

# ehb SMARTdisplay 870

PROGRAMMABLE DISPLAY FOR USE IN  
VEHICLES AND OFF-HIGHWAY MACHINERY

ehb5496-1 / ehb5496-2



## KEY FEATURES / SUMMARY

- Robust HMI/programmable display specifically designed for mobile applications
- Optically bonded 7" colour screen for harsh environments
- Capacitive touchscreen (M870-02 variant)
- Powerful ARM Cortex A9 processor with 800 MHz clock speed
- 512 MB of DDR3 SDRAM and 2 GB of NAND mass storage
- 4 configurable inputs, 4 configurable digital outputs
- Supports landscape and portrait orientation
- 2 independent CAN interfaces, J1939, CAN open and Raw CAN
- Ethernet interface for communication
- Flexible user programming via CODESYS 3.5 or C
- IP67 protection
- 2 camera inputs

## ADDITIONAL HARDWARE

ehb SMARTdisplay 870 connector harness A  
ehb SMARTdisplay 870 connector harness C  
ehb SD 870 Harness-Set A+C Ethernet  
Connector A, 18 pin compl. with pins / Plug set for self-assembly  
Connector C, 18 pin compl. with pins / Plug set for self-assembly  
Programming cable  
M12 to USB cable

## PART NO

eh2402  
ehb2403  
ehb5621  
ZUB0004  
ZUB0005  
M11350  
M11351

## RELATED MATERIALS

### TITLE

ehb SMARTdisplay 870 Installation Instructions  
ehb SMARTdisplay 870 Operator Manual

## VARIANTS

Standard 870  
Touchscreen 870

## PART No

ehb5496-1  
ehb5496-2

## OVERVIEW

### DC SUPPLY

8 V DC to 32 V DC

### CURRENT CONSUMPTION

#### OPERATING CURRENT

< 1000 mA at 12 V and 24 V without external loads  
< 1500 mA at 12 V and 24 V with backlighting and heating

### DISPLAY

800 px x 480 px  
24 bit colour  
Optically bonded

### INPUTS/OUTPUTS (total)

4 inputs / 4 outputs

### INPUTS

Configurable,  
Digital inputs (positive / negative)  
Analogue inputs (Voltage 0 V to 5 V, 0 V to 10 V, 0 V to 32 V, current 4 mA to 20 mA, Ratiometric, Resistive, Frequency)

### OUTPUTS

Binary configurable as  
Digital Output High-Sided/Low-Sided

### INTERFACES

#### CAN 1/2

CAN Interfaces 2.0B, ISO11898  
50 kbits/s... 1 Mbit/s  
CANopen, SAE J1939 or Raw CAN

#### ETHERNET

10/100 Mbit/s

#### USB

USB Host 2.0 (12 Mbit/s)

### DIMENSIONS

272 mm x 165 mm x 81 mm (W x H x D)

### WEIGHT

< 1 kg

### STORAGE TEMPERATURE RANGE

-40 °C to +85 °C

### OPERATING TEMPERATURE RANGE

-30 °C to +85 °C

### PROTECTION RATING

IP67 (with mating connectors)

### MOUNTING

8 x M5 bolts / RAM arm

**Technical Data**
**ehb SMARTdisplay 870**

<b>Supply</b>		<b>Connector A</b>
Operating voltage	8 V DC to 32 V DC	Pin 7
Unit power supply maximum current consumption, full backlight (no external loads)	< 1000 mA at 12 V and 24 V	
Unit power supply maximum current consumption, full backlight and heater (no external loads)	< 1500 mA at 12 V and 24 V	
Unit power supply current consumption after controlled shutdown has occurred due to the ignition being turned off	< 5 mA at 24 V	
<b>Fusing</b>		<b>Connector A</b>
Unit power supply external protection fuse rating	3 A	Pin 7
High current outputs supply input external fuse protection rating (i.e. sum of output currents from all outputs provided for by an individual supply to < external fuse rating in total)	10 A	Pin 1
<b>Housing</b>		
PC PBT alloy plastic resin		
<b>Dimensions</b>		
W x H x D	140 x 230 x 60 mm	
<b>Weight</b>		
	< 1 kg	
<b>Temperature</b>		
Operating temperature	-30 °C to +85 °C	
Storage temperature	-40 °C to +85 °C	
<b>Protection Rating</b>		
	IP67 (with mating connectors)	
<b>Display</b>		
Resolution, pixel	800 px x 480 px	
Colour	24 bit	
Format	7" diagonal	
Touchscreen	Capacitive touch (M870-02 variant)	
Mounting	Optically bonded	
Illumination	LED (lifetime > 50,000 hrs)	
<b>Connectors</b>		
Connector A	18 pin DT 16-18SA-K004	
Connector C	18 pin DT 16-18SC-K004	
Ethernet	M12, D-coded 4 pole socket	
USB	M12, B-coded 5 pole socket	
<b>Digital Inputs</b>		<b>Connector C</b>
Digital inputs configured high or low	4	Pin 14, 15, 16, 17
High level voltage threshold	> 6 V	
Low level voltage threshold	< 2 V	
<b>Analogue Voltage Inputs</b>		<b>Connector C</b>
0 V to 5 V programmable voltage range	0 V to 5 V	Pin 14, 15, 16, 17
0 V to 10 V programmable voltage range	0 V to 10 V	
0 V to 32 V programmable voltage range	0 V to 32 V	
Voltage measurement resolution	12 bits	
Voltage measurement accuracy	± 1% FSD	
Voltage measurement input resistance	≥ 30 kΩ	
Voltage measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		

