

Digital torque & power instrument

Measured values

- Torque
- Current
- Voltage
- Frequency
- Speed
- Mechanical power
- Apparent power
- Effective power
- Reactive power
- Power factor
- Motor efficiency
- Motor health



Characteristics

- All measurements can be performed from the MCC: remote, online and non-intrusive
- No additional speed sensor required
- High sampling rate of 2400 Hz allowing the measurement of start-up torque
- High frequency range allowing measurements down to standstill of motor shaft
- Very easy to use
- Fast and simple installation
- Impossible to overload with mechanical torque and suitable for all motor voltages and currents
- Maintenance free
- Is easily integrated into existing control and monitoring systems

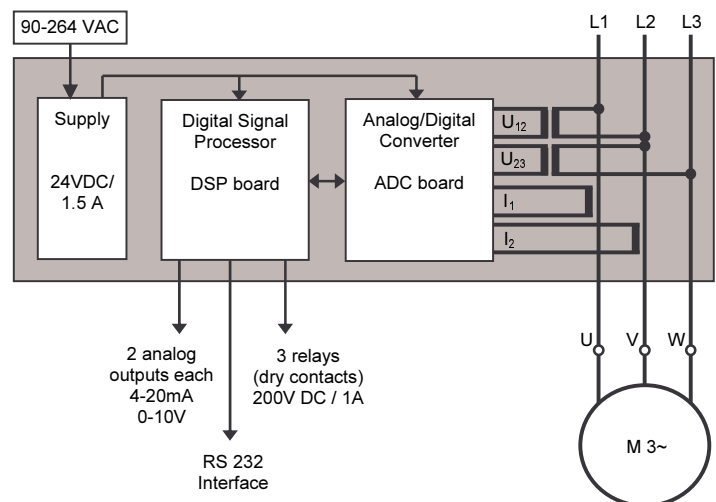
Areas of application

- A durable instrument for the quick and exact measurement of torque, power and motor health
- Designed for mobile and stationary use in temporary and permanent situations
- Mains and vfd - operation
- Simple retrofitting of existing motors without alteration
- Range of torque measurement: 0 - 20 MNm
- Measurement of explosion-proof motors possible by measuring at the MCC
- Early detection of stator turn to turn and phase to phase current leakage
- Early detection of broken rotor bars

Description

The current and voltage of the motor's mains lead are measured with current and voltage transducers in order to calculate the individual mechanical and electrical power components. The ADC circuit board receives these signals and converts them to the digital domain. The DSP circuit board calculates all the Sensortiq values from the digitalized signals. These can then be transferred by way of standardized interfaces to existing monitoring systems.

Function diagram



Sensorq® - Digital torque & power instrument



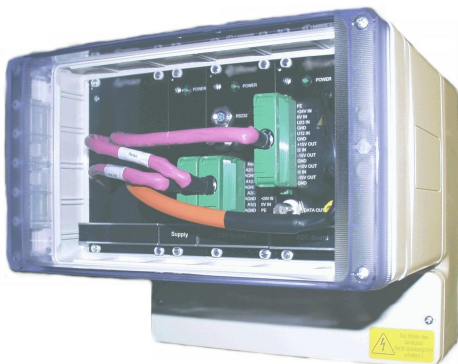
Portable housing



Durable plastic housing for portable use including:

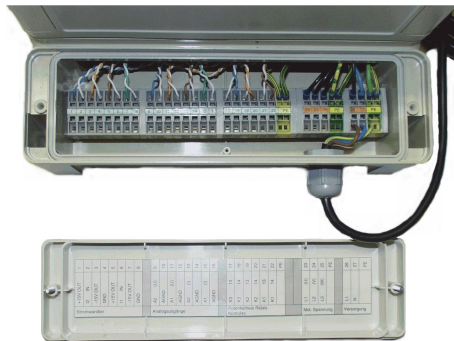
- built-in ADC board, DSP board
- power supply
- internal voltage transducer 1000V
- current transducer
- software on a CD-ROM and operating manual
- RS232 data transfer cable
- secure portability with the hard-shell carrying case

Wall-mount housing



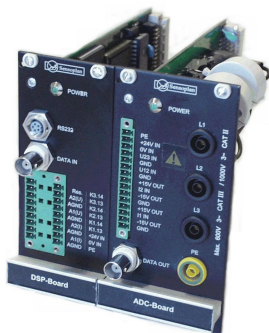
19" housing for installation in an electric cabinet or mounting on a wall with:

- built-in ADC board, DSP board
- power supply
- internal voltage transducer 1000V
- current transducer
- integrated terminal block
- software on a CD-ROM and operating manual
- RS232 data transfer cable



