

INDUSTRIAL INDICATOR

CI-6000A Model

Service Manual

CAS

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1. Introduction

The service manual is the specification for the CI-6000A. They have been designed with CAS reliability under rigid quality control and with outstanding performance.
This manual includes basic technical about composition of hardware and program function

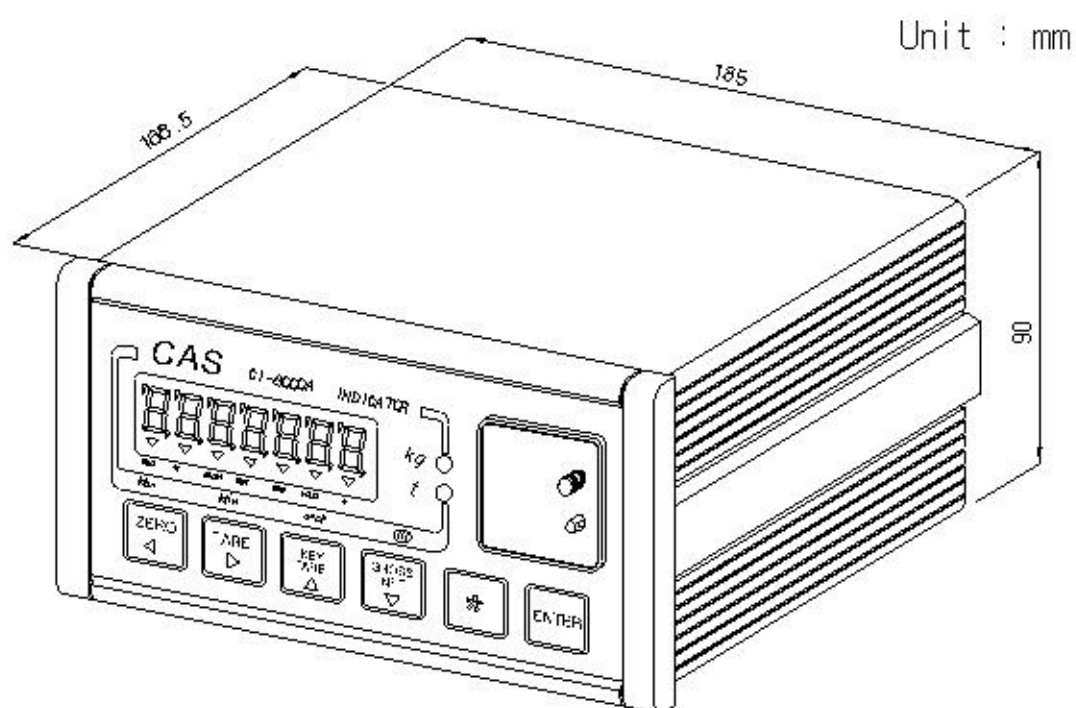
2. Technical Specification

■ Analog Part & A/D Conversion	
Load Cell Excitation Voltage	DC 5V, 8 x 350Ω load cells
Zero adjust range	0.05mV ~ 20mV
Input Sensitivity	0.6μV/D
System Linearity	Within 0.01% of FS
A/D internal resolution	1 / 1,000,000
A/D external resolution	5,000 dd, 10,000 dd (Max.)
A/D conversion speed	Maximum 200 times/sec

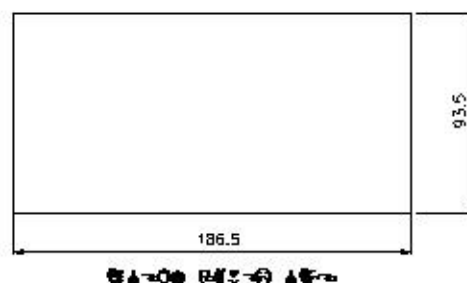
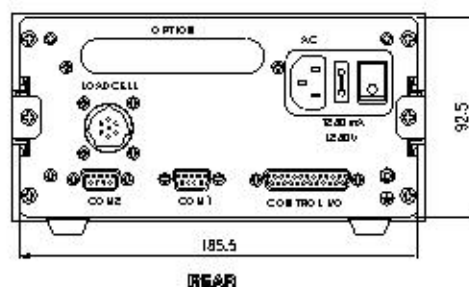
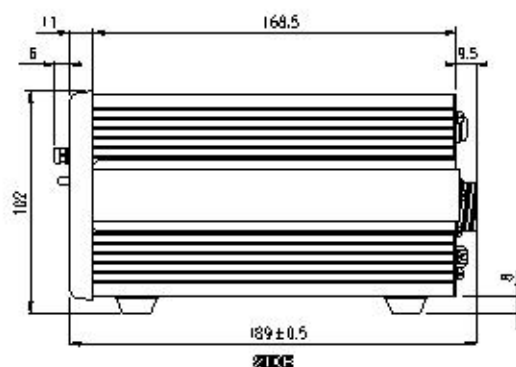
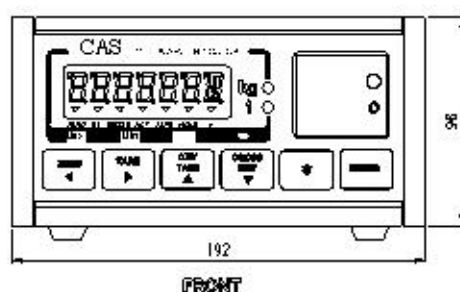
■ Digital Part	
Span calibration	Full Digital Calibration : SPAC™ (Single pass automatic span calibration)
Input Noise	Under ±0.3uVpp
Input Impedance	Over 10MΩ
Display	VFD (7 digit)
Size of letter	13mm (Height)
Minimum division	x1, x2, x5, x10, x20, x50
Display below zero	" _ "
"ZERO" ▼	Current weight of "0" kg
"STABLE" ▼	Weight is stable
"GROSS" ▼	Gross weight is displayed
"NET" ▼	Net weight is displayed
"TARE" ▼	Tare function is activated
"HOLD" ▼	Hold function is activated
" * " ▼	" * " key is pressed (print key) Automatic print is set.

■ General Specification		
Power	AC 100 ~ 240V (50/60 Hz) Input	
	DC +3.3V	Digital Logic
	DC +24V	External I/O
	DC +5V	Analog, Load Cell
	AC 3.6V	VFD
Product Size	192(W) x 199(D) x 96 (H)	
Temperature Range	-30℃ ~ +60℃	
Product Weight	Approx. 2.4kg	

3. Overall View



Unit : mm

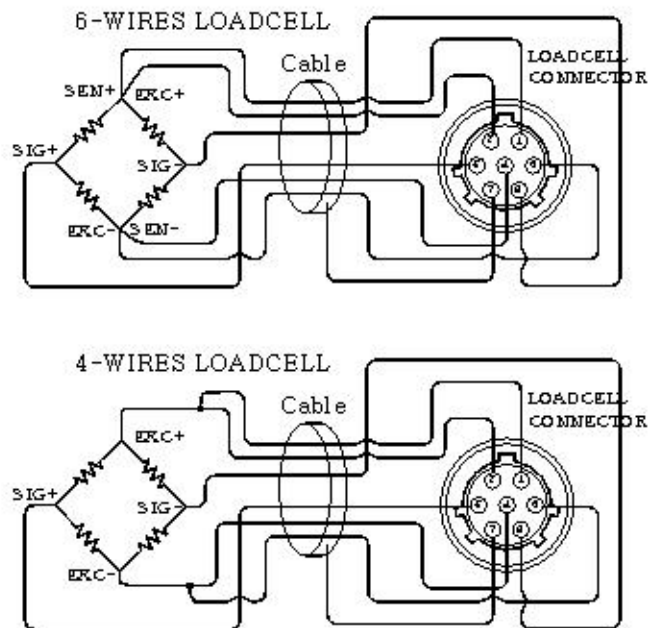


4. Install & Connection

(1) Load cell connection

Connect load cell connector to load cell port which is in the backside CI-6000A

Connecting method



PIN	COLOR
1 (EXC+)	RED
2 (SEN+)	BROWN
3 (EXC-)	WHITE
4 (SEN-)	BLACK
5 (SIG+)	GREEN
6 (SIG-)	BLUE
7 (SHIELD)	SHIELD

Note 1

In case of 4 wires L/C connect EX+ with SEN+, and connect EX- with SEN-.

Note 2

Wire color can be different depending on the load cell's manufacturer or its model

(2) Power

Adjusted to 100VAC ~ 240VAC, 50/60Hz freely.

(3) External Control for Input / Output Interface

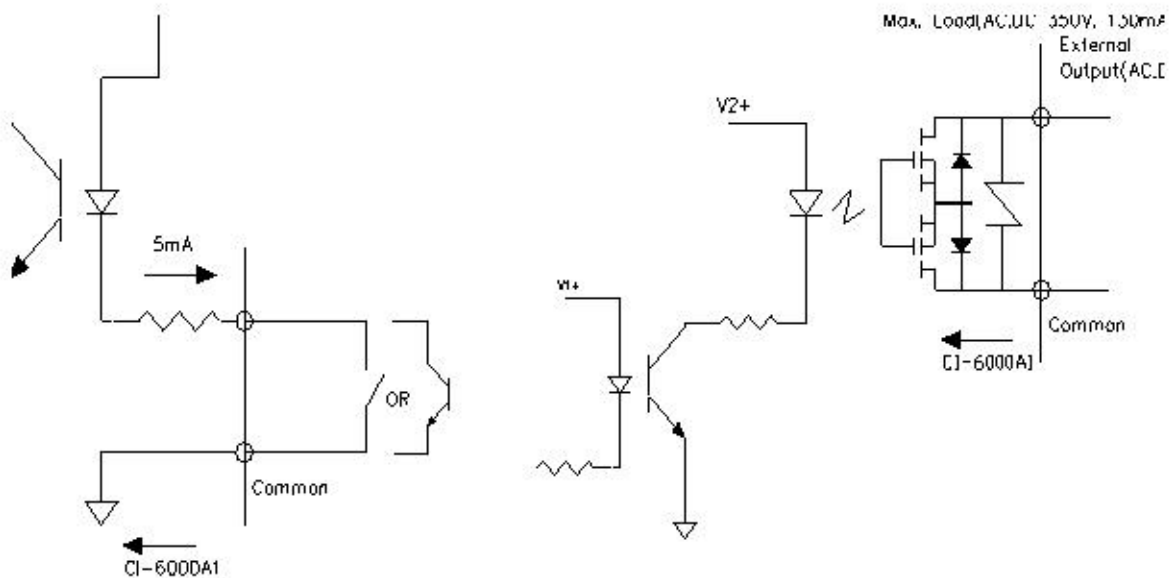
External input

Pin No	Signal Line Name	Description
24, 25	GND(Input common)	External input common
16	ZERO input	ZERO key operation
17	TARE input	TARE key operation
18	START input	Used as START key in batching operation
19	STOP input	Used as STOP key in batching operation
20	"*" input	"*" is used in various way. (Set this key in SET mode F23)
21	ENTER input	"*" is used in various way. (Set this key in SET mode F24)

External output (Relay contact)

Pin No	SIGNAL LINE NAME	Pin No	SIGNAL LINE NAME
3	Zero band signal output (Out 1)	7	High limit signal output (out 5)
4	Optional preliminary output (Out 2)	8	Low limit signal output (out 6)
5	Preliminary output (Out 3)	9	Finish signal output (out 7)
6	Final weight signal output (Out 4)	10	Stable signal output (out 8)
11,12	Output common		

External control I/O circuit



- (4) How to input the set-point Code (00 ~ 49)
There are two ways to input the set-point code.

▣ First way

Press the ENTER key for 2 seconds to enter set-point. (Set-point : 00~49)

Display	Description
Code=00	Set-point Code Number=00 in weighing control
Code=49	Set-point Code Number=49 in weighing control

▣ Second way

You can enter set-point by using RS-232C, RS-485 Communication.

Refer to SET Mode. (In the case of F33 = 4 or F36 = 4, Command Mode)

▣ How to clear the Set-Point value(00~49)

After input "F88" in the SET Mode, press ENTER key and can see the "Factor" and "0000" on the display.

After input "2007" and ENTER key, can see the "SP init". In a few minutes, can see the message of "End" and then exit the SET Mode. It is accomplished.

- (5) How to input the set-point value
There are four ways to input the set-point value.

▣ First way (F50=0)

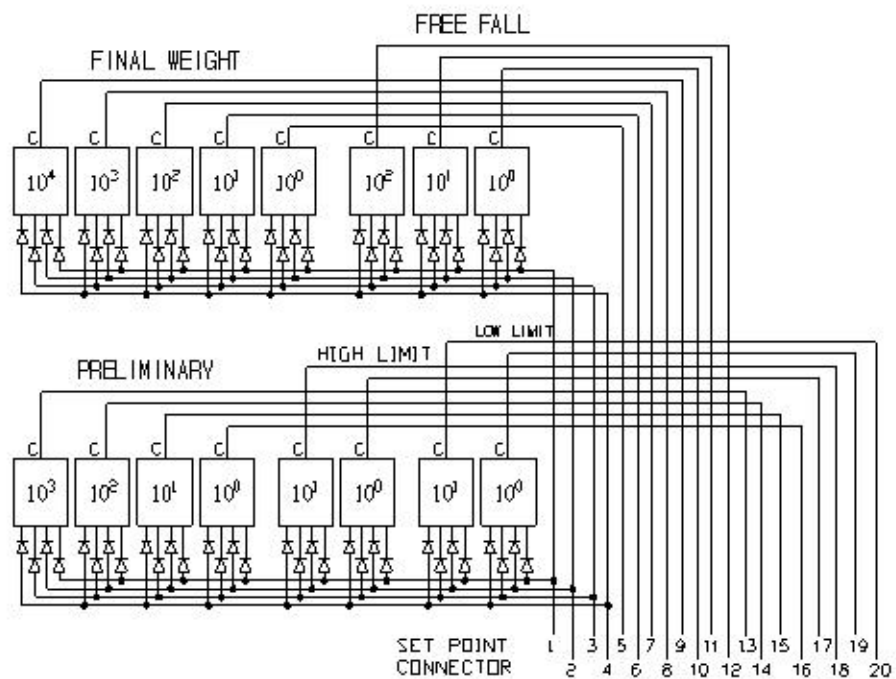
To enter set-point, press the * key for 2 seconds in weighing mode.

Note 1 Set F50 to 0 in set mode.

Note 2 Shift the position of cursor with ►, ◀ key and enter set value with ▲, ▼ key to go to next step, press the * key.

STEP	DISPLAY	DESCRIPTION
STEP1	Point	Zero Band
	ZErO bA	Shift the position of cursor with ►, ◀ key and enter Zero band value with ▲, ▼ key.
	1-00000	To go to next step, press the * key.
STEP2	oP-Pre	Optional Preliminary
	2-00000	Input first weight.
STEP3	PrELiM	Preliminary Weight
	3-00000	Input preliminary weight.
STEP4	FinAL	Final Weight
	4-00000	Input final weight.
STEP5	FALL	Free Fall Weight
	5- 0000	Input free fall weight.
STEP6	H-LiMit	High Limit Weight
	6- 0000	Input high limit weight.
STEP7	L-LiMit	Low Limit Weight
	7- 0000	Input low limit weight.

▣ Second way (F50=0)



Enter set value from F11 to F17 in set mode.

- F11 : Zero Band
- F12 : Optional Preliminary Weight
- F13 : Preliminary Weight
- F14 : Final Weight
- F15 : Free Fall Weight
- F16 : High Limit Weight
- F17 : Low Limit Weight

▣ Third way (External Set-point Input)

Note 1 Set F50 to 1 in set mode.

