User Manual of parameters setting

V1.1

This Manual is to describe the meaning and range of all the parameters that are changeable.

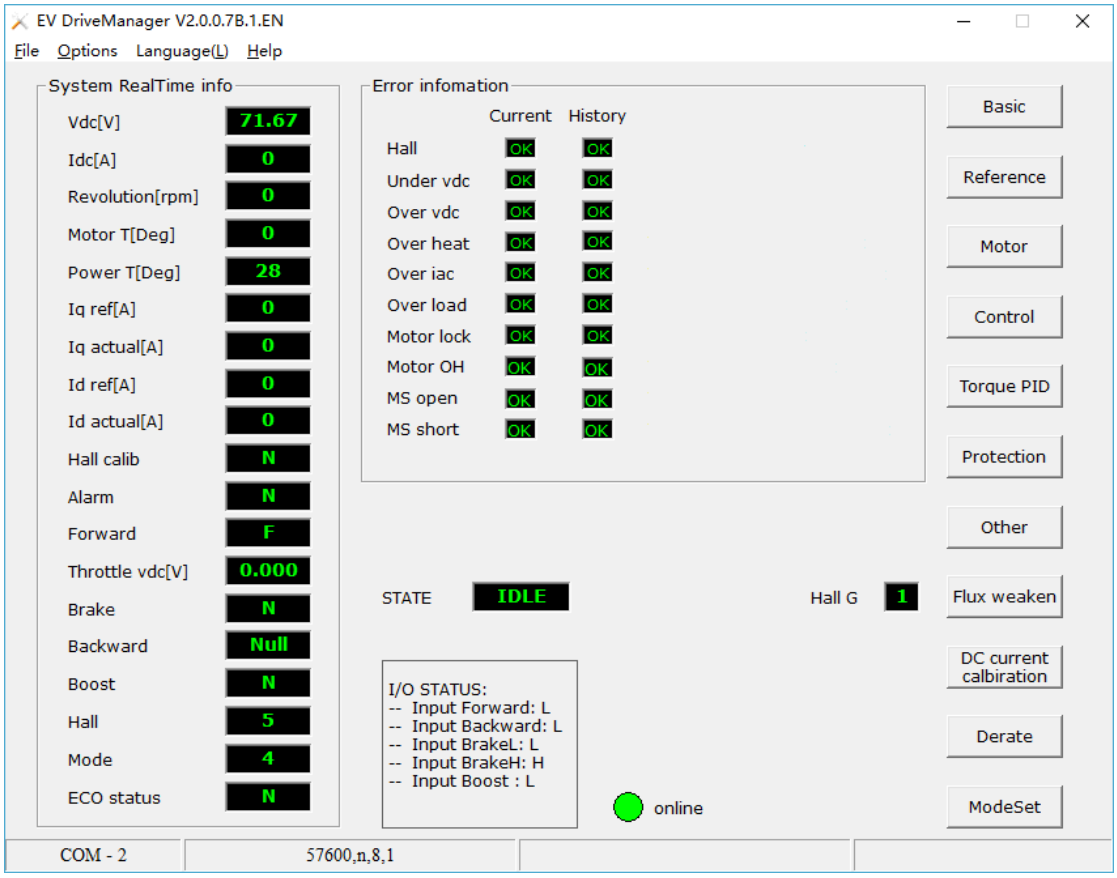


Fig 1. Main window of the DriveManager

The parameters manual will be detailed described in the following page.

