

# Configurable Multi-Input Controller

## 1/16 DIN - 48 x 48 mm

### MS line

This is a miniature controller with very innovative features. Total configurability permits selection of input, output, alarm and operation modes directly from keyboard, thus allowing for maximum flexibility of use. A serial communication enables to interface to a computer.

- **Accuracy:** 0,2
- **Input:** configurable (Pt 100, J, L, K, S, mA, Volt)
- **Control Mode:** On-Off o PID
- **Auto-tuning:** for automatic adjustment of optimum control parameters
- **Main output:** configurable. Logic or relay, single or dual
- **Auxiliary output:** with relay, configurable
- **Indication:** simultaneous display of measurement and Set point
- **Access to parameters:** on 3 different levels for: modification, display only and no-access.
- **Loop Break Alarm**
- **Power supply:** 100...240 Vac switching type, or 24 Vac and 24 Vdc

- **Auxiliary power supply for external transmitter:** 24 Vdc
- **Front protection:** IP54 standard, IP65 with optional front panel gasket
- **Front withdrawable**
- **Dimensions:** 48 x 48 DIN, depth 110

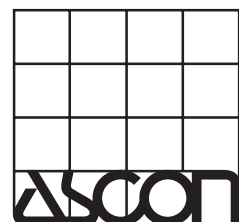
Option:

- **Serial communication**



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Certified ISO 9001



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# MS Series 1/16 DIN Controller

Selectable T/C, RTD,  
Current or Voltage Input  
Relay and Logic output  
Dual output for heat/cool control  
Auto tune on demand  
and ... Serial Communications

## Serial communications

Configurable protocol and access to all controller parameters for working in a distributed control network.

## Maximum protection

High immunity to electrical noises. Three security levels of access to parameters to avoid tampering. IP 54 or IP 65 front protection.

Display of measurement or parameter values

Display of Set point or mnemonic parameter codes

Single power supply  
100 to 240 Vac

24 Vdc power supply  
for transmitter

## Auto tuning

For simple and quick optimisation of control parameters.

Main output "On"

Auxiliary output "On"

## Total configurability from keyboard

Configurable from keyboard using a 4 figure code. Besides, it is very easy to reconfigure the controller on field to meet changing requirements.



Very small but... very smart  
and easy to use.

# Technical data

## INPUT X

### Common features

- A/D Converter: 30,000 points
- Measurement sampling time: 0.5 sec.
- Safety: measurement outside of the scale range or a failure on the input line (interruption or short circuiting) is displayed and imposes on output Y1 the safety state pre-selected during the configuration phase.
- For voltage supply variations from 100 to 240 Vac, the measurement error is irrelevant.

### Thermocouples

- Cold junction incorporated
- Line resistance: 150Ω max
- Measurement accuracy: 0.2% ± 1°C at 25°C ambient temp.
- Measurement drift: < 2μV/°C ambient temperature < 5μV/10Ω line resistance

### RTD Pt100

- 2 or 3-wire connection
- Line resistance: 20Ω max for 3-wire connection
- Measurement accuracy: 0.2% at 25°C ambient temperature
- Measurement drift: < 0.1°C/10°C ambient temperature < 0.5°C/10Ω line resistance (3 wire)

### DC current and voltage

- Input resistance: with current input: 20Ω with voltage input: 10kΩ
- Measurement accuracy: 0.1% at 25°C ambient temperature
- Measurement drift: < 0.1%/20°C ambient temperature

## MAIN OUTPUT Y1

### With Relay

1 NO contact 3A/250 Vac max rating

### Logic voltage

0/18 Vdc ± 20%, 20 mA max, suitable for driving solid state relays.

### Dual for Heat-Cool

The auxiliary output Y2 may be used for the cooling action

## AUXILIARY OUTPUT Y2

- Output: 1 NO contact, isolated, 3A/250 Vac
- Hysteresis: 0.1 to 10% of scale span

The following can be configured:

- The control mode: Active high or Active low (that is relay energised above or under the threshold)
- The type of Set point Deviation: from -300 to +300 display steps Band: from 0 to 300 display steps Independent: within the scale span

### Note

The operation of Y2 configured as Band alarm with inhibited startup is illustrated in fig. 1.

## CONTROL

The main control algorithm features PID, PI, PD, P action or On-Off.

### Common parameters:

- Proportional band: 0.5 to 500%
- Integral action time: 0.1 to 100 minutes, excludable
- Derivative action time: 0.01 to 10 minutes, excludable
- Maximum output Y1: 10 to 100%
- Cycle time: 1 to 200 sec.

