CC-Link

F156 WEIGHING CONTROLLER

OPERATION MANUAL

「CC-Link Ver.1.10」

UNIPULSE

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REV. 1.40

INTRODUCTION

Thank you for purchasing our F156 weighing controller.

This machine based on our long-established weighing technology, is standard-loaded with Mitsubishi Electric's field network CC-Link interface, facilitates linking with a PLC (Programmable Logic Controller). Also, as a fail-safe measure, it is equipped with the function of automatically shutting off the load cell power supply when the load cell and lines are short-circuited or overloaded.

Please carefully read this operation manual before using the F156 in order to fully deliver excellent performance and proper and safe use.

Description in this manual

Basically, initial (default) values are underlined for selecting settings and for setting values.

Example) Digital filter

Setting	8: 256 times	5: 32 times	2: 4 times
	7: 128 times	<u>4: 16 times</u>	1: 2 times
	6: 64 times	3: 8 times	0: OFF

* In this case, "4: 16 times" is the initial value.

About the operational changes of the external input/output functions

In F156s with software versions earlier than 2.22, fixed functions would be assigned to external control inputs, but these have been made selective in the same way as external control outputs; external control input selection 0 to external control input selection 4 are added to setting codes from 70 to 74.

For the details of respective functions, see "8.EXTERNAL INPUT/OUTPUT (Amphenol Connector)" on p.117.

In the initial condition, the settings are as in the case of use of the simple comparison mode; therefore, if you use the sequence mode and request the conventional assignments, please make settings as follows:

For use of the sequence mode (Setting code 46 "Sequence Mode" is 1)

Setting code	Setting value	Pin No.	FUNCTION
70	8	10	No function
71	5	11	Feed/Discharge
72	2	12	Tare subtraction
73	6	13	Sequence start
74	7	14	Sequence stop

Safety Precautions

Be sure to read for safety.

In order to have an F156 Weighing Controller used safely, notes I would like you to surely follow divide into ⚠ WARNING and ⚠ CAUTION, and are indicated by the following documents. Notes indicated here are the serious contents related safely. Please use after understanding the contents well.

⚠ WARNING

Misuse may cause the risk of death or serious injury to persons.

⚠ CAUTION

Misuse may cause the risk of injury to persons or damage to property.

⚠ WARNING

● Use F156 with correct supply voltage.

● Carefully check wiring, etc. before applying power.

● Do not disassemble the main body for modifications or repair.

● Be sure to use crimp contacts for connection to terminal blocks, and do not to connect bare wires as they are.

● Be sure to ground the protective ground terminal.

● When smoke, a nasty smell, or strange sound, please shut off a power supply immediately and extract a power supply cable.

● Do not install in the following environments.

- Place s containing corrosive gas or flammable gas.
- Where the product may be splashed with water, oil or chemicals.

● About the built-in lithium battery

Never disassemble, deform under pressure or throw the battery into fire.The battery may explode, catch fire or leak.

- Battery

  Model : CR14250SE made by SANYO Electric Co., Ltd.

  Nominal voltage : 3V

  Nominal electric capacity : 850mAh

⚠ CAUTION

● Be sure to disconnect the power cable when performing the following.
- Attachment/detachment of load cell connector, external I/O connector, console or RS-232C connection connector.
- Wiring/connection of cables to terminal blocks.
- Connection of the ground line.

● For connection to the signal I/O terminal block, wire correctly after checking the signal names and terminal block numbers.
Also, turn off the power of the main body before connection/wiring to the signal I/O terminal block.

● Use shielded cable for connection with load cell unit and RS-232C.

● Take adequate shielding measures when using at the following locations.
- Near a power line.
- Where a strong electric field or magnetic field is formed.
- Where static electricity, relay noise or the like is generated.

● Do not install in the following environments.
- Places exposed to direct sunlight.
- Where the temperature and/or humidity exceeds the range in the specifications.
- Place s with large quantities of dust, salt or iron powder.
- Where the main body is directly affected by vibration or shock.

● Do not use it, broken down.

● When you send F156 by repair etc., please take sufficient measures against a shock.

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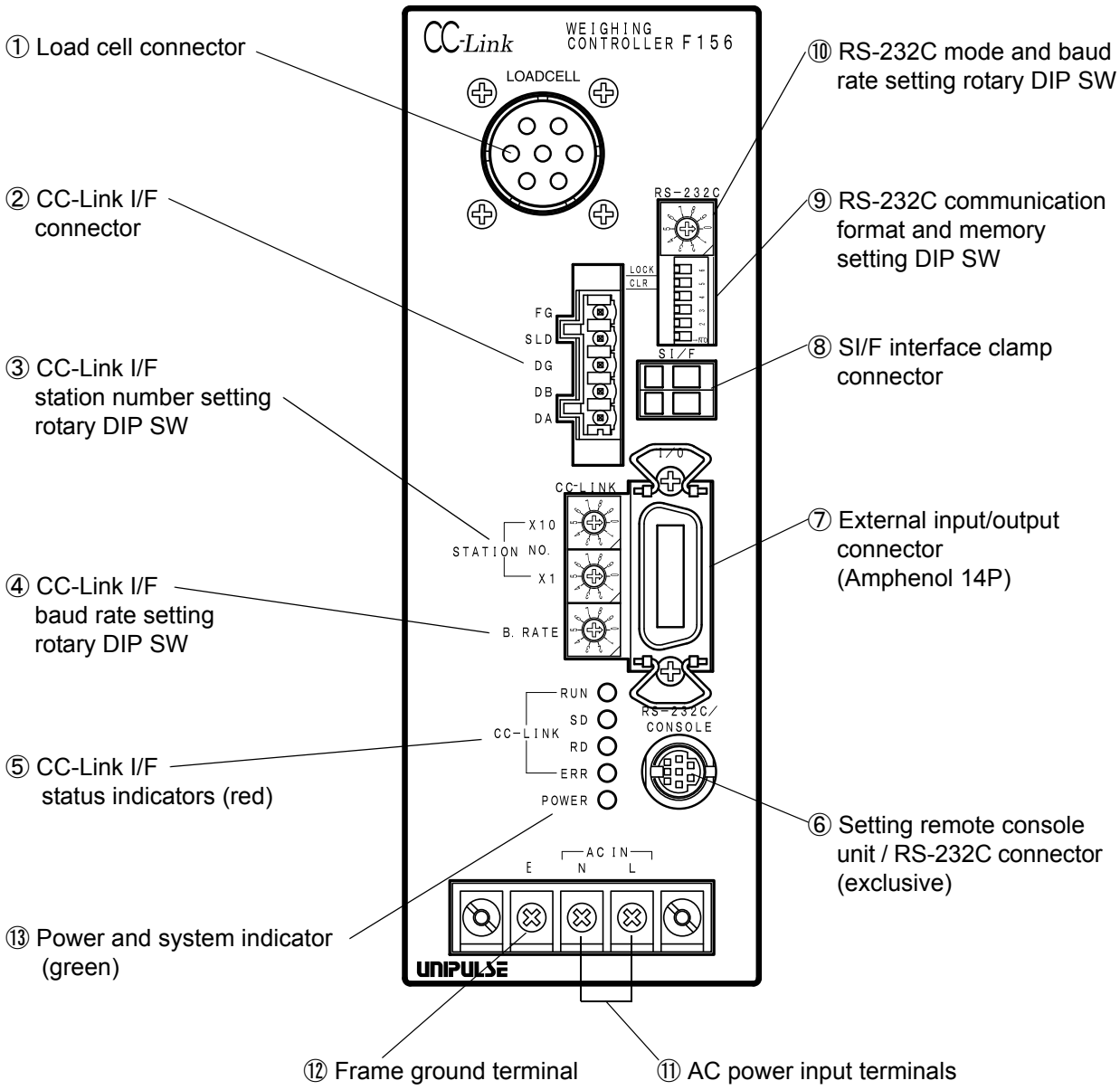
1. PART NAMES AND FUNCTIONS

◇ Front Panel



① Load cell connector

Connect a load cell by using the included connector (female).

② CC-Link I/F connector

Connect a CC-Link interface cable by using the included connector (female).

③ CC-Link I/F station number setting rotary DIP SW

Set a CC-Link I/F station number with two switches: first and second digits. The setting range is 1 – 63.

④ CC-Link I/F baud rate setting rotary DIP SW

The setting range is 0 – 4.

Setting	Baud rate (bps)
0	156k
1	625k
2	2.5M
3	5M
4	10M

⑤ CC-Link I/F status indicators (red LED)

Monitor the CC-Link I/F communications status.

LED name	LED ON	LED OFF	LED Blinking
RUN	・Normal	・Reset action ・No communication	———
SD	・Transmitting	———	———
RD	・Receiving	———	———
ERR	・Setting error ・CRC error ・Fault	・Normal	・Power-on-time switch setting changed

⑥ Setting remote console unit/RS-232C connector

(Usable exclusively)

For the RS-232C, use the attached connector.

⑦ External input/output connector (amphenol 14P)

Feed/Discharge control outputs, control inputs, etc., are assigned as itemized below.

Open collector output: 7 ports

Contact input (photocoupler primary): 5 ports

Common (insulated power supply ground): 2

⑧ SI/F interface (clamp connector)

This is a 2-wire serial interface to connect UNIPULSE-manufactured printer, external display, etc., which is a nonpolar type, and to which up to three external devices can be connected in parallel. For connection, parallel two-core cables, cabtyre cables, and the like can be used.

⑨ RS-232C communication format and memory setting DIP SW

Switch No. 1 - 4 are switches to set the RS-232C communication format, No. 5 is a switch to initialize set values from setting code 00 to 09,13and 19, No. 6 is a lock switch to prevent rewriting of calibration data, etc. For details of the RS-232C, see "10.RS-232C INTERFACE" on p.123.

List of functions

No.	Function	ON	OFF	Validation timing
6	Memory lock	Valid	Invalid	Always
5	Memory clear Note 1)	Clear	Not clear	Only at start-up
4	Parity bit	Odd	Even	
3	Parity bit	Available	Unavailable	
2	Stop bit	2bit	1bit	
1	Data length	7bit	8bit	

Note 1) Set values other than those stored in NOV.RAM are initialized.
(For details, see "11.THE LIST OF INITIAL SETTING CODE" on p.134.)

⑩ RS-232C mode and baud rate setting rotary DIP SW

Set the console mode at 0, and the baud rate in the RS-232C communication mode at 1 – 6 as follows:

Rotary switch (mode and baud rate)

No.	Mode and baud rate	
0 :	Console mode (C110 or C120)	
1 :	1200 bps	RS-232C communication mode
2 :	2400 bps	
3 :	4800 bps	
4 :	9600 bps	
5 :	19200 bps	
6 :	38400 bps	
7 to 9 :	Setting disabled	

⑪ AC power input terminals (red screws)

Input 100V 50/60Hz as the standard.

⑫ Frame ground terminal

Be sure to ground (low ground resistance where possible).

⑬ Power and system indicator (green LED)

LED ON during normal operation, functioning as a power lamp.

LED blinking during calibration, and when a fatal system error occurs.

List of functions

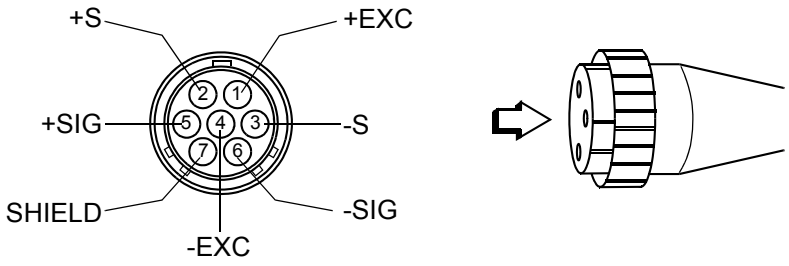
LED status	System status	Remark
LED ON	During normal operation	
LED Blinking with 50% duty	During calibration	Automatically restored to the lighting state when calibration is normally completed
LED Blinking with low duty at a short lighting time	Load cell power supply shutdown with voltage trouble between power feedback +S and –S	Remove obstacles, and then turn the power off and on again. *
LED Blinking with high duty at a long lighting time	Voltage drop of the back-up lithium battery	For replacement of the battery, contact us.

* Obstacles may be failure, mis-wiring, overload, etc., of the load cell.

2. CONNECTION

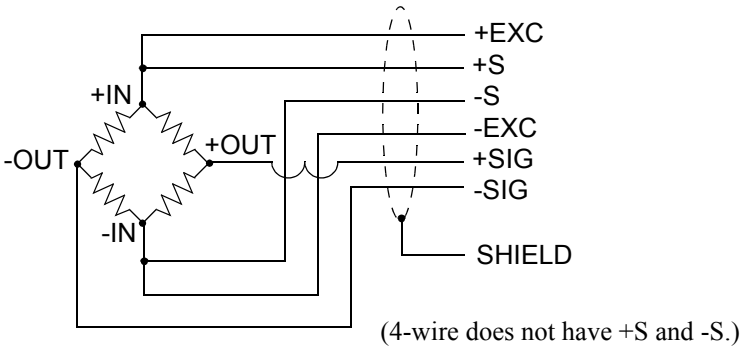
2-1. Load cell Connection

This connector is for connecting a load cell. The adaptable plug is a HIROSE-manufactured JR-16PK-7S (attached) or its equivalent.



Pin No.	Signal (6-wire)	Signal (4-wire)
1	＋ EXC	＋ EXC
2	＋ S	(connect 1 to 2)
3	－ S	－ EXC
4	－ EXC	(connect 3 to 4)
5	＋ SIG	＋ SIG
6	－ SIG	－ SIG
7	SHIELD	SHIELD

2-1-1. Load cell signals

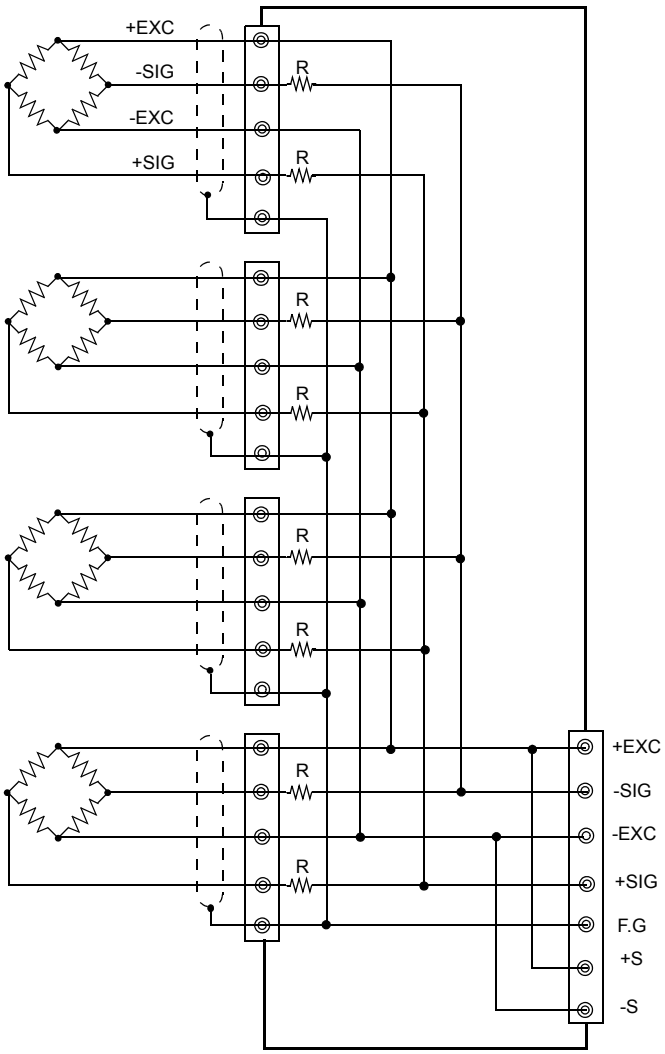


(4-wire does not have +S and -S.)

2-1-2. Connecting load cells in parallel

Some industrial applications require several load cells connected in parallel (e.g., tank or flow scales).

A summing junction box should be used to facilitate connection and corner correction.



'n' (number) load cells connected in parallel are considered one unit whose capacity is 'n' x rated capacity of load cells (load cells must have the same capacity, bridge resistance, and mV/V). The averaging resistor (R) must be in same relative ratios with a low temperature coefficient.

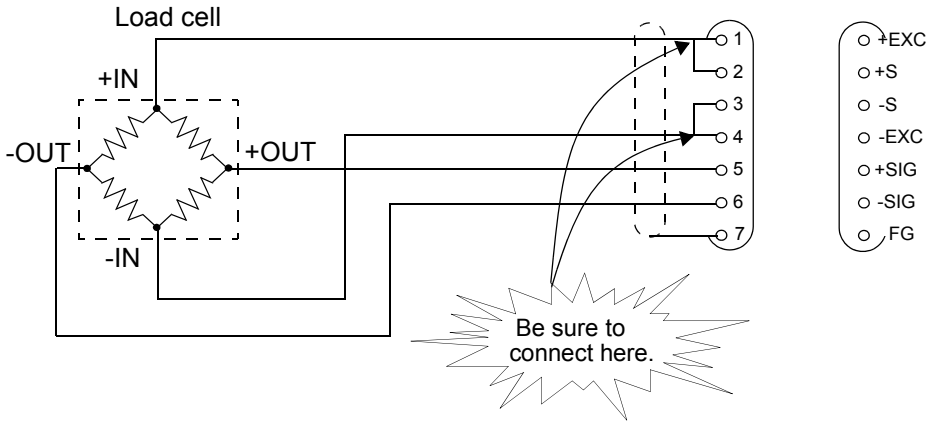
Averaging resistors are not needed if load cells were designed for parallel connection.

CAUTION

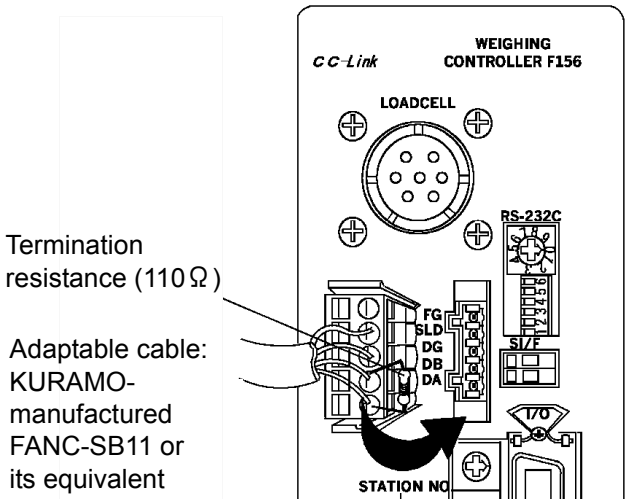
When connecting several load cells in parallel, load cell capacity should be higher than expected load to compensate for mechanical shock or eccentric loading.

CAUTION

- The load cell excitation voltage of the F156 is 10V. Unless its maximum excitation voltage is 10V or more, the load cell may generate heat or be damaged.
- For connecting a 4-wire load cell to the F156, be sure to connect +EXC and +S, and –EXC and –S. Even if +S and –S are not connected, normal operation will seem to be performed, but the load cell may generate heat or be damaged because excessive voltage is applied.



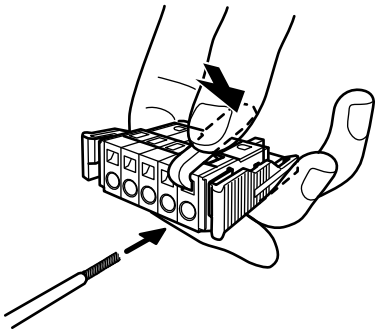
2-2. CC-Link Interface Connection



Adaptable plug : WAGO 721-105/037-000 (Attachment)

Name	Signal type	Remarks
DA	DA side signal line	110Ω termination resistance between them at a bus end
DB	DB side signal line	
DG	Signal line ground	
SLD	Shield	Cable shield
FG	Frame ground	

How to connect



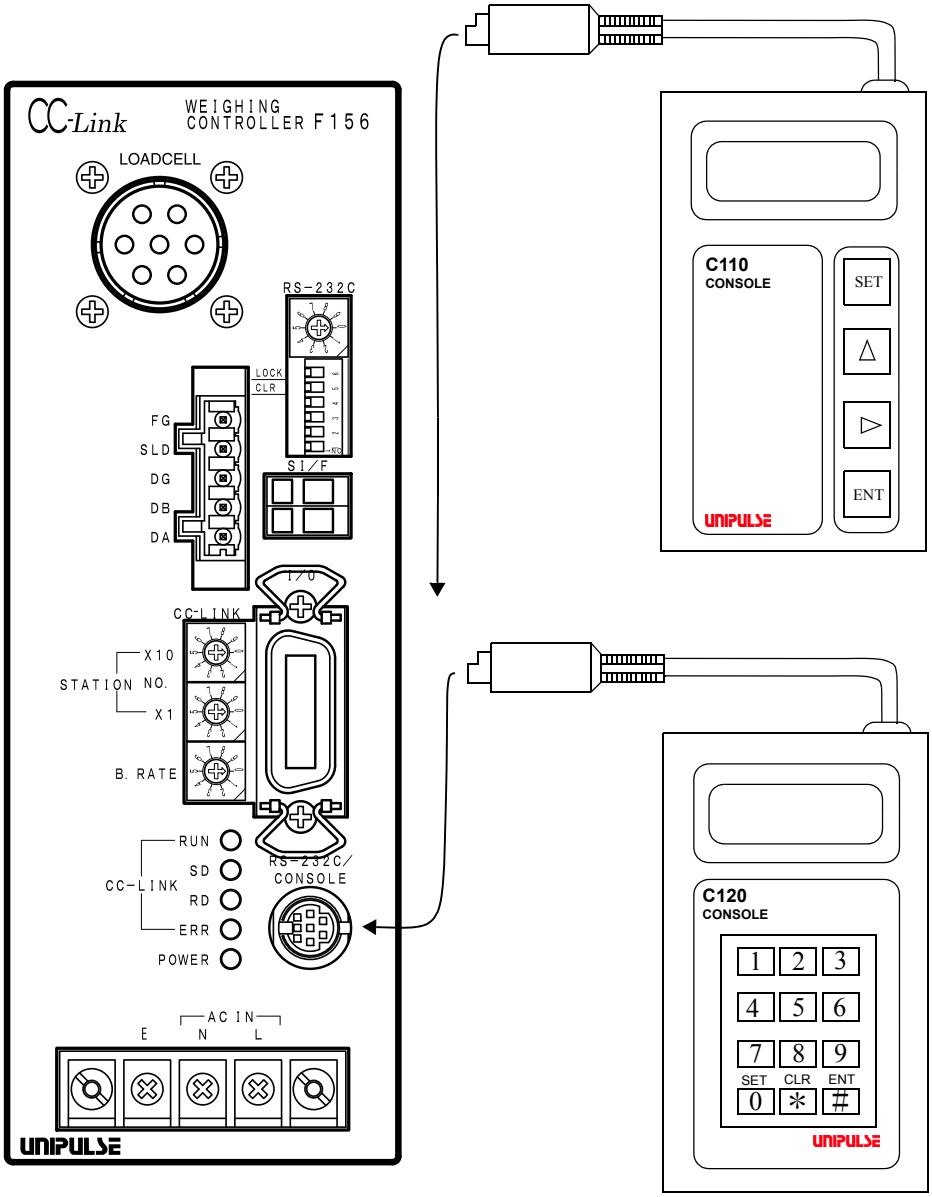
- Unsheathe the individual cable approximately 10mm, insert it in the upper round hole, and clamp it.
- At this time, operate the lever with your thumb, while pinching the plug by hand as shown in the illustration on the left-hand side.
- Never operate the lever as the plug is connected; otherwise, the board may be damaged.

CAUTION

When the DA and DB signal lines and resistance are to be connected to the connector, be aware that poor contact may result if the nipping conditions differ between the leg of the resistance and signal lines.

2-3. Console Connection

The setting remote console unit (C110/C120) can display all commands, parameter settings, weight values, and status.



2-4. External Input/Output (Amphenol Connector) Connection

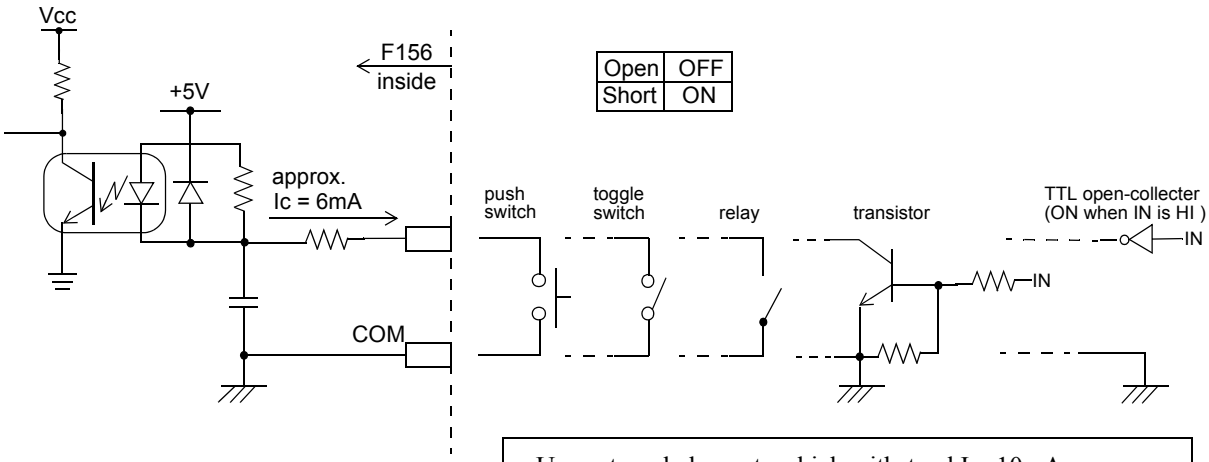
The adaptable connector (plug) is DDK-manufactured 57-30140 (included) or its equivalent.

Connect referring to the internal circuit diagram shown below.

For input

The signal input/output circuit inputs signals by short-circuiting and opening the input and COM terminals.

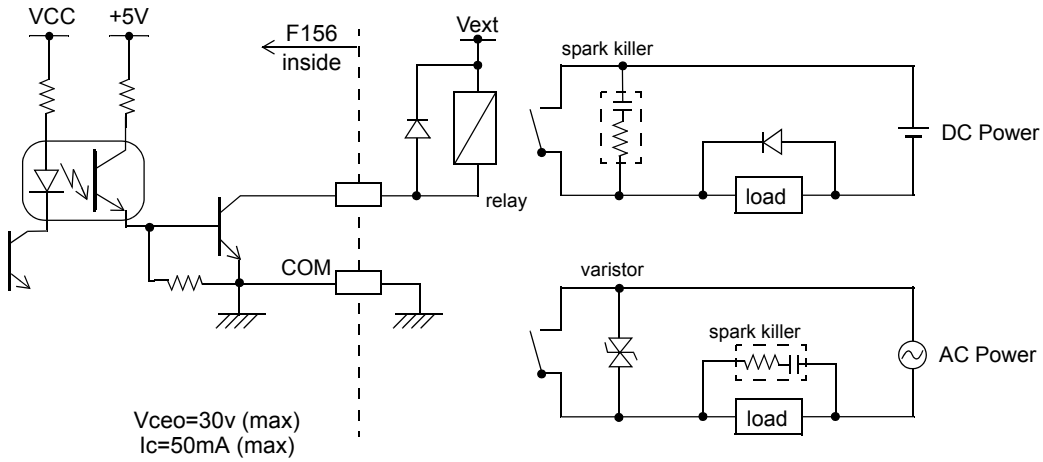
Short circuits are made by contact (relay, switch, etc.) or noncontact (transistor, TTL open collector output, etc.)



・Use external elements which withstand Ic=10mA.
・Leakage of external elements must be within 100 μ A.

For output

The signal output circuit outputs signals by means of a transistor open collector.



Output data	Tr
0	OFF
1	ON

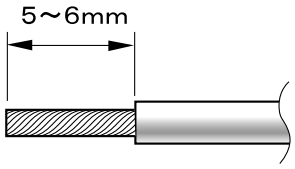
・Use external power source for driving relay (vext) .
・Do not short-circuit the load,such as a coil of relay ,that will break the output transistor.
・Connect a surge absorber or a spark killer to the relay circuit as shown in the draft so that to reduce noise trouble and extend the life of relay.

2-5. SI/F Interface Connection

2-5-1. Connection to a cage clamp type terminal block

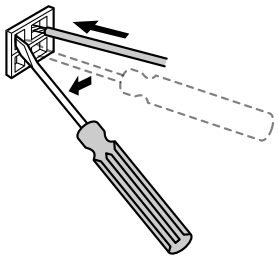
Connect to the cage clamp type terminal block by using the included mini-screwdriver.

1. Unsheathe the electric wire to be connected 5 – 6mm, and twist its end to such an extent that it will not become loose.

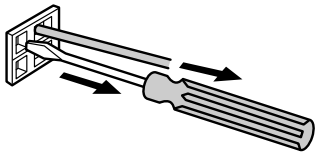


2. Firmly insert the screwdriver into the upper hole while slightly pushing it up.

3. Insert the electric wire into the right hole so as not to loosen its end.



4. Pull out the screwdriver.



5. Lightly pull the electric wire to make sure that it is securely clamped.

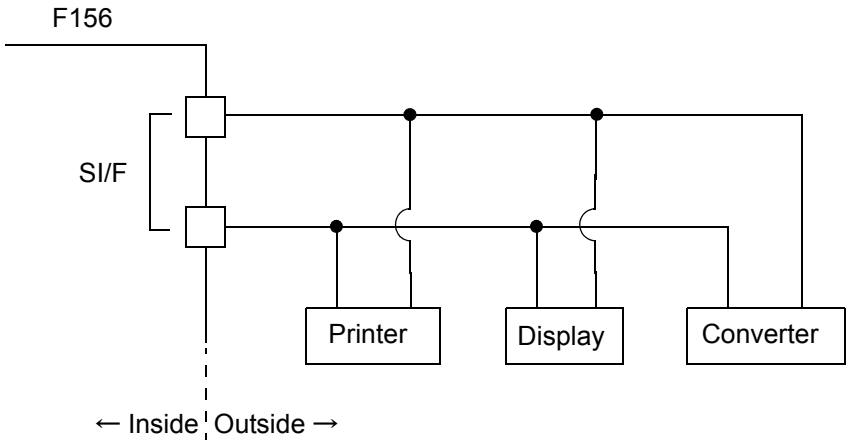
CAUTION

- The electric wire connectable to the cage clamp type terminal block is 0.2 to 2.5mm^2.
- Do not attach a crimp contact to the end of the electric wire, or solder it.
- To connect two or more electric wires, twist them together beforehand.

2-5-2. Connection of external devices

This is a 2-wire serial interface to connect a UNIPULSE-manufactured printer, external display, etc., which is a nonpolar type, and to which up to three external devices can be connected in parallel.

For connection, use parallel two-core cables, cabtyre cables, and the like.



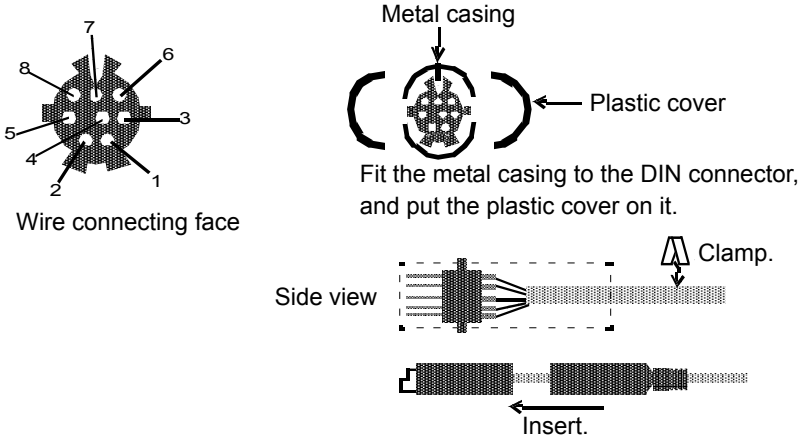
2-6. RS-232C Interface Connection

Exclusively connect to the same connector on the F156 or this unit as the console.
(See "2-3.Console Connection" on p.9)

Connector : HOSIDEN TCP8080-01-020 (Attachment)

Connector-Pin Assignment

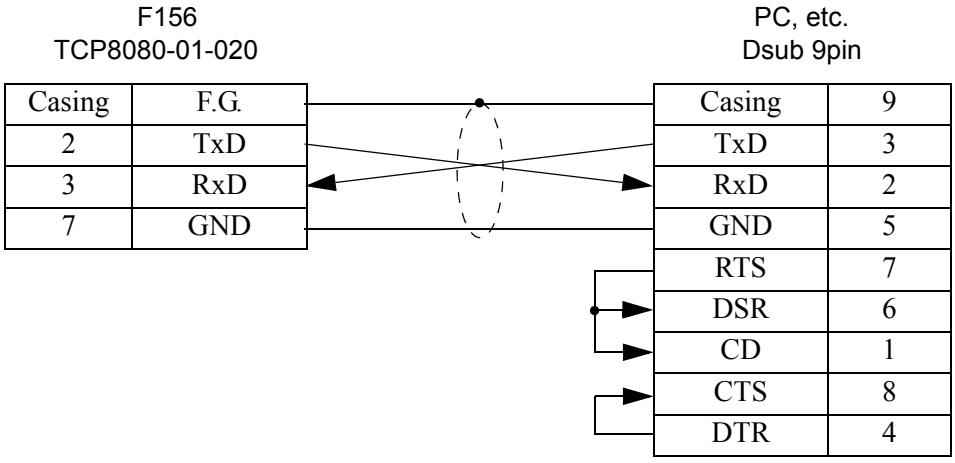
Pin No.	Signal
1	
2	TxD
3	RxD
4	
5	
6	＋ 5V (No protection circuit)
7	GND
8	
casing	F.G.



Example of cabling

A representative example of DTE-DTE connection is shown below. Changes should be made depending on the equipment to be connected.

For details, see the instruction manual of the equipment to be connected.



3. CC-LINK INTERFACE

3-1. Outline

With the F156, standard-loaded with the CC-Link interface (capable of the latest Ver.1.10), you can easily construct a high-speed weighing system on the CC-Link network.

The F156 is a remote device occupying two stations. In the case of construction with the F156 alone, up to 32 units, including one master, can be connected to the bus.

All commands and parameters executable with the console can be set on the CC-Link. Therefore, jobs can quickly be changed in a large-scale weighing system using a large number of load cells.

3-2. Communication Setting Rotary Switch

Decide the station number and baud rate.

Be careful not to make invalid settings.

These settings are read when the power is turned on.

	Setting range
Station No.	1 to 63
Baud rate	0 to 4

・Baud rate　　0：156k,　1：625k,　2：2.5M,　3：5M,　4：10M

CAUTION

About setting of Mitsubishi general-purpose PLC CPU unit

If using Mitsubishi general-purpose PLC MELSEC-Q series, please set the mode configuration and station type as following in the configuration of master station network parameters.

- Mode configuration:　Remote net Ver.1 mode
- Station type:　Remote device stations

(“Station information” → “Station type”)

3-3. Communication Status Indicators

The communication status is indicated by LED.

LED name	LED ON	LED OFF	LED Blinking
RUN	・Normal	・Reset action ・No communication	―
SD	・Transmitting	―	―
RD	・Receiving	―	―
ERR	・Setting error ・CRC error ・Fault	・Normal	・Power-on-time switch setting changed

3-4. Outline of the Buffer Memory for Communication

The Mitsubishi PLC CC-Link master/local unit communicates with the F156 by using the buffer memory in the unit. Hereafter,
the master unit (master station) is called “M” and
the F156 (remote device station) is called “R” in the explanation.