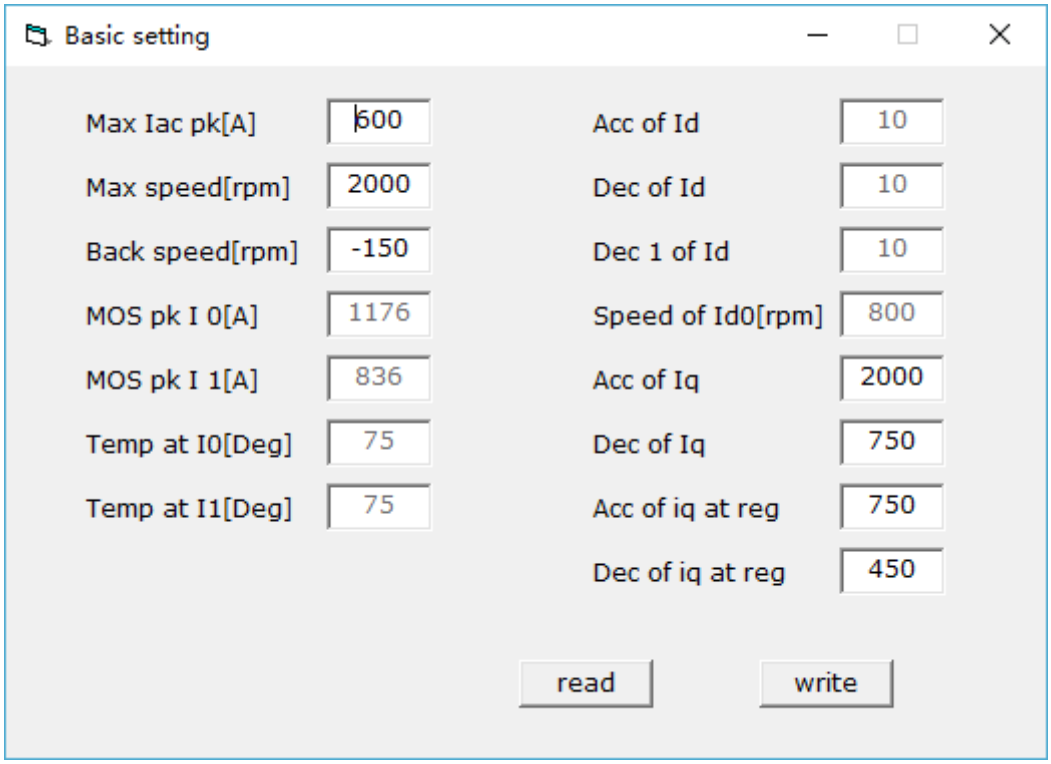


Fig 1 Mask of Basic

Name	**Meaning**	**range**	**unit**	**comments**
Max Iac pk	The Max motor current	0 ~ 600	A	A curve table will be showed later
Max speed	The max rot speed of motor at boost mode	< 2500	RPM	It shows the step of speed: Max speed / 13
Back speed	Reverse speed limit		RPM	
MOS pk I 0	Hardware fixed		A	not changeable
MOS pk I 1			A	
Temp at I 0			Degree	
Temp at I 1			Degree	
Acc of Id	related to IPMSM			not available to in-wheel motor
Dec of Id				
Dec 1 of Id				
Speed of Id0			RPM	
Acc of Iq	Acceleration of current when driving forward	< 20000		
Dec of Iq	Deceleration of current when driving forward	< 20000		
Acc of iq at reg	Acceleration of current when driving backward	< 20000		
Dec of Iq at reg	Deceleration of current when driving backward	< 20000		

table 1 Basic parameters

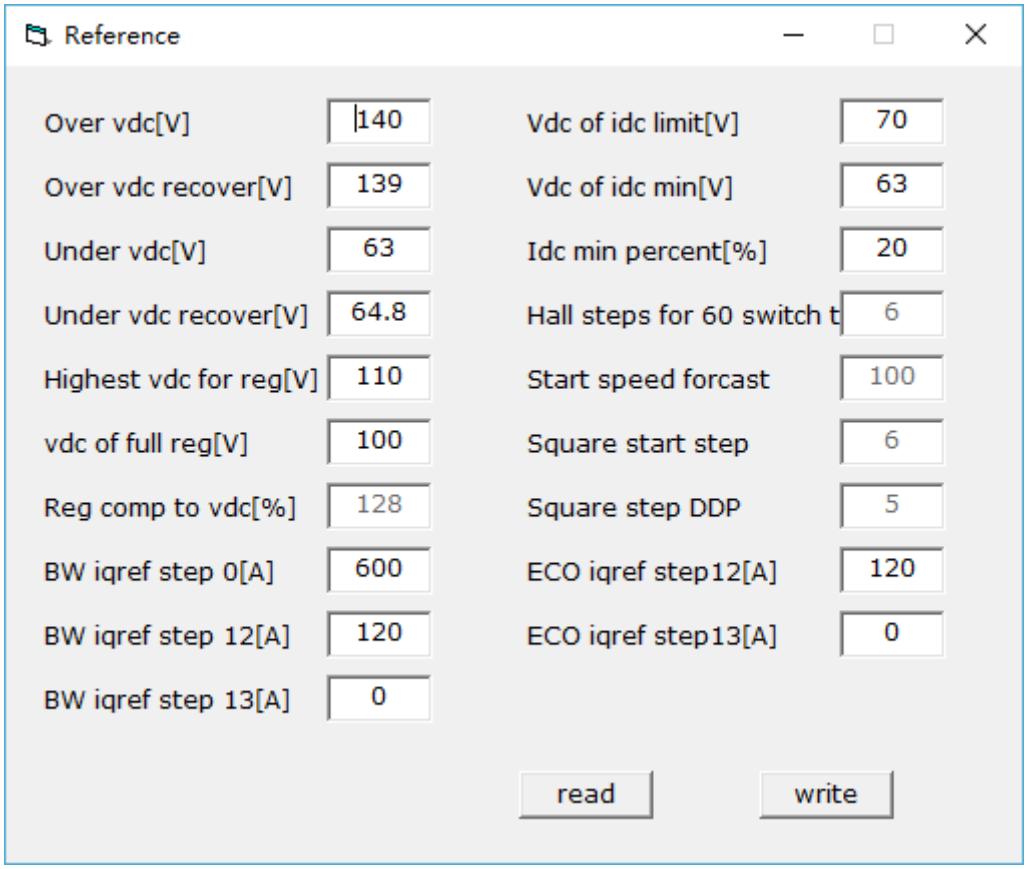
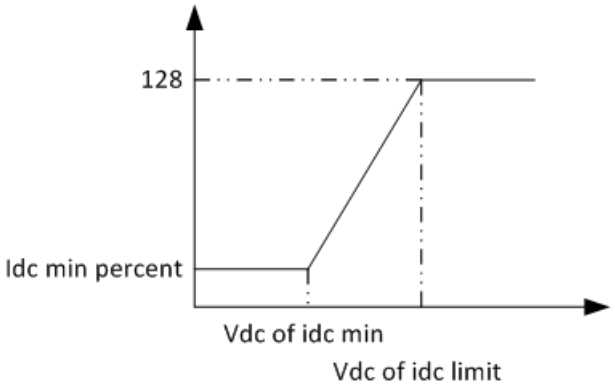


