

DS-220R

CLI20208

Digital Charging Scale



Introduction

Thank you for your purchase of the AccuTools™ DS-220R Digital Charging Scale. The DS-220R is the most accurate and precise refrigerant meter available today with features that cannot be found anywhere else. It is ideal for HVAC and Refrigeration service, including Critical Charging of small refrigeration systems.

With the DS-220R, you can measure weight in both metric and english units. The DS-220R is programmable, and has a built in alarm to indicate a programmed threshold has been exceeded. Attaching the DS-220R to the CM-500 (optional, extra) allows automatic refrigerant charging for A/C systems.

Features

- Large, high-visibility LCD display
- Measures Weight in kgs and lbs
- Built-in memory remembers all previous settings
- Refrigerant Tank Capacity Indicator
- Rugged, Compact Design
- Long Battery Life
- High Accuracy and Resolution
- Programmable
- Can be calibrated in the field with inexpensive reference weights
- Expandable with CM-500 (not included)

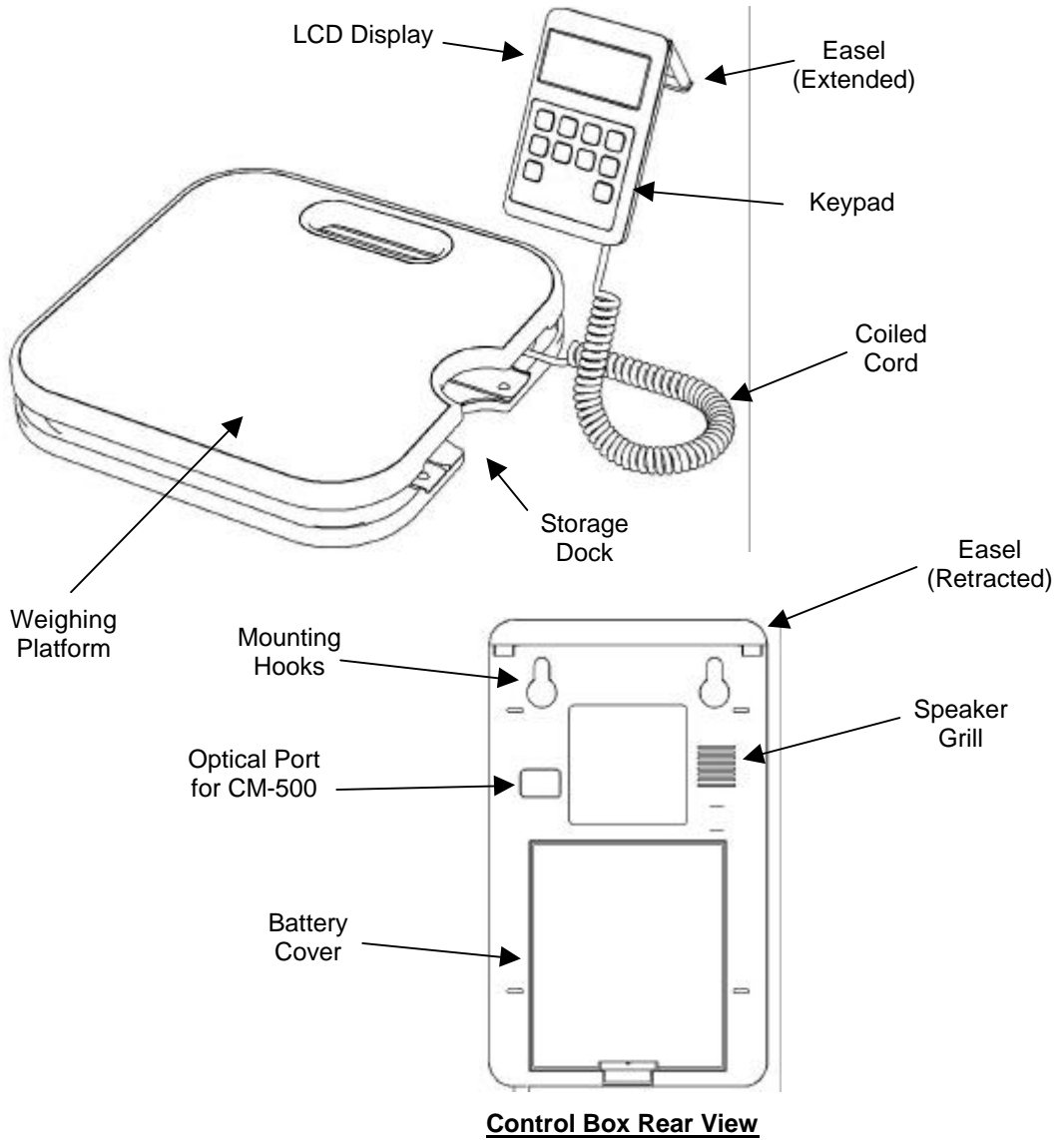


Specifications

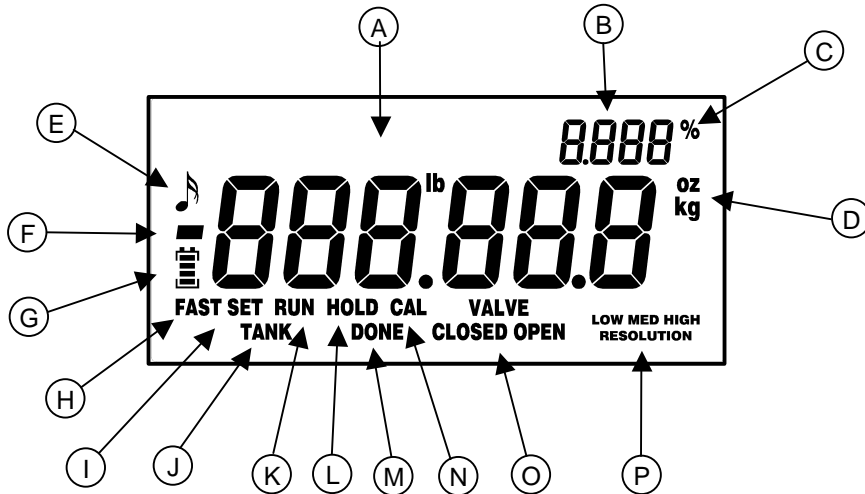
Capacity	100 kilograms (220 Pounds)
Accuracy	0.5% of Reading +/- 1 Least Significant Digit
Resolution	2g, 0.005 lbs., 0.1 oz.