Pin	Signal	Pin	Signal
1	1	14	Preliminary 10^2 Common
2	2	15	Preliminary 10^1 Common
3	4	16	Preliminary 10^0 Common
4	8	17	High Limit 10^1 Common
5	Final Weight 10^4 Common	18	High Limit 10^0 Common
6	Final Weight 10^3 Common	19	Low Limit 10^1 Common
7	Final Weight 10^2 Common	20	Low Limit 10^0 Common
8	Final Weight 10^1 Common	21	
9	Final Weight 10^0 Common	22	
10	Free Fall 10^2 Common	23	
11	Free Fall 10^1 Common	24	Shield
12	Free Fall 10^0 Common	25	Shield
13	Preliminary 10^3 Common		

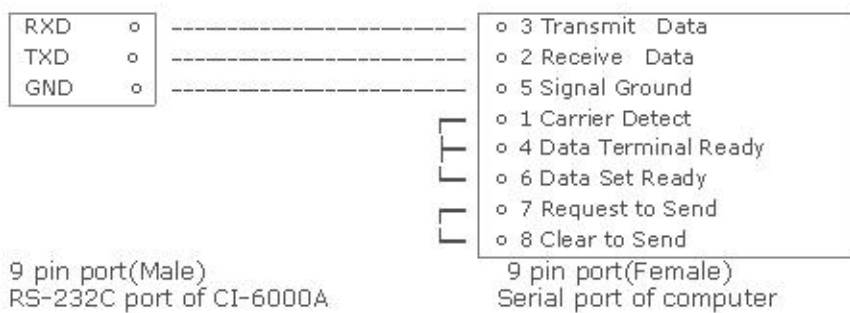
▣ Fourth way

Enter set-point by using RS-232, RS-485 Communication
Set F33 to 4 in set mode. Refer to set mode. (F33)

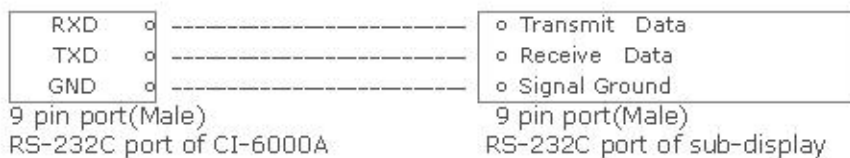
(6) Serial Interface

COM1,COM2	RS-232C Connection
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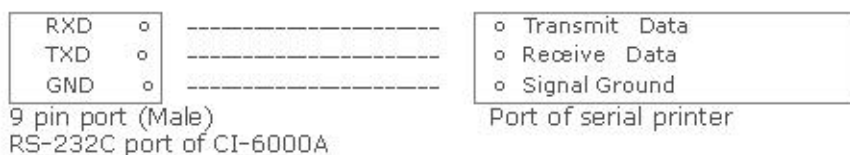
- (1) COM1 - TXD: 2 pin, RXD: 3 pin, GND: 7 pin
 (2) COM2 - TXD: 2 pin, RXD: 3 pin, GND: 5 pin



COM1,COM2	Sub-display Connection
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COM1,COM2	Serial Printer Connection
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COM2	RS-485 Connection
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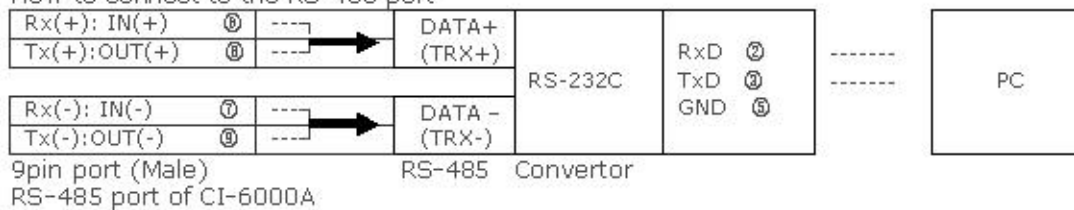
COM2 - OUT (+) : 8pin, OUT(-) : 9pin
 IN (+) : 6pin, IN(-) : 7pin

Transfer Mode : Same to the RS-232C interface

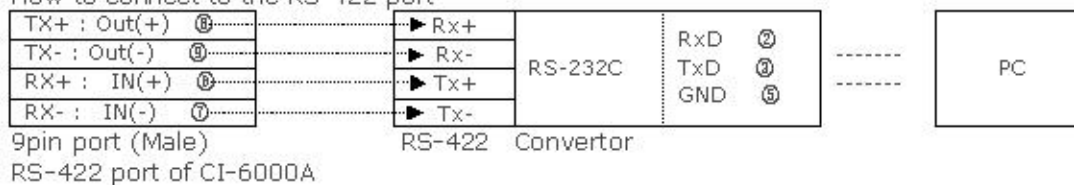
F30	Device ID	00 ~ 99
F34	Baud Rate	600,1200, 2400, 4800, 9600, 19200bps
F36	Output Mode	Stable, Stable or Unstable, Command mode

Data Format : Same to the RS-232C interface

How to connect to the RS-485 port



How to connect to the RS-422 port



5. Test Mode

(1) How to go to Test Mode

Open the front cover of indicator and set SW1 DIP3 on.

1.     : Select test menu that you wish to test.
2. Please select test menu with arrow keys and press ENTER key.
3.     : Test menu is selected. Proceed key test.
4. When test is done, Press ENTER key.

To finish test mode, set DIP3 off.

(2) Test Menu (TEST 1 - TEST 8)

TEST 1 : Key test

TEST 2 : VFD display test

TEST 3 : A/D conversion test

TEST 4 : Serial interface test (COM1, COM2)

TEST 5 : Printer test (COM2)

TEST 6 : External input/output test

TEST 1

Function : Key test

KEY	DISPLAY	DESCRIPTION
ENTER : Go to menu selection mode.	tEst 1	TEST 1 condition
Other keys : Perform test	1 1	Press any key to test then the display shows its number and code.

Note 1 External input key test is TEST 6

< Key list >

KEY	NO.	CODE	KEY	NO.	CODE	KEY	NO.	CODE
ZERO	1	1	TARE	2	2	K.T	3	3
G/N	4	4	*	5	5	ENTER	6	6

TEST 2

Function : Display test

KEY	DISPLAY	DESCRIPTION
ENTER : Go to menu selection mode.	tEst 2	TEST 2 condition
Other keys : Perform test	8888888	TEST 2 is performed.

TEST 3

Function : A/D Conversion test

KEY	DISPLAY	DESCRIPTION
▲,▼ : Change gain. ▶,◀ : Change filter.	tEst 3	TEST 3 condition
ENTER : Go to menu selection mode.	97853	Shows digital value of current weight. This value means converted digital value.

Note 1

Check whether digital value is changing. If the digital value is fixed or zero is displayed, please check the connection of load cell.

TEST 4

Function : RS-232C test with computer (COM1)		
KEY	DISPLAY	DESCRIPTION
▲ : Transmit to PC after increasing value. ▼ : Transmit to PC after decreasing value. ENTER : Go to menu selection mode.	tEst 4	TEST 4 condition.
	00---00	Wait for transmission and reception.
	03---00	Transmit : 3, Receive : none
	08---49	Transmit : 8, Receive : 1

- Note 1** Do this test in Hyper Terminal of PC after the connecting serial port with PC.
 - Port Selection in Hyper Terminal has the Flow Control item, you have to set nothing.
- Note 2** Send no.1 in computer keyboard and check if indicator receives no.49
 Send no.8 in indicator key(▲) and check if computer receives no.8
- Note 3** Baud rate should be specified in SET mode before testing. (F31)

TEST 5

Function : Printer test (COM1)		
KEY	DISPLAY	DESCRIPTION
ENTER : Go to menu selection mode.	tEst 5	TEST 5 condition.
Other keys : Perform test	Good	No error in printer.

- Note 1** Please set F35 to 0 in SET mode.
- Note 2** Please set F41 (the kind of printer) in SET mode.
- Note 3** "Good" message is displayed if the printer connection is done correctly.
- Note 4** The test output format of printer is as follows:

Computer Aided System CAS Corporation TEL 02-2225-3500 FAX 02-475-4668 TEST OK
--

TEST 6

Function : External input/output test		
KEY	DISPLAY	DESCRIPTION
▲,▼ : Move external output. External input :	tEst 6	TEST 6 condition

	In1oUt3	In1 : If you press 1, 1 is displayed. oUt3 : Indicate the condition of external output. Output no.3 is On.
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6. Calibration Mode

(1) How to enter the Calibration Mode

Open the front cover of indicator and set SW1 DIP1 to on.

At this time, **Cal** message is shown on the display and **Cal** is started.
After done and off the SW1 DIP1, back to the weighing mode.

(2) Available Keys

▲,▼ KEY : Change the set value.

▲ key increases set value and ▼ key decreases set value.

►,◀ KEY : Change the position of cursor.

► key moves one digit to right, ◀ key moves one digit to left.

ENTER KEY : The program is moved into next menu.

(3) Calibration Menu (CAL 1 - CAL 7)

CAL 1 : Maximum Capacity

CAL 2 : Minimum Division

CAL 3 : Setting Weight

CAL 4 : Zero Calibration

CAL 5 : Span Calibration

CAL 6 : Micro Span Calibration

CAL 7 : Weight Factor

CAL 1

Function : Maximum Capacity Set(Range : 1~99,999)

KEY	DISPLAY	DESCRIPTION
▲,▼ : Increase or decrease of number.	C=05000	5000 kg
▶,◀ : Shift of cursor position	C=0500.0	500.0 kg (First decimal point)
ENTER : Save and go to next menu	C=050.00	50.00 kg (Second decimal point)

Note 1 The maximum capacity means the maximum weight of the indicator.

Note 2 The max. weight is changed depending on the decimal point.

CAL 2

Function : Minimum Division Set (Range : 0.001~50)

KEY	DISPLAY	DESCRIPTION
▲,▼ : Increase or decrease of number. ENTER : Save and go to next menu	d=1	1 kg
	d=0.2	0.2 kg (First decimal point)
	d=0.05	0.05 kg (Second decimal point)
	d=0.001	0.001 kg (Third decimal point)

Note 1 The minimum division means the value of one division.

Note 2 The value of one division is changed depending on the decimal point.

Note 3 External resolution is obtained by dividing the maximum capacity into the min. division.
Set the resolution to be within 1/10,000.

If it is over 1/10,000, error message "Err 20" is displayed

CAL 3

Function : Setting Weight In Span Calibration

KEY	DISPLAY	DESCRIPTION
▲,▼ : Increase or decrease of number.	L=05000	5000 kg
▶,◀ : Shift of cursor Position	L=0500.0	500.0 kg (First decimal point)
ENTER : Save and go to next menu		

- Note 1** The setting weight should be within the 10 % to 100 % of maximum weight
 100% of maximum weight is set as a default but you can change it for your needs
 If the setting weight is under 10%, error message "Err 22" is displayed
 If the setting weight is over 100%, error message "Err 23" is displayed

CAL 4

Function : Zero Calibration		
KEY	DISPLAY	DESCRIPTION
ENTER : Zero calibration and next	CAL 4 Analog value of load weight state - - -	Remove an item from the platter and press ENTER key.
ZERO : Only zero calibration		Zero calibration.
TARE : Only span calibration		Zero calibration is finished. You will go to span calibration(CAL 5) automatically.

- Note 1** If Zero calibration is done without any error, You will go to span calibration (CAL 5) automatically.
Note 2 If the zero value is too low, error message "Err 27" is displayed.
Note 3 If the zero value is too high, error message "Err 26" is displayed.
Note 4 If you want to do only zero calibration, unload the platter and press the "ZERO" key.
 In a few moment, you will see "ZEro" and "CAL End" messages are displayed.
 Set SW1 DIP1 to OFF and then return to the weighing mode.

CAL 5

Function : Span Calibration		
KEY	DISPLAY	DESCRIPTION
ENTER : Span calibration	CAL 5 Analog value of load weight state - - -	Load the weight which was set in CAL 3 and press ENTER key.
		Span calibration.
		Span calibration is finished. You will go to micro span calibration(CAL 6) automatically.

- Note 1** If span calibration is done without any error, you will go to micro span calibration (CAL 6) automatically.
Note 2 If the span value is low, error message "Err 24" is displayed. Calibrate with lower resolution.
Note 3 If the span value is high, error message "Err 25" is displayed.

CAL 6

Function : Micro Span Calibration

KEY	DISPLAY	DESCRIPTION
ENTER : Save and go to next menu	500.0	Setting weight is shown on the display.
	▽▽▽▽▽▽▽	Check the setting weight and set SW1 DIP1 to off.

Note 1 Confirm if the displayed weight is equal to the setting weight that you have set in CAL 3 and remove the weight from the platter.
If "0" is displayed, set SW1 DIP1 to OFF then you will go to normal mode.

Note 2 The bias is "0" when the central lamp lights up as above display.
Each lamp means the bias of -0.3, -0.2, -0.1, 0, 0.1, 0.2, 0.3 from the left lamp

CAL 7

Function : Weight Constant Calibration

KEY	DISPLAY	DESCRIPTION
▲,▼,◀,▶ : Enter password. ENTER : Exit	FACTOR	Enter password.

Note 1 Users do not have to use this menu, since it is used for calibration test without a weight

(4) Error Message

Error 20

Reason	The resolution exceeds 1/10,000
Solution	Lower the resolution. The resolution = allowed weight/one division. Modify the allowed weight in CAL1 or modify the division in CAL2 so that the resolution is below 1/10,000

Error 21

Reason	The resolution exceeds 1/30,000.
Solution	Lower the resolution. The resolution = allowed weight/one division. Modify the allowed weight in CAL 1 or modify the division in CAL 2 so that the resolution is below 1/30,000

Error 22

Reason	The weight for span calibration is lower than 10% of the maximum capacity of the indicator
Solution	Set the weight for span calibration in CAL 3 to be greater than 10% of the maximum capacity

Error 23

Reason	The weight for span calibration exceeds 100% of the maximum capacity of the indicator
Solution	Set the weight for span calibration to be within the maximum capacity of the indicator in CAL 1

Error 24

Reason	Span value is too low
Solution	Load cell is damaged or setting of current resolution is not possible. Calibrate with less resolution

Error 25

Reason	Span value is too high
Solution	Load cell is damaged or setting of current resolution is not possible. Calibrate with less resolution

Error 26

Reason	Zero value is too high
Solution	Check whether the platter is empty. Remove the setting cover and set SW2 DIP2 to on so that the zero value is increased. Proceed calibration again after checking in test mode 3

Error 27

Reason	Zero value is too low
Solution	Check whether the platter is empty. Remove the setting cover and set SW2 DIP1 to on so that the zero value is decreased. Proceed calibration again after checking in test mode 3

Error 28

Reason	The weight is unstable
Solution	Check whether load cell is properly connected

7. Set Mode

(1) How to go to Set Mode

Open the front cover of indicator. Set SW1 DIP2 to ON then set mode is started. At this time, F01 message is shown on the display after "SET Mod" message.

1. F 01 : You can select the menu that you want to set.
2. Enter number of set menu by pressing the arrow keys and then press ENTER key.
3. F01 1 : F01 is set to 1.
4. Enter number of set menu by pressing the arrow keys and then press ENTER key.

(2) Available Keys

- ▲,▼ KEY : Change the set value.
▲ key increases set value and ▼ key decreases set value.
- ,◄ KEY : Change the position of cursor.
► key moves one digit to right, ◄ key moves one digit to left.
- ENTER KEY : Save current setting value and go to menu selection mode.

(3) Set Menu (F01 ~ F59)

General Function	
F01	Decimal Point Adjustment
F02	Weighing Unit
F03	Analog to Digital Conversion Speed
F04	Digital Filter
F05	Motion Detection Condition
F06	Automatic Zero Tracking Compensation
F07	Weight Backup
F08	Set Zero Range
F09	Conditions of ZERO, TARE & START Keys
F10	Set Hold Type
Batching Operation Function	
F11	Zero Band
F12	Optional Preliminary Weight
F13	Preliminary Weight
F14	Final Weight
F15	Free Fall Weight
F16	High Limit Weight
F17	Low Limit Weight
F18	Timer - Start Delay Time
F19	Timer - Operating Delay Time of Finish Signal
F20	Measurement Mode
F21	Timer - Start Delay Time of Finish Signal
F22	Off Range of Finish Signal
F23	A Use of "*" key
F24	A Use of ENTER key
Serial Interface (COM1, COM2)	
F30	Device ID
F31	COM1 Baud Rate
F32	COM1 Usage
F33	COM1 Output Mode
F34	COM2 Baud Rate
F35	COM2 Usage
F36	COM2 Output Mode
F37	Output Format of COM1 & COM2
F38	Parity Bit

Print Function	
F40	Line Feed
F41	Printer
F42	Automatic / Manual Print
F43	Printing Format
F44	Output the user's message
F45	Date Change
F46	Time Change
User's Utility	
F50	Set-point input type selection
F51	Load cell type selection
F52	Buzzer On/Off selection

F01 ~ F10

F18 ~ F24

F40 ~ F43

F50 ~ F52

These items are possible to be red & written from PC (Set Mode Values)

F11 ~ F17

These items are possible to be red & written from PC (Set Point Values)

* General function

F01

Function	Decimal Point Adjustment			
Set value (0 ~ 3)	Display		Description	
	F01	0	No decimal point	(ex : 12345)
	F01	1	10^1	(ex : 1234.5)
	F01	2	10^2	(ex : 123.45)
	F01	3	10^3	(ex : 12.345)

F02

Function	Weighing Unit			
Set value (0, 1)	Display		Description	
	F02	0	Kilogram (kg)	
	F02	1	Ton (t)	

F03

Function	A/D Conversion Speed			
Set value (0 ~ 9)	Display		Description	
	F03	0	150 times / sec	
	F03	5	175 times / sec	
	F03	9	200 times / sec	

F04

Function	Digital Filter			
Set value (00 ~ 99)	Display		Description	
	F04	10	10 times average value	
	F04	50	50 times average value	
	F04	99	99 times average value	

Note 1 Adjust the set value according to the condition.

