Case name	Shihlin SA3 torque control for electric vehicle system				
Department	FA engineering group	date	2016.09.30	page	2
Product	Shihlin SA3 series				

1.Requirements

The customer uses SA3 with PM motor, which is used as the power source of electric vehicle system. The inverter uses torque control. When stepping on the throttle, it provides 0~10V voltage as torque command. The demand is that the electric vehicle can move forward and backward like a normal vehicle.

2.Problem

Since the car is given a 0~10V torque command voltage by stepping on the throttle, the throttle cannot give a negative torque command. It can be seen from the red box in the table below whether the STF (forward rotation) or STR (reverse) signal is externally applied. When the torque command is given, the car must be forward, and the reverse function cannot be achieved.

	OPERATING CONDITION							
Operation command	forward	reverse	forward	reverse	forward	reverse	forward	reverse
Torque command polarity	+	+	-	-	+	+	-	-
Speed limit set polarity	+	-	-	+	-	+	+	-
Normal rotation direction	forward		reverse		forward		reverse	
Normal speed limit (11-18=0,11-17=0)	11-13 +11-14	11-13 +11-14	11-13 +11-14	11-13 +11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=0)	11-13	11-13	11-13	11-13	11-14	11-14	11-14	11-14
Normal speed limit (11-18=0,11-17=1)	Frequency +11-14	Frequency +11-14	Frequency +11-14	Frequency +11-14	11-14	11-14	11-14	11-14
Normal speed limit (11-18=1,11-17=1)	Frequency	Frequency	Frequency	Frequency	11-14	11-14	11-14	11-14

3.Solutions:

In addition, an external input terminal is used, and the terminal function parameter is set to 71 (the external torque command polarity is reversed) to control the positive and negative polarity of the torque command, as shown by the blue box in the above table, the motor can be reversed to reach the reversing function when the negative torque is present. By stepping on the throttle the running speed of the car forward or backward 0~10V is as shown in the green box above (refer to the table below, according to the original factory setting value 11-18=1, 11-17=0), the forward speed is set in 11 -13 , the reverse speed is set in 11-14.

Parameter	Name	Factory Value	Setting Range	Content
11-12 P.401	Torque reference	0.0%	-400.0 ~ 400.0%	-400.0 ~ 400.0%
11-13 P.402	Speed limit	0.0%	-120% ~ 120%	0 ~ 120%
11-14 P.403	Speed limit bias	10%	0 ~ 120%	0 ~ 120%
11-15 P.404	Torque filter time	0ms	0 ~ 1000ms	0 ~ 1000ms
11-16 P.405	Torque setting source	0	0	Given by the11-12(P.401).
			1	Given by the analog or pulse input.
			2	Given by the communication mode.
11-17 P.406	Selection of speed limit	0	0	The speed is limited according to 11-13(P.402) and 11-14(P.403)
			1	Frequency reference source(it is decided according to00-16(P.79))
11-18 P.407	Unidirectional speed limit bias	1	0	Unidirectional speed limit bias is invalid.
			1	Unidirectional speed limit bias is valid.