HouseLink HL-10S

Installation and Operation Manual

HouseLink™ HL-10S
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Table of Contents

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Installation Overview

This guide covers the mounting and wiring of the HouseLink HL-10S interface. HouseLink interfaces should be placed indoors.

This symbol means the text has extra importance since it is describing the importance of a feature or explaining a step to which you should pay close attention to avoid problems, or to which safety is a concern.

Components

A BinTrac system consists of a number of basic components:

BinTrac Indicator (Version 3.15 or higher)

This is the main unit of the BinTrac system. The BinTrac Indicator communicates with the Smart Summing Boxes to register the weight of feed in the bins and peripheral devices including HouseLink HL-10S. The feed level is computed and displayed on the LED bar graph. One BinTrac Indicator can display up to four feed bins.

Bintrac Indicator (Version 3.08 or earlier)

Bintrac Indicators with previous software versions (3.08 or earlier) will only work in Pass Through mode (see page 10).

Load Cell Bracket

Four or more load cell brackets allow the BinTrac Indicator to accurately measure the feed level in your bins. The summing box averages the signals from all brackets to minimize errors that could result from voids (holes) in the feed.

Smart Summing Box

One Smart Summing Box per bin communicates the current reading on the leg brackets to the BinTrac Indicator.

BinTrac Power Supply

This provides the power for the BinTrac system. The power supply converts the line voltage to low voltage.

HouseLink Model HL-10S

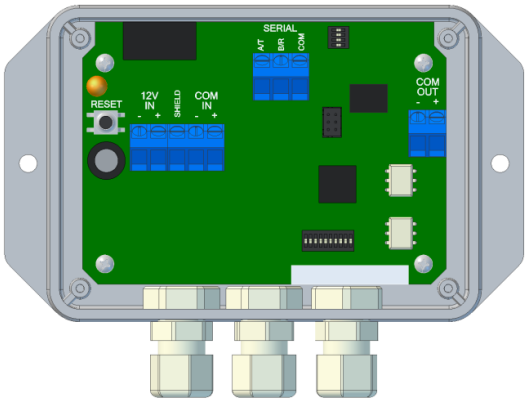
The HouseLink 10S (HL-10S) provides an RS232 or RS485 serial interface to the BinTrac system.

Installation

Mounting HouseLink HL-10S

Step 1: If the HouseLink HL-10S is to be used in RS-232 mode, it should be mounted no more than 25 feet from the house control. If the HouseLink HL-10S is to be used in RS-485 mode, it can be mounted up to 1000 feet from the house control.

Wiring the HouseLink HL-10S Interface



HL-10S	BinTrac Indicator
+12V (IN)	*+12V*
-12V (IN)	*-12V*
+COM (IN)	*+12 SIG*
-COM (IN)	*-12 SIG*
HL-10S Interface RS-485/RS-232	**House Control/PLC**
A/T	*Data Receive*
B/R	*Data Transmit*
COMMON	*Data Common*

Table 1

Step 2: Connect the HouseLink HL10S interface to the BinTrac Indicator using the wiring guidelines in Table 1.

Step 3: Connect the Transmit (RS-232) or A (RS-485), Receive (RS-232) or B (RS-485) and Common to the House Control or PLC.

Step 4: Once the Bintrac System and the HouseLink HL-10S is installed and powered up, press the RESET button on the board. This will force the device to power cycle allowing it discover any devices.

SETUP & CONFIGURATION

There are three modes the HouseLink HL-10S Interface can communicate; ASCII, Modbus RTU and as a Communication Hub. ASCII and Modbus RTU are unique software protocols designed to allow the PLC or house control to communicate with multiple remote devices. The Communication Hub uses a proprietary communication protocol to connect the scale system to BinLink for local monitoring and management and Bintrac.com for remote monitoring and management. Each of these modes use specific setup requirements. Specific settings will need to be provided, these must be obtained from the PLC or house control administrator.

