



## PowerFlex 4 / 40<sup>®</sup> Custom Firmware

### “DB” Option – Modbus Enhancement with Broadcast Mode

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## Overview

The purpose of this insert instructions manual is to provide the special information about the custom firmware version 52.xx (indicated by parameter D016).

This custom firmware option adds support for writing the Logic Command and/or Speed Reference by using the broadcast mode with Modbus function 16 (0x10), the customer specific Modbus addressing / mapping, and also introduces some new customer special parameters such as the speed feedback in RPM unit, the heat sink temperature, the motor power and energy consumption.



**ATTENTION:** The Custom Firmware supplied is designed for a specific application and load condition. It differs from the standard PowerFlex 4/40 product offering and must be installed and run only under this custom application. Attempting to run this Custom Firmware under any other type of applications, could result in unpredictable and/or hazardous conditions.



**ATTENTION:** The drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, “Guarding Against Electrostatic Damage” or any other application ESD protection handbook.

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## About Modbus Registers

To meet the customer requirements, the Modbus function 16 “Preset Multiple Registers” has been implemented. Additionally, the Modbus function 4 “Read Input Register” is also supported in addition to the implemented Modbus function 3 “Read Holding Register”.

For the customer special Modbus access - addressing/mapping, the corresponding registers are included. The following tables show the registers assignment for the Modbus access.

### A.1 PLC Read Registers - Output from Drive

Register (ID)	Name	Type	Range
2048	Logic Status Word	Binary	Binary defined (A.2)
2049	Reserved	Integer 16 bit	
2050	Reserved	Integer 16 bit	
2051	Output Frequency (Feedback)	Integer 16 bit	0..240.00 Hz
2052	Output Speed (Feedback)	Integer 16 bit	0..10000 RPM
2053	Output Current	Integer 16 bit	0..99.9 A
2054	Heat Sink Temperature	Integer 16 bit	0..120°C
2055	Motor Power	Integer 16 bit	0..99.99kW
2056	Output Voltage	Integer 16 bit	0..999.9 V
2057	Energy	Integer 16 bit	0..65535kWh
2058	Drive Error (same as D007)	Integer 16 bit	0..122

**Note:** All values are without sign. The Modbus values have there decimal point adjusted as defined in the table and not as defined in the standard instruction manual.

### A.2 Definition for the Logic Status Word

Bit 15 – 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used	Running at Zero Speed	At Freq	Alarm	Faulted	Running + Backward	Running	Ready

Detailed bit description:

Running at Zero Speed	Bit = 1 when speed is below 2% of max frequency
At Freq	Bit = 1 when output frequency reached frequency command.
Alarm	Bit = 1 when alarm is active
Faulted	Bit = 1 when drive has tripped on fault.
Running + Backward	Bit = 1 when running backwards
Running	Bit = 1 when running
Ready	Bit = 1 when ready and accepting frequency commands.

### A.3 PLC Write Registers - Input to Drive

Register (ID)	Name	Type	Range
2000	Logic Control Word	Binary 16 bit	Binary defined (A.4)
2001	Reserved	Binary 16 bit	
2002	Frequency Command relative to P035	Integer 16 bit	0..100.00% Fmax
2003	Reserved for customer, not used in the drive	Integer 16 bit	
2004	Reserved for customer, not used in the drive	Integer 16 bit	
2005	Reserved for customer, not used in the drive	Integer 16 bit	
2006	Reserved for customer, not used in the drive	Integer 16 bit	

The first register 2000 is used for the “Logic Control Word” and the register 2002 for the “Frequency (Speed) Command”. The following up 4 registers from 2003 to 2006 are especially reserved for the customer and are not used in the drives but external.

#### A.4 Definition for the Logic Command Word

Bit 15 – 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used	CNT	RST	RevDir	Run

Detailed bit description:

The bit CNT does reset the kWh counter (1 resets the counter )

The bit RST does reset drive faults

The bit RevDir commands reverse direction (0 commands forward)

The bit Run commands running (Run=0 for stop)

## About Parameters

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Since these features are implemented for both the PowerFlex 4 and the PowerFlex 40, the new introduced and modified parameters are separately explained for both the PowerFlex 4 and the PowerFlex 40 in the following.

## PowerFlex4

Compared to the standard firmware 3.05, the custom firmware 52.1x has included the new parameters D022, and A158, and modified the standard parameters D010, D024 and A099.

### D010 [Output Speed]

<b>Values</b>	Default	0.0 RPM	
	Min/Max:	0/9999 RPM	
	Display:	0.01-1	Int-16 R

### D022 [Motor Power]

<b>Values</b>	Default	0.00 kW	
	Min/Max:	0.0/99.00 kW	
	Display:	0.01	Int-16 R

### D024 [Heat Sink Temperature]

<b>Values</b>	Default	0 degree	
	Min/Max:	0/120 degree	
	Display:		Int-16 R

### A099 [Speed Scaling Factor]

<b>Values</b>	Default	30.0 RPM/Hz	
	Min/Max:	0.1/999.9 RPM/Hz	
	Display:	0.1	Int-16 R/W

**A158 [Energy Consumption]**

<b>Values</b>	Default	0 kWh	
	Min/Max:	0/65535 kWh	
	Display:		Int-16 R/W

## PowerFlex40

For the PowerFlex40, the custom firmware V52.0x, based on the firmware V1.07, has included the new parameter A158, and modified the standard parameters D010, D022, D024 and A099.

**D010 [Output Speed]**

<b>Values</b>	Default	0.0 RPM	
	Min/Max:	0/9999 RPM	
	Display:	0.01-1	Int-16 R

**D022 [Motor Power]**

<b>Values</b>	Default	0.00 kW	
	Min/Max:	0.0/99.00 kW	
	Display:	0.01	Int-16 R

**D024 [Heat Sink Temperature]**

<b>Values</b>	Default	0 degree	
	Min/Max:	0/120 degree	
	Display:		Int-16 R

**A099 [Speed Scaling Factor]**

<b>Values</b>	Default	30.0 RPM/Hz	
	Min/Max:	0.1/999.9 RPM/Hz	
	Display:	0.1	Int-16 R/W

**A158 [Energy Consumption]**

<b>Values</b>	Default	0 kWh	
	Min/Max:	0/65535 kWh	
	Display:		Int-16 R/W

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