



AUTOMATISMOS Y REGULADORES
para generadores y grupos electrógenos

SAR 713

Control panel for irrigation motor-pumps
INSTALLATION, USE AND CONFIGURATION MANUAL



MANUAL SAR 713 02-01

[05-2011]

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1- PRODUCT DESCRIPTION

SAR713



The SAR713 controller is an instrument designed for manual or automatic control of irrigation motor pumps, and their protection by means of different alarms.

The device has been conceived to simplify electrical panel construction as much as possible.

MAIN FEATURES

- Valid for diesel and petrol engines
- Operation mode selection key:
 - Disconnected: group shutdown and reset
 - Manual: Manual startup and shutdown via button
 - Automatic: Operation/shutdown by means of timed external command
- Measuring Instruments:
 - RPM
 - Battery voltage
 - Record of running hours
 - Running time programmer
- High solid-state power outputs (20 A) that can avoid the use of intermediate relays.
- Management of engine heating process
- Shutdown by solenoid or electro valve
- System protection by means of 10 alarms
- 20 configurable parameters
- IP65 protection rating

2- WIRING AND INSTALLATION

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2.1 TERMINALS

2.1.1) Power Supply

Minimum voltage: **8 Vcc**
 Startup voltage drop:..... **0cc for 50ms**
 Maximum voltage:..... **35Vcc (protected up to 60V)**

2.1.2) Inputs and Outputs

2.1.2.1) Digital inputs

Number of inputs **6**
 Operation: **Operation upon connection of terminal
 to earth**

2.1.2.2) Digital outputs

Startup and shutdown output

Type of output:..... **Transistor**
 Maximum power:..... **20 Amp. (Peaks up to 50 Amp)**
 Protection:..... **Short circuit**

Pre-ignition output

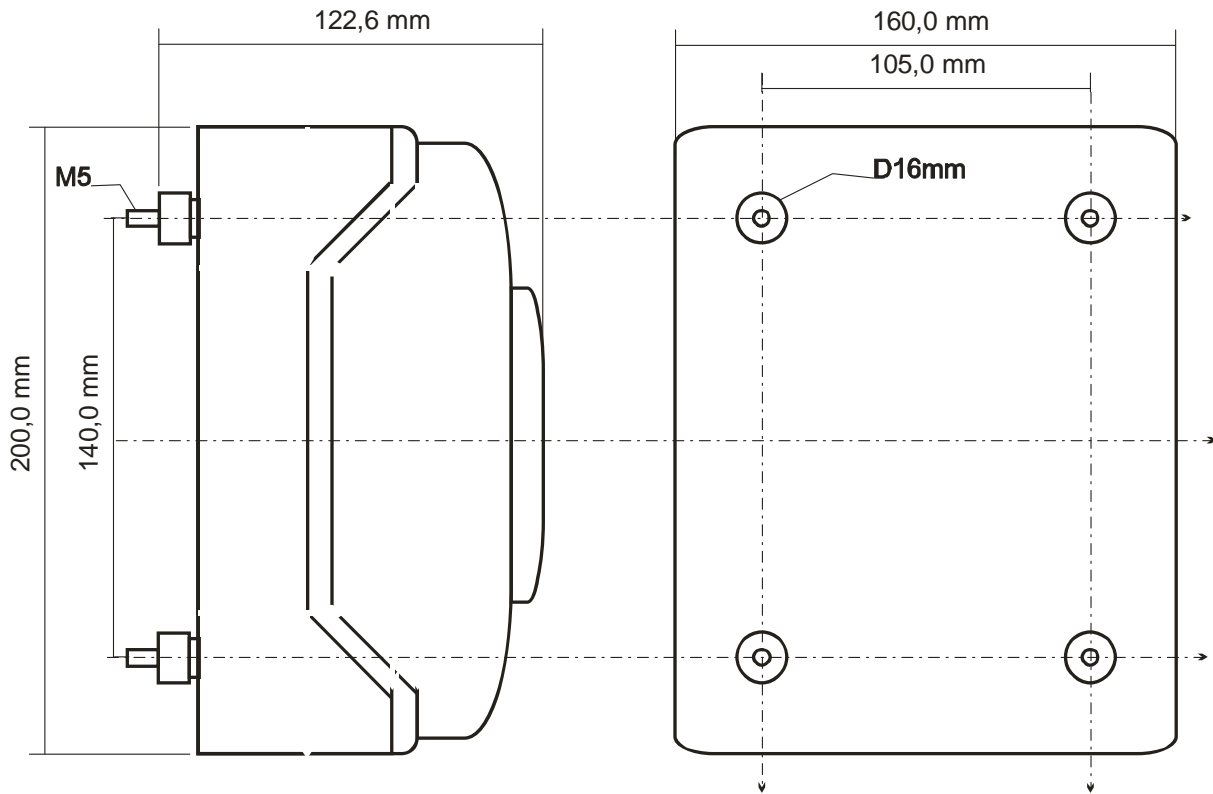
Type of output:..... **Transistor**
 Maximum power:..... **7 Amp. (Peaks up to 15 Amp)**
 Protection:..... **Short circuit**