Since one F156 occupies two stations, station numbers are set as shown below when two or more F156s are connected. The upper column and lower column show the buffer name and buffer address (head), respectively. As just described, the addresses allocated to the remote stations in the master station change according to the station number.

Station No.	Remote input 32 points/ station	Remote output 32 points/ station	Remote register	
			M → R 4 word/station	R → M 4 word/station
1	RX000h	RY000h	RWw0000	RWr0000
	00E0h	0160h	01E0h	02E0h
	RX020h	RY020h	RWw0004	RWr0004
	00E2h	0162h	01E4h	02E4h
3	RX040h	RY040h	RWw0008	RWr0008
	00E4h	0164h	01E8h	02E8h
	RX060h	RY060h	RWw0012	RWr0012
	00E6h	0166h	01ECh	02ECh
5	RX080h	RY080h	RWw0016	RWr0016
	00E8h	0168h	01F0h	02F0h

1st F156

2nd F156

Specified F156s are accessed by using these buffer addresses.

In the application program of the PLC, the buffer memory is accessed by the FROM/TO instruction at A series.

The following explanations are given on the F156 of station No. 1.

3-5. Buffer Memory Assignments

Data area

Remote register M → R (Mitsubishi PLC → F156)

Station	Buffer address	Device M → R	Description	
			MSB	LSB
1	01E0H	RWw0000	Unused	32bit
	01E1H	RWw0001		
	01E2H	RWw0002	Unused	32bit
	01E3H	RWw0003		
2	01E4H	RWw0004	Writing data area	L 32bit
	01E5H	RWw0005		H
	01E6H	RWw0006	0	Code No. 8bit
	01E7H	RWw0007	Unused	16bit

Explanation of remote resistor M → R

◎ Writing data area (32 bit binary) (0 to 99999)

Use to write set values.

◎ Code No. (8 bit binary) (00 to 99)

Set a code No. Be aware that the response flag does not turn on to an invalid command. The high byte is ignored.

Remote resistor R → M (F156 → Mitsubishi PLC)

Station	Buffer address	Device M → R	Description MSB	LSB
1	02E0H 02E1H	RWr0000 RWr0001	Indicated value (net/gross)	L 32bit H
	02E2H	RWr0002	0	Error code 8bit
	02E3H	RWr0003	0	Error assistance code 8bit
2	02E4H 02E5H	RWr0004 RWr0005	Reading out data area	L 32bit H
	02E6H	RWr0006	0	Code No. (response) 8bit
	02E7H	RWr0007	Unused	16bit

Explanation of remote resistor R → M

◎ Weight value (32 bit binary) (-99999 to 99999)

Indicates the weight value. If the data is minus, two's-complement numbers will result.

◎ Error code (4bit BCD) (0 to 9)

Indicates the error code of the indicator.

For details, see "12.ERROR CODES" on p.144.

◎ Error assistance code (4bit BCD) (0 to 9)

Indicates the error code of the indicator. "0" represents no error. Error code "1" and error assistance code "9" represent "calibration error 9."

For details, see "12.ERROR CODES" on p.144.

◎ Reading out data area (32 bit binary) (0 to 99999)

Area to read set values.

◎ Code No. response (8 bit binary) (00 to 255)

Set a code No. for request ON.

Code List

Set value writing and operation instructions (R/W relay OFF)

Item	Code No. (RWw0006)	Setting Range (RWw0004~0005)
Final	00	0 to 99999
Set Point 1	01	0 to 99999
Set Point 2	02	0 to 99999
Compensation	03	0 to 9999
Over	04	0 to 999
Under	05	0 to 999
Upper Limit	06	0 to 99999
Lower Limit	07	0 to 99999
Near Zero	08	0 to 99999
Preset Tare Value	09	0 to 99999
Comparison Inhibit Time	10	0 to 999
Judging Time	11	0 to 999
Complete Output Time	12	0 to 999
Adjust Feeding Time (Sequence Mode)	13	0 to 999
Auto Zero Times (Sequence Mode)	14	0 to 99
Judging Times (Sequence Mode)	15	0 to 99
Auto Free Fall Compensation Coefficient	17	0 to 3
Average Count of Auto Free Fall Compensation	18	1 to 9
Auto Free Fall Compensation Regulation	19	0 to 99999
Over/Under Comparison	20	0 to 2
U/L Limit Comparison	21	0 to 2
Near Zero Comparison	22	0 to 2
Feed/Discharge Control Mode	23	0 to 3
Preset Tare Weight	24	0 to 1
Auto Free Fall Compensation	25	0 to 2
Complete Output Mode	26	0 to 2
Over/Under Comparison mode	27	0 to 3
U/L Limit Comparison mode	28	0 to 1
Digital Filter	30	0 to 8
Motion Detection (period)	31	0 to 99
Motion Detection (range)	32	0 to 99
Zero Tracking (period)	33	0 to 99
Zero Tracking (range)	34	0 to 99
Analog Filter	35	0 to 3
Console Display Rate (LCD)	38	0 to 3
SI/F G/N Selection	39	0 to 1

Set value writing and operation instructions (R/W relay OFF) continued

Item	Code No. (RWw0006)	Setting Range (RWw0004~0005)
Balance Weight	40	0 to 99999
Capacity	41	0 to 99999
Minimum Scale Division	42	1 to 100
Net Over	43	0 to 99999
Gross Over	44	0 to 99999
Digital Zero Regulation Value	45	0 to 9999
Decimal Place	46	0 to 3
Gravitational Acceleration	47	1 to 16
Lock (Soft)	49	0 to 1
Simple Comparison / Sequence Mode Selection	50	0 to 1
Adjust Feeding in Sequence Mode	51	0 to 1
Near Zero Check in Sequence Mode	52	0 to 1
Weight Value Check in Sequence Mode	53	0 to 1
External Control Output Selection 0	60	0 to 16
External Control Output Selection 1	61	0 to 16
External Control Output Selection 2	62	0 to 16
External Control Output Selection 3	63	0 to 16
External Control Output Selection 4	64	0 to 16
External Control Output Selection 5	65	0 to 16
External Control Output Selection 6	66	0 to 16
External Control Input Selection 0	70	0 to 8
External Control Input Selection 1	71	0 to 8
External Control Input Selection 2	72	0 to 8
External Control Input Selection 3	73	0 to 8
External Control Input Selection 4	74	0 to 8
Tare Subtraction	80	(command)
Tare Reset	81	(command)
Digital Zero	82	(command)
Digital Zero Reset	83	(command)
Sequence Start	84	(command)
Sequence Stop	85	(command)
Sequence Error Reset	86	(command)
Zero Calibration	90	(command)
Span Calibration	91	(command)

Reading out of set value (R/W relay ON)

Item	Code No. (RWw0006)
Final	00
Set Point 1	01
Set Point 2	02
Compensation	03
Over	04
Under	05
Upper Limit	06
Lower Limit	07
Near Zero	08
Preset Tare Value	09
Comparison Inhibit Time	10
Judging Time	11
Complete Output Time	12
Adjust Feeding Time (Sequence Mode)	13
Auto Zero Times (Sequence Mode)	14
Judging Times (Sequence Mode)	15
Auto Free Fall Compensation Coefficient	17
Average Count of Auto Free Fall Compensation	18
Auto Free Fall Compensation Regulation	19
Over/Under Comparison	20
U/L Limit Comparison	21
Near Zero Comparison	22
Feed/Discharge Control Mode	23
Preset Tare Weight	24
Auto Free Fall Compensation	25
Complete Output Mode	26
Over/Under Comparison mode	27
U/L Limit Comparison mode	28
Digital Filter	30
Motion Detection (period)	31
Motion Detection (range)	32
Zero Tracking (period)	33
Zero Tracking (range)	34
Analog Filter	35
Console Display Rate (LCD)	38
SI/F G/N Selection	39

Reading out of set value (R/W relay ON)

Item	Code No. (RWw0006)
Balance Weight	40
Capacity	41
Minimum Scale Division	42
Net Over	43
Gross Over	44
Digital Zero Regulation Value	45
Decimal Place	46
Gravitational Acceleration	47
Lock (Soft)	49
Simple Comparison / Sequence Mode Selection	50
Adjust Feeding in Sequence Mode	51
Near Zero Check in Sequence mode	52
Weight Value Check in Sequence Mode	53
External Control Output Selection 0	60
External Control Output Selection 1	61
External Control Output Selection 2	62
External Control Output Selection 3	63
External Control Output Selection 4	64
External Control Output Selection 5	65
External Control Output Selection 6	66
External Control Input Selection 0	70
External Control Input Selection 1	71
External Control Input Selection 2	72
External Control Input Selection 3	73
External Control Input Selection 4	74

Remote output (Mitsubishi PLC → F156)

Station	Buffer Address	Remote Output	Description	Class
1	0160H	RY0000		Use for communication handshake with the host
		RY0001		
		RY0002	Request	
		RY0003	R / W	
		RY0004		
		RY0005		
		RY0006		
		RY0007		
		RY0008		
		RY0009		
		RY000A		
		RY000B		
		RY000C		
		RY000D		
		RY000E		
		RY000F		
	0161H	RY0010	Digital Zero	
		RY0011	Digital Zero Reset	
		RY0012	Tare Subtraction	
		RY0013	Tare Reset	
		RY0014	Hold	
		RY0015		
		RY0016		
		RY0017		
		RY0018	Sequence Start	
		RY0019	Sequence Stop	
		RY001A	Sequence Error Reset	
		RY001B	Zero Calibration	
		RY001C	Span Calibration	
		RY001D		
		RY001E		
		RY001F		

Remote output (Mitsubishi PLC → F156) continued

Station	Buffer Address	Remote Output	Description	Class
2	0162H	RY0020	Indicated Value Net/Gross Selection	
		RY0021	Feed/Discharge Selection	
		RY0022	Auto Free Fall Compensation Selection	
		RY0023	CPS Write Inhibition Selection	
		RY0024		
		RY0025		
		RY0026		
		RY0027		
		RY0028		
		RY0029		
		RY002A		
		RY002B		
		RY002C		
		RY002D		
		RY002E		
		RY002F		
	0163H	:	:	:

About RY (Mitsubishi PLC → F156) signals

Signal	Meaning
Request	Reads or writes set values or performs operational commands at ON edge.
R / W	Turns ON to read set values, and OFF to write set values or perform operational commands.
Tare Subtraction	Does tare subtraction at the edge input.
Tare Reset	Cancels tare subtraction at the edge input.
Digital Zero	Zeros the gross weight at the edge input.
Digital Zero Reset	Cancels digital zero at the edge input.
Hold	Holds the weight value at ON, and cancels holding at OFF. Note 1)
Sequence Start	Starts measurement in sequence mode at ON edge.
Sequence Stop	Stops the sequence at ON, and cancels the sequence stop at OFF. Note 2)
Sequence Error Reset	Resets the sequence error at the edge input.
Zero Calibration	Starts zero calibration at ON edge. Note 5)
Span Calibration	Starts span calibration at ON edge. Note 5)
Indicated Value Net/Gross Selection	Indicates the gross weight at ON, and the net weight at OFF.
Feed/Discharge Selection	Can switch feed and discharge by setting this bit: discharge control at ON, and feed control at OFF. Note 3)
Auto Free Fall Compensation Selection	Validates the auto free fall compensation function at ON, and invalidates it at OFF. Note 4)
CPS Write Inhibition Selection	Inhibits writing of the CPS set value from the CC-Link at ON, and cancels it at OFF.

Note 1) Valid only in simple comparison mode.
Operation will result on OR condition with the hold function by external control input.

Note 2) Operation will result on OR condition with the sequence stop function by external control input.

Note 3) Valid only in setting code 23; feed/discharge control mode is set at 3 (external selection (CC-Link)).

Note 4) Valid only in setting code 25; auto free fall compensation is set at 2 (external selection).

Note 5) Valid only when setting code 49 “Lock (Soft)” is 0 (invalid) and DIP switch lock ("4-3-1.Calibration lock release" on p.38) is OFF.
Be careful not to execute by mistake after calibration.

Relay domain Remote input (F156 → Mitsubishi PLC)

Station	Buffer Address	Remote Input	Description	Class
1	00E0H	RX0000		Use for communication handshake with the host
		RX0001		
		RX0002	Response	
		RX0003	R/W (Response)	
		RX0004		
		RX0005		
		RX0006	CPU Normal Operation	
		RX0007		
		RX0008	Decimal Place 0	
		RX0009	Decimal Place 1	
		RX000A		
		RX000B		
		RX000C		
		RX000D		
		RX000E		
		RX000F		
	00E1H	RX0010	Near Zero	
		RX0011	Set Point1	
		RX0012	Set Point2	
		RX0013	Set Point3	
		RX0014	Over	
		RX0015	Go	
		RX0016	Under	
		RX0017	Stable	
		RX0018	Complete	
		RX0019	Over Scale	
		RX001A	Hold	
		RX001B	Upper Limit	
		RX001C	Lower Limit	
		RX001D		
		RX001E	Sequence Error	
		RX001F	Weight Error	

Relay domain Remote input (F156 → Mitsubishi PLC) continued

Station	Buffer Address	Remote Input	Description	Class
2	00E2H	RX0020	Net/Gross	
		RX0021	Feed/Discharge	
		RX0022		
		RX0023		
		RX0024		
		RX0025		
		RX0026		
		RX0027		
		RX0028	Calibration	
		RX0029		
		RX002A		
		RX002B		
		RX002C	Sequence	
		RX002D		
		RX002E		
		RX002F		
	00E3H	RX0030	:	:
		:	:	:
		RX003A	Error Status Flag	
		RX003B	Remote Ready	
		:	:	
		RX003F		

About RX (F156 → Mitsubishi PLC) signal

Signal	Meaning
Response	It will be “1” when the command request is normally processed, and “0” results when the request is turned off.
R/W Response	Returns the R/W bit status at request-on.
CPU Normal Operation	Repeats ON and OFF in an approximately one-second cycles.
Decimal Place 0,1	Indicates the decimal place.
Near Zero	Turns ON when the weight value ≦ near zero set value.
Set Point 1	Turns ON when the weight value ≧ final – set point 1 set value.
Set Point 2	Turns ON when the weight value ≧ final – set point 2 set value.
Set Point 3	Turns ON when the weight value ≧ final – compensation set value.
Over	Turns ON when the weight value > final + over set value.
Go	Turns ON when the weight value is neither over nor under.
Under	Turns ON when the weight value < final – under set value.
Stable	Turns ON when the weight value is stable. (See the section “Motion detection.”)
Complete	Turns ON when weighing is completed.
Over Scale	Turns ON when the gross weight > (capacity + 9 scale divisions) (OFL2).
Hold	Turns ON when the weight value is held.
Upper Limit	Turns ON when the weight value > upper limit set value.
Lower Limit	Turns ON when the weight value < lower limit set value.
Sequence Error	Turns ON when a sequence error occurs.
Weight Error	Turns ON when a weight error occurs. (LOAD, -LOAD, OFL1, OFL2, OFL3, ZALM)
Net/Gross	It will be “0” when the display is net, and it will be “1” when the display is gross.
Feed/Discharge	Turns OFF in feed control, and turns ON in discharge control.
Calibration	Turns ON during calibration.
Sequence	Turns ON during sequence operation.
Error Status Flag	Turns ON when a calibration error occurs.
Remote Ready	Turns ON when initialization is completed with the error status flag OFF.

Notice

Please confirm turning on Remote ready after turning on the power supply.
Don't turn on Request (RY0002) while the Remote Ready is OFF. There is a possibility for it to become impossible to operate normally if writhing to Remote output or to Remote register M → R before it is turned ON.
Moreover, please conduct initialize process on PLC for access to F156 if they ware turned OFF due to the power failure etc.

3-6. Setting Procedures

(The upper and lower levels of each signal correspond to ON and OFF, respectively.)

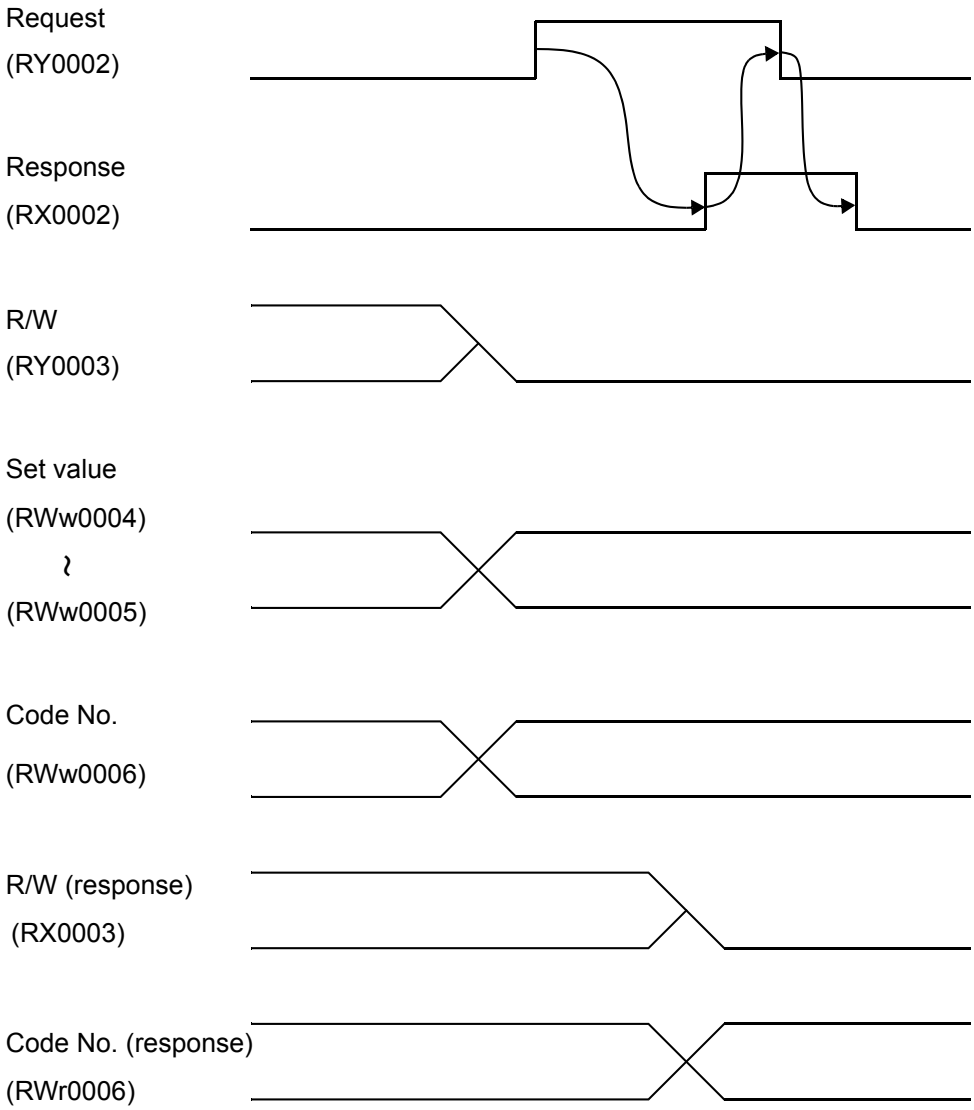
○ Set value writing or operation instruction timing

When the response is OFF, operation is performed at the leading edge of the request.

To write set values and to do operation instructions, turn the R/W OFF.

For operation instructions, writing data values are ignored.

* When power supply is turned on, please set Request to ON after confirming Remote ready is turned ON.

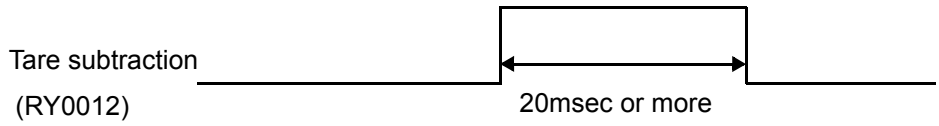


○ Operation instruction timing (using special operation instruction bits)

Operation instructions can also be given by using the bits from RY0010 to RY0014.
The R/W may be either ON or OFF.

When tare subtraction is taken as an example, the operation is performed at the tare subtraction edge input.

Pulse width should be ON more than 20ms.

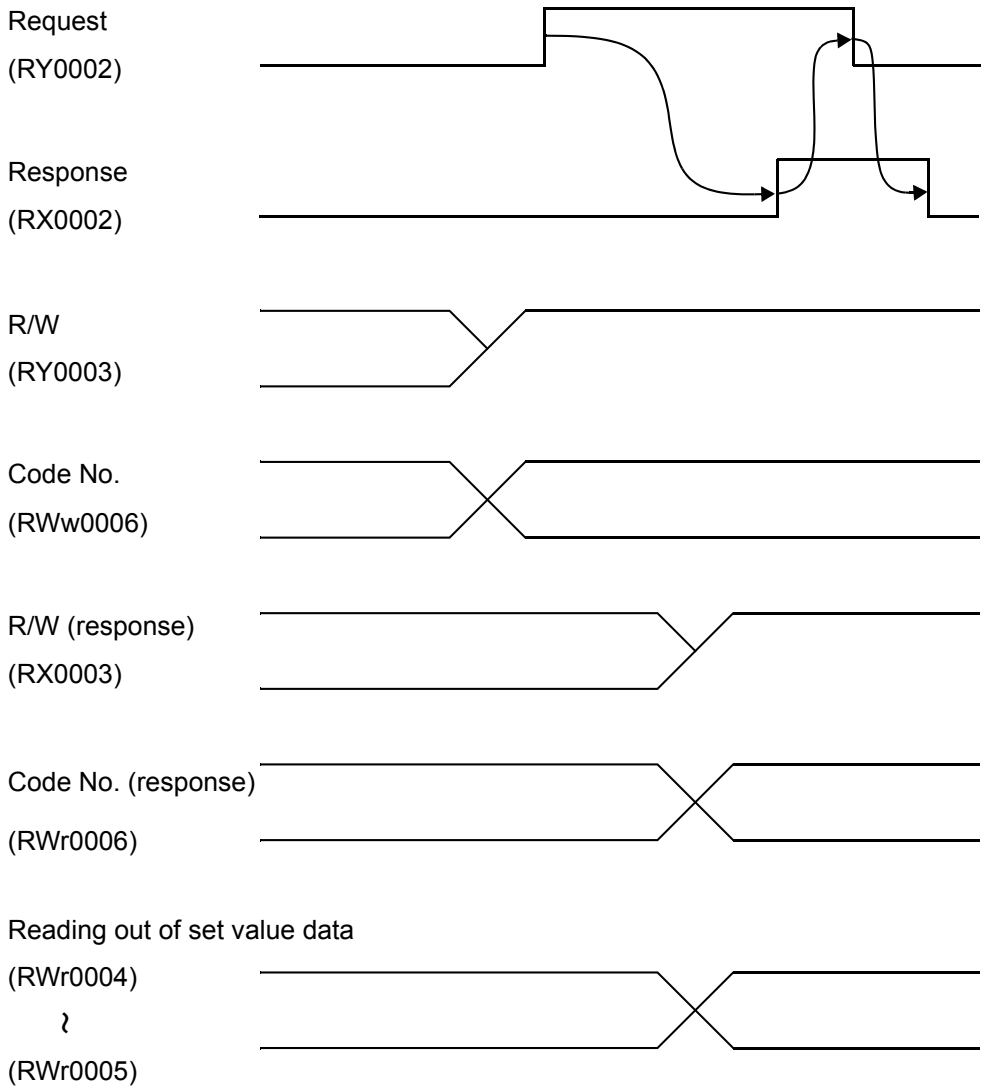


○ Reading out of set value timing

To read set values, turn the R/W ON.

Read the reading data area after making sure that the response has turned ON.

* When power supply is turned on, please set Request to ON after confirming Remote ready is turned ON.



3-7. Sample Ladder

"Sample of incrementing the final value from 0 to 99999"

CPU A1SH

Station No. 1

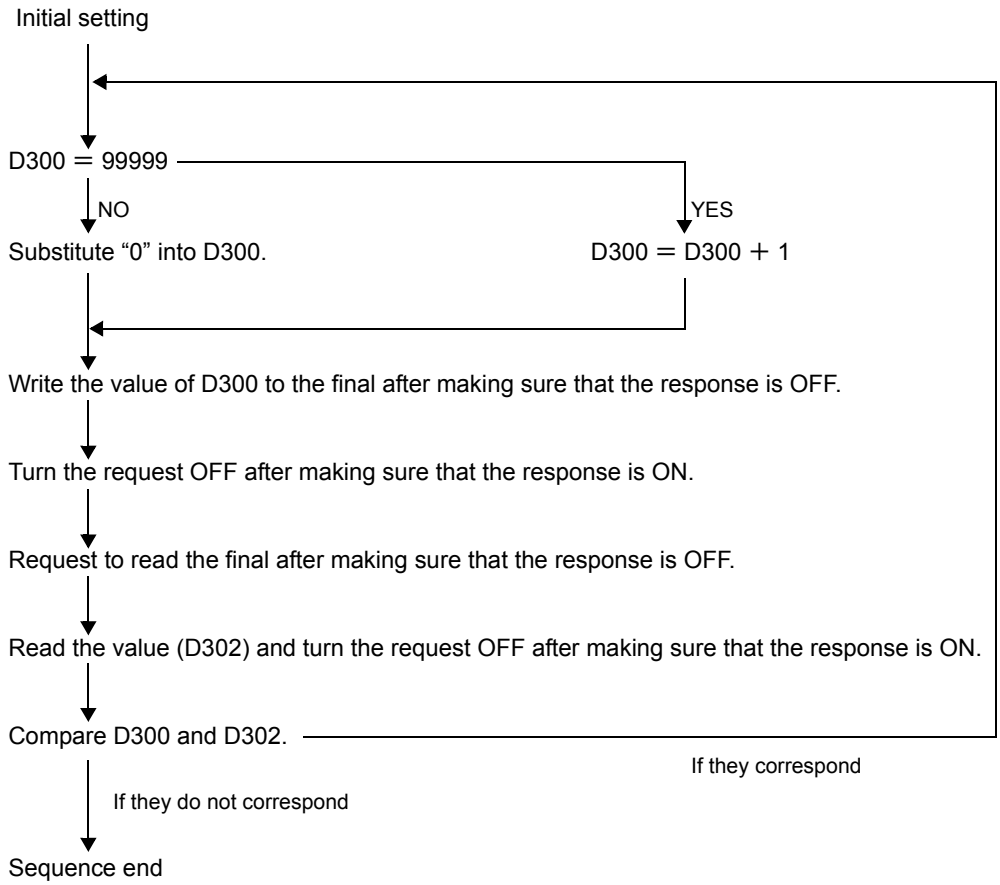
Master slot 2

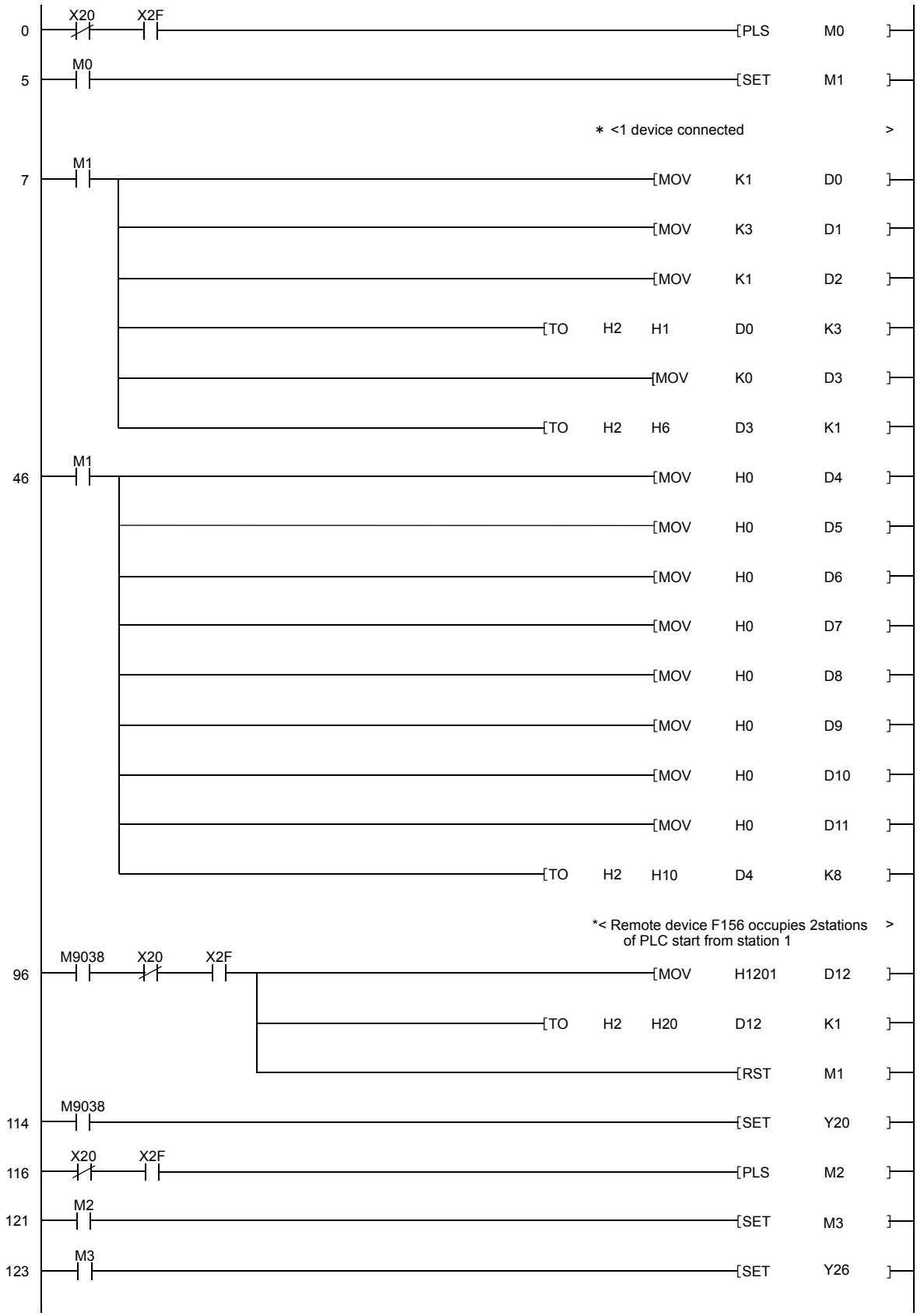
"CC-Link System Master/Local Unit User's Manual (Detailed Information)"

Model: AJ/A1SJ61BT11-U

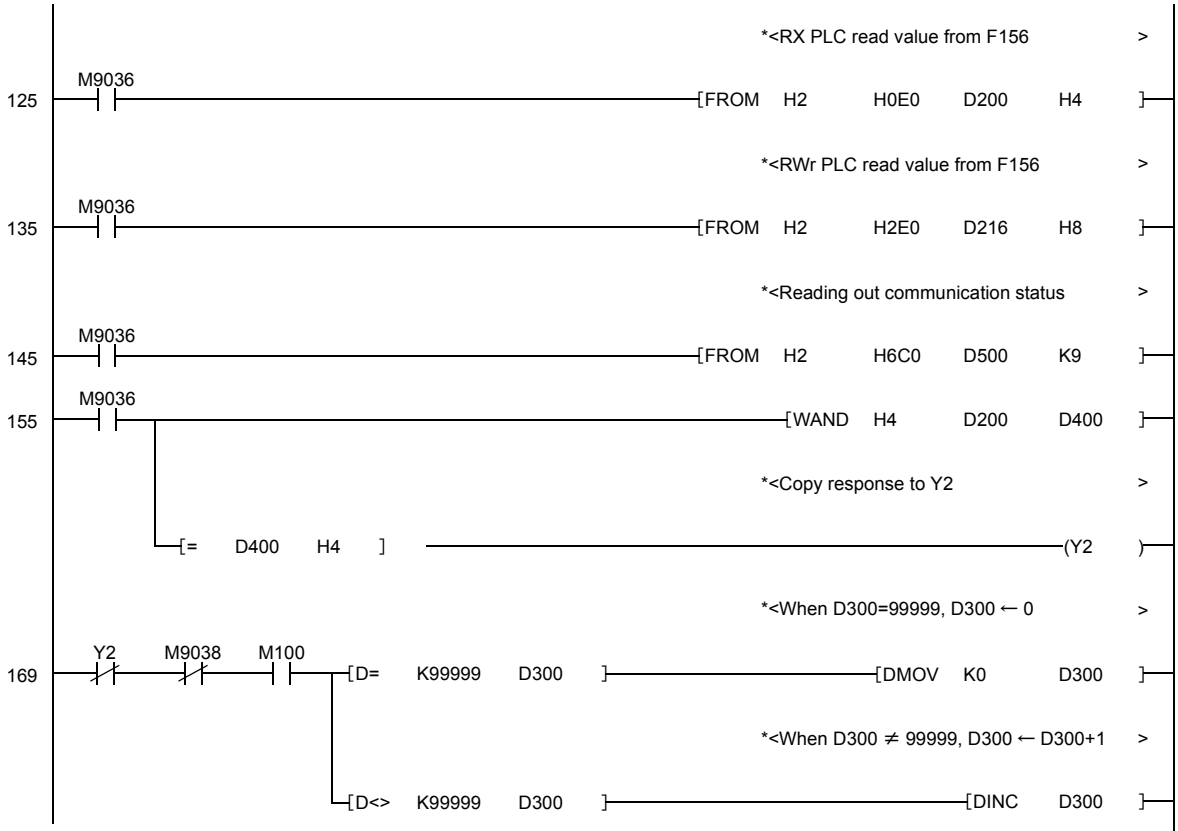
In this sample, the final value is written and read by using the request flag, and two values are compared, and if they correspond, the value is incremented, which is repeated up to "99999." "0" follows after "99999."

