Medidor de contenido de ferrita, DG

DG-SP10A

Dandong Flaw Detector Equipment Co., Ltd.

Ferrite Meter SP10a

Operating manual

Dandong Flaw Detector Equipment Co., Ltd.

Welcome you choosing Ferrite Meter SP10a

1. Application

In the chemical industry the stress-bearing members of containers，pipes，reactor vessels and other plant are usually made of austenitic steel or Duplex or cladding of austenitic chromium-nickel steel．The residual ferrite content must be within a specific range compatible with the mechanical strength requirements or the item concerned．

The SP10a was developed to facilitate accurate ferrite content measurements on welded seams and cladding items. It gives results that match for the standards of ISO 8249 and ANSI/AWS A4.2.

2. Feature

LC-display,

Two display modes (SAVE and FREE).

Two units — Fe% and FN (WRC number).

Statistics display together with measurements.

Built-in Rs-232 interface for printer[1]

3. Compose

3.1 Supplies

Please check the packing for external signs of damage if the instrument is in any way damaged，keep the packaging material in order to claim against the transport company· The carton should contain the following：

— SP 10a machine with Probe SF-1.0a

Option if need

Operating manual

— Two equivalent standards

— Carrying - case 270X240X90mm

3.2 Display

As show in Fig 1, current value displayed together with mean value, max value, min value, standard deviation value. SP10 supplies a convenient for users. The meter contains 4 application blocks (0~3). There are 10 pages in each block, 50 data in each page.
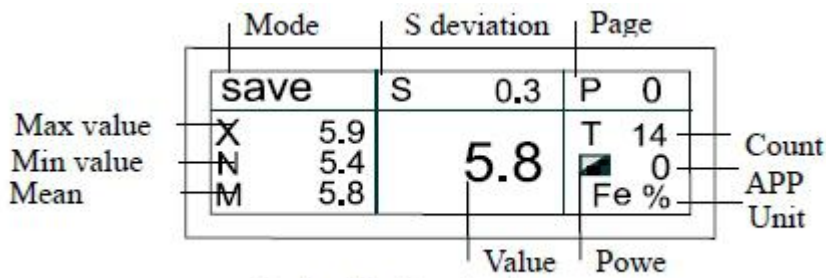
Fig.1 display structure

Explanation of the signs on the display.

№ Sign Instruction

1 SAVE

Mode display，there are SAVE and FREE mode ,press MODE key to select.

2X、N
 M、S

Display mean, max, min and standard deviation values with SAVE mode, no the function under FREE mode.

3 P X

Sign of page. Press ENTER to select page P0~P 9. and 50 data in each page

4 TXX

The count of N times measuring range from 01 to 50，under SAVE mode press ▼▲ key to look each data. Press DEL key can delete the data one by one.

5

Power down is □ sign，battery has to be changed and number 0 stands for application block range from 0~3。

6 Fe%
FN

Unit Fe % and FN select，default unit Fe%.

7 5.8

Measured value, under SAVE mode flash display a time for each measuring. Under FREE mode displaying continuously

3.3 Function key

№ Key Function

1   ON

OFF

Power on/off key, press the key
displaying "FERRITE METER SP10a" and
power on .Press the key again, power down.

2 MODE Mode SAVE/FREE select key.

3 Fe/FN Unit Fe% / FN select key.

4 ENTER

① application block selected .Press
ENTER can select P0~P9.

②in "SET" menu , executive or save key.

5 ▼▲ Select key

Under SAVE mode look at each value
measured.

6 DEL

QUIT

①delete value measured.

②the quit key in "SET" menu.

7 SET

Function select. Include 6 menu；1
calibration、2 select application block、3
filter、4 auto-power down、5 initial set、6
printing.

8

Step：press "SET" → press arrow key
to select 1~6 menu→ press ENTER to
executive and press "DEL/QUIT" to quit.

4 Operations

Connect probe to meter and install 9v 6F22 battery. Press
ON/OFF , the meter power on and the display as show in Fig 1,and
acoustic sounds the same time that stands for the meter is ready.
Under the SAVE mode measurement value displayed together
with statistics. Under FREE mode no statistics displayed. Snap
3~5mm for each location of the weld to measure. Commonly 10
locations are measured.

Impotent: Pay attention to the Unit used in measuring.

4.1 Calibration

Calibrate with equivalent standards or reference specimens.

Key Instructions

SET

① 1 校准CAL lights up➜ENTER➜标样01
and 应用区0(or 1,2,3) lights up on first
line, unit and measurement value **0.0**on

second line.

② Take 5~10 measurements on the first standard or reference specimen. The current mean value is displayed. Before next measurement point probe in air for while.

▼ ▲

③ Set display to ferrite content of standard by pressing arrow keys.

ENTER

④ Press ENTER to register，标样**02** lights up for next standard. If you have one reference specimen only press DEL to end the

7

calibration.

