

Signal description Motronic 4.4

Connector A #A1 – #A43

All the values specified below are measured between the terminal specified in column 1 and terminal #A42 (signal ground), unless otherwise indicated in brackets.

Note! It is important that the breakout box is connected and that the ground terminals have been checked before readings are taken. See [Connecting the breakout box](#) [Connecting the breakout box](#) .

The values specified in the table apply with the engine unloaded and at normal operating temperature.

U=	DC voltage in volts (V)	U _{AC} =	AC voltage in volts (V)
U _{bat} =	battery voltage	f =	frequency in Hertz (Hz)
U _{low} =	voltage approximately 0 V or 0 V	% duty =	duty cycle (pulse ratio) as a percentage (%)
t =	time in milliseconds (ms)		

Terminal	Signal type	Ignition on	Idling speed	Other
#A1	–	–	–	–
#A2	Signal (+) front knock sensor (KS) (measured to terminal #A17)	U _{low}		
#A3	Power ground mass air flow (MAF) sensor	U _{low}		
#A4	Signal mass air flow (MAF) sensor (measured to terminal #A5)	U = 0.1 – 0.2 V	U ≈ 0.9 V	U increases with increasing air mass
#A5	Signal ground mass air flow (MAF) sensor	U _{low}		
#A6	Signal ground engine speed (RPM) sensor	U _{low}		
#A7	Control signal engine cooling fan (FC) low-speed	Engine cooling fan (FC) off: U _{bat} Engine cooling fan (FC) on: U ≈ 0.1 V		
#A8	–	–	–	–

#A9	Control signal injector 5	U_{bat}	$t = 2.2 - 3.6 \text{ ms}$	t increases with engine speed (RPM) and load (measured with EVAP not active)
#A10	Control signal injector 1	U_{bat}	$t = 2.2 - 3.6 \text{ ms}$	t increases with engine speed (RPM) and load (measured with EVAP not active)
#A11	Opening signal the idle air control (IAC) valve	%duty $\approx 25 \%$	% duty = 21 – 32%	%duty increases with load (measured with EVAP not active)
#A12	15– supply (power supply from the ignition switch)	U_{bat}		
#A13	Power ground	U_{low}		
#A14	Control signal front heated oxygen sensor (HO2S), preheating	U_{bat}	Preheating off: $U \approx U_{bat}$ Preheating on: $U \approx 0.4 \text{ V}$	
#A15	Power supply the throttle position (TP) sensor	$U \approx 4.8 \text{ V}$		
#A16	Signal the throttle position (TP) sensor	$U \approx 0.5 \text{ V}$ at closed throttle position (CTP) (idling) $U \approx 4.3 \text{ V}$ at wide open throttle (WOT)		
#A17	Signal (–) front and rear knock sensors (KS)	U_{low}		
#A18	Signal ground sensor (measured to the battery negative terminal)	U_{low}		
#A19	Signal (–) rear heated oxygen sensor (HO2S)	$U \approx 0.7 \text{ V}$	Only measured with the ignition on	

#A20	Signal engine speed (RPM) sensor (measured to #A6)	U_{low}	$U_{\text{AC}} \approx 1.6 \text{ V}$ $f = 825 \text{ Hz}$	
#A21	Signal camshaft position (CMP) sensor	$U = U_{\text{low}}$ or 5.0 V $U = U_{\text{low}}$ or U_{bat}	$f \approx 7 \text{ Hz}$	f increases with engine speed (RPM)
#A22	Control signal engine cooling fan (FC) high-speed	Engine cooling fan (FC) off: U_{bat} Engine cooling fan (FC) on: $U < 0.3 \text{ V}$		
#A23	Control signal injector 4	U_{bat}	$t = 2.2 - 3.6 \text{ ms}$	t increases with engine speed (RPM) and load (measured with EVAP not active)
#A24	Control signal injector 3	U_{bat}	$t = 2.2 - 3.6 \text{ ms}$	t increases with engine speed (RPM) and load (measured with EVAP not active)
#A25	Closing signal the idle air control (IAC) valve	%duty = 75 %	%duty = 68 - 78 %	% duty decreases with load (measured with EVAP not active)
#A26	30- supply (power supply from the battery)	U_{bat}		
#A27	Power supply (from the main relay)	U_{bat}		
#A28	Power ground control module	U_{low}		
#A29	Control signal rear heated oxygen sensor (HO2S), preheating	U_{bat}	Preheating off: $U \approx U_{\text{bat}}$ Preheating on: $U \approx 0.4 \text{ V}$	
#A30	Signal (+) rear knock sensor (KS) (measured to terminal #A17)	U_{low}		