F05

Function	Motion Detection Condition			
Set value (00 ~ 99)	Display		Description	
	F05	12	Stable lamp is off even with the change of only 1 division for 1 sec.	

	F05	56	Stable lamp is on with changing of the weight below 5 division for 3sec.
	F05	88	Stable lamp is on with changing of the weight below 8 division for 4sec.

Note 1 The first digit indicates division and the second digit indicates sec. but have to divide it into 2 on the display.

F06

Function	Automatic Zero Tracking Compensation		
Set value (0 ~ 9)	Display		Description
	F06	0	None
	F06	1	0.5 digit
	F06	5	2.5 digit
	F06	9	4.5 digit
			Auto-zero tracking will remove small variations automatically

F07

Function	Weight Backup		
Set value (0, 1)	Display		Description
	F07	0	Weight backup is OFF
	F07	1	Weight backup is ON

Note 1 Memorize the current weight at sudden power failure.

F08

Function	Set Zero Range		
Set value (0, 1)	Display		Description
	F08	0	Zero key is operated within 2% of max. weight
	F08	1	Zero key is operated within 10% of max. weight

F09

Function	ZERO, TARE & START Keys Availability		
Set value (0, 1)	Display		Description
	F09	0	Always
	F09	1	Works when weight is stable

F10

Function	Set Hold Type		
Set value (0 ~ 2)	Display		Description
	F10	0	Average hold : Compute the average weight of oscillating weights
	F10	1	Peak hold : Compute the maximum weight among oscillating weights

	F10	2	Sampling hold : Compute the moment weight of oscillating weights.
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Note 1 You have to set F23 to 2 in set mode.

Note 2 The hold function is released when it is in zero range or over load automatically.

* Batching operation function

F11

Function	Zero Band
	Set zero band value which will be used in batching operation

F12

Function	Optional Preliminary Weight
	Set optional preliminary weight which will be used in batching operation

F13

Function	Preliminary Weight
	Set preliminary weight which will be used in batching operation

F14

Function	Final Weight
	Set final weight which will be used in batching operation

F15

Function	Free Fall Weight
	Set free fall weight which will be used in batching operation

F16

Function	High Limit Weight
	Set high limit weight which will be used in batching operation

F17

Function	Low Limit Weight
	Set low limit weight which will be used in batching operation

F18

Function	Timer – Start Delay Time		
Set value (00 ~ 99)	Display		Description
	F18	00	No delay
	F18	01	0.1 sec
	F18	99	9.9 sec

F19

Function	Timer – Operating Delay Time of Finish Signal		
Set value (00 ~ 99)	Display		Description
	F19	00	Do not use
	F19	50	5.0 sec
	F19	99	9.9 sec

Note 1 This function is used to decide the time of signal output which batching-operation is completed.

Note 2 You have to set F19 to 00 if you want to use the F22 function.
If F19 & F22 are set any values at the same time, F22 is disregarded.
Because the priority of F19 is high.

F20

Function	Measurement Mode			
Set value (0 ~ 4)	Display		Description	
	F20	0	Do not use	
	F20	1	Customer programmed control mode	Normal batching
	F20	2		Loss-in-weight batching
	F20	3	Built-in automatic program mode	Normal batching
	F20	4		Loss-in-weight batching

F21

Function	Timer – Start Delay Time of Finish Signal		
Set value (00 ~ 99)	Display		Description
	F21	00	No delay time
	F21	10	1.0 sec
	F21	99	9.9 sec

Note 1 This function is used to decide the delay time of start- signal of output which the batching operation is completed

F22

Function	Off Range of Finish Signal	
Set value (00 ~ 99)	Display	Description
	F22 00	Do not use
	F22 01	Finish signal is off when the weight is within one division
	F22 99	Finish signal is off when the weight is within ninety nine division

Note 1 This function is used to decide the size of output signal which batching- operation is completed.

Note 2 You have to set F19 to 00 if you want to use the F22 function.
If F19 & F22 are set any values at the same time, F22 is disregarded.
Because the priority of F19 is high

F23

Function	A Use of "*" Key	
Set value (0 ~ 2)	Display	Description
	F23 0	Do not use
	F23 1	PRINT key
	F23 2	HOLD key

Note 1 It is possible to print key (COM1 only) when the usage of COM2(F35) is to set 0 (F35 = 0). That is, F35 is setting to printer.

F24

Function	A Use of "ENTER" Key	
Set value (0 ~ 3)	Display	Description
	F24 0	Do not use
	F24 1	TOTAL PRINT key
	F24 2	START key in batching operation
	F24 3	STOP key in batching operation

* Serial Interface (COM1, COM2)

* Reference

RS-232C			
Connector	Print Key (F23=1, F24=1)	Comm. Spec.	Command
COM1 (2, 3, 7)	To be set F35 = 0	TxD, RxD	Read/Write
COM2 (2, 3, 5)	Not Printing, transmit data only	TxD	Not

RS-422/485			
CONNECTOR	Print Key (F23=1, F24=1)	Comm. Spec.	Command
COM2 (6, 7, 8, 9)	To be set F35 = 0	TxD, RxD	Read/Write

It's impossible format 3 and 4 in command mode with COM2.

F30

Function	Device ID		
Set value (00 ~ 99)	Display		Description
	F30	00	Device No. 00
	F30	99	Device No. 99

Note 1 It is used for identification of the indicator when system is connected.

F31

Function	Baud Rate of COM1		
Set value (0 ~ 5)	Display		Description
	F31	0	600 bps
	F31	1	1200 bps
	F31	2	2400 bps
	F31	3	4800 bps
	F31	4	9600 bps
	F31	5	19200 bps

F32

Function	A Use of COM1		
Set value (0 ~ 1)	Display	Description	

	F32	0	Connection with sub-display or computer
	F32	1	Connection with printer

F33

Function	Output Mode of COM1		
Set value (0 ~ 4)	Display		Description
	F33	0	No data output
	F33	1	Stream mode
	F33	2	Transmit one time only in stable condition after unloading to zero.
	F33	3	Transmit when data is required * Signal : device ID (F31 : Device ID)
	F33	4	Command Mode

Note 1 : COM1 : F33=4, COM2 : F35=1, F36=4 Command Mode

Command to CI-6000A												Command description	Indicator to PC
0	1	2	3	4	5	6	7	8	9	10	11		
D	ID	K	Z	CR	LF							ZERO key	Return the received data
D	ID	K	T	CR	LF							TARE key	Return the received data
D	ID	K	G	CR	LF							GROSS key	Return the received data
D	ID	K	N	CR	LF							NET key	Return the received data
D	ID	K	S	CR	LF							START key	Return the received data
D	ID	K	P	CR	LF							STOP key	Return the received data
D	ID	K	B	CR	LF							Print key	Return the received data
D	ID	K	C	CR	LF							Total print key	Return the received data
D	ID	K	W	CR	LF							Request weight data	Return the received data
D	ID	H	T	CR	LF							Request set-point value	SEND Format 2
D	ID	H	Z	0	0	0	0	0	0	CR	LF	Zero band	Return the received data
D	ID	H	O	0	0	0	0	0	0	CR	LF	Optional pre. weight	Return the received data
D	ID	H	P	0	0	0	0	0	0	CR	LF	Preliminary	Return the received data
D	ID	H	F	0	0	0	0	0	0	CR	LF	Final weight	Return the received data
D	ID	H	R	0	0	0	0	0	0	CR	LF	Free fall weight	Return the received data
D	ID	H	I	0	0	0	0	0	0	CR	LF	High limit weight	Return the received data

D	ID	H	L	0	0	0	0	0	CR	LF	Low limit weight	Return the received data
D	ID	H	E	0	0	0	0	0	CR	LF	Set-point code (00~49)	Return the received data
D	ID	S	T	CR	LF						Set Mode Value Read	SEND Format 4

(D, ID : 00~99, CR:0x0d, LF:0x0a)

It is impossible to test with Print Key (+ Total Sum Print Key) (Only possible when F35 = 0)

Format 1 [Set Point Write :: COM1/COM2 Port available]

Write the Set-Point values to the CI-6000A with PC

- Writing (Command) & Response Format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
D	ID		H	A	Set Point Code						,	Zero Band					,
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Opt. Preli. Weight					,	Preliminary Weight					,	Final Weight					
34	35	36	37	38	39	40	41	42	43	44	45	46					
,	Free Fall Weight					,	Hi Limit Weight					,					
47	48	49	50	51	52	53											
Lo Limit Weight					CR	LF											

Note 1 When you input the Set Point Value, you have to input without decimal point

Format 2 [Set Point Read :: COM1/COM2 Port available]

Read the Set-Point values from CI-6000A with PC

- Command Format

0	1	2	3	4	5	6
D	ID	H	T	CR	LF	

- Response Format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
D	ID		H	T	Set Point Code						,	Zero Band					,
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Opt. Preli. Weight					,	Preliminary Weight					,	Final Weight					
34	35	36	37	38	39	40	41	42	43	44	45	46					
,	Free Fall Weight					,	Hi Limit Weight					,					
47	48	49	50	51	52	53											
Lo Limit Weight					CR	LF											

Note 1 All of Set Point Values are numeric without decimal point.

• Format 3 [Set Mode Write :: COM1 Port only]

Write the Set-Mode values [F01~F10, F18~F24, F40~F43, F50~F52]
from CI-6000A with PC

- Writing (Command) & Response Format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
D	ID		S	F	F01	F02	F03	F04		F05		F06	F07	F08
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
F09	F10	F18		F19		F20	F21		F22		F23	F24	F40	F41
30	31	32	33	34	35	36								
F42	F43	F50	F51	F52	CR	LF								

• Format 4 [Set Mode Read :: COM1 Port only]

Read the Set-Mode values from CI-6000A with PC

- Command Format

0	1	2	3	4	5	6
D	ID		S	F	CR	LF

- Response Format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
D	ID		S	F	F01	F02	F03	F04		F05		F06	F07	F08
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
F09	F10	F18		F19		F20	F21		F22		F23	F24	F40	F41
30	31	32	33	34	35	36								
F42	F43	F50	F51	F52	CR	LF								

F34

Function	Baud Rate of COM2		
Set value (0 ~ 5)	Display		Description
	F34	0	600 bps
	F34	1	1200 bps
	F34	2	2400 bps
	F34	3	4800 bps
	F34	4	9600 bps
	F34	5	19200 bps

F35

Function	Usage of COM2		
Set value (0, 1)	Display		Description
	F35	0	Connection with printer
	F35	1	Connection with sub-display or computer

F36

Function	Output Mode of COM2		
Set value (0 ~ 4)	Display		Description
	F36	0	No data output
	F36	1	Stream mode
	F36	2	Transmit one time only in stable condition after unloading to zero
	F36	3	Transmit when data is required * Signal : device ID (F31 : Device ID)
	F36	4	Command Mode

F37

Function	Output Format of COM1 and COM2		
Set value (0 ~ 2)	Display		Description
	F37	0	Transmit 22 byte of CAS Format
	F37	1	Transmit 10 byte of CAS Format
	F37	2	Transmit 18 byte of AND Format

F38

Function	Parity Bit		
Set value (0 ~ 2)	Display		Description
	F38	0	Data bit 8, Stop bit 1, Non parity
	F38	1	Data bit 7, Stop bit 1, Even parity
	F38	2	Data bit 7, Stop bit 1, Odd parity

* Printer Function

F40

Function	Line Feed		
Set value (1 ~ 9)	Display		Description
	F40	1	1 Line feed
	F40	9	9 Line feed

F41

Function	Printer		
Set value (0 ~ 2)	Display		Description
	F41	0	Do not use.
	F41	1	CAS TOP printer (P202)
	F41	2	CP-7000 Series Printer (CP-7000D/P, CP-7024P)

F42

Function	Automatic / Manual Print		
Set value (0 ~ 1)	Display		Description
	F42	0	Manual print
	F42	1	Automatic print

Note 1 If F42 is set to 1, printing is done without pressing PRINT key.
It is possible to print again only after the weight is returned to zero (unload).

F43

Function	Printing Format		
Set value (0 ~ 2)	Display		Description
	F43	0	Printing format 0
	F43	1	Printing format 1
	F43	2	Printing format 2

【 FORMAT 0 】

DATE, TIME
SERIAL NO, NET WEIGHT

【 FORMAT 1 】

DATE, TIME
SERIAL NO, NET WEIGHT

【 FORMAT 2 】

DATE, TIME
GROSS WEIGHT, TARE WEIGHT

02.1.1	12:30
Gross :	1000.0 kg
Tare :	0.0 kg
Net :	1000.0 kg
02.1.1	12:40
Gross :	2000.0 kg
Tare :	500.0 kg
Net :	1500.0 kg
Net TOTAL	2500.0 kg

02. 1. 1	12:30
Gross :	1000.0 kg
Tare :	0.0 kg
Net :	1000.0 kg
02. 1. 1	12:40
Gross :	2000.0 kg
Tare :	500.0 kg
Net :	1500.0 kg

Net TOTAL	2500.0 kg

F44

Note 1 You can add user's information in printing format.
(EX: company name, phone no.)

Note 2 The range of coordinate is from 0 to 71. 0th code determines whether head message is printed or not.
(032 : print, others : Do not print) Actually 1st data to 255 is printed.