Flow

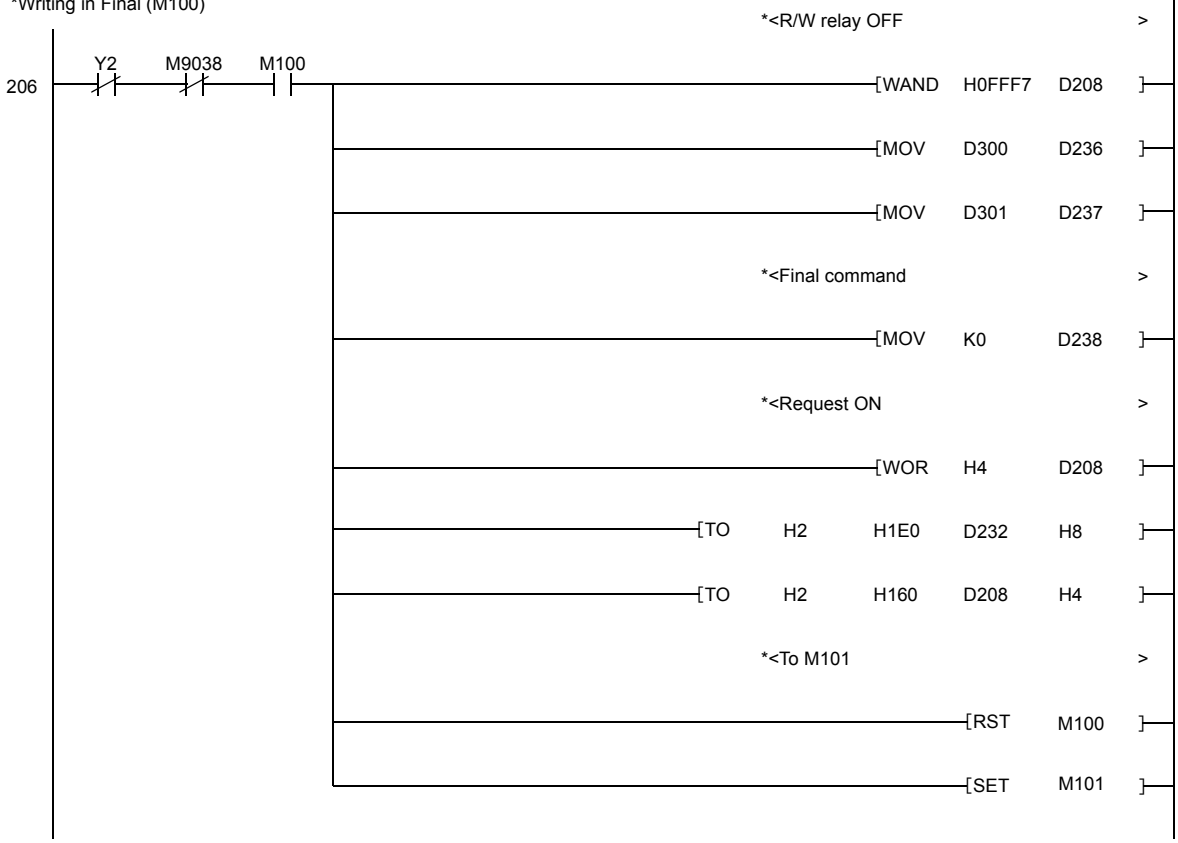


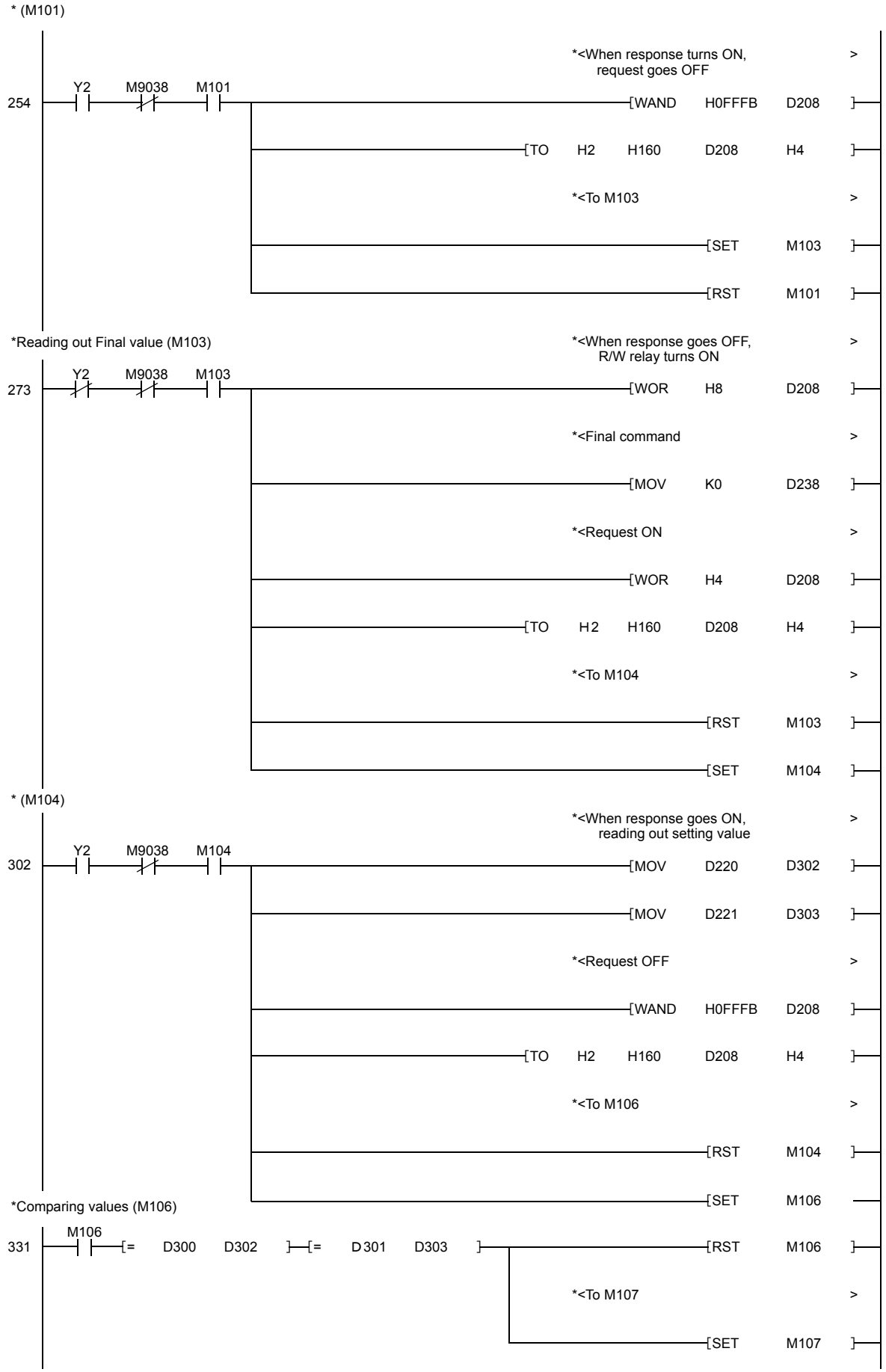

0
X20
X2F
[PLS M0]
5
M0
[SET M1]
* <1 device connected >
7
M1
[MOV K1 D0]
[MOV K3 D1]
[MOV K1 D2]
[TO H2 H1 D0 K3]
[MOV K0 D3]
[TO H2 H6 D3 K1]
46
M1
[MOV H0 D4]
[MOV H0 D5]
[MOV H0 D6]
[MOV H0 D7]
[MOV H0 D8]
[MOV H0 D9]
[MOV H0 D10]
[MOV H0 D11]
[TO H2 H10 D4 K8]
*< Remote device F156 occupies 2stations
of PLC start from station 1 >
96
M9038
X20
X2F
[MOV H1201 D12]
[TO H2 H20 D12 K1]
[RST M1]
114
M9038
[SET Y20]
116
X20
X2F
[PLS M2]
121
M2
[SET M3]
123
M3
[SET Y26]

*Up to here initial setting for communication

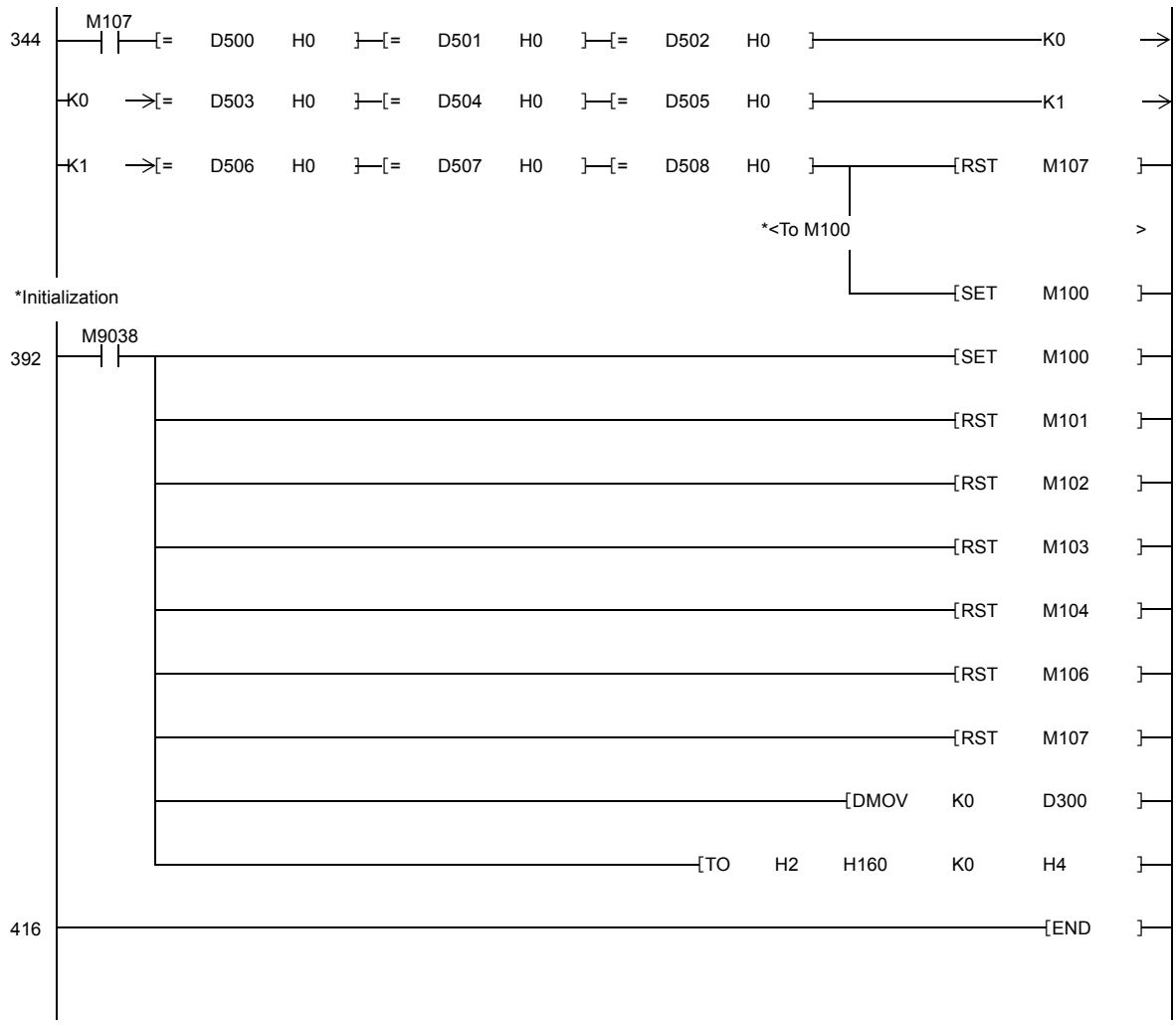


*Writing in Final (M100)




* (M101)
*<When response turns ON, request goes OFF >
254 Y2 M9038 M101 [WAND H0FFFB D208]
[TO H2 H160 D208 H4]
*<To M103 >
[SET M103]
[RST M101]
*Reading out Final value (M103)
*<When response goes OFF, R/W relay turns ON >
273 Y2 M9038 M103 [WOR H8 D208]
*<Final command >
[MOV K0 D238]
*<Request ON >
[WOR H4 D208]
[TO H2 H160 D208 H4]
*<To M104 >
[RST M103]
[SET M104]
* (M104)
*<When response goes ON, reading out setting value >
302 Y2 M9038 M104 [MOV D220 D302]
[MOV D221 D303]
*<Request OFF >
[WAND H0FFFB D208]
[TO H2 H160 D208 H4]
*<To M106 >
[RST M104]
[SET M106
*Comparing values (M106)
331 M106 [= D300 D302] [= D301 D303] [RST M106]
*<To M107 >
[SET M107]

*Check of communication status (M107)



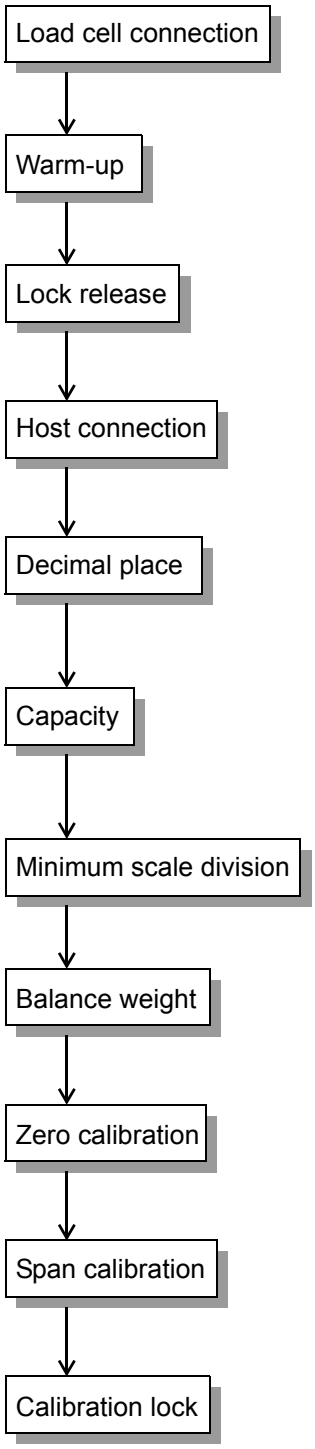
4. CALIBRATION

4-1. What is Calibration?

Operation of matching the F156 and load cell is called “calibration.” To be specific, adjustments are made so that the F156 can exactly display 100.00kg when an actual load (or weight) of 100kg is put on the load cell (scale section) of the weighing machine to which the F156 is connected for example. This operation is called actual load calibration.

4-2. Operation of Actual Load Calibration

To carry out the actual load calibration, follow the procedures given below.



Connect the F156 and load cell according to the section "Connection."

Release the calibration lock which locks calibration.

Establish a CC-Link network.
(Connect the remote console unit if used.)

Register the position of Decimal point.

Register the maximum capacity of the scale.
If the registered value is exceeded by 10 scale divisions or more, display shows over scale "OFL2".

Register the minimum scale division of the scale.

Register the value of load (balance weight) for calibration.

Calibration the initial zero point.

Place the load (balance weight) on the load cell and calibrate the span value.

Disable changing set value related to calibration.

CAUTION

Once calibration is performed, the previous calibration values are lost and cannot be restored. Be sure to turn ON the calibration lock except when performing calibration.

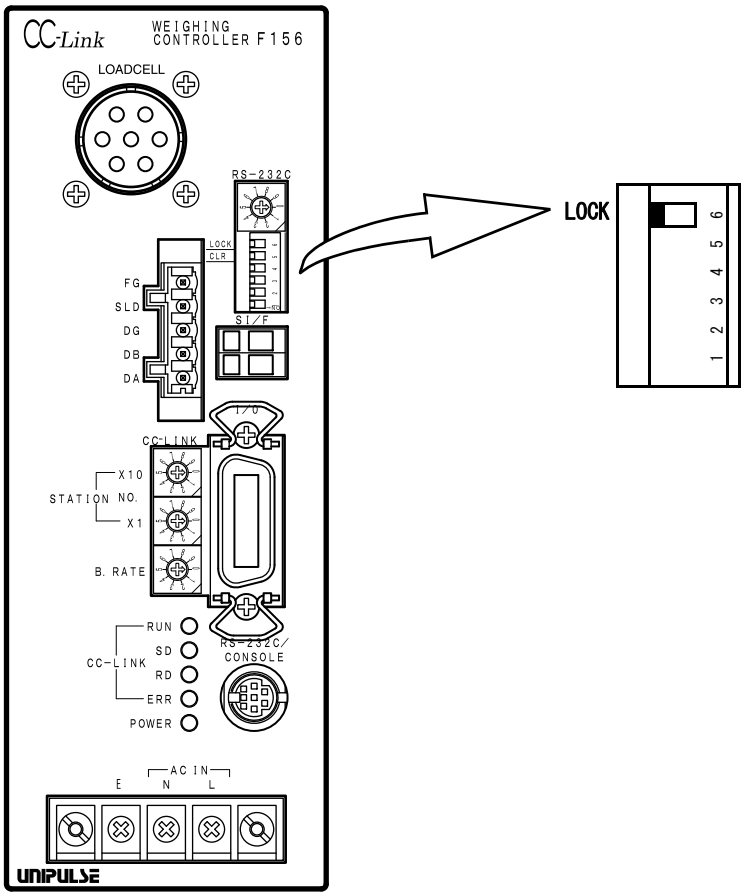
4-3. Actual Load Calibration

4-3-1. Calibration lock release

The F156 has a calibration inhibiting (Lock) function which prevents entered calibration data from unintentional change. This Lock must be released calibrating.

Set 49 “Lock (Soft)” in the setting code to “0.”

Lock switch OFF position on the front panel

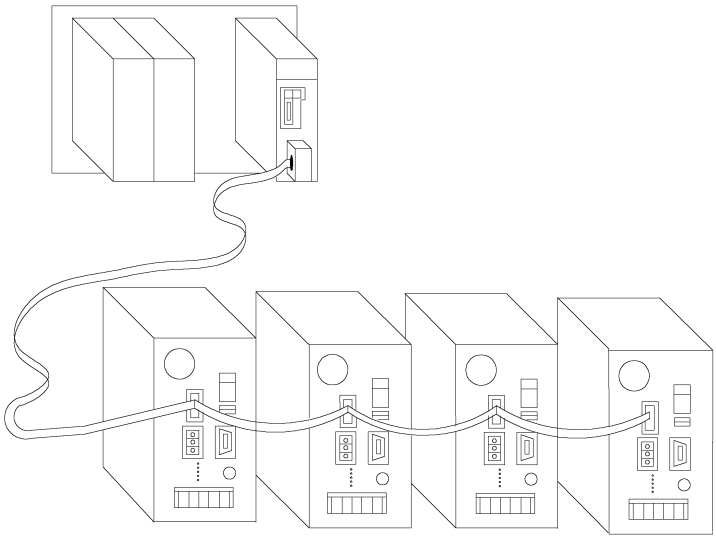


CAUTION

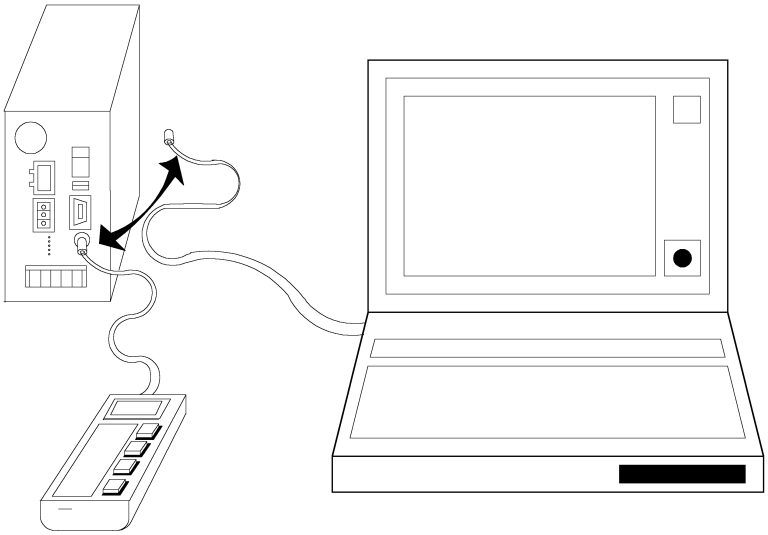
When the calibration lock is ON, changing of initial setting items is also disabled. For the setting items the changing of which is disabled, see the table of set values.

4-3-2. Host connection

① Establish a CC-Link network by using a CC-Link master module, such as Mitsubishi MELSEC-A, PLC, etc.



② Establish a console or RS-232C serial interface with a host computer, etc.



Console operation..... P103
RS-232C format..... P125

4-3-3. Decimal place

Set the decimal place. The decimal place can be selected from 0.000 / 0.00 / 0.0 / 0.

Setting / 3 : 0.000 2 : 0.00 1 : 0.0 0 : 0

CC-Link

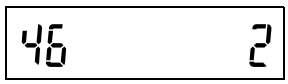
Write the code No. and set value.

Word size remote register

	MSB	LSB	
	0	46	RWw0006
	Code No.		
H	0		RWw0005
L	0 to 3		RWw0004
	Set value		

Console

1) Select code 46.



2) Press the ENT key, and then set the decimal place.

3) Determine the setting with the ENT key.

Decimal place

Not only weight values but also other register addresses of the F156 are not given the notion of decimal place. For example, to set the capacity at 100.00 and the minimum scale division at 0.01, set 10000 and 1, and then the decimal place “2: 0.00,” respectively.

4-3-4. Capacity

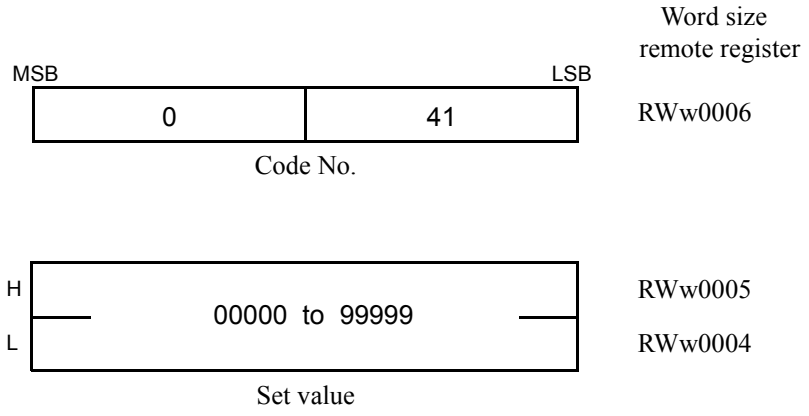
Set the maximum capacity of the scale.

If the registered value is exceeded by 10 scale divisions or more, display shows over scale "OFL2".

Setting range / 00000 to 99999 Initial value / 10000

CC-Link

Write the code No. and set value.

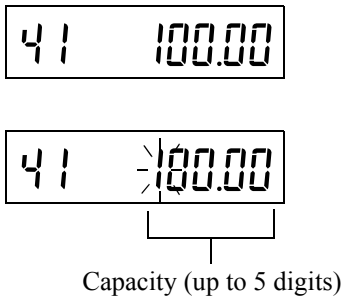


Console

1) Select code 41.

2) Press the ENT key, and then set the capacity.

3) Determine the setting with the ENT key.



4-3-5. Minimum scale division

Set the minimum unit for weighing (scale division). The value of (capacity ÷ minimum scale division) is the resolution of the display. Set a value so that the resolution of the display becomes 10000 or less.

Setting range / 001 to 100

CC-Link

Write the code No. and set value.

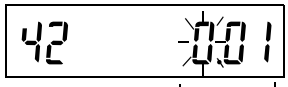
Word size remote register

	MSB	LSB	
	0	42	RWw0006
	Code No.		
H	0		RWw0005
L	001 to 100		RWw0004
	Set value		

Console

1) Select code 42.

2) Press the ENT key, and then set the minimum scale division.



3) Determine the setting with the ENT key.

Minimum scale division (001 to 100)

4-3-6. Balance weight

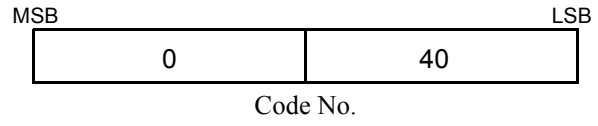
Preset the value of the load (weight) to be applied to the load cell during span calibration.

Setting range / 00000 to 99999 Initial value / 10000

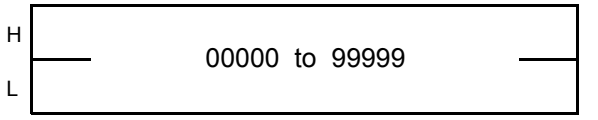
CC-Link

Write the code No. and set value.

Word size
remote register



RWw0006

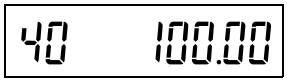


RWw0005

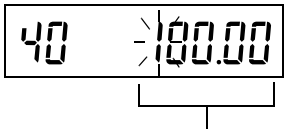
RWw0004

Console

1) Select code 40.



2) Press the ENT key, and then set the balance weight.



3) Determine the setting with the ENT key.

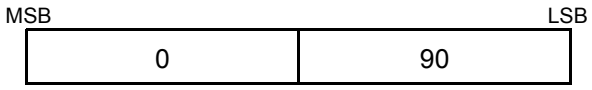
4-3-7. Zero calibration

Adjust the initial zero point.

CC-Link

Write the code No. and set value.

Word size
remote register



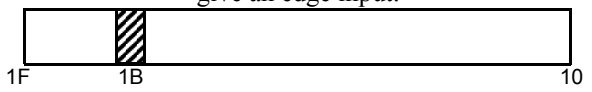
RWw0006

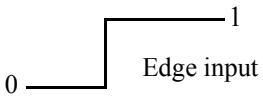
Code No.

or

give an edge input.

Remote output
RY001B

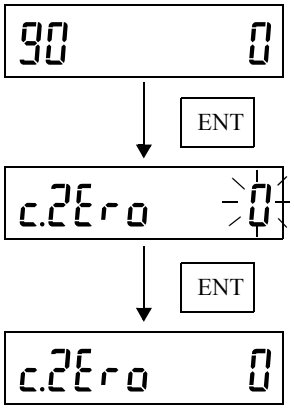




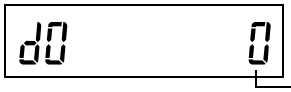
Console

1) Select code 90.

2) Press the ENT key, and then start fine zero adjustment.

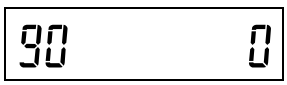


3) When the fine zero adjustment normally ends,



is displayed for a few seconds,

Weight value

and then the 

display is restored.

When a calibration error is displayed, take measures according to the error message, and do zero calibration again.

CC-Link	Console	
1 — 2	cErr2	···The initial tare is above the Zero adjustment range. Remove any excess load from load cell or scale. If cErr2 is still displayed, connect a resistor between +EX and -SIG load cell connections. This should shift the Zero point. Do Zero Calibration again. For the relationship between the resistance connected and input signals, see the next page.
1 — 3	cErr3	···The initial tare is minus. Check that load cell is mounted in the correct direction; check that load is being applied to the load cell in the correct direction; check that the +SIG and -SIG lines are properly connected. If cErr3 is still displayed, connect a resistor between -EX and -SIG load cell connections. This should shift the Zero point. Do Zero Calibration again. For the relationship between the resistance connected and input signals, see the next page.
1 — 9	cErr9	···The weight value is not stable. Adjust the parameters for motion detection, check that the STAB status is “ON”, and then do zero calibration again.

*** Each CC-Link error code consists of:**

Error code	—	Assistance code

*For reference, the relationship between the values of resistance connected and input signals is shown in the table below.

Resistance		Strain	
Calculated value	approx. value	μ-STRAIN	mV/V
875 kΩ	866 kΩ	200	0.1
437 kΩ	442 kΩ	400	0.2
291 kΩ	294 kΩ	600	0.3
219 kΩ	221 kΩ	800	0.4
175 kΩ	174 kΩ	1000	0.5
146 kΩ	147 kΩ	1200	0.6
125 kΩ	124 kΩ	1400	0.7
109 kΩ	110 kΩ	1600	0.8
97 kΩ	97.6 kΩ	1800	0.9
87.3 kΩ	86.6 kΩ	2000	1.0
79.4 kΩ	78.7 kΩ	2200	1.1
72.7 kΩ	73.2 kΩ	2400	1.2
67.1 kΩ	66.5 kΩ	2600	1.3
62.3 kΩ	61.9 kΩ	2800	1.4
58.2 kΩ	57.6 kΩ	3000	1.5
54.5 kΩ	54.9 kΩ	3200	1.6
51.3 kΩ	51.1 kΩ	3400	1.7
48.4 kΩ	48.7 kΩ	3600	1.8
45.9 kΩ	46.4 kΩ	3800	1.9
43.6 kΩ	43.2 kΩ	4000	2.0
41.5 kΩ	41.2 kΩ	4200	2.1
39.6 kΩ	39.2 kΩ	4400	2.2
37.9 kΩ	38.3 kΩ	4600	2.3
36.3 kΩ	36.5 kΩ	4800	2.4
34.8 kΩ	34.8 kΩ	5000	2.5

- This table is for a 350 ohm load cell.
- The temperature coefficient of the connected resistor directly influences the accuracy of the indicator. Use a resistor with a temperature coefficient below 50 ppm/ ℃ . (approximately 5ppm/ ℃ is recommended)

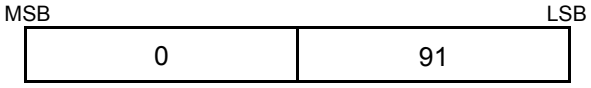
4-3-8. Span calibration

Calibrates the span with a weight on.

CC-Link

Write the code No.

Word size
remote register



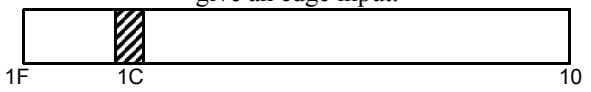
RWw0006

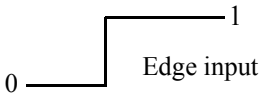
Code No.

or

give an edge input.

Remote output
RY001C

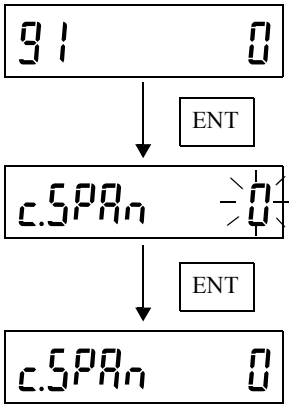




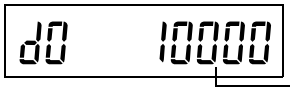
Console

1) Select code 91.

2) Press the ENT key, and then span calibration starts.



3) When the fine span adjustment normally ends,



is displayed for a few seconds,

Weight value

and then the 

display is restored.

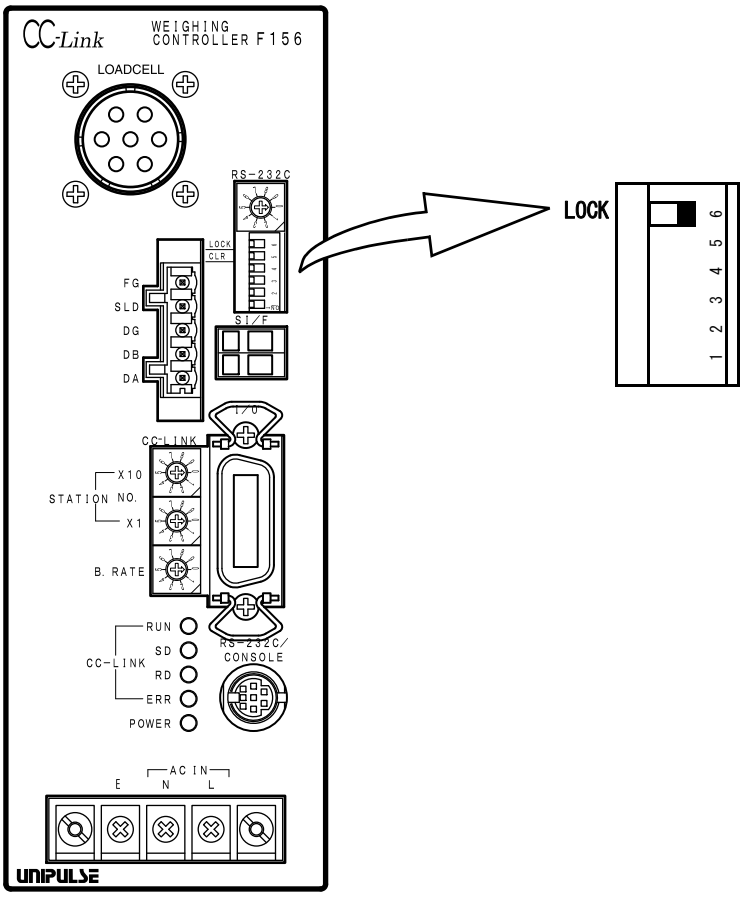
When a calibration error is displayed, take measures according to the error message, and do zero calibration again.

CC-Link	Console	
1 — 2	cErr 1	···The zero point must be re-calibrated.
1 — 4	cErr4	···The entered balance weight value is greater than the maximum capacity. Re-enter a balance weight value lower than the maximum capacity.
1 — 5	cErr5	···The entered balance weight value is 00000. Re-enter the correct value.
1 — 6	cErr6	···The output of the load cell is short of the span adjustment range. Check to see if the load cell is correctly loaded, and the output of the load cell has sufficient performance to reach the span adjustment range.
1 — 7	cErr7	···The output of the load cell is minus. Check to see if the load cell is loaded in the correct direction, and the wiring between +SIG and –SIG of the load cell is not reversed.
1 — 8	cErr8	···The output of the load cell is over the span adjustment range. Check to see if the load cell is correctly loaded, and the output of the load cell is within the span adjustment range of the F156.
1 — 9	cErr9	···The weight value is not stable. Adjust the parameters for motion detection, check that the STAB status is “ON,” and then do zero calibration again.

4-3-9. Calibration lock

Upon completion of zero calibration and span calibration, disable changing of calibrated values to prevent them from being changed carelessly.

Lock switch ON position on the front panel



Or, set 49 “Lock (Soft)” in the setting code to “1.”

Now, changing of calibrated values is disabled.

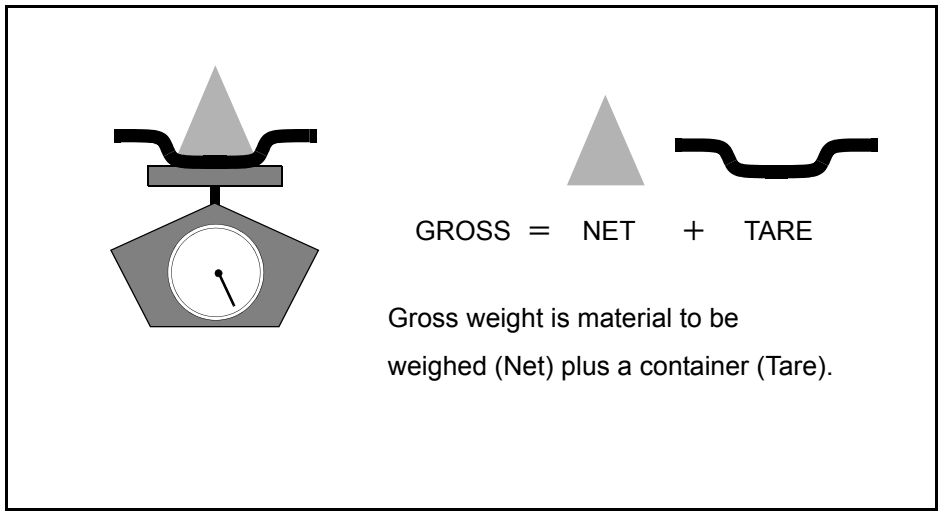
CAUTION

When the calibration lock is ON, changing of initial setting items is also disabled. For the setting items the changing of which is disabled, see the table of set values.

5. WEIGHT DISPLAY

5-1. Gross and Net Weight • Tare Weight

The F156 allows weighing by switching the weight between gross and net.
The relationship between the gross and net weight is as follows:



5-2. Weight Value Reading

Range / -99999 to 99999

CC-Link

First, select net or gross.

Then, read the weight value.

Setting / 0 : Net 1 : Gross

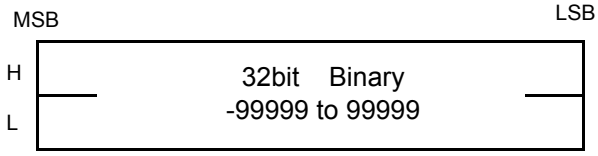
Write 0 or 1.

Remote output

RY0020

Read the weight value.

Word size remote register



RWr0001

RWr0000

Console

See Chapter7.

