ATO

Handheld Digital Panel Meter User Manual

1. Performance indicators and characteristics

1.1. qualification

- The sampling rate is up to 12,800 Hz;
- Nonlinearity is better than 0.01%; accuracy is better than 0.1%;
- Display score-99999~999999;
- The battery can be charged and discharged for about 1,000 times;
- Input range of analog signal-15-15 mV;
- Temperature drift is less than 20ppm;
- 3200 mAh battery, fully charged for 15 hours;

1.2. functional characteristics

- The sampling rate of 50Hz to 12800Hz is adjustable, and the high sampling rate is more accurate for peak capture;
- Real-time curve and the last historical curve selection display, view the force situation of the working process;
- Real-time automatic capture of equipment peak and valley value, analysis of sensor status;
- Parameter backup and recovery, modify the chaotic parameters can also be a key to restore;
- No weight calibration, only input sensor parameters to complete the calibration;
- Use the TEDS intelligent sensor, power on automatic calibration, modify the corresponding unit and decimal point;
- With low power, the instrument interface displays the low power identification, and the charging mark and the charging light are displayed when the charger is inserted;
- Use TYPE-C data line (optional RS485) to directly connect with PC for Modbus communication to facilitate the export of force value data;
- In the interface test interface of the handheld dynamometer, you can view the serial port and wireless communication debugging data;
- Peak and valley value historical data to save 200 groups, power is not lost;
- Multiple alarm options, upper limit alarm; lower limit alarm; peak value alarm; 1.2 times automatic alarm;
- Multiple capture options, threshold-threshold; threshold-time; threshold-key;
- Optional built-in sensor handheld instrument model;

2. Packaging and appearance

2.1. Product size chart

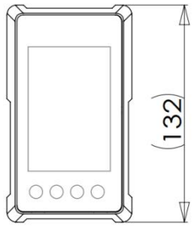

Figure 2-1, head view

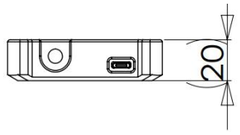

Figure 2-2, top view

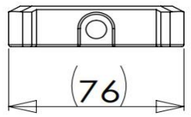

Figure 2-3 DY 920 bottom

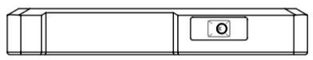

Figure 2-4 DY 920 side

2.2. Binding content

Figure 2-5 One handheld instrument

Figure 2-6 TYPE-C data line one

Figure 2-7 Aviation plug

2.3. Selection and wiring

2.3.1. Sensor selection

This handheld dynamometer is divided into two versions for users to choose, respectively, built-in sensor version and external sensor version.

External sensor， Need to connect to the instrument through the air plug, you can choose the company intelligent sensor. When using the intelligent sensor, the instrument can be automatically calibration, eliminating the customer calibration trouble, and it is very convenient to switch multiple sensors. Only the need to restart the instrument can complete the calibration, and the sensor can be connected to any range.

Built-in version， The sensor is built into the handheld device. You can refer to the following model table to select the appropriate range sensor.

Built-in model table

Model	920-1	920-2	920-3	920-5	920-10	920-20	920-30	920-50
Range	-1~1kg	-2~2kg	-3~3kg	-5~5kg	-10~10kg	-20~20kg	-30~30kg	-50~50kg
division value	0.0001kg	0.0001kg	0.0001kg	0.0001kg	0.001kg	0.001kg	0.001kg	0.01kg

2.3.2. Sensor interface

The wiring of the handheld instrument sensor uniformly adopts the navigation plug, align the air plug gap with the lower entrance of the handheld instrument, and the air plug can be connected by pressing the tail.

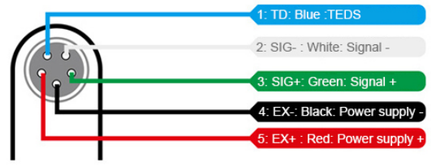

Figure 2-7 Internal wiring diagram

2.3.3. Data transmission and charging interface

The charging port is above the handheld instrument, and the interface is TYPE-C data transmission line, one end is connected to the instrument, and the 5V USB interface for charging operation. When the interface is communicated with the PC, please confirm whether the wire has data transmission function, some charging lines can only charge, not data transmission.