Note 3 Designate as follows if you want to add company name "CAS" on print format
P00-032(ASCII code 32 : Data start), P01-067(ASCII code 67 : character C)
P02-065(ASCII code 65 : character A),P03-083(ASCII CODE 83 :character S)
P04-255(ASCII code 255: Data end)

CHA.	CODE	CHA.	CODE	CHA.	CODE	CHA.	CODE	CHA.	CODE	CHA.	CODE
Space	32	0	48	@	64	P	80	`	96	p	112
!	33	1	49	A	65	Q	81	a	97	q	113
"	34	2	50	B	66	R	82	b	98	r	114
#	35	3	51	C	67	S	83	c	99	s	115
\$	36	4	52	D	68	T	84	d	100	t	116
%	37	5	53	E	69	U	85	e	101	u	117
&	38	6	54	F	70	V	86	f	102	v	118
'	39	7	55	G	71	W	87	g	103	w	119
(	40	8	56	H	72	X	88	h	104	x	120
)	41	9	57	I	73	Y	89	i	105	y	121

*	42	:	58	J	74	Z	90	j	106	z	122
+	43	;	59	K	75	[	91	k	107	{	123
,	44	<	60	L	76	\	92	l	108		124
-	45	=	61	M	77	]	93	m	109	}	125
.	46	>	62	N	78	^	94	n	110	~	126
/	47	?	63	O	79	_	95	o	111	End	255

F45

Function	Date Change	
◀,▶,▲,▼ key : Enter Data	Display	Description
	02.01.10	JAN. 10TH, 2002

F46

Function	Time Change	
◀,▶,▲,▼ key : Enter Data	Display	Description
	11.30.10	11:30:10 AM

* User's utility

F50

Function	Set-point Input	
Set value (0, 1)	Display	Description
	F50 0	Disable external Set-point input
	F50 1	Enable external Set-point input

F51

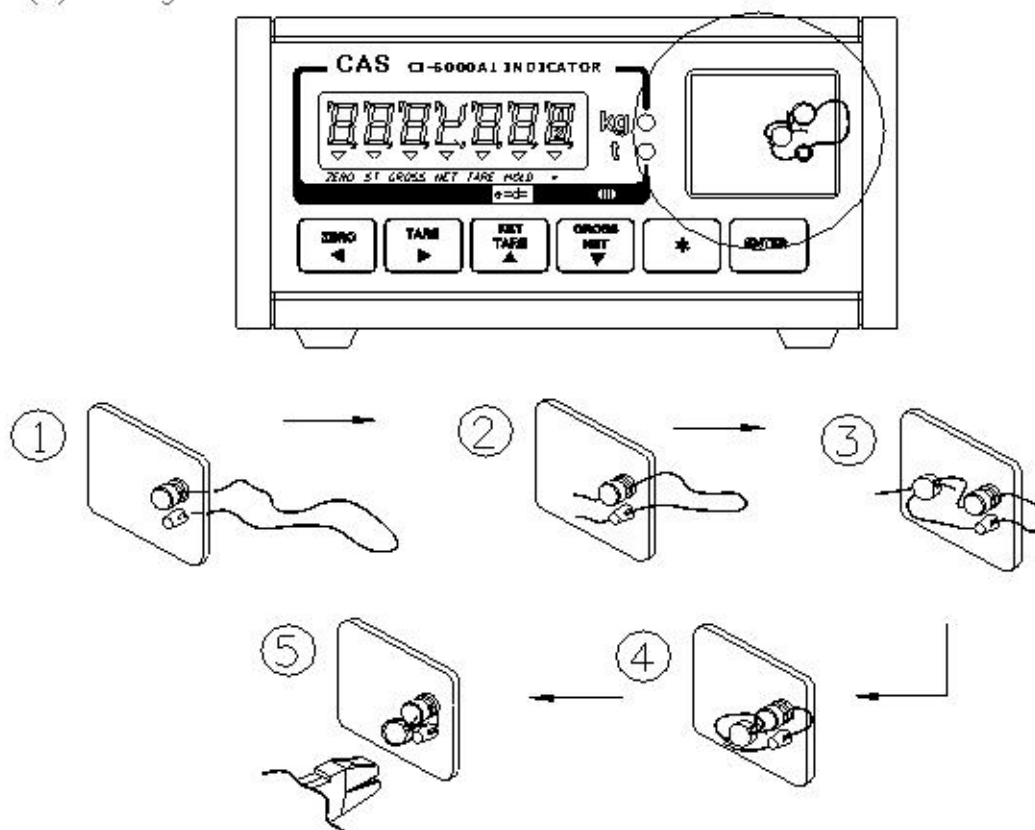
Function	Load cell type	
Set value (0, 1)	Display	Description
	F51 0	Compression or Tension Load cell (0mV ~+40mV)
	F51 1	Compression and Tension Load cell (-20mV ~+20mV)

F52

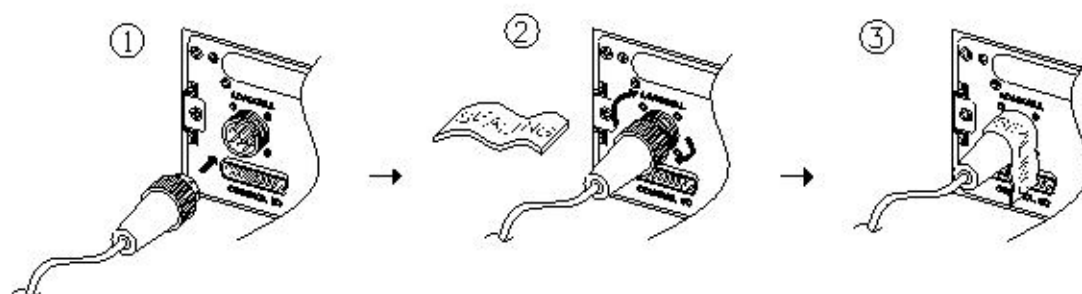
Function	Buzzer On / Off		
Set value (0, 1)	Display		Description
	F52	0	Always Buzzer is ON
	F52	1	Always Buzzer is OFF

8. Sealing Method

(1) Sealing method of cal switch



(2) Sealing method of Load Cell Connector



(3) Error Message

Error 01

Reason	The weight is unstable to initialize the scale
Solution	Put the scale on a stable place and turn on the power

Error 02

Reason	Load cell connection failure or error in A/D conversion part.
Solution	Check the load cell connector to see if the polarity of signal is reversed

Error 05

Reason	You pressed any key for long time or problem of key part
Solution	If there is no problem in key part, call your CAS dealer

Error 08

Reason	You have set the operating condition of ZERO key or TARE key not to operate when the indicator is not stable.
Solution	Reset the operating condition of ZERO and TARE key in SET mode F09

Error 09

Reason	Current weight deviates from zero range
Solution	Set the operational range of the ZERO key within 2% or 10% of the maximum capacity in SET mode F08

Error 10

Reason	Tare weight exceeds the maximum capacity of the scale
Solution	Tare weight should be lower than the maximum capacity. Otherwise, the maximum capacity should be greater than the tare

Error 13

Reason	The zero range deviates from the set range
Solution	Confirm that there is nothing on the platter. If nothing exists, do calibration in CAL mode

Error 14

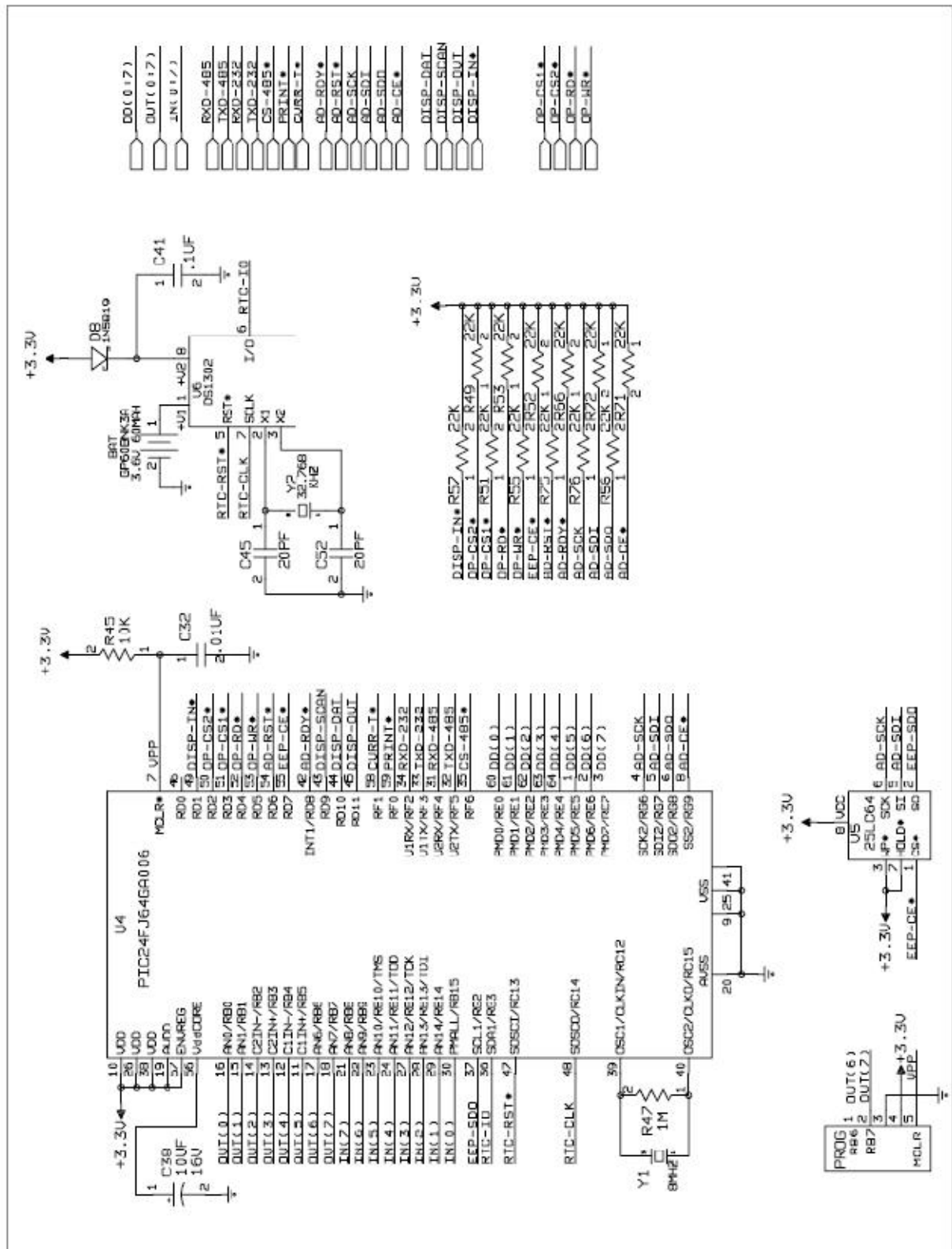
Reason	Gross weight is lower than final Weight in Loss-in-weight batching of built-in automatic program mode
--------	---

Over

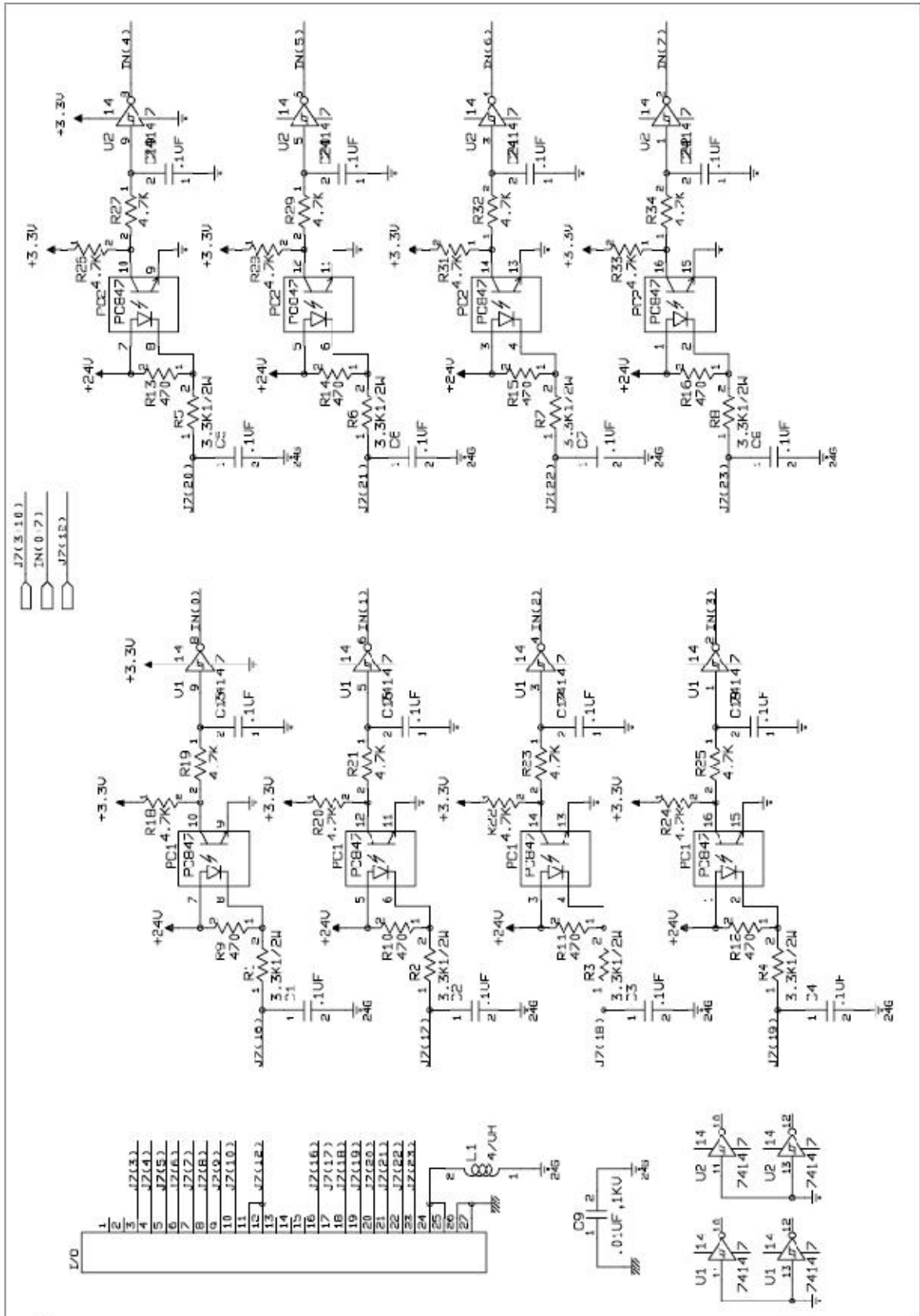
Reason	The weight is exceeds maximum capacity of the indicator
Solution	Do not load the item exceeds the maximum tolerance. If the load cell is damaged, the load cell should be replaced