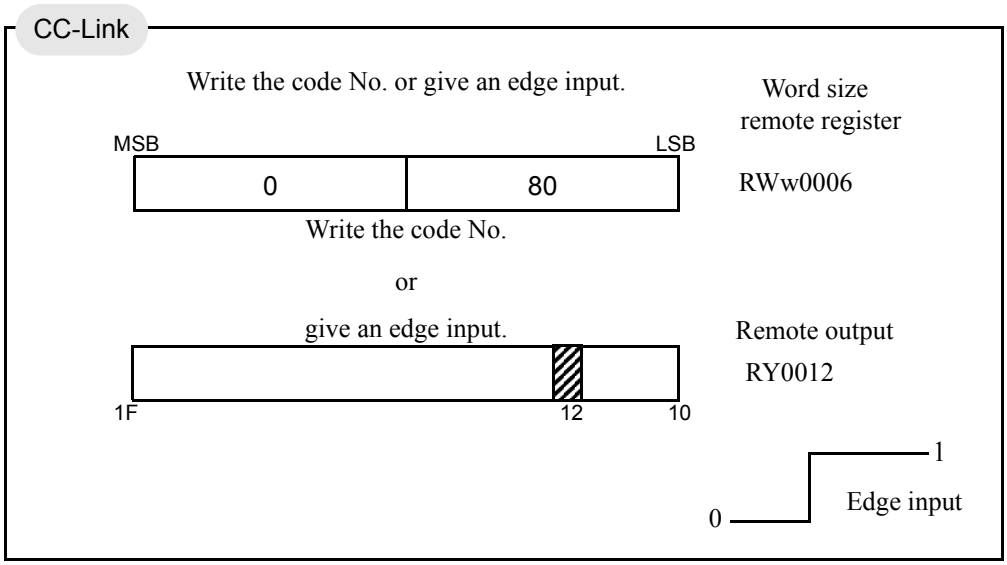
6. FUNCTIONS

6-1. Tare Subtraction

Tare subtraction

This function zeros the net weight. This operation does not change the gross weight.

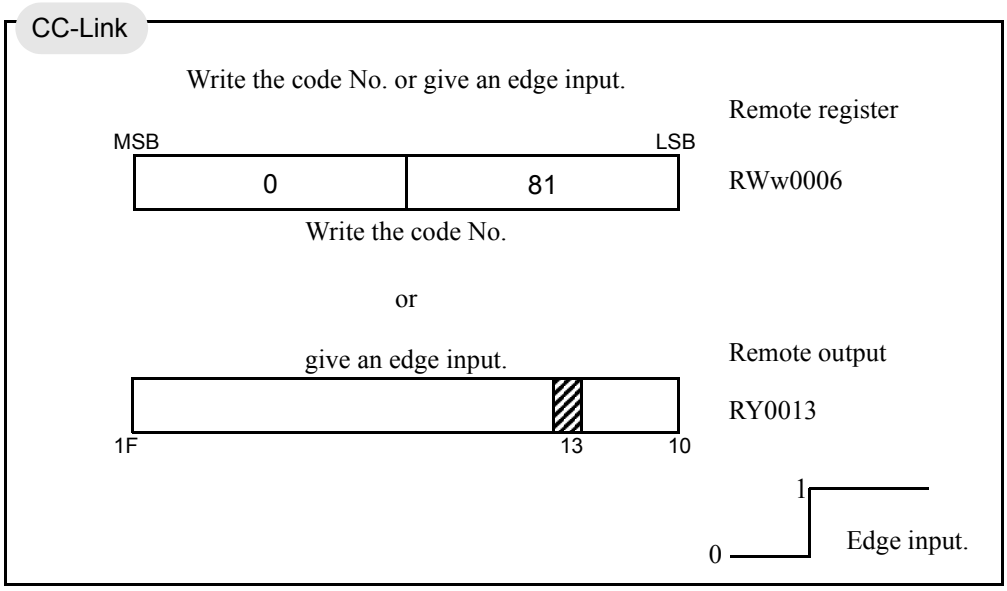
Input TARE ON, or set the tare subtraction command.



Tare reset

This function resets tare subtraction. This operation resets the net weight and gross weight to the same value.

Input TARE OFF, or set the tare reset command.



6-2. Preset Tare Weight

This function subtracts a preset tare value from the net weight.

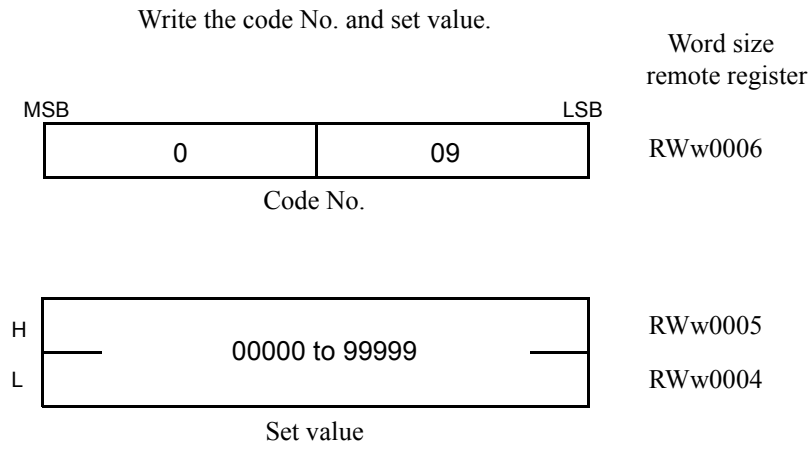
This function works when a weight value to be subtracted is input for a tare setting in setting code 09, and tare setting selection in setting code 24 is valid.

Preset tare value

Setting range / 00000 to 99999

CC-Link

Write the code No. and set value.

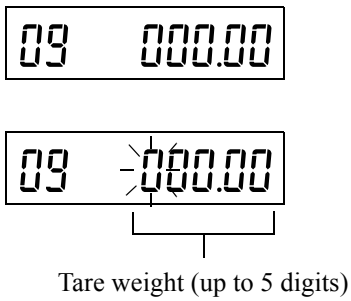


Console

1) Select code 09.

2) Press the ENT key, and then set the tare weight.

3) Determine the setting with the ENT key.



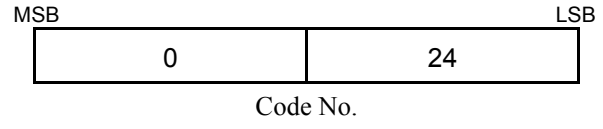
Preset tare weight

Setting / 1 : Valid 0 : Invalid

CC-Link

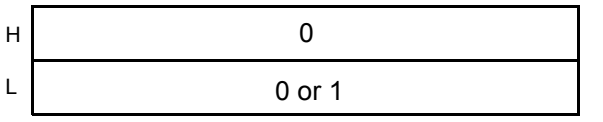
Write the code No. and set value.

Word size
remote register



RWw0006

Code No.



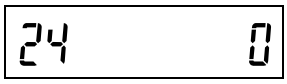
RWw0005

RWw0004

Set value

Console

1) Select code 24.



2) Press the ENT key, and then set the preset tare weight.

3) Determine the setting with the ENT key.

Preset tare weight

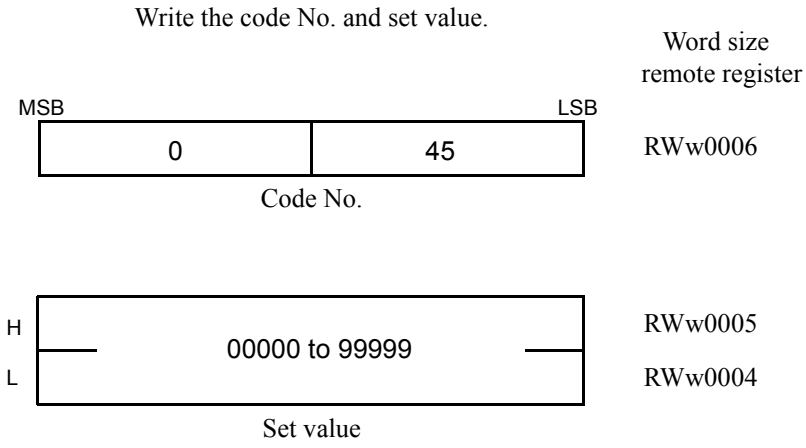
6-3. Digital Zero Regulation Value

Set a range of zero point adjustment (a gap from the registered Zero Calibration value) by digital zero or zero tracking. If digital zero operation is performed or zero tracking is actuated where the digital zero regulation value is exceeded, the “zero alarm” status turns on, and the digital zero regulation value is subtracted from the gross weight.

Setting range / 0000 to 9999 Initial value / 200

CC-Link

Write the code No. and set value.

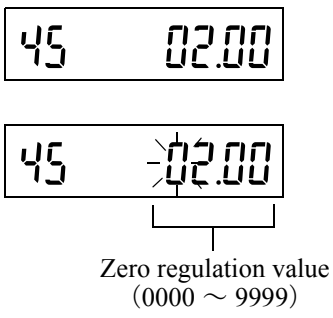


Console

1) Select code 45.

2) Press the ENT key, and then set the zero regulation value.

3) Determine the setting with the ENT key.

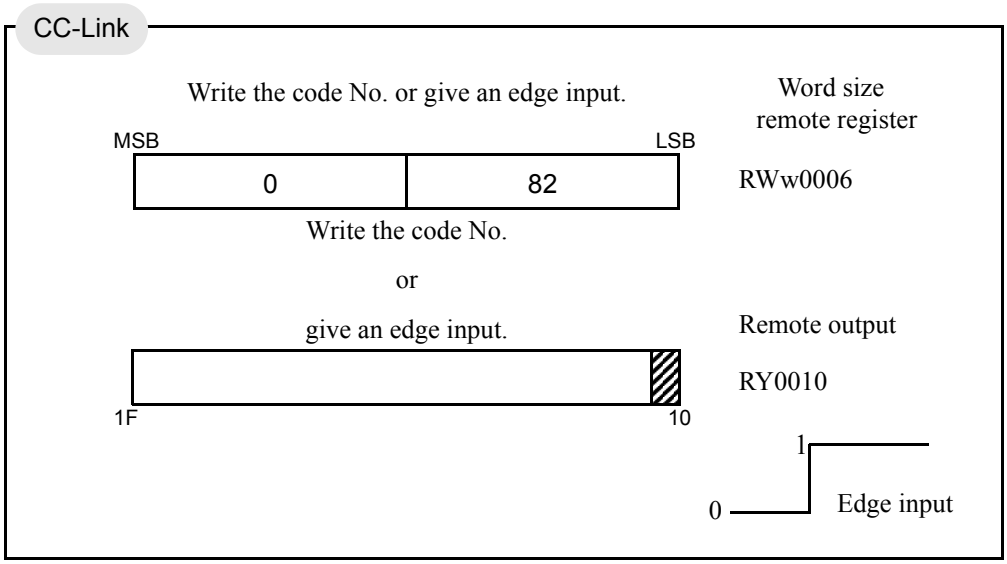


6-4. Digital Zero

Digital zero setting

This function forces the gross weight to be zeroed. However, if this operation is performed where the weight value exceeds the DZ regulation value in setting code 45, the “zero alarm” status turns ON. The net weight changes according to the following expression: (Net weight) = (Gross weight) – (Tare weight).

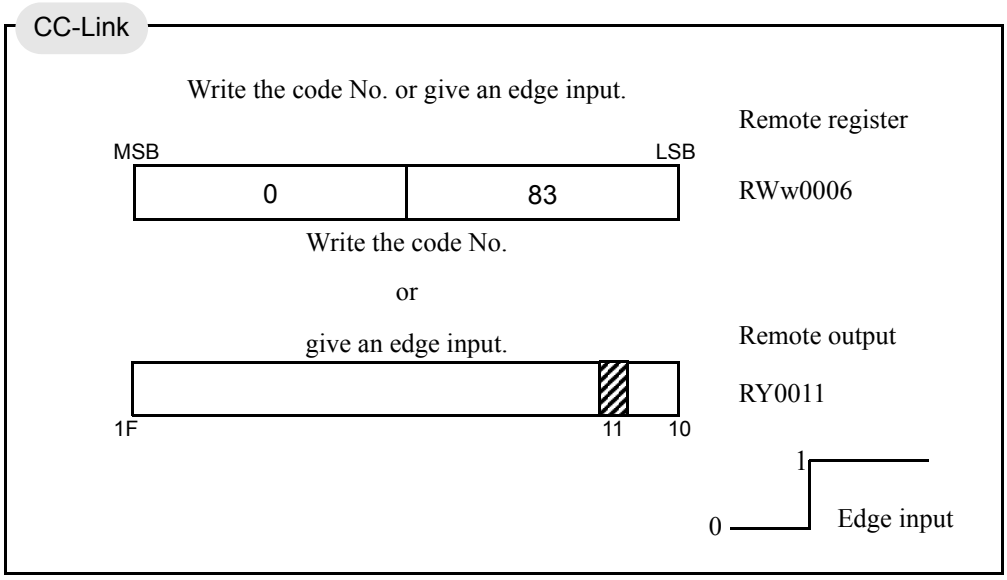
Input DZ ON, or set the digital zero command.



Digital zero reset

This function clears the digital zero. If this operation is performed when the “zero alarm” status is ON, the “zero alarm” status turns OFF.

Input DZ OFF, or set the digital zero reset.



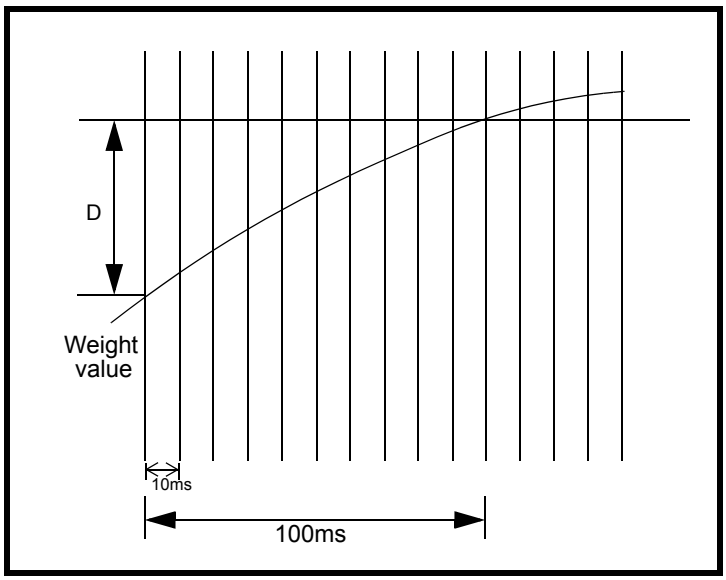
6-5. Motion Detection

Set the parameters for detecting stability.

When the condition of the weight value, varying under the preset range, continues for the preset time or more, the weight value is regarded as stable, and the STAB status turns ON.

At each time of A/D conversion, D in the following figure and the range are compared, and if the preset range is exceeded, the STAB status turns OFF.

* D is the difference between the present weight value and 100msec.-old weight value.



Setting range

Period / 0.0 to 9.9
Initial value / 1.5

Range / 0 to 99
Initial value / 10

CC-Link

<Period> Write the code No. and set value.

Word size remote register

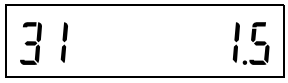
	MSB	LSB	
	0	31	RWw0006
	Code No.		
H	0		RWw0005
L	0 to 99		RWw0004
	Set value		

<Range> Write the code No. and set value.

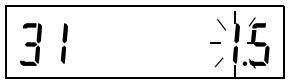
	MSB	LSB	
	0	32	RWw0006
	Code No.		
H	0		RWw0005
L	0 to 99		RWw0004
	Set value		

Console

1) Select code 31.



2) Press the ENT key, and then set the motion detection (period).



3) Determine the setting with the ENT key.

Period (0.0 to 9.9)

4) Select code 32.

5) Press the ENT key, and then set the motion detection (range).

6) Determine with the ENT key.

Range (00 to 99)

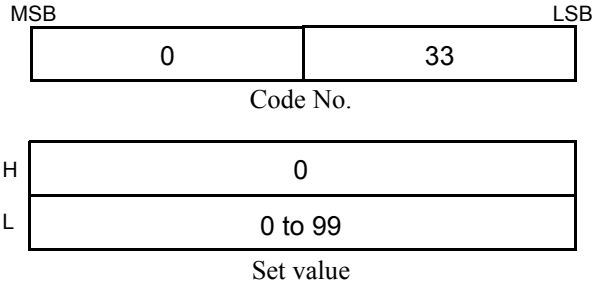
6-6. Zero Tracking

This function automatically corrects slow zero drifts and micro-movements of the zero point caused by residue remaining after weighing.

CC-Link

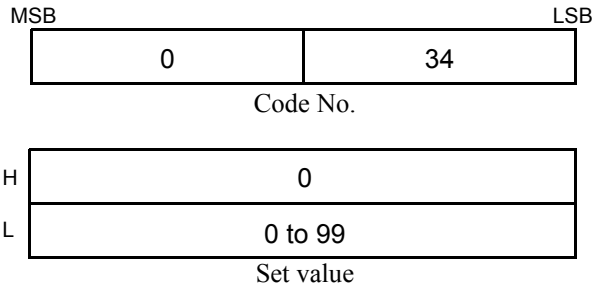
<Period> Write the code No. and set value.

Word size remote register



RWw0006
RWw0005
RWw0004

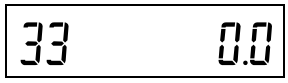
<Range> Write the code No.34 and set value.



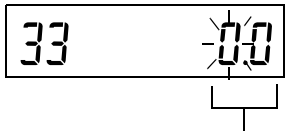
RWw0006
RWw0005
RWw0004

Console

1) Select code 33.



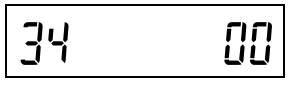
2) Press the ENT key, and then set the zero tracking (period).



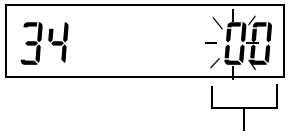
3) Determine the setting with the ENT key.

Period (0.0 to 9.9)

4) Select code 34.



5) Press the ENT key, and then set the zero tracking (range).

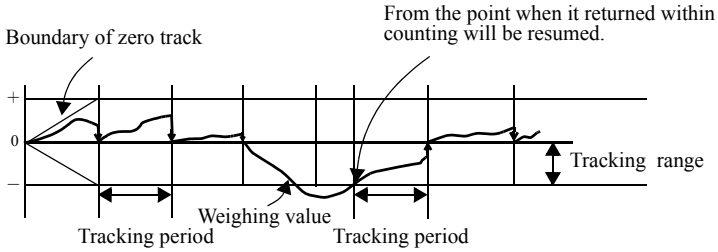


6) Determine with the ENT key.

Range (00 to 99)

- Zero tracking is the function to reset gross weight to zero automatically when the state remaining the zero point drift within the zero tracking range continues more than set period.

- Zero tracking period must be set between 0.1 ~ 9.9 second and its range must be set between 0 ~ 99 using 1/4 resolution interval of weight display.
  For instance, 02 corresponds to 0.5 and 12 corresponds to 3 of weight display.
  Zero tracking range is not proportional to the Minimum scale division regardless of the setting state of Minimum scale division.
  Zero tracking does not work if you set the period to 0.0 sec. and range to 00.



Period / setting range : 0.0 to 9.9

Range / setting range : 00 to 99

CAUTION

- Since zero tracking should work from the point at which the gross weight is zero, it does not work when the weight is already over the tracking range. Adjust the zero point by digital zero or zero calibration.

- If the amount of zero adjustment to be made by digital zero or zero tracking (deviation from the calibrated zero point) exceeds Digital zero regulation value, the zero alarm status turns ON without zero adjustment.

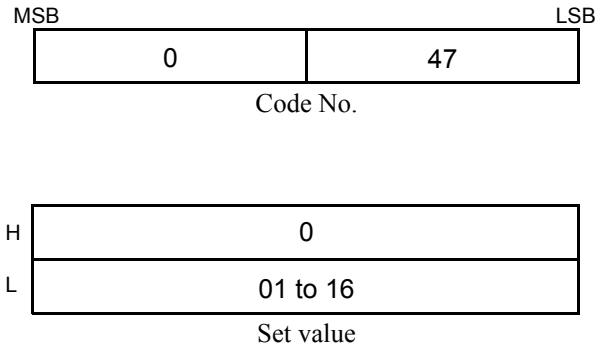
6-7. Gravitational Acceleration

This function corrects weight errors caused by the difference in local gravitational acceleration when the calibration location and installation location of the scale are different.
No setting is required if the calibration location and installation location are in the same area.

CC-Link

Write the code No. and set value.

Word size remote register

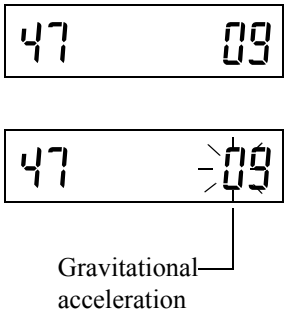


Console

1) Select code 47.

2) Press the ENT key, and then set the gravitational acceleration.

3) Determine the setting with the ENT key.



Gravitational acceleration

01	9.806	02	9.805	03	9.804	04	9.803
05	9.802	06	9.801	07	9.800	08	9.799
09	9.798	10	9.797	11	9.796	12	9.795
13	9.794	14	9.793	15	9.792	16	9.791

6-8. Digital Filter

This function minimizes instability of the weight value through moving average of A/D-converted data. The number of times of moving average can be selected in the range of 2 - 256. The larger the number of times of moving average, the more the weight value becomes stable, but the slower the response becomes. On the contrary, the smaller the number of times of moving average, the quicker the response becomes, but the more the weight value becomes unstable. Select the most appropriate value according to the type of weighing.

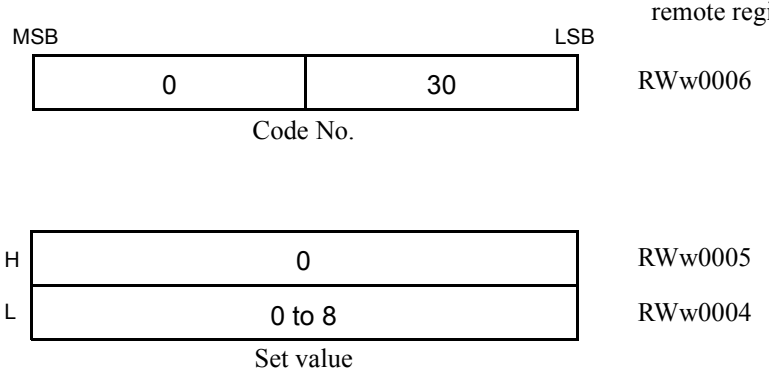
Setting /

8 : 256times	5 : 32times	2 : 4times
7 : 128times	4 : 16times	1 : 2times
6 : 64times	3 : 8times	0 : OFF

CC-Link

Write the code No. and set value.

Word size remote register

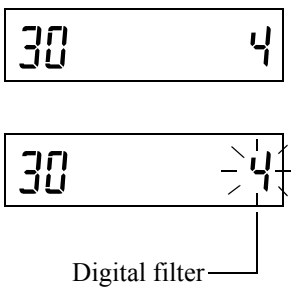


Console

1) Select code 30.

2) Press the ENT key, and then set the digital filter.

3) Determine the setting with the ENT key.



6-9. Analog Filter

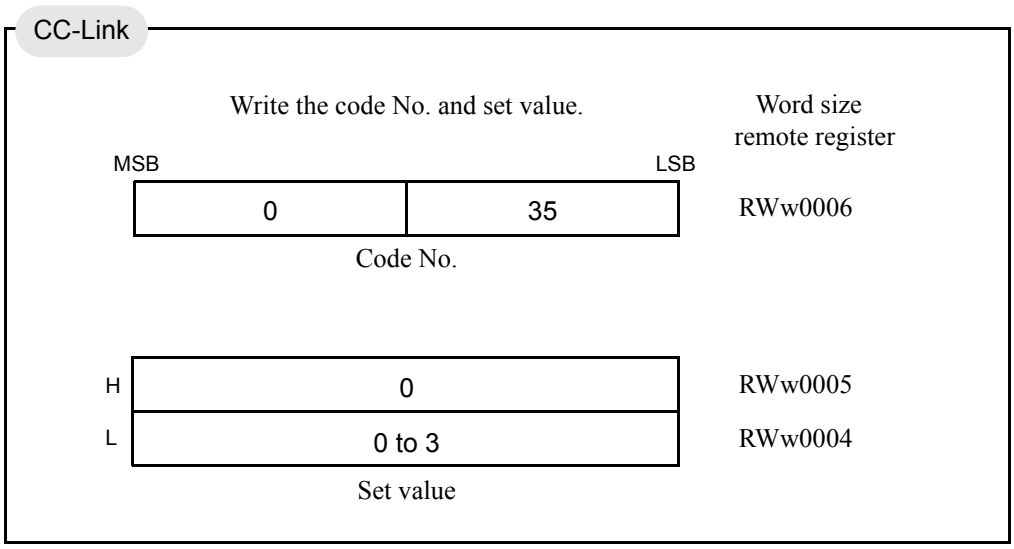
This is a low-pass filter to eliminate noise components from input signals from the load cell, and also stabilize the weight value by averaging.

Select the cutoff frequency from 2Hz, 4Hz, 6Hz and 8Hz.

By lowering the cutoff frequency, the display becomes more stable, but the response worsens. On the contrary, the higher the frequency, the better the response becomes, but the more difficult it is to make the display stable.

Setting / 3 : 8Hz 2 : 6Hz 1 : 4Hz 0 : 2Hz

CC-Link

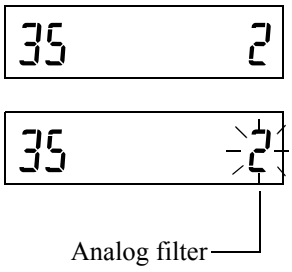


Console

1) Select code 35.

2) Press the ENT key, and then set the analog filter.

3) Determine the setting with the ENT key.



6-10. Net Over

This function gives a warning when the net or gross weight exceeds a fixed regulation value.
Conditional expressions and indications are as follows:

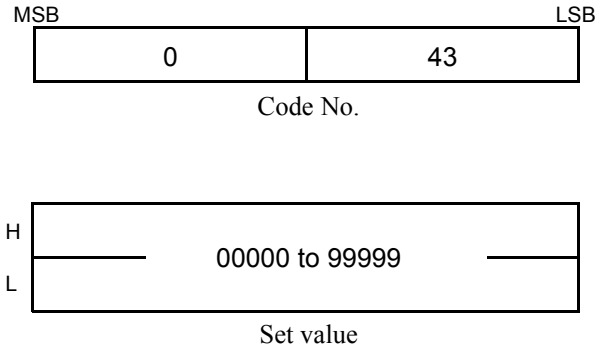
	Conditional expression
Net over	Net weight > Net over set value
Gross over	Gross weight > Gross over set value

Setting range / 00000 to 99999

CC-Link

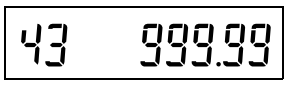
Write the code No. and set value.

Word size
remote register

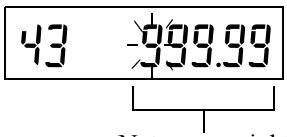


Console

1) Select code 43.



2) Press the ENT key, and then set the net over.



3) Determine the setting with the ENT key.

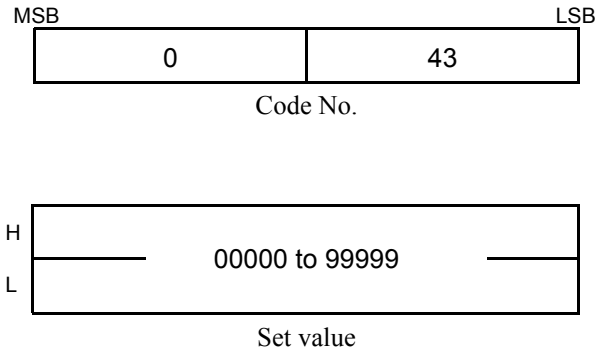
Net over weight
(up to 5 digits)

6-11. Gross Over

CC-Link

Write the code No. and set value.

Word size
remote register

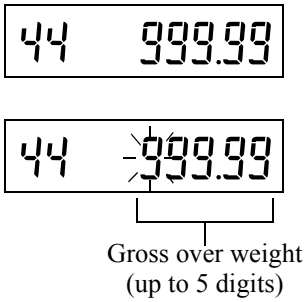


Console

1) Select code 44.

2) Press the ENT key, and then set the gross over.

3) Determine the setting with the ENT key.



6-12. Discharging Control Mode

The discharging control means the control method for discharging raw material from the hopper or tank.

F156 enables to discharge accurate quantity with the proper combination of setting the control of Final, Set Point 2, Set Point 1, Compensation and Judging Over, Under, Go and Timer for Comparison Inhibit, Judging.

According to the way of discharging, Feeding, Discharging or Simple comparison control or Sequence control is selectable.

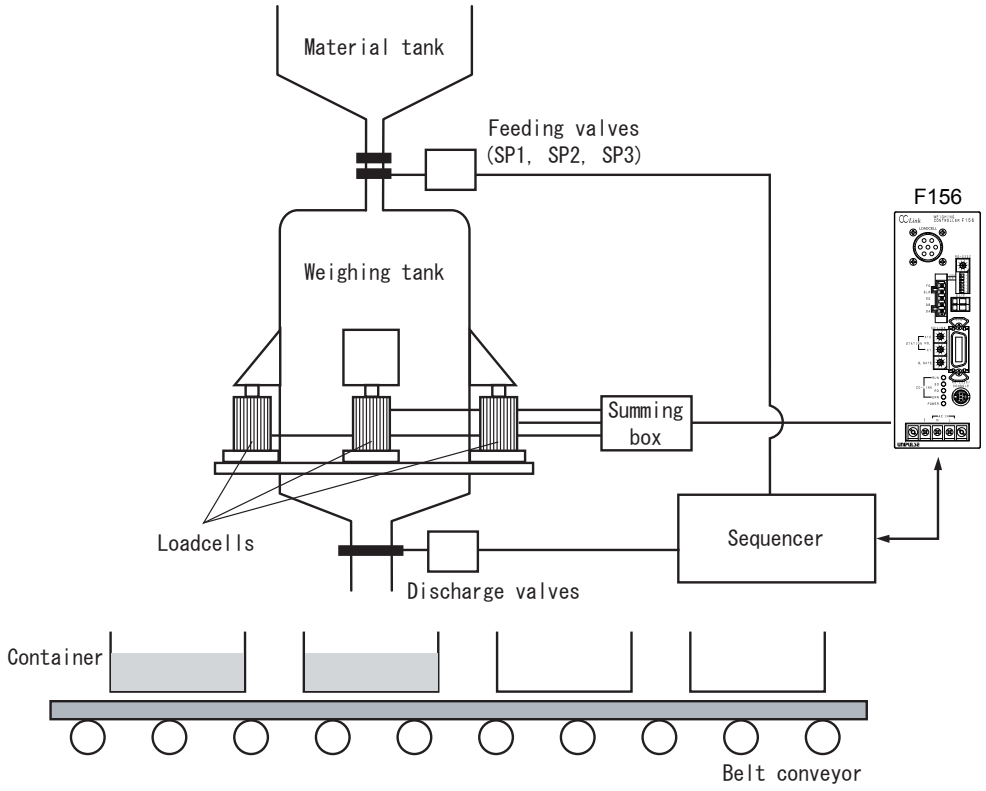
6-12-1. Feeding Weighing and Discharging Weighing

Feeding Weighing

A method controlling a weight while feeding raw materials into a measuring tank (hopper).

Example of feeding weighing.

In this example system, raw materials are to be fed from the material tank to the weighing tank. At first, the feeding valves are to be fully opened to feed, and closed in the order of Set Point 1 → Set Point 2, and Set Point 2 → Set Point 3 at the time of Final - Set Point 1, and Final - Set Point 2, respectively. The feeding valves are to be completely closed at the time of Final - Compensation. The weighed raw materials are to be discharged to a container by opening the discharge valves.



(1) By setting external input; Tare subtraction ON, etc., Net weight is zeroed. (Tare subtraction)

(2) The feeding valves are fully opened to start feeding. When the weighed value reaches (Final - Set Point 1), Set Point 1 output signal turns ON. (If the comparison inhibit timer is set, the timer starts.) After the timer expires, Set Point 1 valve of the material tank is closed to “Set Point 2”.

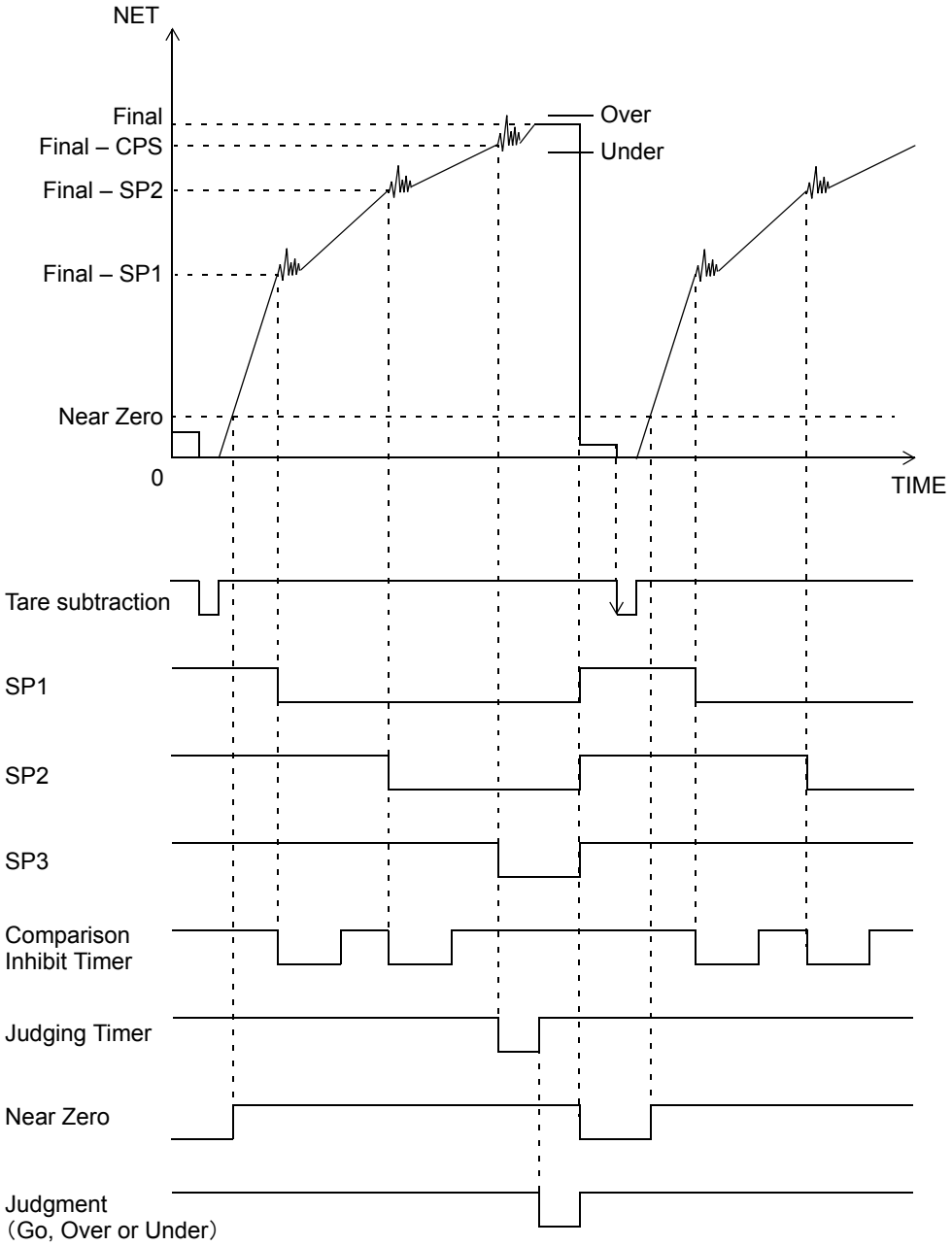
(3) When the weighed value reaches (Final - Set Point 2), Set Point 2 output signal turns ON. (If the comparison inhibit timer is set, the timer starts.) After the timer expires, Set Point 2 valve of the material tank is closed to “Set Point 3”.

(4) When the weighed value reaches (Final - Compensation), Set Point 3 output signal turns ON, and if the judging timer is set, the timer starts. The feeding valves are completely closed.