There are two sets of switch blocks that need to be set in order for your HouseLink HL-10S to operate. The interface configuration switch block (4 positions) allows the user to switch between RS-232 and RS-485 access advanced settings (see below). The communication interface switch block (10 positions) allows the user to set the mode and various settings for each mode based on the user requirements.

Serial Interface Configuration Switch Block (4 position)

	Dip Switch 1	Dip Switch 2	Dip Switch 3	Dip Switch 4
RS-232	OFF	ON	ON	OFF
RS-485	OFF	OFF	OFF	OFF

Table 2

The switches in Table 2 should be set prior to moving forward with the rest of the configuration and will not need to be changed thereafter. Below are the advanced settings

Switch 1: Terminating Resister
The terminating resister helps control signal reflections and is especially important for high speed RS-485 communications. This switch can be turned to the **ON** position for RS-485 applications that use a higher baud rate, long cable run or there is a considerable amount of noise on the cable. For RS-232 applications, this switch should be set to the **OFF** position.

Switch 2: Charge Pump
When using RS-232 in full duplex, this switch should be set to **ON**.

Switch 3: RS-485/RS-232
Switch is used to set RS-232 or RS-485. When set to RS-232, cabling should be no longer than 25 feet.

Switch 4: Slew Rate Limiter (RS-485)/Z input (RS-232)
For low speed RS-485 below 150K baud rate, this switch should set to **ON**. This will control reflection on an improperly terminated cable. For high speed RS-485 (baud rates greater than 150K), this switch should be set to **OFF**. For RS-232, this switch should be set to **OFF**.

Communication Interface Switch Block (10 position)

The following pages will outline how to set up the HouseLink HL-10S for each communications interface mode. Prior to making these configuration changes, you should verify you have the proper settings from the administrator.

Modbus RTU

	Dip Switch 1	Dip Switch 2	Dip Switch 3	Dip Switch 4	Dip Switch 5	Dip Switch 6	Dip Switch 7	Dip Switch 8	Dip Switch 9	Dip Switch 10
Modbus Output	**OFF**	**ON**	-	-	-	-	**OFF**	**OFF**	**OFF**	-
Baud Rate (1200)		-	**OFF**	**OFF**	-	-	-	-	-	-
Baud Rate (9600)	-	-	**ON**	**OFF**	-	-	-	-	-	-
Baud Rate (19200)	-	-	**OFF**	**ON**	-	-	-	-	-	-
Baud Rate (38400)	-	-	**ON**	**ON**	-	-	-	-	-	-
No Parity	-	-	-	-	**OFF**	**OFF**	-	-	-	-
Even Parity	-	-	-	-	**ON**	**OFF**	-	-	-	-
Odd Parity	-	-	-	-	**OFF**	**ON**	-	-	-	-
No Parity	-	-	-	-	**ON**	**ON**	-	-	-	-
RS-232	-	-	-	-	-	-	-	-	-	**ON**
RS-485	-	-	-	-	-	-	-	-	-	**OFF**

Table 3

Modbus Output
Switch 1 and 2 allow the user to set the HouseLink HL-10S to Modbus or ASCII. For Modbus, switch 1 will be set to **OFF** and switch 2 will be set to **ON**.

Baud Rate
There are four different baud rates that are used on the HouseLink HL-10S; 1200, 9600, 19200 and 38400. Switch 3 and 4 will need to be set according to the chosen baud rate. Refer to Table 3 above to determine the correct switch settings.

Parity
There are three different parity settings that are used on the HouseLink HL-10S; No Parity, Even Parity and Odd Parity. Refer to Table 3 above to determine the correct switch settings.

Serial Interface
Switch 10 is used to set the HouseLink HL-10S to either RS-232 (**ON**) or RS-485 (**OFF**).

NOTE: Switches 7, 8 and 9 are not used in Modbus setup and should be set to their default **OFF** position.

