

DATA SHEET

DSE-HIE

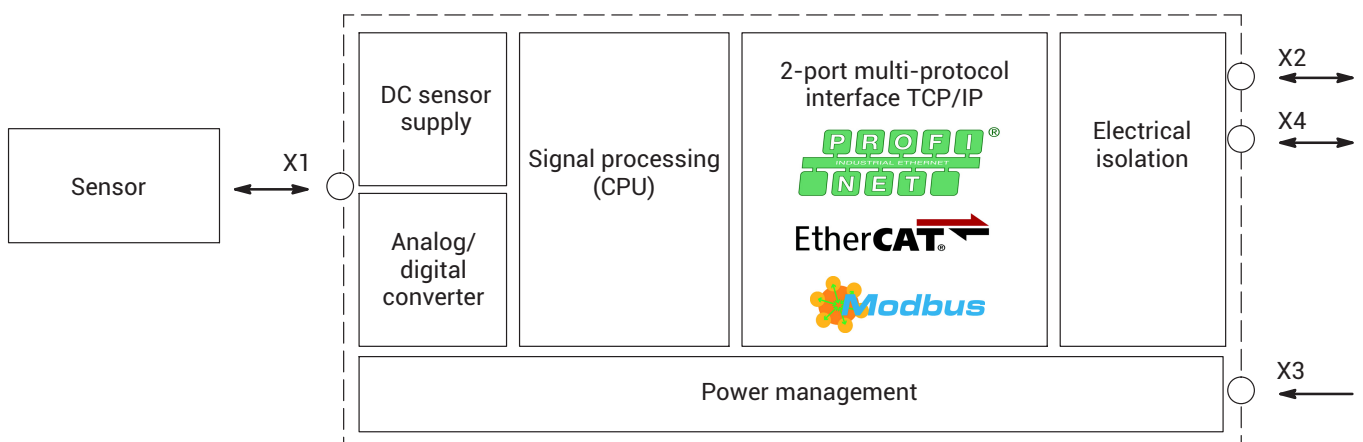
Digital Sensor Electronics - hygienic with industrial Ethernet

SPECIAL FEATURES

- Freely configurable full-bridge strain gage measuring amplifier
- High accuracy and signal resolution based on fast 24 bit A/D converter (2 kHz sample rate)
- Communication protocols: PROFINET® (RT/IRT), EtherCAT®, Modbus TCP and Ethernet (TCP/IP)
- Easy configuration via integrated web server
- Optimized precision-adjustable filters for dynamic production and weighing applications
- Daisy-chain topology
- Robust and compact metal housing
- Compliant with EHEDG and with equipment protection level up to IP69k
- Designed for legal-for-trade applications (in preparation)



BLOCK DIAGRAM



SPECIFICATIONS

Transducer technology		Full bridge strain gages		
Number of load cell verification intervals as per OIML R76, Class III	d=e	10000		
Number of steps in multi-range and multi-interval applications		3		
Number of sensor inputs		1 6-wire and 4-wire via M12 A-coded 8-pin		
Supply voltage	V _{DC}	typically 24; min: 15; max: 30		
Current consumption at 24 V	mA	60 ± 15 (typ.)		
Inrush current	A	< 0.4		
Power consumption	W	1.5 (typ.); ≤3 max. via M12 T-coded 4-pin		
Communication protocols		PROFINET (RT/IRT), EtherCAT®, Modbus TCP and Ethernet (TCP/IP) via M12 D-coded 4-pin		
Signal bandwidth (-3 dB)	Hz	200		
Sample rate	S/s	2000		
Analog/digital converter		24-bit delta/sigma converter		
Measuring range	mV/V	nominal ±2; max. ±4		
Transducer impedance	Ω	200 ... 4500		
Accuracy class with transducer impedance ≤1200 Ω and cable length ≤15 m with transducer impedance >1200 Ω and cable length ≤5 m with transducer impedance >1200 Ω and cable length >5 m		0.01 0.01 0.1		
Transducer excitation voltage	V DC	5 ± 5 %		
Peak-to-peak noise (at 25 °C, 350 Ω or 4500 Ω impedance for 3σ)	μV/V	No filter @ 350 Ω OFF 0.200	IIR @ 350 Ω 40 Hz 0.100 10 Hz 0.060 1 Hz 0.025	FIR @ 350 Ω 30 Hz 0.085 10 Hz 0.060 2 Hz 0.025
		No filter @ 4500 Ω OFF 0.300	IIR @ 4500 Ω 40 Hz 0.135 10 Hz 0.080 1 Hz 0.030	FIR @ 4500 Ω 30 Hz 0.110 10 Hz 0.075 2 Hz 0.030
Temperature drift – zero signal (TC₀)	%/10 K	± 0.0025		
Temperature drift – full scale value signal (TC_S)		± 0.0025		
Non-linearity	%	± 0.0025		
Operating temperature	°C	-10 ... +50		
Storage temperature		-25 ... +75		
Relative humidity in operation and storage	%RH	10 ... 70		
Sensor cable length	m	≤15		
Power supply cable length	m	≤30		
Interface cable length		≤100		
Module weight	g	270		
Overvoltage protection	V	up to 35		
Reverse polarity protection		up to ±35		
Switch-on time before initial data acquisition	s	< 1		

