FIO FERTIGATION FAMILY

LWV FIO-P4

Four isolated pump outputs, one cable in

The FIO-P4 drives four dosing pumps for the FIO-C controller. It takes power and commands from the controller on one M12 cable, passes them on to the next module, and puts its pumps at rest by itself if the controller goes quiet. Up to four modules hang beside one controller, for 16 pumps.



Rev A, rendered from the design.

4
isolated 4–20 mA pump outputs

4
switch inputs with broken-wire check

4
modules per FIO-C controller (16 pumps)

24 V DC
from the controller, on the link cable

FEATURES

Four isolated pump outputs

Each 4–20 mA output has its own isolated supply and isolator. Pumps on different circuits cannot form ground loops, and a wiring fault stays on its own pump.

Pumps rest on their own

If no command arrives for 3 s, every pump goes to rest. If the link loses power, every output falls to 0 mA in hardware within about 15 ms.

Auto, Hand or Off

One key per pump. Hand runs the pump at a set rate for a limited time, and only while the controller allows it.

Knows when a wire breaks

Every pump, input and link port reports nothing plugged in or a broken wire. Inputs use a 68 kΩ end-of-line resistor at the switch.

One cable, no switches

Power and data arrive on one standard M12 jumper and pass on to the next module. Hold a key for 3 s and the controller gives the module its number.

Accurate small doses

Micro-doses are timed by the module on its own 1 ms clock, so the volume does not depend on the speed of the cable.

SPECIFICATIONS

Power	
Supply	24 V from LINK IN (21.2–26.3 V at the controller); no supply of its own
Input protection	0.60 A electronic fuse with soft start, reverse-polarity protection
Voltage window	on above 19.0 V, off below 17.6 V; over-voltage cut-off at 32.6 V
Fault containment	a short inside one module stays inside it
Draw limit	≤ 0.35 A per module, INPUTS supply included (design limit)
Consumption	≈ 0.12 A at 24 V while dosing (design estimate; measured value to be confirmed)
Pass-through	up to 2.0 A from LINK IN to LINK OUT

Pump outputs	
Outputs	4 × 4–20 mA, each isolated from the others and from the link
Load	≈ 600 Ω at 20 mA
Setting	≈ 5.4 µA per step; upper clamp set per pump (20 mA default)
Calibration	every output at 4.000 and 20.000 mA, at the factory
Rest current	0 or 4 mA per pump; a hardware stop is always 0 mA
Checks	loop fault while driving; at 0 mA rest, a 2 mA 200 ms probe every 10 min finds an unplugged pump
Isolation rating	To be confirmed

Inputs	
Switch inputs	4 on 2 ports, optocoupled, 24 V wetting, 2.3 mA through a closed contact
Line monitoring	68 kΩ end-of-line resistor tells a broken wire from an open contact; off for PNP sensors
Sensor supply	24 V on the INPUTS ports, 0.1 A resettable fuse

Keys and modes	
Keys	one per pump on the top wall: Auto → Hand → Off
Hand	set current (12 mA default) for up to 300 s (default), while the controller permits
Off	the pump stays at rest whatever the controller asks

Link	
Bus	RS-485 Modbus RTU; 19 200 baud at start-up, 115 200 baud run speed
Addressing	no switches: hold any key 3 s while the app's Add module window is open
Termination	120 Ω, switched in software; on by itself at the last module
Safe on silence	pumps to rest after 3 s without a command (0.5–60 s setting)
Updates	over the link from the controller, one module at a time

Safety	
Watchdog	every output to 0 mA within 0.38–0.94 s, in hardware
Link power lost (STOP)	every output at 0 mA within ≈ 15 ms, no firmware in the path (calculated)

Panel and processor	
Indicators	port lights with 6-light bars, key mode lights, 6-light scanner, 1-digit module number
Processor	Seeed XIAO RP2350, socketed

Enclosure	
Size	244 × 155.4 × 42.5 mm (9.61 × 6.12 × 1.67 in)
Case	black ASA tub and bezel, heat-set M3 inserts
Window	3 mm smoked grey polycarbonate, 35 % light transmission
Seal and vent	silicone cord seal, ePTFE vent
Ingress protection	IP65 (design target)
Operating temperature	To be confirmed

