

Photoelectric Amplifier

3-Channel, Master/Slave

PAM03DB1RAU24



- Amplifier unit for 3 through-beam sensor sets
- Sensor types: MOFT... / MOFR... up to 50 m sensing range
- Test input for sensor verification
- Automatic Master / slave configuration
- Up to total 10 connected systems
- Fast multiplexed sensors – no crosstalk
- Diagnostics for emitter or receiver fault
- Alignment help for emitter and receiver
- Multi voltage 24 ... 42 VAC/DC
- Alarm output - single module or common
- Adjustment time delay, ON, OFF or ON+OFF
- LED indications for: Supply, outputs, signal quality, fault indication and alignment help
- 50 ... 100% selectable max. sensing range



Description

The Carlo Gavazzi PAM03 amplification module can operate alone, controlling 3 MOF... sensor sets. Up to 10 amplifiers can also be connected automatically in a master/slave setup via the built-in communication port sharing power and controlling up to 30 MOF... sensor sets. All connected MOF... sensors are multiplexed, eliminating crosstalk. Due to their signal strength, the combination of MOF... sensor sets and PAM03 amplifiers are

suitable for environments with high amounts of dust or fog like automatic industrial doors, stone crushing conveyors, wood working machinery, car washes or other applications where a photoelectric sensor must work despite a build-up of dust and dirt or sense through fog, vapor or similar visibility hindrances. The Carlo Gavazzi photoelectric PAM03 amplifiers are available in a plastic (PC/ABS) IP20 approved housing material.

Part selection key

P	-	Photoelectric sensor
A	-	Amplifier relay
M	-	Multiplexed sensors
03	-	Number of channels/sensors sets
D	-	Housing DIN-rail
B	-	Inter bus connection
1	-	Spring terminal connectors
R	-	Relay output
A	-	SPDT N.O. & N.C. contacts
U24	-	24 ... 42 VAC/DC power supply

Part selection

Channels	Connections	Terminals	Output	Part number
3 channels	Inter Bus	Spring terminals	SPDT relays	PAM03DB1RAU24

Features

Main operational data

Functional principal details	Amplifier unit for 3 channels/3 MOFT... / MOFR... sensor sets
Sensing mode	Through-beam sensing
Sensing	
Rated operating distance (S_n)	MOFT20-MOFR... - 20 m MOFT50-MOFR... - 50 m
Sensitivity adjustment	Manual or automatic sensitivity adjustment. Manual: Single turn trimmer 240° Automatic sensitivity adjustment: Trimmer setting fully counterclockwise "A"
Hysteresis	Typically between 10% ... 30%, sensor dependent
Operating frequency	1 module - 55 Hz 2 modules - 27 Hz n modules - 55/n Hz
Temperature drift max (% of S_n)	±10%
Repeatability	<5%, sensor dependent
Response time	1 module - 9 ms max 2 modules - 18 ms max n modules - n x 9 ms max
Automatic master/slave configuration	When two or more modules are connected
Test input	The emitters Channel 1 - 3 are switched off when voltage is applied to the test terminals (24...42 VAC/DC)
Mutual interference protection	All connected MOF... sensors are multiplexed, eliminating crosstalk
Diagnostic functions	Indicate failures on the connected emitters and receivers
Time delay	
OFF delay	0 ... 10 sec., common for all 3 channels single turn trimmer, 240°
ON delay	0 ... 10 sec., common for all 3 channels single turn trimmer, 240°
Optical information MOF... sensors	
Light source	GaAIAs LED, 880 nm, infrared modulated
Optical angle	±2°, ±5° ±8°