Fig 2. Mask of Reference

Name	Meaning	range	unit	comments
Over vdc	Highest voltage the controller can endurance	< 140	V	
Over vdc recover	Over voltage error will be clear when voltage lower than this value	<140	V	
Under vdc	Lowest voltage the controller can work	<140	V	
Under vdc recover	Under voltage error will be clear when voltage higher than this value	<140	V	
Highest vdc for reg	when regeneration enable, when voltage higher than this value, regeneration will be set to 0 automatically	<140	V	
vdc of full reg	when regeneration enable, when voltage lower than this value, regeneration will be set to	<140	V	

	set value automatically			
Reg comp to vdc	related to IPMSM			not available to in-wheel motor
BW iqref step 0	related to backward torque	<600	A	detailed illustration will be in the following
BW iqref step 12				
BW iqref step 13				
Vdc of idc limit	related to reduce output capability based on battery status	< 140	V	see curve 1
Vdc of idc min		< 140	V	
Idc min percent		0-128		
Hall steps for 60 switch to 360	related to start stability			
start speed forecast	related to start stability			
Square start step	related to start stability			
Square step DDP	related to start stability			
ECO iqref step 12	de-actived in in-wheel motor application	<600	A	not available
ECO iqref step 13				

table 2.Reference parameters



curve 1. reduce load parameters

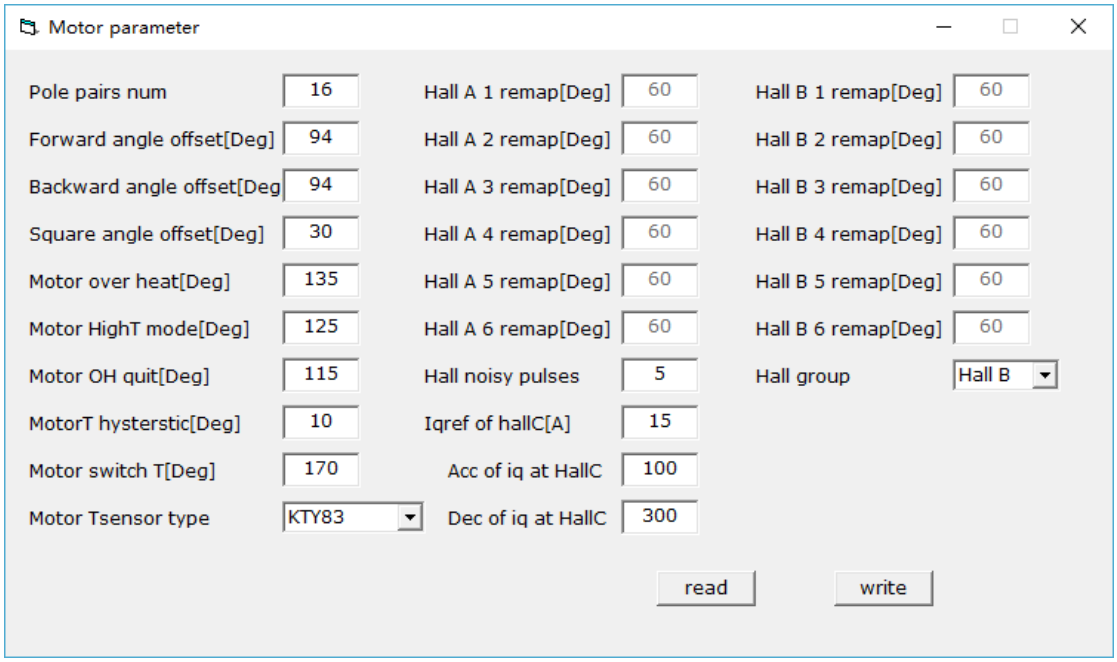


fig 3. Mask of Motor

Name	**Meaning**	**range**	**unit**	**comments**
Pole pairs num	pole pairs num of motor			
Forward angle offset	Angle offset	-180~179	Degree	related to motor
Backward angle offset	Angle offset	-180~179	Degree	
Square angle offset		30	Degree	do not modify
Motor over heat	temperature of motor over heat	<180	Degree	
Motor HighT mode	when temperature higher than this value, reduce output to half	<180	Degree	
Motor OH quit	temperature of recover to normal	<180	Degree	
MotorT hystersitc	reserved			
Motor switch T	reserved			
Motor Tsensor type	type of thermistor of motor			
Hall A 1 remap	related to the hall sensor position of motor			do no modify
Hall A 2 remap				
Hall A 3 remap				
Hall A 4 remap				
Hall A 5 remap				
Hall A 6 remap				
Hall B 1 remap				

Hall B 2 remap				
Hall B 3 remap				
Hall B 4 remap				
Hall B 5 remap				
Hall B 6 remap				
Hall noise pulses	reserved			do no modify
Iqref of hallC	reserved			do no modify
Acc of iq at HallC	reserved			do no modify
Dec of iq at HallC	reserved			do no modify
hall group	current group of hall sensor			switch to normal one auto matically

