Integrated Servo Motor ISV Series



BLDC Servo Motor + Drive, 24-50VDC, Frame 57mm ,90W-180W

Chapter 1 Introduction

1.1 Features and specifications

iSVxxx integrated servo motor is a 57mm frame size brushless motor integrated with a 16bit encoder and a servo drive. At very compact size and with all components integrated, the iSVxxx can save mounting space, eliminate encoder connection & motor wiring time, reduce interference, and cut/reduce cable and labor costs.

Integrated compact size for saving mounting space & setup time, and reducing electrical interference.

- Step & direction command input for position control
- Compatible mounting size with stepper motor
- Smooth motor movement and excellent respond time
- Isolated control inputs of Pulse, Direction
- In-position and fault outputs to external motion controllers for complete system controls
- Over voltage, over-current, and position-error protection

Electrical Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	20	36	50	VDC
Continuous Current	0	-	6.0	А
Pulse Input Frequency	0	-	0-300	kHz
Pulse Voltage	0	5	24	V
Logic Signal Current	7	10	16	mA
Isolation Resistance	100	-	-	MΩ

Note : The max pulse frequency is software configurable

Operating Environment

Cooling	Natural Cooling or Forced cooling				
	Environment	Avoid dust, oil fog and corrosive gases			
Operating	Ambient Temperature	0° C $- 40^{\circ}$ C (32 $^{\circ}$ F $- 104^{\circ}$ F)			
Environment	Humidity	40%RH — 90%RH			
	Operating Temperature (Heat Sink)	70℃ (158°F) Max			
Storage Temperature	-20°C — 65°C (-4°F — 149	°F)			

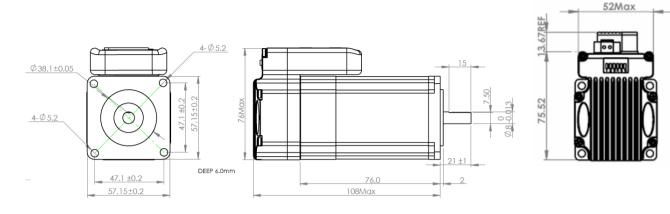
Motor Specifications

Part Number	ISV57T-090	ISV57T-130	ISV57T-180
Rated Power(W)	90	130	180
Rated Torque(Nm)	0.30	0.45	0.6
Peak Torque(Nm)	0.90	1.1	1.5
Rated Speed(rpm)	3000	3000	3000
Peak Speed(rpm)	4000	4000	4000
Rated Voltage(Vdc)	36	36	36
Weight(kg)	0.95	1.25	1.54

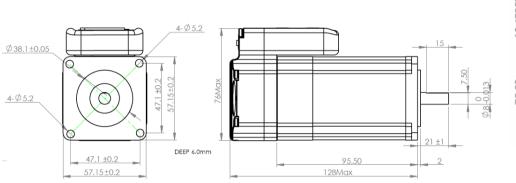
Applications

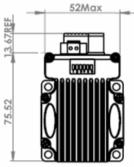
iSVxxx can be used in various applications such as laser cutters, laser markers, high precision X-Y tables, labeling machines, CNC router, etc. Its unique features make the iSVxxx an ideal choice for applications that require both low-speed smoothness and small mounting space.

1.2 Mechanical Specifications

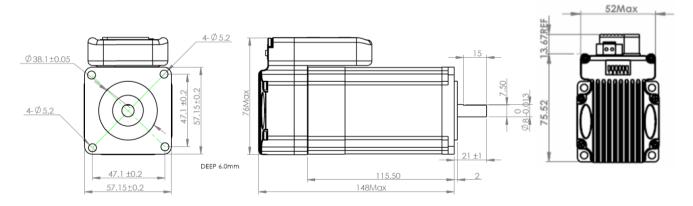


Mechanical Specification of ISV57T-090





Mechanical Specification of ISV57T-130



Mechanical Specification of ISV57T-180

Chapter 2 Conection

2.1 Connectors and Pin Assignment

iSVxxx has three connectors, a connector for control signals connections, a connector for RS232 communication connection, and a connector for power connections.

