

# HF/HF-G/HR OPTIONS

## INSTRUCTION MANUAL

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Instruction-HF/HF-G/HR-03/05-v.1.a-94.10.03

### Serial Interface

HF-03

HF-05

HR-03

HR-05

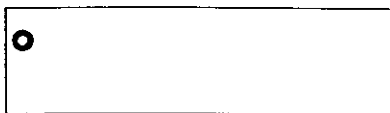


# Contents

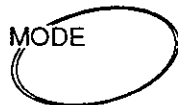
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# C-Parameter Keys and Displays



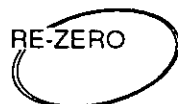
This mark appears when the memorized parameter is shown in the display.



The **MODE** key is used to select the group of C-parameters.



The **SAMPLE** key or **RANGE** key is used to select the item from the group selected by the mode key.



The **RE-ZERO** key is used to select a parameter for the item selected by the **MODE** and **SAMPLE** key ( or **RANGE** key).

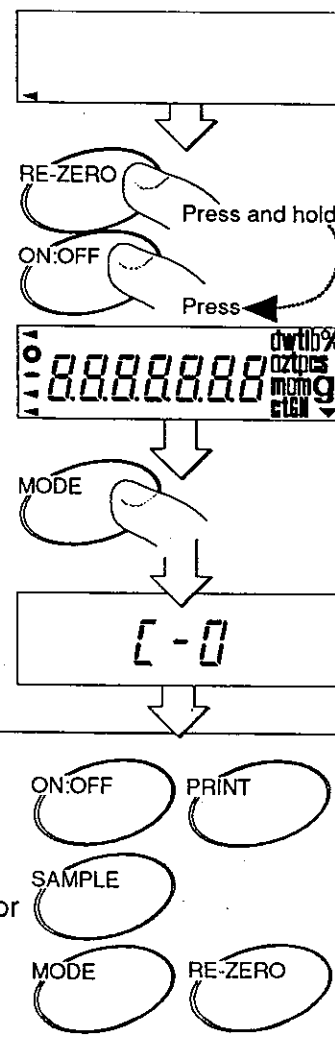


The **PRINT** key is used to save the new C-Parameter settings and to exit to the weighing mode.



The **ON:OFF** key cancels the new C-parameter settings and turns the display off.

- 1** Turn the display off.
- 2** Press and hold the **RE-ZERO** key and press the **ON:OFF** key. Release both keys.
- 3** Press the **MODE** key. The balance enters the function setting mode and **[ - 0 ]** will be displayed.
- 4** Set the C-parameter using the keys described on the preceding page.



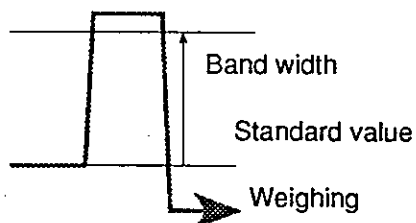
# C-Parameters Settings

## [ - 4 Data out Settings for options 03 and 05

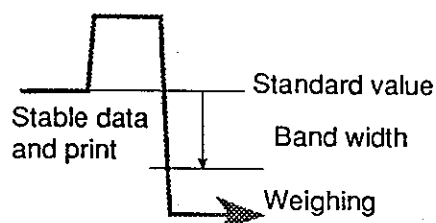
<i>Print</i> Data out mode	parameter	It is necessary to select the method and condition when data is transmitted. If you use auto print mode, please set both "Auto print polarity" and "Auto print band".	
	*0	PRINT key mode	PRINT key command is accepted only if the display is stable. The display will blink when data is transmitted.
	1	Auto print mode A	Data is transmitted when the display is stable and meets the conditions of "Auto print polarity" and "Auto print band". This standard value is the zero-point. Refer to the figure at the bottom of the page.
	2	Auto print mode B	Data is transmitted when display is stable and meets the condition of "Auto print polarity" and "Auto print band". This standard value is the last weighing data. Refer to the figure at the bottom of the page.
	3	Stream mode	Data is transmitted continuously.
<i>RP-P</i> Auto print polarity	parameter	This parameter sets the polarity condition from the standard value that weighing data is able to transmit.	
	*0	Data is able to be transmitted when the weighing data is more than the standard value. (It is called "Plus polarity")	
	1	Data is able to be transmitted when the weighing data is less than standard value. (It is called "Minus polarity")	
	2	Data is able to be transmitted when the weighing data is less than or more than the standard value. (It is called "Absolute polarity")	
<i>RP-b</i> Auto print band	parameter	This parameter sets the band width condition from the standard value that weighing data is able to transmit.	
	*0	Data is able to be transmitted when the weighing data deviates from the standard value more than 10 digits.	
	1	Data is able to be transmitted when the weighing data deviates from the standard value more than 100 digits.	
	2	Data is able to be transmitted when the weighing data deviates from the standard value more than 1000 digits.	

\* Factory setting.

**AUTO PRINT MODE:**     Stable data and print



Case of plus polarity



Case of minus polarity

**[ - 4** Continued

<b>PRUSE</b> Data pause		Selects the use of a pause. If your printer requires a pause, set this to 1.
	<b>*0</b>	No pause.
	<b>1</b>	Using a pause.
<b>RE-F</b> Auto feed		Selects whether or not to use Auto feed after printing. (AD-8121A)
	<b>*0</b>	Not using auto feed
	<b>1</b>	Using auto feed
<b>Re-d</b> Automatically re-zero after data out		Selects whether to use auto re-zero after transmitting.
	<b>*0</b>	Not using re-zero
	<b>1</b>	Using re-zero
<b>inFo</b> Verifying the calibration		Selects whether you verify the calibration using printer, a computer or no verification after calibration.
	<b>*0</b>	No verification of the calibration
	<b>1</b>	Verifying the calibration using the AD-8121 printer.
	<b>2</b>	Verifying the calibration using a computer.