Table 3. parameters of Motor

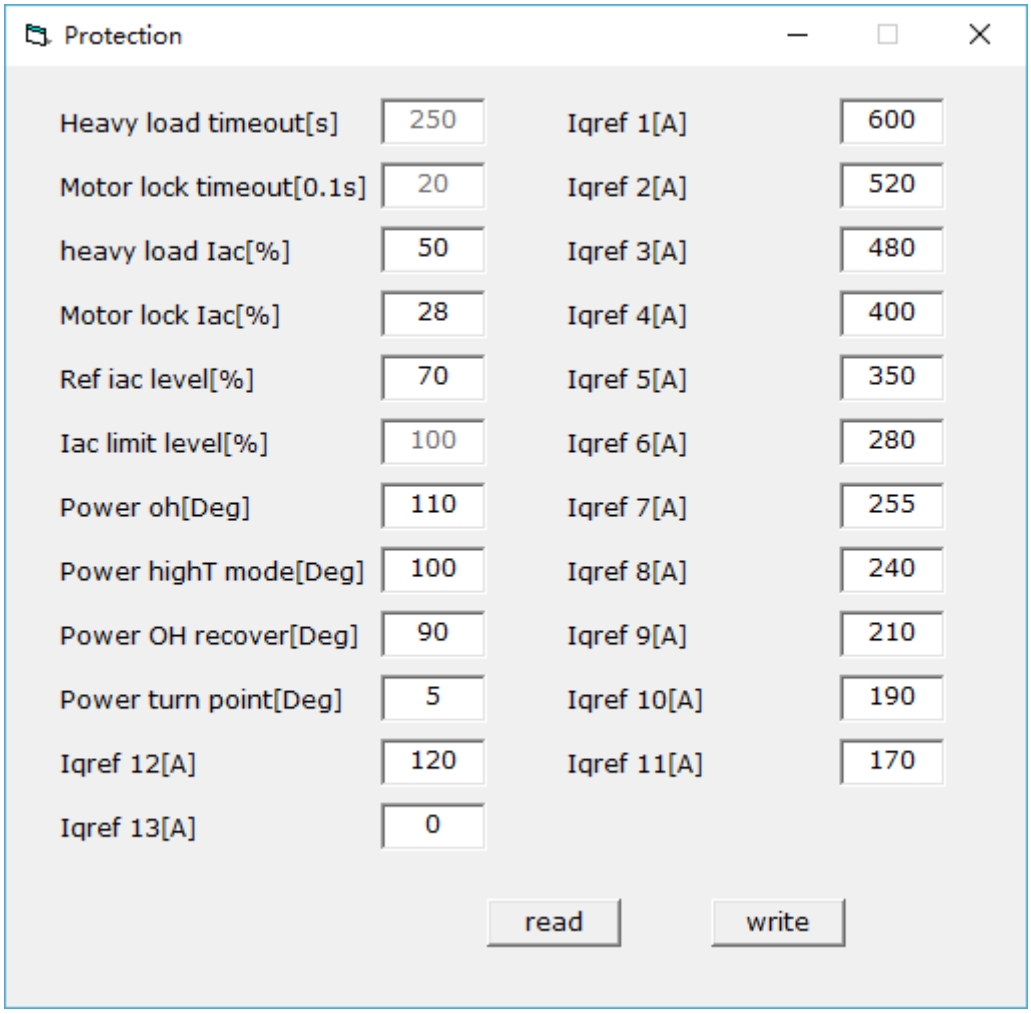


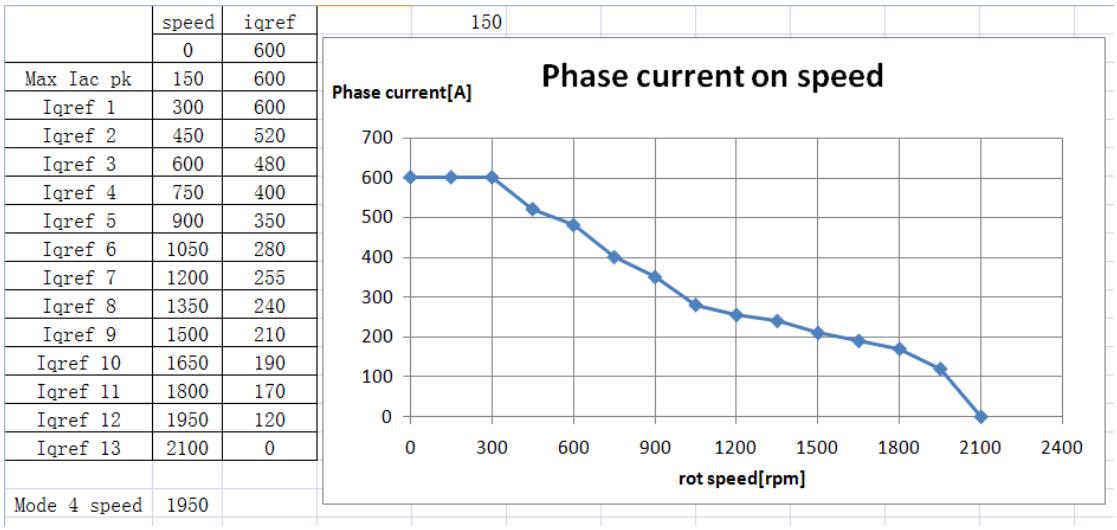
Fig 4. Mask of Protection

Name	**Meaning**	**range**	**unit**	**comments**
Heavy load timeout	time with heavy load		s	
Motor lock timeout	Time when motor lock		s	
Heavy load Iac	The percent of heavy		%	

	load based on current			
Motor lock Iac	The percent of motorlock based on current		%	
Ref Iac level	related to Hardware		%	
Iac limit Level	related to Hardware		%	
Power OH	temperature of controller over heat error occurs		Degree	
Power HighT mode	temperature of controller reduce output to half		Degree	
Power OH recover	temperature controller will recover to normal		Degree	
Power turn point	related to Hardware		Degree	

