AUTOMOTIVE CURRENT TRANSDUCER
HAB 100-S/SP1

Introduction

The HAB Family is best suited for DC, AC or pulsed currents measurement in high power and low voltage automotive applications. It's contains galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).

The HAB family gives you a choice of having different current measuring ranges in the same housing (from ± 20 A up to ± 100 A).

Features

- Open Loop transducer using the Hall effect sensor
- Low voltage application
- Unipolar + 5 V DC power supply
- Primary current measuring range ± 100 A
- Maximum RMS primary current limited by the busbar, the magnetic core or the ASIC temperature T° < + 150°C
- Operating temperature range: - 40°C < T° < + 125°C
- Output voltage: full ratiometric (in sensitivity and offset).

Advantages

- Good accuracy for high and low current range
- Good linearity
- Low thermal offset drift
- Low thermal gain drift
- Hermetic package.

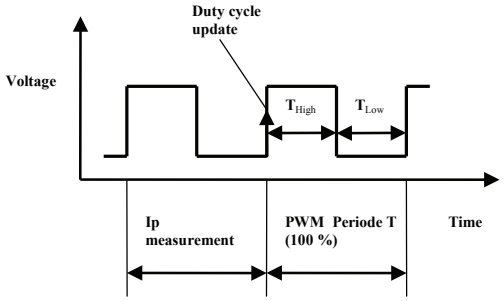
Automotive applications

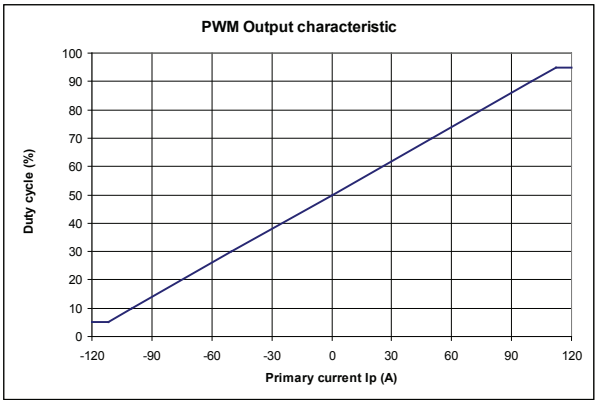
- Battery Pack Monitoring
- Hybrid Vehicles
- EV and Utility Vehicles.

Principle of HAB xxx-S Family

The transducer uses open loop Hall effect technology. It provides a **P**ulse **W**idth **M**odulated output signal proportional to the magnetic induction B generated by the primary current I_P to be measured.

The **PWM** principle is described as follow:





$$PWM\ period\ \ T_{Period} = T_{High} + T_{Low}$$

$$PWM\ frequency = \frac{1}{T_{Period}} = 125\,Hz$$

$$\text{DutyCycle}(\%) = \frac{T_{High}}{T_{Period}} \times 100$$

$$\text{DutyCycle}(\%) = 50\% + G \times I_P \text{ with G = Sensitivity (\%/A)}$$

The **PWM** period T_{period} starts on the rising edge of the output signal. The ouput signal of the duty cycle given during the T_{period} is the image of the primary current during the T_{period} -1 period.