\* Factory setting.

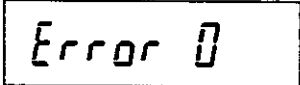
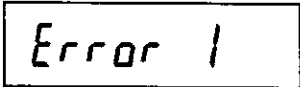
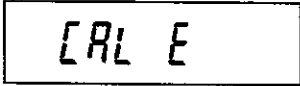
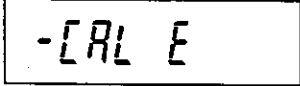
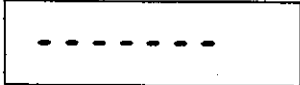
## [ - 5 Serial Interface Settings for options 03 and 05.

<b>bPS</b> Baud rate		Parameter definition and use.
	0	600 baud
	1	1200 baud
	*2	2400 baud
	3	4800 baud
	4	9600 baud
<b>bE-Pr</b> Parity bit		Parameter definition and use.
	*0	7 bits, Even parity check
	1	7 bits, Odd parity check
<b>[r-LF</b> Terminator		Parameter definition and use. (Common setting to both transmitting and receiving.)
	*0	CR, LF
	1	CR
<b>TYPE</b> Data format		Selects a weighing data format. Refer to the book for the option used.
	*0	A&D standard
	1	Dump print format
	2	KF format
<b>E-UP</b> Receive time		Selects the maximum waiting time between receiving command characters.
	0	NO limit
	*1	One second. If the time is over, the balance cancels receiving the command and outputs the error code.
<b>E-Code</b> Error code	*0	Error codes or <AK> signal are not output.
	1	Error codes or <AK> signal are output.
<b>[ES</b> CTS control		Selects the use of the control lines CTS and RTS.
	*0	Not using CTS or RTS.
	1	Using CTS and RTS. Keep the RTS line (active) high while the computer receive data. The balance will set CTS low if it is busy.

\* Factory setting.



# Error Codes

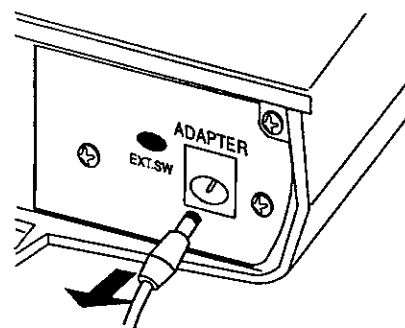
Error code	Description of the error	
E00	<b>Communications error</b> There is a protocol error in communications. Check the format, baud rate and parity.	
E01	<b>Undefined error</b> The command received was not in the list of commands recognized by this balance.	
E02	<b>Balance not ready</b> The command can not be received due to a timing error or the balance is busy. Commands that the balance can not respond to such as "Q", when the balance is in the counting mode.	
E03	<b>Time over error</b> The balance did not receive next character of a command within the time limit of one second.	
E04	<b>Excess characters error</b> The command has more characters than is required or the range of the data is beyond what the balance will accept. Example; when the calibration weight entered is greater than the range of the balance.	
E05	<b>Terminator error</b> A command is followed by other than CR or CR, LF (carriage return and a line feed).	
E06	<b>Format error</b> A command that should include numerical data has none or the data is in the wrong place in the command.	
E07	<b>Out of range error</b> The data entered exceeds the range that the balance will accept.	
E10	<b>Internal operation error</b> The balance is in an abnormal operating condition.	
E11	<b>Stability error</b> The balance can not stabilize due to vibration or other environmental problem.	
E20	<b>Calibration error</b> The calibration weight is to heavy.	
E21	<b>Calibration error</b> The calibration weight is to light.	
E22	<b>Zero out of range error</b> The balance can not zero the display as the zero point offset exceeds the range.	

# Serial Interface (OP-03)

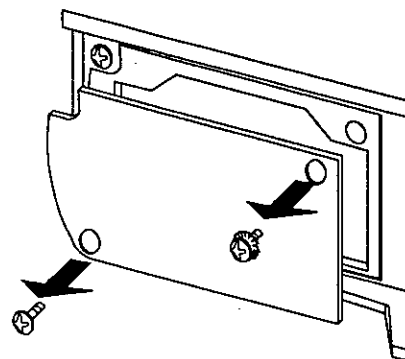
Option 03, is a serial interface that consists of two sections, a bi-directional EIA RS-232C interface and a 20mA passive current loop.

## Installation

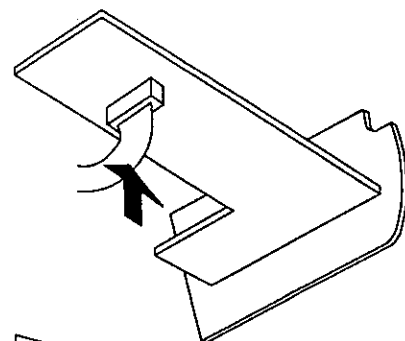
- 1** Turn off the balance and remove the AC adapter.



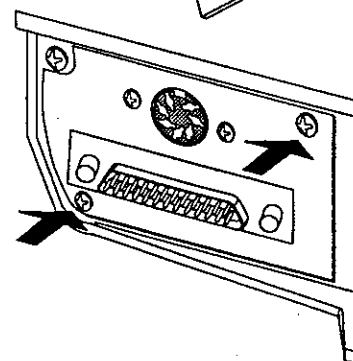
- 2** Remove two screws securing the blank cover on the rear of the balance.



- 3** Remove the cable attached to this panel and connect it to the socket on the option board as shown.