9. Schematic Diagram

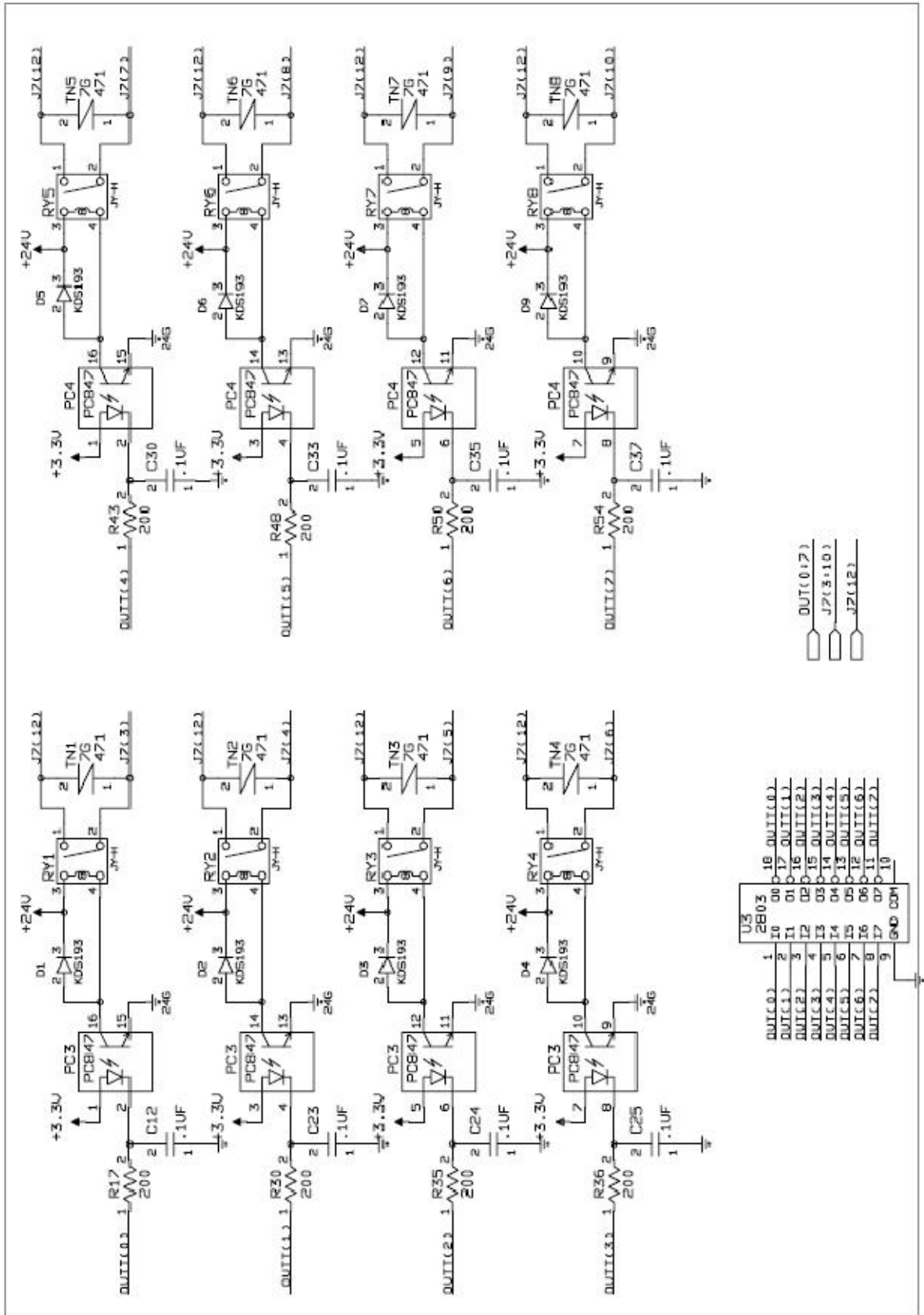
(1) Main PCB – CPU



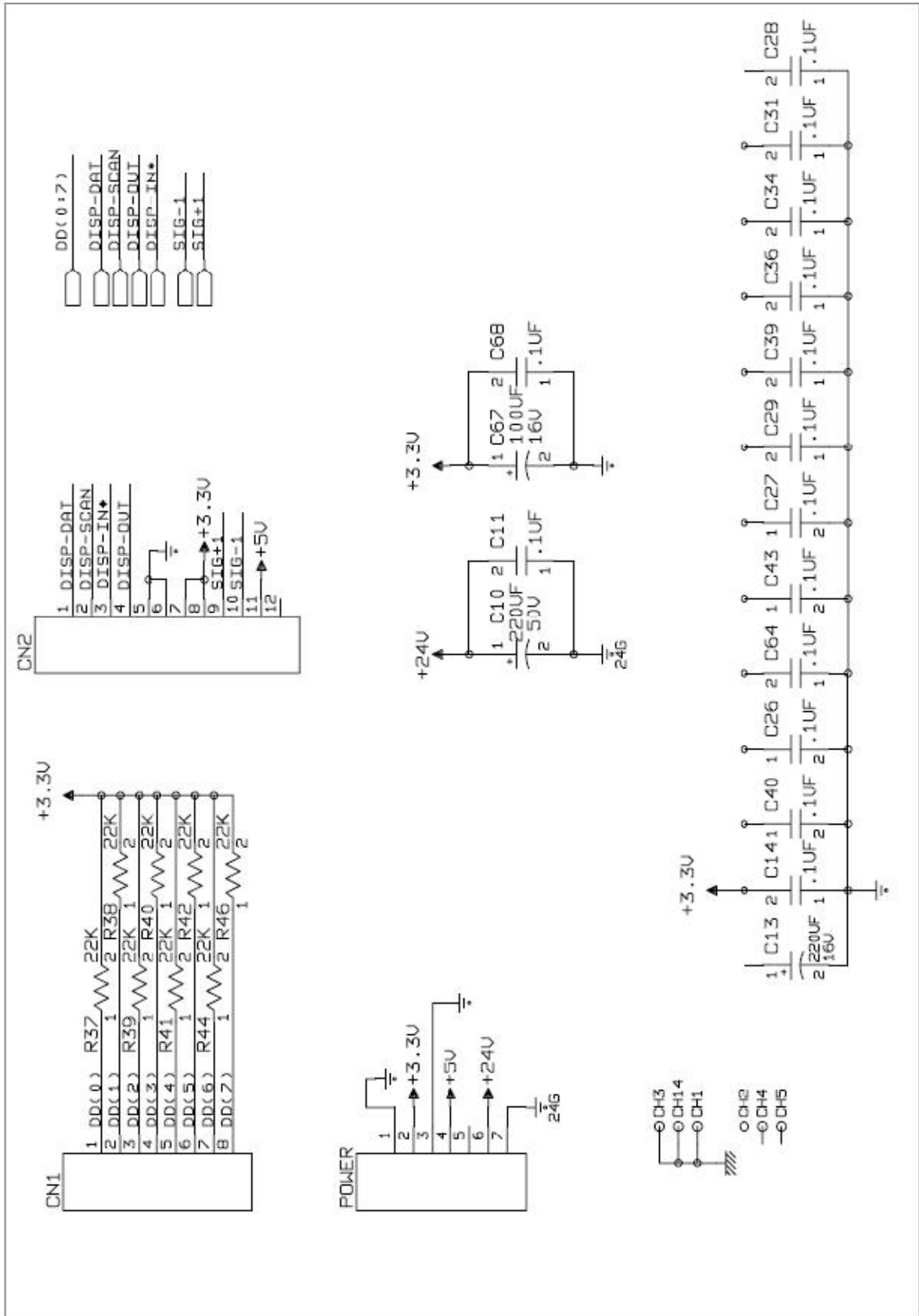
(2) Main PCB – Serial



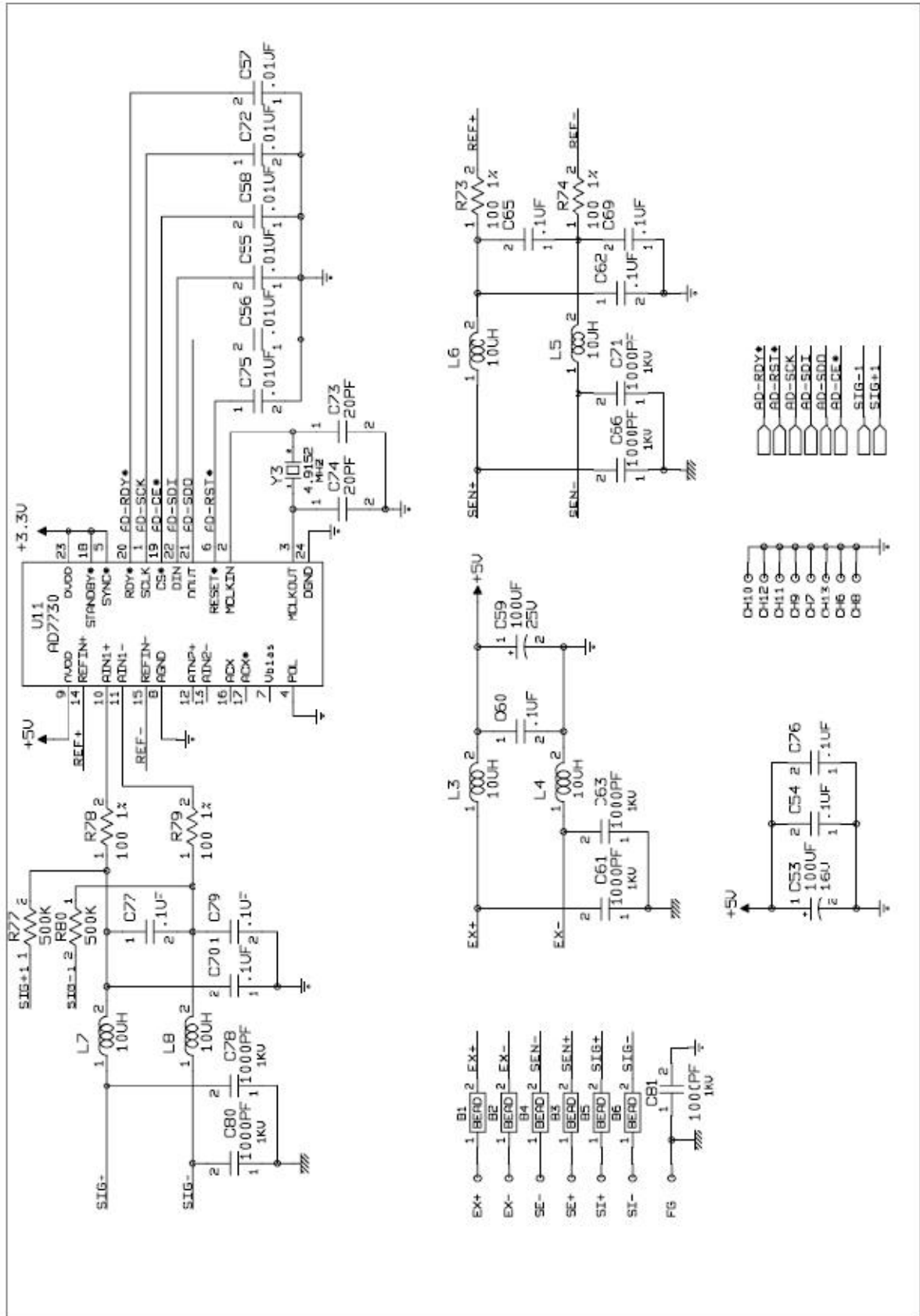
(4) Main PCB - Output



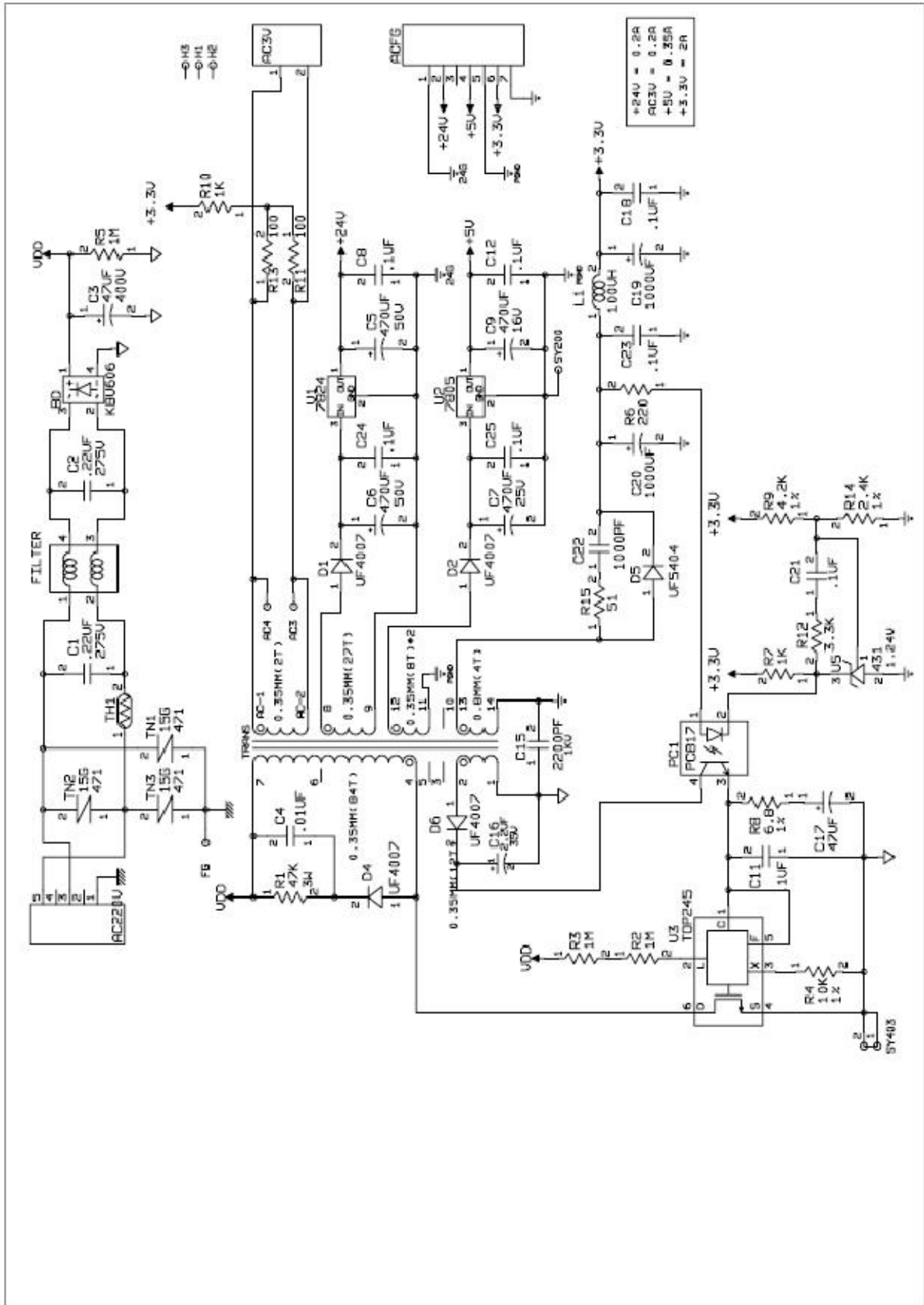
(5) Main PCB - Connector



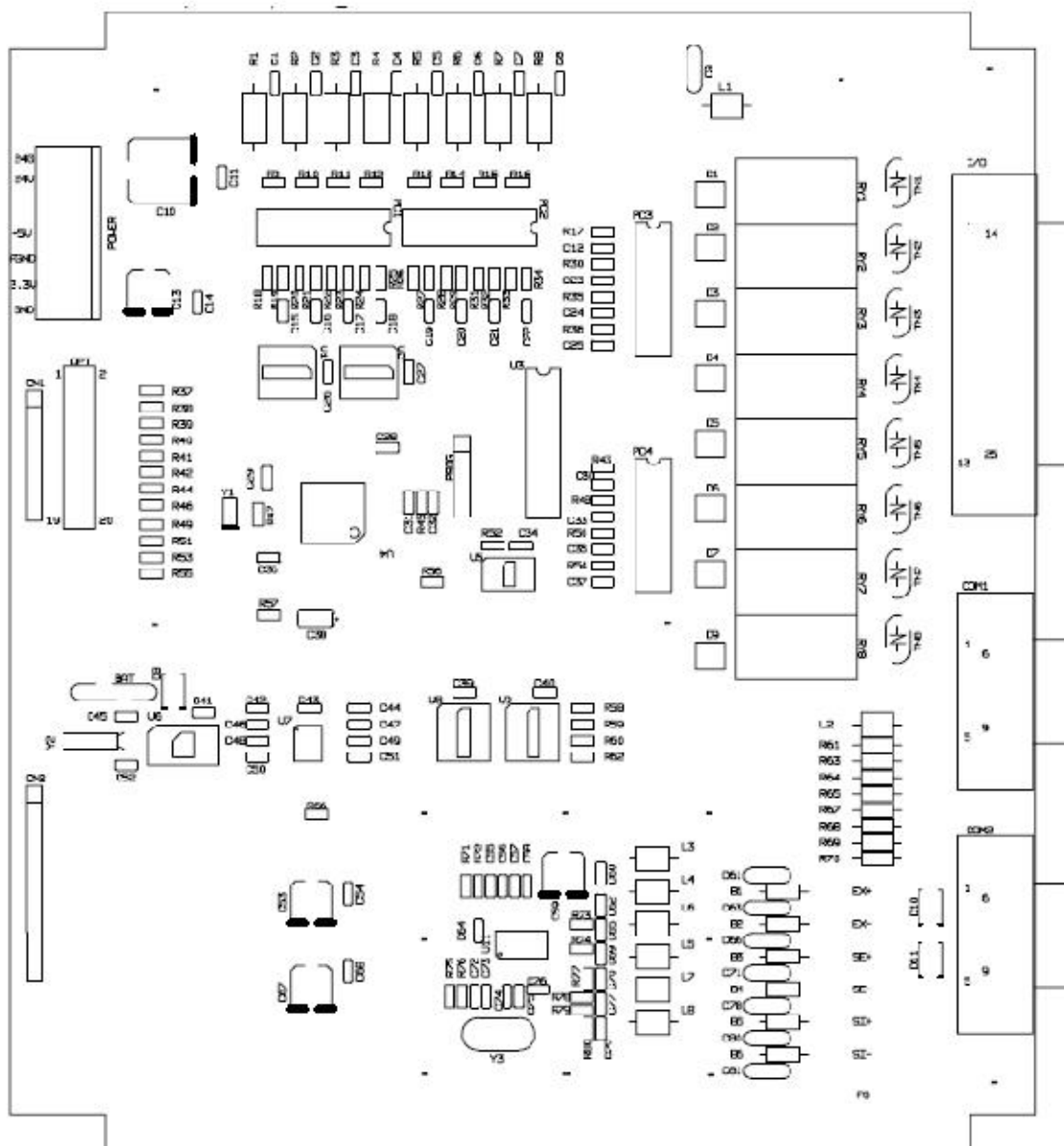
(6) Main PCB - Analog Input (Load cell)