2.4. Power and switch machine

2.4.1. battery status

The power display icon is located in the upper right part of the handheld. When the charger interface is connected, the charging logo shown in the following figure below will be displayed	When the meter power shows the red state shown in the figure below, please charge within 10 minutes
Fig. 2-8 Charging status	Fig 2-9 shows the low power level

2.4.2. Boot and shutdown

When the shutdown state is off, long press the side button of the handheld machine to start up for about 1 second. When the instrument shows the boot picture, it can let go to complete the boot action.

When the startup is on, press the side button for about 2 seconds. Then the handheld will display the shutdown prompt page, as shown in the figure below:

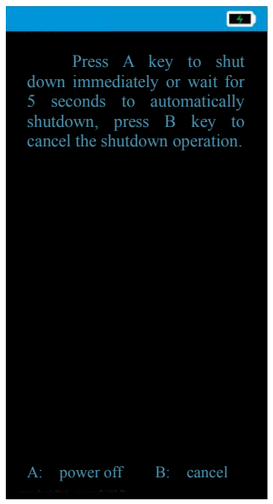

Figure 2-10, shutdown prompt

2.5. Status icon

At operation, the handheld instrument will display some operational status icons with the following description:

transient regime		Force value instability: When the force value fluctuation is greater than the stability condition parameter, the icon will appear, indicating that the system is currently in an unstable state
Zero status		When the real-time force value is less than the automatic zero range of the power, it will be zero and the icon will be displayed
Wireless communication		When the handheld instrument wireless communication is successful, the icon will be displayed and will disappear when there is no communication within 200 ms
String communication		When the handheld instrument serial communication is successful, the icon will be displayed and will disappear when there is no communication within 200 ms
Alert status		When the handheld instrument reaches the set alarm condition, the icon will be displayed and the buzzer will work; when the real-time force value exceeds the set range, the icon will be displayed at 50ms interval and the buzzer works for 100 ms interval.

3. Communication instructions

The instrument data are 32 bits, the high level is before and the low level is after the rear of 2. Instrument default is serial communication, optional RS485 communication. It supports three communication protocols, Modbus-RTU protocol (sub-station), ASC active upload, and HEX custom upload. The default factory setting of the instrument is: 19200 wave rate, 01 machine code and no check, eight data bits, one stop bit data format. Modify the parameters related to communication, and then power on again.

When using PC direct communication and RS485 communication, the internal data flow is consistent.

3.1. The Modbus-RTU protocol

The Modbus-RTU protocol supports 03 read commands and 0x10 write commands, with 32-bit Long long integer or Float floating-point data.

Reference Modbus standard Text for details of Modbus-RTU. When using this function, the serial port communication protocol parameters should be modified to 1.

3.1.1. Read the instructions

In this instrument, reading needs to use 0x03 reading command, most parameters are greater than 16 bits, so the limit is only 32 bytes, and the number of bytes read each time must be even.

Example 1:0x03 Read the measurements

Main Station Send:				
01	03	07 D0	00 02	C4 86
Machine code	read command	start address	Read the number	check code
Instrument return:				
01	03	04	00 00 03 E8	FA 8D
Machine code	read command	start address	Read the number	check code

3.1.2. write instruction

Example 1:0x10 communication reset

The master station sends the reset command:						
01	10	0B B8	00 02	04	00 00 00 0A	0A 4A
Machine code	Order	Communication command address	Number of registers	Number of bytes to	Write 10 for zero	check code

				write		
The instrument returned：						
01	10	0B B8	00 02	C2 0F		
Machine code	read command	start address	Read the number	check code		