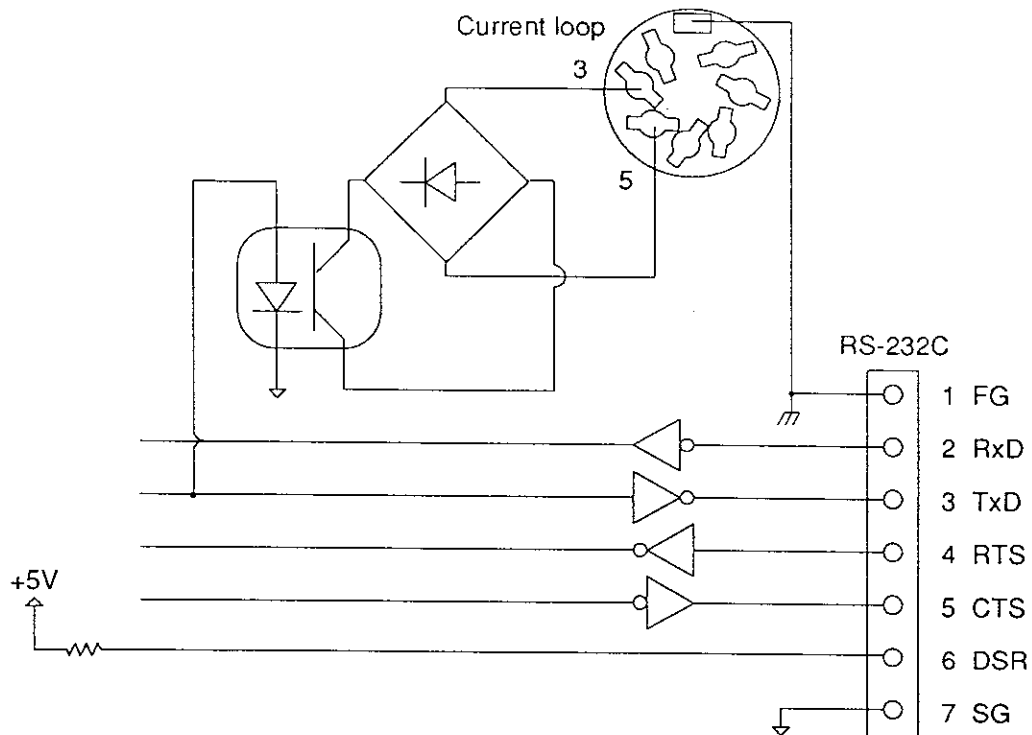


- 4** Install the option board using the screws removed in step 1.









## Connection to other Equipment

- The current loop is of the passive type. It requires an external source of 20mA DC.
- The RS-232C is of the DCE type (Data Communications Equipment) and can use standard DCE cables.
- When connecting to another piece of equipment, consult the manual for that equipment for proper settings and connections.

## Connection to an AD-8121

The following balance functions must be set to use the AD-8121 printer

"C" function	Settings
[ -4 Pr int 0, 1, 2, 3	Select a print mode
[ -4 AP-P 0, 1, 2	Select the polarity for the auto-print mode
[ -4 AP-b 0, 1, 2	Set the auto-print band
[ -5 bPS 2	Select "2400bps"
[ -5 bt-Pr 0	Select "7 bits, Even parity check"
[ -5 Cr-LF 0	Select "CR, LF"
[ -5 tYPE 0, 1	Select "A&D Standard format" or "Dump print format"
[ -5 t-UP 1	Set the receive timing to 1 second
[ -5 t-Code 0	Select "Error codes are not output"
[ -5 CtS 0	Select "Not using CTS and RTS"

## Data Output

There are four modes to control the transmission of the weighing data.

### Key Mode

When you press the **PRINT** key, the balance transmits the weighing data when the display is stable (the stability indicator is on). When the data is transmitted the display will blink one time.

C-4 *Print* 0 ..... Print key mode

### Auto-print Mode A

The balance transmits the weighing data when the display is stable (the stability indicator is on), meets the conditions of "Auto-print polarity" and "Auto-print band". The reference for the auto-print band is the zero point. When the data is transmitted the display will blink one time.

C-4 *Print* 1 ..... Auto-print mode A

C-4 *RP-P* X ..... Auto-print polarity X = 0, 1, 2

C-4 *RP-b* X ..... Auto-print band X = 0, 1, 2

### Auto-print Mode B

The balance transmits the weighing data when the display is stable (the stability indicator is on), meets the conditions of "Auto-print polarity" and "Auto-print band". The reference for the auto-print band is the last weighing data printed. When the data is transmitted the display will blink one time.

C-4 *Print* 2 ..... Auto-print mode B

C-4 *RP-P* X ..... Auto-print polarity X = 0, 1, 2

C-4 *RP-b* X ..... Auto-print band X = 0, 1, 2

### Stream Mode

The balance transmits the weighing data continuously.

C-1 *SPEED* X ..... Display update rate. X = 0, 1, 2

C-5 *bPS* X ..... Baud rate. X = 0, 1, 2, 3, 4

### NOTE:

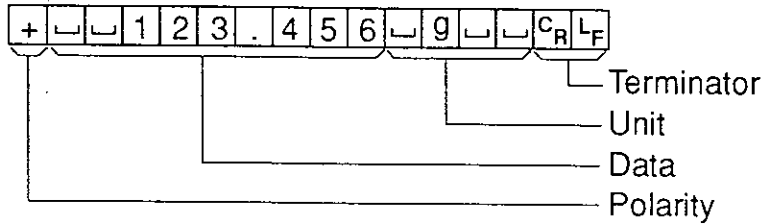
When the baud rate is set to 600 or 1200bps and the refresh rate of the display is set to high speed, the balance is unable to transmit the data completely.