Curve 2 shows the relationship of Iqref and speed.

	speed	iqref
	0	600
Max Iac pk	150	600
Iqref 1	300	600
Iqref 2	450	520
Iqref 3	600	480
Iqref 4	750	400
Iqref 5	900	350
Iqref 6	1050	280
Iqref 7	1200	255
Iqref 8	1350	240
Iqref 9	1500	210
Iqref 10	1650	190
Iqref 11	1800	170
Iqref 12	1950	120
Iqref 13	2100	0
Mode 4 speed	1950	



Curve 2. phase current on different speed

In Curve 2, horizontal axis stands for motor speed, there are 14 speed points in step, and the speed step(150) comes from "Mode 4 speed" in Fig 8 in following equation:

speed step = Mode 4 speed / 13 = 1950 / 13 = 150(default)

Vertical axis stands for phase current reference, there are 14 phase current points in speed step, the 14 points come from: Max Iac pk(Fig 1), and from Iqref 1 to Iqref 13 in Fig 6.

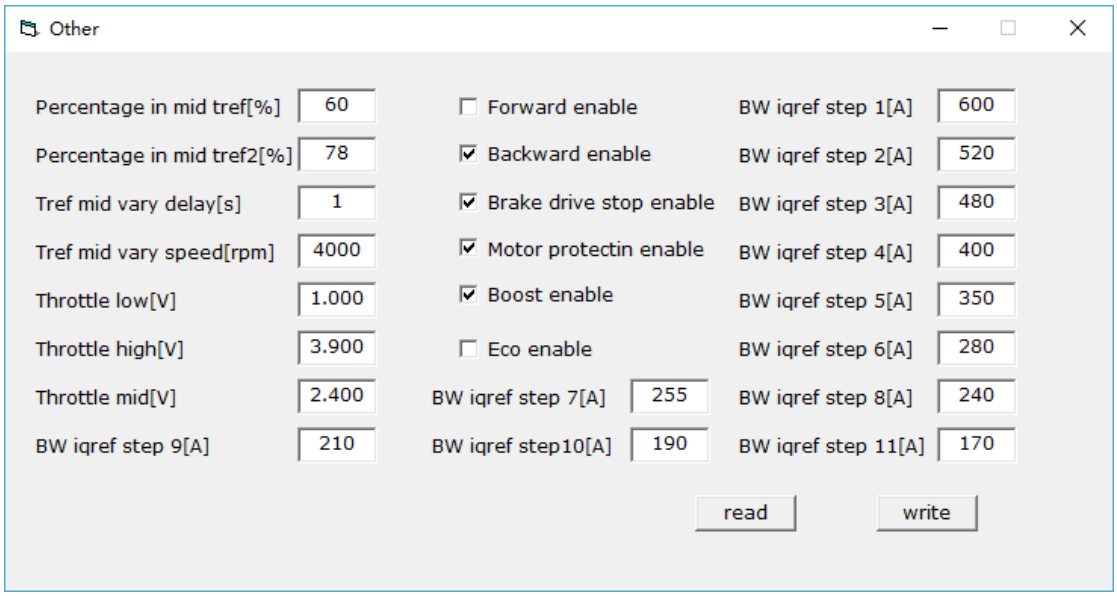
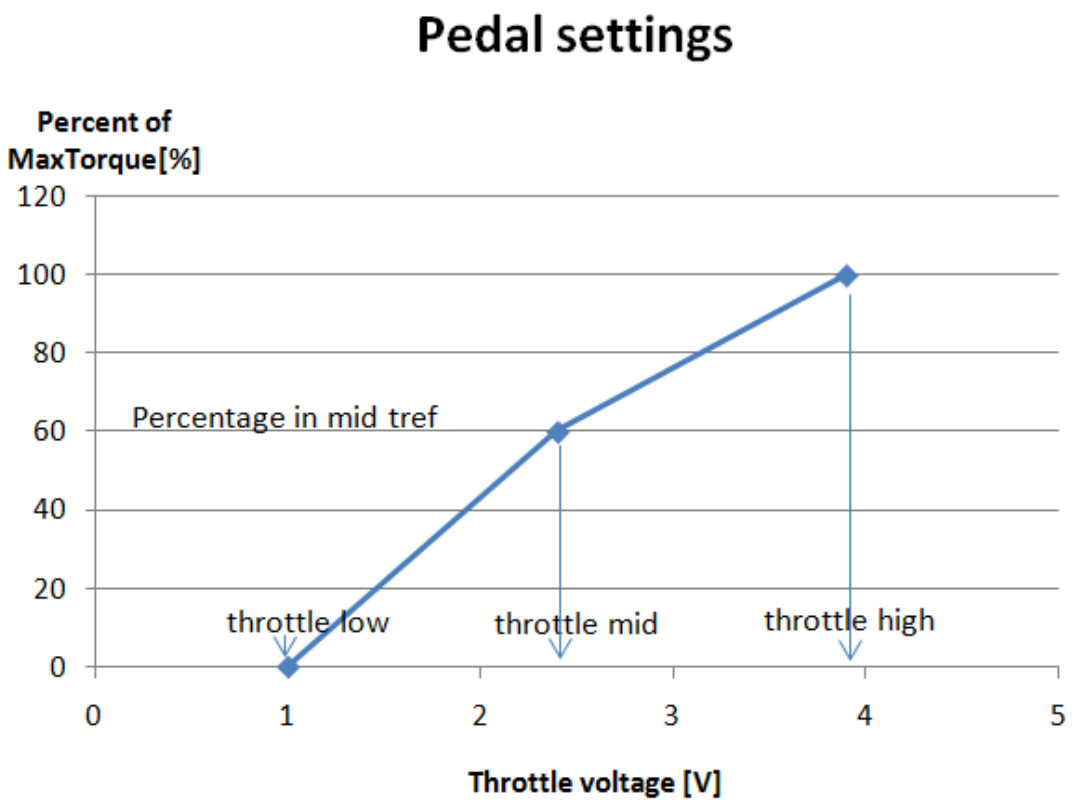