#A31	Signal the engine coolant temperature (ECT) sensor	(at an engine coolant temperature (ECT) of +46°C, the engine control module (ECM) changes the voltage range)	(+20 °C) $U \approx 1.81 \text{ V}$ (+30 °C) $U \approx 1.34 \text{ V}$ (+45 °C) $U \approx 0.83 \text{ V}$ (+46 °C) $U \approx 4.0 \text{ V}$ (+80 °C) $U \approx 2.73 \text{ V}$ (+100 °C) $U \approx 1.96 \text{ V}$	
#A32	Signal (+) front heated oxygen sensor (HO2S)	$U = 1.1 - 1.2 \text{ V}$ (measured to terminal #A42)	U oscillates rapidly between 0.0–0.9 V when the probe is warm. Low voltage = lean engine High voltage = rich engine (measured to terminal #A33)	
#A33	Signal (–) front heated oxygen sensor (HO2S)	$U \approx 0.7 \text{ V}$	Only measured with the ignition on	
#A34	Signal (+) rear heated oxygen sensor (HO2S)	U_{low} (measured to terminal #A42)	U at even load approximately 0.6 V can vary between 0.0 – 0.9 V depending on the operating conditions (measured to terminal #A19)	
#A35	Outer temperature sensor	$U \approx 4.9 \text{ V}$	–	–
#A36	Power supply camshaft position (CMP) sensor	$U \approx U_{\text{bat}}$		
#A37	Pulsed secondary air injection system (PAIR) pump valve, control signal	U_{bat}	pulsed secondary air injection system (PAIR) pump valve not	active $\approx U_{\text{low}}$

			active $\approx U_{bat}$	
#A38	Control signal injector 2	U_{bat}	$t \approx 2.2 - 3.6 \text{ ms}$	t increases with engine speed (RPM) and load (measured with EVAP not active)
#A39	Control signal Canister purge (CP) valve	U_{bat}	Canister purge (CP) valve: % duty = 0 – 33 %	
#A40				
#A41	Control signal main relay	$U \approx 1 \text{ V}$		
#A42	Signal ground control module (measured to the battery negative terminal)	U_{low}		
#A43	–	–	–	–

Connector B terminals #B1 – #B43

All the values specified below are measured between the terminal specified in column 1 and terminal #B28 (signal ground), unless otherwise indicated in brackets in column 2.

Note! It is important that the breakout box is connected and that the ground terminals have been checked before readings are taken. See [Connecting the breakout box](#) [Connecting the breakout box](#) .

The values specified in the table apply with the engine unloaded and at normal operating temperature.

U=	DC voltage in volts (V)	U_{AC} =	AC voltage in volts (V)
U_{bat} =	battery voltage	f =	frequency in Hertz (Hz)
U_{low} =	voltage approximately 0 V or 0 V	% duty =	duty cycle (pulse ratio) as a percentage (%)
t =	time in milliseconds (ms) *		Multimeter 951-0060 reads approximately 71 Hz due to interference in the signal.

Terminal	Signal type	Ignition on	Idling speed	Other

#B1	Power supply accelerometer	$U \approx 5.0 \text{ V}$		
#B2	Signal torque limiting (from automatic gearbox)	$U \approx 1-2 \text{ V below } U_{\text{bat}}$		U_{low} on ignition retardation request (retardation levels 2 and 3)
#B3	Signal torque limiting (from automatic gearbox)	$U \approx 1-2 \text{ V below } U_{\text{bat}}$		U_{low} on ignition retardation request (retardation levels 1 and 3)
#B4	Signal torque limiting acknowledgement (to automatic gearbox)	$U \approx 2.0 \text{ V below } U_{\text{bat}}$		U_{low} when the request has been received
#B5	–	–	–	–
#B6	Signal air conditioning (A/C) compressor status	U_{low}	A/C compressor off: $U < 0.1 \text{ V}$ A/C compressor on: $U \approx U_{\text{bat}}$	–
#B7	Control signal malfunction indicator lamp (MIL) (to the combined instrument panel)	Lamp lit: $U \approx 0.8 \text{ V}$ Lamp not lit: U_{bat}		
#B8	–	–	–	–
#B9	Signal A/C pressure sensor	$U \approx 0.9 \text{ V}$	$U \approx 0.9 \text{ V}$ (when the air conditioning has not been connected) U increases with air conditioning (A/C) pressure	–
#B10	–	–	–	–
	Control signal			U and f increase with