**KF Format**

**TYPE 2**

This is the Karl-Fischer moisture meter format and is used when the peripheral equipment can not communicate using A&D format.



- The data consists of 14 characters (no excluding the terminator).
- The sign of the weighing data is first if the balance is not in overload. The sign is omitted if the balance is at zero.
- The sign is followed by the weighing data (with leading zeros replaced by spaces) and decimal point. The weight data is followed by the unit if the balance is stable.
- A terminator consisting of C<sub>R</sub>, L<sub>F</sub> to indicate to the peripheral equipment that all of the data has been sent.
- The unit presents at stable.

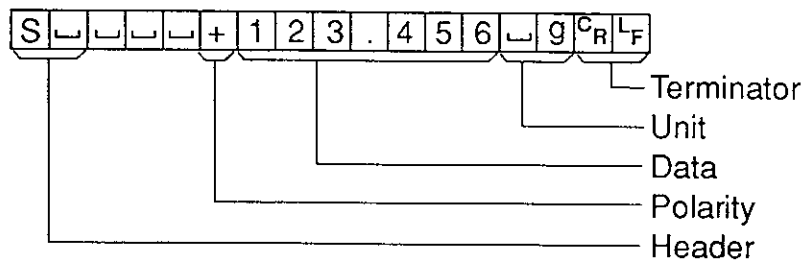


The unit does not present at unstable.

**MT Format**

**TYPE 3**

- The data length will be changed by the unit or overload.



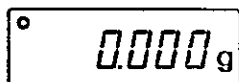
- The weighing data is preceded by a header of two characters. If stable, one character and a space are transmitted.
- The minus sign will be next if the weighing data is negative. The sign is omitted if the weighing data is positive or at zero. Leading zeros are replaced by spaces.
- If the balance is in overload, the weighing data is omitted.

Header: Stable header is **S** ,  
 Unstable header is **S D**

**Data Format Examples**

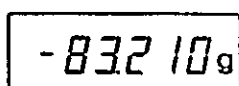
Data format examples use HF-300

STABLE



A&D	S	T	,	+	0	0	0	0	.	0	0	0	g	C <sub>R</sub>	L <sub>F</sub>	
D.P.	W	T							0	.	0	0	0	g	C <sub>R</sub>	
KF					0	.	0	0	0	g			C <sub>R</sub>	L <sub>F</sub>		
MT	S								0	.	0	0	0	g	C <sub>R</sub>	L <sub>F</sub>

UN-STABLE



A&D	U	S	,	-	0	0	8	3	.	2	1	0	g	C <sub>R</sub>	L <sub>F</sub>			
D.P.	U	S							-	8	3	.	2	1	0	g	C <sub>R</sub>	
KF	-				8	3	.	2	1	0			C <sub>R</sub>	L <sub>F</sub>				
MT	S	D							-	8	3	.	2	1	0	g	C <sub>R</sub>	L <sub>F</sub>

OVERLOAD Positive error

E

A&D	O	L	,	+	9	9	9	9	9	9	9	E	+	1	9	C <sub>R</sub>	L <sub>F</sub>			
D.P.	□	□	□	□	□	□	□	□	□	□	□	E	□	□	□	□	□	C <sub>R</sub>	L <sub>F</sub>	
KF	□	□	□	□	□	□	H	□	□	□	□	□	□	□	□	□	C <sub>R</sub>	L <sub>F</sub>		
MT	S	I	+	C <sub>R</sub>	L <sub>F</sub>															

OVERLOAD Negative error

-E

A&D	O	L	,	-	9	9	9	9	9	9	9	E	+	1	9	C <sub>R</sub>	L <sub>F</sub>			
D.P.	□	□	□	□	□	□	□	□	□	□	□	-	E	□	□	□	□	□	C <sub>R</sub>	L <sub>F</sub>
KF	□	□	□	□	□	□	L	□	□	□	□	□	□	□	□	□	C <sub>R</sub>	L <sub>F</sub>		
MT	S	I	-	C <sub>R</sub>	L <sub>F</sub>															

UNITS *(HF -G series can not change the unit and HR series can use without animal weighing mode)*

Unit and display sign		A&D	D.P.	KF	MT
g	<b>g</b>	□□g	□□g	□g□□	□g
mg mode	<b>mg</b>	□mg	□mg	□mg□	□mg
Counting mode	<b>PCS</b>	□PC	□PC	□p c s	□P C S
Percent mode	<b>%</b>	□□%	□□%	□%□□	□%
Ounce (Avoir)	<b>oz</b>	□oz	□oz	□oz□	□oz
Pound	<b>lb</b>	□lb	□lb	□lb□	□lb
Pound Ounce	<b>└ oz</b>	□oz	□oz	□oz□	□oz
Troy Ounce	<b>ozt</b>	o z t	o z t	□o z t	□o z t
Metric Carat	<b>ct</b>	□c t	□c t	□c t□	□c t
Momme	<b>mom</b>	m o m	m o m	□m o m	□m o
Pennyweight	<b>dwt</b>	d w t	d w t	□d w t	□d w t
Grain	<b>GN</b>	□G N	□G N	□g r □	□G N
Tael (HK general,Sing.)	<b>tl</b>	□t l	□t l	□t l s	□t l
Tael (HK, jewelry)	<b>tl</b>	□t l	□t l	□t l h	□t l
Tael (China)	<b>tl</b>	□t l	□t l	□t l t	□t l
Tael (Taiwan)	<b>tl</b>	□t l	□t l	□t l c	□t l
Tola (India)	<b>t</b>	□□t	□□t	□t o l	□t
Messghal	<b>m</b>	m e s	m e s	□M S □	□m
Animal mode	<b>g</b>	□□g	□□g	□g□□	□g

□ Space, ASCII 20H  
 C<sub>R</sub> Carriage Return, ASCII 0DH  
 L<sub>F</sub> Line Feed, ASCII 0AH

# Command list

Command examples use HF-300.

