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Operating Instructions

MultiRanger DS 4820001

Panel Mounted Tachometer
Ratemeter / Counter / Timer

Document No: 15120 Iss 1.0 Tariff / Commodity Code 9029 2038

DS4820001 Specifications

Speed Modes

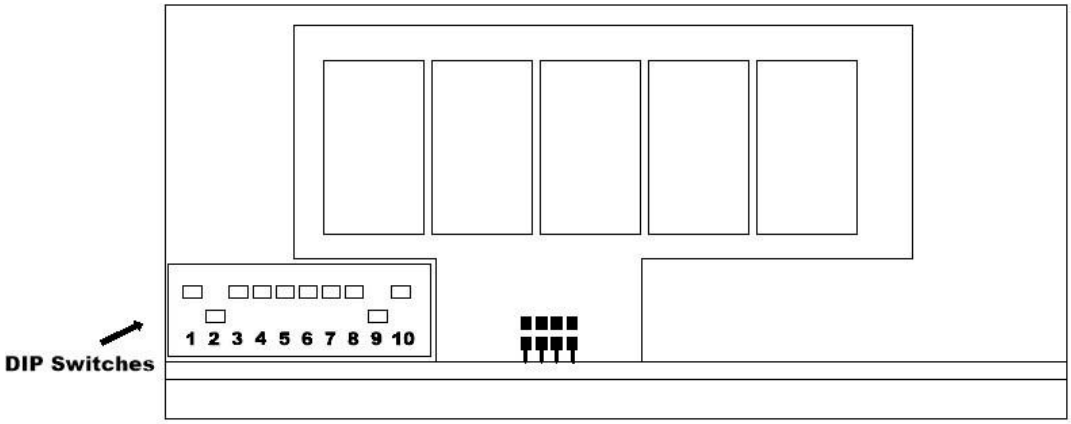
Speed range	0.001 to 99,999 rpm (12Khz max using input divider)
Accuracy	0.01%
Resolution	±1 digit (0.001 RPM below 100 RPM)
Display update time	0.8 secs or time between input pulses whichever is longer 0.1 secs if output module fitted
Cycle time	0.01 sec to 99,999 secs
Count mode	5 digits with overflow to 8 digits (Auto-ranging)
Accumulated time	0.01 - 99,999 secs
Scaling factor	x or ÷ by 0.001 to 99,999 (Operates on all functions)
Power supply	15v 1.0A DC external PSU.
Sensor supply	12v DC @100ma and 5v DC @ 200ma
Enclosure	DIN 48 x 96 x 115mm (123mm including connectors) Panel cut out 42.5 x 91 .5mm

Serial Output RS232

Update time	0.1 secs or time between input pulses
Baud Rate	115200
Data Bits	8
Stop bits	1
Parity	None
Output format	Displayed value in ASCII characters MSD first include decimal point
End of line character	Carriage return (13 decimal, 0D hexadecimal)
Connection	USB FTDI

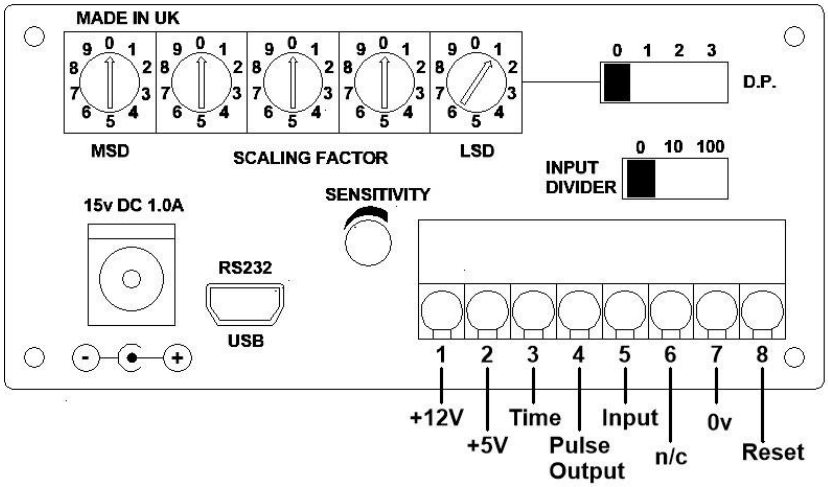
Measuring range and Function select controls