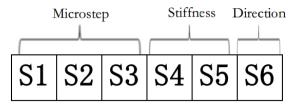
			Control Signal Connector	
Pin	Name	I/O	Description	
1	PUL+	I	<u>Pulse Signal</u> : In single pulse (pulse/direction) mode, this input represents pulse signal, active at each rising or falling edge (Software configurable). In double pulse mode (software configurable), this input	The faction of formation
2	PUL-	I	represents clockwise (CW) pulse, active both at each high level and low level. 4.5-24V for PUL-HIGH, 0-0.5V for PUL-LOW. For reliable response, pulse width should be longer than 2.5µs for 200K MAX input frequency or 1µs for 500K MAX input frequency.	The fuction of four pins will be different if ISV motor works in internal velocity mode .
3	DIR+	I	<u>Direction Signal</u> : In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse,	PIs refer to chapter 3 and chapter 4 about how to use these four
4	DIR-	I	active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5µs at least. 4.5-24V for DIR-HIGH, 0-0.5V for DIR-LOW. Toggle DIP switch SW5 to reverse motion direction.	pins for velocity mode .
5	ALM+	0	<u>Alarm Signal</u> : OC output signal, activated when one of the following protection is activated: over-voltage and over current error. They can sink or source MAX 50mA current at 24V. By default, the impedance	
6	ALM-	0	between ALM+ and ALM- is low for normal operation and becomes high when any protection is activated. The active impedance of alarm signal is software configurable.	

Power Connector

Pin	Name	I/O	Description
1	+Vdc	I	Power Supply Input (Positive) 24-36VDC recommended. Please leave reasonable reservation for voltage fluctuation and back-EMF during deceleration.
2	GND	GND	Power Ground (Negative)

	RS232 Communication Connector						
Pin	Pin Name I/O Description						
1	1 +5V O +5V power output (Note: Do not connect it to PC's serial port)						
2	TxD	0	RS232 transmit.				
3	GND	GND	Ground.				
4	RxD	I	RS232 receive.				
5	NC	-	Not connected.				

2.2 DIP Switch Settings



. Pulses/Rev (S1-S3)

Pulse/rev	S1	S2	S3
Pr0.08	Off	Off	Off
1600	On	Off	Off
2000	Off	On	Off
3200	On	On	Off
4000	Off	Off	On
5000	On	Off	On
6400	Off	On	On
8000	On	On	On

Stiffness setting(S4—S5)

Stiffness	S4	S5
Pr0.03	Off	Off
72	On	Off
71	Off	On
70	On	On

Motor Shaft Direction (S6)

DIP switch S6 is used for changing motor shaft rotation direction. Changing position from "ON" to "OFF", or "OFF" to "ON" will reverse iSVxxx rotation direction.

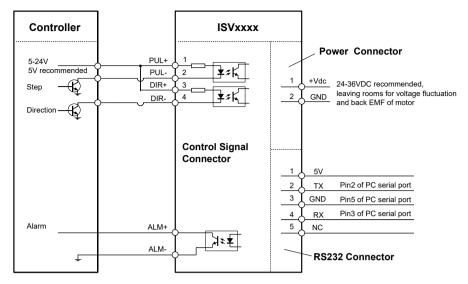
S6	Direction
Off	CCW
On	CW

2.3 RS232 Communication Cable Connections

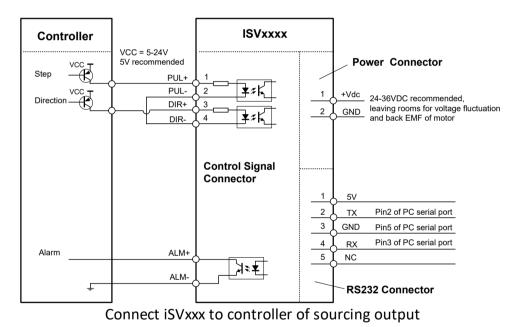
Note1: The RS232 communication port is not isolated. Please use an isolated power supply for the ISVxxx when the PC's serial port is not isolated.