Alarm grouping or buzzer

Type of output:..... **Transistor**
 Maximum power:..... **1 Amp. (Peaks up to 4 Amp)**
 Protection:..... **Short circuit**

2.2 MOUNTING AND DIMENSIONS

The exterior dimensions and perforation required for mounting are given below:

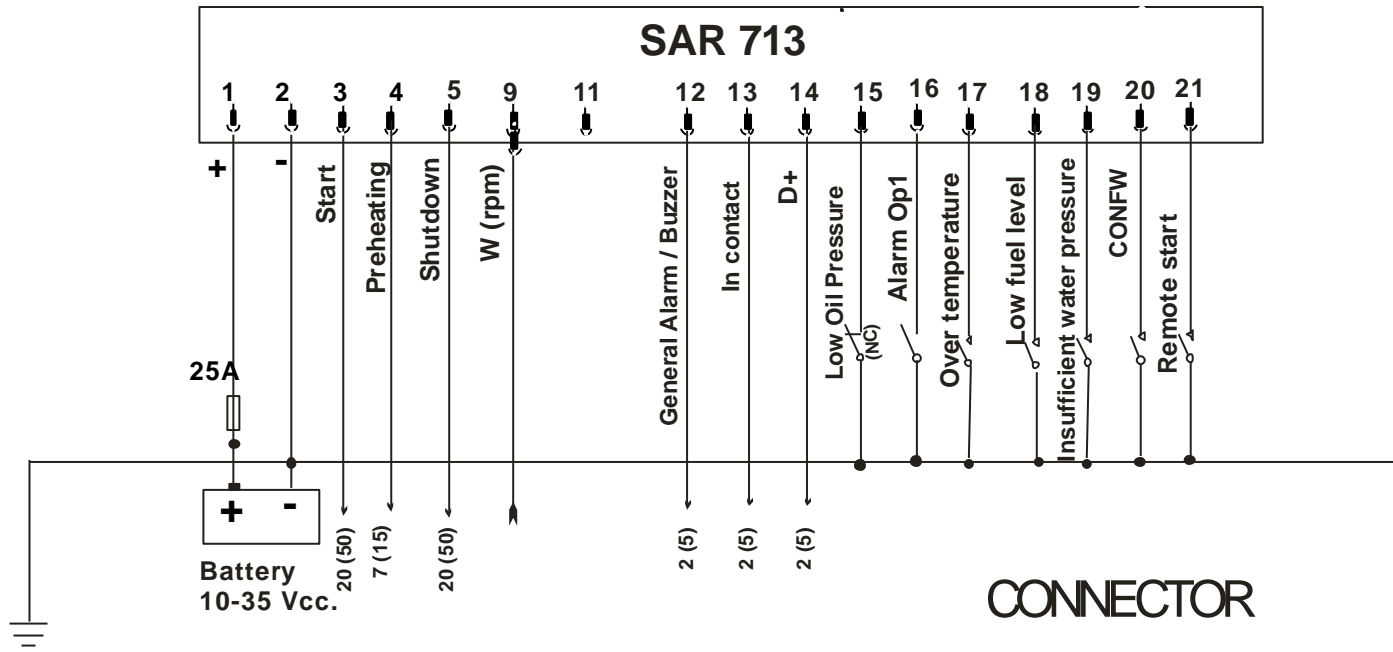


The SAR 713 controller has an IP65 rating; as such it may be installed externally.