To access these remove the front bezel and display filter



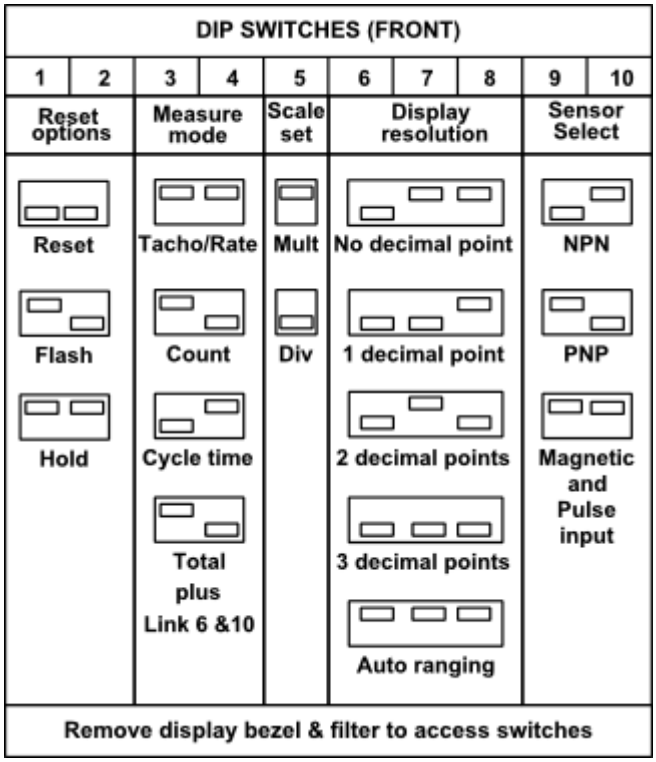
Scaling Factor input divider and voltage selection facilities

These are located on the rear panel of the instrument



Set up procedures

Function select DIP switches (See diagram on previous page for the location of these switches)



Sensors and Signal inputs

NPN/PNP Proximity sensors

Connect the sensor +ve wire to +12v (Terminal 1), 0v wire to 0v (Terminal 7), sensor output to input (Terminal 5), Configure the unit to the appropriate sensor type using the front panel DIP switches 9 & 10 as shown above.

Magnetic sensors

Connect the sensor between 0v (Terminal 7) and input (Terminal 5), configure the unit to magnetic input using the front panel DIP switches 9 & 10 as shown above.

Namur 2-wire sensors

Connect the sensor 0v wire to 0v (Terminal 7) and the signal wire to proximity input (Terminal 5), configure the unit to NPN input using the front panel DIP switches 9 & 10 as shown above.

Pulse inputs (2−30v DC)

Connect the +ve to input (Terminal 5) and 0v to 0v (Terminal 7), configure the unit to magnetic input using the front panel DIP switches 9 & 10 as shown above.

Encoders

Connect the +ve supply to 5v (Terminal 2) or 12v (Terminal 1) as required, output signal to input (Terminal 5) and 0v to 0v (Terminal 7), configure the unit to magnetic input using the front panel DIP switches 9 & 10 as shown above.

AC signal sources (2−30v Peak)

Connect and configure as for magnetic sensors

Sensitivity Control

This sets the level above which the input needs to reach in order for the signal to be recognised, the noise rejection of the instrument also increases as this level is increased.

Measurement mode selection

RPM

Set the front panel DIP switches 3 & 4 to Tacho/rate, the unit will then display the speed of the input pulses in RPM.

Count

Set the front panel DIP switches 3 & 4 to count and set the display resolution to auto-ranging (See display resolution below), the unit will now display a running total of the input pulses received since the power was applied or since the last reset, when the count value exceeds 99,999 counts, the unit will auto-range and count in 10's. The decimal point will move to indicate the position of the thousands i.e. it can be read as the comma that separates thousands from the hundreds e.g. 264.12 = a count of 264,120), if the count again exceeds 999.99 it will again auto-range and count in 100's. The maximum count is 99,999,999.

Accumulated time / Count duration

If during a count session "time" (Rear Terminal 3) is connected to 0v (Terminal 7) the unit will display the time elapsed since the count began, on removing this connection the count will again be displayed.

Cycle Time/ Time interval

Set the front DIP switches 3 & 4 to cycle time and the display resolution to auto-ranging, the unit will now display the time between successive input pulses to a maximum resolution of 0.01 seconds, if the time exceeds 99.990 seconds the unit will auto-range and continue to display the time up to 999.99 seconds, it will again auto-range and display time up to 9999.9 seconds but to a resolution of 0.1 seconds, at times greater than 9,999.9 seconds the unit will again auto-range enabling a maximum count value of 99,999 seconds to a resolution of 1 second, when used in conjunction with the scaling factor this mode can be used to display long process times but with a fast update (See **Process Time** page 5)

Display resolution (rpm modes only)

The resolution of the display can be set to either a fixed resolution of 0, 1 ,2 or 3 decimal places or to be fully auto-ranging in which case the maximum number of decimal places possible at the current speed will be displayed. To select auto range mode set DIP switch 6 to on, in this case switches 7 & 8 will have no effect. To select a fixed number of decimal places set DIP switch 6 to off and select the number of decimal places required as per the above diagram. N**ote**: when in fixed resolution mode, if a resolution is chosen that is too great to fit the whole value in the 5-digit display, the higher digits will be lost but the overall measurement resolution is not changed so the least significant digits will not be displayed to the full accuracy of the unit.

