S E R I E S

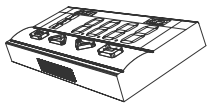
Safety Limiter
1/32 DIN and 1/16 DIN
gammadue® series C1 and M4 lines

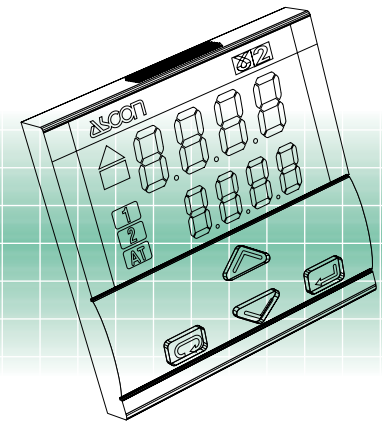
Safety and Reliability in a Small Package

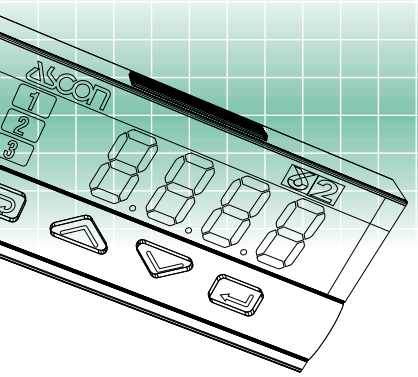
The gammadue® Series C1 and M4 Safety Limiters are microprocessor based instruments used to safely limit temperatures in thermal applications where a runaway condition may compromise operator safety, equipment, or product. C1 and M4 Safety Limiters provide this protection cost effectively and with minimum panel space while providing standard features of IP65 front panel protection and FM approval. Options include a digital input (for remote reset, on M4 only), communications and DIN rail-mounting.

FM APPROVED

CE







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ISO 9001 Certified

gammadue®

the right solution to your needs

Safety limiter solution

In a typical 'High Limit' application the operator sets the limit threshold few degrees below the temperature that would cause an unsafe condition. If that temperature is reached, the Safety Limiter output relay contact opens to shutdown the heat source. The relay will not automatically reset after the temperature goes below the threshold value; the operator must manually either push the "reset" key or a remote reset switch. The Safety Limiter also includes a relay or SSR drive output to actuate a standard second alarm.

Features of the Safety Limiter include:

- Shutdown for High or Low Limit, Upscale or Downscale Burnout and power supply failure;
- Status Retention or Automatic Reset or Manual Reset on Power-On condition;
- Output relay energized under normal conditions;
- Protection against casual adjustment of threshold;
- Dedicated "reset" key and optional digital input for remote reset switch;
- LED for signaling the not acknowledged or acknowledged shutdown condition;
- Reset requires a manual action and is not possible until temperature is below the threshold;
- Approved in accordance with Factory Mutual (FM) Standard Temperature Limit Switches Class 3545.

Features of the standard second alarm output include:

- Absolute, Deviation or Band high/low alarm;
- Sensor break alarm;
- Direct/Reverse action;
- Automatic/Manual Reset;
- Latching;
- Blocking (start-up disabling);
- LED for signaling the alarm status.

The complete operation mode of the safety limiter is detailed in the table that follows:

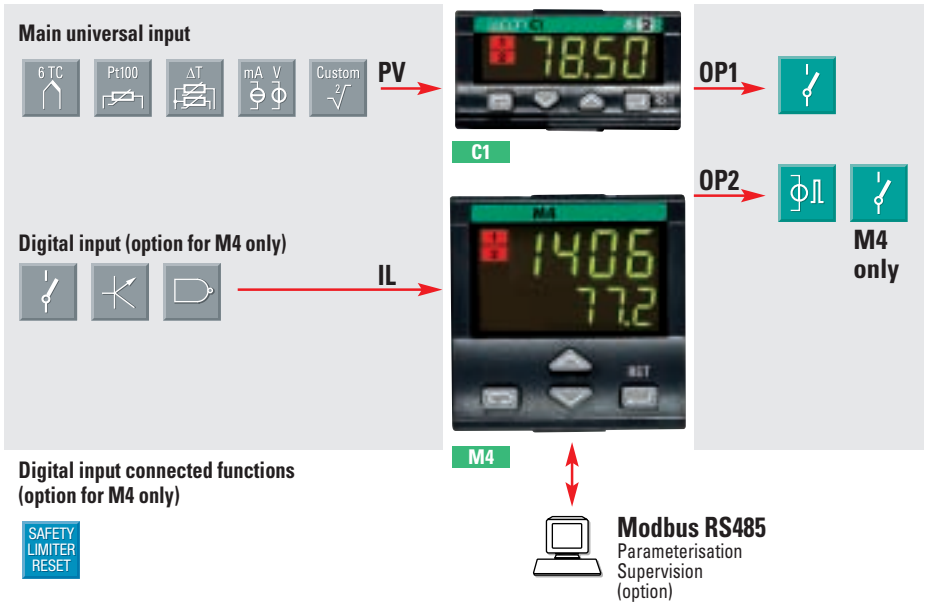
Limiter status	OP1 contact	Led 1	Limiter can change status by:			
Non alarm status	Closed (Relay energized)	OFF	Input condition			
			Non alarm condition	AL1 condition		
			Remains in non alarm status	Transition to non-acknowledged status		
Non-ackowledged status	Open (Relay De-energized)	Flashing			Reset	
					Ack	Non-Ack
					Transition to acknowledged status	Remains in non-acknowledged status
Ackowledged status	Open (Relay De-energized)	Steady ON	Input condition			
			Non alarm condition	AL1 condition		
			Returns to non alarm status	Remains in acknowledged status		