Digital filters, up to 5 cascable	Hz	IIR low pass: 0.1 ... 30 FIR low pass: 3 ... 30 Moving average: 1 ... 100 Comb filter: 1 ... 100
Weighing functions		Checkweigher with pre- and post-trigger, trigger either level-controlled or via external photoelectric sensor; Filling and dosing for filling or emptying, with coarse and fine flow control as well as automatic optimization of target weight, FFT analysis (computational and graphical) to identify and filter or reduce spurious frequencies
Peak-value memory Number Function Sources Response time	ms	3 Minimum, maximum, peak-to-peak mV/V (raw value), gross measured value, net measured value 0.5
Operation		Via internal web server, API or fieldbus; storage of up to 10 formulations/parameter sets with all device settings
IP rating (to EN 60529)		IP67 / IP68 / IP69K
Oscillation according to Class III (following DIN IEC 68 part 2 to 6) Frequency range Duration Acceleration	Hz min m/s ²	5 ... 65 30 per direction 50
Shock according to Class III (following DIN IEC 68 part 2 to 27) Number Duration Acceleration	ms m/s ²	10 in each of the six possible directions 6 350
EMC standards		IEC 61326-1: 2012; EN 61326-1: 2013-07; EN 45501: 2015-02
Configuration		Via integrated web server (via TCP/IP) or via fieldbus
Firmware update		Via integrated web server with multilingual operator dialogs

FIELDBUSES




You can switch the fieldbus type from PROFINET to EtherCAT^{®1)} or Modbus TCP via the ClipX web server.

PROFINET		
Cable type (recommended)		Standard Cat-5, shielded
Cable length (max.)	m	100
Connector socket		2 x M12 socket, D-coded with integrated switch
Real-time classes		1 (RT), 3 (IRT)
Device access point		
Cycle class 1 (RT)	ms	1 / 2 / 4
Cycle class 3 (IRT)	ms	0.5 / 1 / 2 / 4
Supported protocols		RTC (Real-Time Cyclic) Class 1 unsynchronized Class 3 synchronized
		RTA (Real-Time Acyclic)
		DCP (Discovery and Configuration)
		CL / RPC (Connectionless / Remote Procedure Call)
		LLDP (Link Layer Discovery Protocol)
		PTCP (Precision Transparent Clock Protocol)
		SNMP (Simple Network Management Protocol)
Media redundancy		MRP client
Identification & Maintenance		I&M0 ... I&M3 read and write
Device description (GSD file)		Downloadable from device
EtherCAT ^{®1)}		
Type		EtherCAT complex slave
Cable type		Standard Cat-5, shielded
Cable length, max.	m	100
Connector socket		2 x M12 socket, D-coded with integrated switch
Hot-plug possible		Yes
Input data, max.	bytes	1024
Output data, max.	bytes	1024
Device description (ESI file)		Downloadable from https://www.hbm.com/DSE
Data transfer rate, max.	kHz	2
Distributed clocks		Not supported
Modbus TCP		
Cable type		Standard Cat-5, shielded
Cable length, max.	m	100
Connector socket		2 x M12 socket, D-coded
Bit rates	Mbit/s	10, 100
Maximum number of connections		4



1) EtherCAT[®] is a registered brand and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Modbus TCP		
Function codes	FC 1 FC 2 FC 3 FC 4 FC 5 FC 6 FC 15 FC 16 FC 23	Read coils Read input discretes Read multiple registers Read input registers Write coil Write single register Force multiple coils Write multiple registers Read/Write multiple registers
Maximum number of registers per read telegram	FC 3, 4, 23	125
Maximum number of registers per write telegram	FC 16	123
Maximum number of registers per write telegram	FC 23	121
Maximum number of coils per read telegram	FC 1, 2	2000
Maximum number of coils per write telegram	FC 15	1968



STATUS LEDs

DSE LED	Device status	Meaning (system error LED)
	On	DSE error-free and within specification.
	Flashing (1 Hz)	For identifying the DSE.
	On	Values outside operating range, check function.
	Flashing	DSE outside specification.
	On	Device error, check all settings or contact our Technical Support.