Fig 5. Mask of Other

Name	**Meaning**	**range**	**unit**	**comments**
Percentage in mid tref	output percentage at Throttle mid	0- 100	%	see curve 3
Percentage in mid tref2	reserved	0-100	%	
Tref mid vary delay	reserved			
Tref mid vary speed	reserved			
Throttle low	low threshold of pedal	0 - 5	V	see curve 3
Throttle high	high threshold of pedal	0 - 5	V	
Throttle mid	mid value of pedal	0 - 5	V	
Forward enable				
Backward enable				
Brake drive stop enable	used for charging or brake input			
Motor protection enable	for motor temperature protecion			
Boost enable				
Eco enable				
BW iqref step1 ~ BW iqref step 11	phase current settings at backward mode			see curve 4

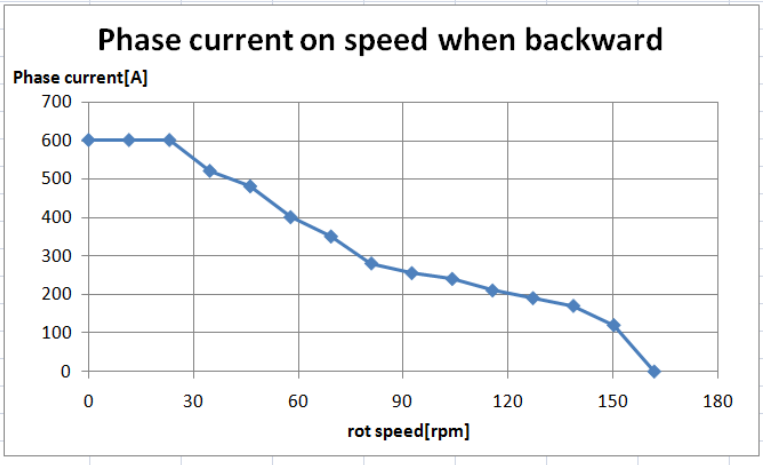
Table 6. Parameters of Other



curve 3. Pedal settings

	speed	iqref
	0	600
BW iqref step0	11.54	600
BW iqref step1	23.08	600
BW iqref step2	34.62	520
BW iqref step3	46.15	480
BW iqref step4	57.69	400
BW iqref step5	69.23	350
BW iqref step6	80.77	280
BW iqref step7	92.31	255
BW iqref step8	103.8	240
BW iqref step9	115.4	210
BW iqref step10	126.9	190
BW iqref step11	138.5	170
BW iqref step12	150	120
BW iqref step13	161.5	0
Mode 4 speed	150	

11.53846



Curve 4. Phase current setting when backward

This part of phase current settings is similar to forward phase current settings.

