

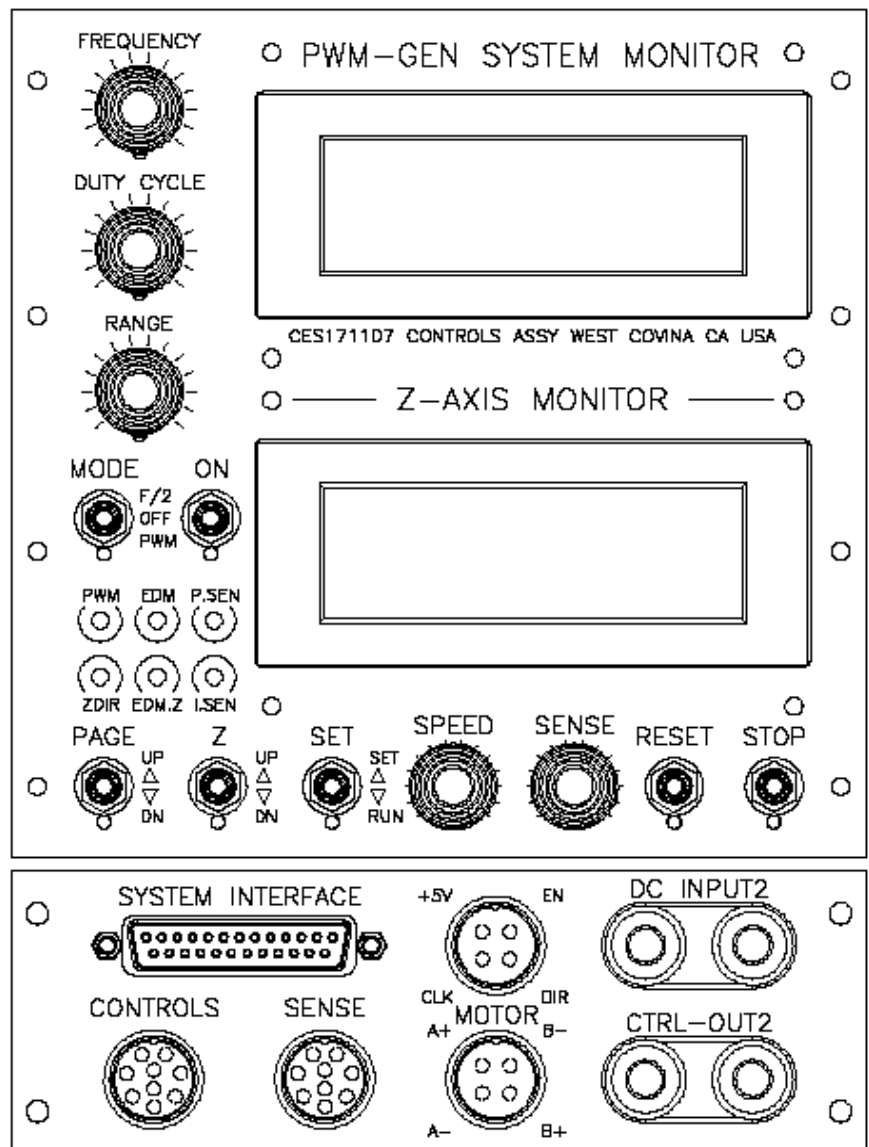
https://en.wikipedia.org/wiki/Electrical_discharge_machining

<http://poco.com/Portals/0/EDM/Effect%20on%20Surface%20Integ%20part%201.pdf>

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MAIN CONSOLE

- a. FREQUENCY (POT)
Frequency Adjustment, higher the frequency under same Duty Cycle setting will has smaller on-time for finer surface finish.
- b. DUTY CYCLE (POT)
On-time Adjustment range from 0% (OFF) to 90% (MAX) under the same frequency. Higher the On-time will deliver higher electrical power, higher processing speed and rougher surface finish.
- c. RANGE (POT)
Frequency Range select.
- d. MODE (SW)
 - i) F/2: Reduce output
Frequency to half with fix 50% duty.
 - ii) OFF: No Output.
 - iii) PWM: Duty adjustable Pulse Output.
- e. ON (SW)
 - iv) ON (up): Override Pulse Output to always ON regardless Probe Status.
 - v) OFF(dn): Auto, Pulse Output controls by Probe Status.



