

■ **ABS-Sensorcheck Test
Device 884 906 288 0
with
Program Card
884 906 289 0**

■ **1. Edition**

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WABCO

Vehicle Control Systems

An American Standard Company

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1. General

The test equipment is composed of the ABS Sensorcheck Test Unit 884 906 288 0 and the program card 884 906 289 0. For testing, the sensor signal of a complete wheel rotation is evaluated. The test includes the following steps:

1.1 Sensor Voltage

Based on the measured data the minimum and maximum sensor voltage is determined. Doing so the minimum voltage must be higher than the minimum value calculated out of the entered pole wheel data (number of teeth and pole wheel diameter). The voltage data are indicated as RMS.

1.2 Pole Wheel Run Out

The airgap change between sensor and pole wheel is measured by the ratio U_{max}/U_{min} .

1.3 Tooth Shape Error

The fault detection is realised by evaluating amplitude height and halfperiod time of the sinusoidal sensor signal. In case of one or more faults, either manufacturing tolerance is not in line with the WABCO pole wheel specification or teeth geometry is damaged.

The test can be done with any wheel speed, while the frequency of the sensor signal must be 15 to 200 Hz. During the test the speed should not fluctuate more than it is known from the usual roller testbenches. In case the test is realised with a known speed, it is possible to determine the number of pole wheel teeth indirectly by measured frequency.

Having passed the test with positive results, the tested sensor/pole wheel combination with a WABCO-ECU can be supposed to be safe.

Faults caused by dynamic influences, like e. g. vibrations on false designed sensor holders, are not detected.

2. Connections

2.1 Voltage Supply

The tester needs a voltage of 24 V. This voltage can either be supplied by an on-board power supply unit (optional) or by the 10polar Harting socket on the back of the tester. The plug is marked as "Control".

Pin 1 = +24V
Pin 2 = GND

2.2 Relay Outlets

For the connection of external lamps or for the evaluation there are 3 potential-free relay outlets in the 10polar Harting socket. The outlet must be maximally charged with 24 V/1 A.

Pin 3 + 4 "GOOD" - indication (Rel. K1)
Pin 5 + 6 "BAD" - indication (Rel. K2)
Pin 7 + 8 Test running (Rel. K3)

2.3 Sensor

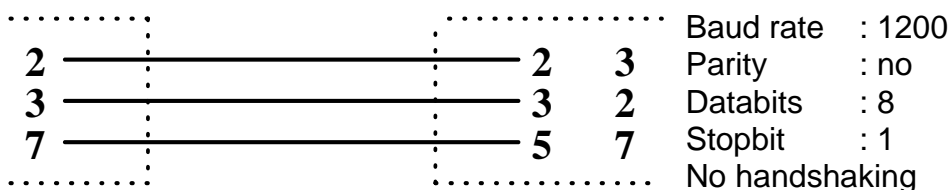
On the back of the tester there is a 4polar Harting socket which is marked as "Sensor". Here the sensor of an axle must be connected.

Pin 1 and Pin 2 = Sensor x

2.4 Serial Interface (RS232)

WABCO 25pol. Sub-D

PC 9pol. 25pol. Sub-D



3. Handling / Function

3.1 Program Description

After switching on the tester, the red and the green signal lamps flash up briefly. The title page appears in the display for a short time (approx. 3 seconds):

Test software	xxx xxx xxx x
Version	x.xx
	CONFIG

○ ○ ○

If during this time the CONFIG-key is pressed, you can select between manual and automatic test. The selected mode is stored in the device and loaded as default after re-start.

Menue	
1. Automatic test	
2. Manual test	
	AUTO MANUAL

○ ○ ○

3.1.1 Automatic Test

For the automatic test the device starts with the following display:

Waiting for data

○ ○ ○

The test starts by transmission of pole wheel data (number of teeth, diameter). The wheel speed must be constant, as immediately after transmission of pole wheel data the measured data are read-in. Measuring time is approx. 1-2 sec. The contact of relay K3 "test running" is made. The following information appears in the display:

ABS sensor pole wheel test Reading-in of measured data (sensor 1)
--

○ ○ ○

After measurement the data are evaluated. The calculation requires approx. 15 sec. and is signalled by suppressing the dots in the display. Moving the wheel during calculation is not necessary. The sensor can be disconnected from the tester.

ABS sensor pole wheel test Measured data are being evaluated! Please wait . . .

○ ○ ○

After test is finished, the data are put out by serial interface. If the test results are ok, the green lamp is on (rel. K1). If a fault was found, it will be indicated in the display (see fault message) and the red lamp is on (rel. K2).

After 1 sec. the tester returns to its normal position (waiting for data ...) and can be re-started.

Pole wheel and sensor voltage ok !

○ ○ ○

Protocol Description of the Serial Interface (RS232)

Process of a measurement:

If the data are confirmed in a wrong way or not within one second, the tester returns into its normal position and waits for the first block of data. The data are transferred in blocks of 5 ASCII characters each. If the tester does not respond to the data any more, it can be reset by switching operating voltage off and then on again.