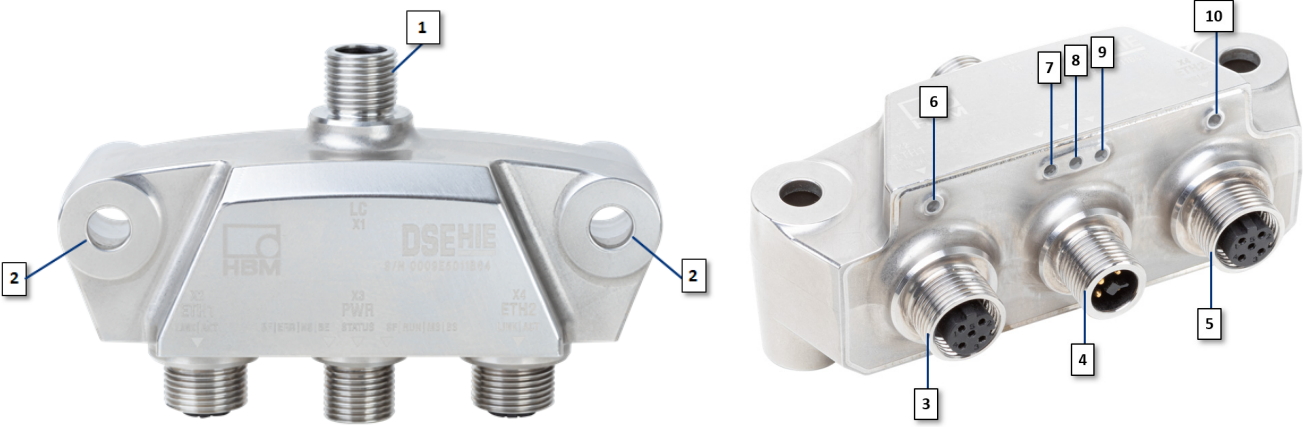
LEDs with PROFINET and EtherCAT

BF LED	Status	Meaning (bus error LED)	SF LED	Status	Meaning (system error LED)
	Off	No error.		Off	No error.
	Flashing 2 Hz	No data exchange.		Flashing 1 Hz for 3 s	A DCP signal service is triggered via the bus.
	On	Error: no configuration, slow or no physical connection.		On	Watchdog timeout; Channel, general or extended diagnostics present; System error.

LEDs with Modbus TCP

RUN LED (COM 0)	Status	Meaning	ERR LED (COM 1)	Status	Meaning
	Off	The DSE is not ready.		Off	No error.
	Flashing 1 Hz	The DSE is ready, but no IP address has been configured.		Flashing 2 Hz, 25% on	System error.
	Flashing 5 Hz	The IP address has been configured, the DSE is waiting to connect.			
	On	The DSE is connected, one or more TCP connections have been established.		On	Connection error.

CONNECTIONS

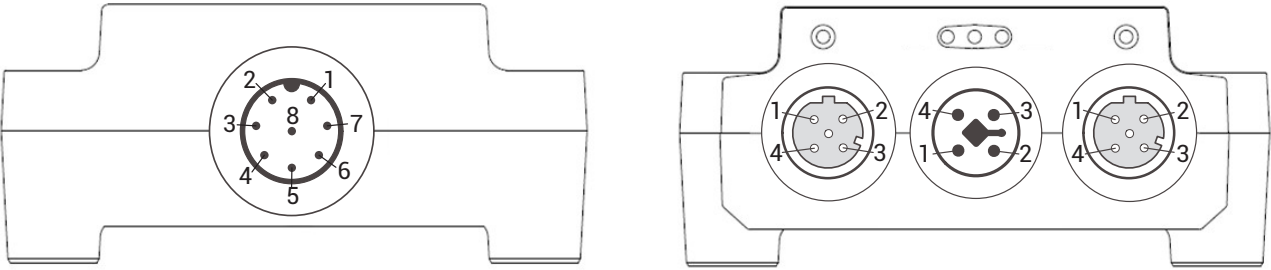


1 X1 – Sensor connection (M12 A plug)
 2 Mounting hole for M6 screw
 3 X2 – Ethernet 1 (M12 D socket)
 4 X3 – Power supply (M12 T plug)
 5 X4 – Ethernet 2 (M12 D socket)
 6 Communication LED Ethernet 1

7 BF LED for PROFINET/EtherCAT, RUN LED with Modbus TCP
 8 Status LED of DSE
 9 SF LED for PROFINET/EtherCAT, ERR LED with Modbus TCP
 10 Communication LED for Ethernet 2