Power	4 x 1.5V 'AAA' Alkaline Batteries (6 VDC)
Battery Life	30 hours continuous use
Operating Temperature	0°C – 60°C (32°F – 140°F)
Weight	2.5 kg (5.5 lbs.)
Dimensions	26.7 cm x 26.7 cm x 4.5 cm (10.5" x 10.5" x 1.75")

NOTE: To prevent damage, never exceed the rated capacity of the DS-220R.

Parts Diagram

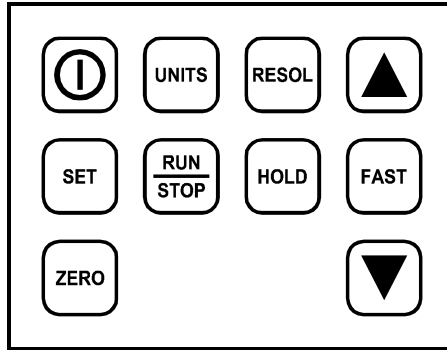


LCD Display



Item	Function
A	Main Numeric Display
B	Alternate Numeric Display
C	Tank Capacity Percent Indication
D	Units Indicators
E	Sound Mute Indicator
F	"Floating" Negative Indicator (Indicates weight removed from platform)
G	Battery Level Indicator
H	Fast Adjustment Indicator
I	Set Mode Indicator
J	Tank Capacity Mode Indicator
K	Run Mode Indicator
L	Hold Mode Indicator
M	Program Complete Indicator
N	Calibration Mode Indicator
O	Valve Open/Closed Indicator for use with CM-500
P	Resolution Indicator

Keypad



Press for power-on, press/hold for power off.



Press to cycle through displayed units.



Press to select low, medium, or high display resolution.





Press to “zero-out” current reading on display.



Use to adjust various settings and programming values.



For faster adjustments. Used in conjunction with  and .



“Freezes” display.



Starts programming mode






Activates/Deactivates stored program.