Customer's device (PC)	Example of data		WABCO test device
			Tester waiting for data
Number of teeth	→	A0080	
		A0080 ←	Data confirmation
Diameter	→	B0170	
		B0170 ←	Data confirmation
			Test started Measuring time : 1-2 sec. Evaluation : ca. 15 sec.
		*C0000 ←	Transmission of test status
Data confirmation	→	C0000	
		D0061 ←	Transmission of speed [min^{-1}]
Data confirmation	→	D0061	
		E0082 ←	Transmission of frequency [Hz]
Data confirmation	→	E0082	
		F0100 ←	Transmission of U_{\min} [mV]
Data confirmation	→	F0100	
		G0061 ←	Transmission U_{\min} [mV] (50Hz stand.)
Data confirmation	→	G0061	
		H1.25 ←	Transmission of ratio U_{\max}/U_{\min}
Data confirmation	→	H1.25	
		I0002 ←	Transm. number of tooth shape errors
Data confirmation	→	I0002	
			Tester waiting for data

***Test status:**

0000 = Pole wheel ok

0001 = Voltage too low

0002 = Tooth shape error

0003 = Pole wheel run out too high

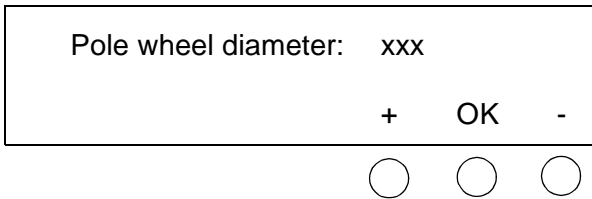
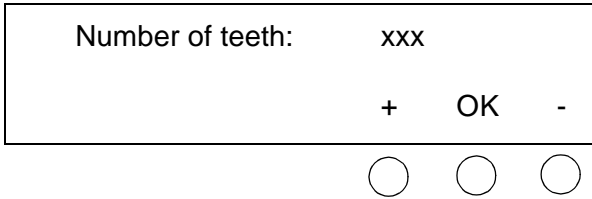
0004 = Speed too low

0005 = Speed too high

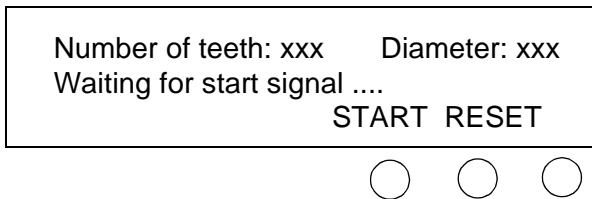
0007 = Sensor not connected

3.1.2 Manual Test

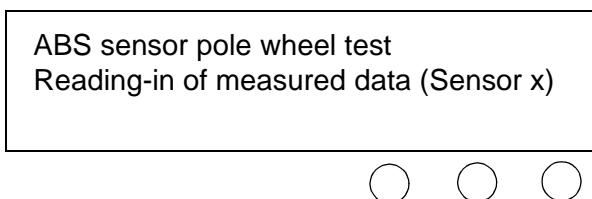
For manual test the device starts with the following display:



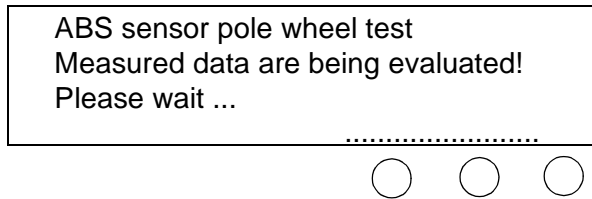
The number of teeth and pole wheel diameter must be adjusted by the + - keys. The last set values are stored in the tester and indicated as preselected values when the program is started. After the pole wheel combination to be tested was selected, the following display appears:



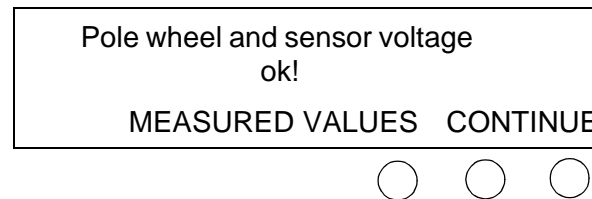
The selected values are displayed again. RESET-key returns the test to the input of teeth and pole wheel diameter. Pressing START-key starts the test. Wheel speed must be constant, as immediately after pushing the START-key measured data are read-in. Measuring time is approx. 1-2 sec. The display shows following information:



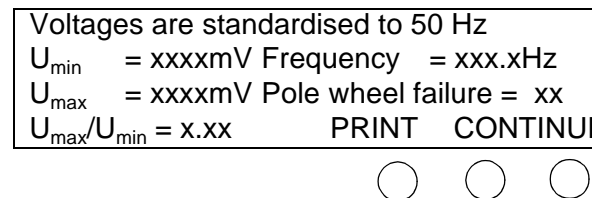
After measurement the data are evaluated. The calculation requires approx. 15 sec. and is signalled by suppressing the dots in the display. Moving the wheel during calculation is not necessary. The sensor can be disconnected from the tester.



If the test is ok, the green lamp is on and test protocol is printed (optional) and put out via the serial interface. If a fault was found, it will be indicated in the display (see fault message) and the red lamp is on. Pushing keys decision can be made how to continue the test.



