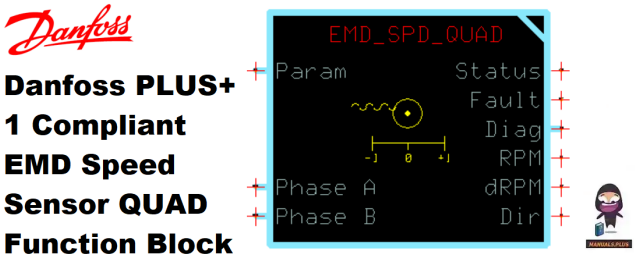

Danfoss PLUS+1 Compliant EMD Speed Sensor QUAD Function Block User Manual

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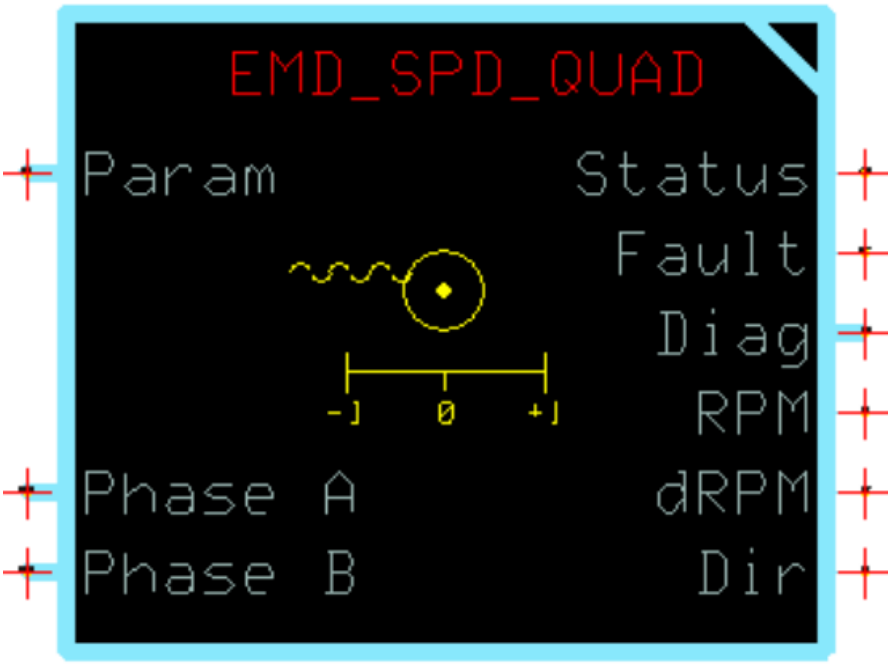
Danfoss PLUS+1 Compliant EMD Speed Sensor QUAD Function Block



Specifications

- **Product:** PLUS+1 Compliant EMD Speed Sensor Quadrature Function Block
- **Revision:** Rev AA (May 2015)
- **Manufacturer:** Danfoss

