CRUXWELD®

INDUSTRIAL EQUIPMENTS PVT. LTD.

DRYO 25

Electrode Drying Oven

25 kg rods up to 450 mm | 10 – 500 °C, digital PID control | AC 220 V single phase



USER MANUAL

Please read this manual carefully before installing and using the machine.

Cruxweld Industrial Equipments Pvt. Ltd.
5, Sector 29, Faridabad – 121008 (Haryana), India
Phone: +91 8800 882 983 | +91 (129) 489 2868 Email: sales@cruxweld.com | Service: support@cruxweld.com
www.cruxweld.com

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This manual describes the installation, operation and maintenance of the Cruxweld DRYO 25 electrode drying oven and its digital temperature controller. Read it before using the oven and keep it near the oven. Cruxweld improves its products continuously; the contents of this manual may be revised without prior notice.

Signs used in this manual

Sign	Meaning
▲ **WARNING**	A potential hazard which may cause death or serious injury if it is not avoided.
▲ **CAUTION**	A hazard which may cause injury or damage to the oven if it is not avoided.
Note	Useful information for correct operation.

1 Safety precautions

1.1 Electrical safety

> **▲ WARNING**
> Connect the oven only to an **earthed** AC 220 V, 50 Hz single-phase socket of adequate rating, preferably on its own circuit. Switch off and unplug the oven before cleaning, maintenance or opening any cover. Internal wiring and controller connections may be changed only by a qualified electrician.

- Do not use the oven if the mains cord, plug or switch is damaged.
- Keep the oven away from water, rain and grinding dust.

1.2 Heat and fire

> **▲ WARNING**
> The chamber, tray, door and electrodes reach up to 500 °C. Wear heat-resistant gloves when opening the door and handling the tray, and place a hot tray only on a steel bench, never on wood or plastic.

- Use the oven only for drying and holding welding electrodes and fluxes. Never put flammable materials, solvents, packaging or food in it.
- Remove electrode cartons, plastic bags and labels before loading.
- Keep at least 30 cm free space around the cabinet and do not cover the vents.
- Keep the door closed and latched while heating. Open it with care: hot air escapes.
- Do not leave the oven running unattended for long periods without the high-temperature alarm set.

2 General description

The Cruxweld DRYO 25 is a floor-standing electrode drying oven for the electrode store. It re-dries welding electrodes that have taken up moisture and holds a batch of up to 25 kg warm and dry before issue to the welders.

A flux coating that has absorbed moisture puts hydrogen into the weld, which causes porosity and, in thick or restrained joints, cold cracking. Low-hydrogen electrodes that have been exposed too long must be re-dried at the temperature on the packet, usually 300 to 400 °C. The DRYO 25 does this under digital PID control up to 500 °C.



Fig. 2.1 DRYO 25, front view



Fig. 2.2 Door open, tray removed

2.1 Features

- **Digital PID control:** controller with PV / SV dual display, K-type thermocouple and adjustable high-temperature alarm; self-tuning function.
- **Far-infrared heating:** tubular elements below the tray heat the whole batch evenly; range 10 – 500 °C.
- **Slide-out stainless steel tray** with dividers and handle: load and unload on the bench, rods sorted by size.
- **Insulated door** with braided ceramic-fibre seal and lever latch.
- **Ammeter** showing the element current, and a power rocker switch.
- **Single-phase supply:** runs from an ordinary AC 220 V, 50 Hz socket.

2.2 Applications

Electrode stores in structural fabrication, pressure-vessel and piping shops, shipyards and heavy fabrication, site stores, maintenance departments and training centres. For holding rods at the welder, use the Cruxweld DRYO 5 portable electrode dryer.

3 Technical specifications

Parameter	DRYO 25
General	
Model	DRYO 25
Type	Floor-standing electrode drying oven, single door
Heating	Far-infrared tubular elements below the tray
Capacity	
Electrode capacity	25 kg
Maximum electrode length	450 mm
Tray	Slide-out stainless steel tray with dividers and handle
Temperature control	
Controller	Digital PID temperature controller, PV / SV dual display
Temperature range	10 – 500 °C, adjustable
Sensor	K-type thermocouple
Resolution	1 °C
Controller accuracy	± 0.5 % of full scale
Alarm	High-temperature alarm, adjustable
Indication	Analogue ammeter for element current; power rocker switch
Electrical	
Supply	AC 220 V, 50 Hz, single phase
Connection	Mains cord at rear
Construction	
Cabinet	Powder-coated steel, grey with blue door and panel
Door	Hinged single door, braided ceramic-fibre seal, lever latch
Ventilation	Louvred vents on the control compartment
Weight	85 kg

All values are for reference; the rating plate on the oven applies. Specifications may change without notice as a result of continuous improvement.