(5) After the judging timer expires, Over/Under judgment is made. If the weighed value exceeds the range of the Over/Under setting value, the over signal or under signal turns ON.

(6) Raw materials are discharged from the weighing tank to a container. The valves of the weighing tank should be opened. Completion of discharge is confirmed with the Near Zero signal. In weighing from the second time onward, (1) ~ (5) are repeated.

The feeding valves and discharge valves should be opened and closed through the sequencer or relay sequence according to the control signals from the F156.

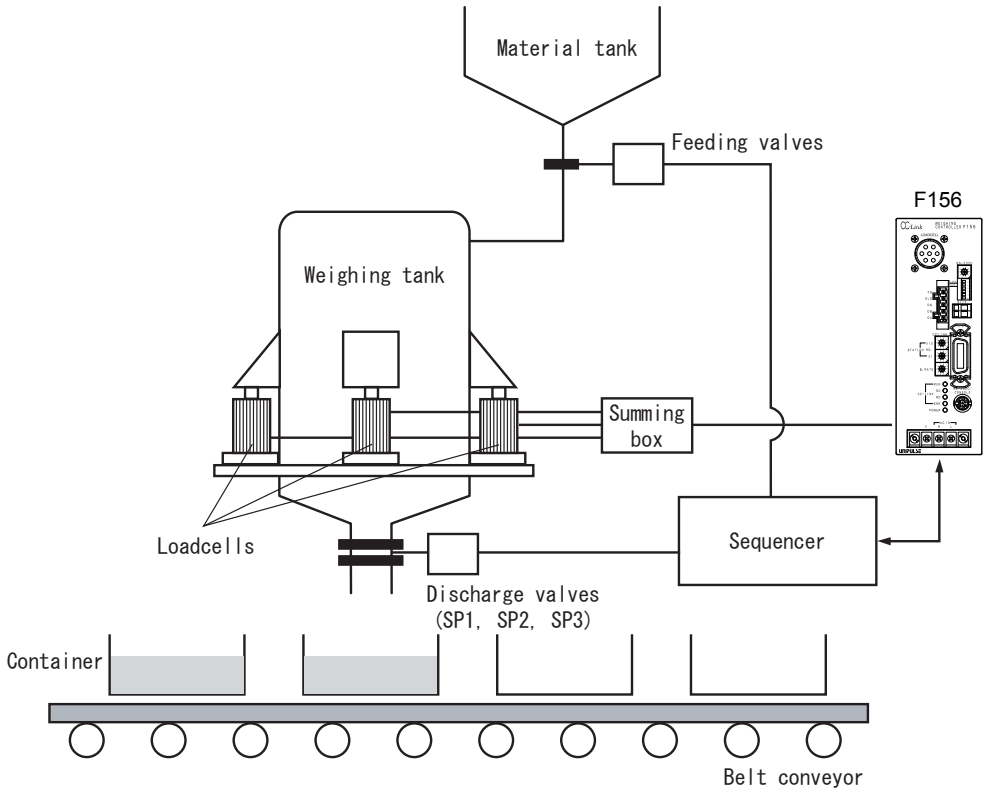

NET
Final
Final – CPS
Final – SP2
Final – SP1
Near Zero
0
Over
Under
TIME
Tare subtraction
SP1
SP2
SP3
Comparison
Inhibit Timer
Judging Timer
Near Zero
Judgment
(Go, Over or Under)

Discharging Weighing

First supply raw material into a metering tank (hopper), then controls a weight while discharging raw material from the metering tank.

Example of discharging weighing

In discharging weighing, the amount of discharge can be weighed by adding negative weighed values. In this example system, raw materials are to be fed from the material tank to the weighing tank, and a fixed quantity of raw materials are to be discharged from the weighing tank to a container. At first, the discharge valves of the weighing tank are to be fully opened to discharge raw materials, and the discharge valves are to be closed in the order of Set Point 1 → Set Point 2, and Set Point 2 → Set Point 3 at the time of Final - Set Point 1, and Final - Set Point 2, respectively. The discharge valves are to be completely closed at the time of Final - Compensation, when one measurement is completed. When the weighing tank runs short, the feeding valves are to be opened to replenish the weighing tank with raw materials from the material tank to weigh.



(1) The valves of the material tank are opened by the lower limit signal, and raw materials are fed into the weighing tank.

(2) It is detected by the upper limit signal that the weighing tank is full, and the valves of the material tank are closed.

(3) By setting external input; Tare subtraction ON, etc., Net weight is zeroed. (Tare subtraction)

(4) The discharge valves are fully opened to start discharging. When the weighed value reaches (Final - Set Point 1), Set Point 1 output signal turns ON. (If the comparison inhibit timer is set, the timer starts.) After the timer expires, the discharge valve (Set Point 1) is closed to "Set Point 2".

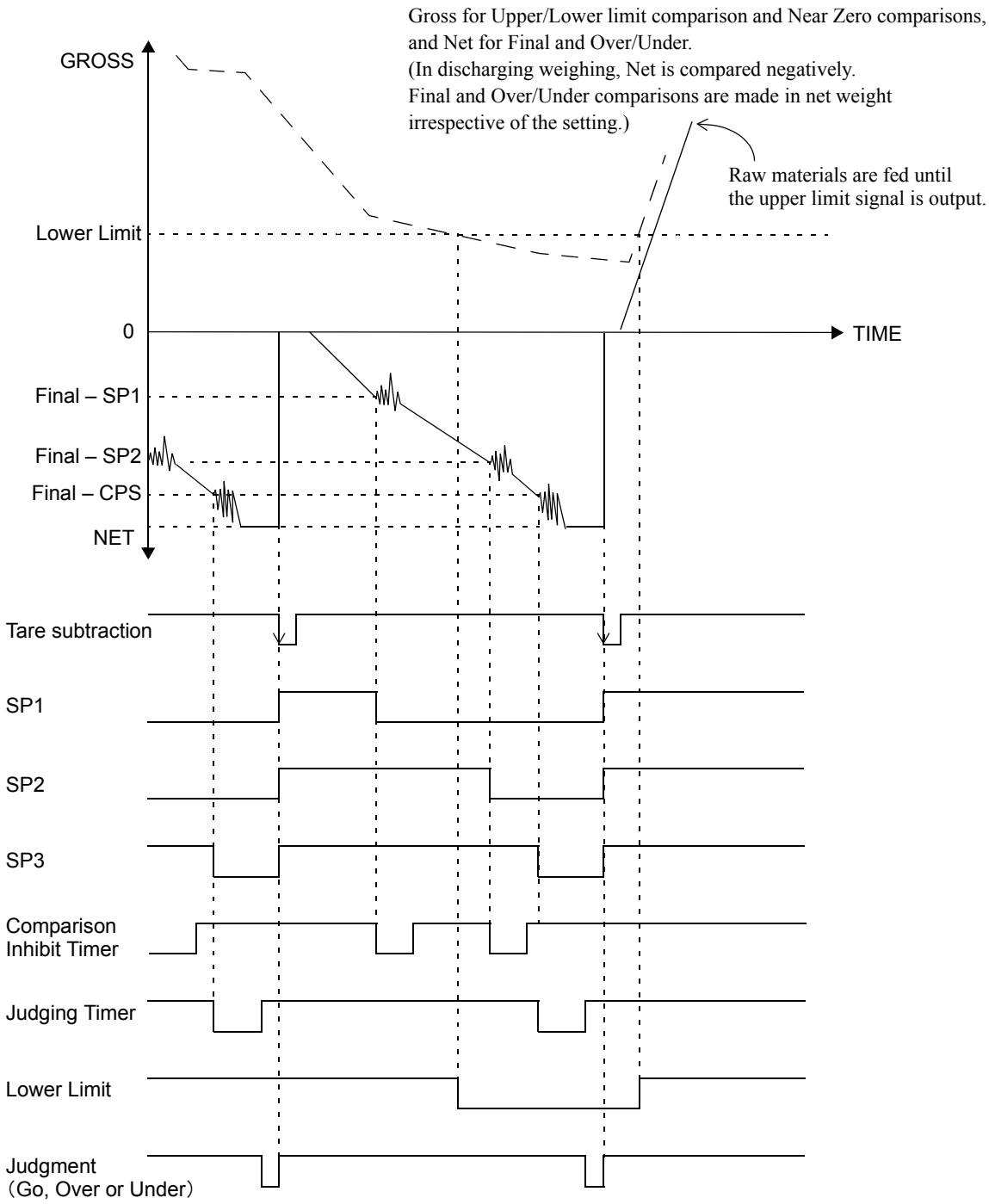
(5) When the weighed value reaches (Final - Set Point 2), Set Point 2 output signal turns ON. (If the comparison inhibit timer is set, the timer starts.) After the timer expires, the discharge valve (Set Point 2) is closed to "Set Point 3".

(6) When the weighed value reaches (Final - Compensation), Set Point 3 output signal turns ON, and if the judging timer is set, the timer starts. The discharge valves are completely closed.

(7) After the judging timer expires, Over/Under judgment is made. If the weighed value exceeds the range of the Over/Under setting value, the over signal or under signal is output. In weighing from the second time onward, (3) ~ (6) are repeated in a like manner.

(8) When the weighing tank runs short of raw materials, the valves of the material tank are opened by the output of the lower limit signal to feed raw materials into the weighing tank.

The feeding valves and discharge valves should be opened and closed through the sequencer or relay sequence according to the control signals from the F156.



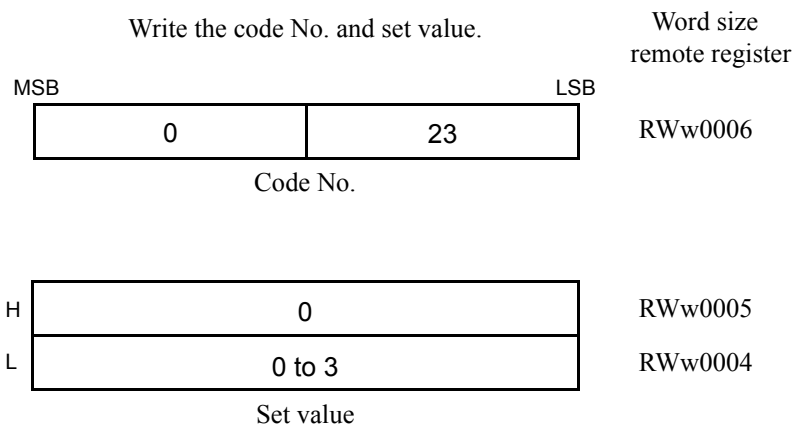
The Near Zero signal is used for discharge completion confirmation as in the case of feeding weighing.

6-12-2. Control mode

Setting / 3 : External selection (CC-Link) 1 : Discharge control

2 : External selection (External Control Input) 0 : Feed control

CC-Link

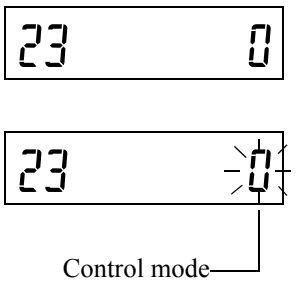


Console

1) Select code 23.

2) Press the ENT key, and then set the feed/discharge control mode.

3) Determine the setting with the ENT key.



When discharge control is set, comparisons are made in net weight even if the setting of final and over/under comparison weight value is gross.

Also, the net weight is outputted as inverted in sign. (The direction that decreases the gross weight is positive.)

6-12-3. Simple Comparison Control and Sequence Control

Simple Comparison Control

Compares weight value with discharging value regulerly.

Output is always ON when the weight value satisfies the conditions of final discharging setting items.

In simple comparison control, the next weighing is judged to be possible when the weight falls short of 25% of the Final after completion of the previous weighing.

Sequence Control

This is a control method which compares the weight value with discharging value after starting signal of weighing ON.

When the starting signal ON, output of each signal of Set Point 1, Set Point 2, and Final turns ON then the signal turns OFF after weight value satisfied the each condition.

Sequential control can be conducted without connecting external sequencer in sequence control.

For details, see "6-13.Sequence Control" on p.91.

Simple comparison mode / Sequence mode

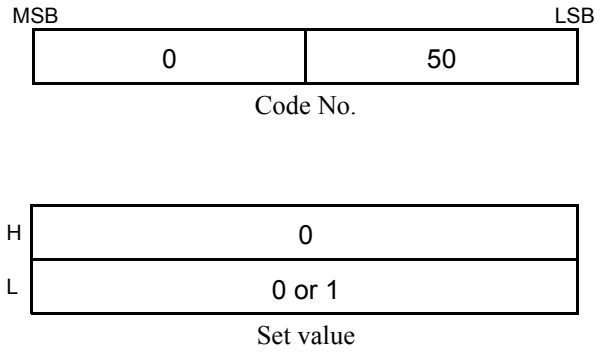
The control method is selected.

Setting / 1 : Sequence mode 0 : Simple comparison mode

CC-Link

Write the code No. and set value.

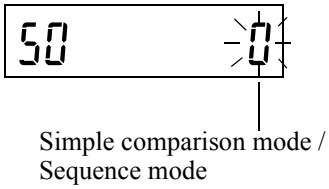
Word size remote register



Console

1) Select code 50.

2) Press the ENT key, and then set the Simple comparison mode / Sequence mode.

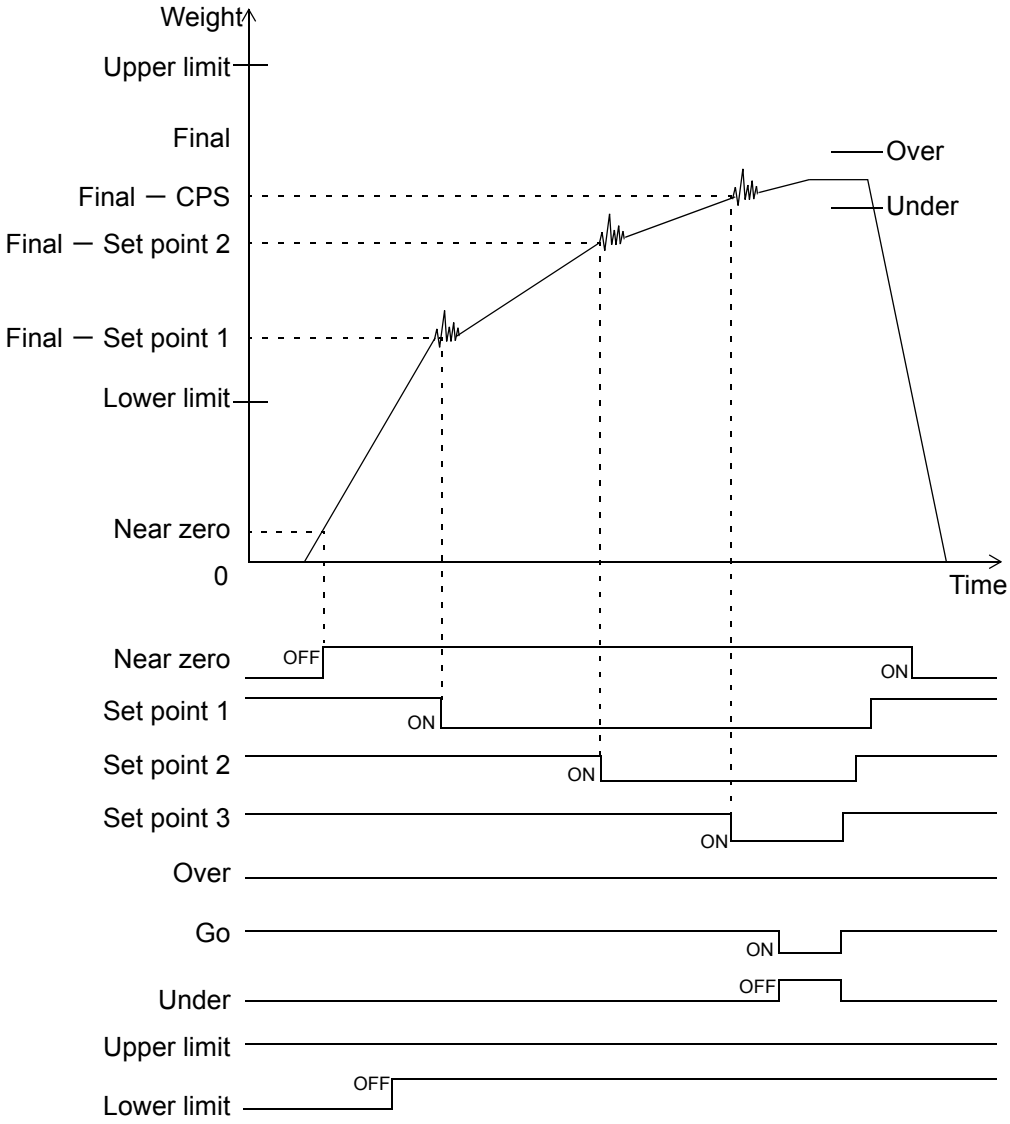


3) Determine the setting with the ENT key.

6-12-4. Final / Set point2 / Set point1 / Compensation / Over / Under

These settings are for controlling and judging feed/discharge.

ex) Simple comparison mode



Signal	Conditional formula
Near zero	Weight value ≦ set value of Near zero
Set point 1	Weight value ≧ Final − Set point 1
Set point 2	Weight value ≧ Final − Set point 2
Set point 3	Weight value ≧ Final − CPS
Under	Weight value < Final − Under
Over	Weight value > Final + Over
Go	Final + Over ≧ Weight value ≧ Final − Under
Upper limit	Weight value > Upper limit
Lower limit	Weight value < Lower limit

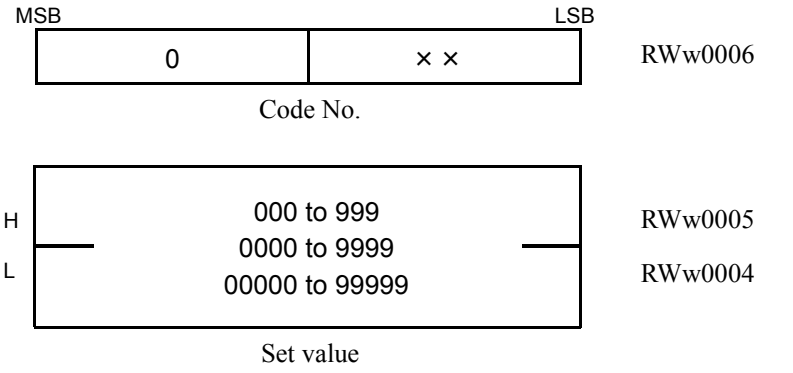
Setting range and code No. of each set value

Set value	Setting range	Code No.
Final	00000 to 99999	00
Set point 1	00000 to 99999	01
Set point 2	00000 to 99999	02
CPS	0000 to 9999	03
Over	000 to 999	04
Under	000 to 999	05

CC-Link

Write the code No. and set value.

Word size
remote register

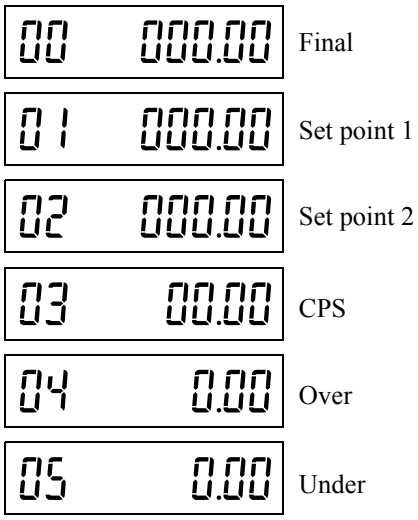


Console

1) Code 00
   Code 01
   Code 02
   Code 03
   Code 04
   Code 05

2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.



6-12-5. Upper limit / Lower limit / Near zero

These settings are for feed/discharge control, and direct comparisons are made with these values irrespective of the final value.

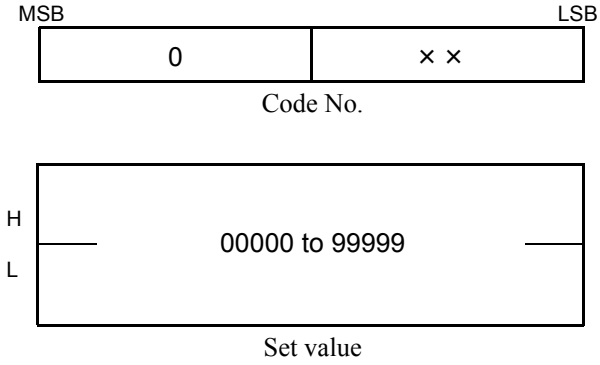
Setting range and code No. of each set value

Set value	Setting range	Code No.
Upper limit	00000 to 99999	06
Lower limit		07
Near zero		08

CC-Link

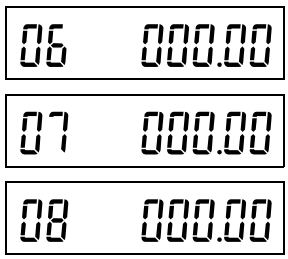
Write the code No. and set value.

Word size
remote register



Console

1) Code 06
   Code 07
   Code 08



Upper limit
Lower limit
Near zero

2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.

6-12-6. Over/under comparison / Upper/lower limit comparison 1 / Near zero comparison

For each comparing point such as final, the comparing weight (gross or net) and timing can be selected.

The following three items are selectable.

1) Over/under comparison

Select the weight value for Over/under comparison. (Code No 20)

Over/under comparison weight value /

2 : Comparison OFF 1 : Net weight 0 : Gross weight

2) Upper/lower limit comparison 1

Select the weight value for upper/lower limit comparison. (Code No 21)

Upper/lower limit comparison weight value /

2 : Comparison OFF 1 : Net weight 0 : Gross weight

3) Near zero comparison

Select the weight value for near zero comparison. (Code No 22)

Near zero comparison weight value /

2 : ComparisonOFF 1 : Net weight 0 : Gross weight

CC-Link

Write the code No. and set value.

Word size remote register

MSB LSB

0	××	RWw0006

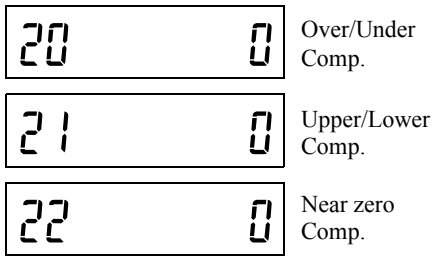
Code No.

H	0	RWw0005
L	0 to 2	RWw0004

Set value

Console

1) Select code 20, 21, and 22.
2) Press the ENT key, and then set the comparison weight value.
3) Determine the setting with the ENT key.



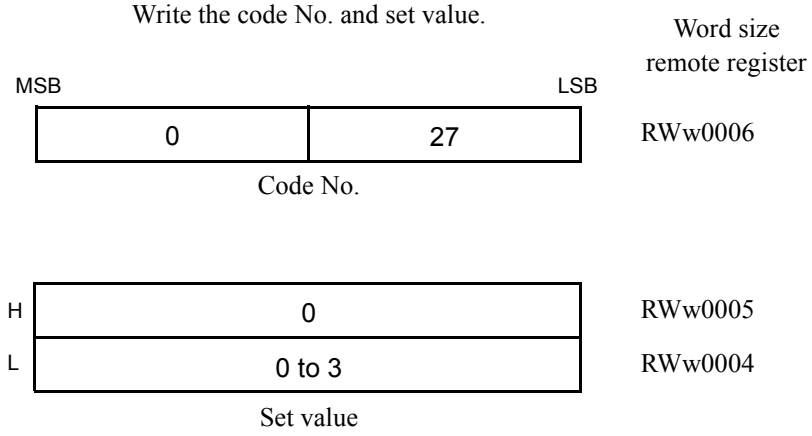
6-12-7. Over/under comparison mode

Setting /

- 3 : Comparison, holding the weight value, when the complete output is ON
- 2 : Comparison when the complete output is ON
- 1 : Comparison when the external judgment input is ON
- 0 : Continuous comparison

CC-Link

Write the code No. and set value.

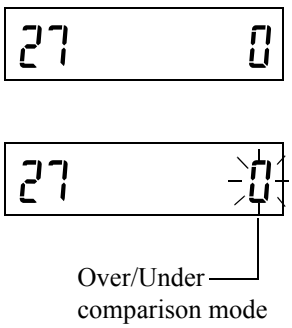


Console

1) Select code 27.

2) Press the ENT key, and then set the comparison mode.

3) Determine the setting with the ENT key.



6-12-8. Upper/lower limit comparison 2

Setting /

1 : Comparison when the external judgment input is ON

0 : Continuous comparison

CC-Link

Write the code No. and set value.

Word size
remote register

MSB LSB

28	RWw0006

Code No.

H	0	RWw0005
L	0 or 1	RWw0004

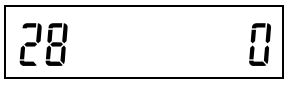
Set value

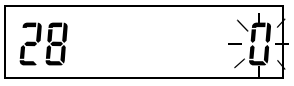
Console

1) Select code 28.

2) Press the ENT key, and then set the comparison mode.

3) Determine the setting with the ENT key.



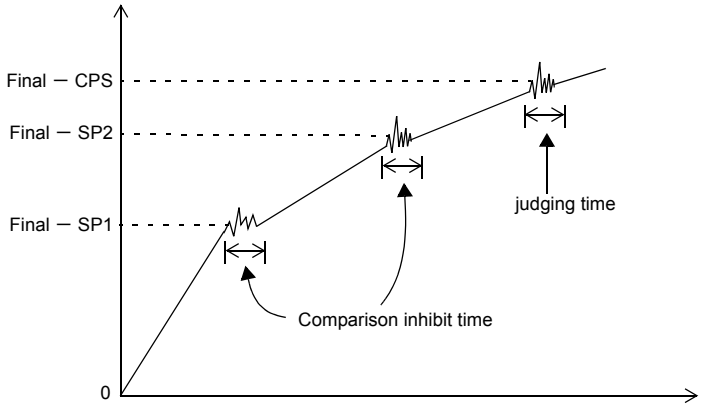


Upper/Lower limit comparison 2

6-12-9. Comparison inhibit time / Judging time / Complete output time

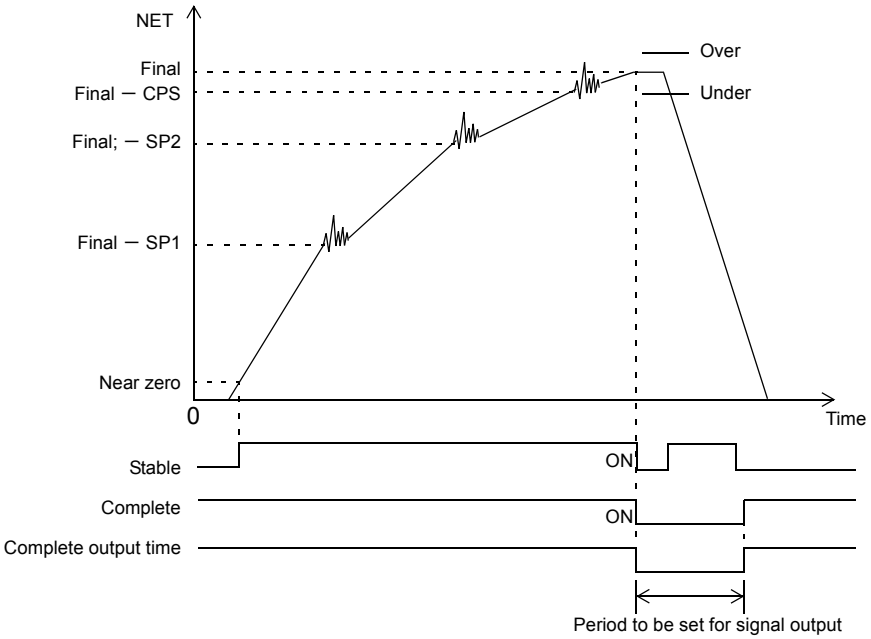
Comparison inhibit time / judging time

These functions inhibit comparison for a fixed period so that control and judgment will not be operated inappropriately due to mechanical vibrations caused by opening and closing of valves.



Complete output time

Set the length of the complete signal (complete relay) to be output when weighing is completed.

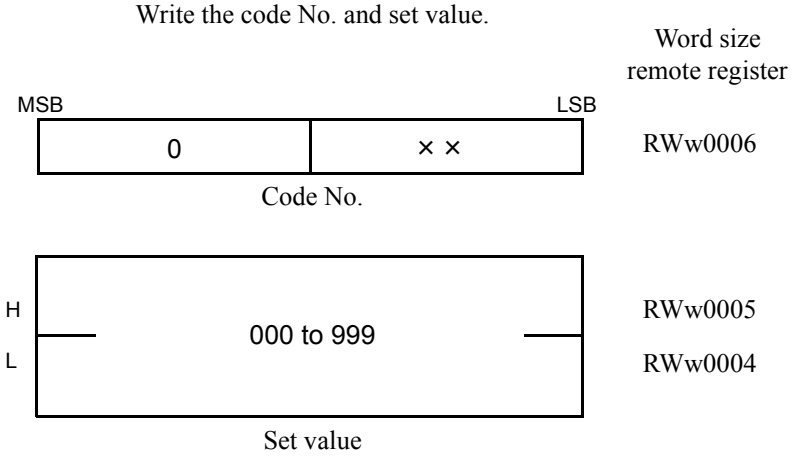


Setting range and code No. of each set value

Set value	Setting range	Code No.	Initial value
Comparison inhibit time	000 – 999	10	50
Judging time	(0.00 – 9.99 sec)	11	150
Complete output time		12	300

CC-Link

Write the code No. and set value.

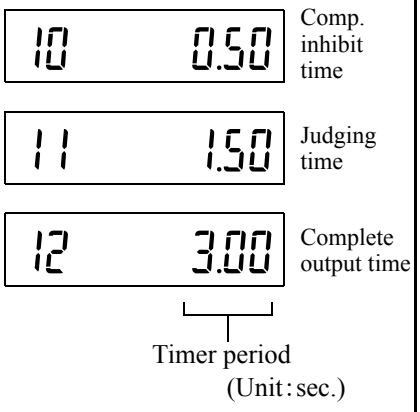


Console

1) Select code 10, 11, and 12.

2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.



6-12-10. Complete output mode

Set the timing to output the complete signal.

Parameters that determine the timing are the judging time and stable signal.

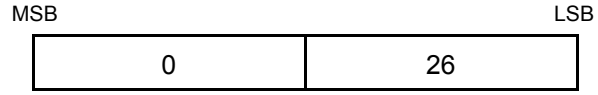
Setting

- 2 : Output by the complete output time after the judging time is up or from when the weight value has become stable with the SP3 signal ON
- 1 : Output by the complete output time from when the weight value has become stable after the judging time is up with the SP3 signal ON
- 0 : Output by the complete output time after the judging time is up with the SP3 signal ON

CC-Link

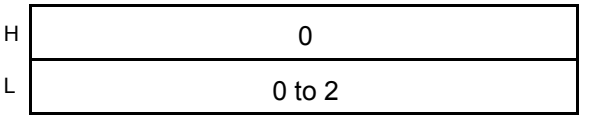
Write the code No. and set value.

Word size remote register



RWw0006

Code No.



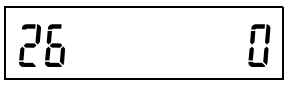
RWw0005

RWw0004

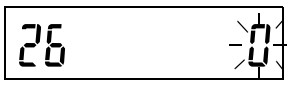
Set value

Console

1) Select code 26.



2) Press the ENT key, and then set the complete output mode.



3) Determine the setting with the ENT key.

Complete output mode

6-12-11. Auto free fall compensation / Auto free fall compensation regulation / Average count of auto free fall compensation / Auto free fall compensation coefficient

The auto free fall compensation function automatically corrects variations in free fall, which is a great factor of weight errors, for accurate weighing. Here, set the parameters for this auto free fall compensation. Be aware that this function is initially set to be valid.

Principle of auto free fall compensation

The difference (D) between the final set value and the actual weighing-completed value is recorded by a fixed number of times (preset number of times) (A), where the average is calculated, and the average multiplied by the compensation coefficient (C) is added to the compensation set value.

Value adjusted to the compensation set value

$$\frac{(D1 + D2 + D3 \cdots\cdots DA)}{A} \times C$$

To minimize errors, the value of D (D1, D2, D3, ... DA) can also be regulated.

Example)	Final	20.000
	Auto free fall compensation regulation	0.100
	Average count of auto free fall compensation	4
	Auto free fall compensation coefficient	2/4

Times	Actual weighing	Error	Average count of AFFC.	CPS
0			0	← Power ON
1	20.050	+0.050	1	0.500
2	20.040	+0.040	2	0.500
3	20.070	+0.070	3	0.500
4	20.080	+0.080	4 → 0	0.500
		+0.240/4 = 0.060		
		0.060 × 2/4 = 0.030		→ CPS value
5	20.020	+0.020	1	0.530
6	20.000	0.000	2	0.530
7	20.010	+0.010	3	0.530
8	20.110	(+0.110)	←× 3	0.530
9	20.010	+0.010	4 → 0	0.530
		+0.040/4 = 0.010		
		0.010 × 2/4 = 0.005		→ CPS value
10	19.880	(-0.120)	←× 1	0.535
11	19.990	-0.010	1	0.535
12	20.010	+0.010	2	0.535
13	20.000	0.000	3	0.535
14	19.980	0.020	4 → 0	0.535
		-0.020/4 = -0.005		
		-0.005 × 2/4 = -0.003		→ CPS value
		0.532		

Compensation coefficient setting

The compensation coefficient can be selected from 1/4, 2/4, 3/4 and 1. Select 1 for weighing such that each weight value is almost equal, and select 1/4 - 2/4 for weighing such that each weight value varies, so that a higher-precision free fall compensation value can be calculated.

◇ Auto free fall parameter setting

Auto free fall compensation

2 : External selection (CC-Link)　1 : Valid　0 : Invalid

Select whether or not to use the auto free fall compensation function. (Code No 25)

Auto free fall compensation regulation

00000 to 99999　Initial value : 9800

Set a regulation value to prevent the compensation value from being extremely large (or small). (Code No 19)

Average count of auto free fall compensation

1 to 9　Initial value : 4

Set the number of times of recording the weight value to calculate the average. (Code No 18)

Auto free fall compensation coefficient

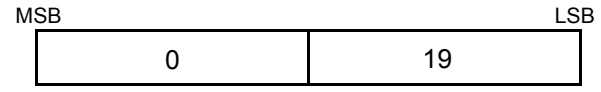
0 : 1　1 : 3/4　2 : 2/4　3 : 1/4

Set a coefficient of 1 or less for multiplication to prevent variations in compensation value. (Code No 17)

CC-Link

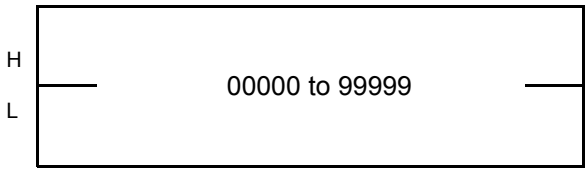
For the auto free fall compensation regulation,
write the code No. and set value.

Word size
remote register



RWw0006

Code No.



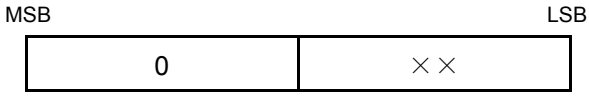
RWw0005

RWw0004

Set value

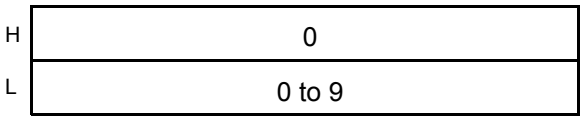
For other cases, write the code No.
and set value as shown below.

Word size
remote register



RWw0006

Code No.