Product Information

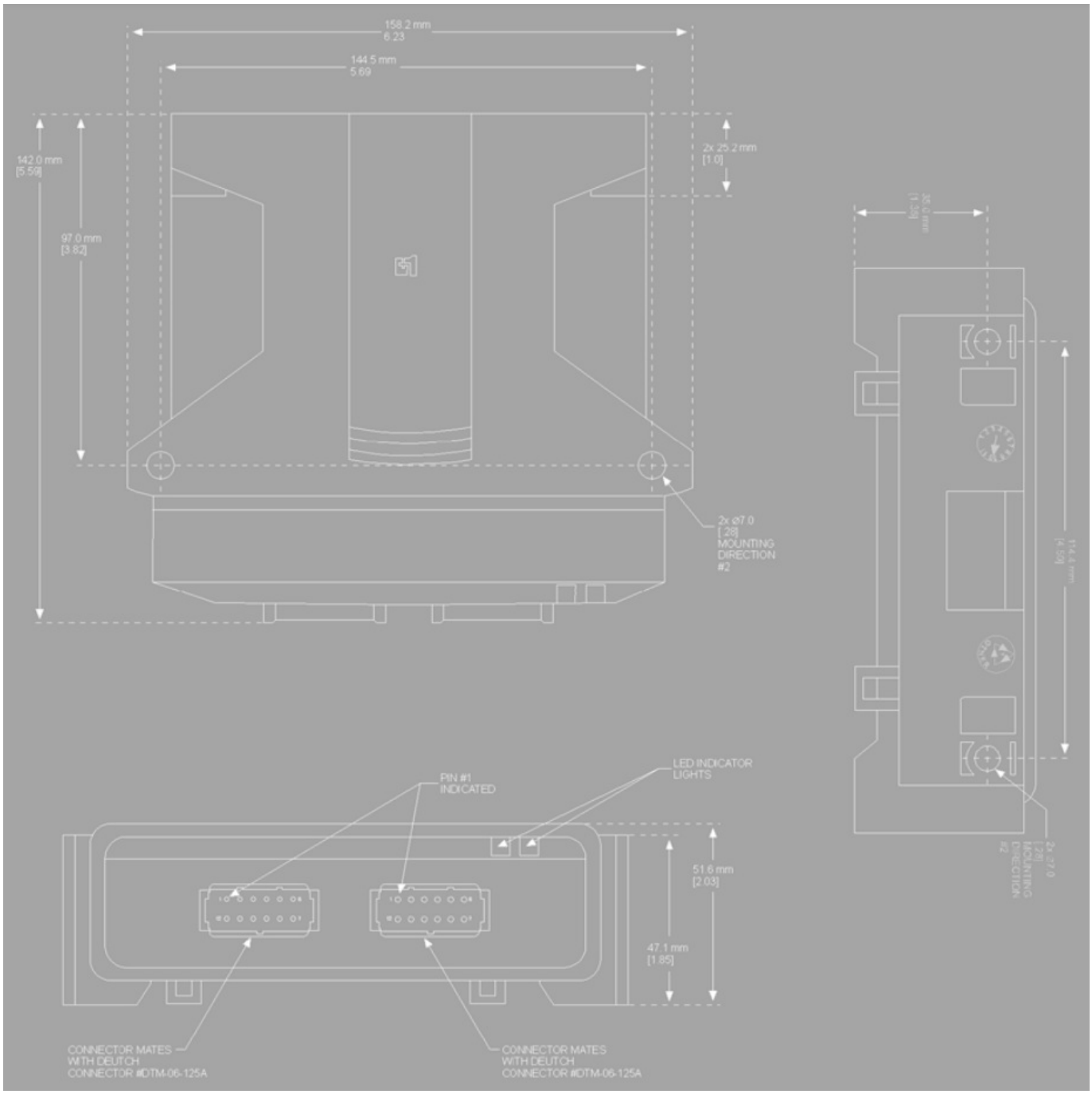
The EMD_SPD_QUAD Function Block outputs an RPM signal and a DIR signal based on inputs from an EMD Speed Sensor. It receives inputs such as Phase A, Phase B, Voltage, and Config signals to calculate RPM output.

FAQ

Q: What is the purpose of the EMD_SPD_QUAD Function Block?

A: The EMD_SPD_QUAD Function Block outputs an RPM signal and a DIR signal based on inputs from an EMD Speed Sensor.

DIMENSIONS



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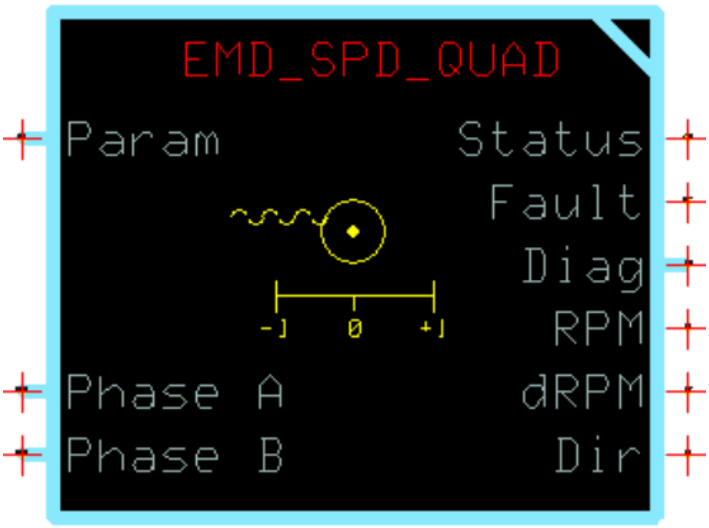
Revision History

Revision	Date	Comment
Rev AA	May 2015	

Overview



This function block outputs an RPM signal and a DIR signal based on inputs from an EMD Speed Sensor. On an MC and SC controller, this function block receives its:

- Phase A input through an MFIn.
- Phase B input through an MFIn.

