	**PE2092**	**PE2592**
0...25	•	**PE2093**	**PE2593**
-1...10	•	**PE2094**	**PE2594**
-1...1	•	**PE2099**	**PE2599**

Pressure transmitters of type PT

Pressure sensors of types PN / PE

Flow meters of type SM

Flow sensors of type SA

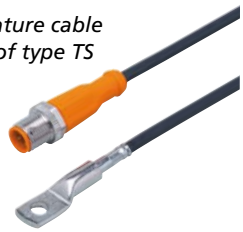
Flow meters

Measuring range [l/min]	Process connection	DNV	Order no.
Display · DC · PNP / NPN · analogue · pulse · IO-Link			
0.005...3	G 1/4 (DN6)	–	**SM4000**
0.1...25	G 1/2 (DN15)	–	**SM6000**
0.2...50	G 3/4 (DN20)	–	**SM7000**
0.2...100	G 1 (DN25)	–	**SM8000**
DC · PNP / NPN · analogue · pulse · IO-Link			
5...300	G 2 (DN50)	–	**SM9000**
5...600	G 2 (DN50)	–	**SM2000**

Flow sensors

Setting range [cm/s]	Process connection/ probe length [mm]	DNV	Order no.
DC · PNP · 2 switching outputs normally open / normally closed (configurable)			
3...300	M18 / 45	•	**SI0521**
DC · PNP/NPN · 2 outputs (switching signal; analogue signal; frequency signal; IO-Link; configurable)			
5…300 / 200…10000	M18 / 45	•	**SA5000**
5…300 / 200…10000	Progressive ring / 100	•	**SA4100**
5…300 / 200…10000	Progressive ring / 200	•	**SA4300**

Temperature cable sensors of type TS



Temperature transmitters of type TA

Temperature transmitters

Measuring range [°C / °F]		Process connection / insertion depth [mm]	DNV	Order no.
[°C]	[°F]			
Analogue output 4…20 mA · IO-Link				
-50...150	–	G 1/4 / 50	•	**TA2115**
–	-58...302	1/2" NPT / 50	•	**TA2313**
-50...150	–	G 1/2 / 50	•	**TA2415**
–	-58...302	1/4" NPT / 50	•	**TA2613**

Acceleration sensors

Frequency range [Hz]	Measuring range vibration [g]	DNV	Order no.
Connection to the VSE diagnostic electronics			
0...6000	-25...25	–	**VSA001**
0...10,000	-25...25	–	**VSA005**
1.5...16,000	50	–	**VSP003**

Diagnostic electronics

Frequency range [Hz]	Interface	DNV	Order no.
2 digital outputs or 1 analogue and 1 digital output cabinet mounting			
0...12,000	TCP/IP	–	**VSE100**
0...12,000	PROFINET IO	–	**VSE150**
0...12,000	EtherNet/IP	–	**VSE151**
0...12,000	Ethercat	–	**VSE152**
0...12,000	Modbus TCP	–	**VSE153**
2 digital outputs or 1 analogue and 1 digital output field mounting			
0.1...12,000	TCP/IP	–	**VSE903**
0...12,000	PROFINET IO	–	**VSE950**
0...12,000	EtherNet/IP	–	**VSE951**
0...12,000	Modbus TCP	–	**VSE953**

Diagnostic electronics of type VSE

Bolt-on and screw-in temperature probes

Measuring range [°C / °F]	Process connection	DNV	Order no.
Connection to evaluation unit			
-20...115 / -4...239	Bolt-on sensor ATEX 10 x 18 x 48 mm	•	**TS502A**
-40...90 / -40...194	Bolt-on sensor 12 x 8.7 x 51 mm	•	**TS2229**
-40...90 / -40...194	Ø 6 mm	•	**TS2289**
-50...250 / -58...482	Ø 6 mm	•	**TS2256**
-100...600 / -148...1112	Ø 6 mm	•	**TS2454**
-50...250 / -58...482	Ø 10 mm	•	**TS2056**
-30...180 / -22...356	Screw-in sensor M5	•	**TS2759**
-30...180 / -22...356	Screw-in sensor M6	•	**TS2659**

Inductive full-metal sensors

Type / housing length [mm]	Sensing range [mm]	DNV	Order no.
PNP, normally open · M12 connector			
M12 / 45	4 f	–	**IFC275**
M18 / 45	8 f	–	**IGC258**
M30 / 70	25 nf	–	**IIC223**
NPN, normally open · M12 connector			
M18 / 70	5 f	–	**IGC252**
M30 / 70	10 f	–	**IIC226**

