

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

- **DUAL OR SINGLE UNIVERSAL FREQUENCY INPUTS SENSOR EXCITATION**
- **FREQUENCY (0.1 to 65000) Hz COUNTER (DC to 1000) Hz**
- **RATE, TOTALISE, K FACTOR, M FACTOR, MATHS**
- **RELAY OUTPUT**
- **USB PC CONFIGURATION, ANDROID VIEW**
- **INTRODUCTION**

The product is a cost effective “smart” powered conditioner that accepts all common process pulse signals with a frequency range between (0.1 to 65000) Hz in standard configuration and (DC to 1000) Hz in counter mode. Typical applications would be to measure flow or batch counting. The product has a built-in capability to operate as a dual input which allows differential flow/count measurement with advanced maths functions. Or as a single channel input, with an external reset contact.

When operated in signal channel mode, the discrete input can be programmed to reset the total counter, batch counter or latched relay. The input can also be programmed to control the total counter direction with a combination of count-up, count-down or halt modes available.

## ➤ **FEATURE HIGHLIGHTS**

### **THREE OPERATING MODES**

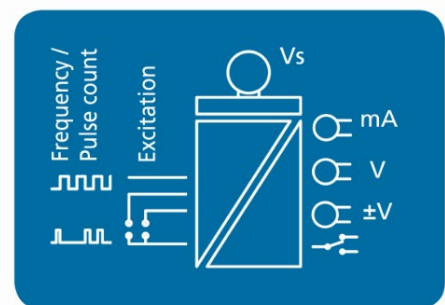
- Basic frequency mode to process signal mode, analogue + relay outputs.
- Advanced frequency mode with K factor, M factor, totalise, rate, maths functions, process signal, 12-point user linearisation for channel A using meter correction, analogue + relay outputs.
- Pulse counter mode with K factor, totalise, maths functions, process signal, analogue + relay outputs.

**USB CONFIGURATION** The product uses a built-in USB port for configuration, together with a simple to use, free menu-driven software configuration tool, allowing the user to take advantage of the products' comprehensive specification.

**ANALOGUE OUTPUT** The output stage offers either voltage, bipolar voltage or active/passive current re-transmission signals. The output signal can be ranged to a scale anywhere within the process range.

**RELAY OUTPUT** A volt free output contact is provided capable of operating as either a trip relay, latched relay or pulsed relay. High and low-level relay functions are also available. Trip options on rate, count, totalize or maths functions.

**SIGNAL RETRANSMISSION SCALING** The input signal range for retransmission can be selected from any part of the maximum input capability. The output signal range can be selected from any part of the total output capability, for example (0 to 12) litres per minute input to (1 to 5) mA output.



### **USB PC CONFIGURATION**

The SEM1600F is quick and easy to configure using a standard-type USB lead and the free-of-charge USBSpeedLink Windows software.

**USB ANDROID VIEW** The SEM1600F can be connected to an Android phone or tablet using an OTG USB adaptor. Running a free App the Android device can then be used to view live data from the SEM1600F