MODBUS PACKET DATA FORMAT

Below are sample Modbus request and response packets:

SAMPLE WEIGHT REQUEST

HEX	DESCRIPTION	DECIMAL	
07	DEVICE ID	7	*BINTRAC STATION ID*
04	INPUT REG	4	
03e7	ADDRESS	1000	*START ADDRESS*
0008	LENGTH	8	*DATA LENGTH*
28	CRC HIGH		
d9	CRC LOW		

TABLE 4

SAMPLE WEIGHT RESPONSE

HEX	DESCRIPTION	DECIMAL	
07	DEVICE ID	7	*BINTRAC STATION ID (1-127)*
04	INPUT REG	4	
10	SIZE	16	
000815a	BIN A	33114	*DATA*
ffff8001	BIN B	-32767	*DATA*
ffff8001	BIN C	-32767	*DATA*
ffff8001	BIN D	-32767	*DATA*
28	CRC HIGH		
2a	CRC LOW		

TABLE 5

SAMPLE FILL REQUEST

HEX	DESCRIPTION	DECIMAL	
05	DEVICE ID	5	*BINTRAC STATION ID*
04	INPUT REG	4	
04AF	ADDRESS	1200	*START ADDRESS*
0012	LENGTH	18	*DATA LENGTH*
40	CRC HIGH		
92	CRC LOW		

TABLE 6

SAMPLE FILL RESPONSE

HEX	DESCRIPTION	DECIMAL	
05	DEVICE ID	5	*BINTRAC STATION ID (1-127)*
04	INPUT REG	4	
24	SIZE	36	
0F	YEAR	15	
6	MONTH	6	
1D	DAY	29	
00	HOUR	0	
0D	MINUTE	13	
00001C29	BIN A	7209	
0F	YEAR	15	
6	MONTH	6	
1D	DAY	29	
00	HOUR	0	
0D	MINUTE	13	
00000F37	BIN B	3895	
0F	YEAR	15	
6	MONTH	6	
1D	DAY	29	
00	HOUR	0	
0D	MINUTE	13	
00001368	BIN C	1968	
0F	YEAR	15	
6	MONTH	6	
1D	DAY	29	
00	HOUR	0	
0D	MINUTE	13	
00001C29	BIN D	7209	
58	CRC HIGH		
77	CRC LOW		

TABLE 7

Sample Modbus request and response packets (continued):

SAMPLE USAGE REQUEST

HEX	DESCRIPTION	DECIMAL	
05	DEVICE ID	5	*BINTRAC STATION ID*
04	INPUT REG	4	
0577	ADDRESS	1400	*START ADDRESS*
0012	LENGTH	18	*DATA LENGTH*
c1	CRC HIGH		
55	CRC LOW		

TABLE 8

SAMPLE USAGE RESPONSE

HEX	DESCRIPTION	DECIMAL	
05	DEVICE ID	5	*BINTRAC STATION ID (1-127)*
04	INPUT REG	4	
24	SIZE	36	
0F	YEAR	15	
07	MONTH	7	
05	DAY	5	
00	HOUR	0	
00	MINUTE	0	
000006A7	BIN A	1703	
0F	YEAR	15	
07	MONTH	7	
05	DAY	5	
00	HOUR	0	
00	MINUTE	0	
000006ED	BIN B	1773	
0F	YEAR	15	
07	MONTH	7	
05	DAY	5	
00	HOUR	0	
00	MINUTE	0	
000004CA	BIN C	1226	
0F	YEAR	15	
07	MONTH	7	
05	DAY	5	
00	HOUR	0	
00	MINUTE	0	
000006ED	BIN D	1773	
5B	CRC HIGH		
24	CRC LOW		

TABLE 9

Weight Data Conditions:

Bintrac Display	Weight	Error Description
no.bin	-32000	Smart Summing Box is not communicating with the BinTrac Monitor
N/A	-32767	Selected Bin is disabled and not displayed.
Error	99999 or -9999	Calculated weight exceeds display limit of >99999 or < -9999
o.LoAd	>150% of Capacity	Weight exceeds 150% of programmed capacity.
no.con	-32600	Remote Display lost communications connection with Host BinTrac Monitor