3.1 Scope of supply

No.	Item
1	DRYO 25 electrode drying oven with PID controller, ammeter and power switch
2	Stainless steel tray with dividers and pull handle
3	Mains cord for AC 220 V, 50 Hz
4	User manual

Not included: electrodes.

4 Machine overview



Fig. 4.1 Main parts of the DRYO 25

No.	Part	No.	Part
1	Steel cabinet	6	Door latch (lever)
2	Control panel	7	Heated chamber with far-infrared elements
3	Digital temperature controller	8	Stainless steel tray with handle
4	Ammeter (element current)	9	Door with ceramic-fibre seal
5	Power switch	10	Feet

4.1 Control panel

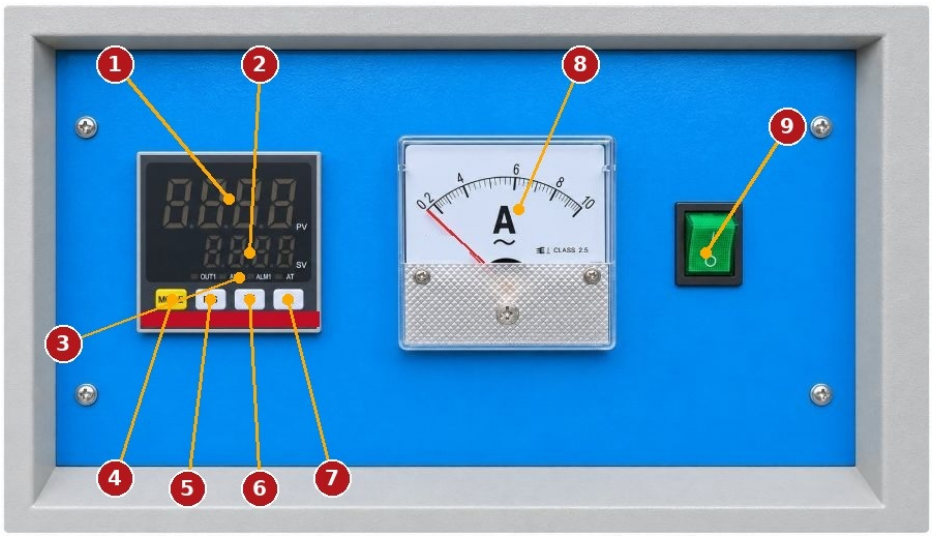


Fig. 4.2 Control panel

No.	Item	Function
1	PV display (upper, red)	Actual chamber temperature; parameter name in setting mode.
2	SV display (lower, green)	Set temperature; parameter value in setting mode.
3	Indicator lamps	OUT: heating output on. ALM1 / ALM2: alarm. AT: self-tuning running.
4	SET (MODE) key	Calls up the set value; selects parameters.
5	Shift key	Moves to the digit to change; starts self-tuning (hold).
6	Down key	Decreases the value.
7	Up key	Increases the value.
8	Ammeter	Shows the current drawn by the heating elements: a quick check that the elements are working.
9	Power switch	Switches the oven on and off; lights when on.

The key markings on your controller may differ slightly (for example MODE and R/S instead of SET and shift); their functions are as described.

5 Installation

1. Unpack the oven and check it for transport damage. The oven weighs about 85 kg: lift and move it with two persons or suitable lifting equipment.
2. Stand it on a firm, level, non-flammable floor in a dry, well-ventilated room, near the electrode issue counter, away from water and grinding dust.
3. Leave at least 30 cm free space around the cabinet; keep the vents clear.
4. Check that the tray slides freely and that the door closes and latches with the seal in place.
5. Plug the mains cord at the rear into an earthed AC 220 V, 50 Hz socket, preferably on its own circuit.



Fig. 5.1 Rear of the oven with the 220 V mains cord

> **Note:** Before the first use, run the empty oven at about 150 °C for 1 hour with the door closed. A slight smell from the new insulation is normal.

6 Operation

6.1 Loading



Fig. 6.1 Sliding the tray out

1. Open the door latch and the door.
2. Pull out the stainless steel tray by its handle (wear gloves if the oven is warm).
3. Lay up to 25 kg of electrodes, up to 450 mm long, across the tray dividers. Spread them in a thin layer; a packed heap dries unevenly. Keep different types and sizes apart.
4. Slide the tray back in, close the door and latch it firmly.

6.2 Drying

1. Switch on the power switch. The controller shows the chamber temperature (PV) and the set temperature (SV).
2. Set the temperature required by the electrode manufacturer (Section 7.2 and Chapter 8).
3. The OUT lamp lights and the ammeter shows current while the elements heat. When the set temperature is reached, the controller switches the elements on and off to hold it.
4. Bake for the time given on the electrode packet, counted from the moment the chamber reaches the set temperature.
5. For holding, reduce the set temperature to the holding value (usually 100 – 150 °C) and keep the door closed.

