

## VERIFICATION

## OF COMPLIANCE With Low Voltage Directive

## C

## Verification No.: 16TW0856-LVD <br> Applicable Standard: IEC 61010-1:2010;

## EN 61010-1:2010

This Verification of Compliance is hereby issued to the below named company. The test results of this report relate only to the tested sample identified in this report.

General Information
Document holder
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TAIWAN (R.O.C)
Product Description : Digital Readout System - Digital Counter
Model Number

Trademark
SC-102, SC-103, SC-202, SC-203, SC-204, SC-302, SC-303, SC-402, SC-502, SC-503, SC-603, SC-613


This device has been tested and found to comply with the stated standards), which is(are) required by the Council Directive of 2006/95/EC. The test results are indicated in the test report and are applicable only to the tested sample identified in the report

Date: Oct.28, 2016

# Easson ${ }^{\circledR}$ Premium Made in Taiwan 



## SC-200

Digital Readout System

- Digital Counter Operation Manual (Standard)

Resson Technologies Co., Ltd.

## Notes in Operation

## Note before using this display!

Use the defined voltage
The rated power voltage supplied to this display should be 100V~230V, select correct voltage supply and try best supplying the power from lighting power line!

Since the power circuit would become unstable under frequent power on/off and cause instant strong interference or even power shutdown; take special note on it!

Ground the display!
To guaranty user safety and stable \& reliable system work, we strongly request user connecting the attached ground line (3-m yellow-green cable packed in the packaged box to the FC terminal at back of display to make good grounding connection!

- Insert each axis optic rule into correct position before turning on display; if doing the turn inversely, it might burn out the electronic devices in the optic ruler!

Do not operate this display in elevated ambient temperature or under high humidity!
Do not operate this display in strong electric field, magnetic field or noisy environment, or by electric machine that would be the main reason making system act in error!

Use dry, soft cloth to wipe cleaning display surface!

- For stain hard to remove, use soft cloth wet by neutral detergent to clean it up!

Do not use gasoline, diesel fuel, kerosene or alcohol to wipe cleaning the display surface!
D not use compressing air gun to blow display and optic scale assembly since it would blow oil, moisture, dust or chips into them from seam and cause system unstable and damage!

## Elaborate maintenance, correct operation;

## Extend operation lifetime and stabilize work performed

## SC-202/203/204 Specification

## SC-202/203/204 Specification :

Number of axes : 2Axes (SC-202), 3Axes (SC-203), 4Axes (SC-204)
Reslution : 0.05/0.02/0.01/0.005/0.002/0.001/0.0005/0.0002/0.0001mm
Display function : 8-digit LED
Response speed : 60m (198.6feet)/min
Quantizing error : $\pm 1$ count
Power source : AC100V~240V / 50~60Hz / 20VA
Temperature fange : Service:0~40 ${ }^{\circ} \mathrm{C} /$ Storage: $-20 \sim 70^{\circ} \mathrm{C}$

## Linear Encoter (Scales) Electrical connector:



D-sub 9 pins connector

TTL

| PIN | SIGNALS |
| :---: | :---: |
| 1 | $\mathrm{~N} / \mathrm{C}$ |
| 2 | 0 V |
| 3 | $\mathrm{~N} / \mathrm{C}$ |
| 4 | Inner shield |
| 5 | $\mathrm{~N} / \mathrm{C}$ |
| 6 | A |
| 7 | 5 V |
| 8 | B |
| 9 | R |$\quad$| PIN | SIGNALS |
| :---: | :---: | :---: |
| 1 | $\mathrm{~A}-$ |
| 2 | 0 V |
| 3 | $\mathrm{~B}-$ |
| 4 | Inner shield |
| 5 | $\mathrm{R}-$ |
| 6 | $\mathrm{~A}+$ |
| 7 |  |$\quad$| 7 |
| :---: |
| 8 |
| 9 |

N/C: No Connection

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## RS-232C output Interface

## RS232 output port

This display has RS232-C output port facilitating user to print out the measuring result or connect it to a computer; the port's picture is as below.