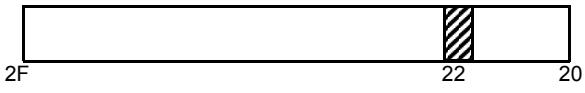
RWw0005

RWw0004

Set value

If auto free fall compensation is set at 2: external selection (CC-Link),
whether it is valid or invalid is determined by the RY0022 bit level.
（ON : Valid　OFF : Invalid）

Remote output
RY0022



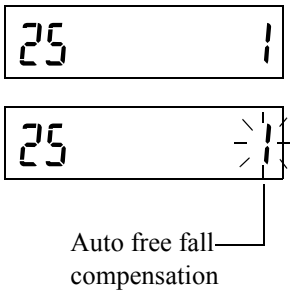
〈Auto free fall compensation〉

Console

1) Select code 25.

2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.



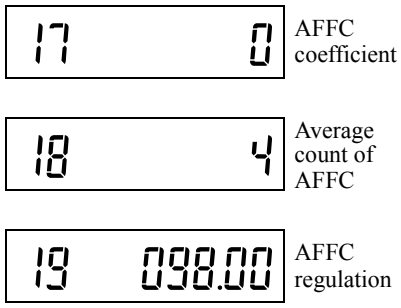
〈Auto free fall compensation regulation / Average count of auto free fall compensation / Auto free fall compensation coefficient〉

Console

1) Select code 17, 18, and 19.

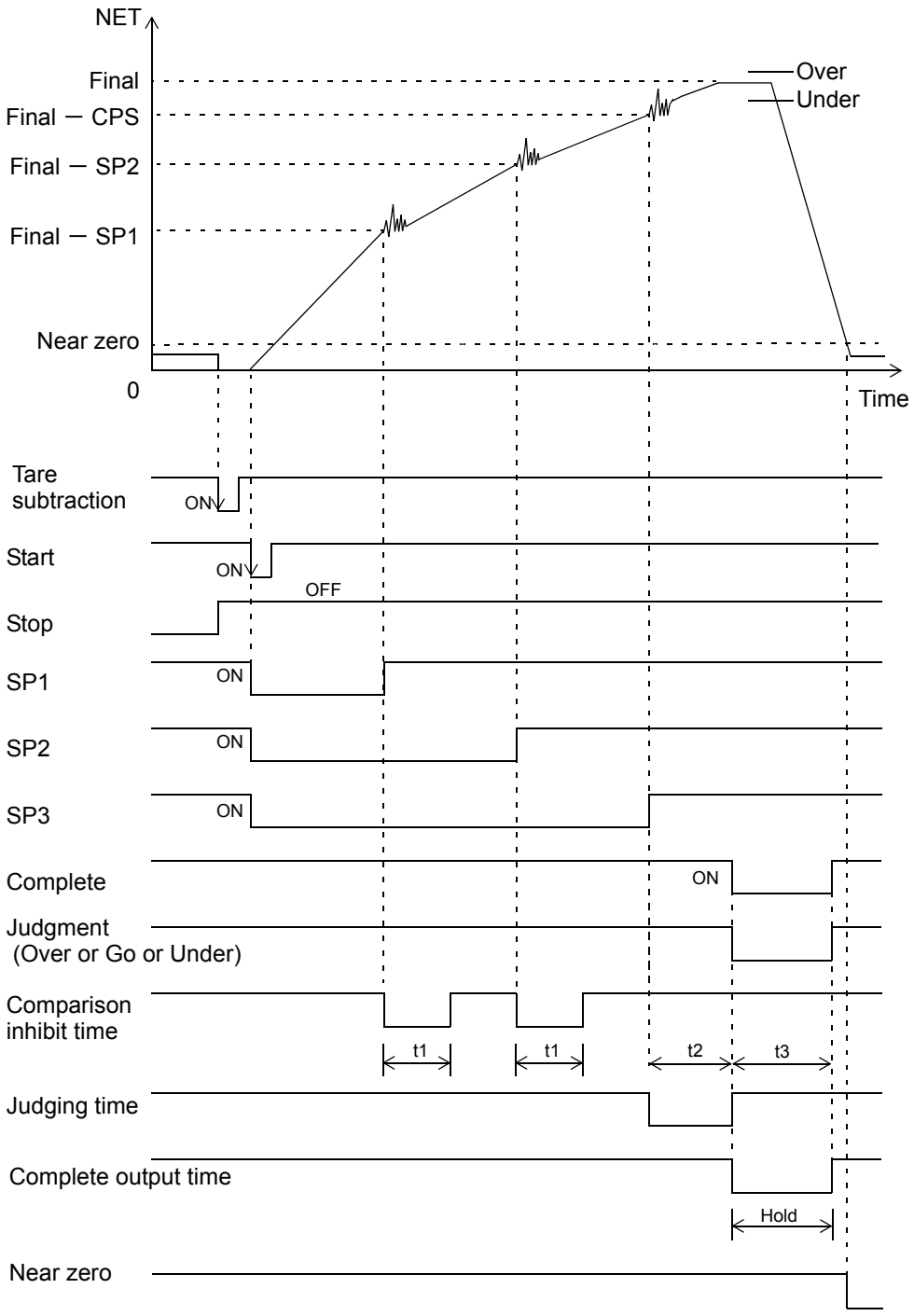
2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.



6-13. Sequence Control

6-13-1. Normal sequence (with judgment)



● The complete signal output timing depends on the setting of the complete output mode of setting code 26.

● Over/under comparisons are made, holding the weight value, when the complete output is ON, deregarding the setting of over/under comparison mode of setting code 27.

● Upper/lower limit comparisons are always made deregarding the setting of the upper/lower limit comparison 2 of setting code 28.

t1 : Comparison inhibit time; comparison inhibit time of setting code 10
t2 : Judging time; judging time of setting code 11
t3 : Complete output time; complete output time of setting code 12

◆ Conditional expressions

・Near zero: ON when the weight value ≦ near zero set value.
・SP1 output: OFF when the weight value ≧ final set value – set point 1 set value.
・SP2 output: OFF when the weight value ≧ final set value – set point 2 set value.
・SP3 output: OFF when the weight value ≧ final set value – compensation set value.

* These turn ON at start-time.

・Under: ON when the weight value < final set value – under set value.
・Over: ON when the weight value > final set value + over set value.
・Go: ON when the final set value + over set value ≧ weight value
≧ final set value – under set value.

● Select the near zero comparison weight value from gross/net with setting code 22.

● Select the SP1/SP2/SP3 output signal and over/go/under judgment signal comparing weight value from gross/net with setting code 20.

Near Zero confirmation at the sequence mode

Setting for confirming whether Near Zero signal ON at the start of weighing.

Weighing will normally start if the Near Zero is ON. “Sequence error 4” is displayed if the Near Zero is OFF.

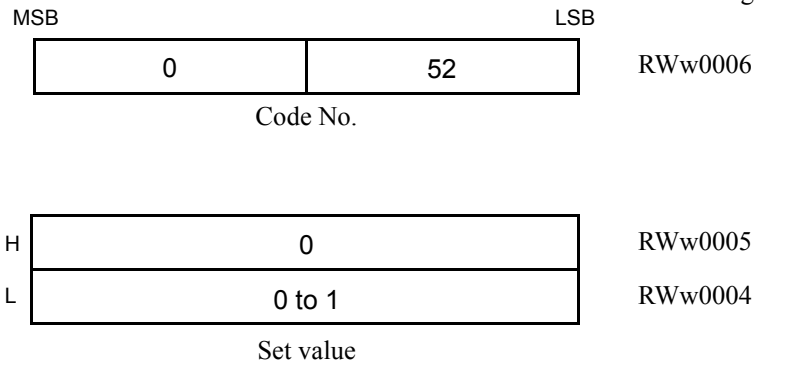
Refer to "6-12-5.Upper limit / Lower limit / Near zero" on p.78 concerning Near Zero setting.

Setting / 1 : Valid <u>0 : Invalid</u>

CC-Link

Write the code No. and set value.

Word size remote register

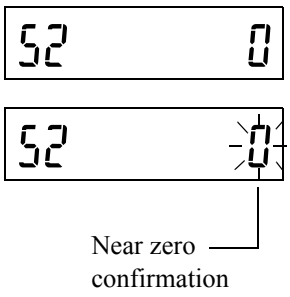


Console

1) Select code 52.

2) Press the ENT key, and then set the near zero confirmation.

3) Determine the setting with the ENT key.

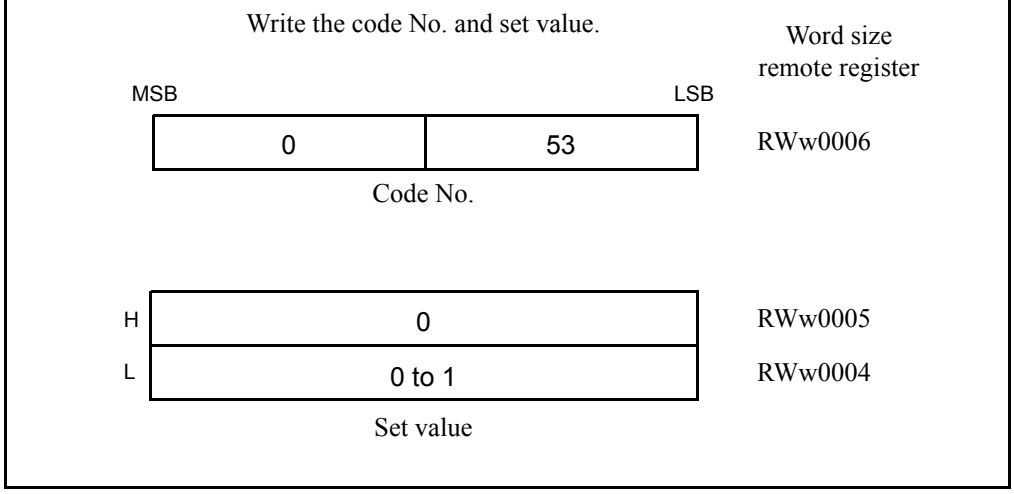


Weight value confirmation at the sequence mode

Confirm whether the weighing value has reached SP1 at the start of weighing.
(select from ON or OFF) If it has, “Sequence error 5” will be displayed.
Refer to "6-12-4.Final / Set point2 / Set point1 / Compensation / Over / Under" on p.75 concerning Set Point 1 setting.

Setting / 1 : Valid 0 : Invalid

CC-Link

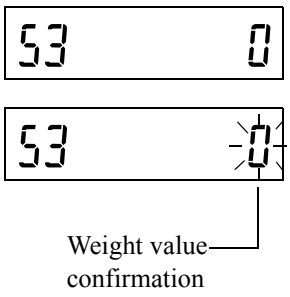


Console

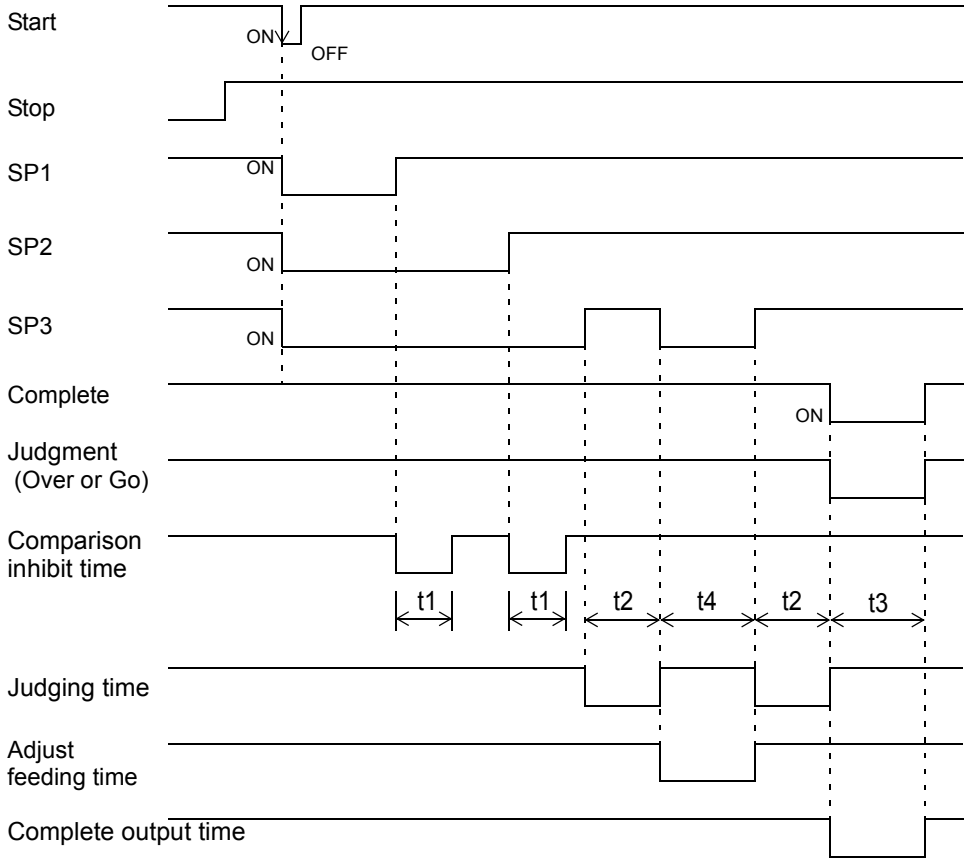
1) Select code 53.

2) Press the ENT key, and then set the weight value confirmation.

3) Determine the setting with the ENT key.



6-13-2. Sequence with adjust feeding valid



● Set adjust feeding ON/OFF in the sequence mode of setting code 51 to ON.

● The complete signal output timing depends on the setting of the complete output mode of setting code 26.

● Over/under comparisons are made, holding the weight value, when the complete output is ON, deregarding the setting of over/under comparison mode of setting code 27.

● Upper/lower limit comparisons are always made deregarding the setting of the upper/lower limit comparison 2 of setting code 28.

t1 : Comparison inhibit time; comparison inhibit time of setting code 10

t2 : Judging time; judging time of setting code 11

t3 : Complete output time; complete output time of setting code 12

t4 : Adjust feeding time; adjust feeding time of setting code 13

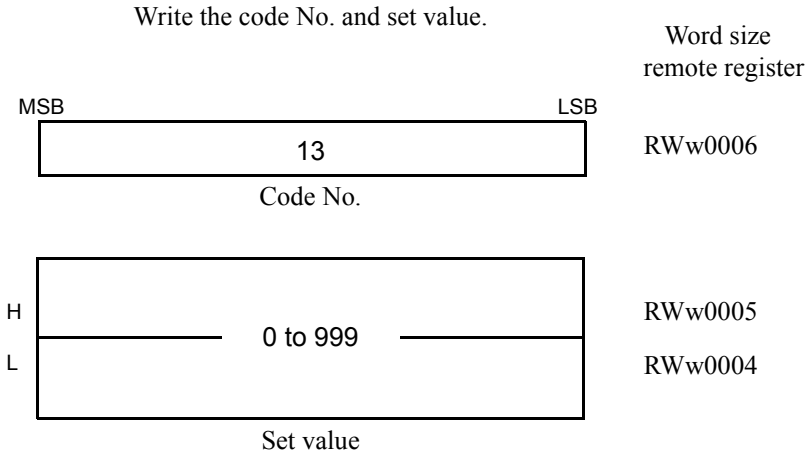
Adjust feeding time

Set the adjust feeding time.

Set value	Setting range	Code No.	Initial value
Adjust feeding time	000 to 999 (0.00 to 9.99 Sec.)	13	100

CC-Link

Write the code No. and set value.

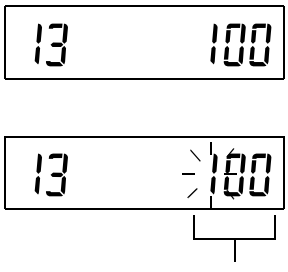


Console

1) Select code 13.

2) Press the ENT key to enter the settings.

3) Determine the setting with the ENT key.



Adjust feeding at the sequence mode

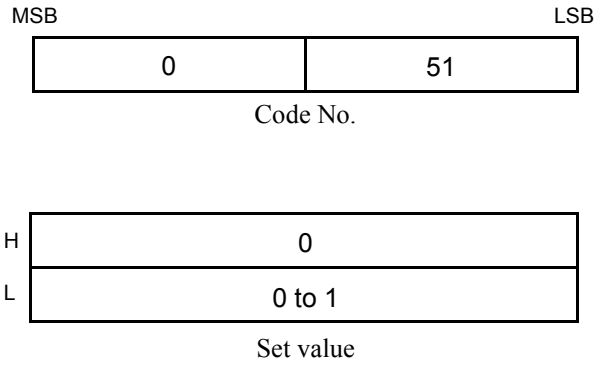
Determines whether adjust feeding is valid or invalid.

Setting / 1 : Valid <u>0 : Invalid</u>

CC-Link

Write the code No. and set value.

Word size remote register

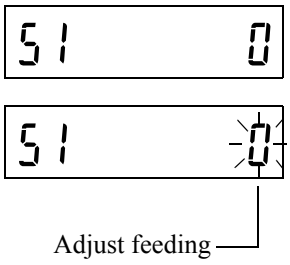


Console

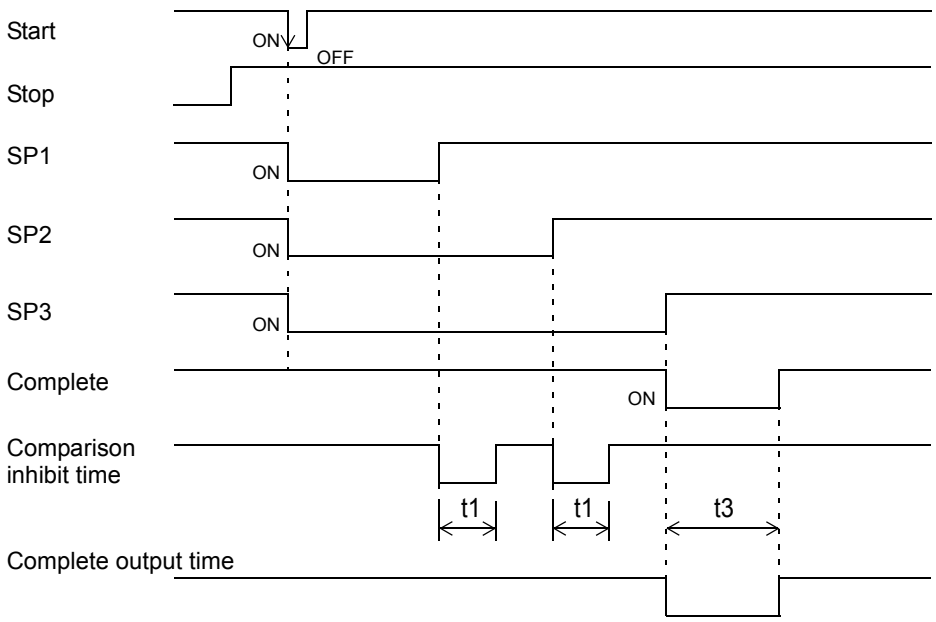
1) Select code 51.

2) Press the ENT key, and then set the Adjust feeding.

3) Determine the setting with the ENT key.



6-13-3. Sequence without judgment



● Over/under judgment is not made when the setting of the number of judging times of setting code 15 is 00.

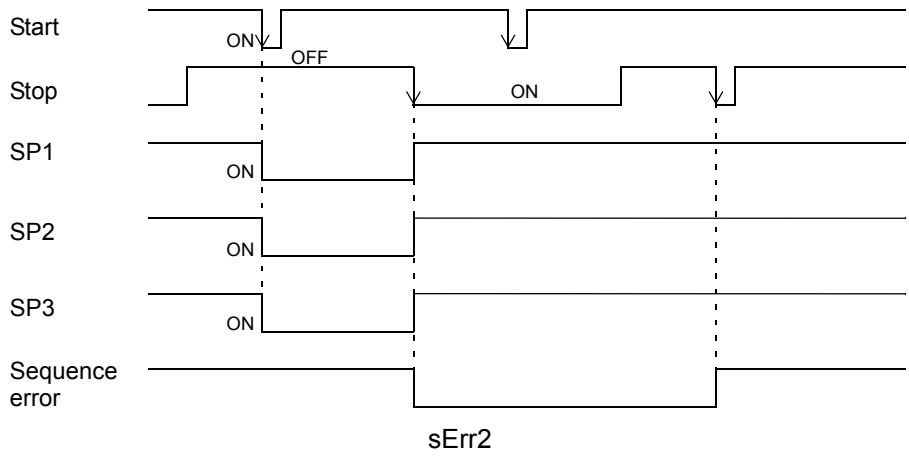
● The complete signal is output at the OFF edge (ON → OFF) of the final (SP3) signal deregarding the setting of the complete output mode of setting code 26.

t1 : Comparison inhibit time; comparison inhibit time of setting code 10

t3 : Complete output time; complete output time of setting code 12

t4 : Adjust feeding time; adjust feeding time of setting code 13

6-13-4. About the stop signal

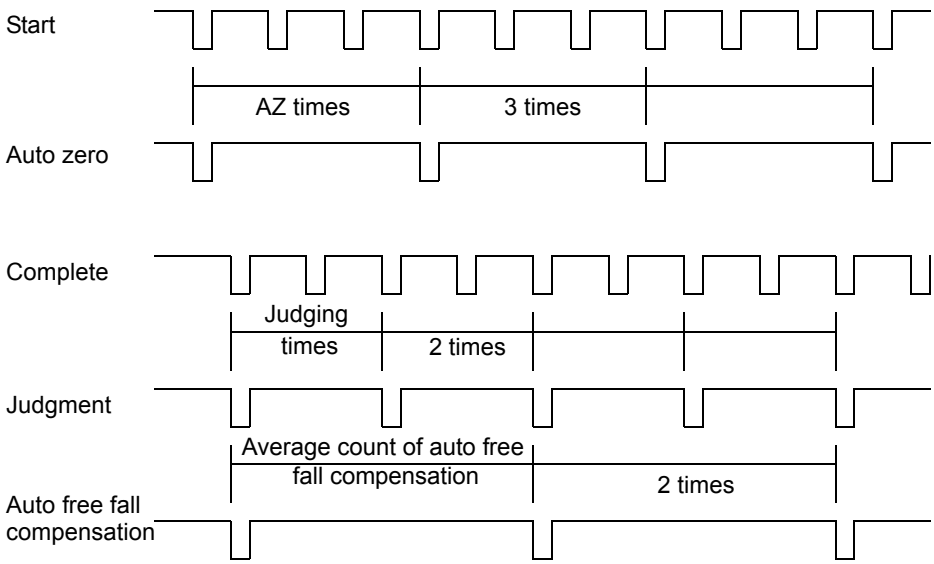


● When the stop signal turns ON, all of the SP1, SP2 and SP3 output signals turn OFF.

● If the start signal is inputted when the stop signal is on the ON level (the sequence stop by external control input or RY0019 by CC-Link communication is ON), sequence error 1 will result.

● To reset the sequence error, input the stop signal or the sequence error reset signal again.

6-13-5. Relationship between auto zero times, judging times, and auto free fall compensation



● When the number of auto zero times is set at 01, auto (digital) zero is applied each time weighing starts. (For weighing in net weight, tare subtraction is carried out.)
When the number of auto zero times is set at 02 – 99, auto zero is applied for every set times.
When the number of auto zero times is set at 00, the auto zero function is OFF. However, digital zero and tare subtraction by console key operation, external input signal, and serial and CC-Link I/F are valid.

● When the number of judging times is set at 01, judgment is made each time weighing ends.
When the number of judging times is set at 02 – 99, judgment is made every set times.
When the number of judging times is set at 00, over/under comparisons are not made.

● Since weight values for auto free fall compensation are sampled at judge-time, the auto free fall compensation function does not work when no judgment is made.

Auto zero times / judging times

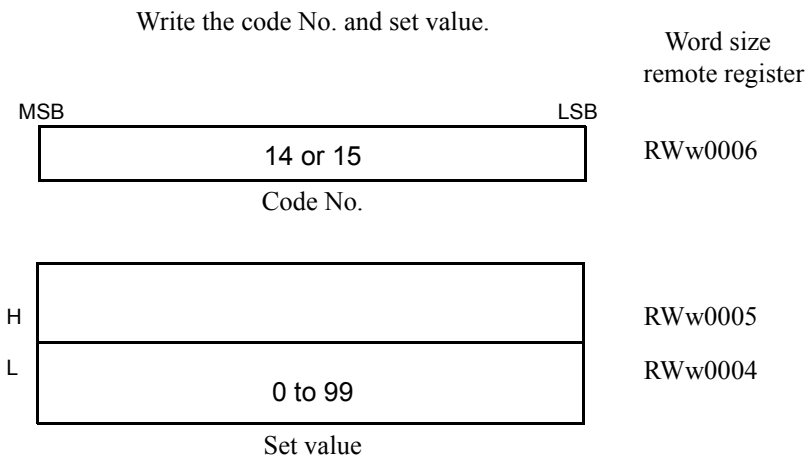
Set the number of auto zero times and the number of judging times in the sequence mode.

Set value	Setting range	Code No.	Initial value
AZ times	00 to 99 (0 to 99 times)	14	01
Judging times		15	01

* When the number of auto zero times is set at zero, the auto zero at start-time becomes invalid.
* When the number of judging times is set at zero, the sequence becomes equal to "sequence without judgment."

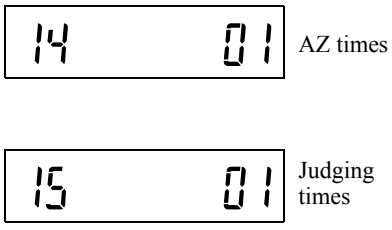
CC-Link

Write the code No. and set value.



Console

1) Select code 14 and 15.
2) Press the ENT key to enter the settings.
3) Determine the setting with the ENT key.



6-13-6. Sequence Error

If the sequence start signal is input under conditions that weighing cannot be performed properly, or if the stop signal is inputted during weighing, a sequence error occurs, and weighing cannot be started until it is canceled. For details of each error, see "12.ERROR CODES" on p.144.

Such a sequence error is canceled by the sequence stop signal (external control input or operational command code 85) or sequence error reset signal (RY001A or operational command code 86).

※ The RY0019 does not include the sequence error reset function. To inhibit the sequence start without resetting the sequence error, turn ON the RY0019.

※ When sequence error 3 occurs, the zero alarm also occurs at the same time, but only the sequence error is canceled. For the method of canceling the zero alarm, see "Digital zero reset" on p.56.

7. REMOTE CONSOLE UNIT

A remote console unit covers all of the F156's functions.

It can suitably be used until startup of a CC-Link system, etc.

Console display rate

Sets the number of times by which the indicated value is updated per second on the remote console unit. Here, the number of updates of the console display can simply be selected. The internal A/D conversion rate and CPU processing speed will stay unchanged.

The display rate is selectable from 27 times/sec., 13 times/sec., 6 times/sec., and 3 times/sec.

Normally, select 27 times/sec. If the indicated value is hard to read due to flickering at the rate of 27 times/sec., decrease the display rate.

Setting / 3 : 27 times/sec 2 : 13 times/sec 1 : 6 times/sec 0 : 3 times/sec

CC-Link

Write the code No. and set value.

Word size remote register

MSB		LSB	
0	38		RWw0006

Code No.

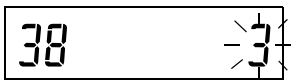
H	0	RWw0005
L	0 to 3	RWw0004

Set value

Console

1) Select code 38.

2) Press the ENT key, and then set the Console display rate.

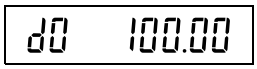


3) Determine the setting with the ENT key.

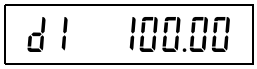
Console display rate

7-1. C110 Operation

Monitor mode

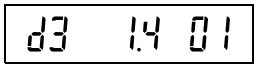


Gross (-sign, 5-digit, decimal place, zero suppression)

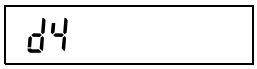


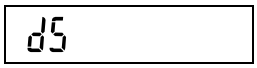
Net (-sign, 5-digit, decimal place, zero suppression)

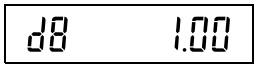
Tare weight (-sign, 5-digit, decimal place, zero suppression)



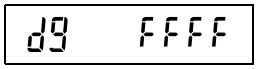
CC-Link settings (baud rate, station No.)





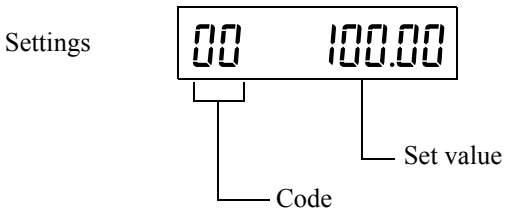


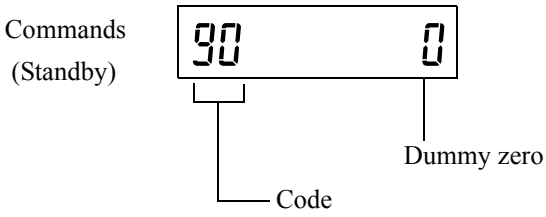
Firmware version

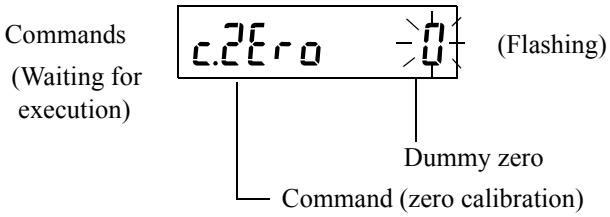


Checksum data

Setting mode



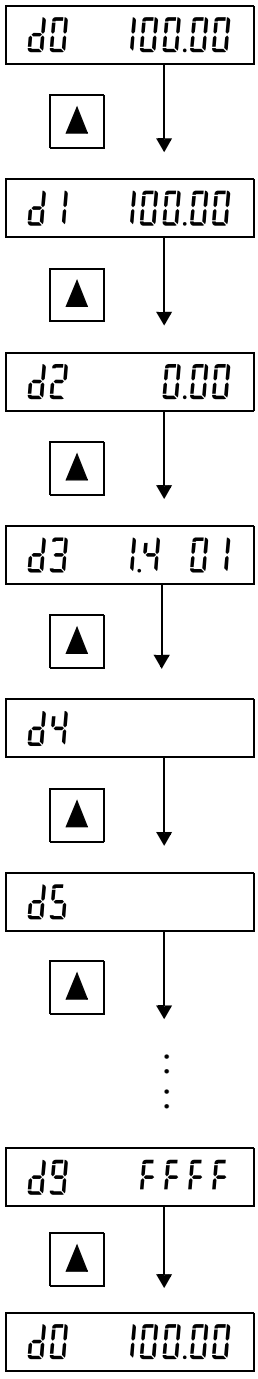




* When no operation is performed for one minute or more in the setting mode, the monitor mode is restored automatically.

Monitor change

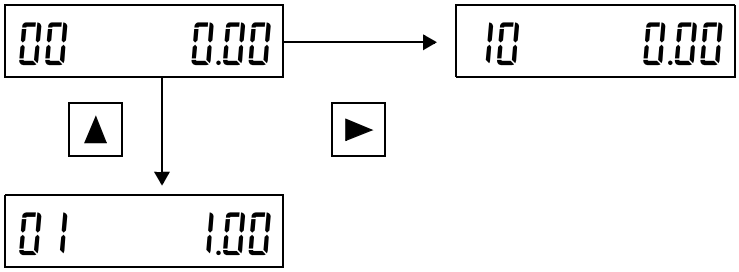
Change the display with the ▲ key.



Reading out of set value

Press the SET key to switch between the monitor mode and setting mode.

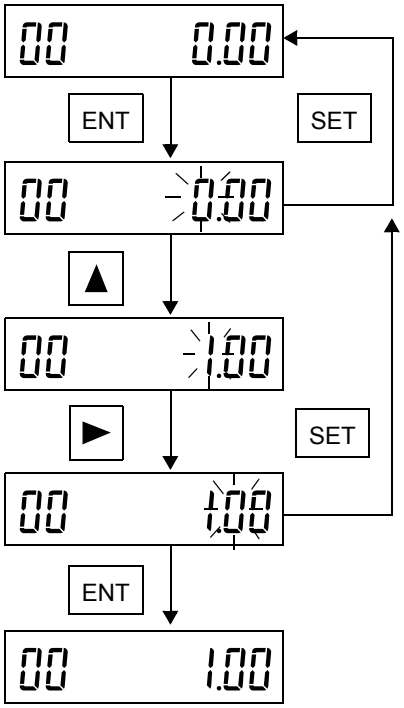
Change the lower digit of the setting code with the ▲ key, and the higher digit with the ► key.



Set value change

After inputting the setting code, start changing with the ENT key, shift the digit with the ► key, change the value with the ▲ key, and stop changing with the SET key.

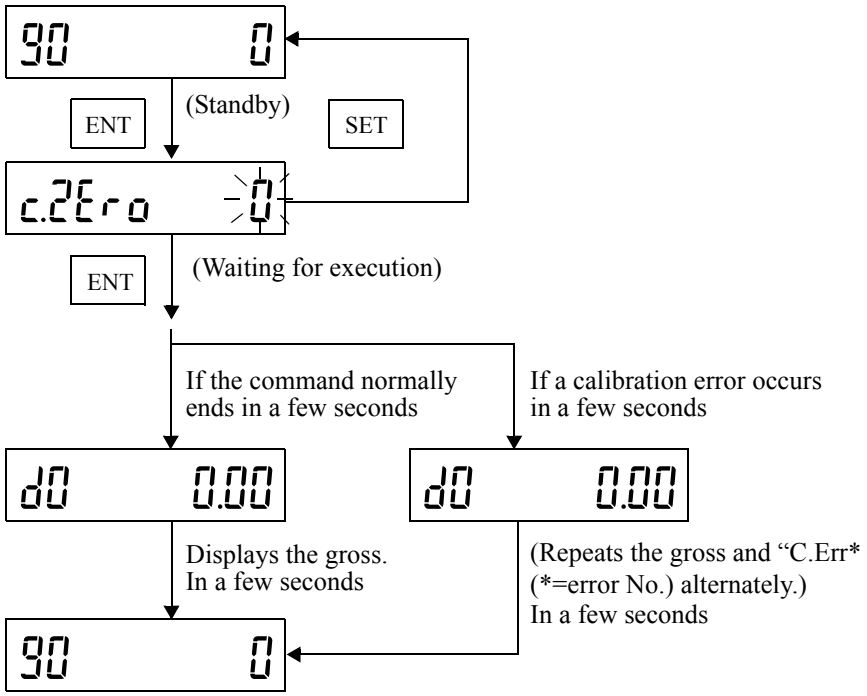
After setting a desired value, register it with the ENT key.



Command execution (zero calibration for example)

Press the ENT key for the command, and then execute it with the ENT key again.

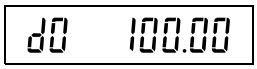
To stop executing the command, press the SET key.



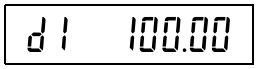
(Returns to standby after the command ends)

7-2. C120 Operation

Monitor mode

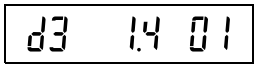


Gross (-sign, 5-digit, decimal place, zero suppression)

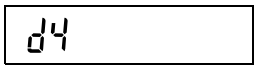


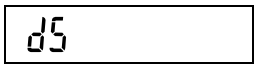
Net (-sign, 5-digit, decimal place, zero suppression)

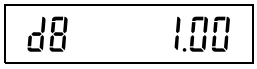
Tare weight (-sign, 5-digit, decimal place, zero suppression)



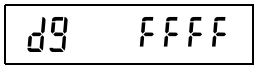
CC-Link settings (baud rate, station No.)