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
+15V OUT	I2 IN	-15V OUT	GND	+15V OUT	I1 IN	-15V OUT	GND	A2 (U)	AGND	A1 (U)	AGND	A2 (I)	AGND	A1 (I)	AGND	K3	K2	K1	K1	L1 (U)	L2 (V)	L3 (W)	PE	L1	N	PE
Current transducers								Analog outputs				Relay dry contact				Motor voltage		Power supply								

Printed Circuit Boards (PCB)



Two 19" rack mount circuit boards in standard format (100mm x 160mm) with:

- ADC board 12 TE and 3 HE
- DSP board 10 TE and 3 HE
- internal voltage transducer 1000V
- current transformer
- software on a CD-ROM and operating manual
- RS232 data transfer cable

(Connection pinout s. page 3/7)

SENSOPLAN Inc. 1156 Bowman Rd., Suite 200 Mt. Pleasant, SC 29464 Phone 843 416 1190 Fax 843 849 9588
 SENSOPLAN AG Gewerbestr. 6 D-79801 Hohentengen a.H., Germany Phone +49 7742 92980 Fax +49 7742 929810
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Specifications

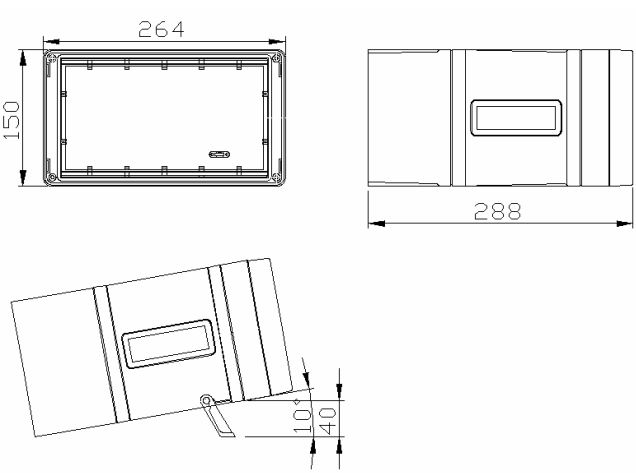
	ADC board	DSP board	Supply	Comments
Supply				
Input voltage range	18 - 30 VDC	18 - 30 VDC	90 - 264 VAC	
Input frequency range	-	-	50 - 440 Hz	
Input current	0.5 A	0.5 A	0.68Arms@115V 0.35Arms@230V	
Output current	-	-	1.5 A	
Measurement range				Motor power at least 0.37 kW/ 0.5 hp
Frequency range	2 - 133 Hz	-	-	
Internal transducer				
Voltage range	1000 VAC	-	-	
External transducer				Only use recommended transformers
Voltage range	On request	-	-	
Current range	On request	-	-	
Sampling rate	2400 Hz	-	-	
Accuracy ¹⁾	2% of rated value	-	-	
Output analog signal 1 and 2				Measured value freely selectable
Voltage range	-	0 - 10 V	-	
Current range	-	4 - 20 mA	-	
Relays 1, 2 and 3				Measured value freely selectable
max. switching voltage	-	200 VDC	-	
max. switching current	-	1 A	-	
max. switching power	-	15W	-	
Temperature range				Custom temperature configurations available
Storage temperature	-30 - +80°C -22 - +176°F	-30 - +80°C -22 - +176°F	-40 - +85°C -40 - +185°F	
Operating temperature	0 - 50°C +32 - +122°F	0 - 50°C +32 - +122°F	0 - 50°C +32 - +122°F	
Safety and standards				flame retardant
Safety regulations for electrical measurement and laboratory devices	DIN EN 61010-1	DIN EN 61010-1	EN 60950 IEC 950 UL 1950	
EMC	DIN EN 61326 Class A	DIN EN 61326 Class A	EN 55022 EN 61000	
Class of equipment	II	II	II	Acc. to IEC 60950
Dimensions				
Front panel	12 TE / 3 HE	10 TE / 3HE	6 TE / 3 HE	
Circuit board	100 x 160 [mm]	100 x 160 [mm]	100 x 160 [mm]	
Weight	0.3 kg	0.25 kg	0.2 kg	

(1) Requires the use of the transducer listed under accessories and that the measurement is made at the switchboard.