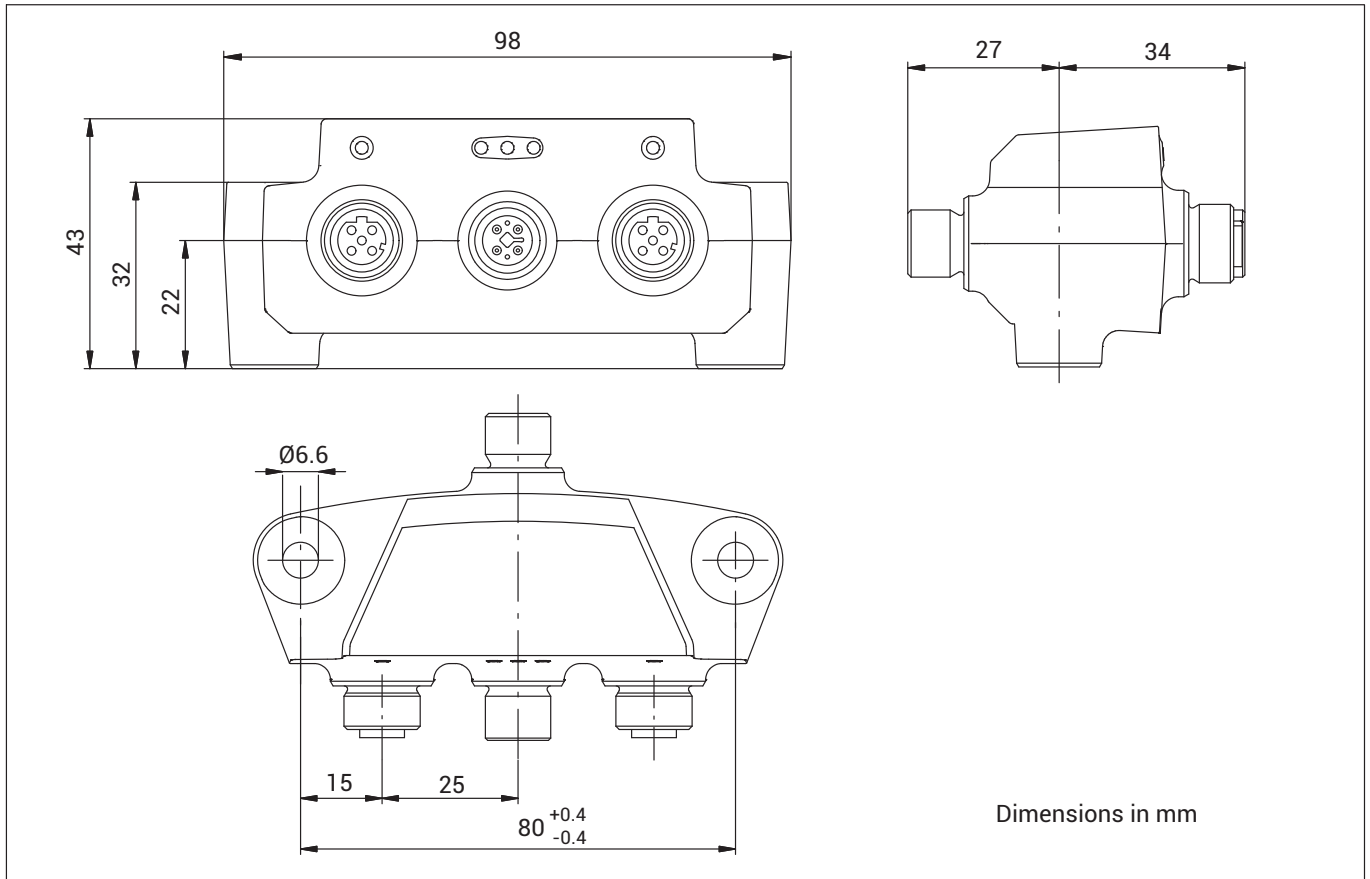
Notice: The MAC address corresponds to the serial number of the DSE.