Example 2:0x10 communication calibration

1、Send the zero clearance command when the instrument is empty

01 10 0B B8 00 02 04 00 00 00 0A 0A4A

2、Place the weight on the sensor and write the weight force value 10000 (0x2710) to 3000 (0 x BBA address)

01 10 0B BA 00 02 04 00 00 27 10 11 A8

3、Send the calibration instruction to complete the calibration

01 10 0B B8 00 02 04 00 00 00 14 8A 42

Parparameter address table:

The parameter name	operate	Address (decimal)	function
zero clearing	write only	Write 10 to the 3000 address	Zero up the real-time value of the instrument display
Clear peak	write only	Write 11 to the 3000 address	Clear the instrument peak value
Read the peak	read only	2562	
Read the valley value	read only	2564	
Read real-time force values	read only	2000	

3.2. The ASCII active upload protocol

The advantage of using ASCII upload method is fast communication speed, the instrument does not need to receive data, and keeps sending real-time force value outside. When using this function, the serial communication protocol parameter needs to be modified to 2. Example data are as follows:

20	20	20	20	31	2E	31	3D
leave a blank space	leave a blank space	leave a blank space	leave a blank space	1	.	1	=

According to the ASCII table, the above force value data is 1.1. , 0x3D, the symbol =, is a separator for the communication data.

3.3. HEX active upload

HEX upload is our custom upload protocol, and the serial communication protocol parameters need to be modified to 3. Data format e. g: 00 00 C2 CA 8C

A packet length is 5 bytes, the first four bytes are 32 long integer force value data, the high is in the front, the last is the first four cumulative check to the eighth.

