HMI Display Matrix Options								
Criteria	Display 1	Display 2	Display 3	Display 4	Display 5	**Display 6**	**Display 7**	**Display 8**
Manufacturer	AutomationDirect	AutomationDirect	ELECROW	Waveshare	Waveshare	NEXTION	Siemens	Siemens
Model	EA3-T6CL	EA9-T7CL	CrowPanel ESP32-S3 (7")	ESP32-S3-Touch-LCD-7	ESP32-S3-Touch-LCD-7B (Type B)	NX8048P070-011C (Intelligent Series)	SIMATIC HMI KTP600 (6AV6647-0AC11-3AX0)	SIMATIC HMI SMART 700 IE (6AV6648-0CC11-3AX0)
Screen Size (inches)	6	7	7	7	7	7	6	7
Resolution	320 × 240	800 × 480	800 × 480	800 × 480	1024 × 600	800 × 480	640 × 480	800 × 480
Touch Type	Resistive	Resistive	Capacitive	5-point capacitive	5-point capacitive (optional)	Capacitive	Resistive	Resistive
Display Panel	TFT	TFT	TFT (TN)	IPS (170°)	IPS (170°)	TFT LCD (65K color)	TFT LCD	TFT LCD
Mount Type	Panel mount (NEMA 4/4X front)	Panel mount (NEMA 4/4X front)	Standalone acrylic case	Dev board / enclosure DIY	Dev board / enclosure DIY	Panel-mount style (front mount); some versions include enclosure	Panel mount (industrial front mount)	Panel mount (industrial front mount)
MCU	Proprietary	Proprietary	ESP32-S3 (LX6, up to 240 MHz)	ESP32-S3 (LX7 dual-core, up to 240 MHz)	ESP32-S3 (LX7 dual-core, up to 240 MHz)	NXP-based, 200 MHz (on-display MCU)	Proprietary Siemens HMI CPU	Proprietary Siemens HMI CPU
Memory	Internal flash	Internal flash + SD	4 MB Flash + 8 MB PSRAM	16 MB Flash + 8 MB PSRAM	16 MB Flash + 8 MB PSRAM	128 MB Flash, 512 KB SRAM	Internal (Siemens-managed)	Internal Siemens-managed flash / RAM
IO / Interfaces	None (HMI only)	None (HMI only)	GPIO, UART, I²C, USB, battery	CAN, RS485, UART, I²C, USB-C, TF, sensor headers	CAN, RS485, UART, I²C, USB-C, TF, sensor headers + 5V out	UART (TTL serial) to ESP32/Arduino; onboard features vary by series (often includes GPIO/RTC on Intelligent)	PROFINET, USB (service)	PROFINET (Ethernet), USB (service/programming)
Connectivity	Serial / USB (Ethernet optional)	Serial / USB / Ethernet	Wi-Fi + Bluetooth	Wi-Fi + Bluetooth 5	Wi-Fi + Bluetooth 5	None (wired UART; no Wi-Fi on the display itself)	Industrial Ethernet (PROFINET)	Industrial Ethernet (PROFINET)
Development Environment	C-more Micro	C-more EA9	Arduino, ESP-IDF, PlatformIO, MicroPython, LVGL	Arduino, ESP-IDF, LVGL	Arduino, ESP-IDF, LVGL	Nextion Editor (drag-and-drop HMI + event code on screen)	Siemens TIA Portal / WinCC	WinCC flexible SMART (free)
Operating Voltage	24 VDC	24 VDC	5 VDC	5 VDC or Li-ion	5 VDC or Li-ion	5 V	24 VDC	24 VDC
Extra features	—	SD logging (EA9)	Case + speaker/battery interfaces vary	—	Backlight adjustment + battery voltage monitoring + charge indicators	Audio/video/animation support, RTC support (per Intelligent series listing)	Alarms, trends, PLC tag binding	Alarms, trends, PLC tag binding, recipes
Cost	≈ $470	≈ $700–750	≈ $50	≈ $37–40	≈ $34–39	≈$122	≈ $500–900(Used)	≈ $130–220 (used market)
Support Level	Medium	Medium	Medium–Low	Medium–High	Medium–High	High	High	High
Support Rationale	Good vendor support, weak onboarding/docs	Same as EA3. I have experince with this.	Mixed docs, more self-debugging	Strong wiki/examples/pinouts	Same as Display 4, plus it's the "upgraded" higher-res version. Looks like a good balance	Easiest path for buttons + live telemetry via simple serial commands according to reddit. But closed source	Excellent industrial documentation and support, closed ecosystem. Wicked expesnive	Strong Siemens documentation and long-term industrial support; closed ecosystem
Industry Standard?	Yes	Yes	No	No	No	Yes	Yes	Yes

The problem with using an industry-standard HMI is that it often needs extra external modules to work with sensors, buttons, and the motor controller. These extra parts increase the total cost. In comparison, an ESP32-based HMI from Elecrow already includes built-in inputs and communication features, which reduces the number of extra components needed and helps keep the system cheaper and simpler. For example, using the AutomationDirect EA9, the HMI along with the required PLC, digital I/O, and analog I/O modules can cost $700–$1,200+ used, not including the VFD or motor, which are already allocated for this project. In contrast, an open-source ESP32-based HMI such as an Elecrow or Waveshare display, including any required modules to communicate over Modbus, would cost under $150–$300 total but at the cost of not being industry rated.