



# SENSOR-TECHNIK IN DER AUSBILDUNG

SCHULUNGEN GEWERBLICHE AUSBILDUNG



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DIAGNOSE  
GRUNDKURS

Online

2

HYDRAULIK UND  
ELEKTRONIK AN  
BAUMASCHINEN

Online + Präsenz

3

MOTOREN  
GRUNDKURS

Online + Präsenz

# SENSOR-TECHNIK IN DER AUSBILDUNG

## DIAGNOSE GRUNDKURS



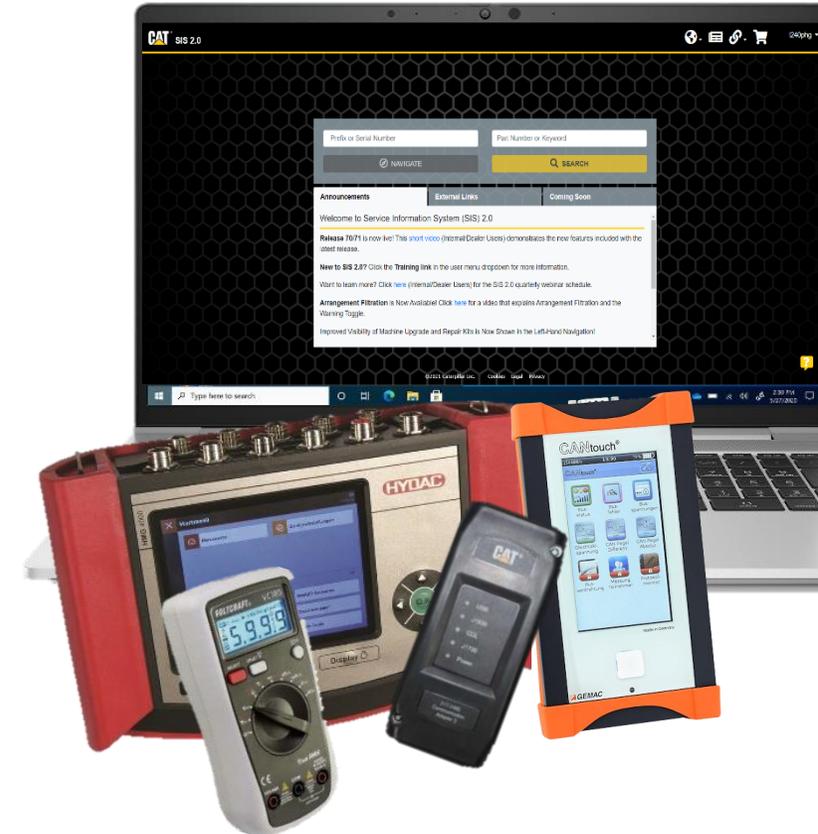
### Schulungsinhalte:

- Messmittel
- Messtechnik an elektrischen und elektronischen Systemen
- Messtechnik an Datenbus-Systemen
- Messtechnik an Hydrauliksystemen
- Fehlersuche und Messungen
  
- Service Information System CAT SIS 2.0
- Service DVD
- Diagnose über CAT ET

### Schulungsziel:

Der Online Diagnose Grundkurs ist die theoretische Vorbereitung für die darauf folgenden Kurse:

- Hydraulik & Elektronik
- Motoren Grundkurs





# SENSOR-TECHNIK IN DER AUSBILDUNG

## HYDRAULIK UND ELEKTRONIK AN BAUMASCHINEN

Vorbereitung im Onlinekurs (1 Woche)

Praxis in Präsenzkurs ZSZ (1 Woche)

### Schulungsinhalte:

- Grundlagen
- Systeme in der Baumaschine
- Arbeiten mit Schaltplänen
- Sensorik
- BUS-Systeme
- Fehlerursachen
- Umgang mit Messmitteln
- Fehlersuche / Diagnose
- Beurteilen und dokumentieren der durchgeführten Arbeiten
- Einstellungen und Kalibrierungen

### Schulungsziel:

Die Teilnehmer erkennen und verstehen die elektrischen und hydraulischen Systeme der Baumaschine. Sie sind sicher im Umgang mit Messmitteln, um erforderliche Überprüfungen, Messungen und Kalibrierungen an den unterschiedlichen Systemen durchführen zu können.