(7) Display PCB



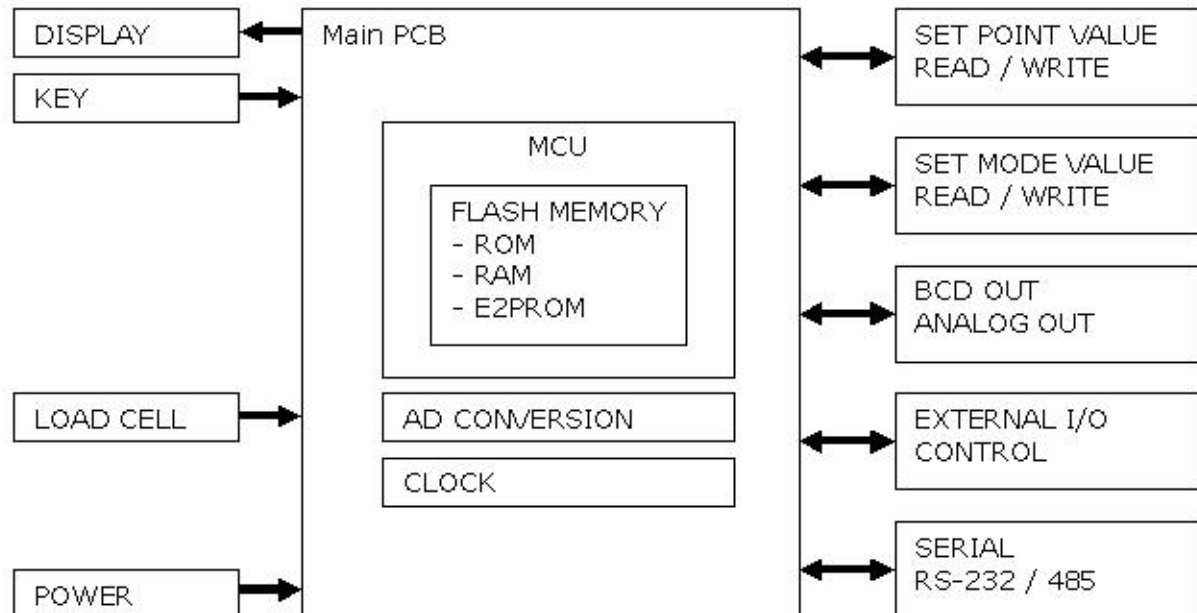
(1) Main PCB



Bill of Materials (BOM) for the PCB assembly:

Ref	Part	QTY
1	PCB	1
2	IC1	1
3	IC2	1
4	IC3	1
5	IC4	1
6	IC5	1
7	IC6	1
8	IC7	1
9	IC8	1
10	IC9	1
11	IC10	1
12	IC11	1
13	IC12	1
14	IC13	1
15	IC14	1
16	IC15	1
17	IC16	1
18	IC17	1
19	IC18	1
20	IC19	1
21	IC20	1
22	IC21	1
23	IC22	1
24	IC23	1
25	IC24	1
26	IC25	1
27	IC26	1
28	IC27	1
29	IC28	1
30	IC29	1
31	IC30	1
32	IC31	1
33	IC32	1
34	IC33	1
35	IC34	1
36	IC35	1
37	IC36	1
38	IC37	1
39	IC38	1
40	IC39	1
41	IC40	1
42	IC41	1
43	IC42	1
44	IC43	1
45	IC44	1
46	IC45	1
47	IC46	1
48	IC47	1
49	IC48	1
50	IC49	1
51	IC50	1
52	IC51	1
53	IC52	1
54	IC53	1
55	IC54	1
56	IC55	1
57	IC56	1
58	IC57	1
59	IC58	1
60	IC59	1
61	IC60	1
62	IC61	1
63	IC62	1
64	IC63	1
65	IC64	1
66	IC65	1
67	IC66	1
68	IC67	1
69	IC68	1
70	IC69	1
71	IC70	1
72	IC71	1
73	IC72	1
74	IC73	1
75	IC74	1
76	IC75	1
77	IC76	1
78	IC77	1
79	IC78	1
80	IC79	1
81	IC80	1
82	IC81	1
83	IC82	1
84	IC83	1
85	IC84	1
86	IC85	1
87	IC86	1
88	IC87	1
89	IC88	1
90	IC89	1
91	IC90	1
92	IC91	1
93	IC92	1
94	IC93	1
95	IC94	1
96	IC95	1
97	IC96	1
98	IC97	1
99	IC98	1
100	IC99	1
101	IC100	1
102	IC101	1
103	IC102	1
104	IC103	1
105	IC104	1
106	IC105	1
107	IC106	1
108	IC107	1
109	IC108	1
110	IC109	1
111	IC110	1
112	IC111	1
113	IC112	1
114	IC113	1
115	IC114	1
116	IC115	1
117	IC116	1
118	IC117	1
119	IC118	1
120	IC119	1
121	IC120	1
122	IC121	1
123	IC122	1
124	IC123	1
125	IC124	1
126	IC125	1
127	IC126	1
128	IC127	1

11. Block Diagram



12. Description of Connector Pin

(1) Main PCB

CN 1		POWER		COM 1		CONTROL I/O			
1	DD(0)	1	GND	1	NC	1	NC	13	NC
2	DD(0)	2	3.3V	2	TXD1	2	NC	14	NC
3	DD(0)	3	GND	3	RXD1	3	J7(3)	15	NC
4	DD(0)	4	5V	4	NC	4	J7(4)	16	J7(16)
5	DD(0)	5	NC	5	GND	5	J7(5)	17	J7(17)
6	DD(0)	6	24V	6	NC	6	J7(6)	18	J7(18)
7	DD(0)	7	24V GND	7	NC	7	J7(7)	19	J7(19)
8	DD(0)			8	NC	8	J7(8)	20	J7(20)
Display data				9	NC	9	J7(9)	21	J7(21)
						10	J7(10)	22	J7(22)
						11	J7(12)	23	J7(23)
						12		24	24V
								25	GND
						Ext. output		Ext. Input	

CN 2		COM 2	
1	DISP-DAT	1	NC
2	DISP-SCAN	2	TXD2
3	DISP-IN	3	RXD2
4	DISP-OUT	4	NC
5	GND	5	GND
6	GND	6	NC
7	3.3V	7	NC
8	3.3V	8	NC
9	SIG+1	9	NC
10	SIG-1		
11	5V		
12	NC		

(2) Display PCB

CN 1		CN 2	
1	DD(0)	1	DISP-DAT
2	DD(0)	2	DISP-SCAN
3	DD(0)	3	DISP-IN
4	DD(0)	4	DISP-OUT
5	DD(0)	5	GND
6	DD(0)	6	GND
7	DD(0)	7	3.3V
8	DD(0)	8	3.3V
	Display data	9	SIG+1
		10	SIG-1
		11	5V
		12	NC

(3) Power PCB

KEY		POWER	
1	KEY IN 1	1	24V GND
2	KEY IN 2	2	24V
3	KEYSCAN (0)	3	NC
4	KEYSCAN (1)	4	5V
5	KEYSCAN (2)	5	PGND
6	NC	6	3.3V
		7	GND

13. Data Sheet

(1) PIC24FJ64GA006 – 16Bit Flash Microcontroller



General Purpose, 16-bit Flash Microcontrollers

High-Performance CPU:

- Modified Harvard Architecture
- Up to 16 MIPS operation @ 32 MHz
- 8 MHz internal oscillator:
 - 4x PLL option
 - Multiple divide options
- 17-bit x 17-bit Single-Cycle Hardware Fractional/Integer Multiplier
- 32-bit by 16-bit Hardware Divider
- 16 x 16-bit Working Register Array
- C compiler Optimized Instruction Set Architecture:
 - 76 base instructions
 - Flexible addressing modes
- Linear Program Memory Addressing up to 12 Mbytes
- Linear Data Memory Addressing up to 64 Kbytes
- Two Address Generation Units for separate Read and Write Addressing of Data Memory

Special Microcontroller Features:

- Operating Voltage Range of 2.0V to 3.6V
- Flash Program Memory:
 - 1000 erase/write cycles, typical
 - Flash retention 20 years, typical
- Self-Reprogrammable under Software Control
- Selectable Power Management modes:
 - Sleep, Idle and Alternate Clock modes
- Fail-Safe Clock Monitor operation:
 - Detects clock failure and switches to on-chip, low-power RC oscillator
- On-Chip LDO Regulator
- JTAG Boundary Scan and Programming Support
- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Flexible Watchdog Timer (WDT) with On-Chip, Low-Power RC Oscillator for reliable operation
- In-Circuit Serial Programming™ (ICSP™) and In-Circuit Emulation (ICE) via 2 pins

Analog Features:

- 10-bit, up to 16-channel Analog-to-Digital Converter (A/D):
 - 500 ksp/s conversion rate
 - Conversion available during Sleep and Idle
- Dual Analog Comparators with Programmable Input/Output Configuration

Peripheral Features:

- Two 3-wire/4-wire SPI modules, supporting 4 Frame modes with 4-level FIFO Buffer
- Two I²C™ modules support Multi-Master/Slave mode and 7-bit/10-bit Addressing
- Two UART modules:
 - Supports RS-232, RS-485 and LIN 1.2
 - Supports IrDA® with on-chip hardware encoder
 - Auto-Wake-up on Start bit
 - Auto-Baud Detect
 - 4-level FIFO buffer
- Parallel Master Slave Port (PMP/PSP):
 - Supports 8-bit or 16-bit data
 - Supports 16 address lines
- Hardware Real-Time Clock/Calendar (RTCC):
 - Provides clock, calendar and alarm functions
- Five 16-bit Timers/Counters with Programmable prescaler
- Five 16-bit Capture Inputs
- Five 16-bit Compare/PWM Outputs
- High-Current Sink/Source on select I/O pins: 18 mA/18 mA
- Configurable Open-Drain Output on Digital I/O pins
- Up to 5 External Interrupt Sources

Device	Pins	Program Memory (Bytes)	SRAM (Bytes)	Timers 16-bit	Capture Input	Compare/PWM Output	UART	SPI	I ² C™	10-bit A/D (ch)	Comparators	PMP/PSP	JTAG
PIC24FJ64GA006	64	64K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ96GA006	64	96K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ128GA006	64	128K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ64GA008	80	64K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ96GA008	80	96K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ128GA008	80	128K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ64GA010	100	64K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ96GA010	100	96K	8K	5	5	5	2	2	2	16	2	Y	Y
PIC24FJ128GA010	100	128K	8K	5	5	5	2	2	2	16	2	Y	Y



Bridge Transducer ADC

AD7730/AD7730L

KEY FEATURES

Resolution of 230,000 Counts (Peak-to-Peak)

Offset Drift: 5 nV/°C

Gain Drift: 2 ppm/°C

Line Frequency Rejection: >150 dB

Buffered Differential Inputs

Programmable Filter Cutoffs

Specified for Drift Over Time

Operates with Reference Voltages of 1 V to 5 V

ADDITIONAL FEATURES

Two-Channel Programmable Gain Front End

On-Chip DAC for Offset/TARE Removal

FASTStep™ Mode

AC or DC Excitation

Single Supply Operation

APPLICATIONS

Weigh Scales

Pressure Measurement

The modulator output is processed by a low pass programmable digital filter, allowing adjustment of filter cutoff, output rate and settling time.

The part features two buffered differential programmable gain analog inputs as well as a differential reference input. The part operates from a single +5 V supply. It accepts four unipolar analog input ranges: 0 mV to +10 mV, +20 mV, +40 mV and +80 mV and four bipolar ranges: ± 10 mV, ± 20 mV, ± 40 mV and ± 80 mV. The peak-to-peak resolution achievable directly from the part is 1 in 230,000 counts. An on-chip 6-bit DAC allows the removal of TARE voltages. Clock signals for synchronizing ac excitation of the bridge are also provided.

The serial interface on the part can be configured for three-wire operation and is compatible with microcontrollers and digital signal processors. The AD7730 contains self-calibration and system calibration options, and features an offset drift of less than 5 nV/°C and a gain drift of less than 2 ppm/°C.

The AD7730 is available in a 24-pin plastic DIP, a 24-lead SOIC and 24-lead TSSOP package. The AD7730L is available in a 24-lead SOIC and 24-lead TSSOP package.

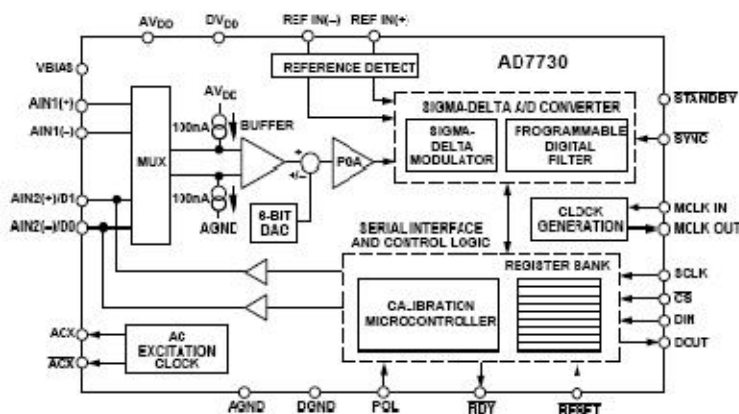
NOTE

The description of the functions and operation given in this data sheet apply to both the AD7730 and AD7730L. Specifications and performance parameters differ for the parts. Specifications for the AD7730L are outlined in Appendix A.

GENERAL DESCRIPTION

The AD7730 is a complete analog front end for weigh-scale and pressure measurement applications. The device accepts low-level signals directly from a transducer and outputs a serial digital word. The input signal is applied to a proprietary programmable gain front end based around an analog modulator.

FUNCTIONAL BLOCK DIAGRAM





25AA640/25LC640/25C640

64K SPI™ Bus Serial EEPROM

DEVICE SELECTION TABLE

Part Number	Vcc Range	Max Clock Frequency	Temp Ranges
25AA640	1.8-5.5V	1 MHz	C,I
25LC640	2.5-5.5V	2 MHz	C,I
25C640	4.5-5.5V	3 MHz	C,I,E

FEATURES

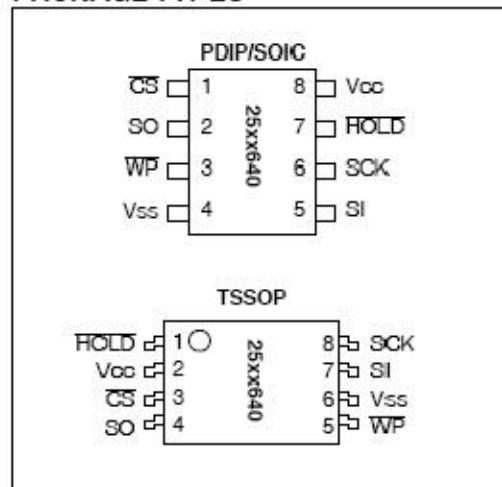
- Low power CMOS technology
 - Write current: 3 mA typical
 - Read current: 500 μ A typical
 - Standby current: 500 nA typical
- 8192 x 8 bit organization
- 32 byte page
- Write cycle time: 5ms max.
- Self-timed ERASE and WRITE cycles
- Block write protection
 - Protect none, 1/4, 1/2, or all of array
- Built-in write protection
 - Power on/off data protection circuitry
 - Write enable latch
 - Write protect pin
- Sequential read
- High reliability
 - Endurance: 1M cycles (guaranteed)
 - Data retention: > 200 years
 - ESD protection: > 4000 V
- 8-pin PDIP, SOIC, and TSSOP packages
- Temperature ranges supported:
 - Commercial: (C) 0°C to +70°C
 - Industrial: (I) -40°C to +85°C
 - Automotive: (E) (25C640) -40°C to +125°C

DESCRIPTION

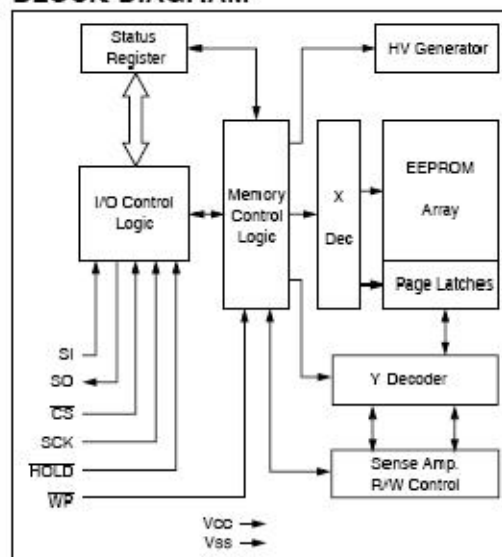
The Microchip Technology Inc. 25AA640/25LC640/25C640 (25xx640) is a 64K bit serial Electrically Erasable PROM. The memory is accessed via a simple Serial Peripheral Interface (SPI) compatible serial bus. The bus signals required are a clock input (SCK) plus separate data in (SI) and data out (SO) lines. Access to the device is controlled through a chip select ($\overline{CS}$) input.

Communication to the device can be paused via the hold pin (HOLD). While the device is paused, transitions on its inputs will be ignored, with the exception of chip select, allowing the host to service higher priority interrupts.