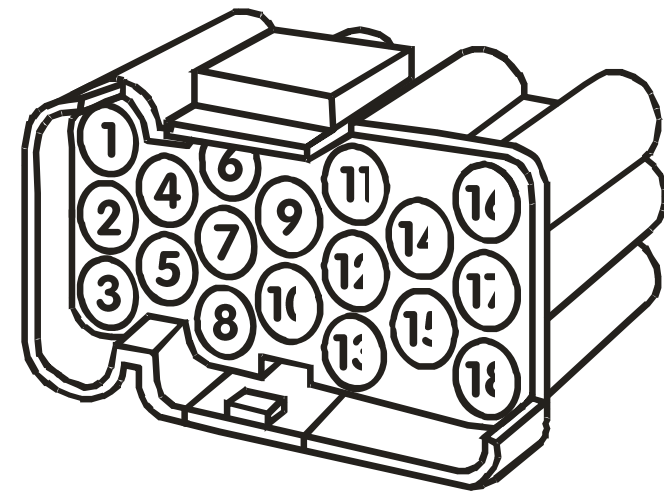


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2.3 WIRING



CONNECTOR



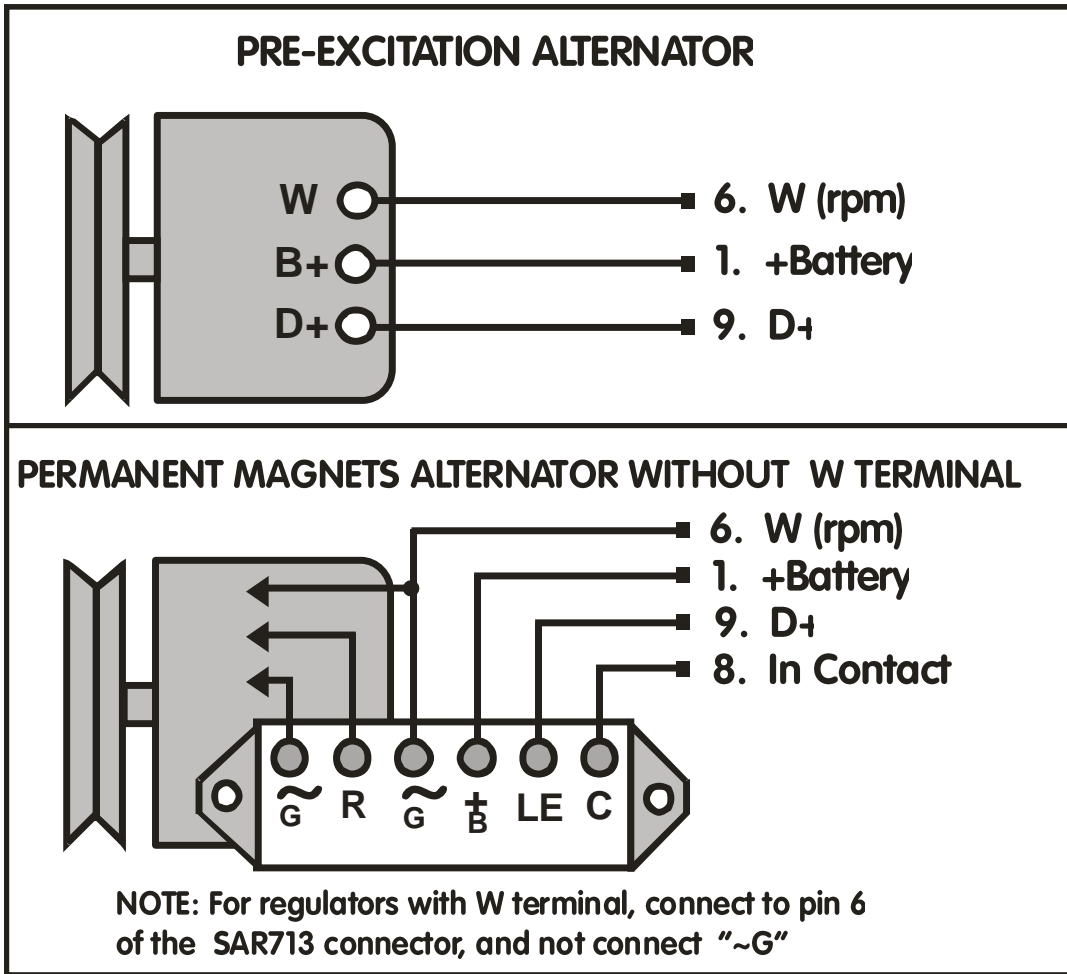
- 1. Battery +
- 2. Battery -
- 3. Start
- 4. Preheating
- 5. Shutdown
- 6. W (RPM)
- 7. General Alarm
- 8. In Contact
- 9. D+
- 10. Low Oil Pressure
- 11. Optional Alarm
- 12. Over temperature
- 13. Low fuel level
- 14. Low water temperature
- 15. W Configuration
- 16. Remote start
- 17. Not used
- 18. Not used