6.3 Unloading

- Wear heat-resistant gloves. Open the door, pull out the tray and place it on a steel bench.
- Issue the rods directly to the welders, or put them into a DRYO 5 portable dryer so they stay dry at the arc.
- Do not leave baked low-hydrogen rods lying on the bench.
- Keep a record of each batch: electrode type, temperature, time and number of re-drying cycles.
- After use, switch off and unplug the oven if it will not be used again soon.

> **▲ CAUTION**
> Keep the door closed during baking; each opening drops the chamber temperature by tens of degrees and lets damp air in.

7 Temperature controller

The oven is controlled by a microprocessor temperature controller with PID control, digital filtering and automatic recovery from interference. It gives accurate measurement and stable temperature control.

Item	Value
Supply	AC 220 V, 50 Hz; power consumption ≤ 5 W
Ambient	0 – 50 °C, 35 – 85 % RH, no condensation
Input	K-type thermocouple
Measuring range	0 – 500 °C
Resolution	1 °C
Accuracy	± 0.5 % of full scale
Insulation resistance	≥ 20 MΩ

7.1 Controller wiring (for service)

The controller is wired in the factory. For service, the terminals are: power supply AC 220 V; heating output to the solid-state relay (+ and −); K-type thermocouple input (+ and −; observe the polarity). Wiring work must be done only by a qualified electrician with the oven disconnected.

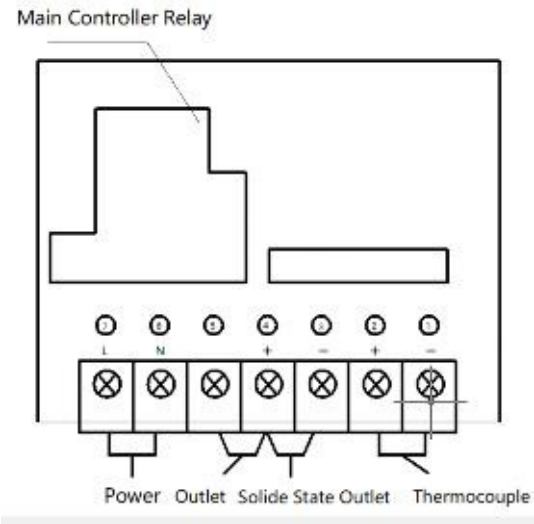


Fig. 7.1 Controller terminals: power, heating output (solid-state relay), thermocouple

7.2 Setting the temperature

1. Press the SET key once. The upper display shows **SP** and the lower display the set temperature.
2. Use the shift key to select the digit and the up / down keys to change the value.
3. Press SET again to store the value and return to the normal display.

7.3 Parameter settings

The PID parameters are set in the factory and normally do not need to be changed. To change them:

1. In the normal display, press and hold SET for about 3 s. The parameter lock **LCK** appears.
2. Set LCK to **1** to unlock the other parameters.
3. Press SET to step through the parameters (Table 7.1) and change them with the shift and up / down keys.
4. Press and hold SET for about 3 s to store the values and return to the normal display.

Display	Parameter	Range	Description	Factory
LCK	Parameter lock	0 / 1 / 2	0: only the set value can be changed; 1: all parameters can be changed; 2: no parameter can be changed	1
P	Proportional band	0 – 99.9	Proportional band of the heating output (0 = on/off control)	2.4
I	Integral time	0 – 999	Integral time of the heating output	183
d	Derivative time	0 – 999	Derivative time of the heating output	36
r	Heating cycle	0 – 60	Control cycle time of the heating output	3
HY	Hysteresis	0 – 40	Switching difference for on/off control	4
AT	Self-tuning	0 / 1	0: self-tuning off; 1: self-tuning on	0
SC	Temperature correction	−20 – 20	Correction of the displayed temperature, for example if the thermocouple position affects the reading	0
AL	High-temperature alarm	0 – 100	Alarm when the temperature exceeds the set value by this amount	50
rAG	Upper limit of set value	0 – 900	Highest temperature that can be set; set it to 500 or lower for this oven	900
CF	Temperature unit	0 / 1	0: °C; 1: °F	0

Table 7.1 Controller parameters (some parameters may not appear, depending on the controller version)

7.4 Self-tuning

If the temperature overshoots or swings, let the controller calculate new PID values by self-tuning:

1. The oven must be in normal use and the chamber temperature well below the set temperature.
2. Press and hold SET for about 3 s, set LCK to 1, step to **AT** and set it to 1. Press and hold SET for about 3 s to return. Alternatively, press and hold the shift key for about 5 s.
3. The AT lamp lights. The controller heats on and off around the set value for a few cycles, then calculates the new PID values, stores them and continues with normal control. The AT lamp goes out.
4. To cancel self-tuning, press and hold SET for about 5 s; the PID values are then not changed.