Quick Start

To operate the DS-220R as a basic weigh scale, perform the following steps:

Setup

1. Unpack the scale as described in the “Unpacking the DS-220R” section below.
2. Install the batteries into the control box as described in the “Battery Installation” section below.
3. Place the Weighing Platform on a firm, level surface.
4. Turn the DS-220R on by pressing .
5. Select the proper measurement units by repeated pressing . The units will cycle as follows:
kilograms → pounds → pounds and ounces → ounces
6. Select the desired display resolution by repeatedly pressing  as described in the RESOLUTION section.

Basic Weighing Operation

1. If using a container to hold the objects being measured, place it empty on the center of the platform.
2. Press  to “zero-out” the scale. The display will read zero.
3. Place the material to measure in the container or on the center of the platform.
4. Read the weight on the display.
5. A positive number indicates the applied weight is greater than the zero value. A negative number indicates the applied weight is less than the zero value.
6. Repeat steps 1 through 5 as necessary.
7. Turn the DS-220R off by pressing and holding  down until the scale turns off.
8. To conserve battery life, the DS-220R will turn itself off after 30 minutes of inactivity, unless it is currently running a program (see Programming section). The last state of the DS-220R will be restored upon power-up.

Unpacking the DS-220R

1. Remove the DS-220R from the carry case.
2. Remove the control box from the storage dock in right side of the weighing platform by pulling the control box firmly from the dock.
3. Unwrap the coiled cord from around the weighing platform. When using the DS-220R, ensure the coiled cord does not touch the top of the weighing platform, or inaccuracies may result.
4. If desired, extend the easel at the top back of the control box by pulling it out. The easel may be used straight for hanging, or folded at an angle for resting on a level surface.

Repacking the DS-220R


1. If extended, restore the easel to the retracted position.
2. Wrap the coiled cord counter-clockwise around the weighing platform.
3. Push the control box firmly into the storage dock of the weighing platform until it snaps in place.
4. Replace the DS-220R into the carry case.

Battery Installation & Replacement

1. Remove the battery cover from the rear of the control box by compressing tab at the base of the battery cover.
2. If necessary, remove old set of batteries.
3. Insert 4 'AAA'. Replace battery cover by aligning tabs and snapping back into place.

IMPORTANT: TO PREVENT DAMAGE TO THE DS-220R, CAREFULLY OBSERVE BATTERY POLARITY AS MARKED INSIDE THE BATTERY COMPARTMENT. DO NOT LEAVE DEAD BATTERIES INSIDE THE CONTROL BOX. REMOVE BATTERIES IF THE DS-220R IS NOT TO BE USED FOR AN EXTENDED PERIOD OF TIME.

Resolution

The resolution (minimum incremental weight) than can be displayed by the DS-220R can be adjusted to make the display easier to read. Unstable loads or high winds can cause the display to fluctuate erratically. By reducing the display resolution, external influences can be minimized. As shipped, the DS-220R is set to **MEDIUM** resolution, suitable for most purposes. The resolution can be changed to **LOW**, **MEDIUM** or **HIGH** by repeated pressing  on the keypad. The table 1 illustrates the displayed resolution for each units mode vs. resolution. Regardless of the resolution setting, the scale operates internally with the highest resolution; therefore, only the displayed value is affected.

Resolution	Units			
	Kilograms	Pounds	Pounds & Ounces	Ounces
HIGH	2 g	0.005 lbs	0.1 oz.	0.1 oz.
MEDIUM	5 g	.0.010 lbs.	0.2 oz.	0.2 oz.
LOW	10 g	0.020 lbs.	0.5 oz.	0.5 oz.



TABLE 1. Resolution Settings

Over Range Indication

If the weight applied to the weighing platform exceeds the maximum capacity of the DS-220R (100 kg), a single “1” will be shown on the left side of the display. To prevent damage to the DS-220R, immediately remove the weight from the platform.


Hold Mode







A special feature of the DS-220R allows the emptying or replacing bins or containers used for weighing without affecting the weight shown on the display. This Hold Mode may be used as follows:






1. Allow load to settle until display is steady.
2. Press . The **HOLD** indicator will turn on and the current weight is now locked on the display.
3. Remove, empty, or replace objects, bins, or containers on the platform.
4. Wait 5 seconds for the new load to stabilize.
5. Press . The **HOLD** indicator will turn off. Measurements will continue from where they left off prior to initiating Hold Mode.