Electrical data

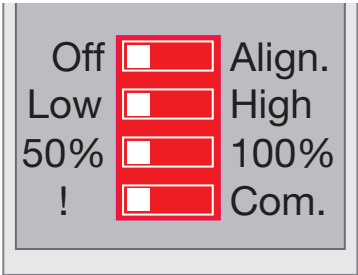
Power supply	
Rated operational voltage (U_o)	U_B : 20.4...46.2 VAC/DC (Ripple included) U_e : 24...42 VAC/DC (Ripple included) For UL508/UL325 certification: U_e : 20.4...30 VAC/20.4...42.4 VDC (Supply Class 2)
Ripple (U_{rpp})	-15%, +10%
Frequency range	45 ... 65 Hz
No load supply current (I_o)	DC: 120 mA @ U_B min, 60 mA @ U_B max AC: 170 mA @ U_B min, 95 mA @ U_B max
Rated operational power	4 VA, AC supply 3 W, DC supply
Power-ON delay (t_v)	≤ 300 ms
Inputs	
Sensor set 1...3	Up to 3 sets of sensors can be used, 3 x 4 terminal blocks
Test input	To be used for testing the connected sensors, 1x2 terminal block
Power Supply	Power from one system can supply all connected systems, 1x2 terminal block
Relay Outputs	
CH1...CH3 relay	SPDT output for sensor outputs, Make & Break, 3 x 3 terminal blocks
Warning relay	SPDT output, Make & Break 1x3 terminal blocks
Relay data	
Relay output	SPDT
Output switching function	N.O. and N.C. (Make & Break)
Relay contact materials	Au (Gold)
Minimum operational current (I_m)	≥ 1 mA @ 5 V (Gold contacts)
Mechanical lifetime contacts	$\geq 5\,000\,000$ cycles
Electrical Lifetime	$\geq 100\,000$ cycles @ Resistive load AC1 and DC1
Utilization category	AC-1: ≤ 0.5 A / 30 VAC (EN IEC 60947-4-1)
	DC-1: ≤ 1.0 A / 30 VDC (EN IEC 60947-4-1)
	AC-14: Control of small electromagnetic loads (EN IEC 60947-5-1)
	DC-13: Control of electromagnets (with freewheeling diode) (EN IEC 60947-5-1)

Environmental data

Ambient temperature	
Operating	-25° ... +50°C (-13° ... +122°F)
Storage	-40° ... +85°C (-40° ... +185°F)
Ambient humidity range	
Operating / storage	35% ... 95% (With no icing or condensation)
Ambient light immunity	
MOFT.../MOFR... sensors	• $\geq 100\,000$ lux incandescent light @ 3000 ... 3200 °K (EN IEC 60947-5-2) • $\geq 10\,000$ lux incandescent light 3200 °K (EN IEC 61496-2). Failure to danger (worst case alignment) • $\geq 3\,000$ lux fluorescent light (EN IEC 61496-2). Failure to danger (worst case alignment) • 0.05 J @ 200 Hz to 0.5 J @ 5 Hz stroboscopic light (EN IEC 61496-2). Failure to danger (worst case alignment) • 3 ... 5 J @ 0.5 ... 2 Hz flashing beacon light (EN IEC 61496-2). Failure to danger (worst case alignment)
Mechanical influences	
Vibration	10 ... 55 Hz, 1.0 mm/15 g (EN IEC 60068-2-6)
Shock	30G / 11ms, 3 pos and 3 neg (EN IEC 60068-2-27)
Drop test	2 x 1 m and 100 x 0.5 m (EN IEC 60068-2-31)
Categorization	
Pollution degree	2 (EN IEC 60664, 60664A; EN IEC 60941-1)
Overvoltage category	III (EN IEC 60664; EN IEC 60947-1)
Degree of protection	IP20 (EN IEC 60529; EN IEC 60947-1)
Nema enclosure types	1 (NEMA 250)
Safety (electrical)	
Protection	Reverse polarity
Rated insulation voltage (U _i)	50VDC or 50VAC RMS
Dielectric insulation voltage	≥ 1 kVAC rms (50/60 Hz for 1 min.)
Rated impulse withstand voltage (U _{imp})	≥ 2 kV (1.2/50 μ s) with 500 Ω
EMC immunity standard	EN IEC 60947-5-2 / EN IEC 61000-6-2
EMC immunity test	
Electrostatic discharge	± 8 kV @ air discharge (EN IEC 61000-4-2) ± 4 kV @ contact discharge
Electromagnetic field	80...1000 MHz: 10 V/m (EN IEC 61000-4-3) 1.4...6.0 GHz: 3 V/m
Fast transient/burst	± 2 kV (EN IEC 61000-4-4)
Surge	1 kV (EN IEC 61000-4-5)
Wire-conducted disturbance	10 Vrms (EN IEC 61000-4-6)
Power frequency magnetic field	30 A/m (EN IEC 61000-4-8)
EMC emission standard	EN IEC 60947-5-2
EMC emission test	
Radio frequency disturbance	EN 55011 / CISPR 11 Class A (industrial) group 1 @ 10m: 30 ... 230MHz: 40dB μ V/m 230 ... 1000MHz: 47dB μ V/m