Reset Options

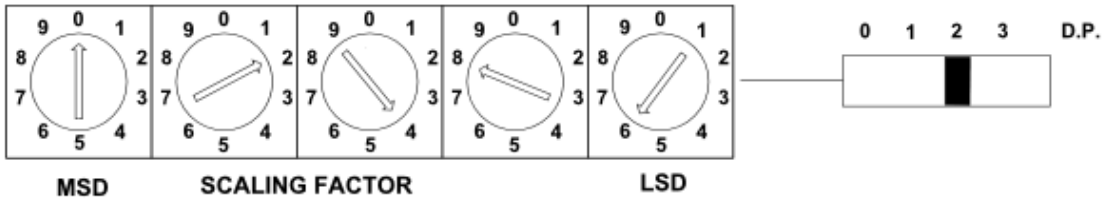
These two DIP switches determine the operation of the unit in under-range and over- range conditions, the alternatives are:-

1. **Reset to zero if no pulses have been received for 20 seconds** (i.e. if the input speed is less than 3 rpm) DIP switch 1 should be set to on, if this is set, then it overrides the action of DIP switch 2.
2. **Continue to measure below 3 RPM**. DIP switches 1 & 2 off, in this case the unit will continue to measure speeds down to 0.001 rpm. **Note:** in this mode if the apparatus being measured stops, then the unit will never go to zero but will continue to display the last reading.
3. **Flash Display on under-range conditions**. DIP switch 2 on, in this case the display will flash when an input pulse has not been received for 20 seconds, the display holds the last reading until another pulse is received, it will also flash the display if the displayed value is greater than 99,999 or if displaying a fixed number of decimal places the value is large than can be displayed with those number of decimal places.

Scaling Factor

This function can be applied to all measurement modes and is set using the 5 rotary BCD switches labelled scaling factor on the rear panel and the upper rear slide switch, the scaling factor can be either a multiplication factor or a division factor.

To set the Scaling factor first determine whether the value should be divided or multiplied by the factor and set the Front DIP switch 5 accordingly, enter the scaling factor including any decimal places required into the 5 scaling factor switches. If the factor contains decimal places then set the rear upper slide switch to the number of decimal places required, e.g. for a scaling factor of 24.86 set the switches as shown.



The scaling factor resolution and the display resolution are completely independent of each other. However, the measurement resolution cannot be increased by the scaling factor e.g. it the unit is in count mode and the scaling factor is set to multiply by 43 the for each count input the display will increment in steps of 43. The scaling function is purely a mathematical calculation on the measured value and hence has no adverse effect on update time etc.

Input pulse divide

This is the lower slide switch on the rear panel. It enables the input pulse rate to be divided by 1, 10, 100, This can be used to measure pulse rates higher than the normal maximum input rate of 99,999rpm up to a maximum of 12Khz (5v square wave 1:1 mark space ratio). It can also be used at slower speeds to average or smooth erratic readings, if the divided input period is greater than 0.8 seconds then the update time will become the input period thus, enabling the update and hence the averaging effect to be increased.

Note: when the reset options (See above) are enabled these refer to the pulse rate after the input divider.

Pulse Output

A 5v TTL compatible output is available on Terminal 4, this output is at the same rate as the incoming pulse rate no scaling is applied to it, it can be used to drive addition instruments that require a 5v pulse input, the maximum loading on this signal is 1KΩ pull up to 5v or 100kΩ pulldown to 0v.

Reset

A reset capability is available via Terminal 8 on the rear panel, the unit can be reset momentarily connecting this terminal to 0v (Terminal 7), when the reset is connected to 0v the unit will stop and the display will continue to display the last reading, When 0v is removed from the reset, the unit is only then reset internally with the measurement starting again from zero.

Process time

Long process times such as those of baking ovens can be measured and controlled with a fast update time by using the time interval mode in conjunction with the scaling factor, this can be achieved by monitoring the speed of the conveyors drive motor, these pulses can be reduced in frequency by using the input divider until the measured value is of sufficient resolution, The displayed value can then be scaled so that the display indicates the actual process time, using this method it is possible to measure process times of long durations (Several minutes or even hours) and yet have an update of only a few seconds.

Serial

The RS232 output is via USB connector. This output continually transmits ASCII characters as shown in the LED display via FTDI serial, 115200 baud.

The command -
get(version)<cr>

returns the unit current firmware version i.e.

/DS48 STM version 1.xx<cr>

[non-measurement data is prefixed with '/']

MultiRanger Numbering System