TABLE 10

ASCII (7 bit)

	Dip Switch 1	Dip Switch 2	Dip Switch 3	Dip Switch 4	Dip Switch 5	Dip Switch 6	Dip Switch 7	Dip Switch 8	Dip Switch 9	Dip Switch 10
ASCII Output	**ON**	**OFF**	-	-	-	-	-	-	-	-
Baud Rate (1200)		-	**OFF**	**OFF**	-	-	-	-	-	-
Baud Rate (9600)	-	-	**ON**	**OFF**	-	-	-	-	-	-
Baud Rate (19200)	-	-	**OFF**	**ON**	-	-	-	-	-	-
Baud Rate (38400)	-	-	**ON**	**ON**	-	-	-	-	-	-
No Parity	-	-	-	-	**OFF**	**OFF**	-	-	-	-
Even Parity	-	-	-	-	**ON**	**OFF**	-	-	-	-
Odd Parity	-	-	-	-	**OFF**	**ON**	-	-	-	-
No Parity	-	-	-	-	**ON**	**ON**	-	-	-	-
Broadcast Off	-	-	-	-	-	-	**OFF**	-	-	-
Broadcast On	-	-	-	-	-	-	**ON**	-	-	-
Single Bin (A)	-	-	-	-	-	-	-	**OFF**	-	-
Multi Bin (A,B,C,D)	-	-	-	-	-	-	-	**ON**	-	-
5 Digit Output	-	-	-	-	-	-	-	-	**OFF**	-
6 Digit Output	-	-	-	-	-	-	-	-	**ON**	-
RS-232	-	-	-	-	-	-	-	-	-	**ON**
RS-485	-	-	-	-	-	-	-	-	-	**OFF**

TABLE 11

ASCII Output
Switch 1 and 2 allow the user to set the HouseLink HL-10S to Modbus or ASCII. For ASCII, switch 1 will be set to **ON** and switch 2 will be set to **OFF**.

Baud Rate
There are four different baud rates that are used on the HouseLink HL-10S; 1200, 9600, 19200 and 38400. Switch 3 and 4 will need to be set according to the chosen baud rate. Refer to Table 11 above to determine the correct switch settings.

Parity
There are three different parity settings that are used on the HouseLink HL-10S; No Parity, Even Parity and Odd Parity. Refer to Table 11 above to determine the correct switch settings.

Broadcast
Switch 7 is used to set broadcast **ON** or **OFF**. Refer to Table 11 above to determine the correct switch settings.

Single/Multi Bin
Switch 8 sets the output data format as single or multiple bin configurations. Refer to Table 11 above to determine the correct switch settings.

5 or 6 Digit Output
Switch 9 selects a 5 or 6 digit output. Refer to Table 11 above to determine the correct switch settings.

Serial Interface
Switch 10 is used to set the HouseLink HL-10S to either RS-232 (**ON**) or RS-485 (**OFF**).

ASCII DATA RECORD FORMATS

Data Format for Single and Multiple Bin Configurations

Data Format Options	Data Format (for "P" command)
Single Bin	+/-wwwwwcrlf **
Multiple Bins	+/-wwwww,+/-wwwww,+/-wwwww,+/-wwwwwcrlf **

TABLE 12

Serial Data Command Set

Poll Command	Description and Data Record Format (fixed length)
P	Current weight of first enabled bin +/-wwwwwcrlf
PP	Current weight of all four bins +/-wwwww,+/-wwwww,+/-wwwww,+/-wwwwwcrlf
SnnP	Current weight of first enabled bin with matching BinTrac Station ID +/-wwwwwcrlf *Also works with F, FF and U, UU commands
SnnPP crlf	Current weight of all four bins with matching BinTrac Station ID +/-wwwww,+/-wwwww,+/-wwwww,+/-wwwwwcrlf *Also works with F, FF and U, UU commands
Fcr	Single Bin Fill: yy,mm,dd,hh,mm,+/-wwwwwcrlf
Ucr	Single Bin Usage: yy,mm,dd,hh,mm,+/-wwwwwcrlf
FFcr	Multiple Bin Fill: yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf
UUcr	Multiple Bin Usage: yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf yy,mm,dd,hh,mm,+/-wwwwwcrlf