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

| ELECTRICAL INPUT<br>Channel A, Channel B                                                                                                                                                |                                                  | SPECIFICATIONS @20°C                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------|
| Type                                                                                                                                                                                    | Range                                            | Accuracy/Stability/Notes *1                                                      |
| Frequency Mode<br>Minimum measuring value<br>Minimum cut off<br>Minimum pulse width<br>Sample time                                                                                      | (0.1 to 65000) Hz<br>1 Hz resolution above 65 Hz | 0.1 Hz<br>0.1 Hz<br>50 us<br>0.1 s or 1 s                                        |
| <b>Type</b>                                                                                                                                                                             |                                                  |                                                                                  |
| Counter Mode<br>Minimum pulse width                                                                                                                                                     | (dc to 1000) Hz                                  | 50 us                                                                            |
| <b>Type Tacho (mV input)</b>                                                                                                                                                            |                                                  |                                                                                  |
| Low trigger<br>High trigger<br>Impedance<br>Over voltage                                                                                                                                |                                                  | < 100 mV<br>> 200 mV<br>>100 KΩ<br>± 50 V                                        |
| <b>Type mA input</b>                                                                                                                                                                    |                                                  |                                                                                  |
| Low trigger<br>High trigger<br>Impedance                                                                                                                                                |                                                  | < 1.2 mA<br>> 2.1 mA<br>1 KΩ                                                     |
| <b>Type PNP, NPN, Contact</b>                                                                                                                                                           |                                                  |                                                                                  |
| Maximum current<br>Maximum current<br>Low trigger<br>High trigger<br>Impedance                                                                                                          |                                                  | 16 mA @ 15 V excitation<br>9 mA @ 8 V excitation<br>< 1.2 mA<br>> 2.1 mA<br>1 KΩ |
| <b>Type TTL</b>                                                                                                                                                                         |                                                  |                                                                                  |
| Low trigger<br>High trigger<br>Impedance                                                                                                                                                |                                                  | < 1.0 V<br>> 2.0 V<br>100 KΩ                                                     |
| Sensor supply                                                                                                                                                                           | 15 Vdc ± 1.0 Vdc @ 25 mA                         | Excitation                                                                       |
| Sensor supply Namur                                                                                                                                                                     | 8 Vdc ± 1.0 Vdc @ 25 mA                          | Excitation                                                                       |
| Dual channel                                                                                                                                                                            |                                                  | Channel A frequency<br>Channel B frequency                                       |
| Single channel                                                                                                                                                                          |                                                  | Channel A frequency<br>Channel B discrete                                        |
| Discrete mode channel B input used for re-set or halt functions.<br>Channel B offers all input sense options when set in discrete mode, in this mode input value is either high or low. |                                                  |                                                                                  |
| NPN non-isolated inputs require external 2 KΩ pull up resistor.                                                                                                                         |                                                  |                                                                                  |

| OUTPUT<br>ANALOGUE mA CURRENT                                            |                               | SPECIFICATIONS @20°C                                 |
|--------------------------------------------------------------------------|-------------------------------|------------------------------------------------------|
| Type/Function                                                            | Range/Description             | Accuracy/Stability/Notes                             |
| Two wire current                                                         | (0 to 20) mA<br>(4 to 20) mA  | (mA output /2000) or 5 uA (Whichever is the greater) |
| Current source                                                           | (0 to 20) mA                  | Maximum load 750 Ω                                   |
| Current sink                                                             | Supply voltage (10 to 30) VDC | SELV                                                 |
| Loop voltage effect                                                      |                               | 0.2 uA/ V (sink mode)                                |
| Maximum output                                                           |                               | 21.5 mA                                              |
| Thermal stability                                                        | Zero at 20 °C                 | 1 uA/ °C                                             |
| The mA output range can be set to anywhere within the maximum capability |                               |                                                      |

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

| OUTPUT ANALOGUE VOLTAGE                                                       |                                  | SPECIFICATIONS @20°C     |
|-------------------------------------------------------------------------------|----------------------------------|--------------------------|
| Type/Function                                                                 | Range/Description                | Accuracy/Stability/Notes |
| Two wire voltage                                                              | (0 to 10) VDC<br>(-10 to 10) VDC | ± 5 mV                   |
| Maximum output                                                                |                                  | 10.5 VDC, -10.5 VDC      |
| Thermal stability                                                             | Zero at 20 °C                    | ± 10 µV/°C               |
| The voltage output range can be set to anywhere within the maximum capability |                                  |                          |

| OUTPUT RELAY          |                                            |
|-----------------------|--------------------------------------------|
| Type/Options/Function | Description                                |
| Type                  | Single pole change-over (common, N/o, N/c) |
| Rating                | 24 VDC ; 0.5 A                             |