Sensors for valve actuators

Description	Connection	DNV	Order no.
NPN / PNP, 2 x normally open			
Dual sensor	M12, plastic	–	**IN5225**
PNP, 2 x normally open			
Dual sensor	M12, metal	–	**IN5327**
As an accessory: target puck		–	**E12517**
PNP, 3 x normally open / normally closed selectable			
Continuous position feedback	M12, metal	–	**MVQ101**

Inductive sensor of type IGC

Dual inductive sensor of type IN

Valve sensor of type MVQ

Conductivity Sensor (Inductive)

Measuring range conductivity [µS/cm]	Process connection/ Inserption depth [mm]	DNV	Order no.
1 analouge output · IO-Link output conductivity · temperature			
100…1,000,000	G1 Aseptoflex Vario / 37	–	**LDL200**
100…1,000,000	G1 Aseptoflex Vario / 77	–	**LDL201**
100…1,000,000	G 1/2 sealing cone / 24	–	**LDL220**
100…1,000,000	G1 sealing cone / 31	–	**LDL210**

Continuous level sensors (guided wave radar)

switching/ analogue output	2 swit-ching outputs	Process connection/ probe length [cm]	DNV	Order no.
Continuous level sensor for water, oils and coolants · guided wave radar DC · PNP/NPN · analogue · IO-Link				
•	–	G 3/4 male / 10…200	•	**LR3020**
–	•	G 3/4 male / 10…200	•	**LR7020**

Level sensors for point level detection

Insertion depth [mm]	DNV	Process connection G 1/2 Order no.	
Application		**Water**	**Oil**
10	•	**LMC100**	**LMC110**
21	•	**LMC400**	**LMC410**
		1/4 NPT female	
34	•	**LMC500**	**LMC510**

Level sensors of type LMC

Level sensors of type LR

Conductivity sensors of type LDL

Particle monitor of type LDP

Oil humidity sensor of type LDH

IO-Link master

Oil humidity sensor

Medium temperature [°C]	Connection	DNV	Order no.
2 analogue outputs			
-40...105	M12	–	**LDH100**

Optical particle monitor

1 digital output, 1 analogue output			
-10...80	M12	–	**LDP100**

Dialogue modules

Compact controller

Compact controllers

Inputs / outputs	DNV	Order no.
16 digital inputs; 16 analogue inputs; 16 frequency inputs; 16 digital outputs	•	**CR0032**
32 digital inputs; 32 analogue inputs; 32 frequency inputs; 48 digital outputs	•	**CR0234**
Safety		
16 digital inputs; 16 analogue inputs; 16 frequency inputs; 16 digital outputs	•	**CR7032**
32 digital inputs; 32 analogue inputs; 32 frequency inputs; 48 digital outputs	•	**CR7132**

Dialogue modules

Display size / resolution	Operating elements	DNV	Order no.
7" / 800 x 480	9 function keys	•	**CR1081**
7" / 800 x 480	9 function keys, video interface	•	**CR1085**

IO-Link masters for field applications

Interface	DNV	Order no.	
		coolant	wet
IO-Link 4 A-Port Master with IoT Port			
Profinet	–	**AL1300**	**AL1301**
EtherNet/IP	–	**AL1320**	**AL1321**
EtherCat	–	**AL1330**	**AL1331**
Modbus TCP	–	**AL1340**	**AL1341**
IoT only	–	**AL1350**	**AL1351**
Powerlink	–	**AL1370**	**AL1371**
IO-Link 8 A-Port Master with IoT Port			
Profinet	–	**AL1302**	**AL1303**
EtherNet/IP	–	**AL1322**	**AL1323**
EtherCat	–	**AL1332**	**AL1333**
Modbus TCP	–	**AL1342**	**AL1343**
IoT only	–	**AL1352**	**AL1353**
Powerlink	–	**AL1372**	**AL1373**

Connection technology

Cable [m]	DNV	Order no.	Order no.
M12 socket		**Straight**	**Angled**
harsh enviroments			
2	–	**EVM001**	**EVM004**
5	–	**EVM002**	**EVM005**
10	–	**EVM003**	**EVM006**
15	–	**EVM014**	**EVM012**
Wet areas, water-based			
2	–	**EVF064**	**EVF067**
5	–	**EVF001**	**EVF004**
10	–	**EVF002**	**EVF005**
20	–	**–**	**EVF095**
25	–	**EVF003**	**–**

The name ifm stands for a large range of different sensors and systems for automation technology.

For fifty years the family-run company has been researching, developing and producing with the aim of optimising technical processes and conserving resources.