TABLE 13

Note: All commands must be terminated by CR. Latency between characters within a multiple character command (including CR), cannot exceed 250msec.

**** Fixed length weight values can be configured for 5 or 6 digits as set by dip switch settings.**

w – bin weight

n – Station ID number

yy,mm,dd,hh,mm – Year, Month, Day, Hour, Minutes

CR – Carriage Return (Hx0D).

LF – Line Feed (Hx0A).

Weight Data Conditions:

Bintrac Display	Weight	Error Description
no.bin	-32000	Smart Summing Box is not communicating with the BinTrac Monitor
N/A	-32767	Selected Bin is disabled and not displayed.
Error	99999 or -9999	Calculated weight exceeds display limit of >99999 or < -9999
o.LoAd	>150% of Capacity	Weight exceeds 150% of programmed capacity.
no.con	-32600	Remote Display lost communications connection with Host BinTrac Monitor

TABLE 14

Communications Hub

	Dip Switch 1	Dip Switch 2	Dip Switch 3	Dip Switch 4	Dip Switch 5	Dip Switch 6	Dip Switch 7	Dip Switch 8	Dip Switch 9	Dip Switch 10
Comm Hub	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**-**
No Parity	**-**	**-**	**-**	**-**	**OFF**	**OFF**	**-**	**-**	**-**	**-**
Even Parity	**-**	**-**	**-**	**-**	**ON**	**OFF**	**-**	**-**	**-**	**-**
Odd Parity	**-**	**-**	**-**	**-**	**OFF**	**ON**	**-**	**-**	**-**	**-**
No Parity	**-**	**-**	**-**	**-**	**ON**	**ON**	**-**	**-**	**-**	**-**
RS-232	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**ON**
RS-485	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**OFF**

Table 15

Communication Hub
The HouseLink HL-10S can operate as a Communication Hub. To do so, switches one through nine will need to be set to **OFF**.

Parity
There are three different parity settings that are used on the HouseLink HL-10S; No Parity, Even Parity and Odd Parity. Refer to Table 15 above to determine the correct switch settings.

Serial Interface
Switch 10 is used to set the HouseLink HL-10S to either RS-232 (**ON**) or RS-485 (**OFF**).

When used as a communication hub, the HouseLink HL-10S can be connected to an external AT modem, Cellular modem or internet connection. This equipment is sold separately.

PASS THROUGH MODE*

	Dip Switch 1	Dip Switch 2	Dip Switch 3	Dip Switch 4	Dip Switch 5	Dip Switch 6	Dip Switch 7	Dip Switch 8	Dip Switch 9	Dip Switch 10
PASS THRU	**ON**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**-**
232	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**ON**
485	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**OFF**

TABLE 16

*This mode allows communications to pass through the HL-10S unaltered. This mode is to be used with systems using a Bintrac Indicator with software version 3.14 or earlier.

Troubleshooting

The HouseLink HL-10S can be used in various modes and with various setup parameters. The LED light inside the unit will display 4 different ways; **OFF, ON, SLOW BLINK, FAST BLINK**. Table 17 has a brief explanation of what those conditions mean and a resolution to each.

LED Condition	Description	Resolution
No Light	No Power	Check Power
Solid ON	No Communication	Verify wiring and baud rate
Slow Blink	Communicating	Verify correct data is being transferred
Fast Blink	Discovery Mode	Discovering devices, wait until finished.