Functions

DIP-switch settings

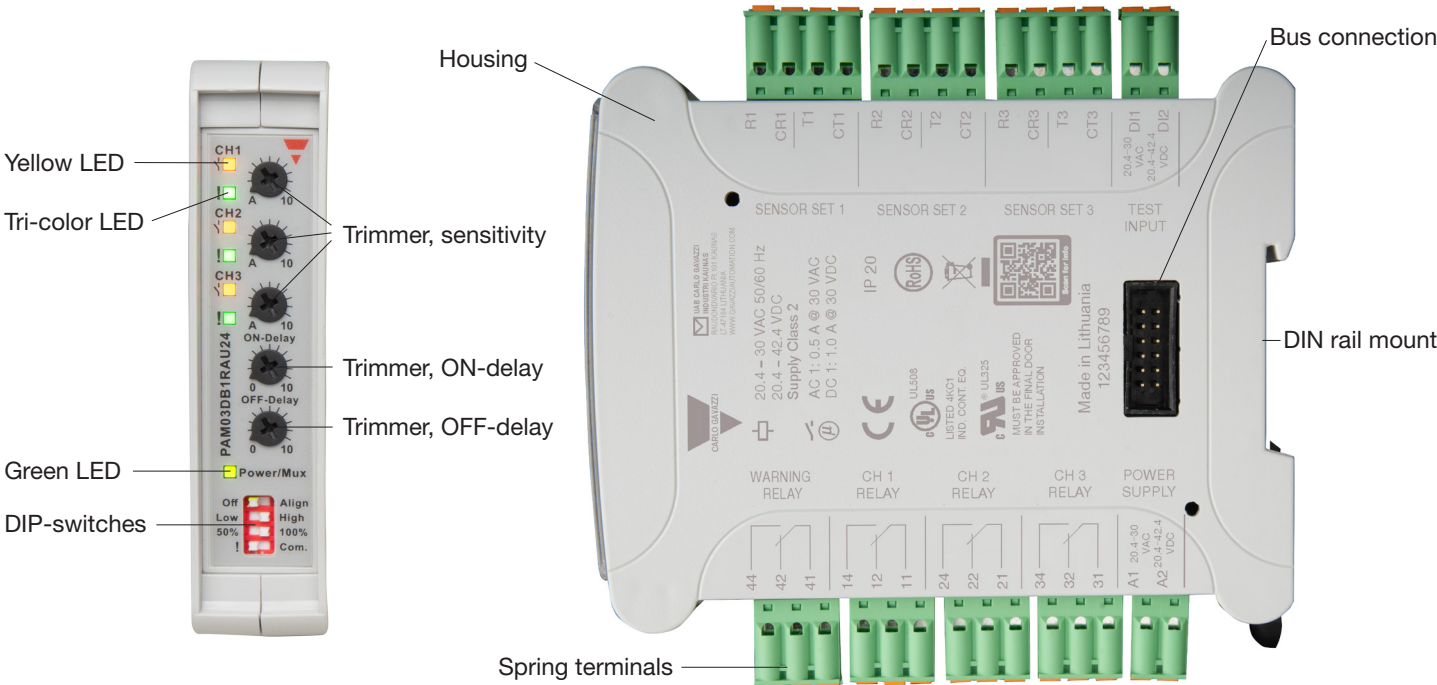


Alignment mode
Excess gain
Sensitivity range
Warning relay

Alignment mode	Off or alignment mode for easy optical sensor alignment.
Excess gain	Low or High dust reserve. Common for CH1 - CH3.
Sensitivity range	50% or 100% of maximum sensitivity range. Common for CH1 - CH3.
Warning relay	• “!” , warning for this specific module only. • “Common”, warning for all connected modules.

