Heart to Heart 4

for RCB-4

USER'S MANUAL

KONDO

KONDO KAGAKU CO., LTD.

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Preface

Thank you for choosing KHR series and HeartToHeart4. The newly designed HeartToHeart4 is easier to use than the former HeartToHeart3, multifunctional and scalable.

- Motion can be controlled per-project.
- Corresponds to Microsoft NET Framework.
- Multi-window system enables separation and connection of all windows.
- Scalability is enhanced by applying plug-in system for motion creating parts.

This manual describes the method of installation and use of HeatToHeart4. In such descriptions, hardware operation of KHR series may be required. We recommend that you read the hardware manual, as well.

Licensing

- The installation and use of HeatToHeart4 (here on referred to as “this software”) is allowed only if agreed to the present licensing terms.
- This software consists of executable format files, dynamic link library, setting files and sample data files. The entirety of the aforementioned files as well as libraries that are added on in the future is referred to as “this software.”
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- The contents of this manual and this software are subject to changes without notice for improvement or other reasons.

Condition of Use

Category	Requirements
OS	Windows XP (service pack 2 or later), Windows Vista
Processor	Pentium 4 2GHz or above
Hard Disk	32 MByte or larger (not including data file)
Memory	256MByte or larger
Drive	CD-ROM drive (for installation)
USB	1 or more USB 2.0 port(s)
Software	Microsoft. NET Frame work 2.0 is necessary

Precautions

- This manual and this software may be applied to some of our microcomputer boards and servo motors for robots. However, please be informed that applicable functions may be limited.
- Please contact the following service section for reports of defects, inquiries and comments regarding this software. However, please be informed that we do not respond to individual requests for software update.

Correspondence

Kondo Kagaku co., LTD. Service Section

support@kondo-robot.com

(Inquiry by email is welcomed, but replies may require some time.)

Glossary

Mouse

Click	Press button on mouse once and immediately let go of button.
Left Click	Click left button on mouse once
Right Click	Click right button on mouse once.
Drag	Move mouse while pressing down on button of mouse.
Drop	Letting go of mouse button after dragging.

Window

Focus	Condition under which buttons etc. can be operated, and the action of creating such condition.
Dialog	A window from which the focus can not be changed unless operation in that window is completed. A modal window.
OK Button	A button which says “OK” or “YES”.
Active	Condition wherein a window is operable. A focused condition.

Hardware

IO	IINPUT and OUTPUT
AD	Analog-Digital transducer.
PIO	Programmable IO. Input and output can be switched using 2 digital values (may be chosen between 0 V or 5 V).
COM	Communication
GND	Ground. Reference Potential. In this manual the point at which 0 V is obtained.
bps	Bit par second. Data transportation speed of communication circuit etc., and refers to the number of bits that can be transferred in one second.
EEPROM	Electric Erasable Programmable ROM. ROM (Read Only Memory) that can be electrically written/erased. Data is not erased even without current. May be referred to simply as ROM in this manual.
RAM	Usually refers to Random Access Memory, but refers to all volatile memory in this manual. Memory area from which content disappears when power is shut off.
ROM	Read Only Memory. Memory area in which once written, content remains saved even after power is shut off. In RCB-4HV, EEPROM is used so read/write can be repeated.

SOFTWARE

Menu	Item that can be selected. When selected, corresponding process is performed.
Pull-down	When menu is selected with a mouse, a more detailed item list is pulled out making them selectable.
Main Menu	Pull-down menu in the main window.
Toolbar	Corresponding process occurs by clicking an icon or word. Refers to the movable menu in HeartToHeart4.
ComboBox	Box-shaped pull-down menu. Some allow entering of text.
csv format	CSV (Comma Separated Values) format refers to data format wherein each data is separated by a comma (,). Mainly enables reading by spreadsheets and data.

Glossary

Keyboard

CTRL	Control key
SHIFT	Shift key
SPC	Space key
ALT	Alt key
ENTER	Enter key
DEL	Delete key
+	Press two keys simultaneously. Ex: CTRL + X press X key while pressing down on Control key.