2.4 REVOLUTION COUNTER (RPM) and FIRST START-UP

Before using the SAR713 for the first time, it is necessary to adapt the device to the impulses it will receive at terminals W or LE, as this signal could differ between installations.

The type of connection required, based on the type of battery-charger alternator used, is given below.

CONNECTION FOR R.P.M. READING



2.4.1) RPM-counter configuration

To configure RPM reading and display, the following steps must be followed.

- Pump running
- Install an external RPM monitor such that true RPM value can be known with certainty
- Connect the connector's CONFW terminal to earth for 3 seconds
- The message $E_r P_i$ will appear. At this point the screen will display the RPM
- Adjust the RPM value to coincide with the external reading using the and buttons.
- Reconnect the CONFW terminal to earth for 3 seconds in order to return to normal operation.

3-DISPLAY AND MEASURING INSTRUMENTS

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The parameters displayed on screen correspond to the LED that is illuminated. The desired parameter is selected by means of the button.

3.1 R.P.M.



The screen displays the engine revolution speed in RPM (revolutions per minute).

3.2 BATTERY VOLTAGE



This function visualizes the voltage of the battery supplying the SAR 713 controller. It is recommended that the same battery be used for pump start-up so that this visualization can be used as an indicator of remaining voltage for both functions.

- Min. Voltage represented:.....**5.00 Vcc**
- Max. Voltage represented:.....**50.00 Vcc**
- Resolution:.....**0.10 Vcc**

3.3 RUNNING TIME COUNTDOWN



This function visualizes the remaining running time in minutes before pump shutdown is to be ordered. This is displayed as a countdown timer, counting down from the value selected at the beginning of operation.

Maximum time displayed: **1.440 min. (24h)**

3.4 RECORD OF RUNNING TIME



The SAR 713 controller offers a record of pump running hours that can be used for the purpose of managing both guarantees and routine preventive maintenance.

When the LED labeled "Hr" is shining, the figure that appears indicates the total running hours of the pump from the first connection of the SAR 713 controller.



If this number surpasses 9999 hours, the screen scrolls to 0000 hours. The tally will continue but a point will appear, indicating that a 1 is needed in front the represented hours (1 - 0000). Two points indicates a 2 must be placed in front of the figure (2-0000), and so on.

MAINTENANCE SIGNAL

When the programmed period of time has elapsed (see CONFIGURATION), the Hr. LED will flash to warn that the periodic maintenance of the group is required.

RESET MAINTENANCE SIGNAL:

To reset the maintenance signal complete the following:

- Engine off.
- Selector key switched to M (MAN).
- Hr. LED lit.
- Press  and  simultaneously for 3 seconds

4-OPERATION

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Initial Configuration

The SAR 713 default factory settings correspond to the requirements of most enginez pumps, but some parameters *must* be adapted to the specific installation. Consult your provider as to whether your device has already been personalized for your particular case; if not you will need to adapt it according to the instructions laid out in sections 5: PARAMETER CONFIGURATION and 6: READER CALIBRATION

4.1 MANUAL MODE

Turn the selector key to M (MAN)

4.1.1 Manual Startup (MAN)

Press the  button ("START/ STOP".)

Following the first pressing of this button, the start-up procedure commences, according to the steps outlined below:

- Preheating (if configured)
- Start-up
- Pause

The start-up order ceases automatically as soon as it is detected that the engine has started.