| USB CONFIGURATION USER INTERFACE |                   |                                                                 |
|----------------------------------|-------------------|-----------------------------------------------------------------|
| Type/Options/Function            | Description       | Notes                                                           |
| Configuration hardware           | USB mini B port   | Cable not included                                              |
| Configuration software           | USBSpeedLink      | Download <a href="http://www.status.co.uk">www.status.co.uk</a> |
| Operating system                 | Microsoft Windows | Windows 7 or later                                              |

| USB CONFIGURATION USER INTERFACE BASIC FREQUENCY MODE |                           |                                        |
|-------------------------------------------------------|---------------------------|----------------------------------------|
| Type/Options/Function                                 | Description               | Notes                                  |
| Sensor configuration                                  |                           | TTL, NPN, PNP, contact, NAMUR, mV      |
| Sensor signal A                                       |                           | TTL, NPN, PNP, contact, NAMUR, mV      |
| Discrete input B                                      |                           | Minimum value 0.1 Hz                   |
| Cut low A                                             | Input limit = 0.1 Hz      | Maximum value 65 KHz                   |
| Cut high A                                            | Input limit = 65 KHz      | (0.1 or 1.0) s                         |
| Sample time A                                         |                           | (0 to 65000) Hz, for diagnostics       |
| Pre-set sensor to setpoint                            | Locks input value A       | (8 or 15) Vdc                          |
| Sensor excitation                                     | Power supply out          | Active high, active low                |
| Channel B discrete input                              | Sense                     | Relay                                  |
| Channel B discrete input                              | Reset action              |                                        |
| Relay configuration                                   |                           |                                        |
| Relay action                                          | High, low                 | Latched options                        |
| Relay source                                          | Signal A                  | Hz                                     |
| Set point                                             |                           | Hz                                     |
| Hysteresis                                            |                           | Hz                                     |
| Analogue output configuration                         |                           |                                        |
| Output source                                         | Signal A                  | Hz                                     |
| Input signal range                                    | High, low                 | Hz                                     |
| Output signal type                                    | mA, V, bipolar V          |                                        |
| Output signal range                                   | High, low                 | Any value within range for output type |
| Live data                                             |                           |                                        |
|                                                       | Read sensor A             | Hz                                     |
|                                                       | Read discrete input B     | High, low                              |
|                                                       | Output signal             | In mA or V                             |
|                                                       | Record live data          | Save data to CSV file                  |
|                                                       | Store configuration to PC | Save data to file                      |
| Other device options                                  |                           |                                        |
|                                                       | Tag                       | Eight characters                       |
|                                                       | Factory reset             | Return to original factory settings    |