Robot Servo Motor Device

Servo Motor	A motor that has control function and can adjust its rotational angle on its own.
Serration	The ridge on the servo motor axis for the purpose of easy attachment of arms etc.
Servo Horn	Attached to serration and transmits motor power to others.
Trim	Gap from center position that can be specified by the servo motor. Occurs due to the distortion from serration when servo horn etc. is attached. The adjustment of this gap is called trim adjustment.
Stretch	The tenderness of the servo motor motion. Compliance.
Gyro Sensor	Sensor that detects angle and angular velocity of an object. Can measure angle of mounted object.
Mixing	Adjustment of output angle of servo motor based on input from sensor etc.
Free (powerless)	Condition where no force is added on to output axis of servo motor. Output axis can be moved freely with your hands.
Hold (retention)	Condition where servo motor is stopped at the current position.
Teach	Mode in which current position is frequently updated under powerless condition. Value is saved when hold state is obtained after rotating output axis of servo motor in powerless condition.
Frame cycle	The interval at which order is sent to servo motor when setting rotational angle of servo motor. Can be selected from 10, 15, 20 and 25 ms for RCB-4HV.
Number of frame	When rotating servo motor from a certain angle to another angle, the action of smoothing out motion by fragmenting the interval into several spans is called complementing, and the number of span is called number of frame. The time consumed for each frame is equivalent to the frame cycle. Thus, when a sequence of motion that takes ten frames is completed at a frame cycle of 10 ms, the time consumed would be 10 x 10 = 100 ms.
Neutral	Center position of the motion area of servo motor. 7500.

Table of Contents

Table of Contents

RCB-4HV Introduction to Hardware

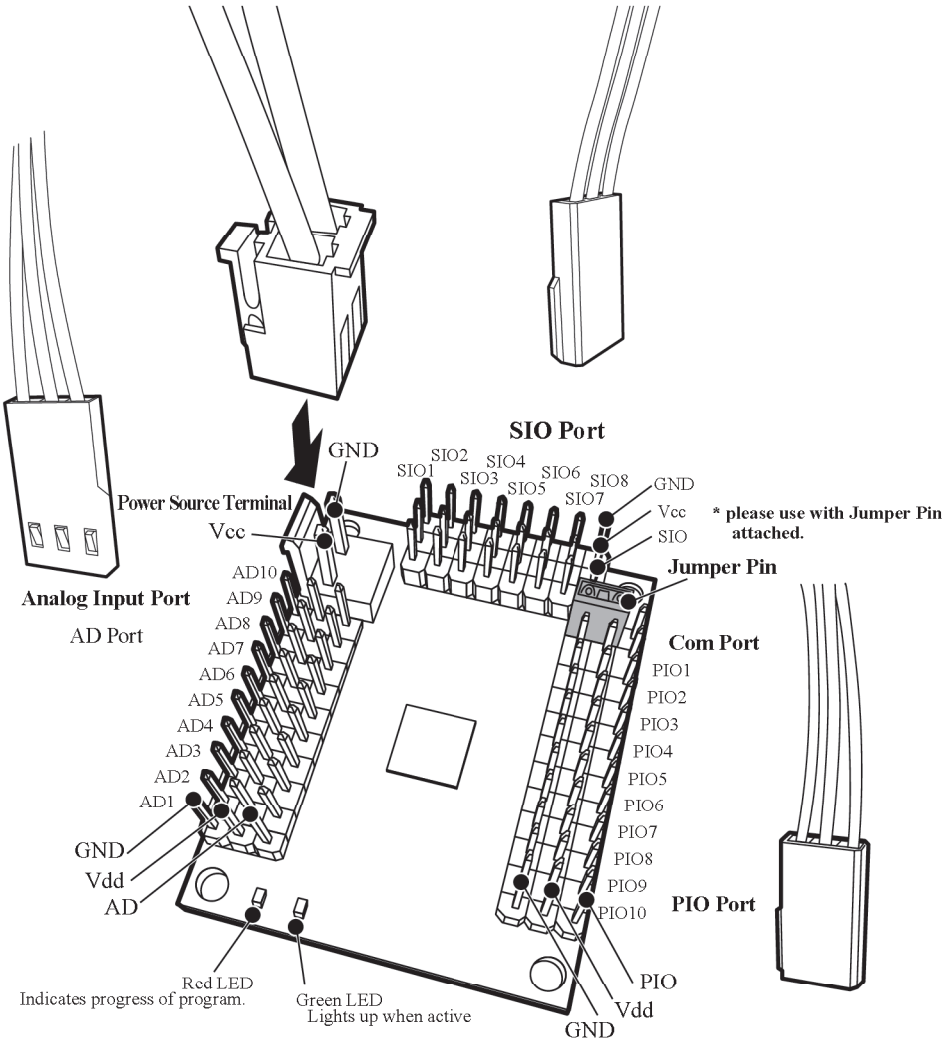
Features

- M16C/26A microcomputer by Renesas Technology has been adopted.
- Contains eight SIO ports for two systems of ICS3.0 compliant device, and can connect up to sixty-four ICS3.0 devices.
- With ten AD ports, multiple analog sensors can now be used. Further, AD input for power management is available separately.
- Ten PIO ports have been newly mounted. Use of ON/OFF switch and light up of LED is made easier.
- The COM ports enable a maximum speed of 1.25 Mbps.
- EEPROM, known for its high-speed and high capacity, has been adopted.

Change from RCB-3

- All PWM ports have been eliminated.
- RX port (low-speed serial port) has been eliminated.
- Microcomputer has been changed from M16C/26 to M16C/26A.
- EEPROM enables 1 Mbit high-speed communication (2.5 times the communication speed of RCB-3) and is now a 256 kByte high capacity ROM (twice the size of RCB-3).
- Reset button has been eliminated.

Part Names



RCB-4HV Introduction to Hardware

Specifications of Hardware

Dimensions:	45 x 35 x 13 (W x H x D) mm. *Same as RCB-3
Weight:	12g
Interface:	SIO port, COM port, AD port, PIO port
Power Supply Voltage:	Our specific HV power source is recommended. Minimum 6 V, Maximum 15 V. (Does not necessarily guarantee motion of device.)
Internal Voltage:	Set at 5 V by a regulator (for 1 A).
Power Supply Terminal:	Please use battery or stabilized power supply corresponding to the above operating voltage.
Com port:	Used for data communication by connecting to PC using serial USB adapter HS. Conventional serial USB adapter can also be used. (When using conventional product, communication speed may be limited.)
AD port:	For connecting analog device. Operating voltage is 0 to 5 V. Check maximum current for device needing power supply.
PIO port:	For connecting digital binary input/output device. Can be used as an output and operating voltage is 0 V (LOW), 5 V (HIGH). Resistance is connected in series, so LED can be connected directly. However, please check operating voltage for the LED.
SIO port:	For connecting device corresponding to ICS. Operating voltage is the same as power supply voltage. DO NOT CONNECT device corresponding to 0 to 5 V (such as analog sensors). Operation may be limited according to the corresponding version of the connected device.

Introduction to Software

In the new HeartToHeart 4, data can be written simultaneously by saving all motion data to a project file. The motion and settings of robot can be converted according to the make up of the robot, the content of the game or the type of sensor used.

The screen structure is multi-window, which enables connection and separation of functional sub windows to the main window. Since the motion edit window can be used as a tab-form multi-window, by opening several motion data and using editing functions such as copy-and-paste among them, motions can be created easily.

Further, online running function enables reproduction of motion on the editing screen without saving motion to ROM. In online running, step-running and repeated running is possible. Corresponds to Run, Stop and Run-From-Middle, even after saving to ROM.

In Motion Edit screen, conventional methods for using position has been inherited; mean while, additional changes is made possible by creating control (what used to be called “Objects” in HeatToHeart 3) using DLL (Dynamic Link Library). Also, by basically implementing one function to one control, program editing in the motion editing screen is much clearer. Further, by exhibiting icons for each function, the flow of program is much easier to see.

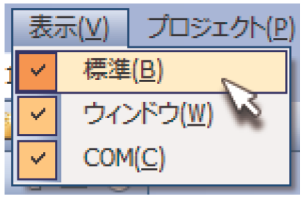
Main Window

Edit Menu

In the Edit Menu, control arranged on the motion editor campus currently being edited (see Motion Editor Window section) is copied or pasted.

1. Cut: The selected control (see Motion Editor Window section) is cut. The cut control is saved on the buffer and thus can be pasted.
2. Copy: The selected control is copied. The copied control is saved on the buffer.
3. Paste: Control in the buffer is pasted. The position at which it is pasted would be on the bottom-right of the copied control. Control may be pasted on a different motion data, as well.
4. Delete: Selected control is deleted. The deleted control can not be restored.
5. Select All: Select all control on the campus currently being edited.

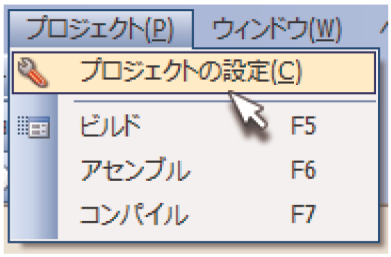
Display Menu



In the Display Menu, toolbars can be displayed or hidden. When toolbar is shown, a check mark appears on the left side of the item. For more details on toolbar, see "Toolbar" section.

1. Standard: Standard toolbar is displayed.
2. Window: Window toolbar is displayed.
3. COM: COM toolbar is displayed.

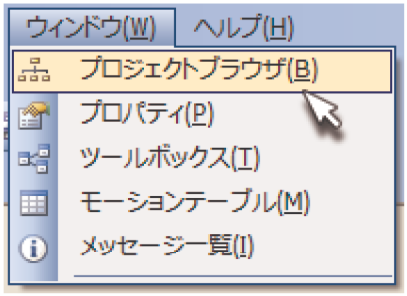
Project Menu



In Project Menu, project is set.

1. Project Setting: Displays Project Setting window.
2. Build: The motion currently being edited is built (see Motion Edit Window section) and written in RCB-4HV.
3. Assemble: The motion currently being edited is assembled (see Motion Edit Window section) .
4. Compile: The motion currently being edited is compiled (see Motion Edit Window section) .

Window Menu

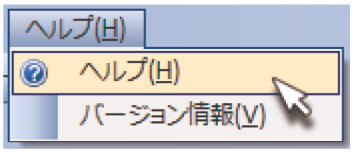


Sub Windows to be connected to the Main Window is displayed or hidden. When the icon on the left side of each item is selected, the window is displayed. For details on Sub Window, see seciton "Sub Window".

1. Project Browser: Display/Hide Project Browser window.
2. Property: Display/Hide Property window.
3. Tool Box: Display/Hide Tool Box window.
4. Motion Table: Display/Hide Motion Table window.
5. Message List: Display/Hide project message window.

Main Window

Help Menu



Help and version information are displayed.

1. Help Menu: Help is displayed.
2. Version Information: Version Information dialog is displayed.

Toolbar

The Toolbar consists of Standard Toolbar, Window Toolbar and COM Toolbar.

Standard Toolbar

In Standard Toolbar, project and motion are controlled.

1. Project: Load Project , Save Project and Create New Project .
2. Motion: Load Motion Data , Create New Motion Data , Save Motion Data and Save All Motion Data .

Window Toolbar

In the Window Toolbar, the following Sub Windows are displayed or hidden.

1. Project Setting: Display/Hide window that sets the content of the project.
2. Project Browser: Display/Hide Project Browser window.
3. Property Window: Display/Hide Property Window.
4. Tool Box: Display/Hide Tool Box window.
5. Motion List: Display/Hide Motion List Window.
6. Message Window: Display/Hide Message Window.

COM Toolbar

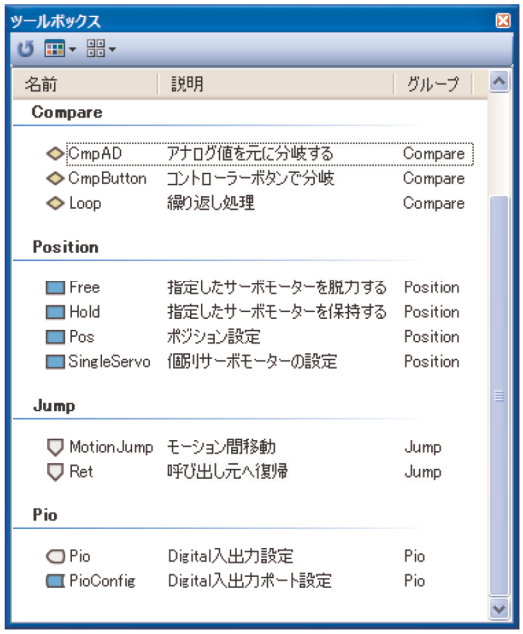
In the COM Toolbar, communication speed of serial USB Adapter HS etc. is set.

1. Select Port Box Menu: Displays list of all port (device) names currently connected to the COM port.
2. COM Button: The area that says COM is the Automatic Communication Speed Search button. By pressing this button, the communication speed of the COM port is automatically adjusted to match the communication speed of RCB-4HV. Normally not used.

Sub Window

Tool Box Window

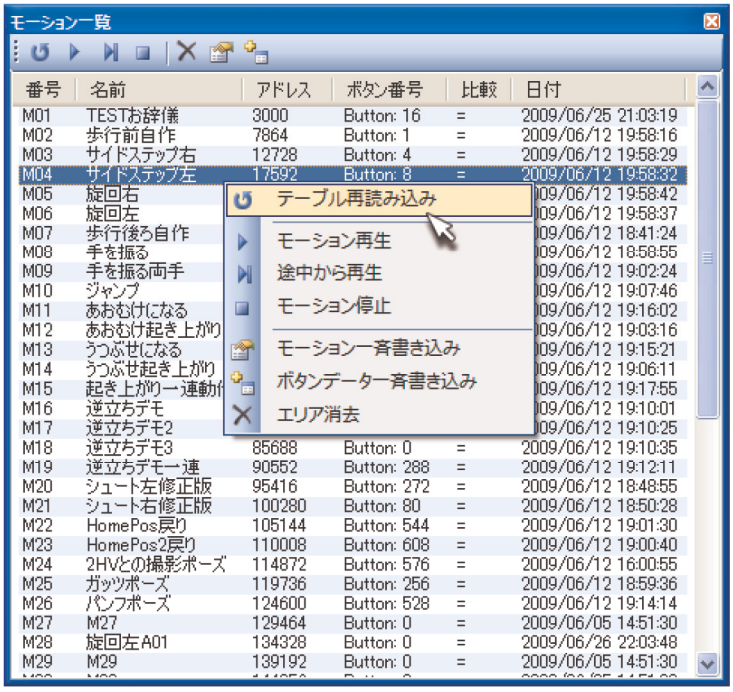
The Tool Box Window displays a list of parts (controls) necessary for creating motion.



1. When Tool Box window is displayed, control details screen (left) appears.
2. Name of control, description of control and group are shown.
3. In the Toolbar Display menu, method of display can be chosen from Icon, List, Detail, and Align.
4. In the Sort Toolbar menu, files can be sorted by name and type. Further, by selecting Display by Group, files can be displayed by group.

Motion List Window

For writing motion saved in project and editing button data.



1. Motion number, motion name, write address, run button number, method of button comparison and write date are shown on the screen.
2. Motion is run by selecting motion name and clicking Run button .
3. Clicking the Stop button while running motion stops the motion.
4. Motion is run from the beginning when the Run button is clicked while motion is stopped.
5. Motion begins from the stopped position when the Mid-run button is clicked.
6. All motion saved in a project is written simultaneously when Write All Motion button is clicked.
7. Button data allocated to each motion is written simultaneously when Write All Button Data button is clicked.
8. When Area Delete button is clicked after saving motion name, the area wherein that motion is saved is deleted. (Only the Return order is written.)
9. Buttons in the toolbar have the same function as the items that appear in the Right-click menu with the same icons.

Sub Window

Message Window

The Message Window displays log of all orders run or sent by HeartToHeart4. Since orders currently being run and error messages in relation to them appear, it is easy to detect where the program failed.*

1. The Message List Display field in the window shows the type of order currently being run, number, content, the address to which data was sent to, length of order, etc.

2. By clicking the Order button in the toolbar, the backdrop of the button changes, and becomes selective. The order run or sent is displayed at this point.

3. By clicking the Information button and turning it selective, messages related to information used in HeartToHeart4 appear.

4. By clicking the Error button and turning it to the selective state, messages related to errors occurring in HeartToHeart4 appear.

5. By clicking the Warning button and turning it to the selective state, messages related to warnings occurring in HeartToHeart4 appear.

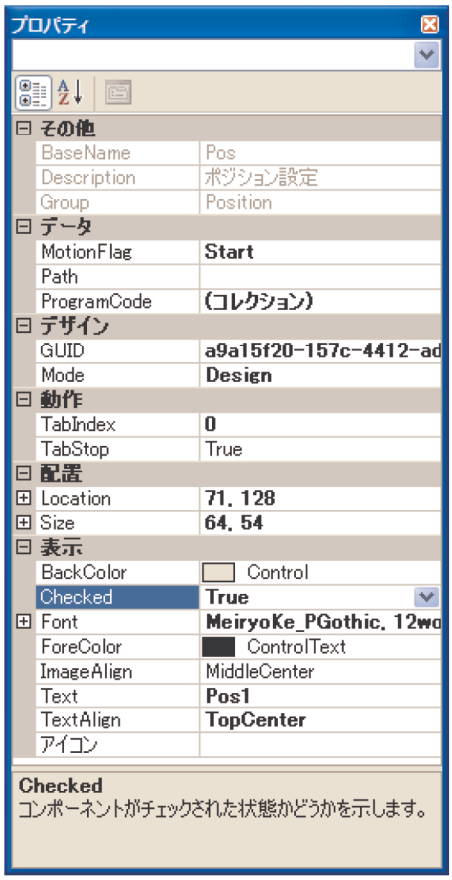
6. The number of lines displayed is controlled in the Display Line Selection ComboBox. When not selected or under standard condition, the maximum number of lines for the message is 100.