The display's RS232 output port transmission parameters are:

$$
\begin{aligned}
& \text { RAUD RATE: } 57600 / 19200 / 9600 / 4800 / 2400 / 1200 \mathrm{bps} \\
& \text { DATA } \\
& \text { STOP BITS }: 1 \text { data bits } \\
& : 1 \text { stop bit }
\end{aligned}
$$

Through the display's RS232 output port, we can output display data to a computer or send the output or reset command to display from the computer; such as asking axis $X$ to reset CX, axis $Y$ to reset CY and axis Z to reset CZ .

RS232 output function


Press orm to output display data; and set the "print" option to "on"; to apply two-way communication, set the "print" option to off.

User may select EPSON LQ-300+RS232 as the working printer; set speed to 19200bps and turn on the print to standby.

## The back shell plug seat of DRO.



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## Basic Functions



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## Set Display to Zero

Purpose : Set the current position for that axis to zero
Example : To set the current $\mathbf{X}$ Axis position to zero


## Inch / Metric Display Conversion

Purpose: Switches between inch and metric display
Example 1: Currently in inch display, to switch to metric display

| ${ }_{\text {migral }}^{\text {St-204 }}$ | ABS |
| :---: | :---: |
| 1.0000 | (a) - - |
| 2.0000 | - 0 |
| 3.0000 | (2) ¢®®) |
| 4.0000 | [ 8 8 |
| Matation ruaran \% | (1) |



Example 2 : Currently in metric display, to switch to inch display


## Enter Dimensions

Purpose : Set the current position for that axis to an entered Dimension
Example : To set the current $\mathbf{X}$ Axis position to $\mathbf{4 5 . 8 0 0} \mathbf{~ m m}$


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## ABS / INC Coordinates display switches

Purpose: SC-200 provides two sets of basic coordinate display, they are ABS (absolute) and INC (incremental) displays.

During machining operations, the operator can store the work piece datum (zero position ) in ABS coordinate, then switch to INC coordinate to continue machining operations.

The operator is then free to zero the axes or preset any dimensions into any axis in INC coordinate for relative position machining. The work piece datum ( work piece zero position ) is still retained in ABS coordinate by the SC-200.

Operator can then toggle between ABS (absolute) and INC (incremental) coordinates without losing the work piece datum ( work piece zero position ).

Example 1: Currently in ABS display coordinate, to switch to INC display coordinate


Example 2 : Currently in INC display coordinate, to switch to ABS display coordinate


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## Centre-find

Purpose : SC-200 provides the centre-find function by halving the current display coordinate, so that the zero point of the work piece is located at the centre of the work piece.

Example : To set the $X$ Axis zero point at the centre of the work piece.
Step 1: Locate the edge finder at one end of the work piece, then zero the X Axis.


Step 3 : Then half the display coordinate using centre-find function as per follows:


Now the $X$ Axis zero point $(0.000)$ is located at the $X$ centre of the work piece.


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## Z+Z1 Sum-up

Function: SC-204 four-axis DRO can sum up the Z-axis and Z1-axis; user can switch over between $Z$-axis and $Z 1$-axis timely through the function key and they can be displayed independently or in sum.

Example: Z-axis 10.000, Z1-axis 5.000
When reading them alone, the display is


## A.Press $Z+Z_{1}$, , the display now will add Z-axis data to Z 1 -axis window; while using <br> $\qquad$ function,

 Z-axis window still can display Z-axis dimension independently.
B. While Z1-axis moves forward for 5 mm , Z1-axis will display 15 mm ; then, move Z-axis forward for another 5 mm , now, the $Z$-axis window will display 15 mm and $Z 1$-axis displays 25 mm .

C.Press $Z+Z$, to end the $Z+Z 1$ sum-up function and return to independent mode.