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

| USB CONFIGURATION USER INTERFACE<br>ADVANCED FREQUENCY MODE                                                                                                                                                                               |                                                                                                                                                                                            |                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type/Options/Function                                                                                                                                                                                                                     | Description                                                                                                                                                                                | Notes                                                                                                                                                                                                                                  |
| Sensor configuration<br>Channels<br>Sensor signal A, B<br>Cut low A, B<br>Cut high A, B<br>Sample time A, B<br>Pre-set sensor to setpoint<br>Sensor excitation<br>Channel B as discrete<br>Channel B as discrete<br>Channel B as discrete | Dual or single + discrete<br><br>Input limit = 0.1 Hz<br>Input limit = 65 KHz<br><br>Locks input value A, B<br>Power supply out<br>Sense<br>Reset action (any combination)<br>Count action | TTL, NPN, PNP, contact, NAMUR, mV<br>Minimum value 0.1 Hz<br>Maximum value 65 KHz<br>(0.1 or 1.0) s<br>(0 to 65000) Hz, for diagnostics<br>(8 or 15) Vdc<br>Active high, low<br>Total A/Batch/Relay<br>Up/down, up/halted, down/halted |
| Rate configuration<br>Rate engineering units<br>Input range A,B<br>K factor A, B<br>Meter correction Chl. A only                                                                                                                          | User defined<br>High, low<br>Number of pulses per unit<br>Up to 12-point calibration                                                                                                       | Six characters<br>Hz to engineering unit<br>Numeric value<br>Hz * (0.1 to 10)                                                                                                                                                          |
| Total configuration *1<br>Total engineering units<br>Total A, B<br>Time base A, B<br>Factor and divisor A, B<br>Reset total at values A, B<br>Reset total to value A, B                                                                   | User defined<br>Count<br><br><br>Up, down                                                                                                                                                  | Six characters<br>Up, down, halted<br>Second, minute, hour<br>Numeric value<br>Numeric value<br>Numeric value                                                                                                                          |
| Function configuration<br>Rate function<br>Total function                                                                                                                                                                                 |                                                                                                                                                                                            | A+B, A-B, highest, lowest<br>A+B, A-B, highest, lowest                                                                                                                                                                                 |
| Relay configuration<br>Relay action<br>Relay source<br><br>Set point<br>Hysteresis<br>Total pulse out every: -*2<br>Pulse duration *2<br>Batch counter reset at:-                                                                         | High, low, pulse<br>Rate (A, B), total (A, B), rate<br>function, total function<br><br>increments batch count<br>Resets to zero                                                            | Latching options<br><br>Engineering unit value<br>Engineering unit value<br>Engineering unit value<br>(20 to 10000) ms<br>Numeric value                                                                                                |
| Analogue output configuration<br>Output source<br><br>Input signal range<br>Output signal type<br>Output signal range                                                                                                                     | Rate (A, B), total (A, B), rate<br>function, total function<br>High, low<br><br>High, low                                                                                                  | <br><br>Any value within engineering unit range<br>mA, V, bipolar V<br>Any value within range for output type                                                                                                                          |
| History                                                                                                                                                                                                                                   | Software version<br>Operational time<br>Meter run time with input (A or<br>B > 0.6 Hz)<br>Maximum input frequencies<br>Device data                                                         | Number<br>Time period<br><br>Time period<br>(A, B) Hz<br>Number of power ups                                                                                                                                                           |
| Other device options                                                                                                                                                                                                                      | Tag<br>Reset total A, B<br>Reset batch<br>Reset master counter<br>Reset relay                                                                                                              | Eight characters<br>To zero (or pre-set value)<br>To zero<br>To zero<br>Clear latched relay                                                                                                                                            |

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|                                                    |                                                                                                                                                                  |                                                                                                                                                                                    |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Live data                                          | Read sensor A, B<br>Rate A, B<br>Total A, B<br>Discrete condition B<br>Rate function<br>Total function<br>Batch count<br>Analogue output signal<br>Relay 1 state | Hz<br>Engineering unit value<br>Engineering unit value<br>High, low<br>Engineering unit value<br>Engineering unit value<br>Numeric value<br>Value in mA, V or bipolar V<br>Off, on |
| Record live data                                   | Save data to CSV file, with adjustable log period                                                                                                                | Date/time, input value(s), output value                                                                                                                                            |
| Store configuration to PC                          | Save data to file                                                                                                                                                |                                                                                                                                                                                    |
| *1 Total = (Rate * Factor) / (Time base * Divisor) |                                                                                                                                                                  |                                                                                                                                                                                    |
| *2 Pulse relay action only                         |                                                                                                                                                                  |                                                                                                                                                                                    |

