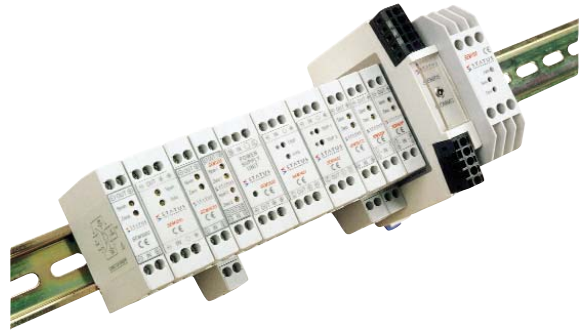


# PROCESS SIGNAL ISOLATORS

## SEM1000 SERIES

- 10 YEAR WARRANTY
- HIGH ACCURACY / 0.05 %
- SMALL SIZE / HIGH PACKING DENSITY
- INPUT AND OUTPUT POWER VERSION
- SIGNAL SPLITTING VERSION
- LOOP BOOSTERS FROM A SINGLE SUPPLY



### INTRODUCTION

The SEM1000 series of loop powered analogue signal isolators comprises versions that are suitable for most applications, regardless of whether the loop power is available at the input or output side of the isolator. There is also a loop 'splitter' which produces two completely isolated outputs from a single input.

Various special applications can be realised such as loop boosting and driving into  $900 \Omega$  from a barrier protected IS circuit, using the SEM1020 low cost version.

The small size of the SEM1000 series enables many more units to now be installed in the same physical space. Their high accuracy permits the addition of isolation to systems without significantly degrading the overall system performance. The zero and span adjustment potentiometers can be used to remove any system errors.

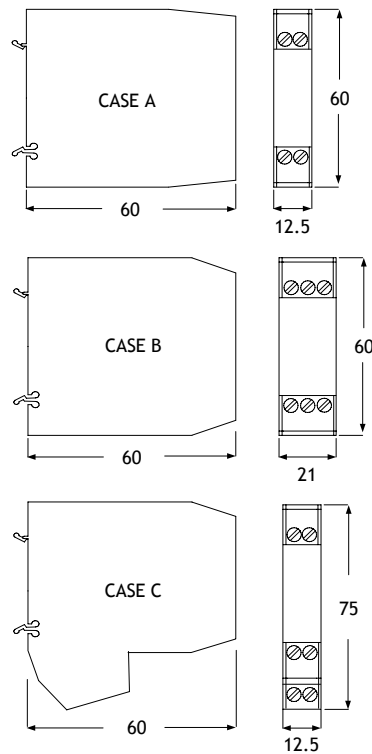
### SPECIFICATIONS @ 20 °C

<b>GENERAL</b>	
Isolation	1000 VAC RMS (Flash tested to 3 KV)
Accuracy	0.05 % (Including hysteresis and linearity)
Stability	0.01 %/°C
Ambient	(0 to 70) °C; (10 to 95) % RH non-condensing
Time Constant	0.1 s (to 63 % of final value)
Cable Size	4 mm <sup>2</sup> Solid/2.5 mm <sup>2</sup> Stranded
Material	Polyamide (Grey)
Flammability	To UL94-VO VDE 0304 Part 3 Level IIIA
Mounting	Top Hat rail to DIN EN 50022-35
Adjustments	Front entry Zero and Span potentiometers

<b>APPROVALS</b>	
EMC	BS EN61326

### MECHANICAL DETAILS

(All dimensions in mm)



# PROCESS SIGNAL ISOLATORS

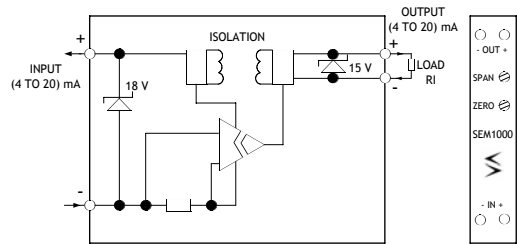
## SEM1000 SERIES

### SEM1000

The SEM1000 is designed to be inserted in an existing (4 to 20) mA loop and provides an isolated (4 to 20) mA signal driving into a load up to 500 Ω.

