iC-MH EVAL MH1D
EVALUATION BOARD DESCRIPTION

preliminary

iC-Haus

ORDERING INFORMATION

Type	Order Designation	Description Options
Evaluation Board	iC-MH EVAL MH1D	iC-MH Evaluation Board ready to operate, accessible through GUI via PC adapter
Software	iC-MH GUI	GUI software for Windows PC stores setup to file, communication to iC-MH please see www.ichaus.com for download information
PC Adapter	iC-MB4 iCSY MB4U iC-MB3 iCSY MB3U	PC-USB Adapter PC-USB Adapter
	iC-MB3 iCSY MB3A	PC-LPT Adapter (not recommended for new designs, supported by MS Windows 2000 and XP only)

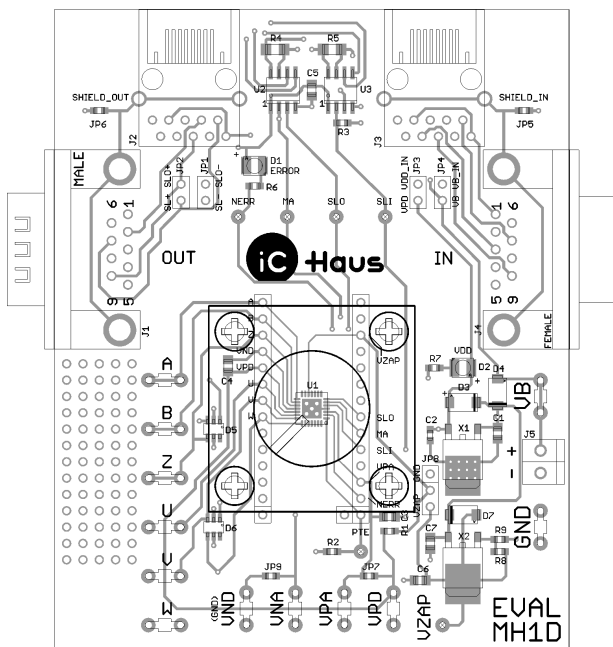## BOARD MH1D

(size 100 mm x 80 mm)

Figure 1: Component side

TERMINAL   DESCRIPTION

VB	+10 to +20 V Supply Voltage
GND	0 V Ground
A	Incremental A (+NU)
B	Incremental B (+NV)
Z	Index Z (+NW)
U	Commutation U (+NA)
V	Commutation V (+NB)
W	Commutation W (+NZ)
VND	Ground (digital)
VNA	Ground (analog)
VPA	+5 V Supply Voltage (analog)
VPD	+5 V Supply Voltage (digital)
VZAP	Zener Zapping Programming Voltage
NERR	Error Output (active low)
MA	Clock Input Interface/SSI
SLO	Data Output Interface/SSI
SLI	Data Input Interface/SSI
D1	Error Indicator LED (red) Illuminates red to indicate errors Connected to NERR pin of iC-MH
D2	Voltage Supply Indicator LED (green) Illuminates green to indicate voltage supply Connected to VPD pin of iC-MH

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RELATED DOCUMENTS

- iC-MH Data Sheet - Specification -
- iC-MH GUI - GUI software for Windows PC -

→ http://www.ichaus.de/product/iC-MH

- iC-MB3 iCSY MB4U - PC-USB ADAPTER -
- iC-MB3 iCSY MB3U - PC-USB ADAPTER -
- iC-MB3 iCSY MB3A - PC-LPT ADAPTER -

→ http://www.ichaus.de/product/MB4U
→ http://www.ichaus.de/product/MB3U
→ http://www.ichaus.de/product/MB3A

CONNECTOR AND TERMINAL PINOUT

9-pin Sub D Connector J1 - male

PIN	Name	Function
1	VB	+12 V Supply Voltage
2	MAO +	Master clock output
3	MAO -	Master clock output (inverted)
4	VDD	+5 V Supply Voltage
5	SLO -	Data output (inverted)
6	GND	0 V Ground
7	SL +	Slave data
8	SL -	Slave data (inverted)
9	SLO +	Data output