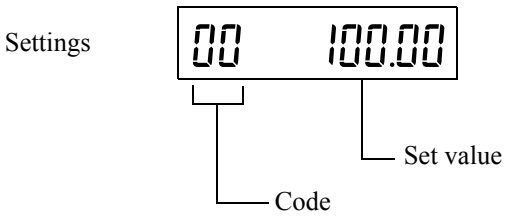


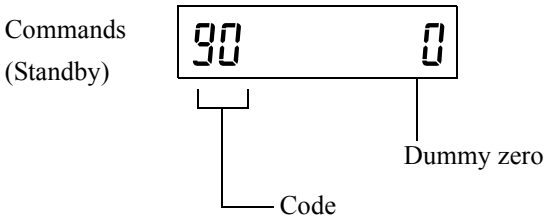
Firmware version

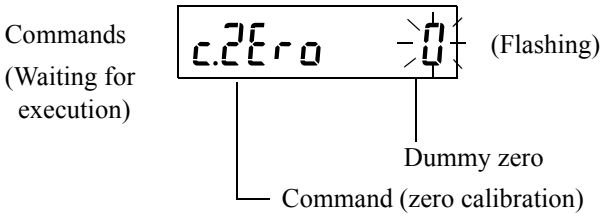


Checksum data

Setting mode

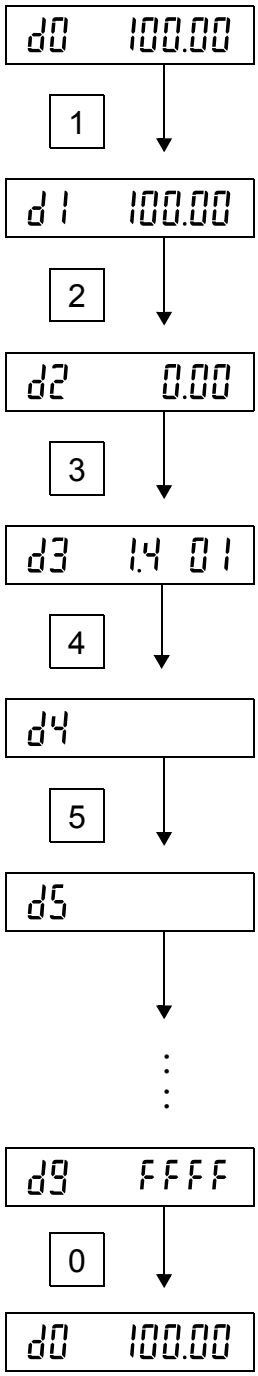






Monitor change

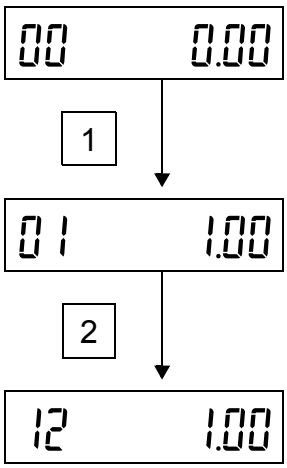
Change the display with the [0] to [9] keys.



Reading out of set value

Press the [*] key to switch between the monitor mode and setting mode.

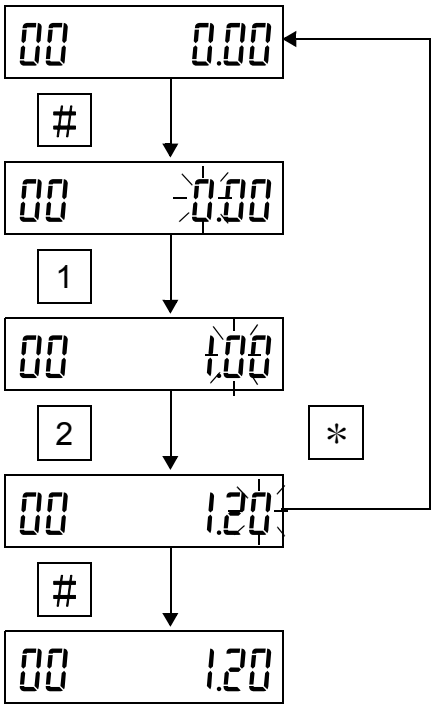
Press numerical keys twice to determine the setting code.



Set value change

Input the setting code, start changing with the [#] key, register the value and shift the digit with numerical keys, and stop changing with the [*] key.

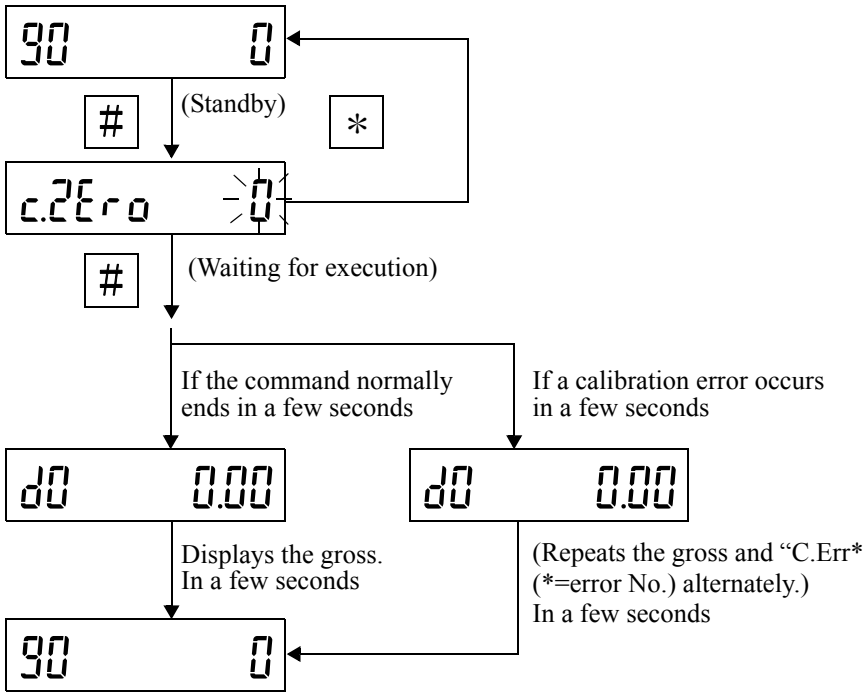
After setting a desired value, register it with the [#] key.



Command execution (zero calibration for example)

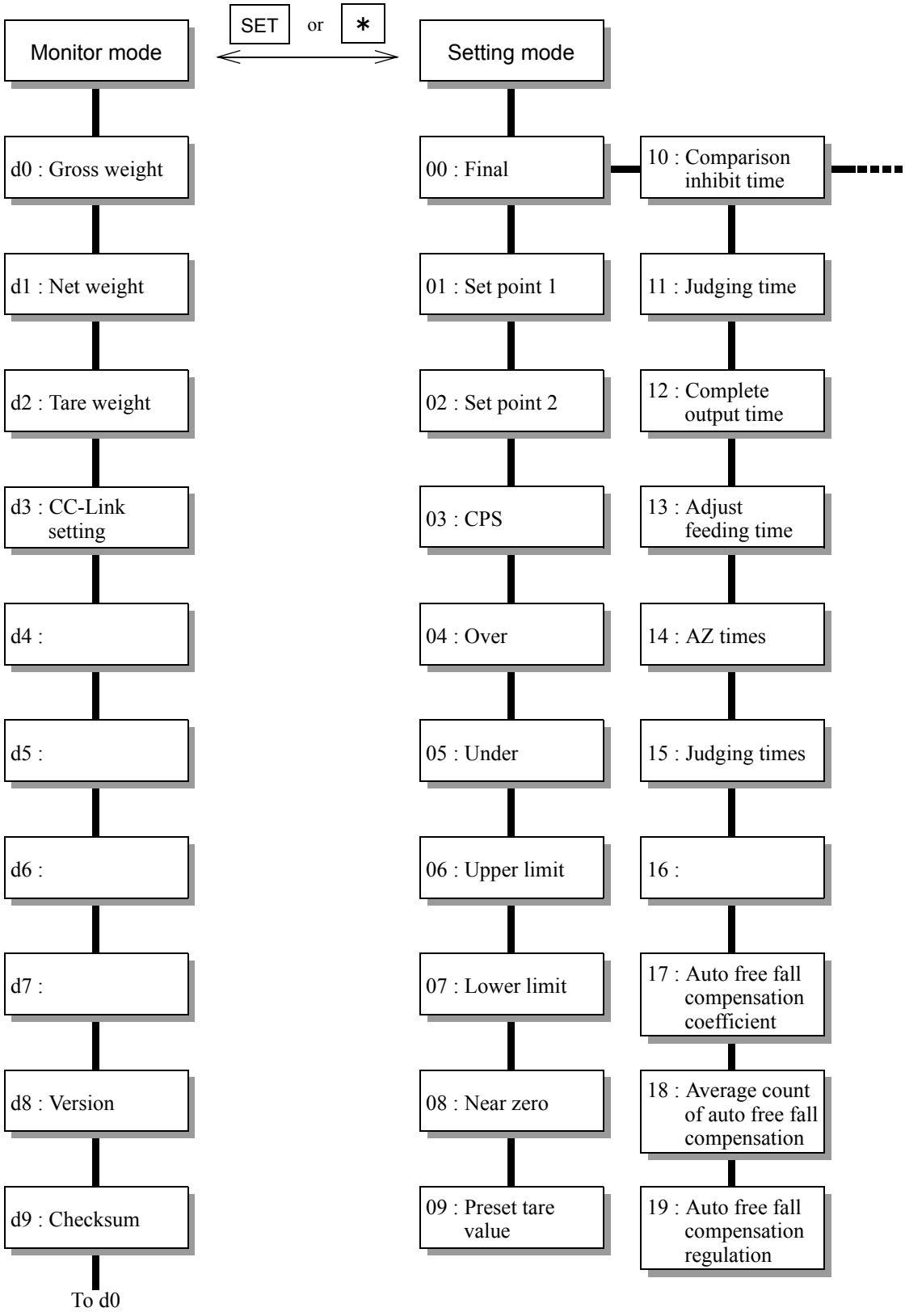
Press the [#] key for the command, and then execute it with the [#] key again.

To stop executing the command, press the [*] key.

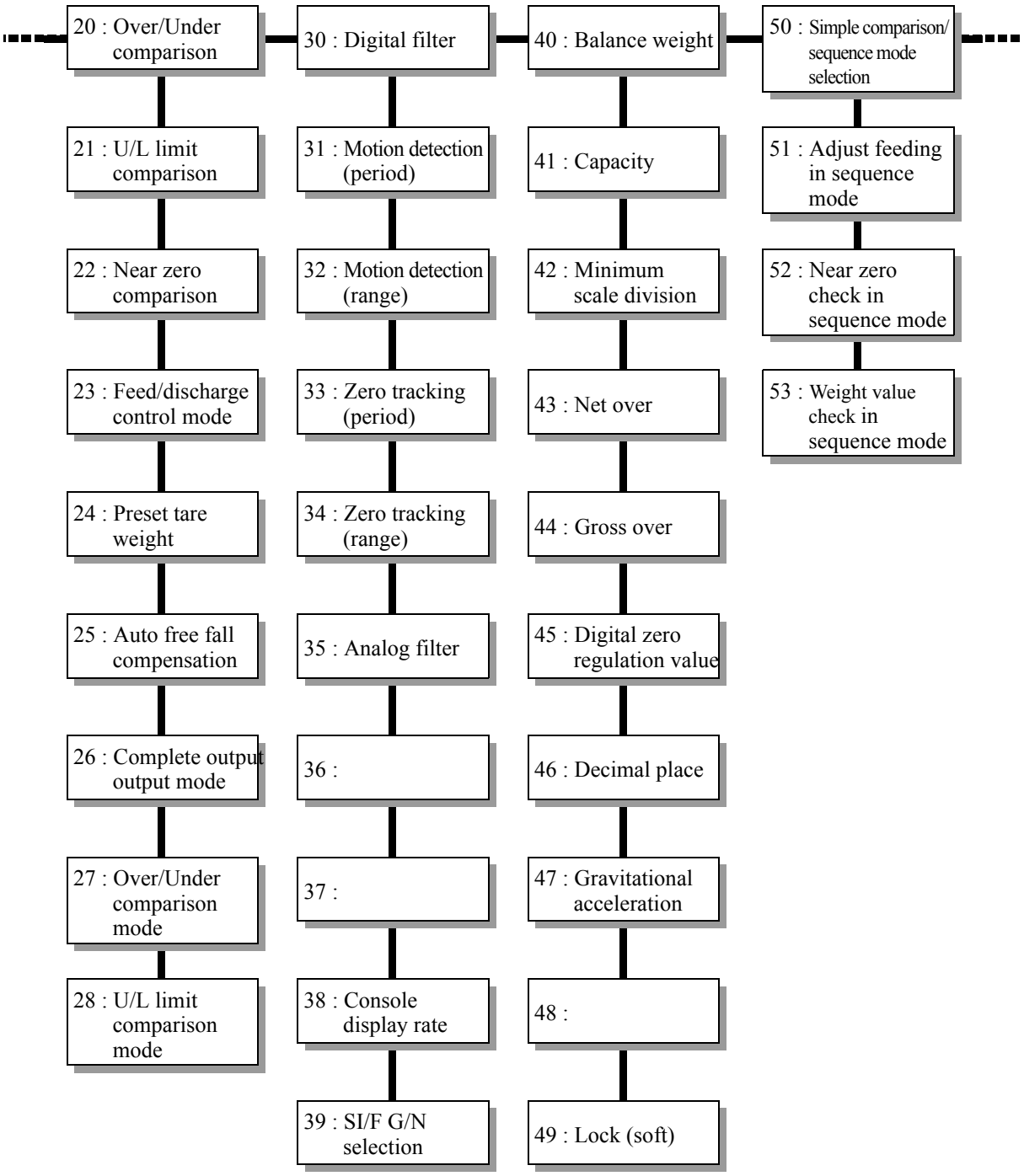


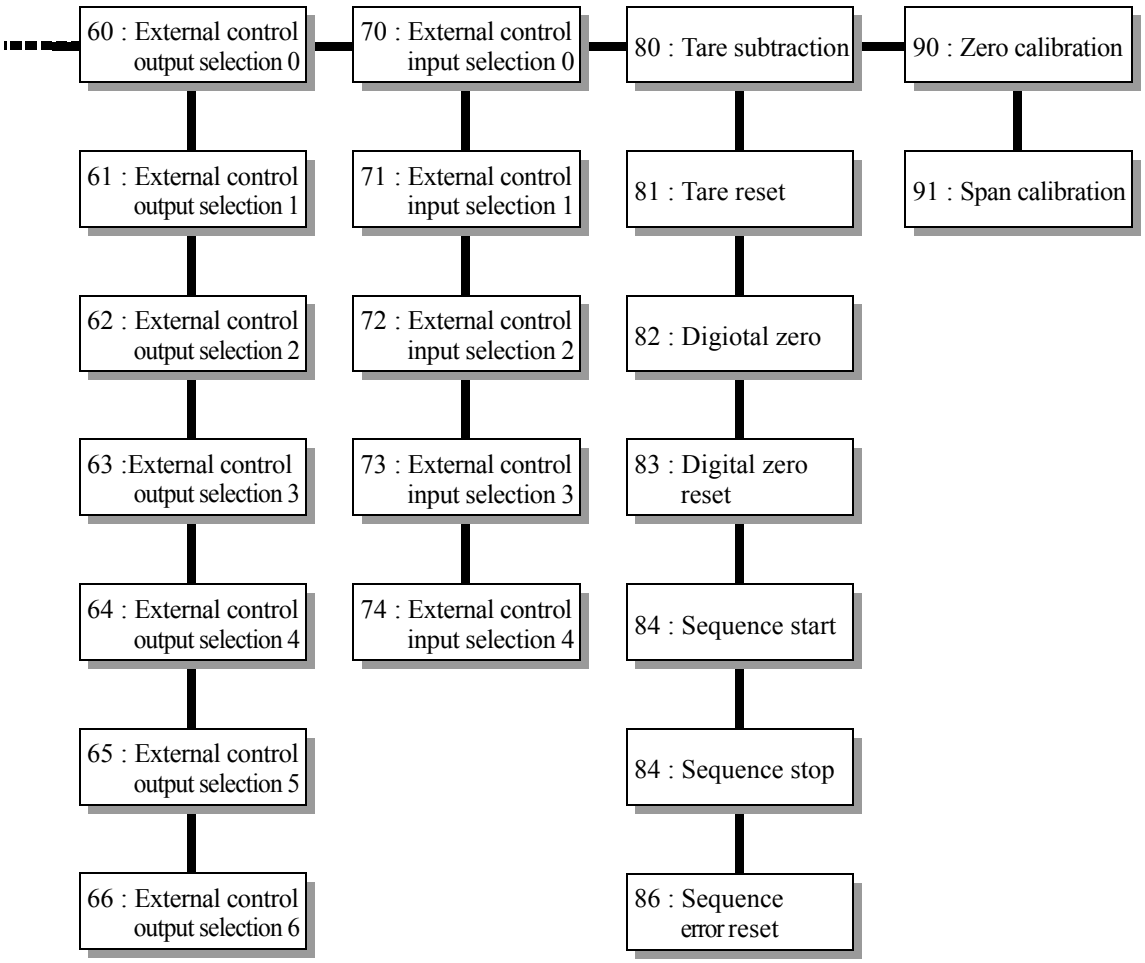
(Returns to standby after the command ends)

7-3. Mode Tree Chart



・You can move between the ▬▬ lines with the ▲ and ► keys(C110), or between the ▬▬ lines with numerical keys (C120) sequentially.




60 : External control output selection 0
70 : External control input selection 0
80 : Tare subtraction
90 : Zero calibration
61 : External control output selection 1
71 : External control input selection 1
81 : Tare reset
91 : Span calibration
62 : External control output selection 2
72 : External control input selection 2
82 : Digiotal zero
63 :External control output selection 3
73 : External control input selection 3
83 : Digital zero reset
64 : External control output selection 4
74 : External control input selection 4
84 : Sequence start
65 : External control output selection 5
84 : Sequence stop
66 : External control output selection 6
86 : Sequence error reset

8. EXTERNAL INPUT/OUTPUT (Amphenol Connector)

The external input/output signals are selective.

Select necessary signals and set them to each port.

However, in the case of redundant settings to input signals, operation is performed as follows:

- For the timing of edge operation

  Functional operation is performed at the edge of any of the input ports assigned with the same signal.

- For the timing of level operation

  The port the largest in number among the input ports assigned with the same signal becomes valid.

8-1. Connector Pin Assignments

Output assignments

Pin No.	Port	Setting code	Initially-specified signal
1	COM (Output power GND)		
2	External control output 0	60	01 (SP1)
3	External control output 1	61	02 (SP2)
4	External control output 2	62	03 (SP3)
5	External control output 3	63	04 (Under)
6	External control output 4	64	05 (Go)
7	External control output 5	65	07 (Complete)
8	COM (Output power GND)		
9	External control output 6	66	11 (Stable)

Output allocation

Setting value	Signal	Setting value	Signal
00	Near zero	09	Lower limit
01	SP1	10	Upper limit
02	SP2	11	Stable
03	SP3	12	Weight error
04	Under	13	Sequence error
05	Go	14	Final error
06	Over	15	In operation (RUN)
07	Complete	16	Clock (in an approximately one-second cycles)
08	Normally OFF		

Input assignments

Pin No.	Port	Setting code	Initially-specified signal
10	External control input 0	70	0 (Digital zero reset)
11	External control input 1	71	1 (Digital zero)
12	External control input 2	72	2 (Tare subtraction)
13	External control input 3	73	3 (Tare reset)
14	External control input 4	74	4 (Hold or Judge)

Setting value	Signal	Operation timing
0	Digital zero reset	ON edge
1	Digital zero	ON edge
2	Tare subtraction	ON edge
3	Tare reset	ON edge
4	Hold or Judge	Level
5	Feed/Discharge	Level
6	Sequence start	ON edge
7	Sequence stop	Level, ON edge
8	No function	

8-2. Output (Meanings of Signals)

◆ For normal feed/discharge signals, see "6-12-4.Final / Set point2 / Set point1 / Compensation / Over / Under" on p.75.

◆ For weight errors and sequence errors, see "12.ERROR CODES" on p.144.

◆ No. 15 “In operation (RUN)” is normally ON, and turns OFF in the following cases:

① When an internal reset occurs due to overflow of the watchdog timer of the CPU

② When the exciter power supply voltage drops

③ When a calibration error occurs

④ When an input-over (plus/minus) error occurs

⑤ When the digital zero adjustment value exceeds the DZ regulation value of code 45

◆ The final error turns ON when the CPS set value > final set value.

8-3. Input (Meanings of Signals)

・Digital zero reset (Edge input)

Resets the zero point correction value by digital zero at the ON edge, and also cancels the zero alarm if it has occurred.

・Digital zero (Edge input)

Zeros the gross value at the edge input. However, the zeroing range is within the set digital zero regulation value. If the value is outside this range, it is not zeroed but the weight error (zero alarm) occurs.

・Tare subtraction (Edge input)

Does tare subtraction at the edge input, and zeros the net value.

・Tare reset (Edge input)

Cancels tare subtraction at the edge input.

・Hold or judgment (Level input)

Valid only in simple comparison mode.

If either or both of setting code 27; over/under comparison mode, and setting code 28; U/L limit comparison mode is set at 1 (comparisons are made when the external judgment input is ON), level input of judgment will result, while in other cases, the weight value and the result of comparison at the ON edge will be held until the input turns OFF. In the case of hold input, operation will result on OR condition with the RY0014 signal.

・Feed / Discharge (Level input)

Valid only in setting code 23; feed/discharge control mode is set at 2 (external selection (external control input)).

Feed control will result at OFF, and discharge control will result at ON.

・Sequence start (Edge input)

Valid only in sequence mode.

Starts the sequence at the ON edge. If the sequence stop is on the ON level, the sequence will not start but sequence error 1 will occur.

▪ Sequence stop (Edge input, Level input)

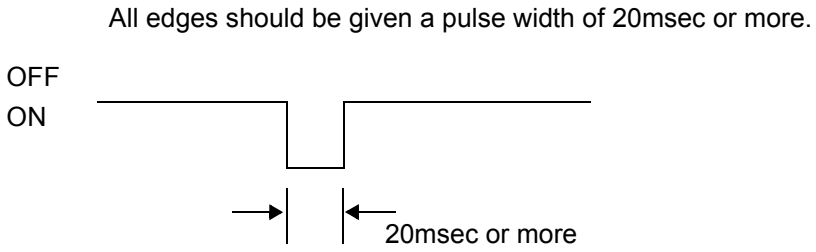
Valid only in sequence mode.

Resets the sequence error at the ON edge. If the sequence has already been in execution, the sequence will stop and sequence error 2 will newly occur.

The sequence start is inhibited on the ON level.

▪ No function

Sets for input pins that are not used.



9. SI/F 2-WIRE SERIAL INTERFACE

This 2-wire serial interface is for connecting F156 to peripheral equipment such as printers or remote displays. No polarity is needed for this simple, low-cost installation.

A two-core parallel cable or a cabtyre cable (Wire with covering thickened for construction) may be used for connection.

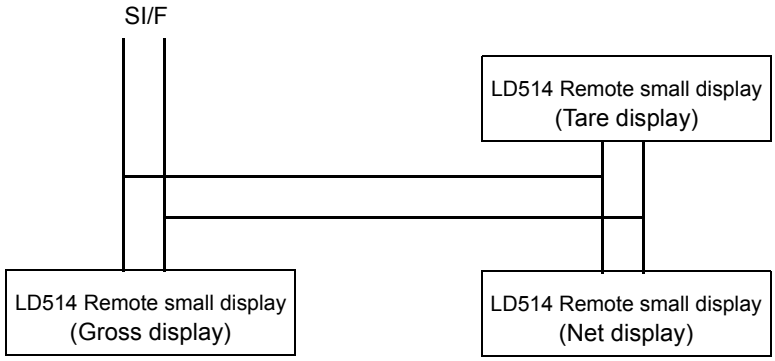
When a two-core parallel cable or a cabtyre cable is used, the transmitting distance is approximately 30m (32.8yds). When a two-core shielded twisted pair cable is used, the transmitting distance is approximately 300m (328yds).

● Connection

Up to 3 peripheral units can be connected in parallel.

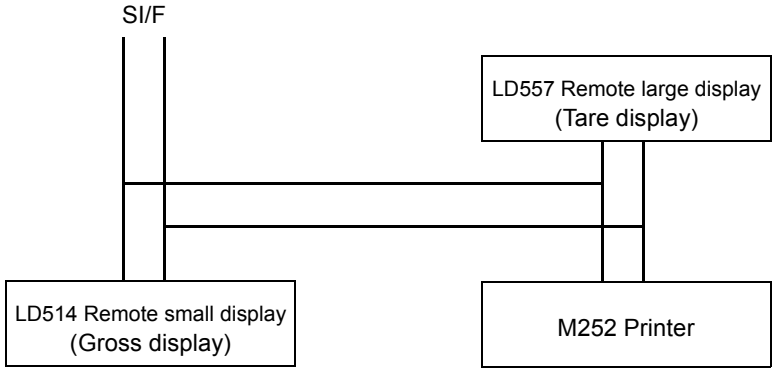
It should not run along side AC or other high-voltage wiring. It may cause of malfunction.

Example 1



Up to 3 remote small displays can be connected. The each display can display individual content according to the selection.

Example 2



These indicated above are examples for the connection of Remote small displays, Remote large display and printer. Each display and printer can select the data individually.

● About the auto print command

The F156 can output the auto print command to the printer or display connected to the SI/F.

The auto print command is output when the complete signal turns ON. Therefore, if the final and over/under comparison is set at “comparison OFF,” the auto print command is not output.

SI/F G/N selection

Select the weight value displayed/printed on the device connected to the SI/F.

Setting / 1 : Net weight 0 : Gross weight

CC-Link

Write the code No. and set value.

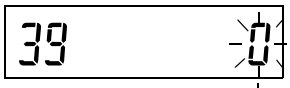
Word size remote register

	MSB	LSB	
	0	39	RWw0006
	Code No.		
H	0		RWw0005
L	0 or 1		RWw0004
	Set value		

Console

1) Select code 39.

2) Press the ENT key, and then set the SI/F G/N selection.



3) Determine the setting with the ENT key.

SI/F G/N selection

Irrespective of this setting, information including net weight, gross weight, and tare weight is always sent from the F156, and some devices connected to the SI/F allow selection of the weight value displayed/printed on the device side. In such a case, this setting is validated by setting the weight value displayed/printed as indicator display value.

10. RS-232C INTERFACE

10-1. Communication Settings

Through the RS-232C interface, you can read indicated values and write set values.
Decide the communication mode with the rotary switch and DIP SW on the main body.

Rotary switch (mode and baud rate)

No.	Mode and baud rate
0	Console mode (C110 or C120)
1	1200 bps
2	2400 bps
3	4800 bps
4	9600 bps
5	19200 bps
6	38400 bps
7	Setting disabled
8	
9	

DIP SW

No.	Function	ON	OFF
4	Parity bit	Odd	Even
3	Parity bit	Available	Unavailable
2	Stop bit	2bit	1bit
1	Data length	7bit	8bit

Switch No. 1 – 4 of DIP SW are settings for the RS-232C. These settings have meanings only when the power is turned on. If you change any of the settings, turn the power off and on again.
The terminator is fixed at CR.

10-2. Connector Pin Assignments

Connect to the connector on the front panel.

Connector : HOSIDEN TCP8080-01-020 (Attachment)

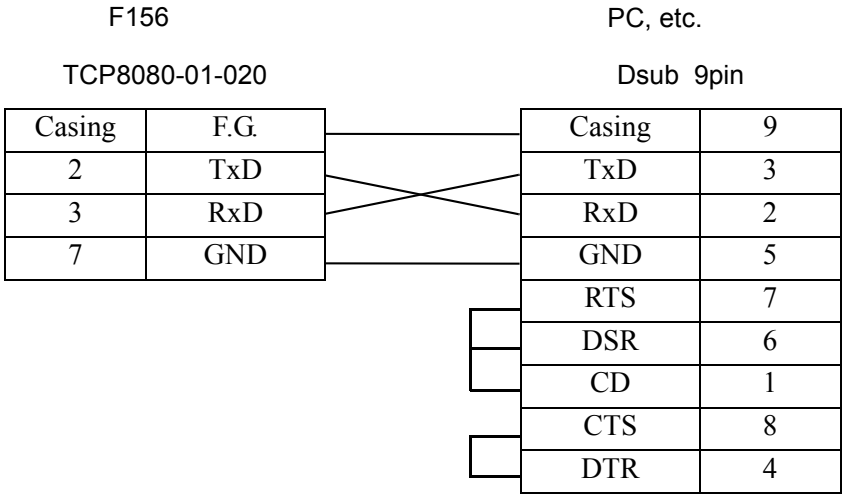
Pin No.		Signal
1		
2	OUT	TxD
3	IN	RxD
4		
5		
6	OUT	+5V
7	*	GND
8		
Casing	*	F.G

Example of cabling

An example of cabling for a DTE terminal, such as a PC, is given below.

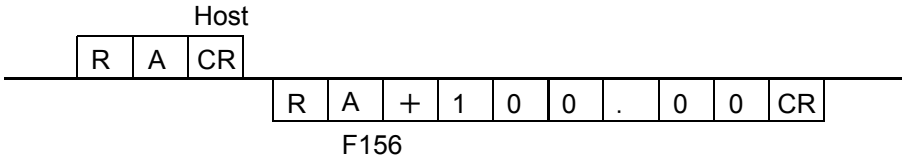
Changes may be made depending on the equipment to be connected.

For details, see the instruction manual of the equipment to be connected.

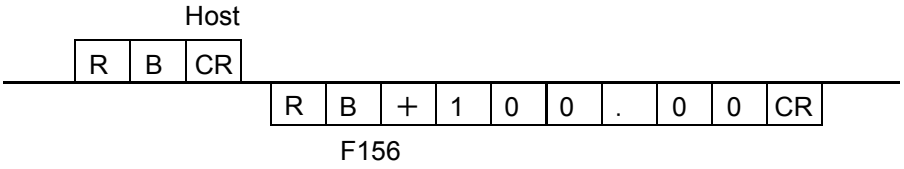


10-3. Communication Format

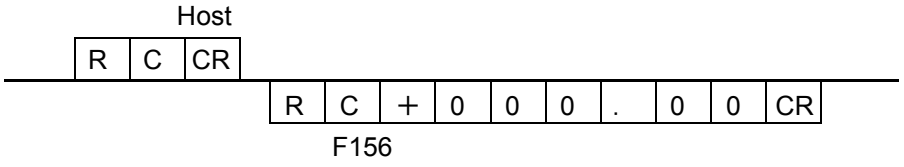
○ Reading out of the gross weight (sign, 5-digit weight, decimal place)



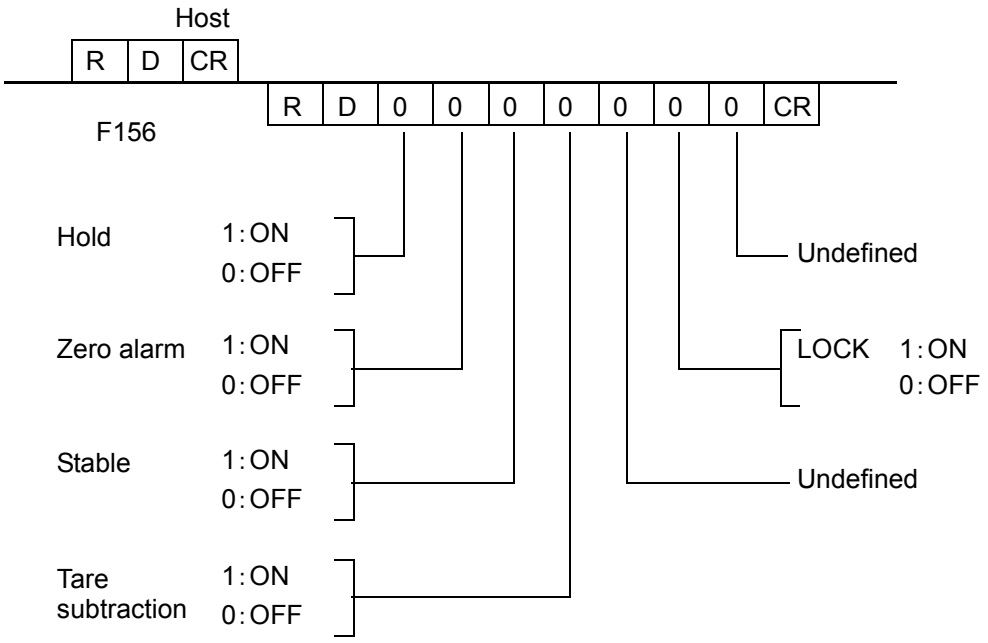
○ Reading out of the net weight (sign, 5-digit weight, decimal place)



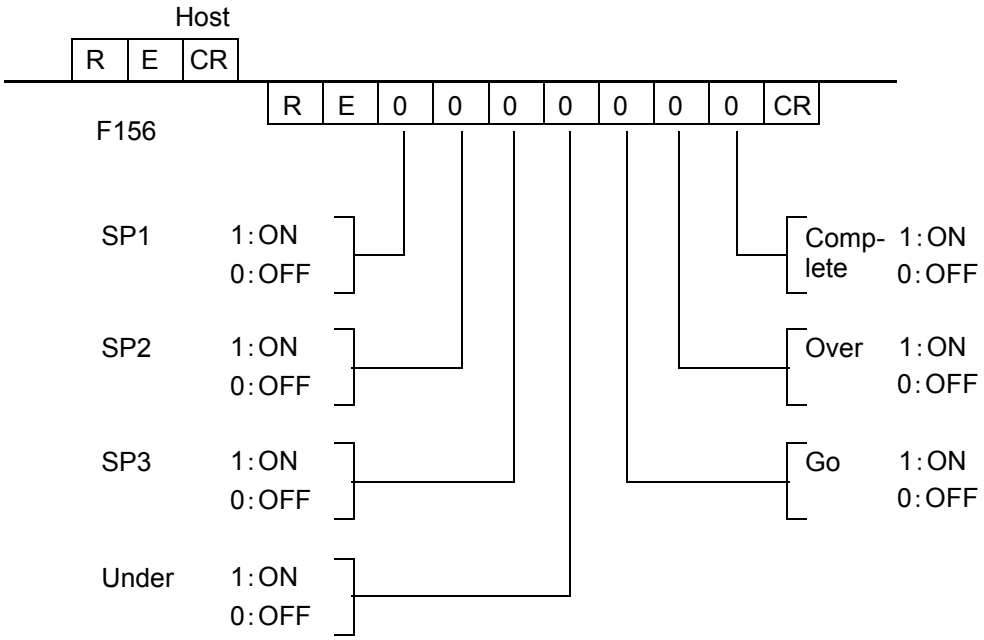
○ Reading out of the tare weight (sign, 5-digit weight, decimal place)