| USB CONFIGURATION USER INTERFACE<br>COUNTER MODE                                                                                                                                 |                                                                                                                                        |                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type/Options/Function                                                                                                                                                            | Description                                                                                                                            | Notes                                                                                                                                                             |
| Sensor configuration<br>Channels<br>Sensor signal A, B<br>Pre-set count to value<br>Sensor excitation<br>Channel B as discrete<br>Channel B as discrete<br>Channel B as discrete | Dual or single + discrete<br><br>Locks count value A, B<br>Power supply out<br>Sense<br>Reset action (any combination)<br>Count action | TTL, NPN, PNP, contact, NAMUR, mV<br>Numeric value for diagnostics<br>(8 or 15) Vdc<br>Active high, low<br>Total A/Batch/Relay<br>Up/down, up/halted, down/halted |
| Total configuration<br>Process units<br>Total A, B<br>K factor A, B<br>Reset count at values A, B<br>Reset count to value A, B                                                   | User defined<br>Count<br>Process units per count<br>Up, down                                                                           | Six characters<br>Up, down, halted<br>Numeric value<br>Numeric value<br>Numeric value                                                                             |
| Function configuration<br>Total function                                                                                                                                         |                                                                                                                                        | A+B, A-B, highest, lowest                                                                                                                                         |
| Relay configuration<br>Relay action<br>Relay source<br>Set point<br>Hysteresis<br>Total pulse out every: -*1<br>Pulse duration *1<br>Batch counter reset at:-                    | High, low, pulse<br>Total A, B, rate total function<br><br>Increment batch counter<br>Resets to zero                                   | Latching options<br><br>Engineering unit value<br>Engineering unit value<br>Engineering unit value<br>(20 to 10000) ms<br>Numeric value                           |
| Analogue output configuration<br>Output source<br>Input signal range<br>Output signal type<br>Output signal range                                                                | Total A, B, total function<br>High, low<br><br>High, low                                                                               | Any value within engineering unit range<br>mA, V, bipolar V<br>Any value within range for output type                                                             |
| History                                                                                                                                                                          | Software version<br>Operational time<br>Device data                                                                                    | Number<br>Time period<br>Number of power ups                                                                                                                      |
| Other device options                                                                                                                                                             | Tag<br>Reset total A, B<br>Reset batch<br>Reset master count<br>Reset relay                                                            | Eight characters<br>To zero (or pre-set value)<br>To zero<br>To zero<br>Clear latched relay                                                                       |

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

|                            |                                                                                                                                                                                              |                                                                                                                                                                       |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Live data                  | Read count A, B<br>Process total A, B<br>Discrete condition B<br>Function<br>Batch count<br>Analogue output signal<br>Save data to CSV file, with adjustable log period<br>Save data to file | Numeric value<br>process unit value<br>High, low<br>Process unit value<br>Numeric value<br>Value in mA, V or bipolar V<br><br>Date/time, input value(s), output value |
| Record live data           |                                                                                                                                                                                              |                                                                                                                                                                       |
| Store configuration to PC  |                                                                                                                                                                                              |                                                                                                                                                                       |
| *1 Pulse relay action only |                                                                                                                                                                                              |                                                                                                                                                                       |

## ANDROID USER INTERFACE

| Type/Function  | Range/Description                    | Accuracy/Stability/Notes                                                                 |
|----------------|--------------------------------------|------------------------------------------------------------------------------------------|
| Hardware       | USB Lead                             | OTG plus A to Mini B                                                                     |
| Software       | USBVeiw                              | Download from <a href="http://www.status.co.uk">www.status.co.uk</a>                     |
| Read live data | Signal<br>Process variable<br>Output | Channel A Hz, Channel B Hz/Digital state<br>Process unit<br>mA, V, $\pm V$ , Relay state |

## GENERAL

| Function              | Description                                                   |
|-----------------------|---------------------------------------------------------------|
| Update time           | 100 ms                                                        |
| Response time         | 200 ms                                                        |
| Start-up time         | 5 s (output condition lags)                                   |
| Warm-up time          | 60 s until full accuracy                                      |
| Galvanic isolation    | Three way (input, output, supply) 500 Vdc                     |
| Default configuration |                                                               |
| State LED             | Red = fault, green = OK, input and output condition monitored |
| Supply range          | (10 to 32) VAC rms, (10 to 48) VDC SELV                       |
| Power                 | < 1 W @ full output current                                   |
| Protection            | Internal resettable fuse (0.5 A) + over-voltage protection    |

## MECHANICAL

| Function    | Description                                          |
|-------------|------------------------------------------------------|
| Dimensions  | 17.5 mm width, 56.4 mm depth from rail, 90 mm height |
| Enclosure   | DIN rail mount                                       |
| Material    | Polymide 6.6 self-extinguishing: Grey                |
| Connections | Screw terminals 2.5 mm wire maximum                  |
| Weight      | 60 g approximate                                     |