4. parameter list

4.1. Advanced parameters

address	Range coefficient	default value	scope	Explain
282	Zero code value	1	0-3	0-50 1-200 2-800 3-3200 4-6400 5-12800Hz (The restart takes effect)
284	Communication packet interval	3	0-7	0-No unit、1-T、2-KN、3-kg、4-lb 5-N、6-g、7-N.M
286	data format	2	0-5	0-No decimal point 、1 - One decimal point、2 - Two decimal points
288	Baud rate	5000	0-999999	Sensor range value
290	Machine code	0	0-999	Modify the normal parameter password to default to 0
292	Serial communication protocol	100	0-999	Modify the advanced parameter password defaults to 100000
300	Displays the interval time	0	0-1	0 ： Data stores only the real-time values； 1-Store the real-time value in the real-time curve interface
302	Y axis end point	0	0-1	0：Turn off the buzzer； 1-Open the buzzer
322	Run the picture setting	0	0-7	0-channel 1；1-channel 2；2-channel 3；3-channel 4；
304	channel selection	0	0-1	1-The real-time value interface is displayed horizontally
306	Signal line exchange	10	0-99999	Built-in mode parameters, modified by the production personnel
314	language	9.800	1-99.999	Built-in mode parameters, input the local gravity acceleration
318	acceleration of gravity	0	0-2	0： simplified Chinese；1- English ； 2- traditional Chinese
320	sensor	0	0-1	0-Do not exchange signal lines ； 1-Change the sensor signal line; calibrate after the change
322	Horizontal screen mode	0	0-6	0-channel 1；1-channel 2；and so forth
360	channel selection	8753	0-999999	Run page Settings, non-professional personnel do not modify, can adjust the main interface default display, 8 for historical data interface, 7 for historical curve interface, 5 for real-time curve interface, 3 for real-time value interface, to real-time curve interface default display, modified to 8735, modify error may not be able to start the machine, communication can change back
368	The buzzer switch	1000	0-999999	The end point of the curve Y axis, increase the value curve Y axis display more comprehensive, and reduce the value display more detailed
378	Storage mode selection	0	0-9.999	Curve drawing point speed, the larger the interval time, the slower the curve drawing
380	Advanced password	1	0-3	0-of no avail；1-modbus-RTU；2-The assii active upload； 3-16 Aggressive active upload
382	Ordinary password	1	0-255	This address is used for wireless communication and 485
384	range	4	0-6	2400 4800 9600 19200 38400 57600 115200 (The restart takes effect)
386	radix point	0	0-1	0-N81 1-N82 （No check bits, eight-bit data bits, and two-bit stop bits）
388	unit	10	0-9999ms	The communication packet is returned after receiving the delay
430	sample rate	0	-99999-9999999	The AD code value corresponding to the zero point
432	The parameter name	5000	0-9999999	Force value dependent parameter (increased if the displayed value is always 0)
472	The TEDS zero-point storage	0	0-1	0：TEDS Not read storage storage os； 1：TEDSRead storage zero (not open by default)
474	TEDS function	0	0-1	0：close 1：open
476	Nonlinear calibration	0	0-1	0：close 1：open
480	Enter hardware zero	0	-999999-999999	Zero time instrument code value, non-professionals do not modify
482	Enter the hardware full	100000	-999999-999999	When the instrument code value is at full range, non-professionals should not modify it
488	485 High-and low-level selection	0	0-1	0: High in the front 1: Low before (change to 0)
540	Correction before value 1	5000	-99999-999999	Real-time value before correction at point 1
542	Adjustment coefficient 1	1.0000	5000-99999	Point 1 adjustment coefficient = actual value / real-time value before correction (keep four-digit decimal input)
544	Fixed previous value 2	5000	-99999-999999	Real-time value before the correction of point 2
546	Adjustment coefficient 2	1.0000	5000-99999	Point 2 adjustment coefficient = actual value / real-time value before correction
548	Correction before value 3	5000	-99999-999999	Real-time value before correction at point 3
550	Adjustment coefficient 3	1.0000	5000-99999	Point 3 adjustment coefficient = actual value / real-time value before correction
552	Corrected before value 4	5000	-99999-999999	Live value before correction at point 4
554	Adjustment coefficient 4	1.0000	5000-99999	Point 4 adjustment coefficient = actual value / real-time value before correction
556	Corrected before value 5	5000	-99999-999999	Real-time value before correction at point 5
558	Adjustment coefficient 5	1.0000	5000-99999	Point 5 adjustment coefficient = actual value / real-time value before correction
560	Corrected before value 6	5000	-99999-999999	Real-time value before correction at point 6
562	Adjustment coefficient 6	1.0000	5000-99999	Point 6 adjustment coefficient = actual value / real-time value before correction
564	Correction before value 7	5000	-99999-999999	Real-time value before correction at point 7
566	Adjustment coefficient 7	1.0000	5000-99999	Point 7 adjustment coefficient = actual value / real-time value before correction
568	Fixed previous value 8	5000	-99999-999999	Real-time value before correction at point 8
570	Adjustment coefficient 8	1.0000	5000-99999	Point 8 adjustment coefficient = actual value / real-time value before correction
572	Corrected before value 9	5000	-99999-999999	Real-time value before correction at point 9
574	Adjustment coefficient 9	1.0000	5000-99999	Point 9 adjustment coefficient = actual value / real-time value before correction
576	Correction before value 10	5000	-99999-999999	Real-time value before correction at point 10
578	Adjustment coefficient 10	1.0000	5000-99999	Point 10 adjustment coefficient = actual value / real-time value before correction
580	Correction before value 11	5000	-99999-999999	Real-time value before correction at point 11
582	Adjustment coefficient 11	1.0000	5000-99999	Point 11 adjustment coefficient = actual value / real-time value before correction
584	Correction before value 12	5000	-99999-999999	Real-time value before correction at point 12
586	Adjustment coefficient 12	1.0000	5000-99999	Point 12 adjustment coefficient = actual value / real-time value before correction
588	Correction before value 13	5000	-99999-999999	Real-time value before point 13 correction
590	Adjustment coefficient 13	1.0000	5000-99999	Point 13 adjustment coefficient = actual value / real-time value before correction
592	Correction before value 14	5000	-99999-999999	Real-time value before correction at point 14
594	Adjustment coefficient 14	1.0000	5000-99999	Point 14 adjustment coefficient = actual value / real-time value before correction
596	Correction before value 15	5000	-99999-999999	Real-time value before correction at point 15
598	Adjustment coefficient 15	1.0000	5000-99999	Point 15 adjustment coefficient = actual value / real-time value before correction