10-pin Y-CON RJ45 Connector J3 - input

PIN	Name	Function
1	SL +	Slave data
2	SL -	Slave data (inverted)
3	MAO +	Master clock output
4	SLI +	Data input
5	SLI -	Data input (inverted)
6	MAO -	Master clock output (inverted)
7	VB	+12 V Supply Voltage
A	VB	+12 V Supply Voltage
8	GND	0 V Ground
B	GND	0 V Ground

10-pin Y-CON RJ45 Connector J2 - output

PIN	Name	Function
1	SL +	Slave data
2	SL -	Slave data (inverted)
3	MAO +	Master clock output
4	SLO +	Data output
5	SLO -	Data output (inverted)
6	MAO -	Master clock output (inverted)
7	VB	+12 V Supply Voltage
A	VB	+12 V Supply Voltage
8	GND	0 V Ground
B	GND	0 V Ground

9-pin Sub D Connector J4 - female

PIN	Name	Function
1	VB	+12 V Supply Voltage
2	MA +	Master clock input
3	MA -	Master clock input (inverted)
4	VDD	+5 V Supply Voltage
5	SLI -	Data input line (inverted)
6	GND	0 V Ground
7	SL +	Slave data
8	SL -	Slave data (inverted)
9	SLI +	Data input line

CIRCUIT DESCRIPTION
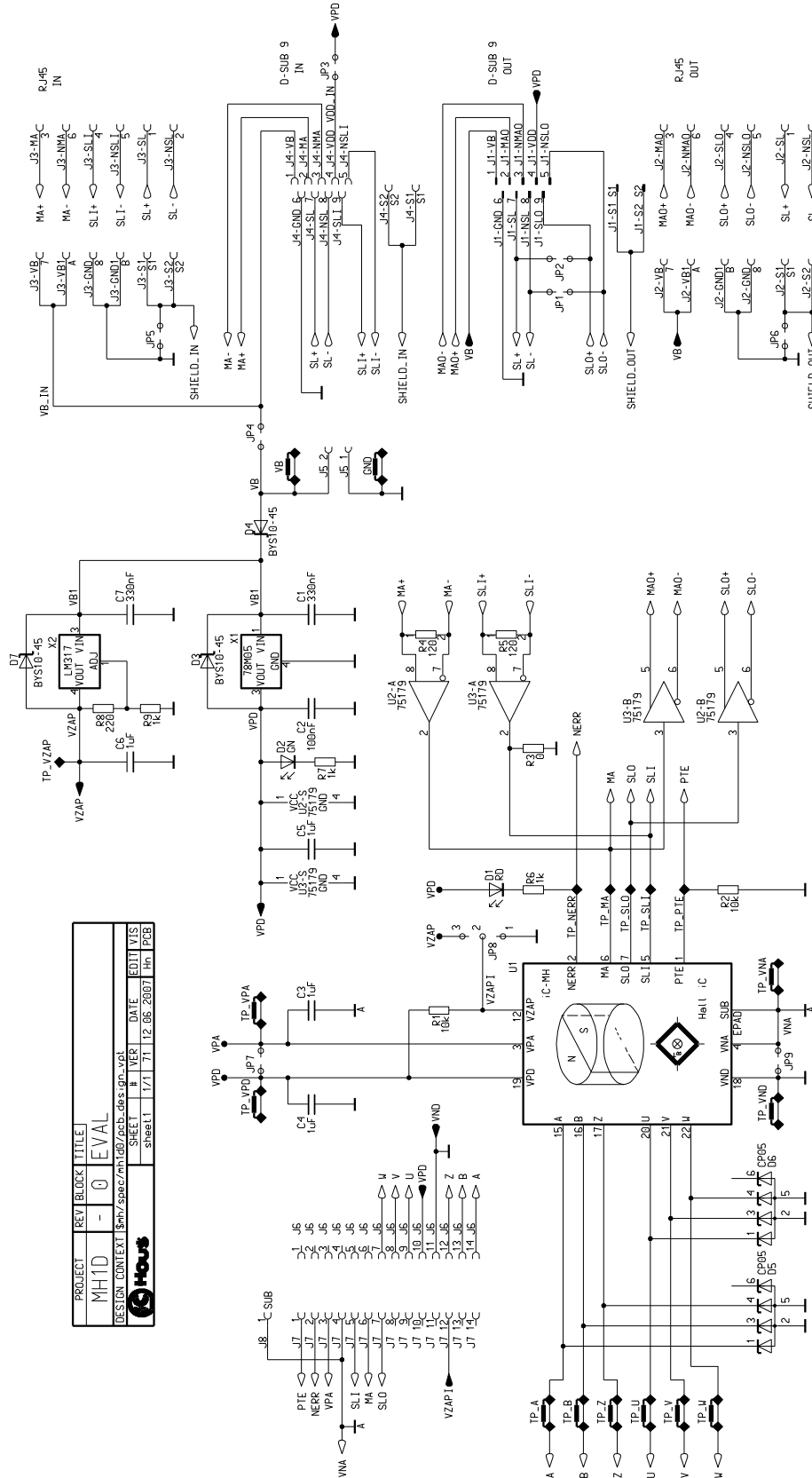
Figure 2: Circuit diagram including optional components