When powered ON, the Limiter alarm (AL1) has three selectable behaviours.
"Automatic Reset". The Limiter status at power ON only depends on the status of the input. If the input is in safe operating range the Limiter automatically enters in the non alarm status. If the input is in the unsafe operating range the Limiter enters in the non-acknowledged alarm status.
"Manual Reset". The Limiter status at power ON is forced to the non-acknowledged alarm status.
"Status retention". The Limiter status at power ON is forced to the same status the Limiter had before power switch OFF as described in the following table.

Limiter Status at previos power OFF	Input AL1 condition at new power ON	Limiter Status at new power ON	OP1 Relay contact	LED 1
Non alarm status (normal operation)	Normal operation	Non Alarm status	Close	Steady OFF
	Alarm condition true	Non Acnknowledged alarm	Open	Flashing
Non Ancknowledged alarm	Normal operation	Ancknowledged alarm	Open	Flashing
	Alarm condition true			
Ancknowledged alarm	Normal operation	Non Alarm status	Close	Steady OFF
	Alarm condition true	Ancknowledged alarm	Open	Steady ON

The behaviour of the second alarm (AL2) is independent from the AL1 Limiter alarm. AL2 status on power ON depends on the status of the input.

Resources



Operating mode

Safety Limiter	Supervisory switch (AL2 alarm)
OP1	OP2

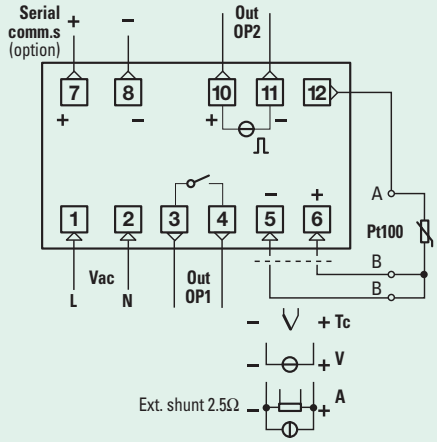
Technical data

Features at env. 25°C	Description			
Total configurability	From keypad or serial communications, the user selects: type of input - associated functions - alarm types and functionality			
PV input (for signal ranges see table 1)	Common characteristics	A/D converter with 50,000 points Update measurement time: 0.2 s Input shift: ±60 digits	Input filter : 1...30 s (OFF= 0)	
	Accuracy	0.25% ±1 digit for temperature sensors 0.1% ±1 digits for mV 0.1% ±1 digits + the accuracy of the external shunt resistor for mA **[1]**	Between 100... 240Vdc error is minimal	
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wire connection	Max. wire Resistance: 20Ω (3 wires) Input drift: 0.35°C/10°C $T_{Env.}$ <0.35°C/10Ω Wire Resist.
	Thermocouple	L,J,T,K,S (IEC 584) °C/°F selectable	Internal cold junction compensation	Max. wire Res.: 150Ω Input drift: <2μV/°C $T_{Env.}$ <5μV/10Ω Wire Resist.
	DC input (current)	0/4...20mA with 2.5Ω ext. shunt Rj > 10MΩ	Engineering units, floating decimal point, Low Range -999...9999 High Range -999...9999 100 digits minimum	Input drift: <0.1%/20°C environmental temperature
	DC input (voltage)	0/10…50mV Rj >10MΩ		
Digital input (M4 only)	The closure of the external contact produces the following action		Reset of OP1 output relay	
Operating modes	Safety limiter with 1 alarm		Limiter AL1 alarm	AL2 alarm
			OP1 - relay	OP2 C1: SSR drive M4: relay or SSR drive
OP1 output (AL1)	SPST relay N.O., 2A/250Vac (4A/120Vac) for resistive load			
OP2 output (AL2)	C1 and M4: SSR drive not isolated: 5Vdc, ±10%, 30mA max. M4: Relay SPST N.O., 2A/250Vac (4A/120Vac) for resistive load			
Limiter AL1 alarm	Hysteresis 0.1…10.0% range			
	Active high / Active low	Absolute threshold, whole range		
AL2 alarm	Hysteresis 0.1…10.0% range			
	Action	Active high / Active low	Action type	Deviation threshold ± range Band threshold 0…range Absolute threshold, whole range
		Special function	Sensor break	
Ser. comm.s (opt.)	RS485 isolated, Modbus/Jbus protocol 1200, 2400, 4800, 9600 bit/s, 2 wires			
Operational safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts display		
	Parameters	A non volatile memory stores for unlimited time all the parameters and configuration values		
	Password	Protection of casual changes of limiter threshold and access to instrument configuration		
General characteristics	Power supply	100...240Vac (-15%/+10%), 50/60Hz; 24Vac (-25%/+12%), 50/60Hz; 24Vdc (-15%/+25%). Power consumption 2,6W max.		
	Safety	Compliance EN61010-1 (IEC 1010-1), installation class 2 (2,5kV), pollution class 2, class II instrument		
	Electromagnetic compatibility	Compliance to the CE standards for industrial system and equipment		
	Protection EN60529 (IEC 529)	IP65 front panel		
	Overall dimensions	C1	$^1/_{32}$DIN - 48 x 24, depth 120 mm, weight 100g approx.	
			Panel cut-out: $45^{+0.6}$ x $22^{+0.3}$ mm	
		M4	$^1/_{16}$DIN - 48 x 48, depth 120 mm, weight 130g approx.	
			Panel cut-out: $45^{+0.6}$ x $45^{+0.6}$ mm	
	Operating conditions	Temperature: 0...55°C		
		Relative Humidity: 5...95% non-condensating		
	Approvals	Factory Mutual Class 3545		