The collage shows various training materials from ZEPPELIN CAT. On the left, there are technical diagrams of a machine's hydraulic and electrical systems with numbered callouts (5, 7, 9, 10, 11, 12, 24, 25, 26, 27, 31, 32, 33). In the center, there are wiring diagrams and a table with the heading 'Bezeichnen Sie die Bauteile (C7.1)'. On the right, there is a worksheet titled 'Beschreiben Sie den Tragen Sie hierzu alle Kennzeichnen Sie die' with a table for 'Caterpillar Sensoren'. The table has columns for 'Komponente', 'Pinbelegung, Spannungsversorgung, Einsatzzweck, Signalspannung, ...', and 'Sensortyp'. Three sensor types are listed with corresponding images: a pressure sensor, a temperature sensor, and a proximity sensor.

Komponente	Pinbelegung, Spannungsversorgung, Einsatzzweck, Signalspannung, ...	Sensortyp
	Pinbelegung, Spannungsversorgung, Einsatzzweck, Signalspannung, ...	
	Pinbelegung, Spannungsversorgung, Einsatzzweck, Signalspannung, ...	
	Pinbelegung, Spannungsversorgung, Einsatzzweck, Signalspannung, ...	

# SENSOR-TECHNIK IN DER AUSBILDUNG

## VORBEREITUNG ONLINE



### AUFBAU

- Vortrag
- Diskussion
- Selbstlernphasen
- Wiederholungen
- Arbeitsaufträge
- Vorführungen
- Praktische Aufgabe zum Kursende

05:03 Präsentation beenden Verlassen

Besprechung in „General“

**Der abgebildete Schaltplan enthält sieben Fehler.**

**Markieren Sie die Fehler ohne Hilfe des Originals!**

*Anschlüsse Signal und Masse vertauscht*

The screenshot displays a technical drawing of a sensor system with various components and their electrical connections. The drawing is annotated with red 'X' marks and green checkmarks. A red circle highlights a specific connection point. A red arrow points from the text 'Anschlüsse Signal und Masse vertauscht' to this highlighted area. The drawing includes a table of components and their connections, with columns for component ID, signal, and mass.

ID	Signal	Masse
EN-C11	3748332	452-0007
EN-C15	3748332	452-0007
EN-C17	3748332	452-0007
EN-C18	3748332	452-0007
EN-C19	3748332	452-0007
EN-C20	3748332	452-0007
EN-C21	3748332	452-0007
EN-C22	3748332	452-0007
EN-C23	3748332	452-0007
EN-C24	3748332	452-0007
EN-C25	3748332	452-0007
EN-C26	3748332	452-0007
EN-C27	3748332	452-0007
EN-C28	3748332	452-0007
EN-C29	3748332	452-0007
EN-C30	3748332	452-0007
EN-C31	3748332	452-0007
EN-C32	3748332	452-0007
EN-C33	3748332	452-0007
EN-C34	3748332	452-0007
EN-C35	3748332	452-0007
EN-C36	3748332	452-0007
EN-C37	3748332	452-0007
EN-C38	3748332	452-0007
EN-C39	3748332	452-0007
EN-C40	3748332	452-0007
EN-C41	3748332	452-0007
EN-C42	3748332	452-0007
EN-C43	3748332	452-0007
EN-C44	3748332	452-0007
EN-C45	3748332	452-0007
EN-C46	3748332	452-0007
EN-C47	3748332	452-0007
EN-C48	3748332	452-0007
EN-C49	3748332	452-0007
EN-C50	3748332	452-0007
EN-C51	3748332	452-0007
EN-C52	3748332	452-0007
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EN-C57	3748332	452-0007
EN-C58	3748332	452-0007
EN-C59	3748332	452-0007
EN-C60	3748332	452-0007
EN-C61	3748332	452-0007
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EN-C92	3748332	452-0007
EN-C93	3748332	452-0007
EN-C94	3748332	452-0007
EN-C95	3748332	452-0007
EN-C96	3748332	452-0007
EN-C97	3748332	452-0007
EN-C98	3748332	452-0007
EN-C99	3748332	452-0007
EN-C100	3748332	452-0007