## Command list

Commands to request weighing data	Description of the command
Q	Request for weighing data immediately
SI	Request for weighing data immediately
S	Request for weighing data when stable
SIR	Request for weighing data continuously
C	Clear the SIR command
<b>Commands to control the balance</b>	
P	Display ON/OFF (same as <b>[ON:OFF]</b> key)
ON	Display ON
OFF	Display OFF
R	Display RE-ZERO (same as <b>[RE-ZERO]</b> key)
CAL	Perform calibration
U <sup>2</sup>	Change unit of weigh (same as <b>[MODE]</b> key)
PRT	Print (same as <b>[PRINT]</b> key)
RNG <sup>1</sup>	Change Range (same as <b>[SAMPLE]</b> key or <b>[RANGE]</b> key)
SMP <sup>2</sup>	Enter the sample weight in counting mode and percent mode (same as <b>[SAMPLE]</b> key or <b>[RANGE]</b> key)
<b>Commands to set values</b>	
CW:	Set the calibration weight
PT:	Set the digital tare weight
ID:	Set the ID number
UW: <sup>2</sup>	Set the unit weight for counting mode
PW: <sup>2</sup>	Set the 100% weight for percent mode
FC:	Set a function parameter
<b>Commands to request Data</b>	
?CW	Request for the calibration weight
?PT	Request for the digital tare weight
?ID	Request for the ID number
?UW <sup>2</sup>	Request for the unit weight for counting mode
?PW <sup>2</sup>	Request for the 100% weight for percent mode
?FC	Request for a function parameter
?UT <sup>2</sup>	Request the current unit of weight
?SN	Request the serial number of the balance
?LT	Request for all function parameters

<sup>1</sup> HF-G and HR series use **[RANGE]** key and HF series uses **[SAMPLE]** key.

<sup>2</sup> HF-G series can not use.

## Commands to request Weighing Data

- Q** Query for weighing data  
(the balance will respond with the weighing data immediately)  
Command **Q**<sup>C<sub>R</sub></sup>L<sub>F</sub>  
Reply **S**T, + 0 0 1 2 . 7 8 3 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>
- S I** Send the weighing data immediately (same as Q)  
(the balance will respond with the weighing data immediately)  
Command **S I**<sup>C<sub>R</sub></sup>L<sub>F</sub>  
Reply **U**S, + 0 0 1 2 . 7 8 3 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>
- S** Send the weighing data when it is stable  
(the balance display will blink when the data is transmitted)  
Command **S**<sup>C<sub>R</sub></sup>L<sub>F</sub>  
Reply **S**T, + 0 0 2 7 . 8 3 5 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>
- S I R** Send the weighing data continuously  
(the balance sends the data in stream mode)  
Command **S I R**<sup>C<sub>R</sub></sup>L<sub>F</sub>  
Reply **U**S, + 0 0 2 7 . 8 3 5 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>  
⋮  
**S**T, + 0 0 2 7 . 8 3 5 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>  
**S**T, + 0 0 2 7 . 8 3 5 <sub>g</sub> <sup>C<sub>R</sub></sup>L<sub>F</sub>
- C** Cancel the SIR command  
(the balance will stop sending data in stream mode)  
Command **C**<sup>C<sub>R</sub></sup>L<sub>F</sub>

## Commands to control the Balance

- P** Display ON/OFF (same as pressing the **ON/OFF** key)  
(if the balance is on it will turn off, if it is off it will turn on)  
Command **P**<sup>C<sub>R</sub></sup>L<sub>F</sub>
- ON** Display ON (If the balance is OFF, it will turn ON)  
Command **ON**<sup>C<sub>R</sub></sup>L<sub>F</sub>
- OFF** Display OFF (If the balance is ON, it will turn OFF)  
(if the balance is already off, nothing will happen)  
Command **OFF**<sup>C<sub>R</sub></sup>L<sub>F</sub>
- R** RE-ZERO the balance (same as pressing the **RE-ZERO** key)  
(the balance display will zero)  
Command **R**<sup>C<sub>R</sub></sup>L<sub>F</sub>
- CAL** Perform calibration  
(the balance will enter the calibration mode)  
Command **CAL**<sup>C<sub>R</sub></sup>L<sub>F</sub>