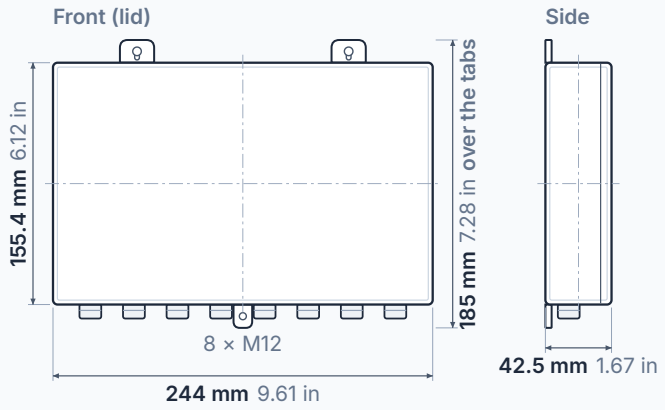
CONNECTORS

PORT	TYPE	USE
LINK IN	M12 A-coded, 4-pin, female	from MODULE LINK or the module before: 1 +24 V, 2 A, 3 0 V, 4 B
PUMP 1–4	M12 A-coded, 4-pin, female	4–20 mA speed input of one dosing pump: 4 mA +, 3 mA –; isolated per port
INPUTS 1/2, 3/4	M12 A-coded, 4-pin, female	two switches per port (pins 4 and 2), 1 +24 V, 3 0 V: floats, pump alarm, contactor auxiliary
LINK OUT	M12 A-coded, 4-pin, male	to the next module; pins as LINK IN; cap it on the last module

STATUS LIGHTS

LIGHT	MEANING
Scanner	as on the FIO-C: green sweep: all good; red sweep: alarm or the controller went quiet; blue: being added or updated
Pump lights	dim green: at rest, loop good; green: driving; amber: nothing plugged in; red flash: loop fault or an over-long run
Pump bars	breathe when ready in Auto, run with the dose rate, stop halfway when blocked; dark in Off
Mode lights	green Auto, amber Hand (blinks in its last 10 s), red Off; three red blinks: key refused
LINK IN, LINK OUT	green: link up; dim blue: end of the chain; red: link lost; the sparks stop where a jumper is broken
IN 1–4	green: switch closed; amber or red: broken wire
Digit	module number; alternates with a letter on a fault (L link, E power, P pump or input, U unit); dash: no address

DIMENSIONS



Weight	To be confirmed
Mounting	Wall: two keyhole tabs on top, 136 mm (5.35 in) apart, for #8 or M4 pan-head screws; one screw in the bottom tab. Boxes 20 mm (0.79 in) apart, 12 mm (0.47 in) at least. A controller and two modules span 772 mm (30.4 in), with four 1300 mm (51.2 in).

WORKS WITH

- LWV FIO-C controller: up to 4 pump modules per controller
- LWV FIO-WQ water-quality module: dosing follows its readings, through the FIO-C
- Dosing pumps with a 4–20 mA speed input up to ≈ 600 Ω (Etatron eOne MF supported)
- Float switches and dry contacts with a 68 kΩ end-of-line resistor; 24 V PNP sensors without
- M12 A-coded cordsets and female-to-male jumpers

ORDERING

PART	DESCRIPTION
FIO-P4	Pump module, Rev A, in its wall-mount box, with a LINK OUT sealing cap and four 68 kΩ end-of-line resistors. Ordering code to be confirmed.
Link jumper	M12 A-coded extension, female to male, 0.5 mm² (20 AWG); 0.3 m (12 in) for boxes 20 mm (0.79 in) apart.
Pump cordset	M12 A-coded, male, straight, moulded, open end, PUR jacket; length to the pump.

1 Every figure is a design value until bench tests confirm it. Firmware is in development.

2 Etatron eOne MF: PUMP pin 4 (black) to pump terminal 2 (mA +), pin 3 (blue) to terminal 1 (mA –). Pump in mA mode: 4.2 mA = 0 strokes/min, 20.0 mA = full rate, STOP outside that range.

3 Fit each input's 68 kΩ end-of-line resistor across the switch, at the switch. Turn line monitoring off for a PNP sensor or a contact without one.

4 Jumpers up to 4 m (13 ft) each at 0.5 mm² (20 AWG): farther out, the last module may not start at the lowest supply voltage.

5 IP65 is a design target, to be confirmed by a water-jet test (IEC 60529) with every port plugged or capped. LINK OUT carries 24 V while the link is on: cap it on the last module.