Loop volt drop = 5 V Typical 5.5 V maximum (plus load)

If output load = 250 Ω Volt Drop = 5 + (0.02 + 250 Ω) = 10 V.

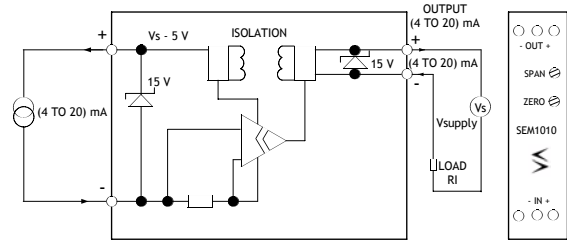


### SEM1010

The SEM1010 provides isolated power for a field transmitter from the (4 to 20) mA output. It requires a single DC power supply (Vs) on the output.

$$(\text{Max Load } R1) = \frac{V_s - 5 - T \times V}{20} \text{ K } \Omega$$

Vs is 24 V nominal or 30 maximum Loop volt drop @ 24 V = 5 V.



### SEM1015

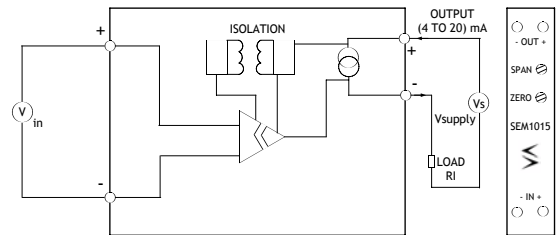
This series provides an isolated (4 to 20) mA output from a voltage input. They require a single DC power supply (Vs) on the output.

$$(\text{Maximum Load } R1) = \frac{V_s - 8}{20} \text{ K } \Omega$$

Vs is 24 V nominal or 30 maximum.

SEM1015 Vin = (± 0.1 to 100) V (user selectable).

(\*NOTE: current inputs can be monitored by use of external resistors).

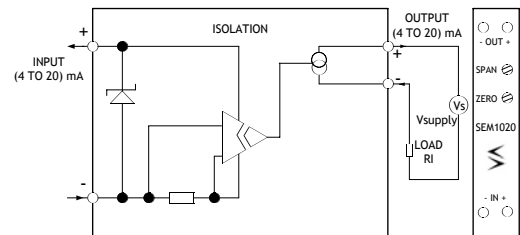


### SEM1020

The SEM1020 is a low cost isolator that requires power on both sides of the isolation barrier. This must of course be provided by two supplies isolated from each other to maintain isolation.

Loop volt drop = 2.7 V      Load R1 = 900 Ω @ Vs = 24 V  
 Load R1 = 1200 Ω @ Vs = 30 V

Vs is 24 V nominal or 30 maximum.



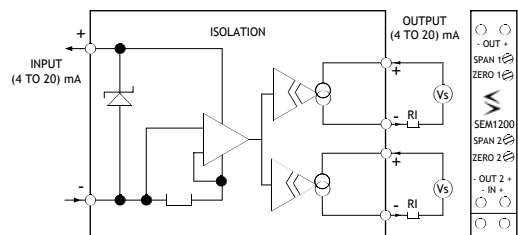
### SEM1200

The SEM1200 is an isolator that provides two isolated (4 to 20) mA outputs from a single (4 to 20) mA input. It requires power for all loops.

Loop volt drop = 5 V      Load R1 = 900 Ω @ Vs = 24 V  
 Load R1 = 1200 Ω @ Vs = 30 V

Loads must be > 250 R for ambients > 50 °C  
 Vs 30 V max

(For best stability keep max volt drop across outputs to < 15 V).