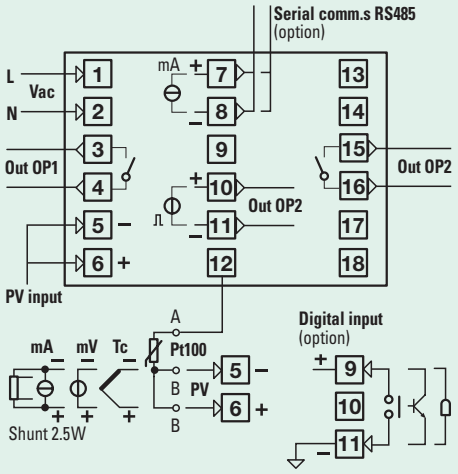
Input type	Scale range
RTD Pt100Ω at 0°C	-99.9…300.0 °C -99.9…572.0 °F -200…600 °C -328…1112 °F
T/C type L Fe-Const.	0…600 °C 32…1112 °F
T/C type J Fe-Cu 45% Ni	0…600 °C 32…1112 °F
T/C type T Cu - CuNi	-200…400 °C -328…752 °F
T/C type K Chromel Alumel	0…1200 °C 32…2192 °F
T/C type S Pt10%Rh-Pt	0…1600 °C 32…2912 °F
0/4…20 mA	Configurable engineering units mA, mV, V, bar, psi, Rh, ph
0/10…50 mV	
mV Custom scale	On request

Table 1 : PV input

C1 Electrical wirings



M4 Electrical wirings



Note:

1] Standard shunt resistor without field calibration will provide: 1.10% input accuracy for 0/4... 20mA input. High accuracy shunt resistor without field calibration will provide: 0.20% input accuracy for 0/4... 20mA input. Both shunt resistors with field calibration will provide 0.10% input accuracy for 0/4... 20mA input.

8 2
S E R I E S

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Ordering codes

	Line	Basic model					Accessories			
Model:	C1	A	0	C	0	–	9	F	G	H

Power supply
Serial communications
Mounting
Instruction handbook
Colour

Line	C 1

Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V– (-15% +25%)	5

Serial communications	C
Not fitted	0
RS485 Modbus/Jbus protocol	5

Instruction handbook	F
Italian-English (std)	0
French-English	1
German-English	2
Spanish-English	3

Front case colour	0/4... 20 mA Input Shunt Resistor	G
Dark grey (std)	Standard resistor	0
Beige	Standard resistor	1
Dark grey (std)	High accuracy resistor	2
Beige	High accuracy resistor	3

Mounting	H
Panel Mounting	0
DIN Rail Mounting	1

If not differently specified the controller will be supplied with standard version
Model: C1 3000-9000

	Line	Basic model					Accessories			
Model:	M4	A	0	C	0	–	9	F	G	H

Power supply
Serial communications
Mounting
Instruction handbook
Colour

Line	M 4

Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V– (-15% +25%)	5

Serial communications/Options	C
Not fitted	0
RS485 Modbus/Jbus protocol	5
Digital Input	9

Instruction handbook	F
Italian-English (std)	0
French-English	1
German-English	2
Spanish-English	3

Front case colour	0/4... 20 mA Input Shunt Resistor	G
Dark grey (std)	Standard resistor	0
Beige	Standard resistor	1
Dark grey (std)	High accuracy resistor	2
Beige	High accuracy resistor	3

Mounting	H
Panel Mounting	0
DIN Rail Mounting	1

If not differently specified the controller will be supplied with standard version
Model: M4 3000-9000