Inputs

EMD_SPD_QUAD Function Block Inputs

Input	Type	Range	Description
Param	——	——	Input for a user-defined **Pulse**/**Rev** value that defines the number of pulses equal to one revolution. Optionally, an input for a **DirLockHz** value to replace this function block's i nternal default fault direction-lock frequency value.
Phase A	Bus	——	Inputs speed and direction signals from the speed sensor.
Per	U32	1,250 to 10,000,0 00	The measured period output by the **Speed Sensor**. The function block uses the **Per** signal, **Count** signal, and **Puls**/**Rev** para meter value to calculate its **RPM** output. 10,000 = 1,000 µs.

EMD_SPD_QUAD Function Block Inputs

Input	Type	Range	Description
Count	U16	0 to 65,535	The measured count per program loop output by the **Speed Sensor**. The function block uses the **Per** signal, **Count** signal, and **Puls**/**Rev** parameter value to calculate its **RPM** output. 1,000 = 1,000.
QuadCount	S16	-32768 to 32767	The measured direction and number of counts based on phase shifted pulse waves from **Phase A** and **Phase B**. 1,000 = 1,000.
Volt/Voltage	U16	0 to 5,250	The measured voltage of the input signal that the Speed Sensor outputs, which the block uses for fault detection.
Config	Sub-bus	——	Contains the signals that configure this input.
Phase B	Bus	——	Inputs speed signals from the speed sensor.
Per	U32	1,250 to 10,000,000	The measured period output by the **Speed Sensor**. The function block uses the **Per** signal, **Count** signal, and **Puls**/**Rev** parameter value to calculate its **RPM** output. 10,000 = 1,000 µs.
Count	U16	0 to 65,535	The measured count per program loop output by the **Speed Sensor**. The function block uses the **Per** signal, **Count** signal, and **Puls**/**Rev** parameter value to calculate its **RPM** output. 1,000 = 1,000.
Volt/Voltage	U16	0 to 5,250	The measured voltage of the input signal that the Speed Sensor outputs, which the block uses for fault detection.
Config	Sub-bus	——	Contains the signals that configure this input.

Outputs

EMD_SPD_QUAD Function Block Outputs

Output	Type	Range	Description

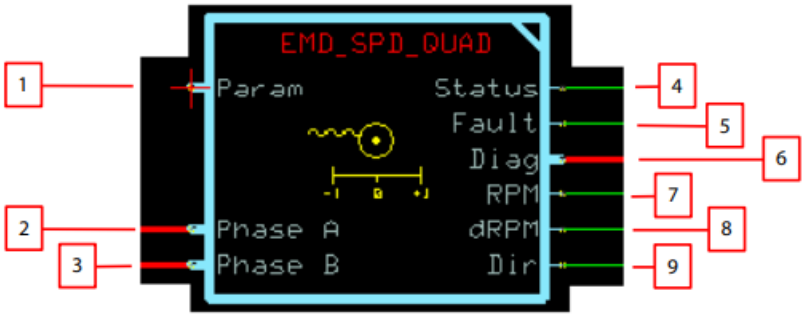
Status	U16	——	Reports the function block's status. This function block uses a non-standard bitwise scheme to report its status and faults. · 0x0000 = Block is OK. · 0x0008 = **Puls**/**Rev** or **DirLockHz** parameter value is out of range.
Fault	U16	——	Reports the function block's faults. This function block uses a non-standard bitwise scheme to report its status and faults. · 0x0000 = Block is OK. · 0x0001 = **Per** signal in the function block's **Phase A** input is too low. · 0x0002 = **Volt**/**Voltage** signal in the function block's **Phase A** input is out of range. · 0x0004 = **Per** signal in the function block's **Phase B** input is too low. · 0x0008 = **Volt**/**Voltage** signal in the function block's **Phase B** input is out of range. · 0x0010 =The difference in frequencies reported by the function block's **Phase A** and **Phase B** inputs is greater than 5%.
Diag	——	——	Outputs a bus with **Freq**, **FltTmrPhase A**, **FltTmrPhase B**, and **FltTmrFreqDiff** signals that are available for troubleshooting.
Freq	U32	0 to 1,000,000,000	The measured frequency of the Speed Sensor. 100,000 = 10,000 Hz.
FltTmrPhase A	U16	0 to 65,535	When a frequency fault: · Occurs, this output counts up the milliseconds until the function block makes a fault declaration. · Clears, the output counts down the milliseconds until the function clears the fault declaration. 1,000 = 1,000 ms.
FltTmrPhase B	U16	0 to 65,535	When a frequency fault: · Occurs, this output counts up the milliseconds until the function block makes a fault declaration. · Clears, the output counts down the milliseconds until the function clears the fault declaration. 1,000 = 1,000 ms.