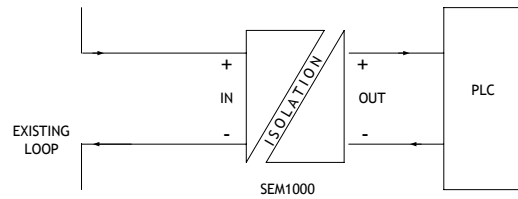


# PROCESS SIGNAL ISOLATORS

## APPLICATIONS

### SEM1000 - ISOLATING INPUTS INTO A PLC

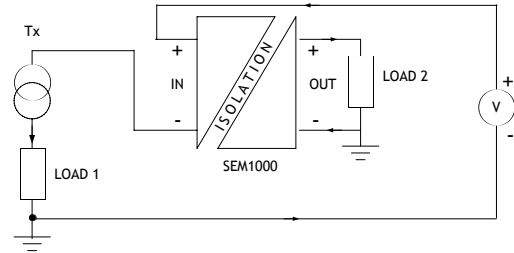
PLC's or similar systems often have high level non-isolated inputs. Inserting the SEM1000 into an existing powered (4 to 20) mA loop provides a simple low cost means of providing complete signal isolation. Use a resistor in the output loop to provide a voltage signal.



### SEM1000 - DRIVING TWO EARTHED LOOPS

A field transmitter and control room device can often have different earths. Inserting the SEM1000 into the loop enables both earths to be connected to the signal lines without the introduction of earth loops.

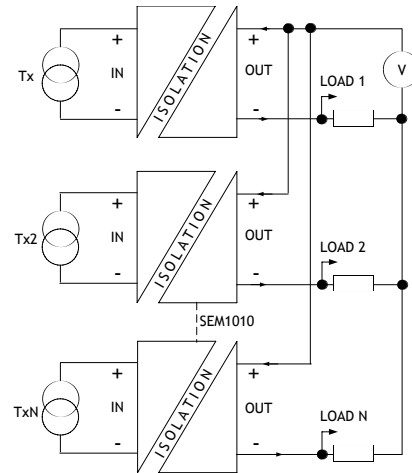
Inserting the SEM1000 into the loop enables both earths to be connected to the signal lines without the introduction of earth loops.



### SEM1010 - A SYSTEM WITH MULTIPLE INPUTS

Many systems have a number of inputs that require isolation. Using conventional isolators, a separate power supply is required for each loop in order to completely isolate each input from each other.

By using the SEM1010 a single power supply at the system side produces a separate isolated power supply for each field transmitter as well as isolating and repeating the transmitter signal.

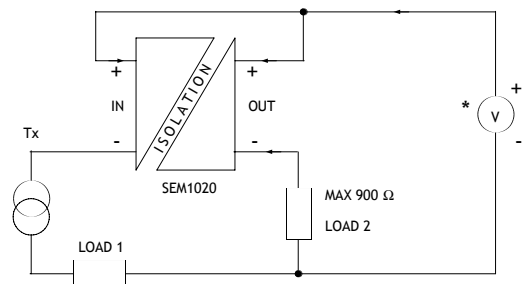


### SEM1020 - LOOP BOOSTING (NON-ISOLATED)

In certain applications there can be a number of devices in a loop, each requiring some volts from the loop. Often there is a requirement for more volts than the loop can supply.

By using the SEM1020 low cost isolator, connected as shown, an additional load up to 900  $\Omega$  can be driven from a single 24 V supply.

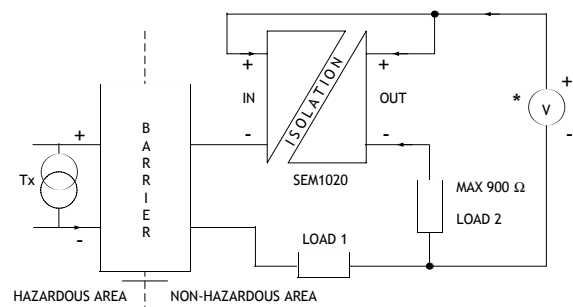
\*NOTE: Input and output loads can be driven from separate supplies to maintain isolation.



### SEM1020 - UP TO 900 $\Omega$ DRIVE FROM IS CIRCUITS

When field transmitters are in hazardous areas, they are normally protected by the inclusion of a zener barrier. Zener barriers have a typical series resistance of approximately 300  $\Omega$  and so it can be difficult on occasions to provide sufficient drive capability for several safe area devices.

The SEM1020 provides an economic means of creating an additional drive capability, of up to 900  $\Omega$ , from a single 24 V supply.