If engine start-up does not occur, the SAR713 controller initiates another start-up cycle. The number of start-up cycles that will be ordered is set in the CONFIGURATION.

4.1.2 Manual Shutdown (MAN)

Manual shutdown is triggered by pressing the  (START/STOP) button when the pump is in operation or when the startup order is being given

The shutdown order will continue for the programmed period of time to ensure the engine stops completely.

4.2 AUTOMATIC MODE (AUTO)

4.2.1.) Start-up sequence in AUTO

The SAR713 controller can start the pump when it receives either of the following signals:

- Terminal 16 (remote startup) connected to negative
- Programmed start-up according to timetable programmer

The start-up sequence will initiate according to the following steps:

- Pre-ignition (if configured).
- Start-up order given
- Pause

The start-up order ceases automatically as soon as it is detected that the engine is running. If engine start-up does not occur, the SAR713 controller initiates another start-up cycle.

The number of start-up cycles that will be ordered is set in the CONFIGURATION

4.2.2.) Shut-down sequence in AUTO

The shut-down sequence commences when:

- Terminal 16 (remote start-up) is released from negative, when this does not occur during the programmed running period
- Programmed running time has ended




Shut-down occurs as follows:


- Engine shutdown order is activated
- This order will continue throughout the programmed period of shut-down time in order to ensure that the engine stops completely.

4.3 AUTOMATIC RUNNING-TIME PROGRAMMER

The SAR713 controller includes a timer which can be used to program the number of minutes of desired pump running time, starting from the moment of pump start-up indicated by the user.

The following steps must be followed:

- Place selector key in A mode (AUTO)
- Press the  button for 2 sec.
- Enter the desired running time using the  and  buttons.

The moment the  button is pressed, the start-up sequence will initiated, as described in section 4.2.1.

Once the specified time has elapsed, the SAR713 controller will order pump shutdown and remain in stand-by mode.

If a new running time is needed, the process described above must be repeated, that is, the desired running time must again be programmed.

The remaining time can be visualized and adjusted at any time by pressing the  button.

4.4 ALARMS

One of the basic functions of the SAR713 controller is protection of the pump. This is achieved via permanent monitoring of electrical and mechanical variables and subsequent activation of the alarms where appropriate.

The presence of an alarm will always be shown on the display screen of the SAR713 controller. Output 6 (general alarm) will also be activated and where necessary group shutdown will be ordered.

The available alarms, together with their meaning and performance, are described below:

ALD1 Start-up failure:

Cause:

- The maximum of 3 start-up attempts (number of attempts is configurable) have been completed without detection of engine running
- Disappearance of engine running signals without SAR713 controller having ordered the shutdown.

Action:

- Warning signal at terminal 6 and immediate shutdown

ALD2 Low oil pressure:

Cause:

- Low oil pressure signal detected at terminal 9. This is only processed after 10 seconds of engine running time.

Action:

- Warning signal at terminal 6 and immediate shutdown

ALD3 Water over-heating:

Cause:

- Coolant thermostat detection at terminal 12

Action:

- Warning signal at terminal 6 and immediate shutdown

ALD4 Overspeed:

Cause:

- Obtained from reading of pump RPM. Indicates engine runaway. Alarm is generated internally in the SAR713 controller upon detection of frequencies above 120% of the nominal frequency, for 1.5 seconds. De-activation of this alarm can be programmed.

Action:

- Warning signal at terminal 6 and immediate shutdown

AL05 Insufficient water pressure in pump

Cause:

- Detection of low water pressure signal at terminal 14. This is only considered after the configured minimum period of engine running time (default setting: 10 minutes), or after an adequate level of water pressure has been detected for at least 1 minute. The alarm is generated if, after one or other of these requirements has been met, the water pressure then fails for 6 seconds or more.