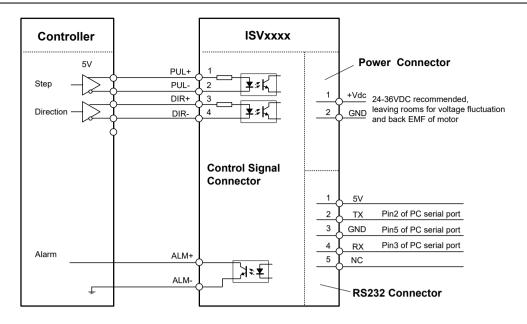
Note2: Do not plug or unplug the connector when power is on.

2.4 Typical Connections



Connect iSVxxx to controller of sinking output





Connect iSVxxx to controller of differential output

Chapter 3 Parameter

3.1 Parameter List

Num	Name	Range	Default	Unit
Pr0.01	Control mode setup	20~21	20	
Pr0.02	Real-time auto-gain tuning	0~2	1	
Pr0.03	Selection of machine stiffness at real-time auto-gain tuning	50~81	70	
Pr0.04	Inertia ratio	0~10000	300	%
Pr0.06	Command pulse rotational direction setup	0~ 1	0	
Pr0.08	Command pulse input mode setup	0~ 32767	4096	Pulse
Pr0.13	1st torque limit	0~ 500	300	
Pr0.14	Position deviation excess setup	0~ 500	200	0.1rev
Pr0.20	Test result of inertia ratio	0~ 32767	0	%
Pr1.00	1st gain of position loop	0~ 30000	320	0.1/s
Pr1.01	1st gain of velocity loop	1~ 32767	180	0.1Hz
Pr1.02	1st time constant of velocity loop integration	1~ 10000	310	0.1ms
Pr1.03	1st filter of velocity detection	0~ 10000	15	
Pr1.10	Velocity feed forward gain	0~ 1000	300	0.10%
Pr1.11	Velocity feed forward filter	0~ 6400	50	0.01ms
Pr1.37	Register for special function	0~ 1	0	
Pr2.22	positional command smoothing filter	0~ 32767	0	0.1ms
Pr3.03	Speed command reversal input	0~ 1	0	
Pr3.04	1st speed setup	-5000 ~ 5000	0	r/min
Pr3.05	2nd speed setup	-5000 ~ 5000	0	r/min
Pr3.06	3rd speed setup	-5000 ~ 5000	0	r/min
Pr3.07	4th speed setup	-5000 ~ 5000	0	r/min
Pr3.12	time setup acceleration	0~ 10000	100	ms/(Krpm)
Pr3.13	time setup deceleration	0~ 10000	100	ms/(Krpm)
Pr3.24	maximum speed of motor rotation	0~ 5000	0	r/min
Pr4.06	input selection SI7	0~ 16777215	1200	
Pr4.07	input selection SI8	0~ 16777215	0E00	
Pr4.08	input selection SI9	0~ 16777215	8383	
Pr4.10	output selection SO1	0~ 16777215	1111H	
Pr4.31	Positioning complete range	0~ 10000	10	Pulse
Pr4.35	Velocity coincidence range	10~ 2000	50	r/min
Pr4.36	At-speed	10~ 2000	1000	r/min
Pr5.13	Over-speed level setup	0~ 5000	0	r/min
Pr5.20	Position setup unit select	0~ 2	0	

3.2 Parameter function

3.2.1 Basic Setting

Pr0.01* Control Mode Setup		Range	unit	default		ated ol mode			
	control mode Setup			20 - 21	-	20	Р	S	
	Setup va	lue	st mode						
	20		Position						
	21		Velocity						