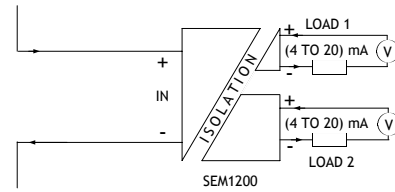
# PROCESS SIGNAL ISOLATORS

## SEM1200 - SIGNAL SPLITTING

In modern control systems there are frequent requirements to send a common signal from a field transmitter to two different pieces of equipment e.g. a control system and a recorder.

Because of earth loop effects or because the designer wants to ensure that any fault at the recorder has no effect on the control system, both signals should be isolated from each other.

The SEM1200 is designed to satisfy this requirement, taking a single (4 to 20) mA loop and providing two identical isolated (4 to 20) mA outputs.

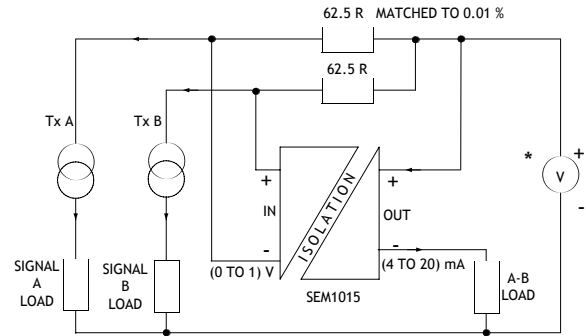


## SEM1015 SUBTRACTOR (NON-ISOLATED)

It is a frequent requirement to provide a different output from two (4 to 20) mA transmitters. The circuit shown enables each transmitter to be used independently and at the same time produce a (4 to 20) mA output signal proportional to the difference between the two signals.

$$(4 \text{ to } 20) \text{ mA} = A - B$$

\*NOTE: Input and output loads can be driven from separate supplies to maintain isolation.

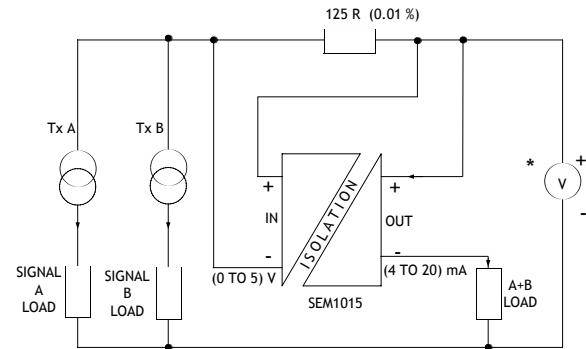


## SEM1015 - ADDER (NON-ISOLATED)

In a similar way to the Subtractor outlined above, the adder circuit enables the outputs from two (4 to 20) mA transmitters to be used independently whilst providing an isolated output proportional to the sum of the two signals.

$$(4 \text{ to } 20) \text{ mA} = A + B$$

NOTE: Input and output loads can be driven from separate supplies to maintain isolation.



## ORDER CODE

	INPUT	OUTPUT	CASE	POWER REQUIREMENTS	NOTES
SEM1000	(4 to 20) mA	(4 to 20) mA	A	INPUT	Replaces SEM100
SEM1010	(4 to 200) mA	(4 to 20) mA	B	OUTPUT	Replaces SEM101
SEM1015	(± 0.1 to 100) V	(4 to 20) mA	A	OUTPUT	Voltage to current conversion
SEM1020	(4 to 20) mA	(4 to 20) m	A	INPUT & OUTPUT	Low cost
SEM1200	(4 to 20) mA	(4 to 20) mA (4 to 20) mA	C	INPUT & OUTPUT	1 x input, 2 x outputs

### ALSO AVAILABLE: DIN RAIL PRODUCTS

SEM1100  
SEM1401/2  
SEM1300  
SEM1500

MAINS POWERED PROCESS ISOLATOR/CONVERTOR  
LOOP POWERED TRIP AMPLIFIERS  
24 V POWER SUPPLY (90 TO 240) VAC INPUT  
Pt100 & TC SIGNAL CONDITIONERS