Structure

Housing

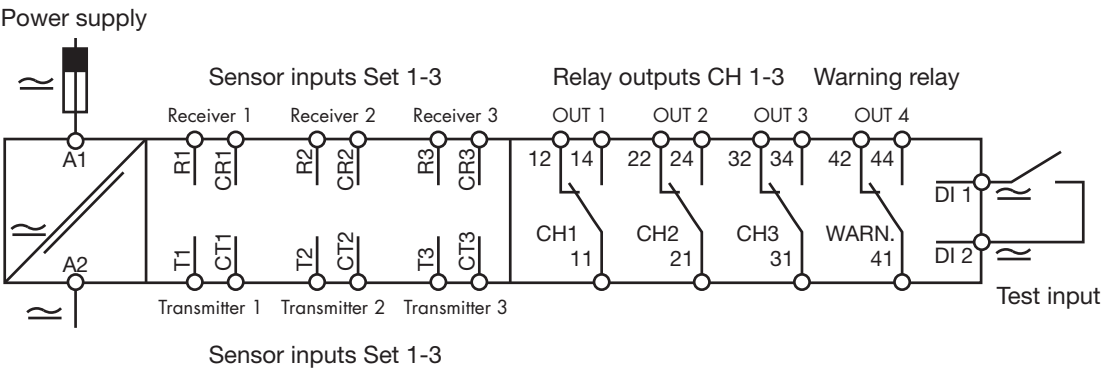
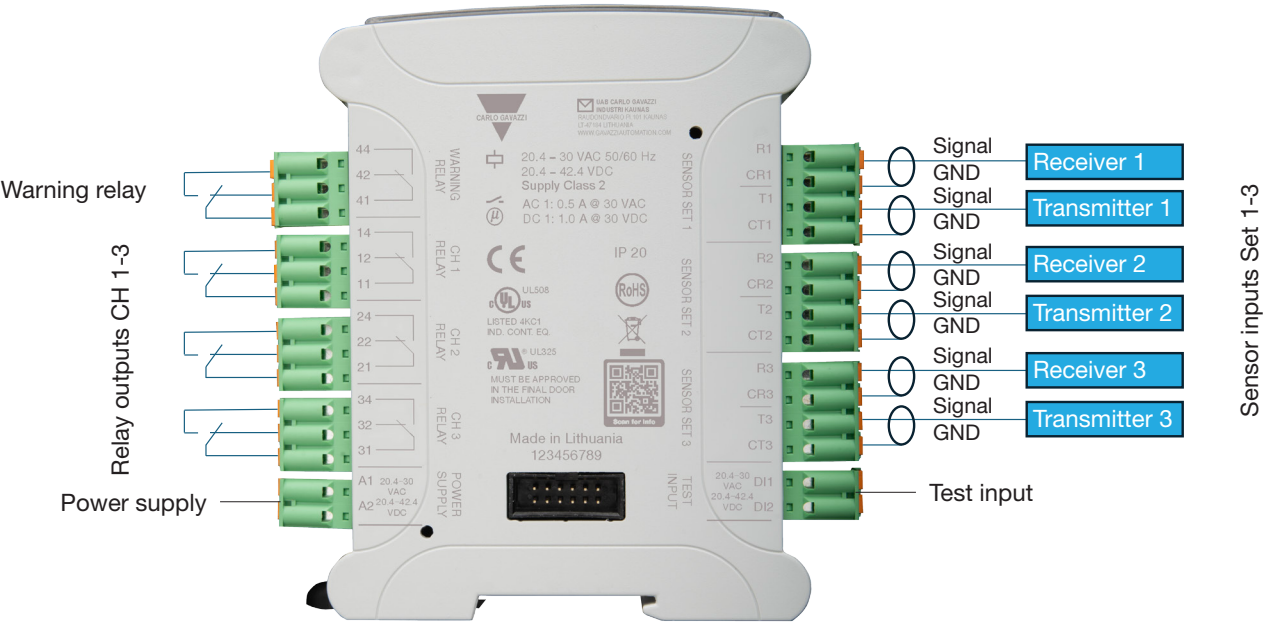