With industry and application know-how, ifm – one of the leading manufacturers of automation technology – successfully provides system solutions that are both innovative and economical. A comprehensive range ensures the flexibility required to meet the customers' demands: from an individual sensor, matching accessories to a complete system solution.

With our wealth of sensors and control systems experience we know about the special requirements in ship automation: Heat, cold, moisture, dust and vibration – maximum reliability and safety are required in the harsh conditions found on the seven seas.

The ifm group of companies is present in over 85 countries with more than 8,000 employees and looks after more than 160,000 customers from the various industries. We take being close to the customer very seriously: Service visits in the event of questions or requests, support for installation or set-up have become a standard for us. Your satisfaction drives us on.

ifm – a reliable partner for implementing your projects.

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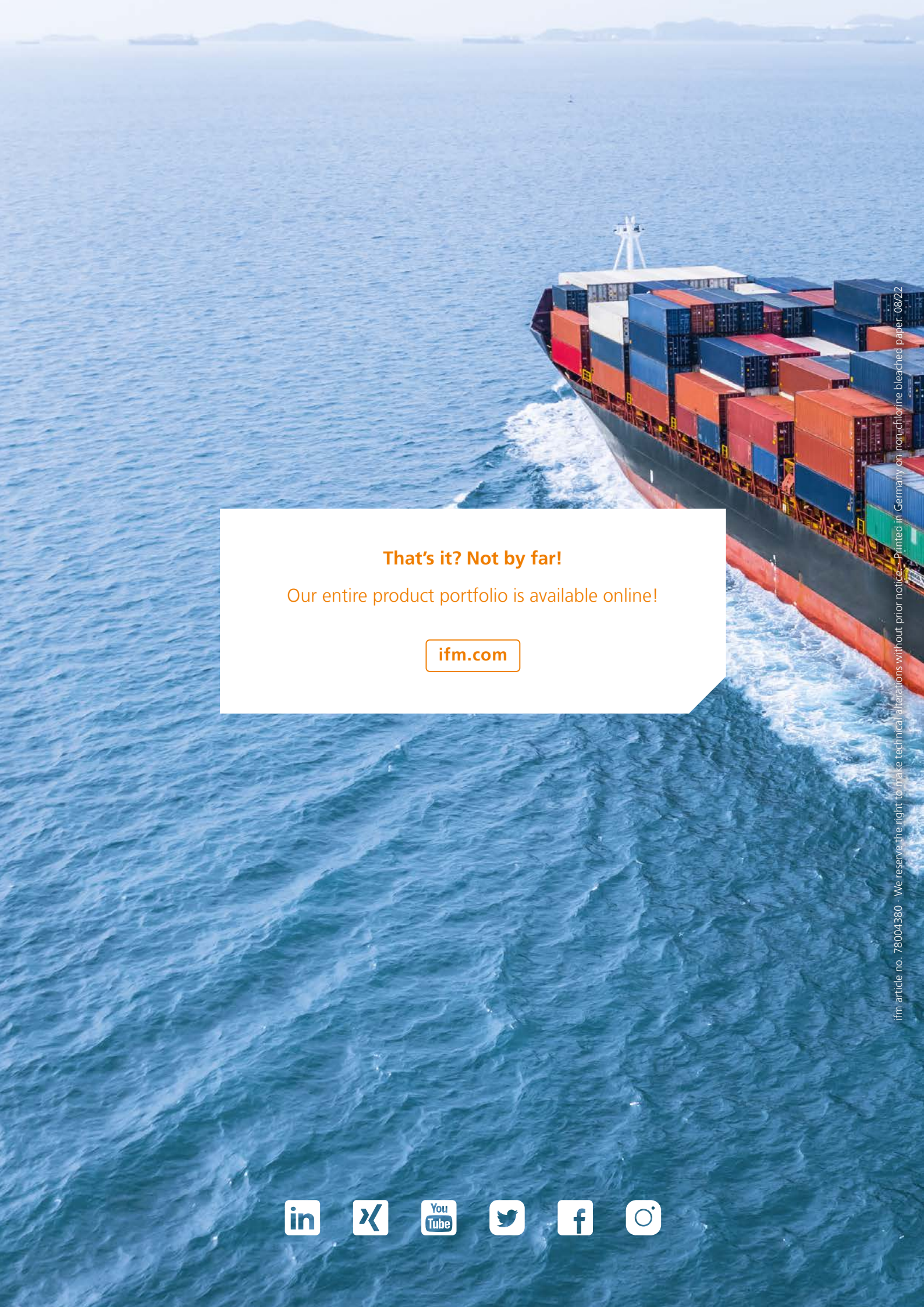

That's it? Not by far!

Our entire product portfolio is available online!

ifm.com

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