#B11	ignition discharge module (IDM)	$U \approx 0.1 \text{ V}$	$f \approx 35 \text{ Hz} *$	engine speed
#B12	Signal load Tq (to automatic gearbox)	$U \approx 0.8 \text{ V}$	$f \approx 35 \text{ Hz}$	f increases with engine speed (RPM)
#B13	–	–	–	–
#B14	–	–	–	–
#B15	Power supply fuel tank pressure sensor	$U \approx 5 \text{ V}$		–
#B16	–	–	–	–
#B17	–	–	–	–
#B18	Signal speed (from combined instrument panel)	$U \approx U_{\text{low}}$ or U_{bat} (the voltage depends on the position of the front wheels)		f increases with speed $f = 40 \text{ Hz}$ at 20 km/h.
#B19	Control signal fuel pump	$U \approx U_{\text{bat}}$	Closed $U \approx U_{\text{low}}$	
#B20	Signal throttle position (TP) sensor (to automatic gearbox)	$U \approx 0.5 \text{ V}$ at closed throttle position (CTP) (idling) $U \approx 4.3 \text{ V}$ at wide open throttle (WOT)		
#B21	Signal tachometer (to combined instrument panel)	$U \approx U_{\text{bat}}$	$f \approx 28 \text{ Hz}$	f increases with engine speed (RPM)
#B22	Atmospheric pressure sensor	$U \approx 4.6 \text{ V}$	–	–
#B23	Signal engine coolant temperature (ECT) (to ECC and combined instrument panel)	Cold engine (+20° C): $f \approx 40 \text{ Hz}$ Engine at operating temperature (+100 °C): $f \approx 21 \text{ Hz}$		
#B24	Signal constant idle speed compensation P/N position (from automatic gearbox)	P/N–position: $U \approx U_{\text{bat}}$ Other positions: $U \approx U_{\text{low}}$ Manual: $U \approx 9.0 \text{ V}$		
#B25	Signal air conditioning (A/C) relay status	U_{low}	Air conditioning (A/C) relay not activated:	

			U < 0.1 V Air conditioning (A/C) relay activated: $U \approx U_{bat}$	
#B26	Signal malfunction indicator lamp (MIL) request (from automatic gearbox)	$U \approx 0 - 1 \text{ V}$	$U \approx U_{bat}$ NOTE! Other values apply if there are diagnostic trouble codes (DTCs) stored in the gearbox control module (TCM).	
#B27	Control signal fuel pump	$U \approx 7.5 \text{ V}$	f = 42 Hz (multimeter set to U_{AC})	
#B28	Signal ground sensor (measured to the battery negative terminal)	$U < 0.1 \text{ V}$		
#B29	Power supply A/C pressure sensor	$U \approx 5.0 \text{ V}$		
#B30	–	–	–	–
#B31	Fuel tank pressure sensor (certain markets only)	$U_{max} \approx 4.7 \text{ V}$ $U_{nominal} \approx 2.5 \text{ V}$ $U_{min} \approx 0.6 \text{ V}$		
#B32	Signal accelerometer	$U \approx 2.5 \text{ V}$		
#B33	–	–	–	–
#B34	–	–	–	–
#B35	–	–	–	–
#B36	Diagnostic lead K-link	$U \approx 1 - 2 \text{ V}$ below U_{bat}	Other values apply if a generic fault-tracing instrument is connected to the data link connector (DLC)	

#B37	–	–	–	–
#B38	Control signal pulsed secondary air injection system (PAIR) pump relay	$U \approx U_{bat}$	pulsed secondary air injection system (PAIR) pump valve off $U \approx U_{bat}$	pulsed secondary air injection system (PAIR) pump valve active $U \approx U_{low}$
#B39	Signal fuel consumption (to the trip computer)	$U \approx 2 \text{ V below } U_{bat}$ No trip computer: $U \approx U_{bat}$	$f \approx 14 - 25 \text{ Hz}$	f increases with engine speed (RPM) and load (measured with EVAP not active)
#B40	Control signal air conditioning (A/C) relay (allows A/C to start)	$U \approx 9 \text{ V}$	Air conditioning (A/C) permitted: U_{low} air conditioning (A/C) not permitted: $U \approx 11 \text{ V}$	
#B41	Control signal, turbocharger (TC) control valve	U_{bat}	–	Voltage decreases with increased valve synchronisation
#B42	Turbocharger (TC) boost pressure limiting signal (from automatic gearbox)	$U \approx 10 \text{ V}$	–	–
#B43	–	–	–	–