Programming

With the DS-220R, a programmable threshold weight will sound an alarm. The alarm will sound when the displayed weight (either positive for increasing weight, or negative for decreasing weight) equals the programmed weight. To program the alarm, perform the following steps:

1. Set up the DS-220R with the desired units and resolution as described in the Quick Start Setup section above.
2. If measuring decreasing weight, place the objects or container with the objects or material that will be removed on the weighing platform.
3. Press  to start the SET Mode, indicated by the **SET** annunciator on the LCD display.







4. Press and/or hold the  or  keys to set the desired alarm set point. To change the set point faster, press . This will activate the **FAST SET** mode which will change the set point 10x faster than normal. Press  again to return to the normal speed **SET** mode.
5. Press . The display will automatically change to zero and the **RUN** indicator will show to indicate that the program is running.
6. When the applied (or removed) weight exceeds the programmed amount, the alarm will sound and the **DONE** indicator will flash on the display.
7. Press any key to stop the alarm.
8. To cancel the RUN mode at any time, press the  key.

NOTE: *The RUN mode can only be initiated from the SET mode. If you cancel the RUN mode by pressing , and wish to RUN again, press  (the previous set point will be restored) followed by  again. The display will be zeroed when the program restarts. You may program the SET mode without starting the RUN mode by pressing  after setting the program set point. The new value will be saved until next time the SET mode is activated.  can be used during the RUN mode similarly as described in the HOLD MODE section. The CM-500 provides additional functionality when using the RUN mode. Refer to the CM-500 User's Guide for details.*

Tank Capacity Mode

It is often convenient to know the relative amount of material (i.e. refrigerant) remaining in a container (tank). The DS-220R's Tank Capacity Mode allows a continuous display of the percentage of material remaining in a tank. In order to compute the percentage accurately, the DS-220R must be trained to know the weights of an empty and full tank. To train the DS-220R Tank Capacity Mode, perform the following steps:





Tank Capacity Mode Training

1. While holding  down, press . The **SET TANK** indicator will turn on, and **OFF** will show on the display. This indicates that the Tank Capacity Mode is currently off.
2. Turn the Tank Capacity Mode on by pressing . The display will show **ON**, and the Alternate Numeric Display and Percent Indicator will turn on.
3. Press  to proceed to the first step of training. **0%** will flash in the Alternate Numeric Display indicating that the weight of an empty container must be registered.
4. Apply an empty container (or a load representing the weight of an empty container) on the platform. Wait 5 seconds for the load to stabilize, then press . **100%** will flash in the Alternate Numeric Display indicating that the weight of a full container must be registered.
5. Apply a full container (or a load representing the weight of a full container) on the platform. Wait 5 seconds for the load to stabilize, then press . This completes the training process, and the **SET TANK** indicator will turn off.
6. From this point forward, the Alternate Numeric Display will show the percent of material remaining in the container from 0% to 100%.

NOTE: *The 100% weight must be larger than the 0% weight by at least 200g. If not, "Err" will show on the Alternate Numeric Display. To clear the error, retrain as above using a 100% weight that is at least 200g larger than the 0% weight. During training, the ZERO key may be used to assist in setting the 0% and 100% values. This will have no effect on the training, as the Tank Capacity Mode relies on absolute, not relative, weights.*





Turning Tank Capacity Mode Off

Perform the following steps to turn the Tank Capacity Mode Off:

1. While holding  down, press . The **SET TANK** indicator will turn on, and **ON** will show on the display. This indicates that the Tank Capacity Mode is currently on.
2. Turn the Tank Capacity Mode off by pressing . The display will show **OFF**, and the Alternate Numeric Display will turn off.
3. Press  to return to normal operation.

Turning the Tank Capacity Mode On without Re-training

The Tank Capacity Mode can be turned back on without retraining. The DS-220R will remember the previous 0% and 100% set points until the unit is re-trained as above. To turn the Tank Capacity Mode on without re-training, perform the following steps:

1. While holding  down, press . The **SET TANK** indicator will turn on, and **OFF** will show on the display. This indicates that the Tank Capacity Mode is currently off.
2. Turn the Tank Capacity Mode on by pressing . The display will show **ON**, and the Alternate Numeric Display and Percent Indicator will turn on.
3. Press  to return to normal operation.