FltTmrFreqDiff	U16	0 to 65,535	When a frequency difference fault: · Occurs, this output counts up the milliseconds until the function block makes a fault declaration. · Clears, the output counts down the milliseconds until the function clears the fault declaration. 1,000 = 1,000 ms.
dRPM	U16	0–25,000	Speed sensor revolutions per minute x 10 (deciRPM). The function block clamps this output at 25,000. 1 = 0.1 rpm.
RPM	U16	0–2,500	Speed sensor revolutions per minute. The function block clamps this output at 2,500. 1 = 1 rpm.

EMD_SPD_QUAD Function Block Outputs

Output	Type	Range	Description
Dir	S8	-1, 0, +1	The Speed Sensor's direction of rotation. · -1 = Counterclockwise (CCW). · 0 = Neutral. · +1 = Clockwise (CW).

About Function Block Connections



Function Block Connections

Item	Description
1.	Input for common parameters that can be applied to multiple function blocks.
2.	Input for a bus with: · The voltage, period, **quadcount,** and count signals output by the EMD Speed Sensor. · A sub-bus with signals that configure the controller input that receives these signals.
3.	Input for a bus with: · The voltage, period, **quadcount,** and count signals output by the EMD Speed Sensor. · A sub-bus with signals that configure the controller input that receives these signals.
4.	Reports the status of the function block.
5.	Reports the fault of the function block.
6.	Outputs a bus with **Freq**, **FltTmrPhase A**, **FltTmrPhase B**, and **FltTmrFreqDiff** signals that are availa ble for troubleshooting.
7.	Speed sensor revolutions per minute.
8.	Speed sensor revolutions per minute x 10 (deciRPM).
9.	The Speed Sensor's direction of rotation. · -1 = Counterclockwise (CCW). · 0 = Neutral. · +1 = Clockwise (CW).

Status and Fault Logic

Unlike most other PLUS+1 compliant function blocks, this function block uses non-standard status and fault codes.

Status Logic

Status	Hex*	Binar y	Cause	Response	Correction
A parameter is out of range.	0x000 8	1000	**Puls**/**Rev**, **FaultDetTm**, or **DirLockHz** paramete r is out of range.	The function block cla mps the out-of-range v alue at either its upper or lower limit.	Get the out-of-range param eter back within its range.

* Bit 16 set to 1 identifies a standard Danfoss status or fault code.