**ehb SMARTdisplay 870**

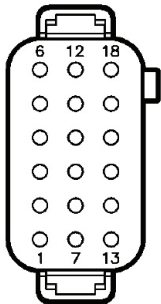
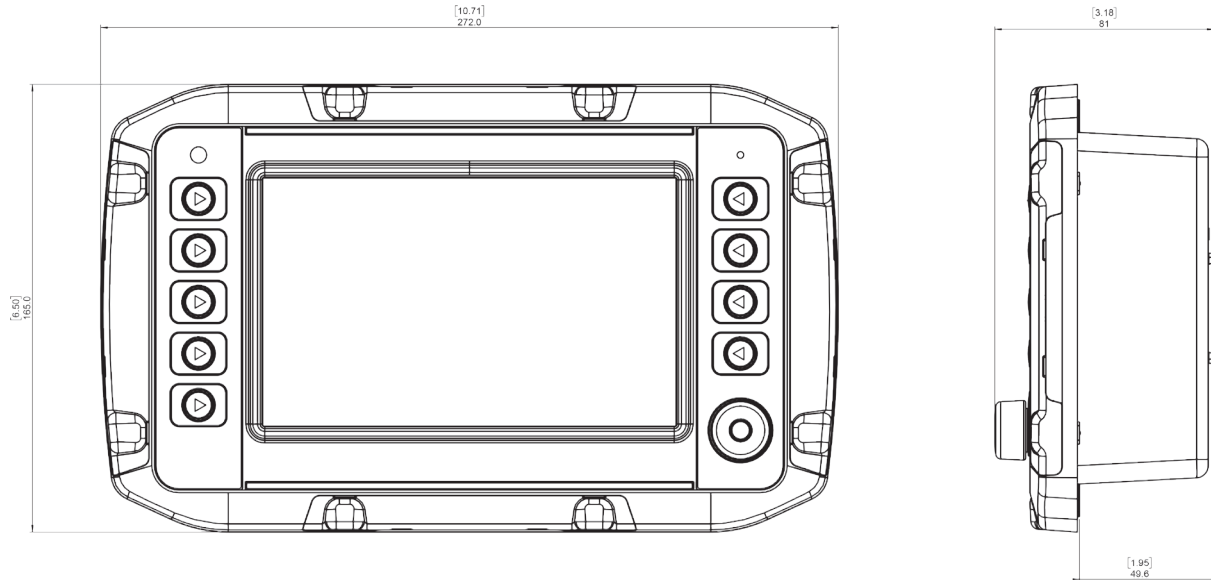
<b>Analogue Current Inputs</b>		<b>Connector C</b>
Current measurement direction	Current sink only	Pin 14, 15, 16, 17
Current measurement ranges	0 mA to 20 mA	
	4 mA to 20 mA	
Current measurement resolution	12 bits	
Current measurement accuracy	± 1% FSD	
Current measurement input sink resistance	100 Ω ± 1%	
Current measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		
<b>Analogue Resistive Inputs</b>		<b>Connector C</b>
Resistance measurement range	0 Ω to 3200 Ω	Pin 14, 15, 16, 17
Resistance measurement source voltage	12 V maximum	
Resistance measurement current	1 mA	
Resistance measurement resolution	12 bits	
Resistance measurement accuracy	± 1% FSD	
Resistance measurement sampling rate	500 Hz	
<i>FSD = Full Scale Deflection</i>		
<b>Analogue Ratiometric Inputs</b>		<b>Connector C</b>
Voltage ratiometric measurement voltage range		Pin 14, 15, 16, 17
Voltage ratiometric measurement Vref	Supply/Vref	
Voltage ratiometric measurement	Ratio of input pin to supply voltage	
Voltage ratiometric measurement accuracy	± 1% FSD	
<i>FSD = Full Scale Deflection</i>		
<b>Frequency Inputs</b>		<b>Connector C</b>
Frequency range	5 Hz to 30 Hz	Pin 14, 15, 16, 17
Resolution	100 Hz at max. freq	
Accuracy	400 Hz at max. freq	
Maximum space voltage	< 0,9 V	
Minimum mark voltage	> 2,4 V	
<b>Digital Outputs High Side</b>		<b>Connector C</b>
Switching current	2 A	Pin 2, 3, 4, 5
Digital output active high 'ON' state internal voltage drop at rated current	< 100 mV	
Digital output active high 'OFF' state leakage current	< 10 µA at 24 V	
<b>Digital Outputs Low Side</b>		<b>Connector C</b>
Switching current	2 A	Pin 2, 3, 4, 5
Digital output active low 'ON' state maximum voltage at rated current	< 100 mV	
Digital output active low 'OFF' state leakage current	< 2 µA at 24 V	
<b>Reference Voltage</b>		<b>Connector C</b>
Reference voltage output	Programmable 5 V or 10 V, 500 mA accuracy ±5%	Pin 6
		VRef GND Pin 18
<b>Auxiliary Voltage</b>		<b>Connector C</b>
12 V auxiliary voltage	12 V, max 100 mA	Pin 13