PACKAGE TYPES



BLOCK DIAGRAM



(4) SMBJ24CA – Transient Voltage Suppressor



Micro Commercial Components
21201 Itasca Street Chatsworth
CA 91311
Phone: (818) 701-4933
Fax: (818) 701-4939

**SMBJ5.0
THRU
SMBJ170CA**

**Transient
Voltage Suppressor
5.0 to 170 Volts
600 Watt**

Features

- For surface mount applications in order to optimize board space
- Low profile package
- Fast response time: typical less than 1.0ps from 0 volts to V_{BR} minimum
- Low inductance
- Excellent clamping capability

Mechanical Data

- CASE: JEDEC DO-214AA
- Terminals: solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes positive end (cathode) except Bidirectional
- Maximum soldering temperature: 260°C for 10 seconds

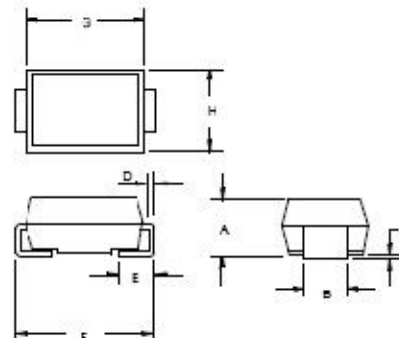
Maximum Ratings @ 25°C Unless Otherwise Specified

Peak Pulse Current on 10/1000us waveform	I_{TP}	See Table 1	Note: 1
Peak Pulse Power Dissipation	P_{TP}	600W	Note: 1, 2
Peak Forward Surge Current	I_{FSM}	100A	Note: 2, 3
Operation And Storage Temperature Range	T_J, T_{STG}	-55°C to +150°C	
Thermal Resistance	R	25°C/W	

NOTES:

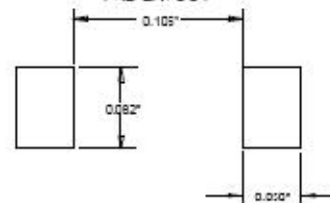
1. Non-repetitive current pulse, per Fig.3 and derated above $T_A=25^\circ\text{C}$ per Fig.2.
2. Mounted on 5.0mm² copper pads to each terminal.
3. 8.3ms, single half sine wave duty cycle=4 pulses per. Minute maximum.
4. Peak pulse current waveform is 10/1000us, with maximum duty Cycle of 0.01%.

**DO-214AA
(SMBJ) (LEAD FRAME)**



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.791	.796	2.13	2.44	
B	.075	.083	1.91	2.11	
C	.002	.006	0.051	0.203	
D	.006	.012	0.152	0.305	
E	.791	.793	2.06	2.27	
F	.200	.220	5.08	5.59	
G	.180	.195	4.57	4.93	
H	.130	.150	3.30	3.84	

**SUGGESTED SOLDER
PAD LAYOUT**

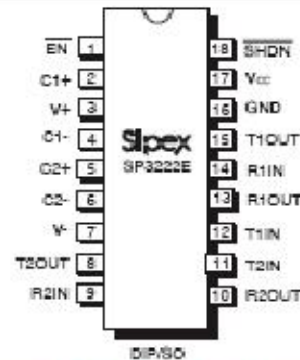


(5) SP3232ECY – 3.3V RS_232 Transceiver and Receiver

True +3.0V to +5.5V RS-232 Transceivers

FEATURES

- Meets true EIA/TIA-232-F Standards from a +3.0V to +5.5V power supply
- Minimum 120Kbps Data Rate Under Full Load
- 1 μ A Low-Power Shutdown with Receivers Active (SP3222E)
- Interoperable with RS-232 down to +2.7V power source
- Enhanced ESD Specifications:
 - ±15kV Human Body Model
 - ±15kV IEC1000-4-2 Air Discharge
 - ±8kV IEC1000-4-2 Contact Discharge



Now Available in Lead Free Packaging

Note: See page 6 for other pinouts

DESCRIPTION

The SP3222E/3232E series is an RS-232 transceiver solution intended for portable or hand-held applications such as notebook or palmtop computers. The SP3222E/3232E series has a high-efficiency, charge-pump power supply that requires only 0.1 μ F capacitors in 3.3V operation. This charge pump allows the SP3222E/3232E series to deliver true RS-232 performance from a single power supply ranging from +3.3V to +5.0V. The SP3222E/3232E are 2-driver/2-receiver devices. This series is ideal for portable or hand-held applications such as notebook or palmtop computers. The ESD tolerance of the SP3222E/3232E devices are over ±15kV for both Human Body Model and IEC1000-4-2 Air discharge test methods. The SP3222E device has a low-power shutdown mode where the devices' driver outputs and charge pumps are disabled. During shutdown, the supply current falls to less than 1 μ A.

SELECTION TABLE

MODEL	Power Supplies	RS-232 Drivers	RS-232 Receivers	External Components	Shutdown	TTL 3-State	No. of Pins
SP3222	+3.0V to +5.5V	2	2	4	Yes	Yes	18, 20
SP3232	+3.0V to +5.5V	2	2	4	No	No	18

3.3V FULL-DUPLEX RS-485 DRIVERS AND RECEIVERS

FEATURES

- 1/8 Unit-Load Option Available (Up to 256 Nodes on the Bus)
- Bus-Pin ESD Protection Exceeds 15 kV HBM
- Optional Driver Output Transition Times for Signaling Rates⁽¹⁾ of 1 Mbps, 5 Mbps and 25 Mbps
- Low-Current Standby Mode: < 1 μ A
- Glitch-Free Power-Up and Power-Down Protection for Hot-Plugging Applications
- 5-V Tolerant Inputs
- Bus Idle, Open, and Short Circuit Failsafe
- Driver Current Limiting and Thermal Shutdown
- Meets or exceeds the requirements of ANSI TIA/EIA-485-A and RS-422 Compatible
- 5-V Devices available, SN65HVD50-59

(1) The signaling rate of a line is the number of voltage transitions that are made per second expressed in the units bps (bits per second).

APPLICATIONS

- Utility Meters
- DTE/DCE Interfaces
- Industrial, Process, and Building Automation
- Point-of-Sale (POS) Terminals and Networks

DESCRIPTION

The SN65HVD3X devices are 3-state differential line drivers and differential-input line receivers that operate with 3.3-V power supply.

Each driver and receiver has separate input and output pins for full-duplex bus communication designs. They are designed for balanced transmission lines and interoperability with ANSI TIA/EIA-485A, TIA/EIA-422-B, ITU-T v.11 and ISO 8482:1993 standard-compliant devices.

The SN65HVD30, SN65HVD31, SN65HVD32, SN65HVD36 and SN65HVD37 are fully enabled with no external enabling pins. The SN65HVD36 and SN65HVD37 implement receiver equalization technology for improved performance in long distance applications.

The SN65HVD33, SN65HVD34, SN65HVD35, SN65HVD38, and SN65HVD39 have active-high driver enables and active-low receiver enables. A very low, less than 1 μ A, standby current can be achieved by disabling both the driver and receiver. The SN65HVD38 and SN65HVD39 implement receiver equalization technology for improved performance in long distance applications.

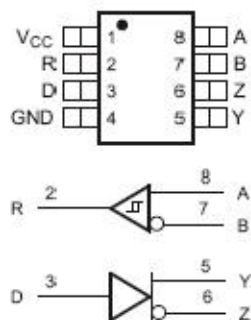
All devices are characterized for operation from -40°C to 85°C .

The SN65HVD36 and SN65HVD38 implement receiver equalization technology for improved jitter performance on differential bus applications with data rates up to 20 Mbps at cable lengths up to 100 meters.

The SN65HVD37 and SN65HVD39 implement receiver equalization technology for improved jitter performance on differential bus applications with data rates in the range of 1 to 5 Mbps at cable lengths up to 1000 meters.

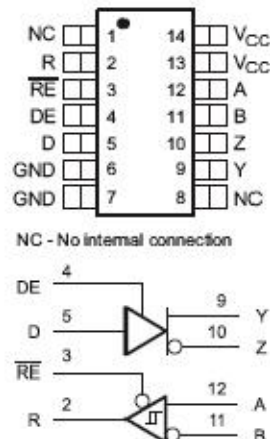
SN65HVD30, SN65HVD31, SN65HVD32, SN65HVD36, SN65HVD37

D PACKAGE (TOP VIEW)



SN65HVD33, SN65HVD34, SN65HVD35, SN65HVD38, SN65HVD39

D PACKAGE (TOP VIEW)



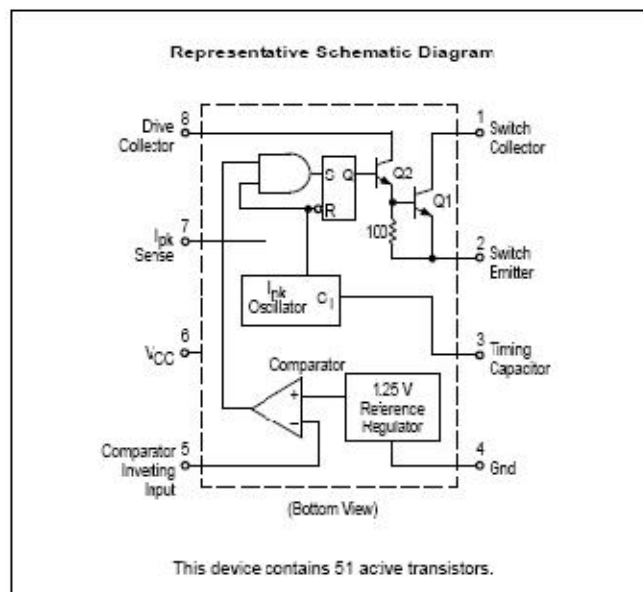
NC - No internal connection

(7) MC34063 – DC/DC Converter

DC-to-DC Converter Control Circuits

The MC34063A Series is a monolithic control circuit containing the primary functions required for DC-to-DC converters. These devices consist of an internal temperature compensated reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. This series was specifically designed to be incorporated in Step-Down and Step-Up and Voltage-Inverting applications with a minimum number of external components. Refer to Application Notes AN920A/D and AN954/D for additional design information.

- Operation from 3.0 V to 40 V Input
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.5 A
- Output Voltage Adjustable
- Frequency Operation to 100 kHz
- Precision 2% Reference



DC-to-DC CONVERTER CONTROL CIRCUITS

SEMICONDUCTOR TECHNICAL DATA

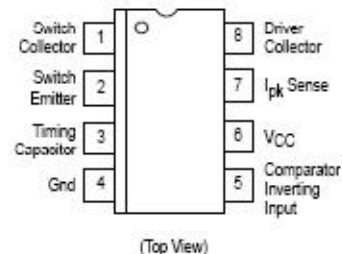


P, P1 SUFFIX
PLASTIC PACKAGE
CASE 626



D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC33063AD	$T_A = -40^\circ \text{ to } +85^\circ \text{C}$	SO 8
MC33063AP1		Plastic DIP
MC33063AVD	$T_A = -40^\circ \text{ to } +125^\circ \text{C}$	SO-8
MC33063AVP		Plastic DIP
MC34063AD	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	SO-8
MC34063AP1		Plastic DIP

(8) TD62783A – 8CH Source Driver

8CH HIGH-VOLTAGE SOURCE DRIVER

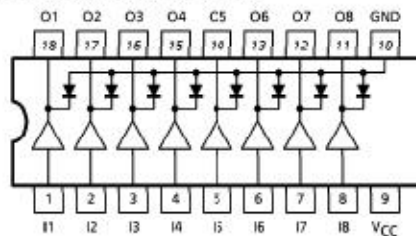
The TD62783AP/F/AF Series are comprised of eight source current Transistor Array.
These drivers are specifically designed for fluorescent display applications.
Applications include relay, hammer and lamp drivers.

FEATURES

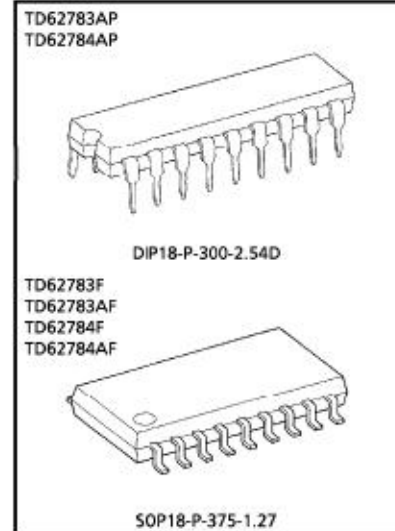
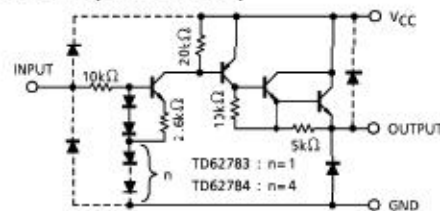
- High output voltage Type-AP, AF : $V_{CC} = 50V$ MIN.
Type-F : $V_{CC} = 35V$ MIN.
- Output current (single output) $I_{OUT} = -500mA$ MIN.
- Output clamp diodes
- Single supply voltage
- Input compatible with various types of logic
- Package Type-AP : DIP-18pin
- Package Type-F, AF : SOP-18pin

TYPE	DESIGNATION
TD62783AP/F/AF	TTL, 5V CMOS
TD62784AP/F/AF	6~15V PMOS, CMOS

PIN CONNECTION (TOP VIEW)



SCHEMATICS (EACH DRIVER)



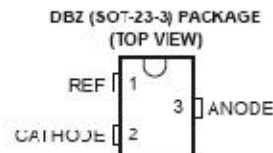
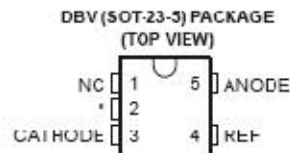
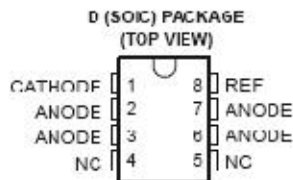
Weight
DIP18-P-300-2.54D : 1.47g (Typ.)
SOP18-P-375-1.27 : 0.41g (Typ.)

(9) TLV431ILP – Programmable Precision Reference

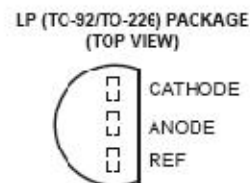
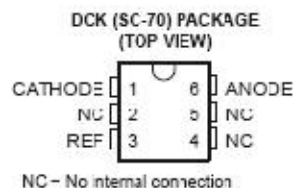
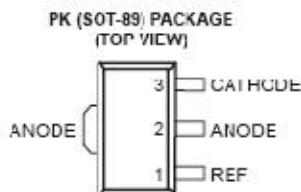
TLV431, TLV431A, TLV431B **LOW-VOLTAGE ADJUSTABLE PRECISION SHUNT REGULATOR**

SLVS139S – JULY 1996 – REVISED JANUARY 2006

- Low-Voltage Operation . . . $V_{REF} = 1.24\text{ V}$
- Adjustable Output Voltage, $V_O = V_{REF}$ to 6 V
- Reference Voltage Tolerances at 25°C
 - 0.5% for TLV431B
 - 1% for TLV431A
 - 1.5% for TLV431
- Typical Temperature Drift
 - 4 mV (0°C to 70°C)
 - 6 mV (–40°C to 85°C)
 - 11 mV (–40°C to 125°C)
- Low Operational Cathode Current . . . 80 μA Typ
- 0.25- Ω Typical Output Impedance
- Ultra-Small SC-70 Package Offers 40% Smaller Footprint Than SOT-23-3
- See TLV11431 and TLV11432 for
 - Wider V_{KA} (1.24 V to 18 V) and I_K (80 mA)
 - Additional SOT-89 Package
- Multiple Pinouts for SOT-23-3 and SOT-89 Packages



NC – No internal connection
 * For TLV431, TLV431A: NC – No internal connection
 * For TLV431B: Pin 2 is attached to Substrate and must be connected to ANODE or left open.



NC – No internal connection

description/ordering information

The TLV431 is a low-voltage 3-terminal adjustable voltage reference with specified thermal stability over applicable industrial and commercial temperature ranges. Output voltage can be set to any value between V_{REF} (1.24 V) and 6 V with two external resistors (see Figure 2). These devices operate from a lower voltage (1.24 V) than the widely used TL431 and TL1431 shunt-regulator references.