⑤ Repeat steps②，③ and ④ for 2nd and till N standard(N<14).

DEL ⑥ Anytime to press DEL two times end the calibration.

Pay attention to the unit used in calibration

4.2 Application block select

Key Step

SET

Display 1 校准CAL➔press▼▲→2 应用区APP

➔ ENTER ➔ press ▼ ▲ key to select

0~3→ENTER→ register and press DEL→ quit.

4.3 Filter

Key Step

SET

Display 1 校准CAL➔press▼▲→3 滤波FILT➔

ENTER ➔ press ▼ ▲ key to select

0~100→ENTER →register and press DEL→

quit. Filter function data is commonly used 0~25

4.4 Auto-power down

Key Step

SET

Display 1 校准CAL➔press▼▲→4 关机OFF➔

ENTER ➔press▼▲ key to select 0~59 minute

→ENTER →register and press DEL→ quit.

4.5 Default set

Key Step

SET

Display 1 校准CAL➜press▼▲→5 出厂设置

INIT ➜ ENTER ➜ press ▼ ▲ key to select

application block umber 0~3 →ENTER

→register and press DEL → quit. The application

block is set to initial.

4.4 Print

Key Step

SET

Display 1 校准CAL➜press▼▲→6 打印PRI➜

ENTER ➜press▼▲ key to select 0~9 page

→ENTER →print , press DEL → quit. Connect

printer first

5. Technical data

The meter is manly used for the ferrite content of welded

austenitic steel or Duplex or cladding of austenitic chromium-nickel

steel.

Type Ferrite meter SP10a

Probe SF-1.0a

Range 0.1~80%Fe (0.1~110)WRC-number

Precision

±2%(raneg0.1~15%Fe),

±5%(raneg15~60% Fe)

Operating

temperature

5 ~ 40℃

Batteries 9v 6F22 , out power interface

Equivalent

standard

2

Accessories Carrying-case , operating manual

6 Influence

6.1 Correction

A correction is made by：

— taking a test specimen of known ferrite content P0 with

identical geometry to that to be measured,

— making comparative measurements is P1 on the test specimen，

— determining a correction k by subtracting the mean measured

value from the true value：

k = P0 - P1

measuring the test specimens to obtain the mean ferrite
content，P2 correcting the mean value by adding the previous
determined correction：

P = P2+k

If your products are usually of the same shape but differ in
size it pays to tabulate or plot a graph of the corrections．provided
the same reference calibration is used(e.g. with the equivalent
standards），the correction is always at hand.

Example: Instrument measures 28%Fe for a 25 %Fe specimen

k = 25 - 28= - 3%Fe

The test specimens are measured at 27%Fe，the corrected value is：

P= 27＋(-3)= 24%Fe

6.2 Curvature of the specimen

Pronounced curvature affects the measurement; the displayed
value deviates from the true value．

making a comparative measurement on a specimen of known
ferrite content（identical to that to be measured) and determining a
correction factor.

6.3 Limited area of the specimen

For specimens of limited area, the measured value will
deviate from the true value．If measurements are to be made on
small specimens

make sure these exceed the dimensions 1 cm square ，
otherwise calibrate on the specimen.

6.4 Thickness of the cladding

Claddings must exhibit a minimum thickness，otherwise the
displayed value deviates from the true ferrite content. The limit
depends upon the type of substrate：

for austenitic steel substrates approx.1.5mm.

for magnetic steel substrates approx. 3 mm．

7 Technical and statistical terms

7.1 Mean value P

Statistics output with LC-Display. The mean or average
ferrite content P is the sum of all the measurements in a series
divided by their number:

7.2 Standard deviation

The minimum and maximum ferrite contents are the extreme
values of a measurement series．The difference between the two is
termed the range, which is sometimes used as a measure of the
scatter in ferrite content of a specimen.

As can be seen from the figure below，it is possible that two

very different specimens have the same mean ferrite
content. Another measure of the scatter in values is given by the
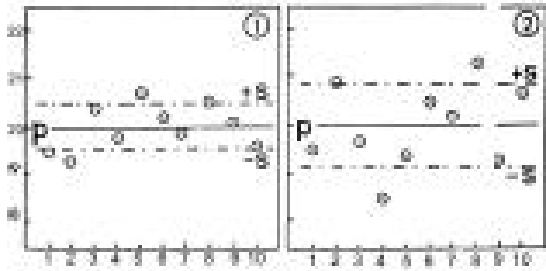
standard deviation, which represents the average deviation of the
values from the mean.

To calculate the standard deviation, the deviation of each
point from the mean is calculated, squared （so that positive and
negative values do not cancel out) and summed. The sum is divided
by the number of measurements -1, and the square root take.

$$S = \sqrt{\frac{(P-P_1)^2 + (P-P_2)^2 + \ldots + (P-P_n)^2}{n-1}}$$

The S value is the square of the standard deviations. The
coefficient of variation is the percentage standard deviation from the
mean。

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