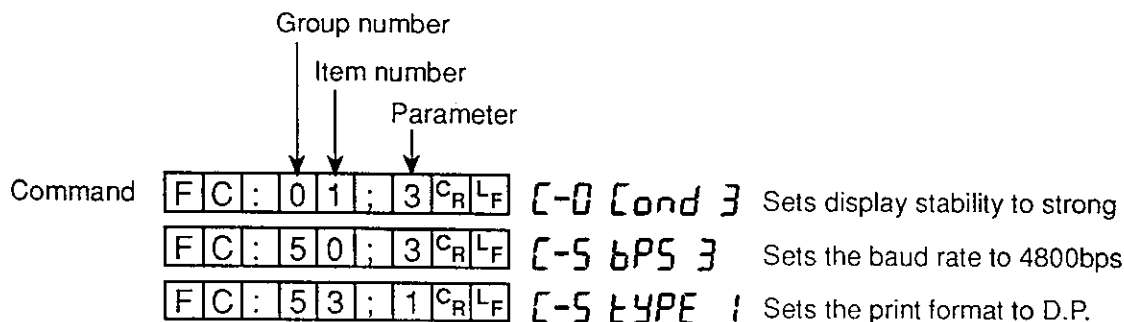


- U** Change the mode (same as pressing the **MODE** key)  
(the balance will shift to the next selected unit of weigh, to the counting or percent mode)  
Command **U****C<sub>R</sub>****L<sub>F</sub>** (HF and HR series can use this command)
- PRT** Print (same as pressing the **PRINT** key)  
(if the balance will send data dependent on the function parameters )  
Command **PRT****C<sub>R</sub>****L<sub>F</sub>**
- RNG** Change range (same as pressing the **RANGE** key or **SAMPLE** key)  
Command **RNG****C<sub>R</sub>****L<sub>F</sub>**
- SMP** Enter the sample weight in counting mode and percent mode (same as pressing the **RANGE** key or **SAMPLE** key)  
Command **SMP****C<sub>R</sub>****L<sub>F</sub>**

## Commands to set Data

- CW:** Command **CW: 0 3 0 0 . 0 3 4** **g** **C<sub>R</sub>** **L<sub>F</sub>**  
When in the calibration mode, this command is used to set the actual value of the calibration weight. The calibration weight is reset to the standard value upon entry into the calibration mode.  
**Caution : only grams can be used as the unit of weight when setting the value. Please set the calibration weight after entering the calibration mode.**
- PT:** Command **PT: 0 0 4 5 . 6 7 0** **g** **C<sub>R</sub>** **L<sub>F</sub>**  
This command is used to set the digital tare weight.  
**Caution : pressing the **RE-ZERO** key or commanding RE-ZERO will clear this value.**
- ID:** Command **ID: 1 2 3 - A B C** **C<sub>R</sub>** **L<sub>F</sub>**  
When using GLP (Good Laboratory Practice), this command is used to set the ID number to be printed out of the verification of calibration. The ID can consist of seven characters, A through F, numbers, 0 through 9, spaces or the negative sign (-).
- UW:** Command **UW: 0 0 1 . 2 3 4** **g** **C<sub>R</sub>** **L<sub>F</sub>**  
When using counting mode, this command is used to set the unit weight. The command that delete the unit weight is as follows :  
Command **UW: C** **g** **C<sub>R</sub>** **L<sub>F</sub>** (HF and HR series can use this command)
- PW:** Command **PW: 0 3 4 . 5 6 0** **g** **C<sub>R</sub>** **L<sub>F</sub>**  
When using percent mode, this command is used to set the 100% weight. The command that delete the 100% weight is as follows :  
Command **PW: C** **g** **C<sub>R</sub>** **L<sub>F</sub>** (HF and HR series can use this command)

**FC :** Setting a "C" parameter



Group Number	Item and Item Number							
	Group	0	1	2	3	4	5	6
0	<b>[-0</b> Environment	<b>Stb-b</b> Stability band	<b>Cond</b> Resp. / Environ.	<b>trc</b> Zero tracking				
1	<b>[-1</b> Display	<b>SPEED</b> Refresh rate	<b>Point</b> Decimal point	<b>P-on</b> Auto start function				
2	<b>[-2</b> Auto re-zero	<b>Ar-0</b> Auto re-zero on/off	<b>Ar-b</b> Auto re-zero band	<b>Ar-t</b> Detection time				
3	<b>[-3</b> Calibration	<b>CAL</b> Calibration inhibit						
4	<b>[-4</b> Data out	<b>Print</b> Data out mode	<b>AP-P</b> Auto print polarity	<b>AP-b</b> Auto print band	<b>PAUSE</b> Data pause	<b>At-F</b> Auto feed	<b>Ar-d</b> Zero after data out	<b>Info</b> Cal verification
5	<b>[-5</b> Serial interface	<b>bPS</b> Baud rate	<b>bt-Pr</b> Parity bit	<b>Cr-LF</b> Terminator	<b>tYPE</b> Data format	<b>t-UP</b> Receive time	<b>E-Cod</b> Error code	<b>cts</b> CTS control
6	<b>[-6</b>	Response/environment is common data with the condition of response accessible using the keyboard. If a value is set in the C parameters, it will be changed if new conditions of response are set.						
7	<b>[-7</b>							
8	<b>[-8</b>							
9	<b>[-9</b> Parameter control	<b>Pn</b> ID protect	<b>PF</b> Parameter protect					

## Commands to request Data

**?CW** Request for the calibration weight.

"\_" = a space

Command **?CWCR LF**

Reply **CW, +0300.034 \_ \_g CR LF**

**Caution**, if the calibration mode has been entered since the calibration weight was last entered, the value returned will be the standard calibration weight. The unit of weight will always be grams.

**?PT** Request for the digital tare weight.

Command **?PTCR LF**

Reply **PT, +0045.670 \_ \_g CR LF**

**Caution**, if the **RE-ZERO** key has been pressed since the last digital tare was registered, the value returned will be a positive value equivalent to the weight of any item on the pan prior to pressing the **RE-ZERO** key. The unit of weight will be the unit of weight currently in use.

