



40 Log Canoe Circle, Stevensville, MD 21666
 (410) 604-3400 | bardac.com | driveweb.com

APPLICATION NOTE

Drive Applications Support Library

Application Note	AN-P2-011
Title	Using the Display Scaling Function
Related Products	P2 Series AC Drives
Level: 1	1 - Fundamental - No previous experience necessary. 2 - Basic - Some basic drives knowledge recommended. 3 - Advanced - Some basic drives knowledge required. 4 - Expert - Good experience in topic of subject matter recommended.

Overview:

In some applications, it can be desirable to scale the output display of the P2 Series drives to show different units that are more useful or applicable to the application being performed. E.g. where the motor drives a load via a gearbox, the user may wish to display the output speed of the gearbox rather than that of the motor shaft. This can be done by using the display scaling function.

The value to be scaled can be selected between motor speed, motor current, or from an analog input coming into the drive. The analog input setting allows for feedback from various types of sensors to be displayed in relevant units on the drive display.

Parameters:

P 2-22 Display speed scaling Source

P2-22 defines the initial value (variable) that will be used to scale and show user units on the drive display.

The selections for the source variable are as follows:

P2-22 Setting	Source Variable for Scaling
0	Motor Speed
1	Motor Current

P2-22 Setting	Source Variable for Scaling
2	Analog Input 2
3	P0-80 Value

This application note details the use and configuration of the additional relays for each of the option module mentioned above. If additional I/O is provided in the same option module then this is detailed in the option module user guide.

P 2-21 Display speed scaling factor

If this parameter is zero (0.000), the display-scaling function is disabled.

If this parameter is > 0 , the custom display scaling function is enabled, and operates as details in the following table.

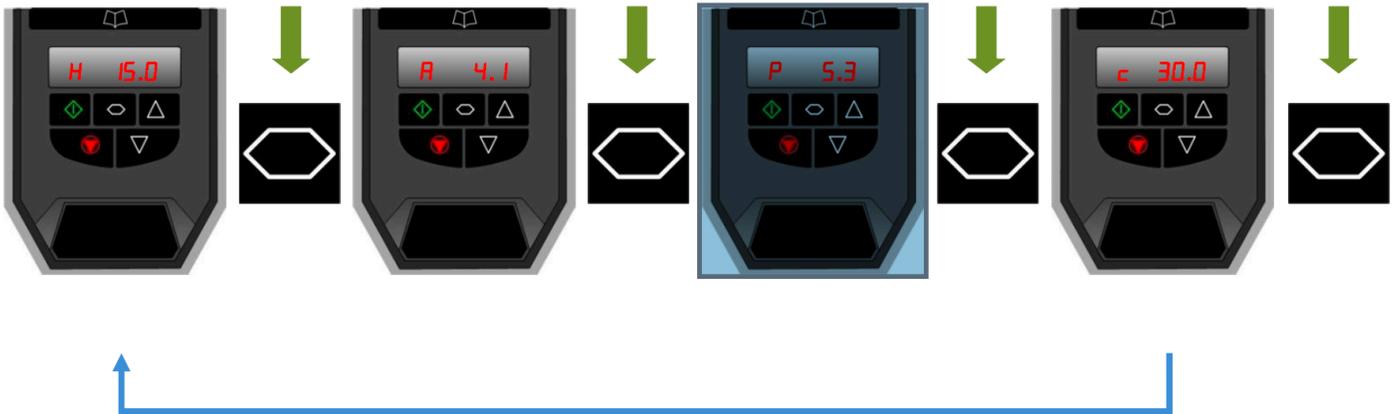
Display Scaling Value	Display Scaling Source P2-22	Motor Rated Speed P1-10	Scaled Display
Motor Speed (Hz)	Motor Speed	= 0	Output Frequency (Hz) x P2-21
Motor Current (RPM)	Motor Current	> 0	Motor RPM x P2-21
Motor Current	Analog Input 2	N/A	Motor Current (A) x P2-21
Analog Input 2	Analog Input 2	N/A	Analog input 2 (%) x P2-21

Showing Custom Units on the Drive Display:

The scaled display value can be viewed as one of the main real-time values of the drive display whenever the drive is running. The <navigate> key is used to scroll through the available display values. Provided a value has been entered in P2-21 (P2-21 $<> 0$) then the custom user units display will form one of the options scrolled to using the navigate key. A lower case character 'c' will be displayed on the display to distinguish the scaled value from the other real-time values on the & segment LED display. A text description is provided on the OLED display. The sequence when scrolling through the drive display is shown below.