### For On-Off control with hysteresis

- Hysteresis from 0.1 to 10%

### For Heat/Cool

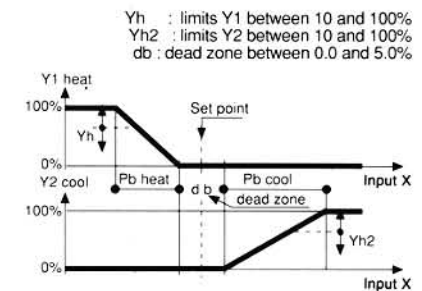
The proportional band, cycle time and maximum output can be set separately for the 2 Heat and Cool channels.

- Neutral zone between the two actions: 0.0 to 5% (see fig. 1)
- Relative cooling gain: from 0,1 to 3,0 (in respect of heating)

Fig.1: Y2 auxiliary output

### Dual output action (Heat-Cool)

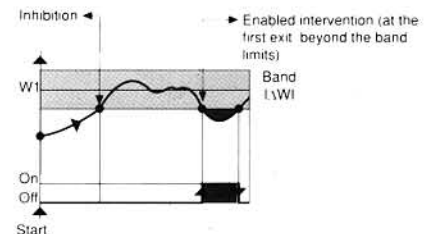
With Y1 configured for reverse action and Y2 configured for Heat-Cool operation



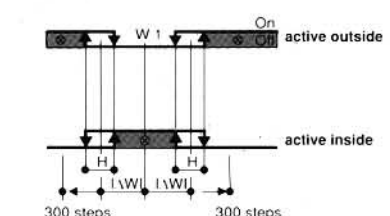
With  $c.c.r.$  = relative gain of cool action from 0.1 to 3.0

$$Pb\ cool = \frac{Pb\ heat}{c.c.r.}$$

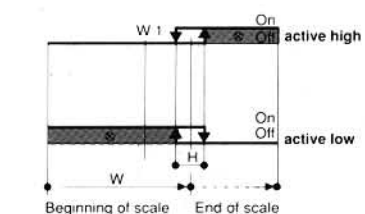
### Band with inhibition



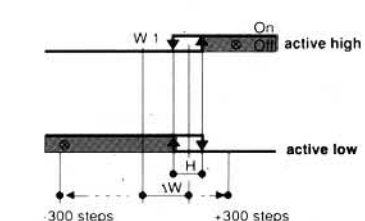
### Band ΔW



### Independent W



### Deviation ΔW



The Setting range of Y2 is not limited by the limits of the main Set point W1 but only by the scale span

# Connections and overall dimensions

## SET POINT SLOPE

The Set point slope in passing from a value to another can be set (separately for ascent and descent) from 0,1 to 100,0 digit/minute or as a normal step change.

## POWER SUPPLY FOR TRANSMITTER

- To supply a 2-wire 4...20 mA transmitter or a 3-wire 24 Vdc transmitter

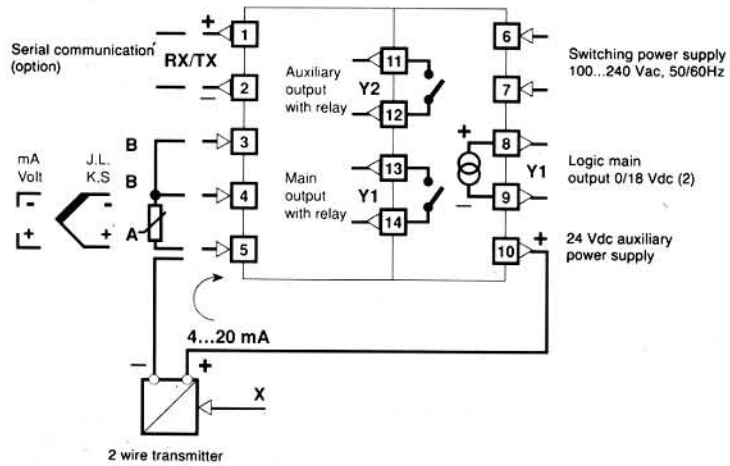
## SERIAL COMMUNICATION

- Interface with RS232C, RS422A or RS485 port by means of a traffic concentrator, type ALS for 64 controllers max
- Passive isolated interface
- Number of addressable channels: 64 max
- Dialogue: asynchronous, half-duplex
- Message length: 5 characters in transmission and 6 or 10 in reception
- Character length: 10 bits (7 of which represent the ASCII character)
- Baud rate configurable between: 600, 1200, 2400, 4800 or 9600 (only for Modbus/Jbus) Bits/s
- Programmable parity: even, odd or excluded
- Check sum: may be inserted for further check of received-transmitted message

## GENERAL DATA

- Power supply: 100...240 V, 48...63 Hz or 18...28 Vac, 50/60 Hz or 20...30 Vdc, 3 VA max
- Isolation class: C according to VDE 0110
- Climatic group: KWF according to DIN 40040
- Ambient operating temperature: 0 to 55°C
- Protection according to DIN 40050 front panel: IP54 case: IP30 terminal board: IP20 case self-extinguishing material UL 94-V1
- Weight: about 0.2 kg
- Dimensions: 48 x 48, depth 110 mm