Setup (**"MH1D connected via USB Adapter - MB3U"**)

The MH1D evaluation board is equipped with the iC-MH 12 bit angular hall encoder. The board features two 9-pin SUB-D connectors for serial communication. The PC-USB Adapter enables the evaluation board to be connected to a common Windows PC. Figure 3 shows the setup for a single board connected via the **IN** junction (J4). Figure 4 shows another example how to use two MH1D evaluation boards at the same time. Here the **IN** junction (J4) of the second board is plugged on the **OUT** junction (J1) of the first board. An external power supply (12 V - inner contact: negative pole - outer contact: positive pole) is required in case of connecting two boards. iC-MH software can be used to access the board from a Windows PC (see section "APPLICATION SOFTWARE" for more details).

Note : Please install the latest USB and/or LPT driver before you attach the PC Adapter to the PC.

Important jumper settings for both examples are marked by red circles and explained in-depth in section "JUMPER DESCRIPTION"
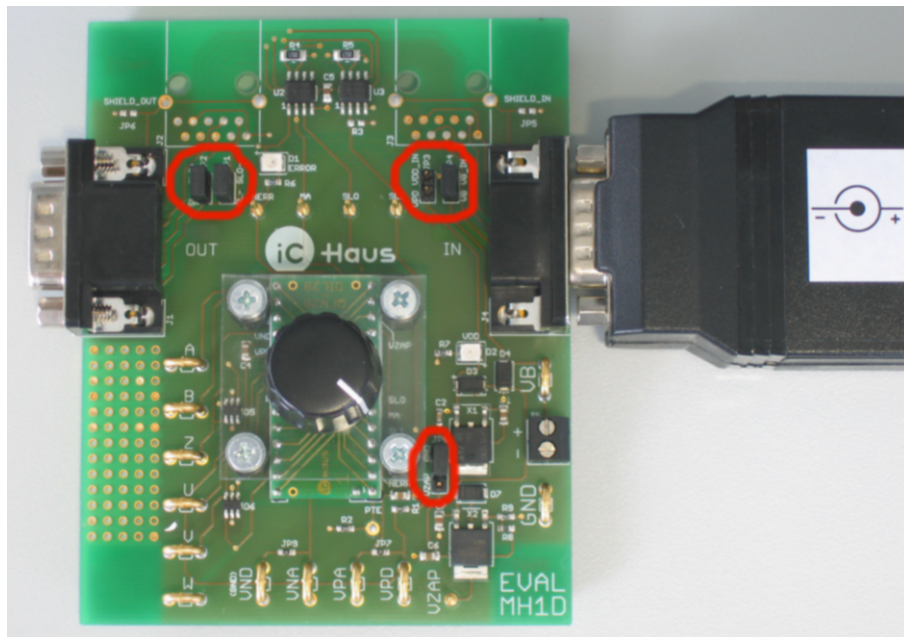