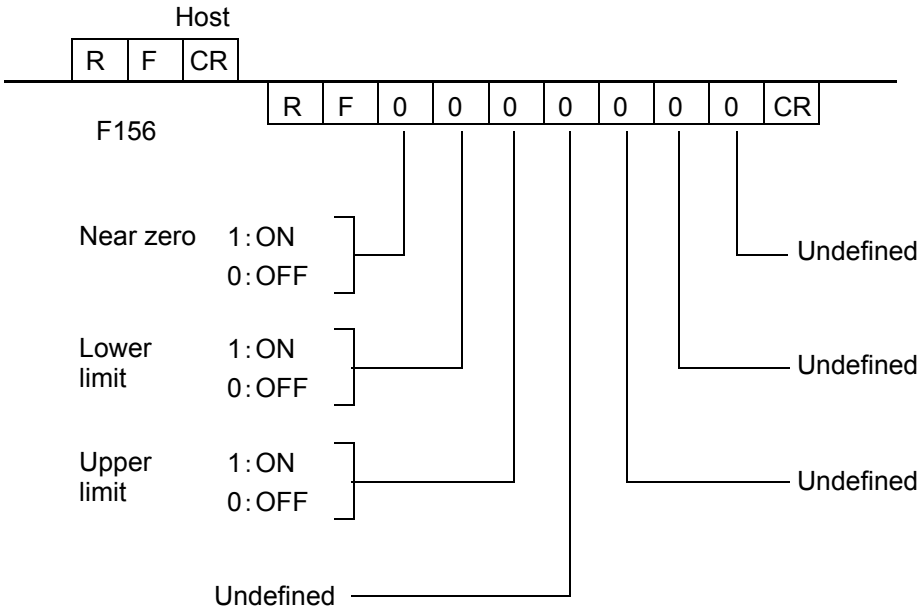
○ Status 1 (7-digit)



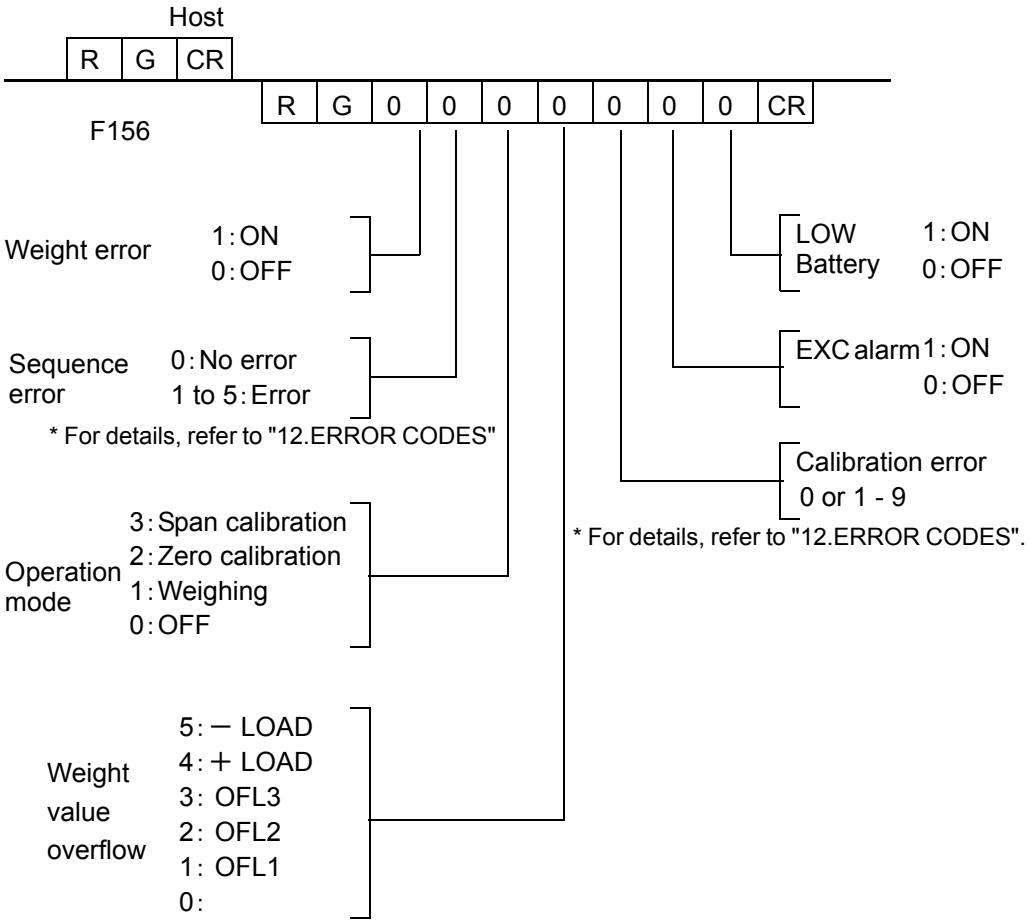
○ Status 2 (7-digit)



○ Status 3 (7-digit)

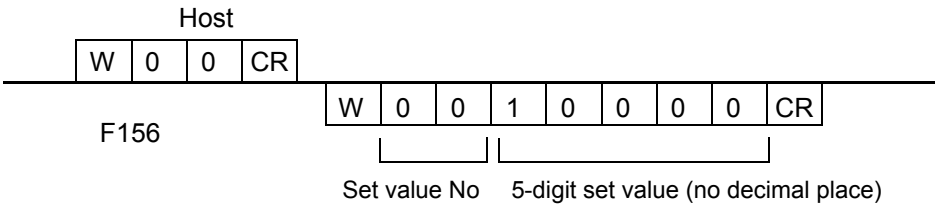


○ Status 4 (7-digit)



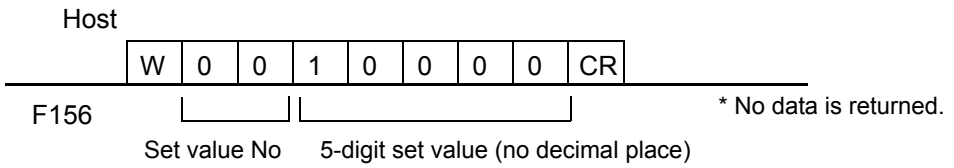
○ Reading out of a set value

Example) Final value



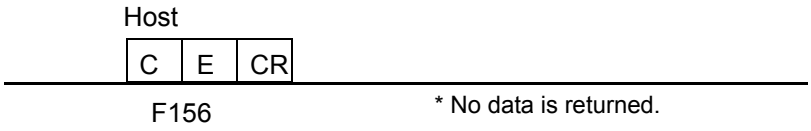
○ Writing of a set value

Example) Final value

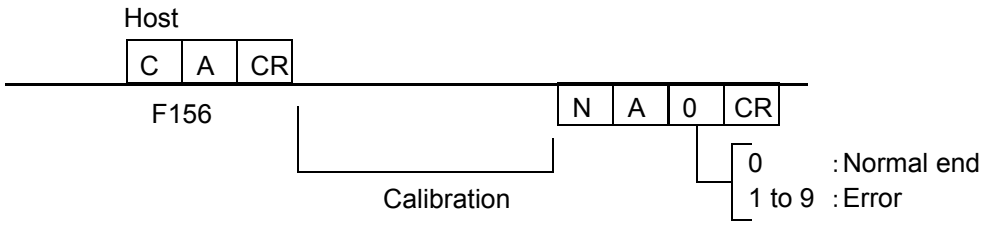


○ Command

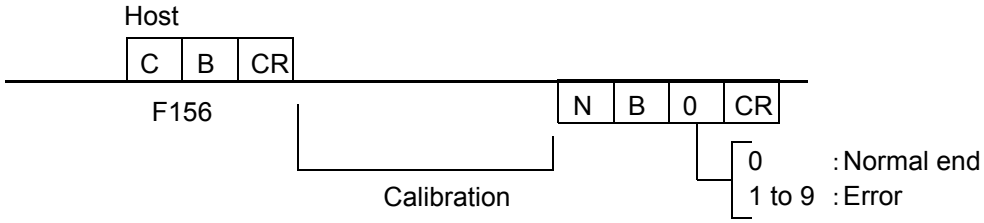
Example) Tare subtraction



Example) Zero calibration



Example) Span calibration



* Before sending these commands, set the capacity, minimum scale division, balance weight value, etc.

10-4. List of Set Value

Final

W	0	0						CR

SP1

W	0	1						CR

SP2

W	0	2						CR

CPS

W	0	3	0					CR

Over

W	0	4	0	0				CR

Under

W	0	5	0	0				CR

Upper limit

W	0	6						CR

Lower limit

W	0	7						CR

Near zero

W	0	8						CR

Preset tare value

W	0	9						CR

Comparison inhibit time

W	1	0	0	0				CR

Judging time

W	1	1	0	0				CR

Complete output time

W	1	2	0	0				CR

Adjust feeding time

W	1	3	0	0				CR

Auto zero times

W	1	4	0	0	0			CR

Judging times

W	1	5	0	0	0			CR

Auto free fall compensation coefficient

W	1	7	0	0	0	0		CR

Average count of auto free fall compensation

W	1	8	0	0	0	0		CR

Auto free fall compensation regulation

W	1	9						CR

Over/Under comparison

W	2	0	0	0	0	0		CR

U/L limit comparison

W	2	1	0	0	0	0		CR

Near zero comparison

W	2	2	0	0	0	0		CR

Feed/discharge control mode

W	2	3	0	0	0	0		CR

Preset tare weight

W	2	4	0	0	0	0		CR

Auto free fall compensation

W	2	5	0	0	0	0		CR

Complete output mode

W	2	6	0	0	0	0		CR

Over/Under comparison mode

W	2	7	0	0	0	0		CR

U/L limit comparison mode

W	2	8	0	0	0	0		CR

Digital filter

W	3	0	0	0	0	0		CR

Motion detection (period)

W	3	1	0	0	0			CR

Motion detection (range)

W	3	2	0	0	0			CR

Zero tracking (period)

W	3	3	0	0	0			CR

Zero tracking (range)

W	3	4	0	0	0			CR

Analog filter

W	3	5	0	0	0			CR

Console display rate (LCD)

W	3	8	0	0	0	0		CR

SI/F G/N selection

W	3	9	0	0	0	0		CR

Balance weight

W	4	0						CR

Capacity

W	4	1						CR

Minimum scale division

W	4	2	0	0				CR

Net over

W	4	3						CR

Gross over

W	4	4						CR

Digital zero regulation value

W	4	5	0					CR

Decimal place

W	4	6	0	0	0	0		CR

Gravitational acceleration

W	4	7	0	0	0			CR

Lock (Soft)

W	4	9	0	0	0	0		CR

Simple comparison / Sequence mode selection

W	5	0	0	0	0	0		CR

Adjust feeding in sequence mode

W	5	1	0	0	0	0		CR

Near zero check in sequence mode

W	5	2	0	0	0	0		CR

Weight value check in sequence mode

W	5	3	0	0	0	0		CR

External control output selection 0

W	6	0	0	0	0			CR

External control output selection 1

W	6	1	0	0	0			CR

External control output selection 2

W	6	2	0	0	0			CR

External control output selection 3

W	6	3	0	0	0			CR

External control output selection 4

W	6	4	0	0	0			CR

External control output selection 5

W	6	5	0	0	0			CR

External control output selection 6

W	6	6	0	0	0			CR

External control input selection 0

W	7	0	0	0	0	0		CR

External control input selection 1

W	7	1	0	0	0	0		CR

External control input selection 2

W	7	2	0	0	0	0		CR

External control input selection 3

W	7	3	0	0	0	0		CR

External control input selection 4

W	7	4	0	0	0	0		CR

10-5. List of Command

Zero calibration

C	A	CR

Digital zero

C	G	CR

Span calibration

C	B	CR

Digital zero reset

C	H	CR

Tare subtraction

C	E	CR

Sequence start

C	I	CR

Tare reset

C	F	CR

Sequence stop

C	J	CR

11. THE LIST OF INITIAL SETTING CODE

Setting Value

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
00	Final	000.00				P.75
01	SP1	000.00				P.75
02	SP2	000.00				P.75
03	CPS	00.00				P.75
04	Over	0.00				P.75
05	Under	0.00				P.75
06	Upper limit	000.00				P.78
07	Lower limit	000.00				P.78
08	Near zero	000.00				P.78
09	Preset tare value	000.00				P.53

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
10	Comparison inhibit time	0.50	○		○	P.83
11	Judging time	1.50	○		○	P.83
12	Complete output time	3.00	○		○	P.83
13	Adjust feeding time	1.00	○			P.96
14	Auto zero times	01	○		○	P.100
15	Judging times	01	○		○	P.100
16						
17	Auto free fall compensation coefficient	0	○		○	P.86
18	Average count of auto free fall compensation	4	○		○	P.86
19	Auto free fall compensation regulation	098.00	○			P.86

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
20	Over/Under comparison	0	○		○	P.79
21	U/L limit comparison	0	○		○	P.79
22	Near zero comparison	0	○		○	P.79
23	Feed/discharge control mode	0	○		○	P.72
24	Preset tare weight	0	○		○	P.54
25	Auto free fall compensation	1	○		○	P.86
26	Complete output mode	0	○		○	P.85
27	Over/Under comparison mode	0	○		○	P.81
28	U/L limit comparison mode	0	○		○	P.82
29						

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
30	Digital filter	4	○		○	P.62
31	Motion detection (period)	1.5	○		○	P.57
32	Motion detection (range)	10	○		○	P.57
33	Zero tracking (period)	0.0	○		○	P.59
34	Zero tracking (range)	00	○		○	P.59
35	Analog filter	2	○		○	P.63
36						
37						
38	Console display rate (LCD)	3	○		○	P.103
39	SI/F G/N selection	0			○	P.122

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
40	Balance weight	100.00	○	○	○	P.43
41	Capacity	100.00	○	○	○	P.41
42	Minimum scale division	0.01	○	○	○	P.42
43	Net over	999.99	○	○	○	P.64
44	Gross over	999.99	○	○	○	P.65
45	Digital zero regulation value	02.00	○	○	○	P.55
46	Decimal place	2	○	○	○	P.40
47	Gravitational acceleration	09	○	○	○	P.61
48						
49	Lock (Soft)	0			○	P.49

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
50	Simple comparison / Sequence mode selection	0	○		○	P.73
51	Adjust feeding in sequence mode	0	○		○	P.97
52	Near zero check in sequence mode	0	○		○	P.93
53	Weight value check in sequence mode	0	○		○	P.94
54						
55						
56						
57						
58						
59						

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
60	External control output selection 0	01	○		○	P.117
61	External control output selection 1	02	○		○	P.117
62	External control output selection 2	03	○		○	P.117
63	External control output selection 3	04	○		○	P.117
64	External control output selection 4	05	○		○	P.117
65	External control output selection 5	07	○		○	P.117
66	External control output selection 6	11	○		○	P.117
67						
68						
69						

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
70	External control input selection 0	0	○		○	P.118
71	External control input selection 1	1	○		○	P.118
72	External control input selection 2	2	○		○	P.118
73	External control input selection 3	3	○		○	P.118
74	External control input selection 4	4	○		○	P.118
75						
76						
77						
78						
79						

Operational Commands

For details of each function, see "8-3.Input (Meanings of Signals)" on p.119.

For sequence error reset, see "6-13-6.Sequence Error" on p.102.

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
80	Tare subtraction	---------				P.52
81	Tare reset	---------				P.52
82	Digital zero	---------				P.56
83	Digital zero reset	---------				P.56
84	Sequence start	---------				P.119
85	Sequence stop	---------				P.120
86	Sequence error reset	---------				P.102
87						
88						
89						

Setting CODE	Function	Initial value	SOFT LOCK	LOCK SW	NOV. RAM	Page number
90	Zero calibration	---------	○	○		P.44
91	Span calibration	---------	○	○		P.47
92						
93						
94						
95						
96						
97						
98						
99						

* LOCKSW corresponds to switch No. 6 of DIP SW. When this switch is ON, the lock is valid. SOFT LOCK corresponds to “Lock (Soft)” of setting code 49. When this setting is “1,” the lock is valid.

11-1. Setting Range Details of the Set Value

Code		Set value
00	Final	(00000 to 99999)
01	SP1	(00000 to 99999)
02	SP2	(00000 to 99999)
03	CPS	(0000 to 9999)
04	Over	(000 to 999)
05	Under	(000 to 999)
06	Upper limit	(00000 to 99999)
07	Lower limit	(00000 to 99999)
08	Near zero	(00000 to 99999)
09	Preset tare value	(00000 to 99999)
10	Comparison inhibit time	(0.00 to 9.99)
11	Judging time	(0.00 to 9.99)
12	Complete output time	(0.00 to 9.99)
13	Adjust feeding time	(0.00 to 9.99)
14	Auto zero times	(00 to 99)
15	Judging times	(00 to 99)
17	Auto free fall compensation coefficient	(0 to 3) 3 1/4 2 1/2 1 3/4 0 1
18	Average count of auto free fall compensation	(1 to 9)
19	Auto free fall compensation regulation	(00000 to 99999)

Code

20 Over/Under comparison (0 to 2)

- 2 Comparison OFF
- 1 Net weight
- 0 Gross weight

21 U/L limit comparison (0 to 2)

- 2 Comparison OFF
- 1 Net weight
- 0 Gross weight

22 Near zero comparison (0 to 2)

- 2 Comparison OFF
- 1 Net weight
- 0 Gross weight

23 Feed/discharge control mode (0 to 3)

- 3 External selection (CC-Link)
- 2 External selection (External Control Input)
- 1 Discharging
- 0 Feeding

24 Preset tare weight (0 , 1)

- 1 Valid
- 0 Invalid

25 Auto free fall compensation (0 to 2)

- 2 External selection
- 1 Valid
- 0 Invalid

26 Complete output mode (0 to 2)

- 2: ON by the complete output time after stability of the weight value or a lapse of the judging time
- 1: ON by the complete output time after stability of the weight value and a lapse of the judging time
- 0: ON by the complete output time after a lapse of the judging time

Code

27 Over/Under comparison mode

(0 to 3)

- 3: Comparison, holding the weight value, when the complete signal is ON
- 2: Comparison when the complete signal is ON
- 1: Comparison when the external judgment input is ON
- 0: Continuous comparison

28 U/L limit comparison mode

(0 , 1)

- 1: Comparison when the external judgment input is ON
- 0: Continuous comparison

30 Digital filter

(0 to 8)

8	256 times	3	8 times
7	128 times	2	4 times
6	64 times	1	2 times
5	32 times	0	OFF
4	16 times		

31 Motion detection (period) (0.0 to 9.9)

32 Motion detection (range) (00 to 99)

33 Zero tracking (period) (0.0 to 9.9)

34 Zero tracking (range) (00 to 99)

35 Analog filter

(0 to 3)

- 3 8Hz
- 2 6Hz
- 1 4Hz
- 0 2Hz

38 Console display rate

(0 to 3)

- 3 27 times/sec
- 2 13 times/sec
- 1 6 times/sec
- 0 3 times/sec

39 SI/F G/N selection

(0, 1)

- 1 Net weight
- 0 Gross weight

Code

40	Balance weight	(00000 to 99999)
41	Capacity	(00000 to 99999)
42	Minimum scale division	(001 to 100)
43	Net over	(00000 to 99999)
44	Gross over	(00000 to 99999)
45	Digital zero regulation value	(0000 to 9999)
46	Decimal place	(0 to 3)
47	Gravitational acceleration	(01 to 16)
49	Lock (Soft)	(0, 1)

50 Simple comparison/ Sequence mode selection

(0, 1)

- 1 Sequence mode
- 0 Simple comparison

51 Adjust feeding ON/OFF in sequence mode

(0, 1)

- 1 Valid
- 0 Invalid

52 Near zero check ON/OFF in sequence mode

(0, 1)

- 1 Valid
- 0 Invalid

53 Weight value check ON/OFF in sequence mode

(0, 1)

- 1 Valid
- 0 Invalid

60 External control output selection 0
61 External control output selection 1
62 External control output selection 2
63 External control output selection 3
64 External control output selection 4
65 External control output selection 5
66 External control output selection 6

In any of these outputs (0 – 16), the selected output of each value is as follows:

Value	Output event	Value	Output event
0	Near zero	9	Lower limit
1	SP1	10	Upper limit
2	SP2	11	Stable
3	SP3	12	Weight error
4	Under	13	Sequence error
5	Go	14	Final error
6	Over	15	In operation (RUN)
7	Complete	16	Clock (in an approximately one-second cycle)
8	(Normally OFF)		

* To disable the output, allocate “normally OFF” (8).

70 External control input selection 0
71 External control input selection 1
72 External control input selection 2
73 External control input selection 3
74 External control input selection 4

(0 – 8)
Selections of setting values are as follows:

Setting value	Function
0	Digital Zero Reset
1	Digital Zero
2	Tare Subtraction
3	Tare Reset
4	Hold or judgment
5	Feed/Discharge
6	Sequence Start
7	Sequence Stop
8	No Function

12. ERROR CODES

Error code and Error assistance code

When both are 0, there is no error.

Error codes are “1” for calibration errors, “2” for weight errors, “3” for command errors, “4” for system errors, and “5” for sequence errors. The description of each error and corresponding error assistance code are as shown below.

◇ Calibration errors (error code=1)

Contents of error	Error assistance code	Console message
The zero point must be re-calibrated.	1	cErr1
The initial tare is above the zero adjustment range.	2	cErr2
The initial tare is minus.	3	cErr3
The entered balance weight value is greater than the maximum capacity.	4	cErr4
The entered balance weight value is "00000".	5	cErr5
The output of the load cell is short of the span adjustment range.	6	cErr6
The output of the load cell is minus.	7	cErr7
The output of the load cell is over the span adjustment range.	8	cErr8
The weight value is not stable and calibration stopped.	9	cErr9

◇ Weight errors (error code=2)

Contents of error	Error assistance code	Console message
A/D converter input over	1	LoAd
A/D converter input minus over	2	-LoAd
Net > net over set value	3	oFL1
Gross > capacity + 9 scale divisions	4	oFL2
Gross > gross over set value	5	oFL3
Zero alarm	6	No change

◇ Command errors (error code=3)

Contents of error	Error assistance code	Console message
Command not in the command list	1	No change
Attempt to write read-only data Attempt to read out write-only data Attempt to write with the lock ON	2	No change
Writing data larger than 99999	3	No change
During zero calibration or span calibration	4	No change

◇ System errors (error code=4)

Contents of error	Error assistance code	Console message
EXC alarm (*) Obstacles to the exciter power supply	1	SHtdn
Low battery Back-up battery voltage drop	2	No change
* The EXC alarm has priority over other errors. Therefore, if two or more errors including this error occur at the same time, the error code becomes 41.		

◇ Sequence error (error code=5)

Contents of error	Error assistance code	Console message
The stop signal is ON when weighing starts.	1	sErr1
The stop signal turned ON during weighing to stop weighing.	2	sErr2
Auto zero was operated by the setting of auto zero times, giving a zero alarm.	3	sErr3
The near zero signal is OFF when weighing starts. (when the check is set at ON)	4	sErr4
The weight value ≧ SP1* when weighing starts. (when the check is set at ON)	5	sErr5

* SP1 = Final – Set point 1

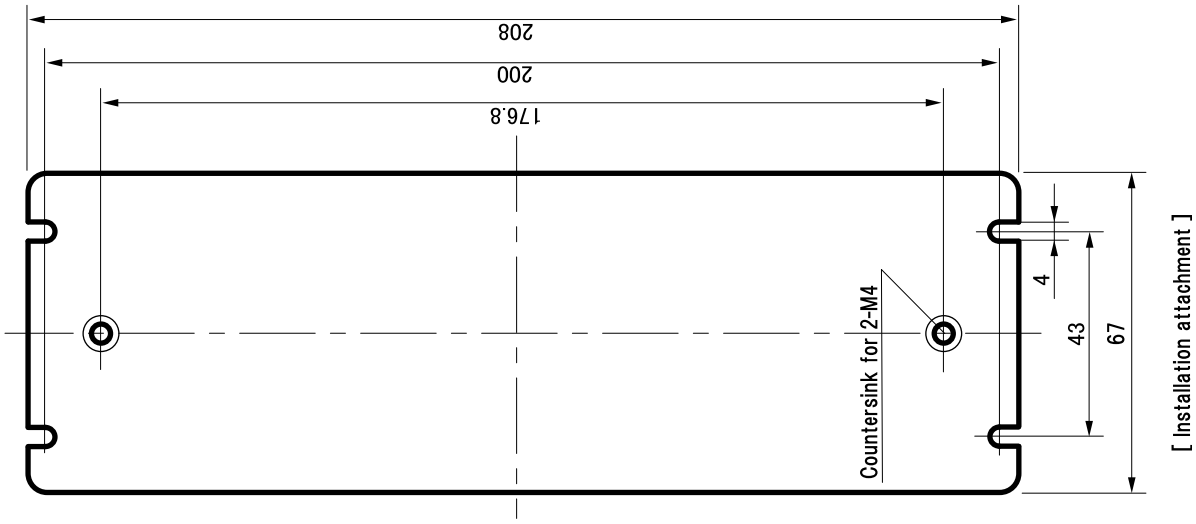
When two or more errors occur, priority is given as shown below.

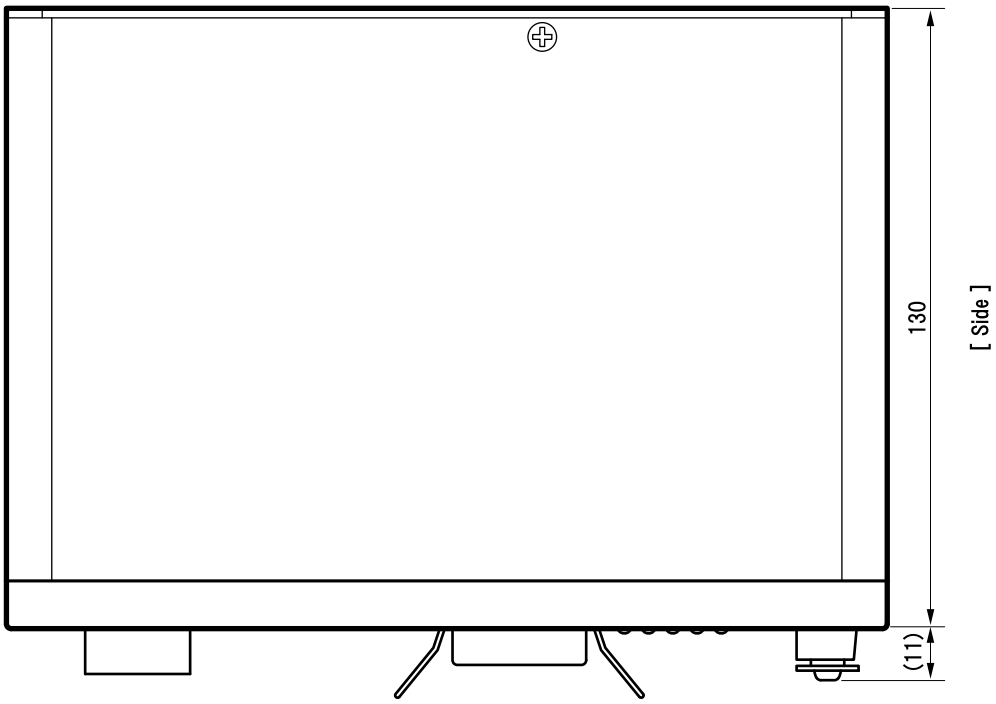
EXC error > Calibration error (1 – 9) > Weight error > Sequence error > Command error > Low battery

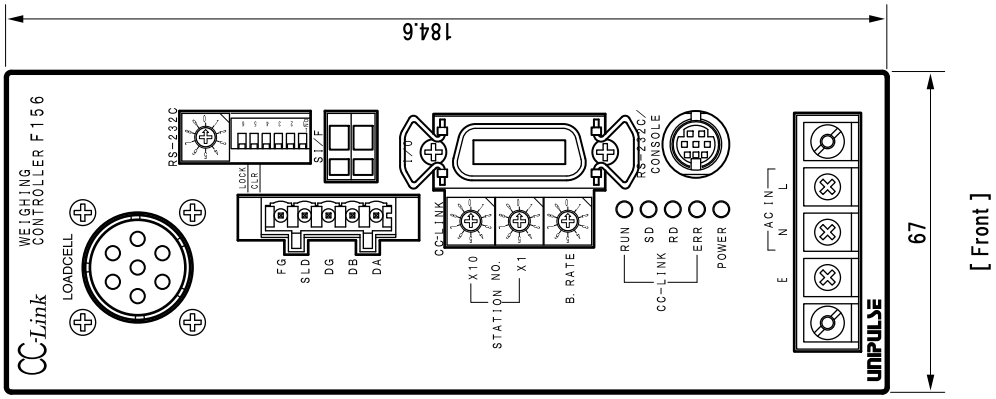
When two or more weight errors occur, priority is given as shown below.

-LOAD > LOAD > OFL2 > OFL3 > OFL1 > Zero alarm

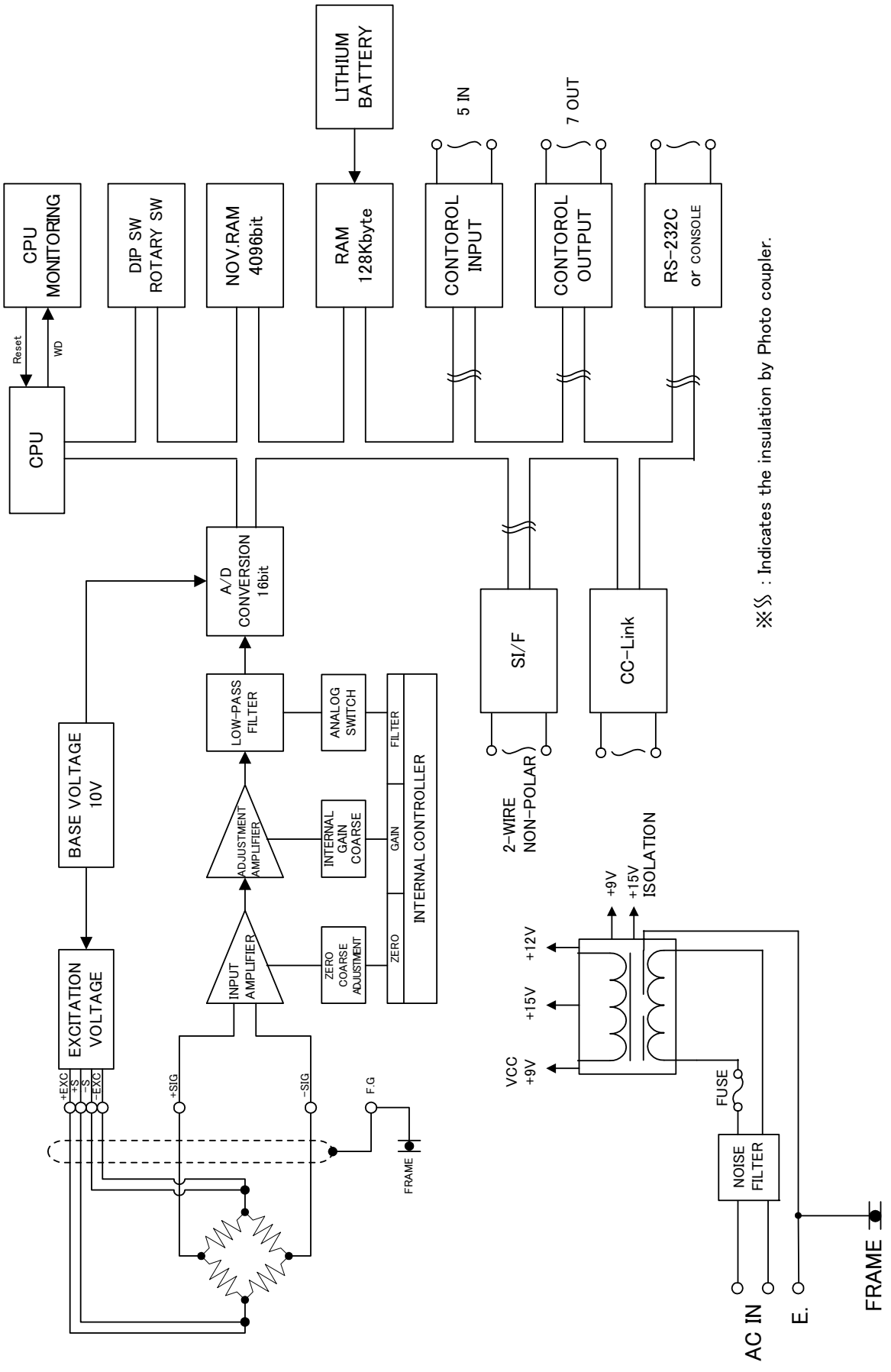
13. DIMENSIONS







14. BLOCK DIAGRAM



15. SPECIFICATIONS

15-1. Analog section

Load cell excitation	10V DC ± 5%, output current within 120mA Remote sensing (Up to four 350Ω load cells can be connected in parallel.)
Zero and span	Zero adjustment range: 0 – approximately 2mV/V Span adjustment range: 0.3 – 2.0mV/V
Minimum input sensitivity	0.3 μ V/Count
Accuracy	Non-linearity: Within 0.01%FS Zero drift: Within 0.1 μ V/ ℃ RTI Gain drift: Within 15ppm/ ℃
Analog filter	Bessel low-pass filter -12dB/oct, cutoff frequency 2/4/6/8Hz
A/D converter	Rate: 500 times/sec Resolution: 16bit
Resolution	1/10000 (internal resolution 1/40000)

15-2. Setting section

Setting method	Setting by a host on the CC-Link network, or a host on the RS-232C interface, such as remote console unit (C110/C120), PC, etc.
Storage of set values	Initial set values: NOV RAM (nonvolatile RAM) Other set values: Lithium-battery-backed-up C-MOS RAM * Rewriting can be locked in either case.

External signal input/output (14P Amphenol connector)

Input (5 points):	ON when short-circuited with the COM terminal
Output (7 points):	Transistor open collector output ON when the transistor is ON Vce=30V (max), Ic=50mA (max)

15-3. Interface

CC-Link interface

(Serial bus interface for connection with Mitsubishi PLC as the remote device stations corresponding to CC-Link Ver.1.10.)

Transmission medium: 3-wire type (shielded)

Transmission speed: Selectable from 156K/625K/2.5M/5M/10Mbps

RS-232C interface

Weight data, various statuses, and various set values can be written and read by commands from the host side.

(Exclusively used with setting remote console unit C110 or C120)

Specifications:	RS-232C-based	
Transmission method:	Full duplex/start-stop method	
Transmission speed:	Selectable from 1200 / 2400 / 4800 / 9600 / 19200 / 38400 bps	
Format:	Data length:	7/8 bit
	Stop bit length:	1/2 bit
	Parity bit:	Odd / Even / None

SI/F 2-wire serial interface

This is a simple output serial interface for connection of a UNIPULSE-manufactured printer, external display, etc.

Transmission method: Start-stop method

Transmission speed: 600 bps

15-4. General performance

Power supply voltage	Selectable from 85 – 110V/102 – 132V/170 – 220V/187 – 242V AC.	
Power consumption	50/60Hz 13.0/12.5VA (when 100V is rated)	
Dimensions	67W×185H×130D (mm) (excluding projections)	
Operating conditions	Temperature:	Operating temperature range:-10 to +40 ℃ Storage temperature range: -20 to +80 ℃
	Humidity:	85%RH or less (non-condensing)
Weight	Approximately 1.7kg	

15-5. Accessories

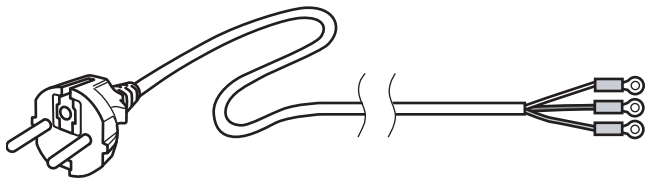
Operation manual 1
Power cable (3m) 1
Spare fuse (0.5A) 1
Minus screw driver (For WAGO terminal) 1
Pressure terminal 3
Load cell connector 1
Control signal Input/Output connector 1
Connector for CC-Link 1
Connector for RS-232C 1
Installation attachment 1

About the power cable

- The power cable attached to this product as standard equipment can be used in the AC100V power supply in Japan. (Official ratings voltage AC125V)
  Please use the power cable authorized in the country when you use this product outside Japan.

- Our company sells following resistance pressure cable AC250V (European standard product) separately.
  Please purchase it from us when you need after confirming its plug shape/voltage.

CAAC3P-CEE7/7-B2 : CEE7/7 Plug cable (2m)



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