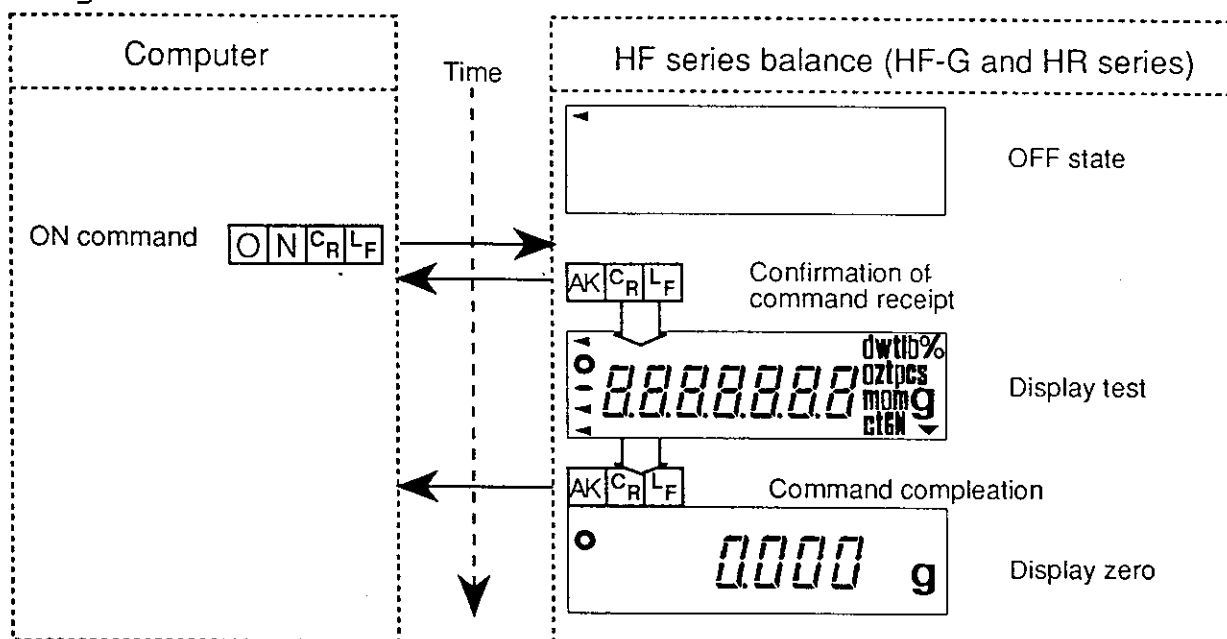
The fact that the value returned after RE-ZERO has been pressed is the actual tare weight, means this can be used to read the tare weight into a program.



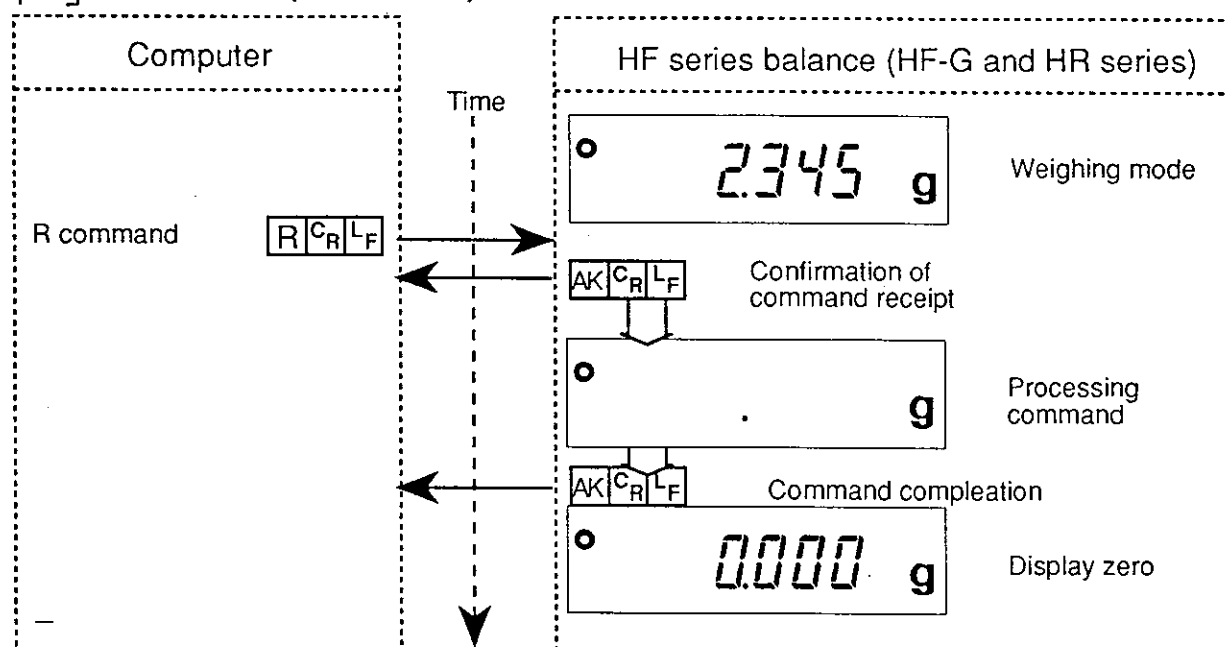
# Command Examples

## [ON] Command

Command examples use HF-300.



## [R] Command (RE-ZERO)



Please note that there needs to be a delay time of one second between the balance acknowledgment <AK> and the next command transmission to the balance. Line 124 sets the delay time. To change the delay, set "100" to another value. Example: 124 FOR I = 1 TO 200: NEXT I.