7. By clicking the Save Log button, the list of messages currently displayed is saved as csv file.

8. Delete button.

Property Window

The property window is for future developers and power users, and will not be described in this text.



* This manual don't explain about program. Refer the Reference Manual which release lator.

Creation of Project

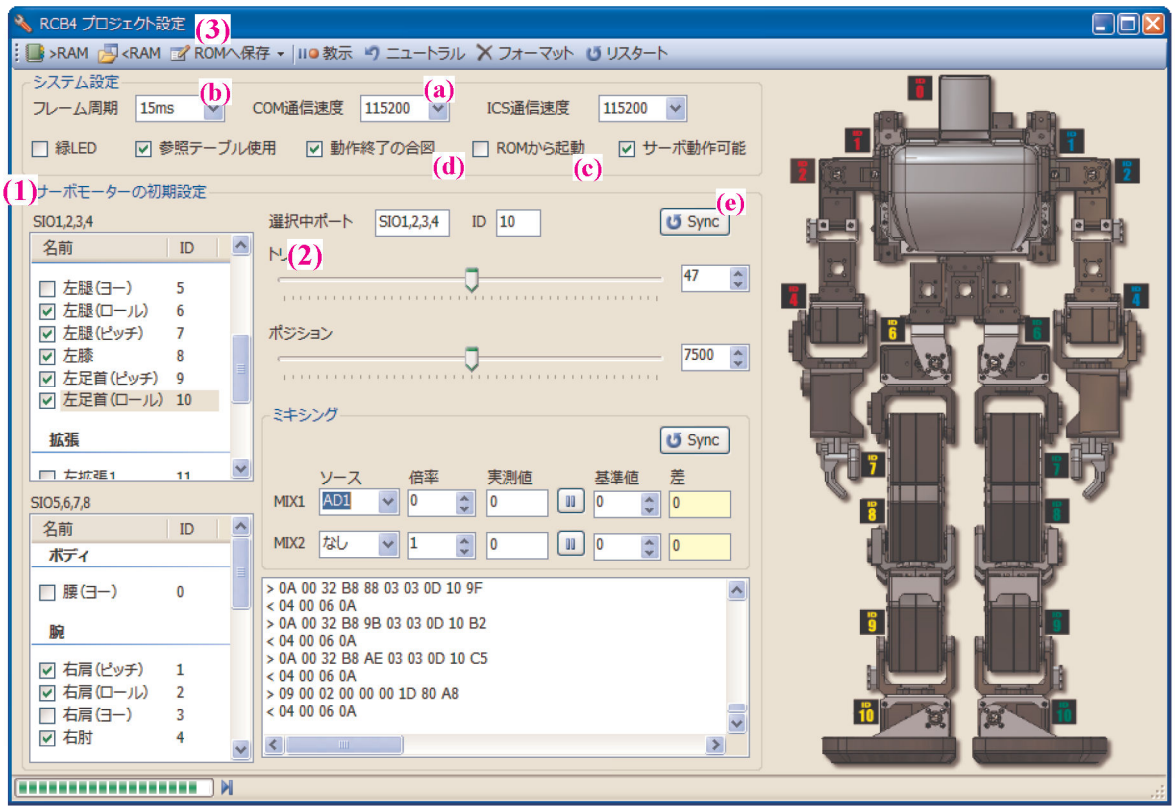
Check Project Construction

Project Construction can be confirmed in the project browser window. The project folder created contains a motion file along with a project file. (See Project Window section)

In HeartToHeart4, one folder basically contains one project file, and the project file should coincide the folder name. All other motion files can have an arbitrary name.

Project Setting

Next, project is set. In the project setting screen, editing of startup position, adjustment of trim position, and analog mixing are mainly set.



When project is loaded, Project Setting Window must be displayed.

1. The following dialog may appear when opening project screen. This message appears when the bow rate setting is wrong or when the serial USB adapter HS is not connected. If such is the case, select the correct COM port in the COM toolbar in the Main Window and select the communication speed you wish to use in the COM communication rate setting field in the project setting window.