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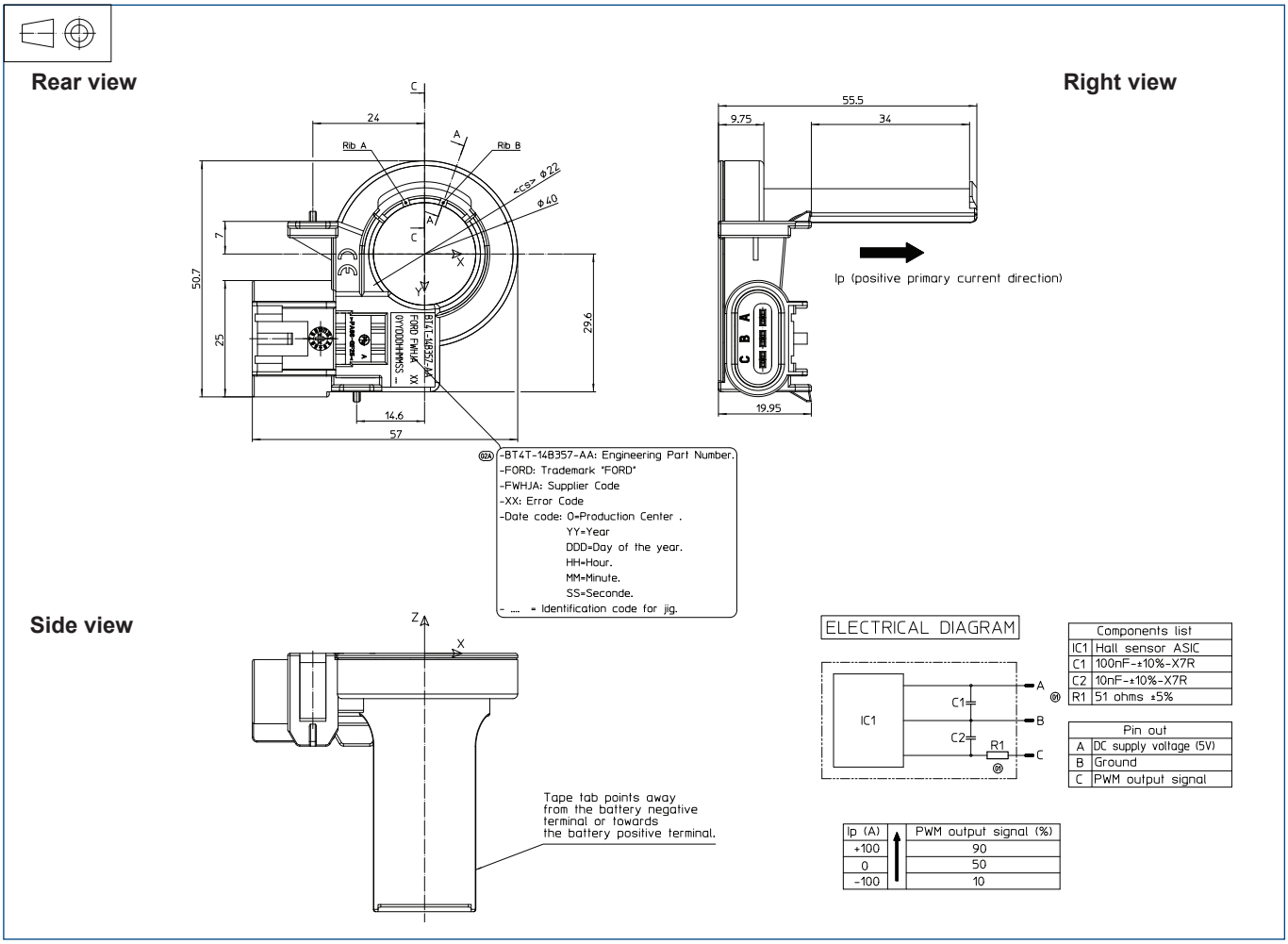
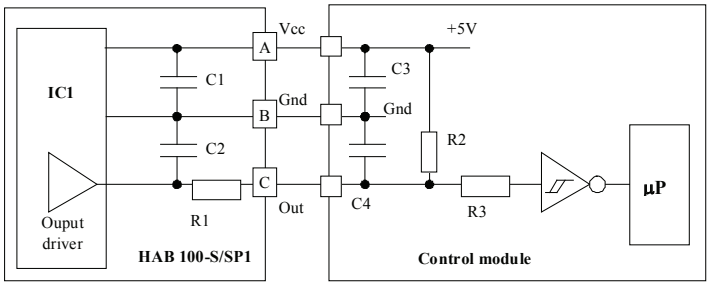
Dimensions HAB 100-S/SP1 family (in mm.)