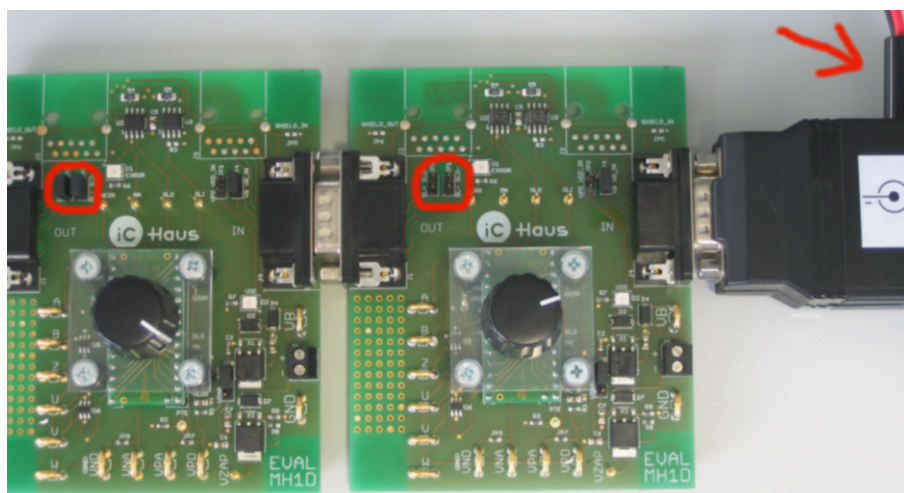Figure 3: Connection and jumper settings of one MH1D evaluation board

Figure 4: Connection and jumper settings of two MH1D evaluation boards

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JUMPER DESCRIPTION

Communication Chain **Board 1** **Board 2** *(optional)*

Information	Jumper Configuration JP1	JP2	Jumper Configuration JP1	JP2	Comments
Set the board 1 as the last slave in the line	bridged	bridged	N/A	N/A	shipment setup (only one board)
Set the board 2 as the last slave in the line	open	open	bridged	bridged	Adapter → Board 1 (J4) Board 1 → Board 2 (J1)[1]
	open	open	N/A	N/A	don't use
	open	open	open	open	don't use
	bridged	bridged	open	open	don't use
	bridged	bridged	bridged	briged	don't use

Notes [1]) Connect the two boards as shown in figure 4.

Voltage Supply - Adapter "MB3U"

Voltage Supply via board terminals[2]	via J4 plug[3]	Component Supply iC-MH	Jumper Configuration JP3 (VDD) +5 V via J4	JP4 (VB) +12 V via J4	Comments
-	X	via J4 (VDD)	bridged	open	shipment setup (no zapping possible)
-	X	via J4 (VB)	open	bridged	zapping possible
X	X	via board terminals	open	open	zapping possible
X	X	shortens VB terminal to J4	bridged	don't care	don't use
X	X	shortens VB terminal to J4	don't care	bridged	don't use

Voltage Supply - Adapter "MB3A"

Voltage Supply via board terminals[2]	via J4 plug[4]	Component Supply iC-MH MB3A	Jumper Configuration JP3 (VDD)	JP4 (VB)	Comments
-	none	no voltage supply	bridged	open	shipment setup (no zapping possible)
X	none	via board terminals	bridged	don't care	zapping possible

Notes [2]) Supply of +10 to +20 V required to board terminals VB and GND.
  [3]) Supply voltage sourced from J4 plug out of PC adapter.
  [4]) MB3A needs to be externally supplied via the MH1D evaluation board

Zapping

Information	Jumper Configuration JP8	Comments
VZAP to GND (0 V)	1-2	shipment setup (no zapping possible)
VZAP to VZAP (7 V)	2-3	zapping possible
VZAP to VPD (5 V)	open	pseudo zapping[5]

Notes [5]) Zapping-command will be sent but voltage supply of 5 V isn't sufficient to write zapping ROM. At least 6,5 V is required to successfully write zapping ROM.

ASSEMBLY PART LIST

Device	Value (typical)	Comment
C1, C7	330 nF	Supply backup capacitor
C2	100 nF	Supply backup capacitor
C3, C4, C5, C6	1 µF	Supply backup capacitor
D1	LS-T670	Indicator LED (red) for error message
D2	LG-T670	Indicator LED (green) for power supply
D3, D4, D7	BYS10-45	Revers protection diodes
D5, D6	CP05	Line protection diodes
J1	D-SUB9 M	Serial output connector
J4	D-SUB9 F	Serial input connector
J5	AKL059-02	Screwing terminal for power supply VB
J7	MK 01 14 G	Connection to DIL28 iC-MH-Adapter
J8	MK 01 2 G	Connection to DIL28 iC-MH-Adapter (Substrate)
JP1 - JP4	SL LP1/097 2G	Jumper
JP1 - JP4		Jumper CAB
JP7, JP9	0 Ω	
JP8	SL LP1/097 3G	Jumper for zapping voltage supply
R1, R2	10 kΩ	Pull-up Vzap / Pull-down PTE
R4, R5	120 Ω	Line termination resistors
R6, R7, R9	1 kΩ	
R8	220 Ω	
U2, U3	75SN179	Line driver for serial interface
X1	78M05	Voltage reglulator (5V)
X2	LM317	Voltage regulator (adj. to 7V)

APPLIACTION SOFTWARE

iC-MH software for PCs running on Windows operating systems, as well as the required USB and/or LPT driver are available as a ZIP file.