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ref datum memory function



## ref datum memory function

function : During the daily machining process, it is very common that the machining cannot be completed within one working shift, and hence the DRO has to be switched off, or less commonly, a power failure occurs whilst machining which leads to loss of the work piece datum ( work piece zero position ). The re-establishment of work piece datum using edge finder or other method inevitably introduces machining inaccuracies, because it is not possible to re-establish the work piece datum exactly at the previous position.

To allow the recovery of work piece datum very accurately, with no need to re-establish the work piece datum using an edge finder or other methods, every transducer has a reference point location to provide a datum point memory function.

The working principal of the ref datum memory function is as follows.

- There are a permanent and fixed mark (position) on the transducer, normally called ref mark or ref point..

Since this ref point position is permanent and fixed, it will never change or disappear when the DRO system is switched off. Therefore, we simply need to store the distance between the ref point and the work piece datum (zero position ) in DRO's memory. Then, in case of the power failure or the SC-200 being switched off, we can recover the work piece datum (zero position ) by presetting the display zero position as the stored distance from the ref point.

Example : to store the $X$ axis work datum
$X$ axis ref mark position


Operation: SC-200 provides one of the most easy-to-use ref datum memory function.
There is no need to store the relative distance between the ref mark and your work datum zero into the SC-200, whenever you alter the zero position of ABS coordinate, such as by zeroing, centre find, coordinate preset or etc.., SC-200 will automatically store the relative distance between ABS zero and the ref mark location into SC-200's memory.

In daily operation, operator simply needs to locate the ref mark position whenever they switch on the SC-200 to let it know where the ref mark position is, then SC-200 will automatically do the work datum storage on its' own. In the case of a power failure or the SC-200 being switched off, the operator can recover the work piece datum easily by using the RECALL 0 procedure.

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## Find the scale's ref mark position ( FIND REF )

function : In ref datum memory function, the SC-200 will automatically store the relative distance between the ref mark position and the work piece datum ( zero position ) whenever the operator alter the ABS zero position, such as zeroing, centre find, co-ordinate preset or etc...

Therefore, the SC-200 needs to store the ref mark position prior to any machining operation. So that the loss of the work piece datum ( zero position ) is avoided during any accidential or unexpected events, such as power failure or etc.. it is recommend that the operator finds the ref mark position using the ( FIND REF ) function whenever he switches on the SC-200.
step 1 : To enter the ref function, select the FIND REF ( find ref mark )


FIND REF (find ref mark)



step 2 : select the axis of which ref mark needs to be found

select $\mathbf{X}$ axis
in this example


## Find the scale's ref mark position ( FIND REF )

step 3 : move the machine reader head across the length of the transducer until digits display in SC-200 start to count.


Recall the work datum zero ( RECALL 0 )
function : If the ref point is lost for any reason, the work piece datum can be recovered by RECALL 0 function as follows:.
step 1 : enter into the ref function, select the RECALL 0 ( recall work piece zero)


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## Recall the work datum zero ( RECALL 0 )

step 2 : select the axis of which work datum (zero position) needed to be recovered

step 3 : move the machine across the length of the transducer until the SC-200 display starts to count, then the work piece datum is recovered

move the machine across the length of the transducer

## 199 SubDatum function



## 199 SubDatum function

> Purpose: Most DRO cabinet on the market provide just two set of work co-ordinates - ABS/INC. It was found that ABS/INC was inadequate and inconvenient to use, and, particularly in the case of complex machining or repetitive work, which needed more than just two sets of working co-ordinates.

ABS / INC operation has the following shortfalls :

- In much machining work, the work-piece machining dimensions are derived from more than two datums, therefore, the operator has to switch between ABS and INC to set up the machining datums time after time. This process is very time consuming and prone to error.
- In the case of batch machining of repetitive work, the operator has to set up and calculate all the machining positions time after time.
SC-200 provides a 199 subdatum ( SdM ) memory to cope with the shortfalls of ABS/INC. SdM function does not just simply provide 199 sets of INC co-ordinates, it is specially designed to provide much more convenient features for the operator to cope with repetitive work.
The difference between INC and SdM is as follows:.