# SENSOR-TECHNIK IN DER AUSBILDUNG

## INHALTE SENSORIK

### SENSOR TYP

TEMPERATUR

DRUCK

POSITION

DREHZAHL

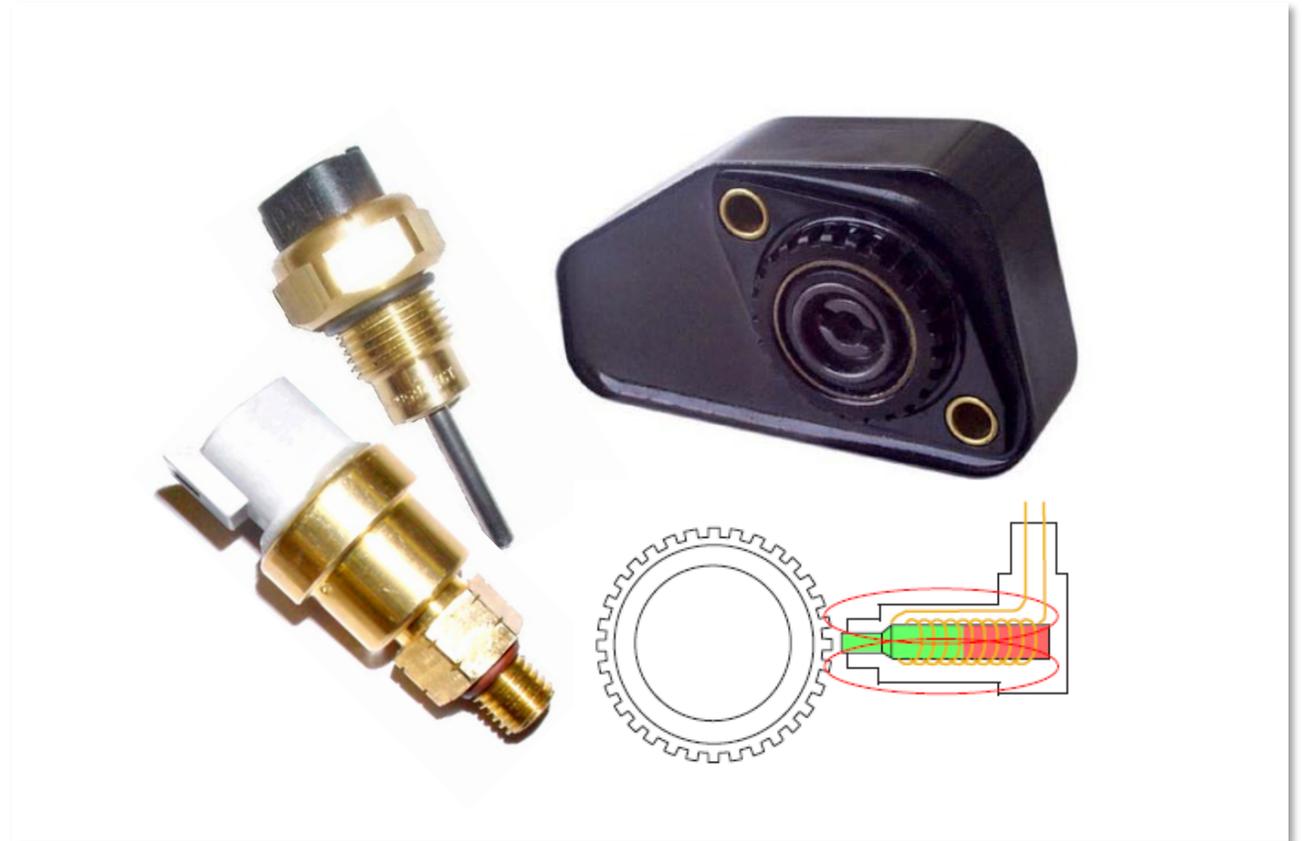
....