Download package: http://www.ichaus.de/MH_gui
Software overview online: http://www.ichaus.de/software

Features

- Reducing evaluation and design-in time and cost
- Manually setting up parameters of iC-MH
- Saving parameter configuration into ROM
- Saving parameter configuration to Hex files
- Loading predefined configurations from Hex files
- Reading and displaying of sensor data

Installation

After unzipping the iC-MH software package MH1SO_gui_xx resp. MH1SO_gui_xxrte, the following files are located in the selected working directory.
xx is a placeholder for revisions

→ Subfolder MH1SO_gui_xx including the executable setup.exe which starts the installation routine.
→ Driver packages for USB, LPT and/or other adapter devices.
→ Evaluation board description.

Note: Administrator rights are required to run installations.

1. To access the iC-MH evaluation board, interface adapter drivers for USB, LPT and/or other adapter devices need to be installed. Before connecting the adapter to your PC the driver installation must be completed successfully.
→ Execute the USB_xx.exe and/or LPT_xx.exe installation package and follow the on-screen instructions. This can take a few minutes.

1.1 When using an iC-Haus USB adapter, it must be connected to the PC after the driver installation, to complete the whole driver installation procedure.

2. Install the evaluation software MH1SO by executing the setup.exe located in the subfolder MH1SO_gui_xx.
→ Follow the on-screen instructions to finish the installation.

3. After installation the executable MH1SO_gui_xx.exe will be available in the selected working directory. Figure 5 shows a screenshot of the evaluation software.

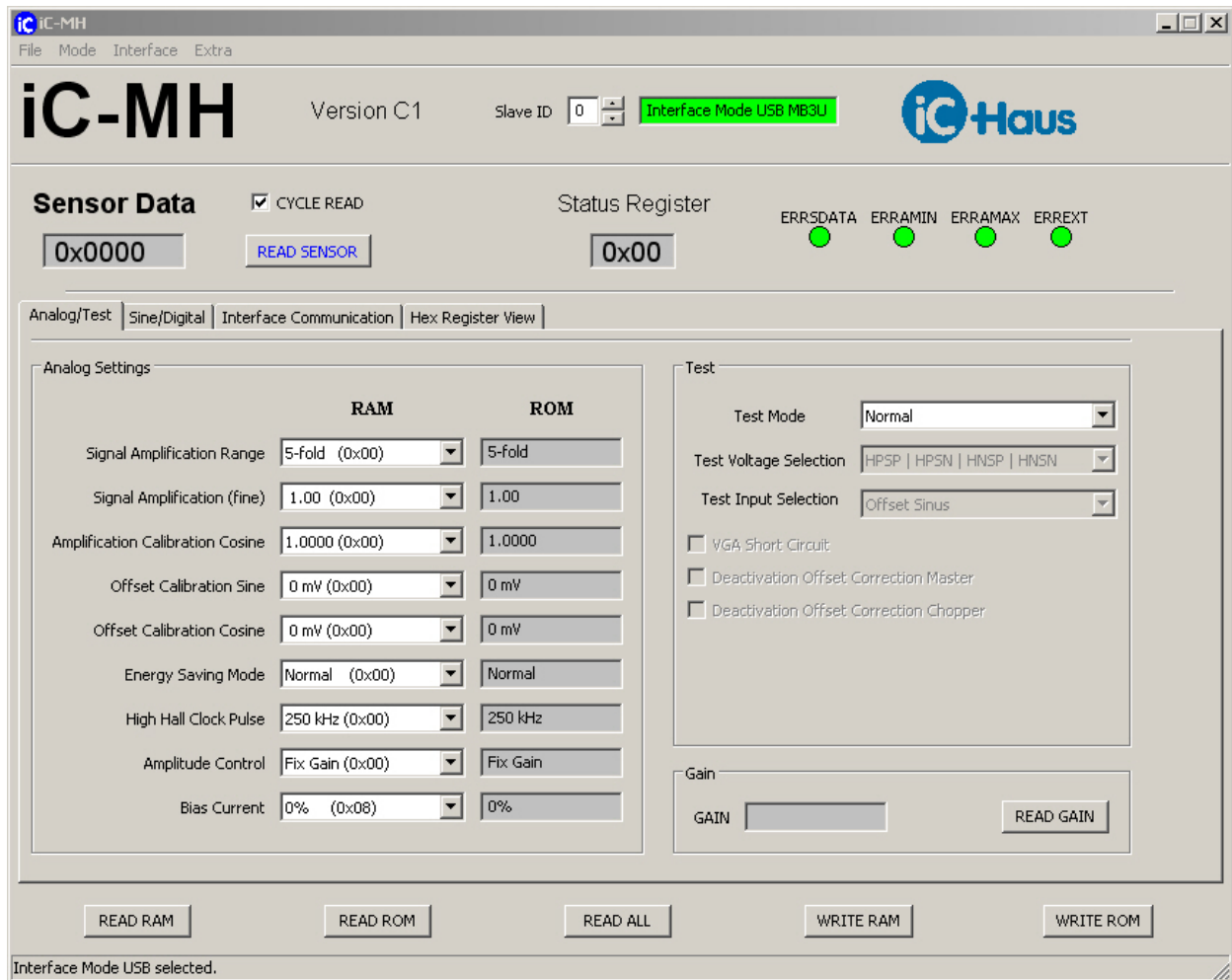LabView™is a trademark of National Instruments.