## ENVIRONMENTAL

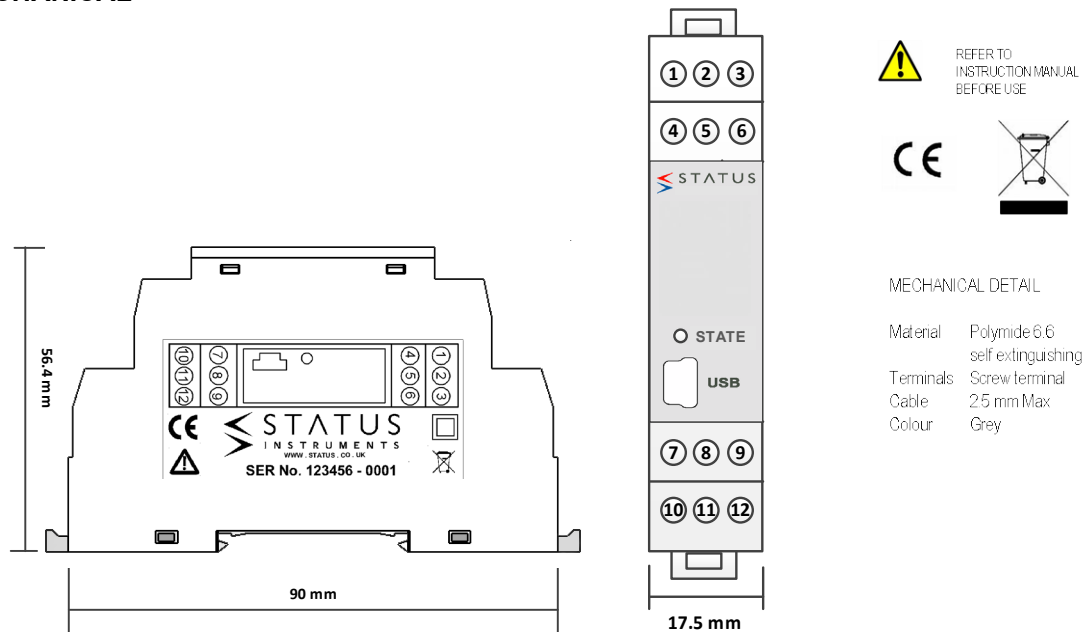
| Function                  | Description                                                        |
|---------------------------|--------------------------------------------------------------------|
| Ambient temperature       | Operating / storage (-20 to 70) °C                                 |
| Ambient Humidity          | Operating / storage (10 to 90) %RH non-condensing                  |
| Protection requirement    | Device must be installed in an enclosure offering >IP65 Protection |
| USB configuration ambient | (10 to 30) °C                                                      |

## APPROVALS

|                    |                                                                       |
|--------------------|-----------------------------------------------------------------------|
| EMC                | BS EN 61326: Note - Sensor input wires to be less than 30 m to comply |
| Ingress protection | BS EN 60529                                                           |
| RoHS               | Directive 2011/65/EU                                                  |

# SEM1600F DIN RAIL FREQUENCY/PULSE CONDITIONER

## MECHANICAL



## ORDER CODE

|                    |          |
|--------------------|----------|
| Basic frequency    | SEM1600F |
| Advanced frequency |          |
| Pulse counter      |          |

## ACCESSORIES

|                            |                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------|
| USB configuration software | USBSpeedLink free of charge from <a href="http://www.status.co.uk">www.status.co.uk</a> |
| Android live data view     | USBView free of charge from <a href="http://www.status.co.uk">www.status.co.uk</a>      |
| Loop powered display       | Refer to <a href="http://www.status.co.uk">www.status.co.uk</a>                         |
| USB Leads                  | Contact <a href="mailto:sales@status.co.uk">sales@status.co.uk</a>                      |

To maintain full accuracy annual calibration is required contact [support@status.co.uk](mailto:support@status.co.uk) for details  
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