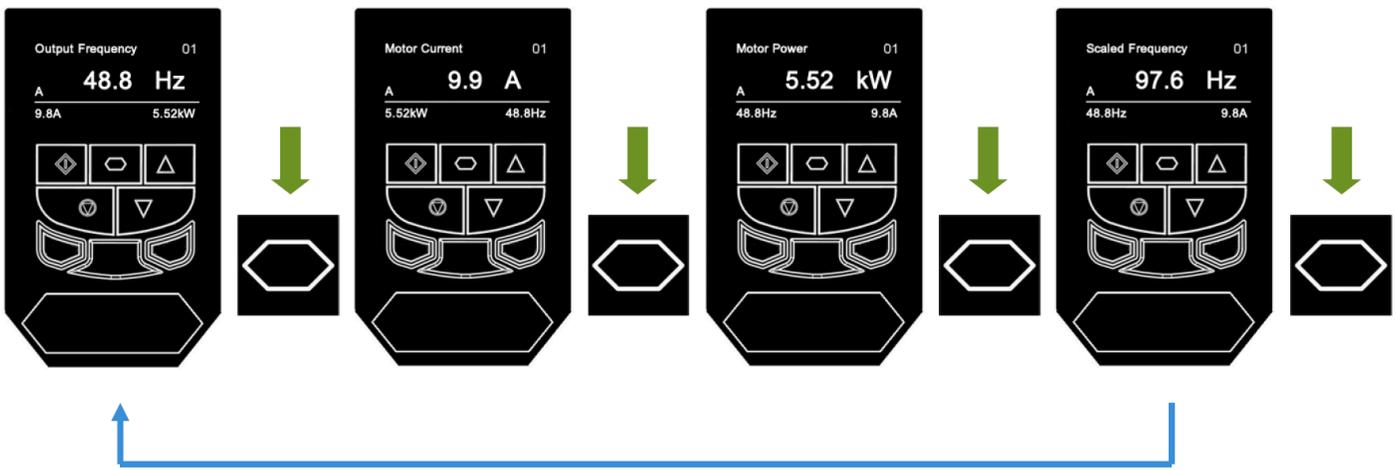
7 Segment LED Display:

Custom Display Units



7 Segment LED Display:

Custom Display Units



Examples show source (P2-22) set to motor speed and scaling (P2-21) set to 2.000

When the drive is turned on it will power up with the same display units as shown on the display when the unit was powered off. Hence if custom units are shown on the drive display at power off, then they will be retained on the display at power on.

Example – Displaying Gearbox Output RPM:

If the controlled motor is connected to a gearbox and it is desired to display the gearbox output shaft speed rather than the motor shaft speed, this can be achieved in the following way:

Enter the Motor nameplate speed into P1-10

Calculate the value of $P2-21 = 1 / \text{Gearbox Ratio}$

E.g. Gearbox ratio = 10:1, P2-21 = $1/10 = 0.1$

Set P2-21 = 0.1

P2-21 remains at the value for motor speed (P2-22 = 0)

The scaled display will now show the gearbox output RPM.

Advanced Display Scaling Function

An Advanced Display Scaling Function, enabled by setting P2-22 = 3, allows a wide variety of internal variables from within the drive to be displayed and scaled using P2-21. This is intended to allow enhanced flexibility of the drive in complex applications.

The value displayed in P0-80 is determined by the setting of P6-28. The following settings are possible.