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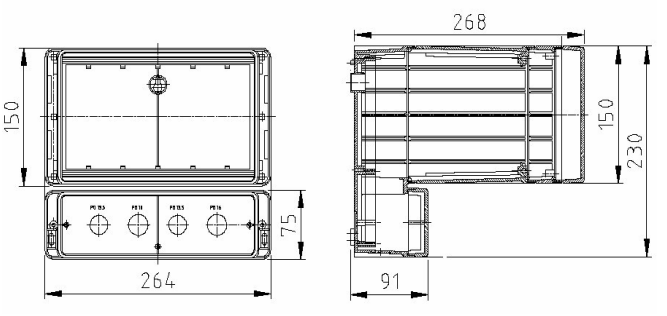
Models

Portable housing



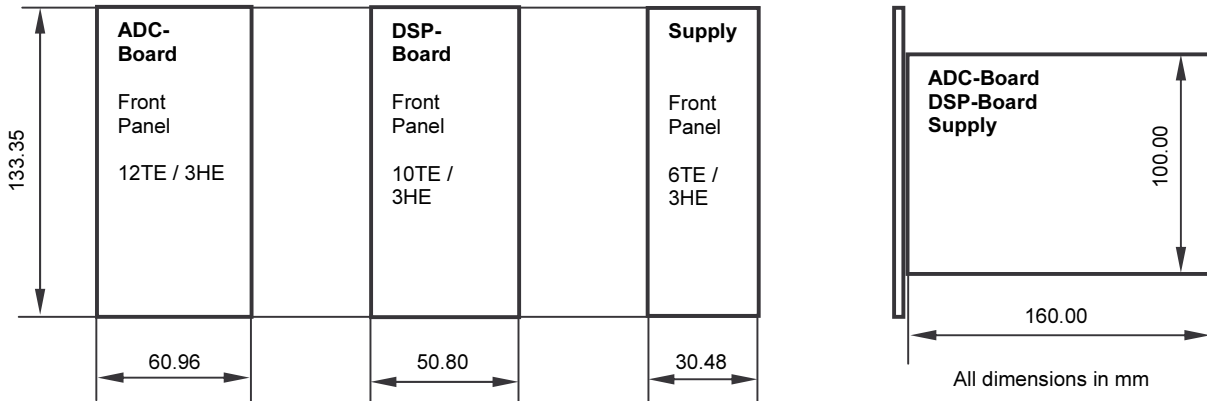
Enclosure	IP 54
Weight	1.3 kg
Dimensions (L x B x T)	264 x 150 x 288 [mm]
Safety and standards	ABS (UL 94 HB)

Wall-mount housing



Enclosure	IP 54
Weight	1.3 kg
Dimensions (L x B x T)	264 x 230 x 268 [mm]
Safety and standards	ABS (UL 94 HB)

PCB



Plug-in module	Two 19" compatible circuit boards in European printed circuit board standard format 100 x 160 [mm]
Safety and standards	ABS (UL 94 HB)

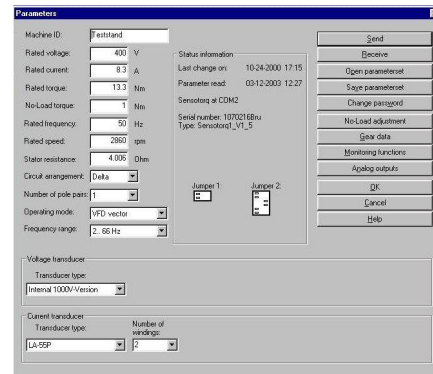
Sensorq® - Digital torque & power instrument



Sensorq® PC-Interface

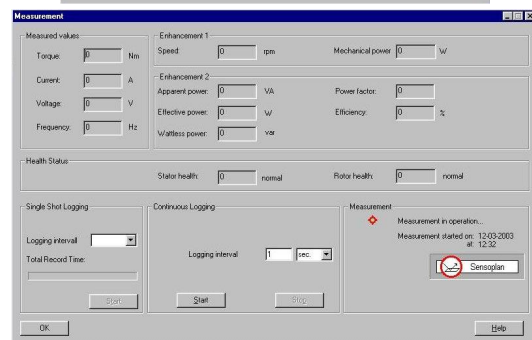
Parameter interface

- Instrument set-up consisting of
 - Motor data
 - Transducer type
- Optional set-up consisting of
 - Analog outputs
 - Monitoring functions
 - Gear data



Measurement interface

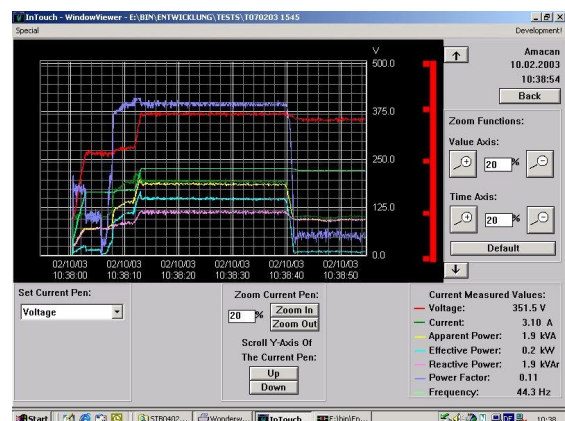
- Online display of 13 measured parameters
 - Including stator health and rotor health on a scale of 0-100
- Set-up and start data recorder
 - Continuous recording (up to 15ms sample rate)
 - Single shot (up to 420µsec sample rate)