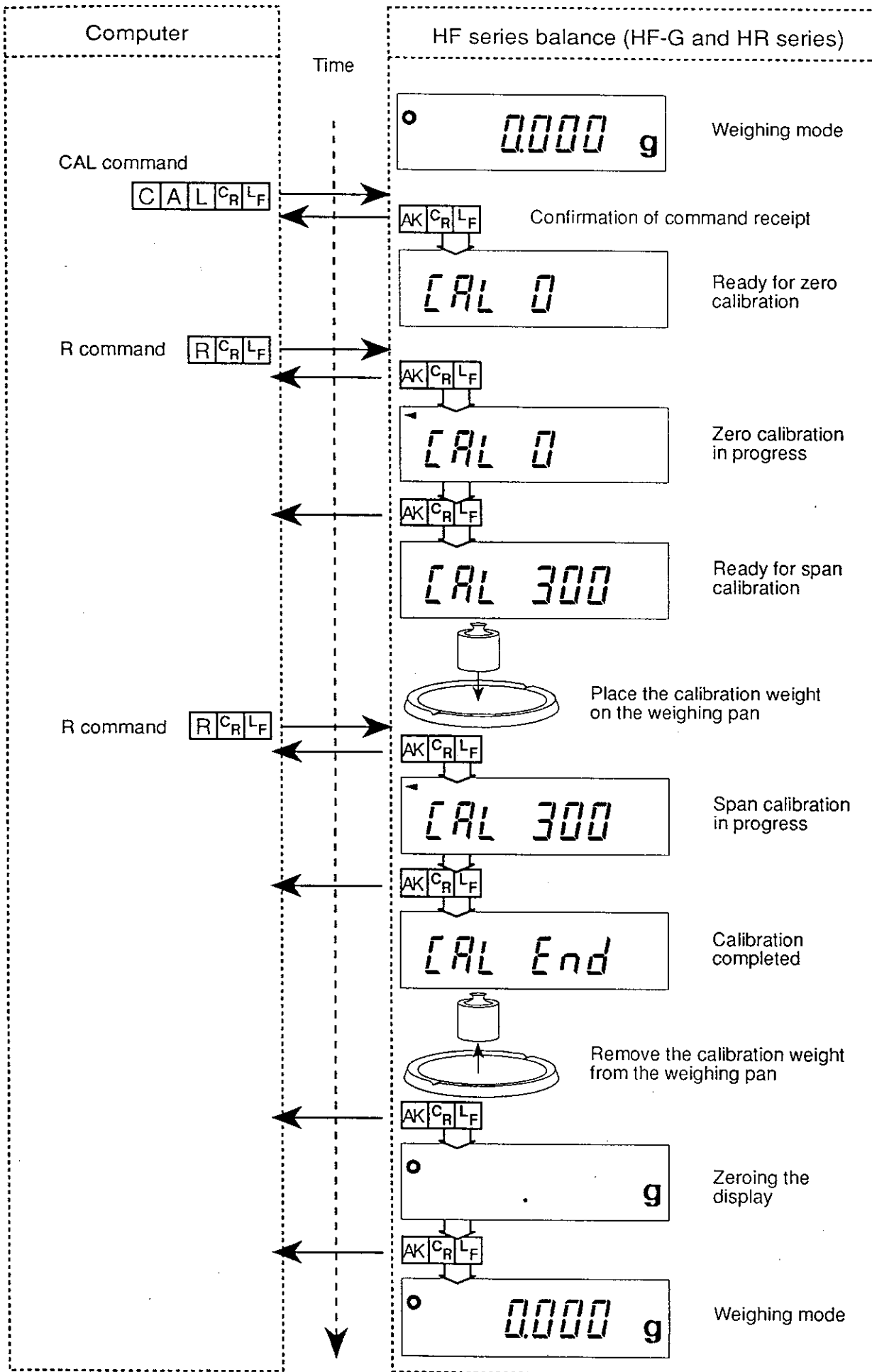
Example using a BASIC language program

```

1...
123 LINE INPUT #1, AK$           Receive <AK>
124 FOR I = 1 TO 100: NEXT I     Delay time (the '100' sets the delay)
125 PRINT #1, "Q"               TX: 'Q' command
1...

```

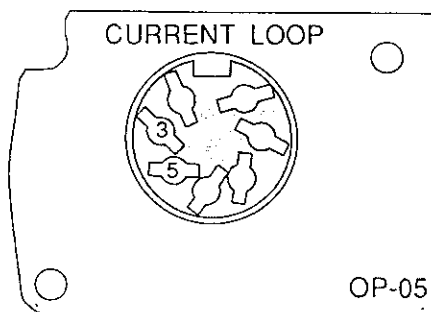
OP-03  
**CAL** Command (Calibration)



# Current Loop Interface (OP-05)

Option 05 is a 20mA current loop interface. As this option is similar to option 03, please refer to that section for characteristics and use.

This option is passive and requires an external current source to operate. It is a transmit only device and as such is best used with external displays or printers. Many such devices supply the current required by this interface.



## Installation

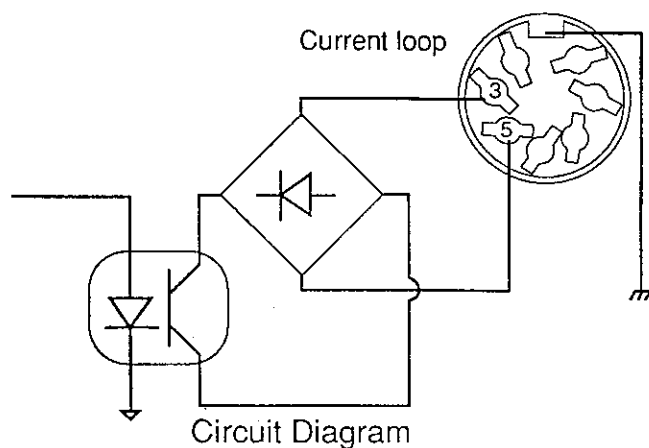
The installation of this option is the same as option 03, please refer to that section for the installation.

## Circuit Diagram and Connector Drawing

Pin	Discription
1	No connection
2	No connection
3	Current loop (positive or negative)
4	No connection
5	Current loop (positive or negative)
6	No connection
7	No connection
Shell	Frame ground



7 Pin DIN Connector



Specifications  
 Maximum voltage ----- 25V