Figure 5: Evaluation software start-up window

Function Description

The iC-MH software starts in the 'No Hardware' mode. Changing parameter values will cause an error message as long as there is no adapter selected (regardless whether an adapter is attached to the USB-port or not). This state can be used to configure parameters without any hardware connected to save the configuration into a Hex file for later use (e. g. zapping ROM).

Menu Section

	Button	Description
<File>	Open	Chip configuration I/O, Intel Hex file format (*.hex)
	Save	Transfer configuration to file, Intel Hex file format (*.hex)
	Exit	Quit software
<Mode>	No Hardware	Switch to no hardware to reset PC to adapter communication
	MB3U	for use with PC-USB adapter MB3U
	MB4U	for use with PC-USB adapter MB4U
	Lpt-Spi	for use with PC-LPT adapter MB3A, eval board MB3D-S
<Interface>	Config Interface	Serial interface settings (use AUTODETECT for slave detection)
	Read RAM	Reads in iC-MH's current configuration (RAM to PC)
	Read ROM	Reads in ROM's current configuration (ROM to PC)
	Read ALL	Reads the whole content (RAM, ROM, ID, Profile to PC)
	Write RAM	Transfers the displayed configuration to iC-MH RAM
	Write ROM	Transfers the displayed configuration to ROM
	Read ID	Reads in iC-MH's ID (address: 0x78-0x7F)
	Read Profile	Reads in iC-MH's Profile (address: 0x42-0x43)
<Extra>	Enable Output Window	Displays sensor data (optical, hexadecimal, decimal, binary, degree)
	About	Additional informations

Upper Section

Button	Description
Slave ID	Switch between slaves
CYCLE READ	Activates continuous sensor data read in
READ SENSOR	Reads in sensor data (continuously with CYCLE READ activated)

Middle Section

Parameter settings. See iC-MH Data Sheet for detailed description

Bottom Section

Button	Description
READ RAM	See description of Menu section
READ ROM	See description of Menu section
READ ALL	See description of Menu section
WRITE RAM	See description of Menu section
WRITE ROM	See description of Menu section

For a detailed description of the parameter settings please refer to iC-MH's Data Sheet. When moving the mouse cursor to a parameter input box, a tool tip is displayed identifying the corresponding parameter name as described in the specification.

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REVISION HISTORY

Rev	Notes	Pages affected
A1	Initial version	
A2	Document layout revised	1, 2, 4, 7, 8
A4	Minor correction	1, 7, 8
A5	Section APPLICATION SOFTWARE revised Adapter MB4U added	1, 2, 7, 8, 9