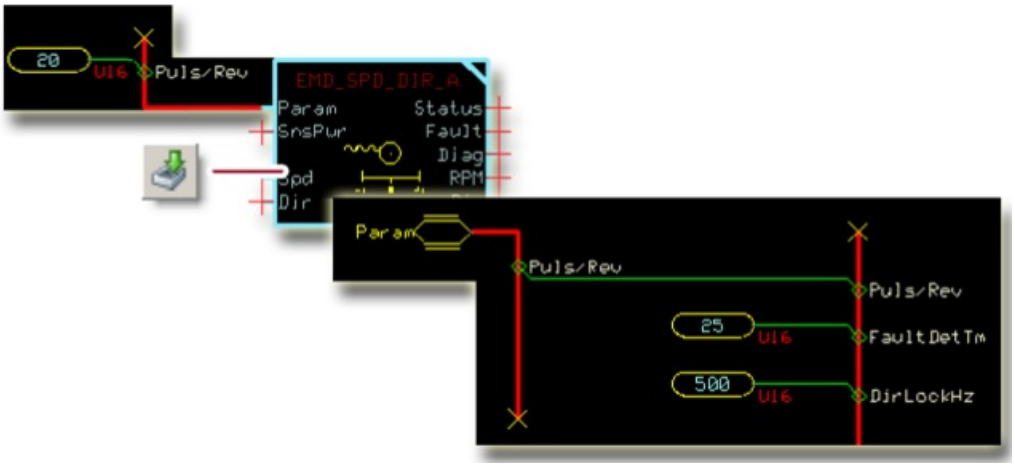
Fault Logic

Fault	Hex*	Binary	Cause	Response	Delay†	Latch‡	Correction
Per signal in the function block's **Phase A** input is too low.	0x0001	00000001	**Per** signal < 1,250 Hz.	The function block outputs its maximum **RPM** and **dRPM** values.	Y	N	Check for hardware issues, such as electrical noise, that can produce an invalid **Per** signal value.
Volt signal in the function block's **Phase A** input is out of range.	0x0002	00000010	2000 V < **Volt** signal < 3000 V.	The function block outputs 0 for **RPM** and **dRPM** values.	Y	N	Check for hardware issues, such as an open circuit signal wire or missing sensor voltage supply.
Per signal in the function block's **Phase B** input is too low.	0x0004	00000100	**Per** signal < 1,250 Hz.	The function block outputs its maximum **RPM** and **dRPM** values.	Y	N	Check for hardware issues, such as electrical noise, that can produce an invalid **Per** signal value.
Volt signal in the function block's **Phase B** input is out of range.	0x0008	00001000	2000 V < **Volt** signal < 3000 V.	The function block outputs 0 for **RPM** and **dRPM** values.	Y	N	Check for hardware issues, such as an open circuit signal wire or missing sensor voltage supply.
Measured difference between **Phase A** and **Phase B** frequency too big.	0x0010	00010000	|Freq A -Freq B| > 5% of current frequency.	No built-in response, output reported as measured by **Phase A** input.	Y	N	Check for hardware issues, such as electrical noise, that can produce an invalid **Per** signal value.

Bit 16 set to 1 identifies a standard Danfoss status or fault code.
A delayed fault is reported if the detected fault condition persists for a specified delay time. A delayed fault cannot be cleared until the fault condition remains undetected for the delay time.
The function block maintains a latched fault report until the latch releases.

Function Block Parameter Values

Enter the top-level page of the EMD_SPD_QUAD function block to view and change this function block's parameters.



Function Block Parameters

Input	Type	Range	Description
Puls/Rev	U16	20–120, 180	Number of pulses per revolution of the Speed Sensor. Refer to the EMD Speed Sensor Technical Information (Danfoss part L1017287) for the correct value.
FaultDetTm	U16	——	Sets the time between when the function block detects a: · Fault condition and then makes a fault declaration. · Cleared fault condition and then clears the fault declaration. 1,000 = 1,000 ms.
DirLockHz	U16	0–8,000 Hz	Sets the frequency above which the function block's Dir output locks. Above this frequency, the function block does not report changes in direction. 1,000 = 1,000 Hz.

MC Controller—Input Configuration

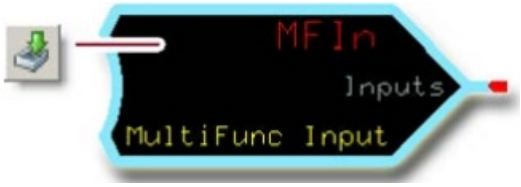
If you have an SC controller

You route the function block's:

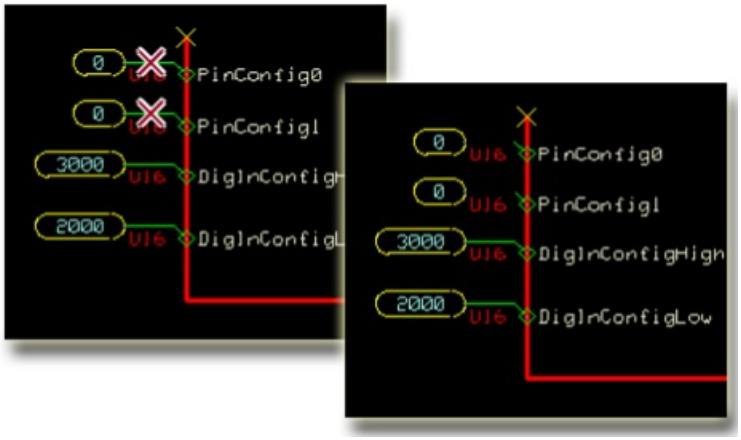
Phase A and Phase B inputs through MFIn.
You must change the MFIn default configurations to accept these inputs.

How to Configure a MFIn

1. In the GUIDE template, enter the Inputs page.



2. Enter the MFIn page that receives the input.



3. Make the changes that are shown in the preceding figure.

SC Controller—Input Configuration

If you have an MC controller

You route this function block's:
Phase A and Phase B inputs through MFIn.
You must change the default configuration of the MFIn to accept this input.

The MFIn that you use must be capable of a Freq input and have configurable Bias, Range, and InputMode values.

How to Configure a MFIn

1. In the GUIDE template, enter the Inputs page.

2. Enter the MFIn page that receives the input.

3. Make the changes that are shown in the preceding figure.

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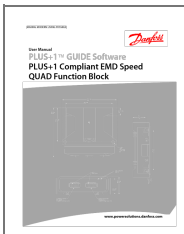	Danfoss PLUS+1 Compliant EMD Speed Sensor QUAD Function Block [pdf] User Manual PLUS 1 Compliant EMD Speed Sensor QUAD Function Block, PLUS 1, Compliant EMD Speed Sensor QUAD Function Block, Speed Sensor QUAD Function Block, Sensor QUAD Function Block, QUAD Function Block, Function Block, Block

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