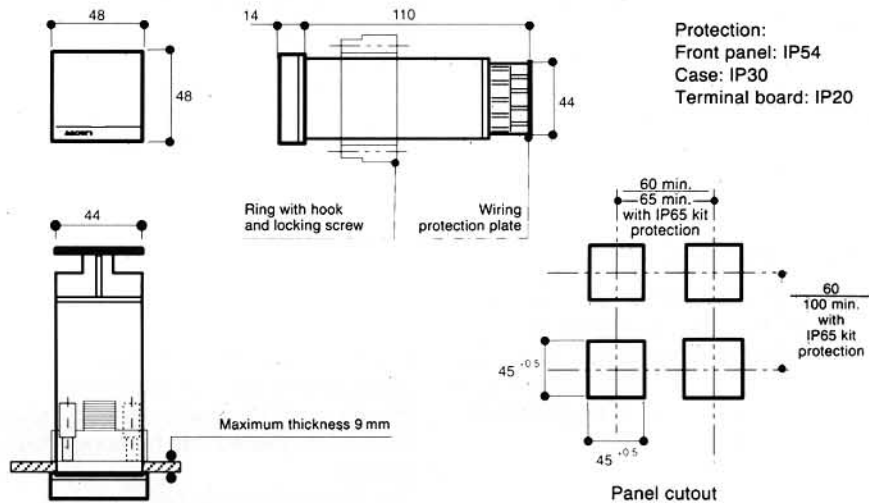
## CONNECTIONS



### Notes:

- To connect a 2-wire RTD Pt100, link terminals [3] and [4]
- To supply 3 or 4-wire transmitters, use terminals [10] + and [4]-
- The main output Y1 may be chosen between the two simultaneously available: "Relay" between terminals [13] and [14] or Logic voltage between terminals [8] and [9].

## DIMENSIONS



Protection:  
Front panel: IP54  
Case: IP30  
Terminal board: IP20

# General description

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## INPUT

Suitable for use with usual temperature probes (thermocouples J, L, K, S and RTD Pt100), and normalised signals (mA or Volt).

The sensor type and range are user-configurable from the front panel or via the optional serial communications port. All ranges are fully calibrated, which means the user can change quickly and easily from one sensor type to another.

## MAIN OUTPUT

The main output is with relay (3A/250 Vac) and logic voltage (0/18 Vdc). They are both contemporary available. It may be configured for direct or reverse action and for heat-cool action.

## AUXILIARY OUTPUT

Auxiliary output is with relay (3A/250 Vac) and its action is configurable from keyboard.

The action mode (active High/Low) and type of Set point (deviation, band, or independent) can be programmed. It can also be configured as band alarm with "startup inhibition", to avoid undesirable actions in the starting phase.

## LOOP BREAK ALARM

The auxiliary output may also be used as "Loop Break Alarm" function to signal control loop failure or interruption.

Simultaneous flashing of all controller displays signals the alarm.

## CONTROL

The P, I and D actions are continuously adjustable over a wide range. Setting a simple On-Off action with adjustable hysteresis is also possible.

## AUTOMATIC TUNING

Automatic tuning for computation and automatic set of PID optimum parameters in the starting phase, or when the Set point is changed, or in normal conditions whenever deemed necessary by the operator. Enabled on

the operator's request, it disconnects automatically at the end of the operation (One shot).

## SERIAL COMMUNICATION

This is an option. It permits insertion of the controller into a distributed control system.

A traffic concentrator permits connection of up to 64 controllers to a single serial line of type RS232 or RS422 or RS485, communicating with each one individually, thus creating a data transmission network permitting complete isolation of each instrument and guaranteeing service continuity, also in the event of some instruments being removed from their case.

## CONFIGURATION

Configuration may be carried out via a serial line using a personal computer, or simply from the instrument front keyboard.

The configuration code is viewed on the measurement display. If the instrument is not configured, the figure 9999 appear, with direct access to configuration. If the instrument is already configured, the configuration indexes are shown on the display, and the secret code must be introduced in order to modify it.

## ACCESS TO PARAMETERS

In order to avoid tampering by unauthorized staff, or inadvertent alterations of parameter values, these have been divided into homogeneous groups.

The "level of accessibility" can be configured for each group as follows:

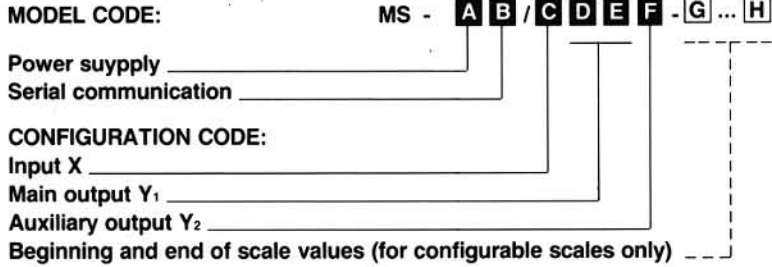
- 1st level: visible and modifiable parameters
- 2nd level: visible but non-alterable parameters
- 3rd level: hidden and therefore non alterable parameters operating with the preset values but not appearing on call from keyboard.