4.2. underlying parameter

Address	The parameter name	default value	Scope	Explain
8	The hysteresis ratio	10	1-99	Force value is less than the hysteresis ratio multiplied by the end of capture
14	End capture condition	0	0-2	0-End of delay; 1-end of threshold; 2-End of button; 3-Unconditional mode
16	Start capturing the threshold	50	0-999999	When the force value is greater, start the historical curve record, and the peak and valley value is cleared, and the peak and valley value record starts
18	Capture time	1s	0-999.9s	End the capture
20	Capture interval time	0.5s	0-999.9s	Interval between capture (prevent miscapture)
240	filtering	10	1-99	Curve recording, communication and other data filtering, the larger the value, the stronger the filtering ability
246	Determine the scope of stability	2	0-200d	The fluctuation in this range is judged to be stable
250	Manual zero ratio	100 %	0-100%	Range to allow zero clearance (range * proportion)
252	Power clearance	50	0-999999	If the force value is within the range, it will be automatically cleared
254	Automatic zero range	0	0-999999	The end condition reaches the force value range of starting the automatic zero clearance
256	Zero bit tracking time	2	0-999.99	Automatic zero in the zero zone
258	Automatic zero clearance and delay time	1.0s	0-9.999s	After the end condition is reached, the delay starts to automatically clear zero
260	The alarm way	0	0-4	Alarm under this condition 0-no alarm; 1-force value> alarm value; 2-force value <alarm value
262	Alarm value	5000	-99999-999999	3-Peak value> alarm value; 4-valley value <alarm value;
264	Peak valley alarm time	1.0	0-99.9	Value to compare when warning

5. frequently asked questions

Q: The instrument display value is jumping?

A: Please confirm whether the sensor wiring is normal, in order to improve the high-speed sampling performance, the force value is not fixed to 0; usually the display value is due to the sensor; please check the range coefficient parameter in the advanced parameter, generally within 100000, if much greater than the value, reduce the parameter and recalibrated;

Q: Peak peaks not captured the way I wanted?

A: Please check the parameter description of Chapter 5 "End Capture Conditions" and adjust the parameters according to your required mode;

Q: How is the historical curve displayed?

A: When A complete start-end condition process is completed, it will automatically display;

6. Warranty instructions

- Products from the date of sale, the whole machine warranty for one year.
- During the warranty period, if the product is faulty, contact our company in time and shall not remove it by itself, otherwise the company has the right to refuse the warranty.
- Charge for repair under any of the following circumstances:
  - Products with of warranty.
  - Damaged due to poor transportation or storage or failure to operate as required by the instructions.
  - Products independently disassembled or not repaired by the company's warranty point.
  - Products with no product number or no product number on the warranty form that does not match or alter the product number sent for repair.
  - Damage other than product quality causes during the warranty period.

7. matters need attention

- Do not use them on atomic energy devices and medical devices related medical devices.
- Please do not mix metal sheet or wire debris into this product, otherwise it may cause electric shock, fire or failure.
- Please confirm whether the air plug is firmly connected. If not fully connected, it may lead to electric shock and fire.
- Be sure to clean after cutting off.
- When cleaning, please wipe off the dirt of the product with a dry soft cloth. Please do not use a moisture absorption agent. Otherwise, it may lead to deformation and discoloration.

8. product types choosing

Goods number	product name	Simple description of the product function	Appendix	Remarks
	920 Handheld dynamometer	External sensor force measurement, display	Handheld instrument * 1; TYPE-C data line * 1	Smart sensor is optional
	920 handheld dynamometer (built-in version)	Built-in sensor force measurement, display	Handheld device * 1; TYPE-C data line * 1; built-in sensor * 1	Built-in sensor range is optional