Housing	PC/ABS
Front	PC/ABS
Trimmer shaft	PA
Dimensions	97 x 22.5 x 121 mm (H x W x D) (Without terminal blocks)
Weight	185 g

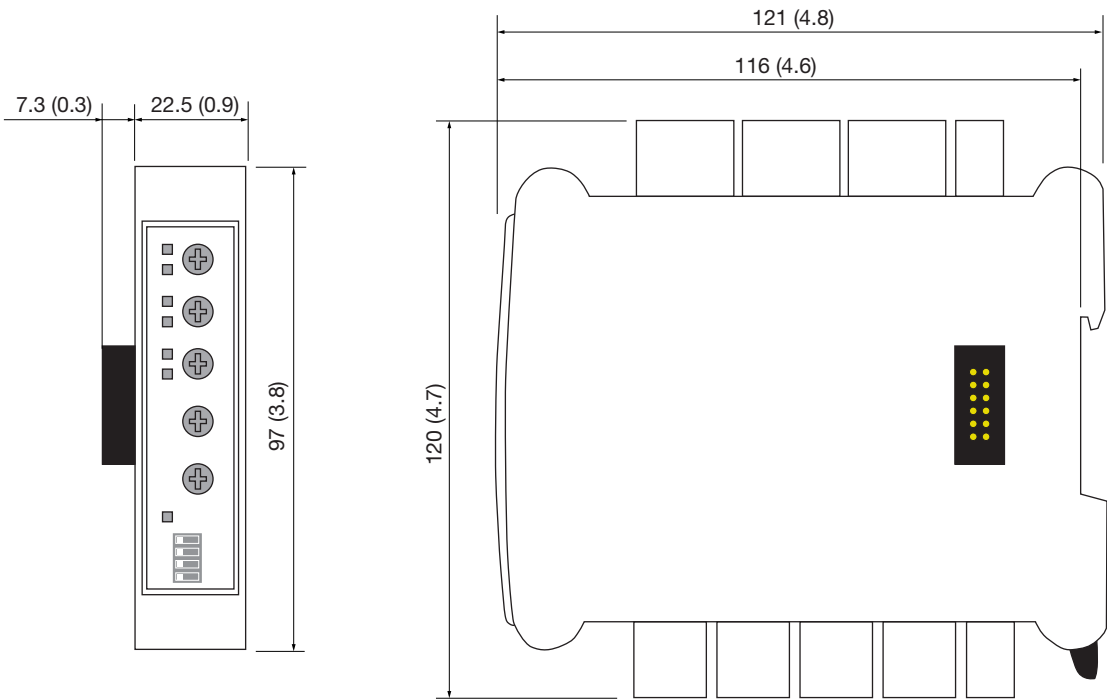
LED indication

Yellow LEDs	Relay output active
Green LED	Power ON or Master/slave function
Tri-colour LEDs	
Green	Channel is in Automatic Sensitivity Adjustment mode
Yellow	Alignment mode. Flashing according to the signal strength
Red	Max. Automatic Sensitivity Adjustment level reached
Yellow and red, alternating	Receiver error
Green and red, alternating	Transmitter error

Connection and wiring



Dimensions in mm (inches)



Compatibility and conformity

Approvals and markings

General reference	Sensor designed according to EN IEC 60947-5-2
MTTF _d related to product lifetime	216.8 years (EN ISO 13849-1, SN 29500)
MTTF _d related to safety device, performance level	1003.7 years
CE-marking	CE
Approvals	 (UL508)  (UL325)
ESPE type	2
Performance level (PL)	d
PFH _d	1.14 x 10 ⁻⁷ error per hour
Mission Time	20 years

Delivery contents and accessories

Delivery contents

- Photoelectric amplifier set: PAM03DB1RAU24
- Accessory bag (Spring terminal blocks 3x4, 4x3, 2x2)
- Packaging: Cardboard box

Accessories

- MOFT... / MOFR... sensors to be purchased separately
- AMO-MB5 mounting bracket

Further information

User manual	http://cga.pub/?5f294c	
MOFT... / MOFR... sensors	http://cga.pub/?effd5	
Mounting brackets	http://cga.pub/?6fa29a	
Carlo Gavazzi website	www.gavazziautomation.com	

Please refer to the user manual for in-depth explanations.