Advanced Pulse Counter

□

Contents

Functionality description

Pulse counter functionality enables devices to count digital impulses going to DIN1/DIN2/DIN4. This means that 3 digital inputs of the devices can be used with fuel flow meters, impulse frequency, and impulse RPM counter or other impulse-based accessories. Impulse-based fuel usage monitoring is much more accurate than different types of fuel metering sensors and it makes the devices a perfect solution for high-fuel usage machines like cranes, construction vehicles, mining machines, and agriculture equipment.

This functionality was added in 03.28.04.Rev.00 firmware version.

Warning!
When the pulse counter is enabled, all other scenarios **will ignore** the corresponding DIN state, except DIN1 which can be used to wake up the device from Deep Sleep.

Parameter values

System parameters (ID = 145). Device/Available/Input port/Frequency:

Device		Not available	DIN1		DIN2		DIN4	
			50Hz	2kHz	50Hz	2kHz	50Hz	2kHz
FM3001, FM3010		+						
FM4001		+						
FMB0	[1-6] - FMB010, FMB001, FMB001 buzzer, FMB003, FMB002, FMB020		+					
FMC0	[1, 3-4] – FMC001, FMC003. FMC00A	+						
FMM0	[1, 21-22, 34, 41] – FMM001 BG96, FMM001/3 BG95M3, FMM003 BG95M6, FMM00A BG95M1	+						

FMB1	[3-4, 23-24] – FMB125 DualSIM, FMB125 no BAT dualSIM, FMB125, FMB125 no BAT	+			
	[1-2, 5-6, 21-22][1]	+		+	
FMC1	FMC120, FMC122, FMC125, FMC130	+			
	FMC120, FMC122, FMC130			+	
FMU1	[1-5] - FMU120, FMU122, FMU125, FMU130, FMU126, [23, 24]	+			
	FMU120, FMU122, FMU130, [24]			+	
FMM1	[3, 23] – FMM125 BG96, FMM125 BG95M3	+			
	[4, 24-25] – FMM130 BG96, FMM130 BG95M3, FMM13A	+		+	
FMB2	[130, 161] – FMB225, FMB225 DualSIM	+			
	[1-3, 132-133] – FMB202, FMB204, FMB206, FMB230, FMB240	+		+	
	FMB208, [11-14]				+
FMC2	[130] – FMC225	+			
	[131] – FMC230	+		+	
FMM2	[151] – FMM230 BG95M3	+		+	
FMB9	[1-2(21-22)] – FMB900, FMB920 [3-5] - FMB962, FMB964 FMB964 DualSim, [8-11] - FMB965, FMB965 I/O, FMB930, FMB939,		+		
	[7] - FMB910	+			
FMC9	[1] – FMC920		+		
FMM9	[1] – FMM920		+		
MCX2	MCX201	+		+	
MTB1	MTB100 Storageless, MTB100, [3]	+			

1 – [1-2, 5-6, 21-22] - FMB110 DualSIM, FMB120, FMB122 DualSIM, FMB130, FMB140m FMB110 BLE, FMB120, FMB122 BLE

System parameters description

If this function is active, then all other settings associated with the this input are disabled.

Frequency measurement can be performed in 2 different ways:

1. Frequency is measured by counting pulses over time period (997 ms). Method is used for frequencies higher than 100 Hz.
2. Frequency is measured by measuring time between pulses. Method is used for frequencies lower than 100 Hz.

Advanced Pulse Counter limitations

Advanced Pulse counter functionality has limitations when pulse is at different duty cycle and signal voltage at 2kHz frequency. Exceeding limitations might lead to unexpected pulse count or even stop functionality from working. Tables below shows those limitations for specific DIN.

Devices on DIN2 support up to 2kHz pulse frequency. Pulses can be with different duty cycles, but only pulses that are greater than 120µ period is counted, otherwise they are filtered as signal noise. In other words, pulse change between low and high state should not take longer than 120µ. Also, there is a pulse rise time that affects time when voltage threshold is reached. So, for 2kHz there is limitations for available duty cycle.

Duty Cycle, % =20	**DIN2**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
2.5	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%
6	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%
8	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%
10	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%

Duty Cycle, % =50	**DIN2**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
2.5	+	+	+	+	+	+	
6	+	+	+	+	+	+	
8	+	+	+	+	+	+	
10	+	+	+	+	+	+	

Duty Cycle, % =80	**DIN2**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
2.5	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%
6	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%
8	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%
10	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%

For lower than 2kHz frequencies smaller or bigger duty cycle might be available, considering previously mention conditions.

Also, devices that’s support 2kHz on DIN1 (see Table 1) have same limitations as DIN2, but also minimum voltage provided to DIN1 by pulse should be 7.5V or grater. Lower than 7.5V pulses add pulse rise time. For example, at 3.6V pulse rise time is ~500µ comparing to 7.5V at 60µ (FMB920). Pulse counting might work at these low voltages with low frequency but it is not reliable.

Duty Cycle, % =20	**DIN1**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
7.5	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%
8	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%

10	+	+	+	+	+	-	Min Duty Cycle at 2kHz is ~25%

Duty Cycle, % =50	**DIN1**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
7.5	+	+	+	+	+	+	
8	+	+	+	+	+	+	
10	+	+	+	+	+	+	

Duty Cycle, % =80	**DIN1**						
U, V	**Frequency , Hz**						**Notes**
	30	50	100	500	1000	2000	
7.5	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%
8	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%
10	+	+	+	+	+	-	Max Duty Cycle at 2kHz is ~70%

Advanced pulse counter parameter in configurator