When used with an optocoupler, the TLV431 is an ideal voltage reference in isolated feedback circuits for 3-V to 3.3-V switching-mode power supplies. These devices have a typical output impedance of 0.25 Ω . Active output circuitry provides a very sharp turn on characteristic, making them excellent replacements for low-voltage Zener diodes in many applications, including on-board regulation and adjustable power supplies.

14. Part List

(1) Main PCB Ass'y

No	Item	Qty	Description	Reference	Size
1	1N5819	1	SCHOTTKY BARRIER DIODE	D8	DO-214AA
2	74HC125RPEL	1	QUAD 3-STATE Buffer W/LOW ENABLE	U8	SOP-14
3	HIF3FB-20PA-2.54DSA	1	20Pin BOX Headers Connectors	OPT	DIP
4	DS1302S	1	TRICKLE CHARGE TIMEKEEPING CHIP	U6	SOP-8
5	D,KDS193	8	SWITCHING SMD DIODE KDS193 (KEC)	D1-D7,D9	SOT-23
6	ULN2803AP,TD62083	1	8 DARLINGTON TR ARRAY	U3	DIP-18
7	XTAL, 32.768KHz	1	32.768KHZ CRYSTAL	Y2	LEAD
8	XTAL, 4.9152MHz	1	4.9152MHz CRYSTAL	Y3	LEAD
9	R, 8MHz	1	8MHz RESONATOR	Y1	CSTCE 8M0G52A
10	25AA640-I/SN	1	64K BIT SPI EEPROM	U5	SOP-8
11	SN65HVD35DR	1	3.3V RS-485 DRIVERS AND RECEIVERS	U9	SOP-14
12	74HC14RPEL	2	Hex inverting Schmitt trigger	U1,U2	SOP-14
13	AD7730BRU	1	BRIDGE TRANSDUCER ADC	U11	SSOP-24
14	BAT,CR1220	1	CR1220(need to work the pin)	BAT	DIP
15	BEAD	6	BAS3560	B1-B6	LEAD
16	CC, 0.01uF	7	0.01uF NON-POLARIZED CAPACITOR	C32,C55-C58,C72,C75	2012
17	CC, 0.01uF,1kV	1	0.01uF 1KV Non-Pol. CAPACITOR	C9	LEAD
18	CC, 0.1uF	52	0.1uF NON-POLARIZED CAPACITOR	C1-C8,C11,C12,C14-C31, C33-C37, C39-C43,C46, C48,C50, C54,C60,C62, C64,C65,C68-C70, C76,C77,C79	2012
19	CC,1000pF,1kV	7	1000pF CERAMIC CAPACITOR 1KV	C61,C63,C66,C71, C78,C80,C81	LEAD
20	CC,100pF	4	100pF CERAMIC CAPACITOR	C44,C47,C49,C51	2012
21	CC,20pF	4	20pF NON-POLARIZED CAPACITOR	C45,C52,C73,C74	2012
22	CE,100uF,16V	2	100uF 16V POLARIZED CAPACITOR	C53,C67	F60(6Φ)
23	CE,100uF,25V	1	100uF 25V POLARIZED CAPACITOR	C59	F60(6Φ)
24	CE,220uF,16V	1	220uF 16V POLARIZED CAPACITOR	C13	F60(6Φ)
25	CE,220uF,50V	1	220uF 50V POLARIZED CAPACITOR	C10	J10(10Φ)
26	TCSCN1E106MC	1	10uF25V TANTAL CAPACITOR	C38	C
27	12Pin, A2-12PA-2.54DS	1	PIN HEADER	CN2	DIP
31	8Pin, A2-8PA-2.54DS	1	PIN HEADER	CN1	DIP
28	RDBD-25SE-LNA	1	D-SUB CONNECTOR	I/O	DIP
29	CN,5268-05A MOLEX	1	5 PIN CONNECTOR	PROG	DIP
30	CN,5273-07A	1	7 PIN CONNECTOR	POWER	DIP
32	RDBD-9SE-LNA	2	D-SUB CONNECTOR	COM1,COM2	DIP
33	COIL,10uH	6	COIL 10uH(resistor Type 1/2size)	L3-L8	LEAD
34	COIL,47uH	2	COIL 47uH(resistor Type 1/2size)	L1,L2	LEAD
35	SMBJ24CA	2	Transient Voltage Suppressor 24V 600 Watt	D10,D11	DO-214AA
36	SP3232ECY	1	RS232 TRANSCEIVER & RECEIVER(+3.3V)	U7	TSSOP-16
37	PC847,D	4	PHOTO COUPLER PC847 (D)	PC1-PC4	DIP-16
38	PIC24FJ64GA006	1	GENERAL 16-BIT FLASH CONTROLLER	U4	LQFP
39	RD,100,1/10W	8	RESISTOR 100 1/10W 5%	R61,R63-R65,R67-R70	2012
40	RD,10K,1/10W	5	RESISTOR 10K 1/10W 5%	R45,R58-R60,R62	2012
41	RD,1M,1/10W	1	RESISTOR 1M 1/10W 5%	R47	2012
42	RD,200,1/10W	8	RESISTOR 200 1/10W 5%	R17,R30,R35,R36, R43,R48,R50,R54	2012
43	RD,22K,1/10W	20	RESISTOR 22K 1/10W 5%	R37-R42,R44,R46,R49,R51-R53, R55-R57,R66,R71,R72,R75,R76	2012
44	RD,4.7K,1/10W	16	RESISTOR 4.7K 1/10W 5%	R18-R29,R31-R34	2012
45	RD,470,1/10W	8	RESISTOR 470 1/10W 5%	R9-R16	2012
46	RN,499K,1/10W	2	RESISTOR 499K 1/10W 1%	R77,R80	2012
47	RN,100,1/10W	4	RESISTOR 100 1/10W 1%	R73,R74,R78,R79	2012
48	RD,3.3K,1/2W	8	RESISTOR 3.3K,1/2W 5%	R1-R8	LEAD
49	RY,IRJ-1A-D24S	8	24VDC(1A) 5A ILOSAM	RY1-RY8	DIP
50	TNR,7G471	8	TNR,7G471	TN1-TN8	LEAD

(2) Display PCB Ass'y

No	Item	Qty	Description	Reference	Size
1	D,1N5819	1	SCHOTTKY BARRIER DIODE	D1	DO-214AA
2	5267-02AX MOLEX	1	2 PIN CONNECTOR	AC	DIP
3	74HC244	1	DUAL 4-BIT 3-STATE W/LOW ENABLE	U2	SOP-20
4	MC34063,KA34063	1	DC/DC CONVERTER CONTROLLER	U9	SOP-4
5	TD62783A, UDN2981	3	8CH SOURCE DRIVER 50V	U6-U8	SOP-18
6	74HC574	3	8-BIT REGISTER W/TRI-STATE OUTPUTS	U3-U5	SOP-20
7	BUZZER,ALP-1205S	1	PIEZO BUZZER	BZ	DIP
8	CC,,1uF	5	.1uF NON-POLARIZED CAPACITOR	C1-C4,C6	2012
9	CC,1000pF	3	1000pF NON-POLARIZED CAPACITOR	C10-C12	2012
10	CC,1200pF	1	1200pF NON-POLARIZED CAPACITOR	C9	2012
11	CE,100uF,16V	2	100uF 16V POLARIZED CAPACITOR	C5,C7	F60(6Φ)
12	CE,47uF,50V	1	47uF 50V POLARIZED CAPACITOR	C8	H63(8Φ)
13	CN,53015-0610	1	6PIN CONNECTOR	KEY	DIP-6
14	COIL,220uH	1	COIL,220uH	L1	DR2
15	DIP-SW,KSD 02H	1	2 POSITION DIP SWITCH	SW2	DIP-4
16	DIP-SW,KSD 03H	1	3 POSITION DIP SWITCH	SW1	DIP-6
17	LED,RED	2	RED,GENERIC LED	LD1,LD2	Lead
18	RD,180,1/10W	1	RESISTOR 180 1/10W 5%	R7	2012
19	RD,1K,1/10W	5	RESISTOR 1K 1/10W 5%	R17-R21	2012
20	RD,2,1/10W	4	RESISTOR 2 1/10W 5%	R3-R6	2012
21	RD,100,1/10W	1	RESISTOR 100 1/10W 5%	R13	2012
22	RD,330,1/10W	2	RESISTOR 330 1/10W 5%	R1,R2	2012
23	RD,4.7K,1/10W	3	RESISTOR 4.7K 1/10W 5%	R10-R12	2012
24	RD,22K,1/10W	2	RESISTOR 22K 1/10W 5%	R15,R16	2012
25	RN,1.3K,1/10W	1	RESISTOR 1.3K 1/10W 1%	R8	2012
26	RN,33K,1/10W	1	RESISTOR 33K 1%	R9	2012
27	TR,DTC143ZKA	1	NPN TR	Q1	SMT3
28	VFD(FIP)	1	F-52B (7DIGIT)	VFD	
29	VFD CUSHION	1	30*20*2T	VFD	
30	LED HOLDER	2	STD-110BLK(3mm)	LD1,LD2	

(3) Key PCB Ass'y

No	Item	Qty	Description	Reference	Size
1	SKHCAD	6	TACT S/W	SW1~6	
2	CONNECT WIRE	1	53015-6P*60mm	KEY	
3	KEY PCB	1			

(4) Power PCB Ass'y

No	Item	Qty	Description	Reference	Size
1	5267-02AX MOLEX	1	2 PIN CONNECTOR	AC3V	
2	CN,5096-03C	1	5 PIN CONNECTOR	AC220V	
3	CN,5273-07A	1	7 PIN CONNECTOR	ACFG	
4	KBU606	1	BRIDGE DIODE 6A 600V	BD	
5	TLV431ILP	1	PROGRAMMABLE PRECISION REFERENCES	U5	TO-92
6	LM7805	1	REGULATOR 5V	U2	TO-220
7	LM7824	1	REGULATOR 24V	U1	TO-220
8	CC,.01uF	1	.01uF NON-POLARIZED CAPACITOR	C4	Lead
9	CC,.1uF	8	.1uF NON-POLARIZED CAPACITOR	C8,C11,C12,C18, C21,C23-C25	Lead
10	CC,1000pF	1	1000pF NON-POLARIZED CAPACITOR	C22	Lead
11	CC,2200pF,1KV	1	2200pF CERAMIC CAPACITOR 1KV	C15	Lead
12	CE,1000uF,16V	2	1000uF 16V POLARIZED CAPACITOR	C19,C20	Lead
13	CE,470uF,16V	1	470uF 16V POLARIZED CAPACITOR	C9	Lead
14	CE,470uF,25V	1	470uF 25V POLARIZED CAPACITOR	C7	Lead
15	CE,470uF,50V	2	470uF 50V POLARIZED CAPACITOR	C5,C6	Lead
16	CE,47uF,10V	1	47uF 10V POLARIZED CAPACITOR	C17	Lead
17	CE,47uF,400V	1	47uF 400V POLARIZED CAPACITOR	C3	Lead
18	CQ,.22uF,275V	2	METALLIZED POLYESTER FILM CAP	C1,C2	
19	CT,2.2uF,35V	1	2.2uF 35V TANTAL CAPACITOR	C16	
20	COIL,100uH	1	COIL 100uH CORE	L1	
21	D,U4007	4	ULTRA FAST RECOVERY DIODE	D1,D2,D4,D6	
22	D,U404	1	ULTRA FAST RECOVERY DIODE	D5	
23	HEAT SINK	1	SY200	U2	
24	HEAT SINK	1	SY403	U3	
25	L,FILTER	1	DYU1	FILTER	
26	PC817A	1	PHOTO COUPLER	PC1	
27	RD,100,1/4W	2	RESISTOR 100 1/4W 5%	R11,R13	
28	RD,1K,1/4W	2	RESISTOR 1K 1/4W 5%	R7,R10	
29	RD,1M,1/4W	3	RESISTOR 1M 1/4W 5%	R2,R3,R5	
30	RD,220,1/4W	1	RESISTOR 220 1/4W 5%	R6	
31	RD,3.3K,1/4W	1	RESISTOR 3.3K 1/4W 5%	R12	
33	RD,51,1/4W	1	RESISTOR 51 1/4W 5%	R15	
34	RN,2.4K 1/4W	1	RESISTOR 2.4K,1/4W,1%	R14	
35	RN,10K,1/4W	1	RESISTOR 10K 1/4W 1%	R4	
36	RN,4.2K,1/4W	1	RESISTOR 4.2K 1%	R9	
37	RN,6.8,1/4W	1	RESISTOR 6.8 1/4W 1%	R8	
32	RD,47K,3W	1	RESISTOR 47K 3W 5%	R1	
38	THR,10D-11	1	THERMAL RESISTOR	TH1	
39	TNR,15G471	3		TN1-TN3	
40	TOP245Y	1	PWM CONTROLLER	U3	
41	TRANS,14P	1	DYT6000	TRANS	

(5) Body Ass'y

No	Item	Qty	Description	Reference	Size
1	OPTION PLATE (SUS)	1	105*20*1.0T	6-4	
2	REAR PLATE(SUS)	1	185*92*1.2T	6-2	
3	PCB-GUIDE	1	11.5*11.5*1T	6-25	
4	FRONT GUIDE	2	92*17*1.2T	6-3	
5	SIDE SLIDE	2	168*30*1.2T	6-6	
6	NOISE BRACKET	1	101*67*1T	6-9	
7	INDICATE CASE	1	CI-6000A	6-1	
8	SUPPORT BAR PCB	2	6*160*1T	6-10	
9	SPAN COVER BOLT	1	@7*@5*13.7	6-11	
10	SCREW-MACHINE(PH)	5	M3*5	6-33	
11	SCREW-MACHINE(PH)	7	M3*8	6-30	
12	SCREW-MACHINE(PH)	4	M4*10	6-34	
13	SCREW-MACHINE(WPH)	6	M4*12-SUS	6-29	
14	SCREW-MACHINE(TH)	8	M3*5-NI	6-27	
15	SCREW-MACHINE(TH)	2	M3*8-NI	6-28	
16	SCREW-MACHINE(CON)	4	M3*12(H)*10(D)	6-35	
17	NUT (HEX)	5	M3*0.5	6-31	
18	WASHER (SPR)	5	Ø3	6-36	
19	E-RING	1	Ø2.5* Ø7*0.6-SUS	6-14	
20	SPEC PLATE	1	Common SPEC	6-7	
21	FRONT COVER	1	CI-6000A	6-8	
22	SPAN COVER	1	CI-6000A	6-13	
23	DISPLAY COVER	1	83.6*31.6*1T	6-12	
24	KEY BOARD PAD	1	CI-6000A(RUSSIA)	6-37	
25	VFD CUSHION	2	30*20*2T	6-16	
26	AC SOCKET CONN	1	IN 0717-1S	6-15	
27	FUSE	2	250Ma / 250V Ø5 UL, S, VD	6-18	
28	금속육각접지단자	1	TE-501	6-38	
29	CONNECTOR WIRE	1	5264-2P*2P*135mm	6-39	
30	CONNECTOR WIRE	1	1143-3P(5P)*100mm	6-21	
31	CONNECTOR WIRE	1	5264-5P*5P*100mm	6-23	
33	CONNECTOR WIRE	1	1143-6P*6P*110mm	6-22	
34	CONNECTOR WIRE	1	5264-7P*7P*100mm		
35	LEAD WIRE	1	0.18*20C*110M/M (BLACK)		
36	SHRINKABLE TUBE	0.05	Ø 3		
37	STIKER	1	PASSED CAS		
32	LOCKING PAINT	0.002	접착제 (200G) (녹색)		

(6) C/T Box Ass'y

No	Item	Qty	Description	Reference	Size
1	BUMPON	4	SJ-5023 (5523)		
2	AC CORD	1		6-17	
3	HOOD	1	25P		
4	D-SUB CONNECTOR	1	DS25P-(CI) SOLDER-MALE		
6	SHIELD WIRE ASS'Y	1	SRCN-16N-07P*530mm		
7	MANUAL	1	CI-6000A 영문		
8	C/T BOX	1	310*275*165 (국문, 영문)		
9	POLY URETHANE BOX	1	265*140*80		
10	POLY BAG	1	90*150*0.05T (FUSE)		
11	POLY BAG	1	230*330*0.05T		
12	POLY BAG	1	350*450*0.05T (HEAD)		
13	SILICAGEL	2	10 g		
14	봉인납	1	수출용		
15	SEALING WIRE	0.002	300M / ROLL		
16					
17					
18					
19					
20					

15. Explode View