PIN ASSIGNMENT



Sensor – A-coded plug		Ethernet – D-coded socket	Power supply – T-coded plug
1 Measurement signal +	5 Sense lead –	1 TX+ Transmit	1 Supply voltage +
2 NC	6 Excitation voltage –	2 RX+ Receive	2 NC
3 Sense lead +	7 Excitation voltage +	3 TX– Transmit	3 GND
4 NC	8 Measurement signal –	4 RX– Receive	4 NC

DIMENSIONS

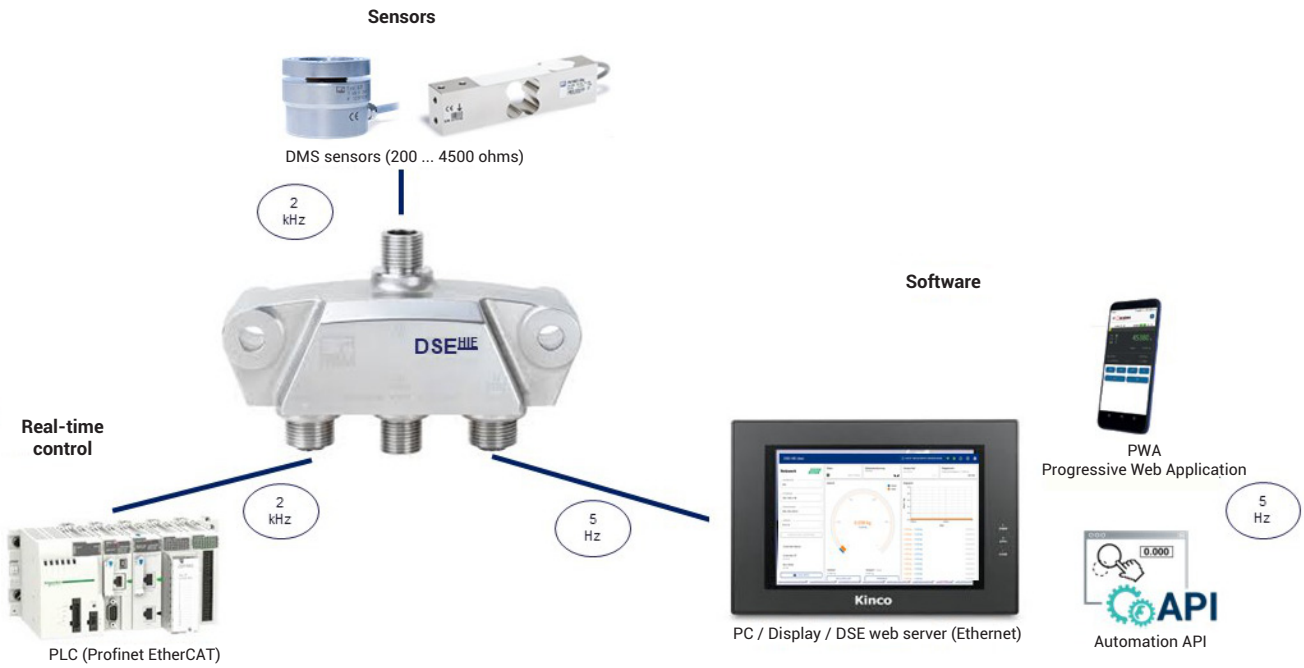


ACCESSORIES (NOT INCLUDED IN THE SCOPE OF SUPPLY)

Accessories for IP67 version:

Designation	Description	Ordering number
Sensor connection	Cable socket M12, 8-pin, with straight cable outlet, A-coded, IP67	1-CON-S3003
	Cable socket M12, 8-pin, with angled (90°) cable outlet, A-coded, IP67	1-CON-S3004
	Connection cable with M12 socket on both ends, 8-pin, 0.3 m long, A-coded, IP67	1-KAB189-0.3
Ethernet cable	Ethernet connection cable CAT5, M12 plug on both ends (daisy-chain), 4-pin, D-coded, 0.3 m long, IP67	1-KAB2144-0.3
	Ethernet connection cable CAT5, M12 plug on RJ45, 4-pin, D-coded, 2 m long, IP67	1-KAB284-2
	Ethernet connection cable CAT5, M12 plug on RJ45, 4-pin, D-coded, 5 m long, IP67	1-KAB2129-5
	Ethernet connection cable CAT5, M12 plug on RJ45, 4-pin, D-coded, 10 m long, IP67	1-KAB2149-10
Power supply	Cable socket M12, 4-pin, with straight cable outlet, T-coded, IP67	1-CON-S1023
	Connection cable with M12 socket on free ends, 4-pin, 1 m long, T-coded, IP67	1-KAB2150-1
Cap	Cap to close off an M12 socket (e.g. Ethernet), IP67	1-CON-A2004

DSE CONNECTIVITY



Notice: The numbers in the circles are sample rates for inputs and outputs, NOT the bandwidth.

Runnable examples and Tech Notes for operation in fieldbus/PC/Scada systems as well as drivers are available as free downloads from the DSE website:

<https://www.hbm.com/en/8162/hygienic-load-cell-signal-conditioner-with-industrial-ethernet/>

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