1. INC is independent of ABS and will not follow any change in ABS zero point. All SdM co-ordinates are relative to the ABS coordinates, so, all SdM positions will move together when the ABS zero position changes.
2. All SdM relative distance data to ABS can be entered directly into SC-200 memory using the keypad. No need for any additional calculations.


## 199 SubDatum function

## Application example:

To set up four subdatum zero ( SdM 1 to SdM 4 ) the following two methods can be used
Either 1. Move machine to required subdatum position, then zero SdM display coordinates
Or 2. Directly key in the SdM zero position co-ordinates (co-ordinate relative to ABS zero )


Method 1 : Move machine to required subdatum position, then zero SdM display coordinate

Set up the work piece datum in ABS co-ordinate, move the machine to the required subdatum position, then zero
SdM display co-ordinate.
Step 1: Set up the work piece datum in ABS co-ordinate


Step 2 : Set up the subdatum point 1 ( sdm1 )

Locate the tool at subdatum point 1 ( sdm 1 ):
$X=50.000, Y=35.000$



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## 199 SubDatum function



Step 3: Set up the subdatum point 2 ( sdm 2 )


Step 4 : Set up the subdatum point 3 ( sdm 3 )


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## 199 SubDatum function



Step 5 : Set up the subdatum point 4 ( sdm 4 )


All the four subdatum points have already been set up


## 199 SubDatum function

switch to next (up )
sdm coordinate display


SC-200's XY displays
switch to next ( up ) sdm coordinate display


## SC-204




SC-200's XY displays
are referenced


SC-200's XY displays
are referenced to the sdm 1 zero

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## 199 SubDatum function

In a case where many subdatum ( sdm ) points need to be set up,the operator will find that the method of direct keying in the of SdM zero position co-ordinates (co-ordinate relative to ABS zero ) is much quicker and less prone to error.

## Mtheod 2 : Direct keying in the of SdM zero position co-ordinate (co-ordinate relative to ABS zero )

Set up the work piece datum ( ZERO) at ABS co-ordinate, then move the tool located at the work piece datum (ABS zero point )and directly key in all subdatum point co-ordinates ( the relative position to $A B S$ zero ) using the keypad.
Step 1: Set up the work piece datum in ABS coordinate


Step 2: Set up the subdatum point 1 ( sdm 1 )


## 199 SubDatum function

Step 4 : Set up the subdatum point 3 ( sdm 3 )


Step 5 : Set up the subdatum point 4 ( sdm 4 )


All the four subdatum points have already been set up


Example :
switch to ABS coordinate display


SC-200's XY displays are referenced to the ABS zero

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## 199 SubDatum function



SC-200's XY displays are referenced
switch to next ( up ) sdm coordinate display


SC-200's XY displays
are referenced


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## Parameters Setup

BAUD SET set up RS232 transmission baud.
BEEP ON/OFF turn on/off printer.
BEEP ON/OFF turn on/off beeper.
RESOLUTE set up Linear scale resolution.
CP ERROR compensate Linear scale errorLINEAR P ............... compensate linear error.
NL ERROR compensate nonlinear error (point compensation)
DIRECT set up direction.
EXIT end and exit.

## Parameters Setup

## Reset display's original parameter (RESET)



When the DRO is under the impact of abnormal voltage, or user's improper operation that cause parameter setting in error, it needs to default simple working parameters by resetting them to default value from memory. Yet, before parameter reset, check if there is any parameter value set in already; if so, write down the setting data and set it up after reset.

## Operation steps:

1). Turn off the DRO power.
2). Turn on the DRO; when " 11111111 " test signal is shown in the display window, press " 0 " and the display start performing "reset".

3). 1.When parameters reset, "WATING" will show on the display.


[^0]

After coming backing to normal mode, the parameter reset process is complete.