Configurability of the level of accessibility, combined with a secret code (Password) makes the instrument safer and at the same time easier to use for the final operator.

## PROTECTION

All parameters and configuration values are stored in a non volatile memory for an unlimited period of time. In the parameter setting phase, the following can be established: upper and lower limits of the Set point, an upper limit for the main output, a standby value for the main output to be activated in case of input signal failure. Furthermore, circuit protections give this controller a degree of immunity to electrical disturbances higher than the maximum level (IV) considered by standard IEC 801-4 for heavy industrial environments.

# Models and configurations



**MODEL CODE:**

Power supply	A
100...240 V 50/60 Hz	3
18...28 V 50/60 Hz or 20...30 Vdc	5

Serial communications	B
None	0
20 mA C.L. Ascon std. protocol	1
20 mA C.L. Modbus/Jbus protocol	2

**CONFIGURATION CODE: (1)**

Input type, scale range (2)		C
RTD IEC 751	Pt100 -200...600°C	0
	Pt100 -99,9...300,0°C	1
Thermocouple IEC 584	J 0...600°C	2
	L 0...600°C	3
	K 0...1200°C	4
	S 0...1600°C	5
4...20 mA	Conf. eng. units	6
0...20 mA	Conf. eng. units	7
0...1 Vdc	Conf. eng. units	8
0...10 Vdc	Conf. eng. units	9

Output type Y <sub>1</sub>	D
Relay 3A/250 Vac	0
Logic 0/18 Vdc	1

Type of action and safety state Y <sub>1</sub>		E
On-Off	Reverse Safety 0%	0
	Direct Safety 0%	1
	Reverse Safety 100%	2
	Direct Safety 100%	3
P.I.D.	Reverse Safety 0%	4
	Direct Safety 0%	5
	Reverse Safety 100%	6
	Direct Safety 100%	7
	Reverse Safety -100% (3)	8
Direct Safety -100% (3)	9	

Type of Set point and control mode output Y <sub>2</sub>		F
Disabled		0
Heat-Cool		1
Band with startup inhib.	Active outside	2
	Active inside	3
Band	Active outside	4
	Active high	5
Independent	Active low	6
	Active high	7
Deviation	Active high	7
	Active low	8
Loop Break Alarm		9

## Notes on configuration

1 - To receive a non-configured instrument, indicate code **9999**.

2 - For mA and Volts inputs, the beginning and end of scale values can be configured in engineering units between -999 and 9999. The minimum scale span is 100 steps.

The values can be expressed in units (xxxx), in tenths (xxx.x), hundredths (xx.xx), or thousandths (x.xxx). Lacking the indication of beginning and end of scale values, the instrument will be supplied with 0.0...100.0 scale.

3 - Only for Heat-Cool action (F = 1).

## Ordering examples:

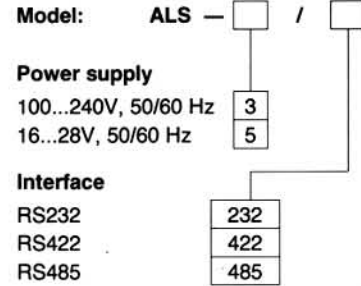
**MS-30/4107**  
defined configuration

**MS-31/6109/-50,0...150,0**  
configuration with scale in engineering units

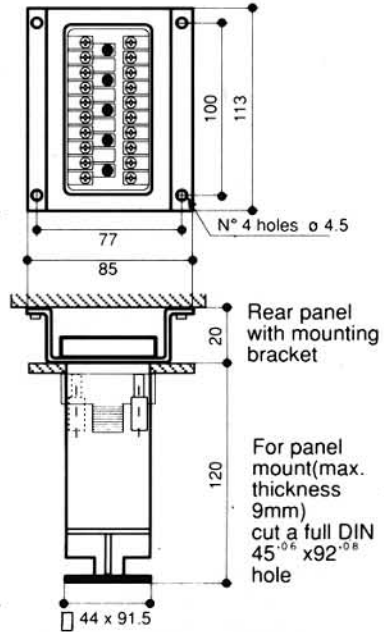
**MS-31/9999**  
not configured

## ACCESSORIES

- **SERIAL COMMUNICATION INTERFACE** for 64 ASCON controllers



## Panel or rear panel mount



- **FRONT PROTECTION KIT IP65:** mod. F10-141-1AMS