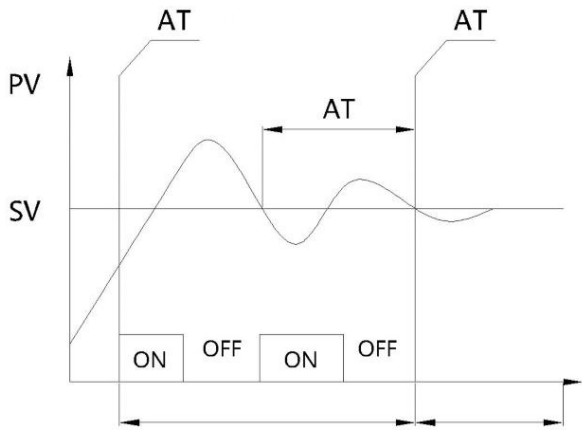


Fig. 7.2 Self-tuning (AT): on/off cycles, then PID control

8 Electrode drying guide

Always follow the electrode manufacturer’s chart for temperature, time and the number of re-drying cycles allowed. The values below are common practice.

Duty	Temperature / time	Typical use
Holding	100 – 150 °C	Keeping opened rutile and basic rods dry until issue
Rutile re-dry	100 – 150 °C, typically 1 h	E6013 and E7024 left out overnight
Low-hydrogen bake	300 – 400 °C, typically 1 – 2 h	E7018, E7016 and stainless basic rods
Reserve	up to 500 °C	Hardfacing and special consumables that call for a hotter bake

Electrode	Coating	Moisture sensitivity	In the DRYO 25
E7018 / E7016	Basic, low hydrogen	High	Re-dry at 300 – 400 °C, 1 – 2 h; then hold at 100 – 150 °C
E308L / E316L	Stainless rutile-basic	Medium	Re-dry at 250 – 350 °C per packet; hold at 100 – 150 °C
E6013	Rutile	Low	Dry at 100 – 150 °C for 1 h if left out; do not over-bake
E7024	Rutile iron powder	Low to medium	As E6013
Hardfacing	Basic	High	Re-dry as low hydrogen, per maker
E6010 / E6011	Cellulosic	Keep as packed	Not for the oven: store sealed, do not dry

- Spread rods in a thin layer across the tray dividers.
- Limit the number of re-drying cycles; record each batch.
- Move baked low-hydrogen rods straight to a DRYO 5 or keep them in the oven at holding temperature.

9 Maintenance

> **▲ WARNING**
> Switch off, unplug and let the oven cool down completely before any cleaning or maintenance.

Interval	Work
After each batch	Remove flux dust and broken coating from the tray and chamber.
Weekly	Check the door seal for damage and the latch for correct closing; clean the vents.
Monthly	Check the mains cord and plug. Compare the displayed temperature with a reference thermometer; correct with the SC parameter if necessary.
As needed	Replace a worn door seal, heating elements or the controller with genuine Cruxweld spare parts (qualified electrician).

- Do not wash the oven with water.
- Keep the oven dry when it is not in use.

10 Troubleshooting

Fault	Possible cause	Remedy
Display off when switched on	No supply; plug or cord faulty; fuse or switch faulty	Check the socket, plug and cord; have the switch and wiring checked
Display on, oven does not heat; ammeter shows 0	Set temperature below chamber temperature; heating element or solid-state relay faulty; loose connection	Check the set value; have the elements, relay and wiring checked
Temperature rises above the set value	Solid-state relay stuck on; wrong PID values	Switch off; have the relay checked; run self-tuning
Temperature swings or overshoots	PID values not suited to the load	Run self-tuning (Section 7.4)
Display flashes, shows an error or a wrong temperature	Thermocouple broken, disconnected or reversed	Have the thermocouple and its polarity checked
Displayed temperature differs from a reference thermometer	Thermocouple position or ageing	Correct with the SC parameter
Parameters cannot be changed	Parameter lock set to 0 or 2	Set LCK to 1
Oven heats slowly; heat escapes at the door	Door seal worn; door not latched	Replace the seal; latch the door firmly

If the fault cannot be cleared, contact Cruxweld service and state the model and the serial number from the rating plate.

11 Warranty

Cruxweld warrants the DRYO 25 against defects in material and workmanship for the period stated on the quotation and invoice. During this period Cruxweld will repair or replace parts that are found to be defective due to faulty material or workmanship.

The warranty does not cover the door seal and other wearing parts, or damage caused by incorrect supply voltage, overheating through wrong settings, use not in line with this manual, water, transport, or repair by unauthorised persons.

Model	DRYO 25
Serial number	
Invoice no. / date	
Customer	
Dealer stamp	

For service and spare parts please contact:

Cruxweld Industrial Equipments Pvt. Ltd.
5, Sector 29, Faridabad – 121008 (Haryana), India
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