Battery Level Indicator

The battery level indicator shows the relative strength of the batteries. Full power is indicated by four bars. As the batteries are depleted, the number of bars displayed decreases, until no bars are left. At this point, it is necessary to replace the batteries (refer to the Battery Installation section above). If the battery power drops to the point where the DS-220R can no longer function accurately, the alarm will beep 20 times and the power will turn off automatically. When the batteries are replaced, and the scale is turned back on, the DS-220R will resume operation with all previous setting intact.

Calibration

The DS-220R is calibrated at the factory to provide high accuracy. While recalibration should seldom, if ever, be necessary, recalibration is performed easily without sending the product to the manufacturer for service. A known calibration weight (in kilograms) is required to recalibrate the scale, and can be any value between 5 kg and 100 kg. 25 kg is recommend. Best accuracy is obtained by using the largest weight available (i.e. a 50 kg calibration weight will provide better calibration accuracy than a 5 kg calibration weight). In addition, it is necessary to know the weight to within 2 grams.



To recalibrate the DS-220R, perform the following steps:




1. Place the DS-220R weighing platform on a firm, level surface.
2. Turn the power to the DS-220R off.
3. Remove all objects from the platform.
4. While holding , press and release . The DS-220R will turn on, and after a few seconds the display will show **SET CAL** and **25.000 kg**.
5. Using  or  adjust the displayed value (in 2g increments) so that it is equal to the weight of the reference calibration weight. Use the  key to adjust in 1 kg increments.
6. Press . A number representing the weight of the unloaded platform will appear on the display. Press  to lock in this value. The display will read zero.
7. Apply the calibration weight to the platform. A number representing the applied reference weight will appear on the display. Allow at least 10 seconds for this number to stabilize.
8. Press . The DS-220R is now recalibrated to the reference weight.
9. Refer to the Quick Start section above for setting the desired Units and Resolution.

Restoring Factory Calibration

If you make a mistake recalibrating the DS-220R, you can always restore the factory calibration (and factory defaults) of the scale.



To restore the factory settings perform the following steps:

1. Turn the power to the DS-220R off.
2. Remove any objects from the platform.
3. While holding , press and release . The DS-220R will turn on and 10 beeps will sound. The factory settings are now restored.
4. Refer to the Quick Start section above for setting the desired Units and Resolution.

NOTE: *When calibrating or restoring the factory calibration,  or  must be held while pressing and releasing . Otherwise, the calibration or calibration restore functions will not operate.*

Sound

As delivered from the factory, the DS-220R beeps when turning on and when keys are pressed. This sound can be muted as follows:

1. Make sure the power is on.
2. While holding , press . The musical symbol on the left of the display will turn off to indicate that the sound has been muted.





Repeat steps 1 and 2 to turn the sound back on.

NOTE: *The Mute function only affects the power-on and key-press beeps. It has no effect on the alarm.*

HVAC Service

Because of its high stability and accuracy, the DS-220R is ideal for automotive, commercial, and residential A/C refrigerant charging and recovery. Its high resolution also allows accurate critical charging of small refrigeration systems such as commercial freezers.

To use the DS-220R for refrigerant charging, perform the following steps:

1. Press  to set the desired display units.
2. If desired, set up the Tank Capacity Mode as described in the Tank Capacity Mode section. This will allow you to know at any time the percent of refrigerant remaining in the refrigerant cylinder.
3. Carefully set the refrigerant cylinder on the weighing platform.
4. Attach the cylinder to the charging manifold via a utility hose. Open the cylinder valve and purge air from the hose.
5. Program the desired refrigerant charge weight as described in the Programming section. Activate the program by pressing .
6. Open the manifold valve(s).
7. The display will indicate the weight charged as negative, indicating refrigerant is being removed from the charging cylinder.
8. If the refrigerant cylinder empties while charging:
 - a. Close all valves.
 - b. Press  to “freeze” the display (as described in the Hold Mode Section).
 - c. Replace the empty refrigerant cylinder with a full one. Attach and purge hoses.
 - d. Press  to exit the Hold Mode.
 - e. Open manifold valve(s). Charging will continue from where it left off.
9. When charging is complete, the alarm will sound. Close all valves and press any key to cancel the alarm.

NOTE: *The CM-500 Charging Module allows for automatic charging of HVAC systems. Please refer to the CM-500 Charging Module User's Guide for details.*