For Manual Operation (w/o using the Z-Axis servo):

- Connect the manual electrode to the Z-Axis electrode connection.
- Connect the work piece to Returns Base connection.
- Using ON (SW) to control the PWM power output stage.

Spark Timing, Probe Wear, Surface Finish

1. Frequency & Duty Adjustment

Frequency set the Cycle time duration (period) and Duty set the ON-Time and OFF-Time ratio within.

Where Period (Second) = $1 / \text{Frequency (Hz)}$

Typical Setting 1KHz has 1mS ($1/1000^{\text{th}}$ Sec) and 1% of Duty = 10uS ($1/1000000^{\text{th}}$ Sec) ON-Time.

500uS On-Time can be obtained by;

50% at 1KHz or

90% @ 556Hz ($100 * 500 / 90$) or

25% of 1KHz ($100 * 500 / 25$) ...

EDMP3 controls the Power via Duty Adjustment (On/OFF ratio) from 0% (OFF) to 90% (max) by designed.

Adjusting RANGE POT to obtain desire operating Frequency range as needs.

2. Cut Rate

Longer ON-Time (Higher Current) result higher cut rate and rougher surface finish.

3. Probe Wear

Probe wear shall be consider and compensate by;

- a. EDM Cut-Thru Process should be continue above the erosion part of Probe.
- b. EDM Sinker Process required Probe replaced or re-surface.

4. Surface Finish

To obtains fine finish surface by reducing ON-Time to 10uS (1% @ 1KHz) or below at the end of process.

10uS On-Time can be obtained by;

1% at 1KHz or

5% at 5KHz

10% at 10KHz

20% @ 20KHz ...

EDMP4 (1500W) Re-Design Guide

MECHANICAL

- Console
 - Base on Similar EDMP3 Case design's concept
 - Control Panels
 - F1 Primary Controls & Display
 - R2 AC-IN, Prim PS1 Interface w/ On-OFF (30A)
 - F2 ZDRV4 Connections, External PS2 Interface (30A)
 - Output Current Adjustments
 - Water Pump On/Off
- ZDRV
 - New Case designs
 - Minimize Interface Cabling
 - Accept 60mm and 150mm Z-Axis Assembly
 - Increase Step Resolution to 1/16 Steps
 - Enlarge Probe base mounting surface
 - Built-in RD/SQ Rod and Blade Quick-Mount mechanism
 - Simplified Base Board attachments and/or extension method
 - TOP & Bottom Mounting for none base (floating) operation
 - Enclosed TSense, BSense Limit Switches
 - External WSense for finish depth setting
 - CNC Mountable (Sinker follow define path)

ELECTRICAL

- Control Section
 - Dual 2004A LCD Display
 - PWM Range 2uS to 500uS
 - Change FREQ POT to ON-TIME adjustment
 - Change DUTY POT to DENSITY (Period of Pulse) adjustment
 - Keep RANGE POT as required
 - Keep F/2 and PWM SW
 - Keep OVERRIDE-ON for Manual Operation
 - Keep Page U/D SW and Z U/D SW
 - Keep SET/RUN SW
 - Keep STOP/RESET SW
 - Keep SPEED POT
 - Keep SENSE POT
 - Add Current Adj POT
 - LED:
 - EDM Power ON/OFF
 - TSense Limit
 - BSense Limit
 - WSense Work Depth Setting
 - iSense Probe Current detection
 - PSense Probe to Work detection

- ZDRV
 - 12VDC Stepping Motor 60mm or 150mm
 - LED:
 - Power Indicator
 - TSense Limit
 - BSense Limit
 - WSense Work Depth Setting
 - iSense Probe Current detection
 - PSense Probe to Work detection
 - Toggle-SW:
 - RUN
 - STOP
 - RESET
 - Limit--SW:
 - TSense
 - BSense
 - WSense
 - Console Interface:
 - GX16-4 for Stepper
 1. A+
 2. A-
 3. B+
 4. B-
 - GX16-9 for Controls
 1. +5
 2. GND
 3. TSense
 4. BSense
 5. WSense
 6. PSense
 7. RUN key
 8. STOP key
 9. RESET key