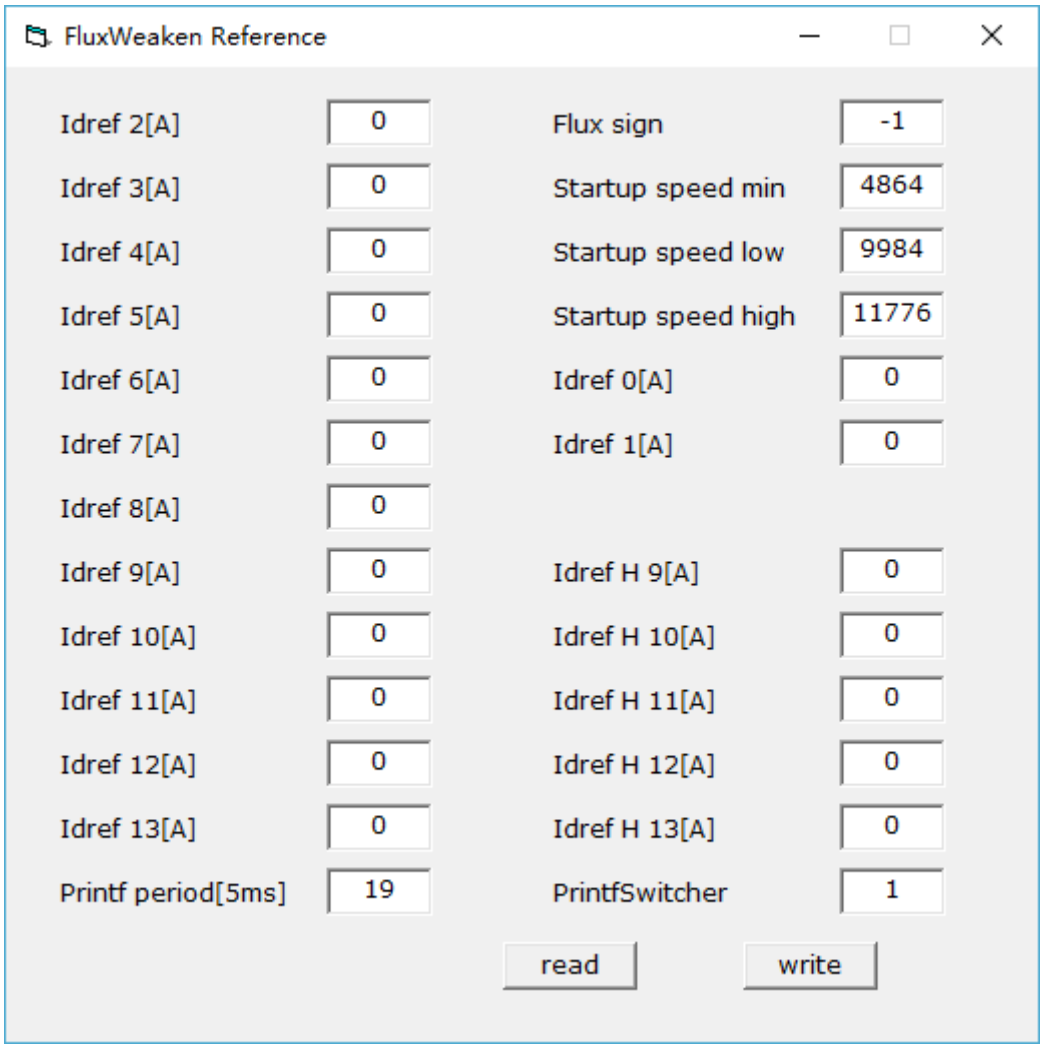


Fig 6. Mask of FluxWeaken Reference

In the mask of FluxWeaken Reference, only parameters from Idref0 to Idref13 is in usage. the speed step is the same as forward phase current settings. for In-wheel motor, we can ignore this fluxweaken part.