pr0.02=1 or 2 , yo the real-time aut	ode of the real-time auto-gain to Varying degree of load inertia Real-time auto-gain tuning funct Basic mode. do not use unbalan switching, mainly used for inter Main application is positioning. equipment without unbalanced equipment with low friction, etc ou can't modify the values of pri- co-gain tuning ,all of them are see machine stiffness at real	in motion tion is disa ced load, f polation m it is recom horizonta c, mainly u 1.01 – pr1.	bled. riction ovemen mendeo l axis, based sed for .13, the	nt . d to use th all screw du point-to-po e values of	is mode riving pint mo them Rel	e on		
pr0.02=1 or 2 , yc the real-time aut	Varying degree of load inertia Real-time auto-gain tuning funct Basic mode. do not use unbalan switching, mainly used for inter Main application is positioning. equipment without unbalanced equipment with low friction, etc ou can't modify the values of pri- co-gain tuning , all of them are see machine stiffness at real	in motion tion is disa aced load, f polation m it is recom horizonta c, mainly u 1.01 – pr1. et by the d	bled. riction wended axis, based axis, bas	nt d to use th all screw di point-to-po e values of self.	is mode riving pint mo them Rel	e on ovement		
invalid standard positioning pr0.02=1 or 2 , yo the real-time aut selection of r	Real-time auto-gain tuning funct Basic mode. do not use unbalan switching, mainly used for inter Main application is positioning. equipment without unbalanced equipment with low friction, etc bu can't modify the values of pri- co-gain tuning , all of them are se machine stiffness at real	tion is disa aced load, f polation m it is recom horizonta c,mainly u 1.01 – pr1. et by the d	bled. riction wended axis, based axis, bas	nt d to use th all screw di point-to-po e values of self.	is mode riving pint mo them Rel	e on ovement		
standard positioning pr0.02=1 or 2 , yo the real-time aut selection of r	Basic mode. do not use unbalan switching, mainly used for inter Main application is positioning. equipment without unbalanced equipment with low friction, etc ou can't modify the values of pri- co-gain tuning , all of them are se machine stiffness at real	nced load, f polation m it is recom horizonta c, mainly u 1.01 – pr1. et by the d	riction ovemended axis, based for .13, the river it	nt d to use th all screw di point-to-po e values of self.	is mode riving pint mo them Rel	e on ovement		
positioning pr0.02=1 or 2 , yo the real-time aut selection of r	switching, mainly used for inter Main application is positioning. equipment without unbalanced equipment with low friction, etc ou can't modify the values of pri- co-gain tuning , all of them are se machine stiffness at real	polation m it is recom horizonta c, mainly u 1.01 – pr1. et by the d	ovemen mendeo l axis, based for .13, the river it	nt d to use th all screw di point-to-po e values of self.	is mode riving pint mo them Rel	e on ovement		
pr0.02=1 or 2 , yo the real-time aut selection of r	equipment without unbalanced equipment with low friction, etc ou can't modify the values of pri- co-gain tuning , all of them are se machine stiffness at real	horizonta c , mainly u 1.01 – pr1. et by the d	l axis, ba sed for .13, the river it	all screw di point-to-po e values of self.	riving pint mo them Rel	ovement		
the real-time aut selection of r	o-gain tuning , all of them are se machine stiffness at real	et by the d	riverit	self.	Rel			
		Range	unit	default				
time auto gain	tuning							
enne aate gan	rtuning	50 - 81	-	70	Р	S		
Low — M	-	ng is valid.						
Low \longrightarrow Servo gain \longrightarrow High 81.80 \longrightarrow 70.69.68 \longrightarrow 51.50 Low \longrightarrow Response \longrightarrow High Notice: Higher the setup value, higher the velocity response and servo stiffness will be obtained. However, when increasing the value, check the resulting operation to avoid oscillation or vibration. Control gain is updated while the motor is stopped.								
;I	Low	Low — Response — High her the setup value, higher the velocity response when increasing the value, check the resulting op	Low \longrightarrow Servo gain \longrightarrow High 70.69.68	Low \longrightarrow Servo gain \longrightarrow High \longrightarrow 70.69.68	Low \longrightarrow Servo gain \longrightarrow High \longrightarrow 70.69.68	Low Servo gain High 		

For ISV motor , stiffness can be set with switch with SW4,SW5, any change from the SW4,5 will be available after restarting power