SENSOVIEW graphical interface (optional)

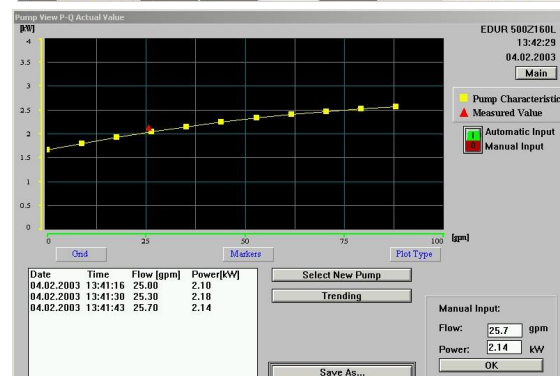
Data view (graphical environment)

- Sensorq® data visualization
- Data recording
- Trending of stator health, rotor health, power factor and motor efficiency



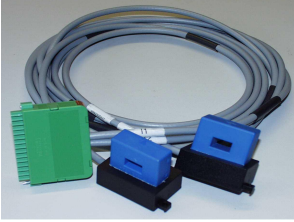
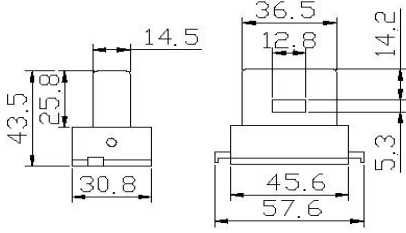
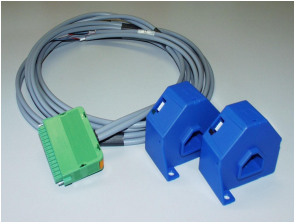
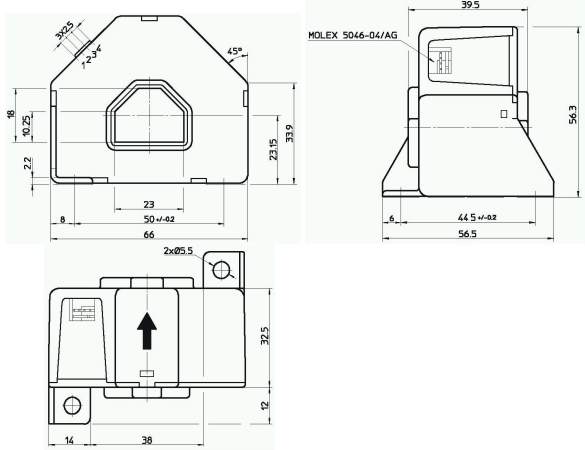

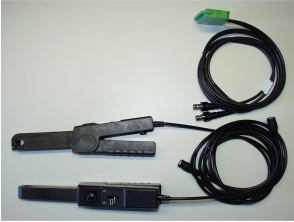

Pump view

- Calculation of the performance point of a centrifugal pump based on the input of pressure and density or flow obtained from the plant control system and mechanical power measurement by Sensorq®
- The performance point is compared to the pump performance curve
- Pump condition with respect to wear and/or mechanical defects
- The measurements can be logged for historical monitoring



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Accessories

Current transducers	Measurement range	Input voltage	Cable length	Dimensions (in mm)
CT 50 / CT 100 	50 A (CT 50) / 100 A (CT 100) ¹⁾	±15 VDC (supplied by the ADC board)	3 m	
CT 200 	200 A ¹⁾	±15 VDC (supplied by the ADC board)	3 m	
LEM~flex RR3030 	30 A / 300 A / 3000 A (switchable)	3 V (Batteries AA or ext. supply)	2 m	Electronic box: 116 x 68.5 x 30 mm Probe: length 610 mm (∅ 194 mm) ¹⁾ Can be opened for installation Weight: 0.18 kg ¹⁾ Further modules available on request
AEMC E3N 	7 A / 70 A (switchable)	9 V (Battery PP3 or ext. supply)	2 m	Clamp-on probe: 231 x 67 x 36 mm Weight: 0.33 kg Cable diameter max. 11.9 mm
Milliohmmeter METRAHit 271 	Resistance measurement	4-wire measurement: 3 mΩ to 300 mΩ (1 A meas. current) 30 mΩ to 30 Ω (200 mA meas. current) Resistance measurement: 300 Ω to 30 MΩ		
	Insulation test	30 MΩ to 3 TΩ (50 / 100 / 250 / 500 V)		
	Voltage meas.	3 V to 600 V (AC / DC)		
	Frequency meas.	300 Hz to 3 kHz		
	Data hold memory	1200 measured values		
	Supply	3x NiMH rechargeable batteries AA (charger as standard equipment included)		

Data sheet Version 3.0

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