Bill of materials

- Plastic case — Technyl A218V25 black
- Magnetic core — FeNi alloy
- Pins — Brass tin plated
- ***m*** — 24.5 g



HAB 100 components		Control module components		
IC1	Hall sensor ASIC	C3	100 nF X7R	
C1	100 nF X7R	C4	1 nF X7R	Optional
C2	10 nF X7R	R2	4.7 kΩ	Optional
R1	51 Ω	R3	High impedance protection	Optional

The optional components are needed if current sensor is outside the control module circuit.

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Absolute maximum ratings (not operating)

PARAMETER	Symbol	Min	Max	Unit
Maximum primary current	I_P		Infinite	A
Supply voltage	V_C	- 8.5	8.5	V
Supply voltage (over voltage t < 1 min)		- 14	14	V
Current consumption (t < 1 min)	I_C		50	mA
Output voltage (t < 1 min)	V_{out}	- 5	14	V
Output voltage over supply voltage	V_{out}-V_C		2	V
Output current	I_{out}	- 10	10	mA
Output short-circuit duration	t_c		10	min
Ambiant storage temperature	T_S	- 40	125	°C

Operating conditions

PARAMETER	Symbol	Min	Typical	Max	Unit
Supply voltage	V_C	4.5	5.00	5.5	V
Supply voltage (accurate range)	V_C	4.75	5.00	5.25	V
Pull up load resistor	R_L	2.2	4.7		KΩ
Capacitive loading	C_L			1	nF
Ambient operation temperature	T_A	- 40	25	125	°C
Ambient operation temperature (accurate range)	T_A	- 10	25	65	°C

Operating characteristics

PARAMETER	Symbol	Min	Typical	Max	Unit
Primary current nominal range	I_{PN}	-100		100	A
Maximum current measuring range (clamping)	I_{PM}	-112		112	A
Current consumption	I_C	-	7.5	10	mA
Output PWM frequency	f_{PWM}	105	125	145	Hz
Output duty cycle sensitivity	G		0.4		%/A
Output duty cycle @ I_P = 0	D_{OUT}		50		%
Output duty clamping low		4	5	6	%
Output duty clamping high		94	95	96	%
Duty cycle resolution			0.0125		%
Power-up time to reach valid duty cycle				25	ms
Setting time after over load				25	ms
Output voltage high (pull up = 4.7 KΩ)	V_{OUTH}	V_C -0.2			V
Output voltage low (pull up = 4.7 KΩ)	V_{OUTL}			0.2	V
Output internal resistance	R_{out}		50	100	Ω
Ouput PWM rise time	t_{rise}			10	µs
Ouput PWM fall time	t_{fall}			10	µs

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Accuracy

PARAMETER	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
PERFORMANCE DATA						
Electric Offset Current @ 25 °C	I_{OE}	A		± 0.05		@ T_A = 25°C
Magnetic Offset Current @ 25 °C	I_{OM}	A		± 0.05		@ T_A = 25°C
Global offset current	I_O	A		± 0.10		@ T_A = 25°C
				± 0.15		@ - 20°C < T° < 65°C
				± 0.3		@ - 40°C < T° < 125°C
Sensitivity error	ε_G	%		± 0.2		@ T_A = 25°C
				± 0.7		@ - 20°C < T° < 65°C
				± 1.5		@ - 40°C < T° < 125°C
Linearity @ -80A < Ip < 80A	ε_L	%		0.2		of full range, @ T_A = 25°C
Linearity @ -100< Ip < -80A or 80A < Ip< 100A				1		

Global error table

	Symbol	Unit	Temperature T° (°C)					
Global error (A)	X	A	-40°C	-20°C	0°C	25°C	65°C	125°C
Global offset error			± 0.40	± 0.34	± 0.28	± 0.20	± 0.34	± 0.55
Global error at 50A			± 1.50	± 1.41	± 1.32	± 1.20	± 1.24	± 1.30
Global error at 100A			± 3.70	± 3.45	± 3.21	± 2.90	± 3.14	± 3.50