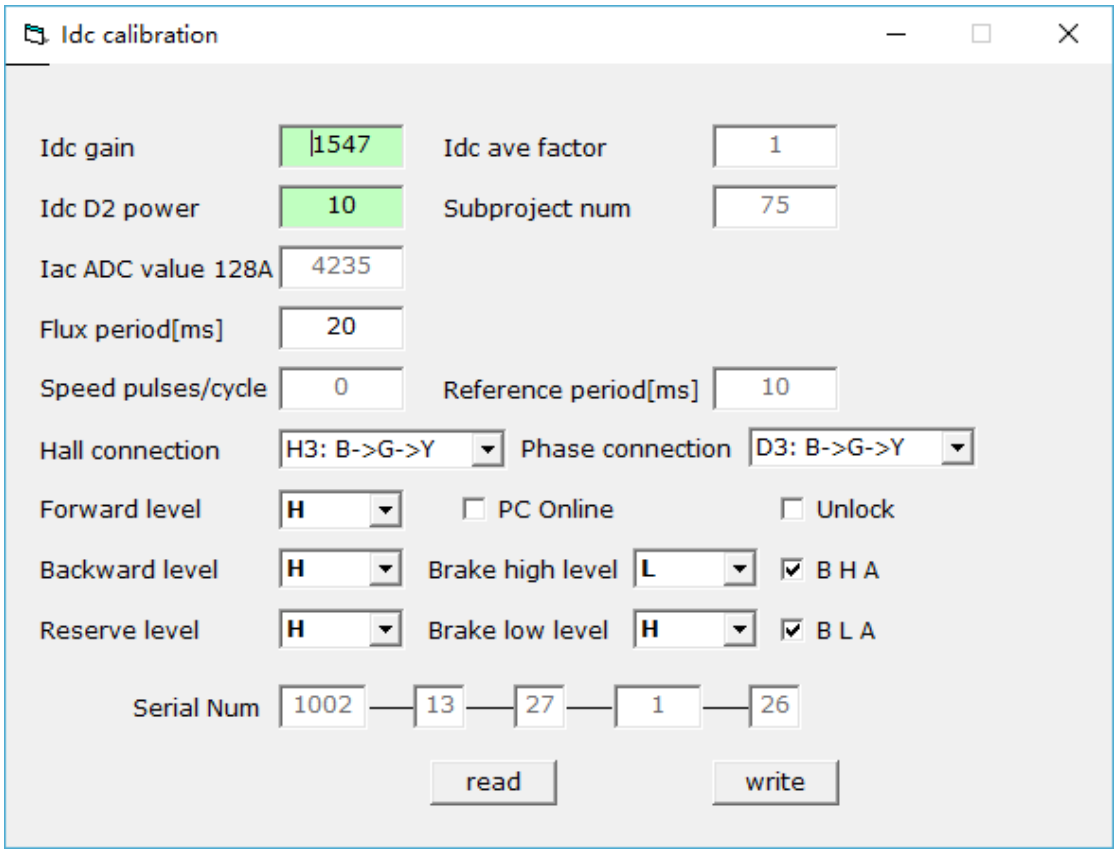


Fig 7. Mask of DC current calibration

Name	Meaning	range	unit	comments
Idc gain	reserved			
Idc D2 power				
Iac ADC value 128A				
Flux period	reserved			
Speed pulses/cycle	Controller output pulse according to motor speed			
Idc ave factor	reserved			
subproject num	Hardware related			
Reference period	not changeable			
Hall connection	Hall connection way	H3, H1		
Phase connection	Phase connection way	D3,D1		
Forward level	Hardware related			
Backward level	Hardware related			
Brake high level	Hardware related			
Brake low level	Hardware related			
BHA	Brake High Active			
BLA	Brake Low Active			

Table 6. parameters of DC current calibration

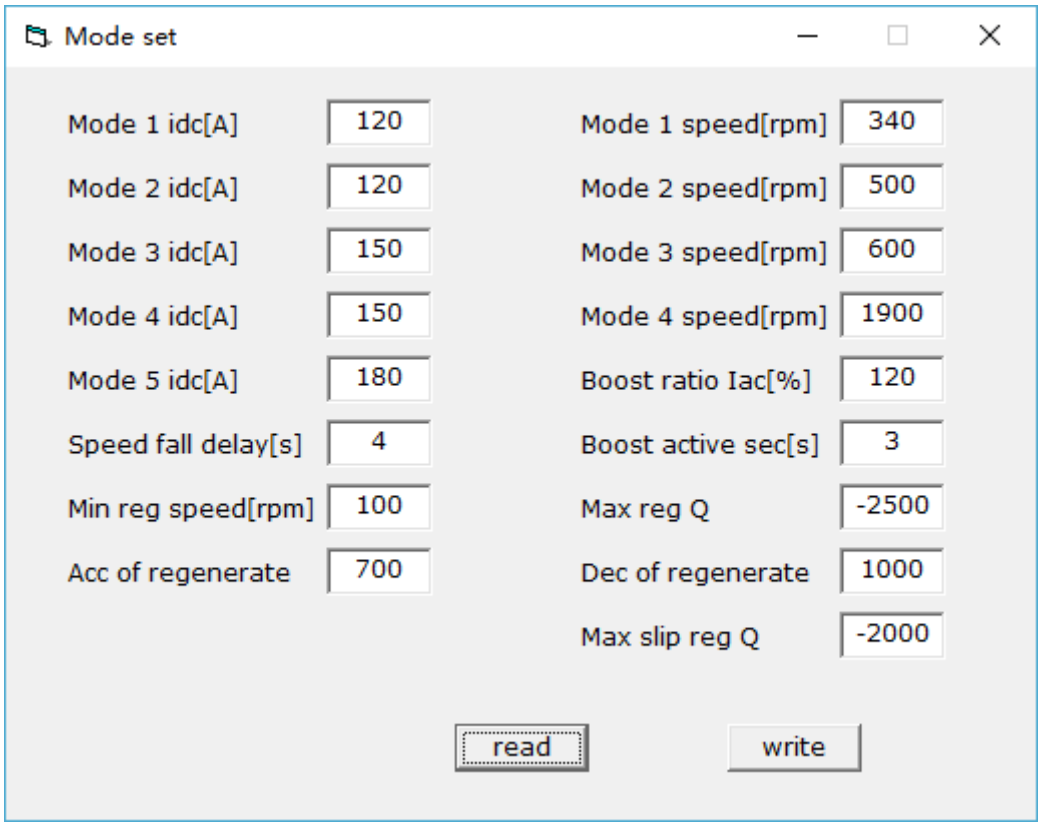


Fig 8. Mask of ModeSet

Name	**Meaning**	**range**	**unit**	**comments**
Speed fall delay	transient time between mode change		s	
Min reg speed	The min speed for regeneration active	>= 0	RPM	
Acc of regenerate	Acceleration of Iq when regenerating			
Mode 1 speed	Speed limit at mode 1	< 20000	RPM	
Mode 2 speed	Speed limit at mode 2	< 20000	RPM	
Mode 3 speed	Speed limit at mode 3	< 20000	RPM	
Mode 4 speed	Speed limit at mode 4	< 20000	RPM	
Boost ratio Iac	at boost mode, phase current will be this value multiplied by iqref[7]...[13]	1~1.5		
Boost active sec	the time for boost function active			
Max reg Q	max reg equivalent Iq when brake active	-32768 ~ 0		
Dec of regenerate	Deceleration of Iq when regenerating			
Max slip reg Q	max reg equivalent Iq when release pedal	-32768 ~ 0		

Table 7. parameters of ModeSet

Record

Version	comments	date	Maker
V1.1	The initial version of parameters setting based on in-wheel motor	2018-9-18	Yang Rong