TABLE 17

RESET BUTTON

The reset button will respond differently depending upon the mode the device is currently in. Below is an explanation of the reset button based on mode

Modbus: Device will reset and all parameters will remain the same.

ASCII: Device will reset and all parameters will remain the same. If the device is in broadcast mode, it will enter discovery mode*.

Communication Hub: Device will reset and will enter discovery mode*.

**Discovery mode is when the HouseLink HL-10S searches for BinTrac® devices.*

BinTrac Error Messages

no.bin

This error message indicates that the BinTrac Indicator is not communicating with the Smart Summing Box of the indicated bin.

- *Disable bins that do not have an associated Smart Summing Box and bin.*
- *Verify wiring between Smart Summing Box and BinTrac Indicator is correct and has not been damaged.*
- *Verify Smart Summing Box has been programmed as the correct bin.*
    - *Verify Smart Summing Box dip switch settings are set for their selected bin (A, B, C or D).*
    - *Verify that two Smart Summing Boxes are not programmed as the same bin as this will cause no.bin error for both.*
- *Inspect Smart Summing Box for flashing light.*
    - *A steady flashing light indicates the Smart Summing Box has power and is operating correctly.*
    - *An irregular flashing light indicates the Smart Summing Box has power but is unable to communicate with the BinTrac Indicator.*
        - *Confirm all wires are tight and secure.*
        - *Confirm dipswitches are set correctly.*
        - *Communications port on Summing Box or BinTrac Indicator may have been damaged.*
            - *If BinTrac Indicator is displaying no.bin for other connected bins, replace indicator.*
            - *Replace summing box*
    - *No Light indicates the Smart Summing Box does not have adequate power or has been damaged.*
        - *Confirm all wires are tight and secure.*
        - *Verify 12VDC is available to the Smart Summing Box.*
        - *Locate a shorted loadcell that could be shorting power within Smart Summing Box.*
- *If more than a single bin is displaying no.bin, isolate the problem Smart Summing Box by removing all connects except to a single Smart Summing Box.*

Error

This error message indicates the weight reading exceeds the five digit display. This can be caused by invalid programmed settings, a loadcell not correctly plugged into a connector in the Smart Summing Box, a defective loadcell causing a large weight reading, or a defective Smart Summing Box.

- *Confirm all programmed settings are correct*
    - *Verify Zero is valid and in-range. A large incorrect zero can cause this.*
    - *Verify Capacity has been correctly programmed.*
- *Open summing box and inspect loadcell connections.*
    - *Verify connector is properly aligned with its associated header.*
    - *Verify wires are properly seated in each connector.*
- *Confirm Summing Box is clean and dry. Long-term moisture in a Summing Box can cause inaccurate readings.*
- *Check Loadcells See **"Loadcell Troubleshooting Procedures"***

no.con

This error message indicates that this device has been programmed as a Remote Display device and is unable to communicate with the BinTrac Indicator.

- *Verify that this indicator is intended to be a Remote Display as configured in Setup Configuration. This error message more often appears when a Bin Indicator was accidently programmed as a Remote Display unit.*
- *Verify wiring is correct between BinTrac Indicator and BinTrac Remote Display.*

Operational Specifications

Operating Temperature Range:	-40°C to +60°C (-40°F to +140°F)
Humidity:	5% to 95% (non-condensing)
Environmental Air:	No corrosive gasses permitted
Shock and Vibration:	N/A
Enclosure Type:	Unsealed
Agency Approvals:	N/A
Wiring Type:	Screw terminal blocks
Power Requirements:	10.5 VDC – 13.5 VDC (Current depends on port loading)
Configurable SERIAL Com Interface:	Isolated RS232/RS485
COM IN/OUT Serial Com Interfaces:	Herdstar optically isolated (proprietary)

APPENDIX A

When using the HouseLink HL-10S with a software version less than 3.14, you will need to set the device in pass-through mode.

Legal

Portions of this devices firmware are ported from freemodbus available at http://freemodbus.org. The following disclaimer is required by the author: