

FLUX SHUTTLE PROFILER v1.0

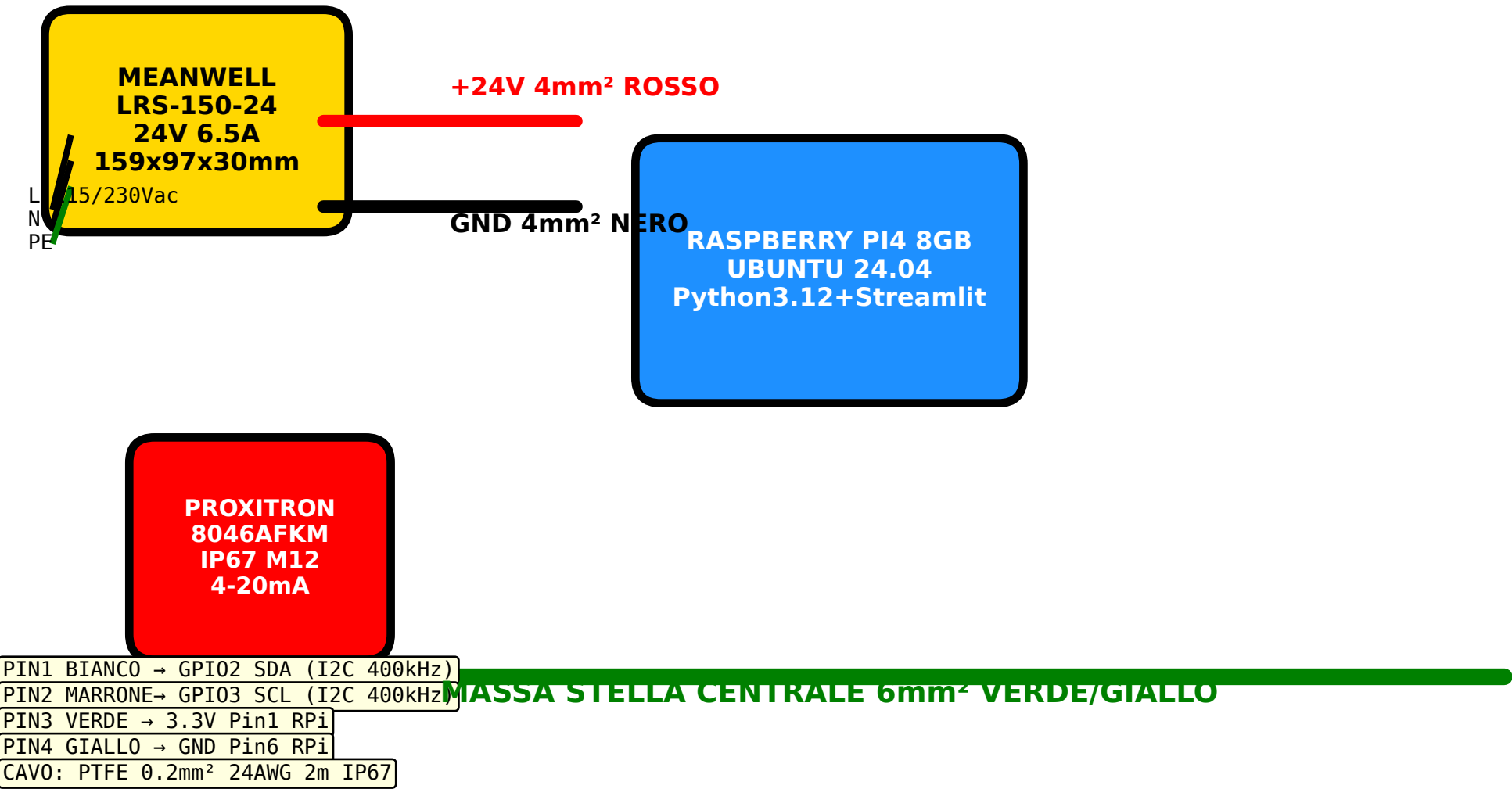
MANUALE TECNICO DI COSTRUZIONE - BOM + SCHEMI + FORI

FORGIALEAN s.r.l. | MILANO 2026 | EN9100 READY

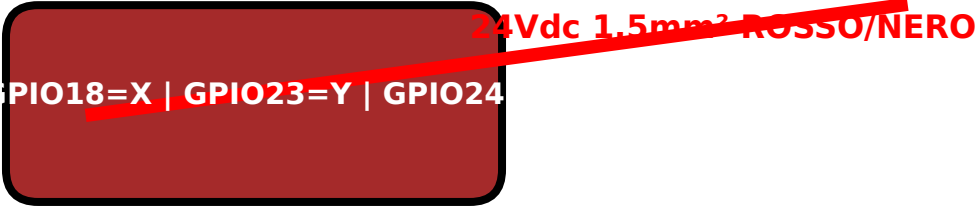
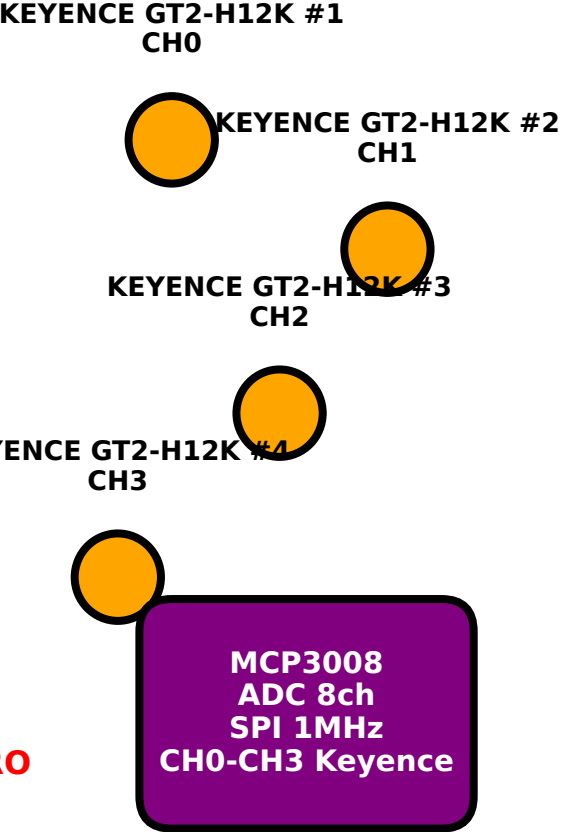
BOM COMPLETA - 13 COMPONENTI | TOTALE €1.740 | MARGINE 65%

REF	COMPONENTE COMPLE	Q.TY	UNIT	UNIT€	TOTALE€	FORNITORE
FS001	Electron 8046AFKM IP67 D25x80	1	pz	320.00	320.00	RS-Online
FS002	Keyence GT2-H12K 0-10V D12x	4	pz	100.00	400.00	Keyence-IT
FS003	RPi4 8GB 85x56x19mm Ubuntu	1	pz	95.00	95.00	Arrow
FS004	NEMA17 Stepper 42x42x40mm 1	3	pz	25.00	75.00	RobotShop
FS005	Omron HGR15 500mm + 2xHG	2	pz	85.00	170.00	Misumi-EU
FS006	Ure SFU1605 D16x1000mm p	1	pz	45.00	45.00	CNCShop-IT
FS007	MeanWell LRS-150-24 24V 6.5A 15	1	pz	45.00	45.00	RS-Online
FS008	Finecorsa OMRON EE-SX67 II	2	pz	15.00	30.00	RS-Online
FS009	Driver DRV8825 24V 2.5A Micr	3	pz	18.00	54.00	Pololu
FS010	MCP3008 ADC 8ch SPI I	1	pz	8.00	8.00	RS-Online
FS011	Cable M12 PTFE IP67 2m 4 poli 0.	10	pz	15.00	150.00	Lapp-IT
FS012	Profilo alu 20x20x2000mm nero	12	m	1.20	14.40	AluStock
FS013	Panello comandi 500x400x3mm a	1	pz	35.00	35.00	Locale
SUBTOTAL MATERIA					1.320,00	
ASSEMBLAGGIO 12h x €35/h					420,00	
GRAND TOTAL PROTOCOLO					1.740,00	FAT €5.000

SCHEMA ELETTRICO 1/2 - ALIMENTAZIONE + M12 PROXITRON + GPIO

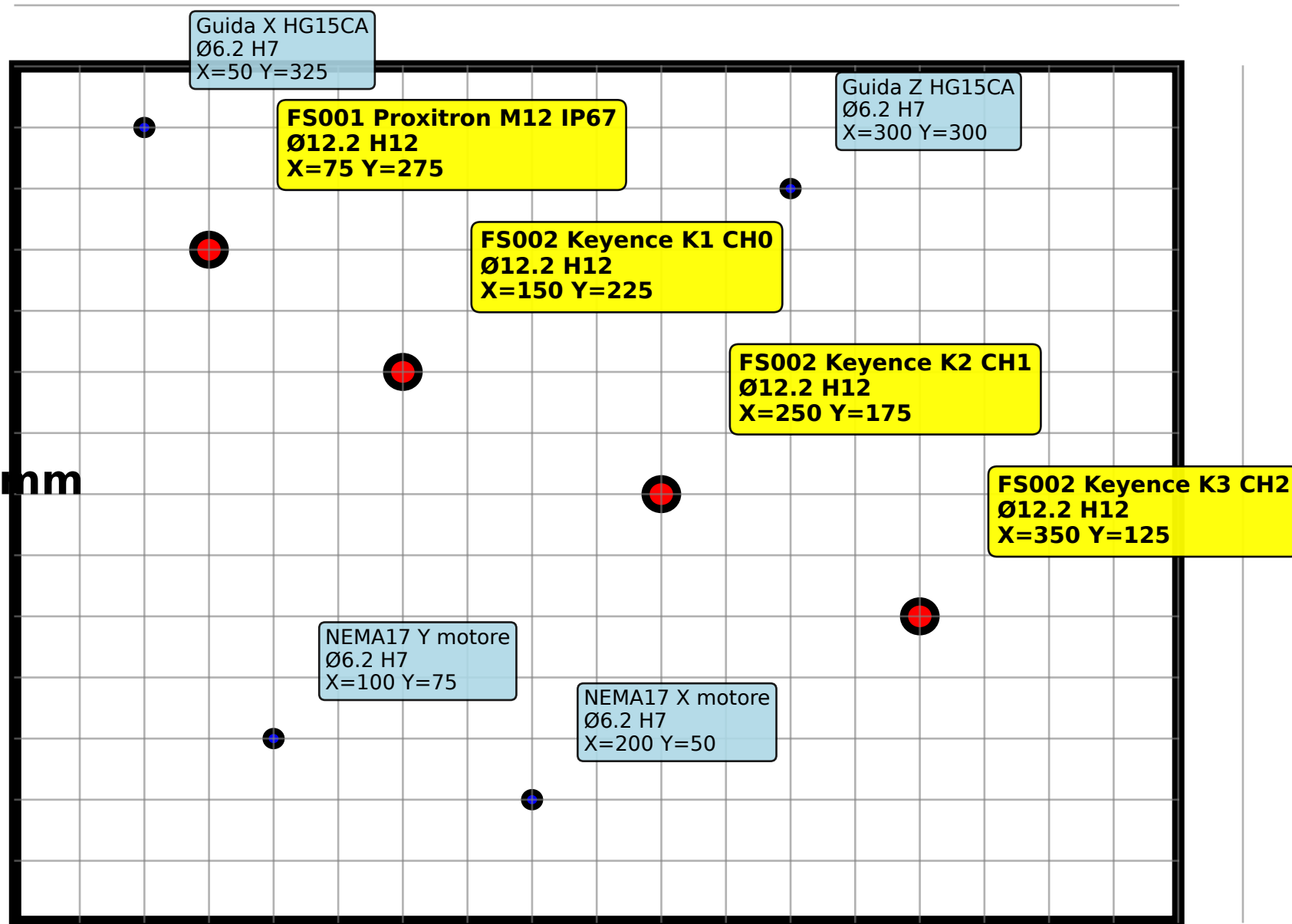


SCHEMA ELETTRICO 2/2 - KEYENCE + NEMA17 + DRIVER



CAVO 24V: 1.5mm² flessibile rosso/nero | M12: PTFE 0.2mm² 4 poli | Massa: 6mm² verde/giallo | CRIMPATURA: 0.5-1.5mm²

400 mm



500 mm

PANELLO COMANDI 500x400x3mm - FORI SCALA 1:1

TRAPANO/STAZIONE CNC:

M12 SENSORI: FRAESATURA Ø12.2 H12 (IP67)

M6 MECCANICI: TRAPANO Ø6.2 H7 (viti M6)

TOLLERANZA POSIZIONE: +/-0.1mm

MARGINE BORDO: 25mm tutti i lati

MATERIALE: Alluminio 5754 T6 sp. 3mm

GIORNO 1: BASE + PREPARAZIONE (4h)

F 1: F1: Taglio 12 profili Alu20x20: 4x500mm(X), 4x400mm(Y), 4x300mm(Z) → Seghetto+guida $\pm 0.5\text{mm}$

F 2: F2: Verifica Proxitron: 4-20mA loop test multimetro 500 Ω carico

F 3: F3: Keyence GT2-H12Kx4: 0-10V sweep test oscilloscopio

F 4: F4: RPi4 Ubuntu24.04: pigpio+Streamlit install → streamlit hello OK

F 5: F5: Base 500x400mm: 4 profili Alu20x20 + 8 staffe M5x20=12Nm

F 6: F6: Traversa Y 400mm: 2 cuscinetti lineari gioco<0.1mm calibro

F 7: F7: 4 piedini M10 reg. $\pm 5\text{mm}$ + livella laser<0.05°

F 8: F8: CTRL: Diagonale 707.1 $\pm 0.7\text{mm}$ | Livello bolla<0.05°

GIORNO 2: GUIDE + SFU1605 (5h)

F 1: F9: HGR15-500 X: 4 viti M4x8=12Nm | Ctrl parallelo 0.1mm

F 2: F10: 2xHG15CA X: KLÜBER46 | Gioco laterale<0.02mm calibro

F 3: F11: HGR15-400 Y: Ctrl parallelo 0.1mm squadro

F 4: F12: Carrello Y HG15CA: Gioco<0.02mm | Lubrificazione

F 5: F13: SFU1605-D16x1000 Z: Cuscinetti SK12/SK16=15Nm

F 6: F14: Ctrl backlash SFU1605<0.05mm comparatore digitale

F 7: F15: Lubrificaz. completa 4cc KLÜBER46 | Corsa XYZ OK

F 8: F16: Allineamento XYZ ortogonale 0.01mm calibro

CHECKLIST COLLAUDO FINALE | 4 ORE

MECCANICA:

- ☐ Base diagonale $707.1 \pm 0.7 \text{mm}$ ✓
- ☐ Guide HGR15 parallelo $< 0.1 \text{mm}$ ✓
- ☐ SFU1605 backlash $< 0.05 \text{mm}$ ✓
- ☐ Corsa XYZ: $450 \times 350 \times 280 \text{mm}$ ✓
- ☐ Livello totale $< 0.05^\circ$ ✓

ELETTRONICA:

- ☐ Proxitron M12: PIN1-4 $< 1\Omega$ ✓
- ☐ Keyence 0-10V sweep OK ✓
- ☐ Isolamento $500\text{V} > 100\text{M}\Omega$ ✓
- ☐ 24V stabile $\pm 10\%$ 6.5A ✓
- ☐ GPIO pigpio DMA 1MHz ✓

SOFTWARE:

- ☐ Streamlit dashboard 2Hz ✓
- ☐ Cpk preliminare > 1.33 ✓
- ☐ 10 cicli automatici OK ✓

PROTOCOLLO APPROVATO ✓

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