### BAUART DES SENSORS

PASSIV ANALOG

AKTIV ANALOG

DIGITAL



# SENSOR-TECHNIK IN DER AUSBILDUNG

## INHALTE SENSORIK



### SENSOR SIGNAL

PWM

NTC

PTC

INDUKTIV

CAN

PLAUSIBILITÄT

### DIAGNOSE

STEUERGERÄT

FEHLERSUCHE

TROUBLESHOOTING SIS

FEHLERCODES

The screenshot displays the CAT SIS 2.0 diagnostic tool interface. The browser address bar shows the URL: `sis2.cat.com/#/detail?keyword=sensor&tab=service&serialNumber=jrf&infoType=7&serviceMediaNumber=KENR8276&serviceSystemControlNumber=i02755031`. The page title is "Wheel-Type Loader > Compact Wheel Loader > 909H2 > JRF". The left sidebar contains a navigation menu with options like "Torque Specifications", "Troubleshooting", "Systems Operation", "General Information", "Service Tools", "Connector Locations", "Diagnostic Capabilities", and "Event Code List". The main content area shows the "Event Code List (KENR8276-00)" for the date 2008/07/08. Below this, there is a table titled "Machine ECM Event Code List" with the following columns: "Code and Description" and "Possible Cause / Recommended Response".

Code and Description	Possible Cause / Recommended Response
E83 (2S) Transmission Overspeed	A Change in operation of the machine or performance of a maintenance procedure is required. Activated when drive motor speed exceeds 5500 rpm. This event is logged.
E273 (2) Machine operation attempted using an invalid key (MSS)	Use of invalid key (applies only to machines equipped with MSS)
E283 (1) Low Hydraulic Charge Pressure	A machine system requires attention. The hydraulic oil pressure switch indicates low pressure. This event should always be active when the machine is keyed-on and the engine is not running.
E283 (3) Low Hydraulic Charge Pressure	Immediate safe shutdown is required. The hydraulic oil pressure switch indicates low pressure while the engine is running. A problem exists with the machine's hydraulic system, or the switch is stuck in the low pressure position.
E353 (2) Machine Configuration Changed	See Troubleshooting, "E353 Machine Configuration Changed"
E360 (1) Low Engine Oil Pressure	A machine system requires attention. The engine oil pressure switch indicates low pressure. This event should always be active when the machine is keyed-on and the engine is not running.
E360 (3) Low Engine Oil Pressure	Immediate safe shutdown is required.
E361 (1) High Engine Coolant Temperature	A machine system requires attention. The engine coolant temperature sensor indicates to the machine ECM that the engine coolant temperature is consistently high enough to issue a Level 1 warning. Inspect the engine cooling system for efficiency of operation.
E361 (2) High Engine Coolant Temperature	A Change in operation of the machine or performance of a maintenance procedure is required. The engine coolant temperature sensor indicates to the machine ECM that the engine coolant temperature is consistently high enough to issue a Level 2 warning. Inspect engine cooling system for efficiency of operation
E361 (3) High Engine Coolant Temperature	Immediate safe shutdown is required. The engine coolant temperature sensor indicates to the machine ECM that the engine coolant temperature is consistently high enough to issue a Level 3 warning. Inspect engine cooling system for efficiency of operation.
E362 (2) Engine Overspeed	A Change in operation of the machine or performance of a maintenance procedure is required. Activated when engine speed exceeds 3500 rpm. Repair the cause of the active diagnostic code.
E490 (2S) Park Brake Applied while Shift Lever not in Neutral	See Troubleshooting, "E490 Park Brake Applied while Shift Lever not in Neutral"
E575 (3) Unexpected Drive Motor Forward Speed Detected	See Troubleshooting, "E575 Unexpected Drive Motor Forward Speed Detected, E576 Unexpected Drive Motor Rearward Speed Detected"
E576 (3) Unexpected Drive Motor Rearward Speed Detected	
E627 (2S) Parking Brake Applied with Machine in Motion	See Troubleshooting, "E627 Parking Brake Applied with Machine in Motion"
E695 (3) Unexpected Motor Speed Detection Disabled	See Troubleshooting, "E695 Unexpected Motor Speed Detection Disabled"
E707 (0) Transmission Failed to Engage Desired Gear	See Troubleshooting, "E707 Transmission Failed to Engage Desired Gear"
E861 (0) Clock Manual Alignment Required	A machine system requires attention. Applies only when Product Link is installed. Use ET to check (and adjust) the date and time on the machine ECM and Product Link: ECM (Select "ECM Date/Time" menu item).







Vielen Dank für Ihre Aufmerksamkeit.

**Ihre Fragen bitte!**