## Parameters Setup

## Set up new parameters in display (SETUP)

When DRO-change IC is under the impact of abnormal voltage or improper operation, which cause the default disturbed; or user wants to change production process and needs to modify the default value, it needs to set up DRO and reset function values in memory.

DRO in the display and related key locations in the SETUP process:


## Operation steps:

1) 1.Turn off the DRO power.
2) Turn on the DRO; when self-diagnosis test signal is shown in the display window, press 6 and the display start performing "setup"


The setup procedure is designed to option menu mode; the Definition List facilitates user to apply the following options.

## Parameters Setup

## The first layer functions are, in turn, defined as below:

BAUD SET $\qquad$ set up RS232 transmission baud.
BEEP ON/OFF .............. turn on/off printer.
BEEP ON/OFF ............. turn on/off beeper.
RESOLUTE .................. set up Linear scale resolution.
CP ERROR .................. compensate Linear scale error
LINEAR P ............... compensate linear error.
NL ERROR ............. compensate nonlinear error (point compensation)
DIRECT set up direction.
EXIT $\qquad$ end and exit.
3) Press


Press ENT to enter the setting of RS232 transmission baud.


Press or to select the correct baud speed from 1200/2400/4800/9600/19200/57600.


After baud speed is selected, press ENT to end up this setting function.

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## Parameters Setup

4) Press ( or and move to "PRT ON/OFF".


Directly press ENT to change over OFF \& ON.

| SC-204 DIGITAL COUNTER | PRT OFF |
| :---: | :---: |
|  |  |
| Natar | (6)] |


5) Press or and move to "BEEP ON/OFF".



Directly press ENT to change over OFF or ON.



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## Parameters Setup

6) Press or and move to "RESOLUTE".


Press ENT to enter the linear scale resolute setup.


Press the axis going to be changed: $, \boldsymbol{X}, ~(\mathbb{Z}$


Press
 to switch to the correct resolution value from : 0.05/0.02/0.01/0.005/0.002 / 0.001/0.0005/0.0002/0.0001mm.


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## Parameters Setup

Press ENT to end up this axis's setup


Then, press $E$ to end up the linear scale resolute setup procedure.
7) Press or to "CPERROR" (error compensation).


Press ENT to enter the compensation setup; you can press or to switch between the "LINEAR P" (linear compensation) mode and "NL ERROR" (nonlinear compensation) mode; choose one alternatively.


While selecting "LINEAR P", press ENT to enter the linear compensation process.


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## Parameters Setup

Press the axis $\boldsymbol{X}$ Y $(\boldsymbol{Z}$ under compensation.


Input the length measured and press ENT.


Input the actual length and press ENT.


Press other axis (Z) under change and follow the above procedure to operate; after the compensation procedure is done, press ENT to end up the compensation of linear scale.

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## Parameters Setup

Press or to switch to "NL ERROR" (nonlinear compensation).


Press ENT to enter the nonlinear compensation setup.


Press the axis (X) (Z) under compensation.


Input CP START


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## Parameters Setup



After entering the "Point 1 "
status, press the up/down key to select the measuring result at the point selected.


Input the measuring result.


After all data inputs are done, press CE to exit.


Press up/down key till EXIT appears.


If use the error compensation function, you must turn off the DRO then power on the DRO again, otherwise your compensated value will invalid.

## Parameters Setup

8) Press or to move the "DIRECT" (direction setup).


Press ENT to enter direction setup mode. " 0 " means in positive direction whereas " 1 " means the negative direction.


Press or $\boldsymbol{X}_{0}$ to set up X-axis to " 1 " (negative direction); and do it to
Y- \& Z-axis similarly.

9) Press ENT to exit; and or to "EXIT" and end up the parameter setup.


## Easson SC-100 milling Multi-function



## Easson SC-300 Lathe



Easson SC-500 2D Measuring


## Easson SC-600 edm

Easson SC-200 standard
$\qquad$


Easson SC-400 Grinding


## Easson SC-600

$\qquad$


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[^0]:    "WAITING --" is shown as parameter reset is underway.