P0-80 Setting	Function Description	Remark	P0-80 Setting	Function Description	Remark
0	Off condition	Binary	81	Motor speed	Data
1	Digital input 1	Binary	82	Motor current	Data
2	Digital input 2	Binary	83	Motor torque	Data
3	Digital input 3	Binary	84	Motor power	Data
4	Digital input 4	Binary	85	PID speed reference	Data
5	Digital input 5	Binary	86	DC bus voltage	Data
6	Digital input 6	Binary	87	Drive temperature	Data
7	Digital input 7	Binary	88	AMB temperature	Data
8	Digital input 8	Binary	89	Scaling display value 1	Data
9	Analog output 1	Data	90	Scaling display value 2	Data
10	Analog output 2	Data	91	Reserved	
11	Digital output 1	Binary	92	Reserved	
12	Digital output 2	Binary	93	Extension IO input	Data
13	Digital output 3	Binary	94	Reserved	
14	Digital output 4	Binary	95	Reserved	
15	Digital output 5	Binary	96	Plug-In module ID	Data

P0-80 Setting	Function Description	Remark	P0-80 Setting	Function Description	Remark
16	On condition	Binary	97	Anybus module type ID	Data
17	User register 1 (RAM)	Binary/Data	98	Anybus module error	Data
18	User register 2 (RAM)	Binary/Data	99	Anybus status	Data
19	User register 3 (RAM)	Binary/Data	100	Reserved	Data
20	User register 4 (RAM)	Binary/Data	101	Scope channel 1 data	Data
21	User register 5 (RAM)	Binary/Data	102	Scope channel 2 data	Data
22	User register 6 (RAM)	Binary/Data	103	Scope channel 3 data	Data
23	User register 7 (RAM)	Binary/Data	104	Scope channel 4 data	Data
24	User register 8 (RAM)	Binary/Data	105	OLED language index	Data
25	User register 9 (RAM)	Binary/Data	106	OLED display version	Data
26	User register 10 (RAM)	Binary/Data	...	Reserved	
27	User register 11 (RAM)	Binary/Data	124	PLC user ID	Data
28	User register 12 (RAM)	Binary/Data	...	Reserved	
29	User register 13 (RAM)	Binary/Data	130	kWh meter (user resettable)	Data
30	User register 14 (RAM)	Binary/Data	131	MWh meter (user resettable)	Data
31	User register 15 (RAM)	Binary/Data	132	kWh meter (fixed)	Data
32	User analog output 1	Data	133	MWh meter (fixed)	Data
33	User analog output 2	Data	134	Total run hour	Data
34	Reserved	Data	135	Total run minutes and seconds	Data
35	Reserved	Data	136	Run hour since last enable	Data
36	User relay/digital output 1	Binary	137	Run min/sec since last enable	Data
37	User relay/digital output 2	Binary	...	Reserved	
38	User relay/digital output 3	Binary	143	Real time clock second	Data
39	User relay/digital output 4	Binary	144	Real time clock minute	Data
40	User relay/digital output 5	Binary	145	Real time clock hour	Data
41	User scaling value	Data	146	Real time clock weekday	Data

P0-80 Setting	Function Description	Remark	P0-80 Setting	Function Description	Remark
42	User scaling decimal	Data	147	Real time clock day	Data
43	User speed reference	Data	148	Real time clock month	Data
44	User torque reference	Data	149	Real time clock year	Data
45	User/fieldbus ramp reference	Data	...	Reserved	
46	Scope index 1/2	Data	255	Dummy register	
47	Scope index 3/4	Data			
48	24hour timer clock (hh:mm)	Data			
49	User display control register	Data			
50	User display value register	Data			
...	Reserved				
61	Analog input 1 (Q12)	Data			
62	Analog input 1 (%)	Data			
63	Analog input 2 (Q12)	Data			
64	Analog input 2 (%)	Data			
65	Digital input status (1~5)	Data			
66	Speed reference	Data			
67	Digital speed pod	Data			
68	Field bus speed reference	Data			
69	Master speed reference	Data			
70	Slave speed reference	Data			
71	Frequency speed reference	Data			
72	Torque reference (Q12)	Data			
73	Torque reference (%)	Data			
74	Master torque reference	Data			
75	Fieldbus torque reference	Data			
76	PID user reference	Data			

P0-80 Setting	Function Description	Remark	P0-80 Setting	Function Description	Remark
77	PID user feedback	Data			
78	PID reference	Data			
79	PID feedback	Data			
80	PID output	Data			

Appendix:

Revision History			
Version	Comments	Author	Date
1.0	Document Creation	JP	02/08/12
1.1	Revised with additional options added	KB	04/26/13
<p><i>**This application note was originally created by Invertek Drives Limited. Bardac Corporation does not claim responsibility for its contents. By using this application note, you accept that Bardac Corporation has no liability for any damage or claims resulting from the use of the information contained herein.**</i></p>			