Action:

- Warning signal at terminal 6 and immediate shutdown

AL06 Low battery/battery charger alternator failure:

Cause:

- Battery voltage detected at 20% below V_n for at least 2 minutes
- Lack of signal detection at terminal 8

Action:

- Programmable: Warning at terminal 6 only; or warning plus shutdown

AL07 Low fuel:

Cause:

- Fuel level buoy contact detected at terminal 13

Action:

- Programmable: Warning at terminal 6 only; or warning plus shutdown

AL08 Optional alarm:

Cause:

- Detection of optional contact at terminal 10

Action:

- Programmable: warning signal at terminal 6 only, or warning plus shutdown

ALARM RESET

The alarms that only produce a warning signal will be reset automatically as soon as the cause of the alarm is removed.

To reset the alarms that also trigger pump shutdown, complete the following:

- Put selector in 0 "OFF" position
- Rectify the cause of the problem.

5- PARAMETER CONFIGURATION

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The SAR713 controller offers an extraordinary capacity for adaptation to different types of engines and pumps as well as to the specific needs of individual users.

The SAR713 controller can be adapted to the particular requirements of each installation following the suitable configuration of its modifiable parameters.

Configurable parameters and their possible values are given below. **Default values (factory configuration) are given in bold or underlined type.**

	PARAMETER	VALUE: 00	VALUE: 01
01	Language	Spanish	English
02	Motor type	Diesel	Petrol
03	Shutdown type	De-excitation	Excitation
04	Running time prior to RMP monitoring (for "motor running" signal)	2s	10s
05	Withdrawal of startup for battery charge alternator (D+)	No	Yes
06	Withdrawal of startup for low oil pressure	No	Yes
07	Number of startup attempts	00 -99 (3)	
08	With/without priming of battery charger alternator or magnetic plate regulator	Without priming	With priming
09	Overspeed monitoring	No	Yes
10	Low fuel alarm	Warning	Shutdown
11	Alarm for battery charger alternator failure-broken belt	Warning	Shutdown
12	Optional alarm 1	Warning	Shutdown
13	Output for centralised alarms (pemanent) or buzzer (programmed duration)	Buzzer	Centralised alarms
14	Buzzer duration	0-99 min. 3 min.	
15	Preignition time (sparkplug heating) (deisel motors only)	00-99 seg. 15 sec. (00 No preig)	
16	Starter duration (petrol motors only)	00-9.9 sec. 1.5 sec. (00 no start)	
17	Shut-down time in AUTO	2-99 sec. 15 sec.	
18	Periodic maintenance reminder frequency	0 - 99 (0-990 h) 25: (250h)	
19	Delay before first maintenance reminder	0 - 99 (0-990 h) 10 (100h)	
20	Running time prior to "low water pressure" signal monitoring	1-99 min 10 min (00 no alarm)	

Procedures to access, change, and save configurable values, and to finalize the configuration process, are given below.

5.1 INITIATING CONFIGURATION MODE


Initial conditions:



- Group stopped (if the SAR713 controller is not connected to the group, it is necessary to simulate the inputs)
- SAR713 supplied by battery
- Selector key in "M" position (MAN)
- Selector LED should not be in Hr.
- Press and for 5 seconds

The SAR713 controller will enter configuration mode and display the message **Pr.o.** The first modifiable parameter is displayed according to the table above, that is: **0 1.00**

5.2 MODIFYING THE CONFIGURATION

The two first digits correspond to the N° of the parameter; the following digits correspond to its assigned value.

Each time  is pressed the chosen value is stored and the next parameter selected.

The buttons  and  modify the values displayed for each parameter.

5.3 EXITING CONFIGURATION MODE

Once the desired values in each configurable parameter have been established, exit configuration mode as follows:



- Press  and  for 5 s.

The SAR713 controller will exit configuration mode, displaying the message *Fin*

The equipment is now ready to enter operation.

5.4 RESET TO FACTORY VALUES

The following procedure must be followed if for any reason you wish to return the controller SAR713 to its default factory values:







- Enter into configuration mode as indicated above
- Set selector key to "0": The device will display the message *PF00*
- Press  and  for 5 s.

Installation running hours will not be erased.

6- BATTERY VOLTAGE READER CALIBRATION

SAR713

If a more precise measurement of battery voltage is desired, this too can be calibrated, according to the following steps:

- Pump running
- Screen displaying "Vbat"
- Press  and  simultaneously
- Screen will flash and allow an increase or decrease in Vbat value, via the  and  buttons
- Press  and  simultaneously to exit calibration mode



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