**ehb SMARTdisplay 870**

<b>RTC</b>		
Real time clock	Standard RTC, powered by Super Cap, backup time ~800 hours	
<b>Camera</b>		
Analogue video input (supported video standards: PAL & NTSC)	2	<b>Connector A</b> 5, 6, 11, 12
<b>CAN Interfaces</b>		
Number of CAN ports	2	<b>Connector A</b> Pin 2, 3, 8, 9, 14, 15
Supported protocols	J1939 CANopen Raw CAN	
Supported programmable baud rates	50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 Mbit/s, 1 Mbit/s	
<b>Ethernet Interface</b>		
		<b>M12, 4 pole</b>
Number of Ethernet ports	1	D-coded 4 pole socket
Supported data rates	10/100 Mbit/s	
Supported protocols	Modbus TCP	
<b>USB Interface</b>		
		<b>M12, 5 pole</b>
Number of USB host ports	1	B-coded, 5 pole socket
Supported USB version	2.0	
Speeds supported	Full speed (12 Mbit/s)	
Device class supported	08 (Mass Storage)	
Supported filing system	FAT32	
<b>Processor</b>		
Technexion Freescale iMX6-SOLO Microcontroller	ARM A9	
	800 MHz	
<b>Memory</b>		
Flash / RAM	2 GB / 512 MB	
<b>Environmental and Testing</b>		
CE marking	Electromagnetic compatibility (EMC) noise immunity Electromagnetic compatibility (EMC) emission standard	ISO 13766-1
E11 marking	Emission standard noise immunity with 100 V/m	UN/ECE-R10
Electrical tests	Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state B Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state B Pulse 5a, severity level: III; function state C	ISO 7637-2
Climatic tests	Damp heat, cyclic upper temperature 55°C, number Damp heat, steady state test temperature 40 °C / 93% RH Test duration: 21 days Salt spray test severity level 3 (vehicle)	EN 60068-2-30 EN 60068-2-78 EN 60068-2-53
Mechanical tests	Test VII; vibration, random mounting location: vehicle body Vibration, sinusoidal 2000 Hz: 0.73 mm / 10g; 10 cycles/axis Bumps 30 g / 6 ms; 24,000 shocks	ISO 16750-3 EN 60068-2-6 ISO 16750-3

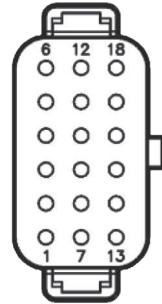
# ehb SMARTdisplay 870

PROGRAMMABLE DISPLAY FOR USE IN  
VEHICLES AND OFF-HIGHWAY MACHINERY



### Connector A

PIN	DESCRIPTION
1	EGU
2	CAN 1 screen
3	CAN 2 screen
4	nc
5	Camera 1 screen
6	Camera 2 screen
7	ECU Supply +VE
8	CAN1 H
9	CAN2 H
10	nc
11	Camera 1 signal
12	Camera 2 signal
13	Ignition +VE (15)
14	CAN1 L
15	CAN2 L
16	nc
17	nc
18	nc



### Connector C

PIN	DESCRIPTION
1	Output supply +VE
2	OUT 1
3	OUT 2
4	OUT 3
5	OUT 4
6	VREF +
7	Output supply GND
8	nc
9	nc
10	nc
11	nc
12	Output supply GND
13	Aux 12 +VE Output (max. 100mA)
14	AIN 1, DIN 1, FREQ 1
15	AIN 2, DIN 2, FREQ 2
16	AIN 3, DIN 3, FREQ 3
17	AIN 4 DIN 4, FREQ 4
18	VREF GND



### Ethernet

M12 'D' coded - 4 pin female

Pin - 01	TX+
Pin - 02	RC+
Pin - 03	TX-
Pin - 04	RC-



### USB Host

M12 'B' coded - 5 pin female

Pin -01	5 V
Pin - 02	Data+
Pin - 03	Data-
Pin - 04	ID
Pin - 05	GND

#### Abbreviations

OUT  
AIN, DIN, FREQ

Output can be configured as a digital high-side or digital low side  
Input can be configured to accept signals from positive digital, negative digital, 0 V to 10 V, 4 mA to 20 mA, ratiometric or resistive.