Pressing the CONTINUE-key resets the program. Again the message "waiting for start signal" appears. The tester is ready for a new measurement. Pressing the MEASURED VALUES-key indicates following values in the display, before a new measurement can be started. Data can be printed again.



Protocol Print

Example for protocol print:

<p>ABS sensor/pole wheel test</p> <p>Inputs:</p> <p>Pole wheel diameter : 170</p> <p>Number of teeth : 100</p> <p>Measured values:</p> <p>Frequency [Hz] : 70.1</p> <p>Speed [min-1] : 42.1</p> <p>U_{min} [mV_{rms}] : 0560</p> <p>U_{min} (stand. 50Hz) : 0400</p> <p>U_{max}/U_{min} : 1.07</p> <p>Pole wheel failure : 0</p> <p>Pole wheel and sensor ok</p>	<p>ABS sensor/pole wheel test</p> <p>Inputs:</p> <p>Pole wheel diameter : 170</p> <p>Number of teeth : 100</p> <p>Measured values:</p> <p>Frequency [Hz] : 70.3</p> <p>Speed [min-1] : 43.4</p> <p>U_{min} [mV_{rms}] : 0510</p> <p>U_{min} (stand. 50Hz) : 0350</p> <p>U_{max}/U_{min} : 1.19</p> <p>Pole wheel failure : 3</p> <p>Pole wheel failure detected!</p>
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3.2 Fault Messages

Pole wheel and sensor voltage ok!



Pole wheel ok test status 0000

ABS sensor pole wheel test
Pole wheel failure detected! Airgap between sensor and pole wheel varies too much!



Pole wheel run out too high test status 0003

ABS sensor pole wheel test
Sensor voltage too low, airgap between sensor and pole wheel probably too large!



Sensor voltage too low test status 0001

ABS sensor pole wheel test
Speed too low or sensor not connected!



Speed too low test status 0004

ABS sensor pole wheel test
Pole wheel failure detected!
Check tooth shape error!



Tooth shape error test status 0002

ABS sensor pole wheel test
Speed too high!



Speed too high test status 0005

ABS sensor pole wheel test
Sensor voltage not available,
sensor possibly not connected!



Sensor voltage not available test status 0007

4. Limit Values

Pole wheel diameter	= 50 - 280 mm
Number of teeth	= 40 -120
Frequency range	= 15 - 200 Hz
Max. admissible ratio U_{\max}/U_{\min}	= 2,2 - 2,5 (depending on sensor voltage)
Minimum response voltage	= 80 mV _{rms}
Minimum required sensor-voltage at 50 Hz	= 0,1 - 1,1 V _{rms} (depending on pole wheel diameter, number of teeth)

The sensor cable must not exceed 10 m length. Sensor cable must be drilled with a winding deflection of 55mm. It should not be laid in one harness together with cables of high currents or with cables for the control of inductivities. In case of disturbances (e. g. engine) screening the cable may help.

The ABS Sensorcheck Test Device can be reset anytime by switching off the operating voltage. After switching the operating voltage on, the device is in its normal position.

The supply voltage (18-28 V) may have a maximum superimposed ripple voltage of 60 mV and must be free of voltage peaks.

5. Spares

Device	Manufacturer	Supplier	Reference
Controller printed-board incl. display	WABCO	WABCO	446 300 107 2
Program card	WABCO	WABCO	884 906 289 0
Relay card	WABCO	WABCO	884 904 989 2
Sensor probe	WABCO	WABCO	446 300 350 0
Body	Schroff	Schroff	20842-621
10pol. socket	Harting	Schuricht	09 33 010 2701
Attachable body	Harting	Schuricht	09 30 010 0301
4pol. socket	Harting	Schuricht	09 20 003 2711
Attachable body	Harting	Schuricht	09 20 003 0301
25pol. D-Sub connector	Siemens	Schuricht	13.069.7
Switch	Rafi	Schuricht	13.880.40
Lamps 24V/30mA	Rafi	Schuricht	7.475.54
OPTIONAL:			
Power supply unit	Haltec	Haltec	52.0000.7153
Printer	DATAMEGA	DATAMEGA	DPN-272-24-0-191-V24-5V
Printer ribbon	DATAMEGA	DATAMEGA	DPN-290-BL
Paper roll	DATAMEGA	DATAMEGA	DPA-008

Addresses

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 D-75334 Straubenhardt
 Tel.: (07082) 794-0

CE Conformity Declaration

We

WABCO Vehicle Control Systems An American Standard Company

declare that the

ABS Sensorcheck Test Device 884 906 288 0

meets the requirements of

EN 55081-2 SA Industriebereich
EN 55082-2 SF Industriebereich
EN 61000-4-2 ESD
EN 61000-4-6 Leitungsgeführte SF
EN 61000-4-3 HS SF
EN 61000-4-4 Burst
EN 61000-4-5 Surge
EN 61000-4-8 Magnetfelder.

The test results are recorded in test report no. 970629 of EMV lab of computer based Automations- und Prüftechnik Riß GmbH.