Pr0.04	Inertia ratio	Range	unit	default		ated ol mode		
110.04		0 -10000	%	300	Р	S		
You can se	et up the ratio of the load inertia against the roto	or(of the mo	tor)ine	ertia.				
Pr0.04=(load inertia/rotate inertia)×100%								
Notice:								
inertia rat becomes	tia ratio is correctly set, the setup unit of Pr1.01 is tio of Pr0.04 is larger than the actual value, the se larger, and when the inertia ratio of Pr0.04 is sma ocity loop gain becomes smaller.	etup unit of	the ve	locity loop	gain			

Pr0.06*	Command Pulse Rotational Direction	Range	unit	default		ated ol mode		
110.00	Setup	0 -1	-	0	Р			
Set command pulse input rotate direction, command pulse input type								
Pr0.07*	Command Pulse Input Mode Setup	Range	unit	default		ated ol mode		
110.07		0 -3	-	3	Р			

Pr0.06	Pr0.07	Command Puls	e Format	Się	gnal	Dir	sitive ectio mmai	n	Dire	ative ection		
0	0 or 2	90 phase difference 2-phase pulse(A p phase)		Puls sign	-	A <u>相</u> B相 B相				1 比A相滞后	 90°	
	1	e- ⊦		t2 t2								
	3 Pulse + sign Pulse sign						t4 t5 "H"			→ t5 "∟"	t6	
1	90 phase differencePulse0 or 22 phase pulse(A phase +B phase)Pulse							「 「	t1 B相	tl tl ti ti tl 比A相超前g		
	1	ie I		t2 t2		t3		_				
	3	Pulse+sign		Puls sign	-	↓ t6	t4 t5	, "	t6 t6	"H" te		
Command	d pulse inp	out signal allow large	est frequency	and s	malles	ttim	ewid	th				
PULS/SIG	GN Signal	Input I/F	Permissible Input Frequ				tTim :2		1	+	+6	
Pulse	longd	istance interface	500kpps	iency	t1 2		.2	t3 1	t4	t5 1	t6 1	
series interface		collector output	200kpps		5		_	2.5	2.5	2.5	2.5	
		and pulse counts	••	otor	Rang	e	unit	d	efault		ated	-
Pr0.08	revolut								0	contr P	ol mode	ĩ
Whenthis	revolution0-32767pulse0PSet the command pulse that causes single turn of the motor shaft.When this setting is 0, Pr009 1 st numerator of electronic gear and Pr0.10 Denominator of electronic Gear become valid.											
Pr0.20	Range unit default Related											
	2.52.03				0 - 32	767	%		0	Р	S	
	0-32767 % 0 P S											

3.2.2 Gain Adjustment

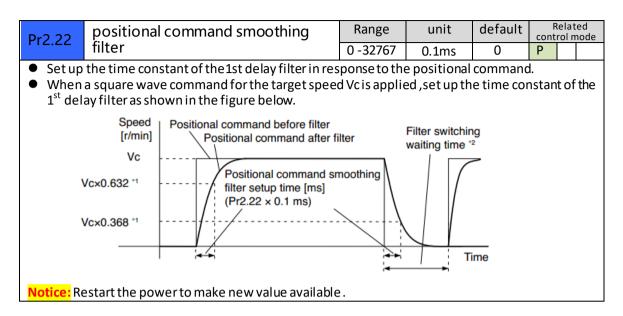
Pr1.00	1st gain of position loop	Range	unit	default		ated ol mode
111.00	rst gain of position loop		0.1/s	320	Р	
	etermine the response of the positional contro aster the positioning time you can obtain. Note	, ,		U 1		

Pr1.01	1st gain of velocity loop	Range	unit	default		ated ol mode		
111.01	ist guill of velocity loop	0 -32767	0.1Hz	180	Р	S		
You can determine the response of the velocity loop. In order to increase the response of overall servo system by setting high position loop gain, you need higher setup of this velocity loop gain as well. However, too high setup may cause oscillation.								
Pr1.02	1st Time Constant of Velocity Loop	Range	unit	default		elated ol mode		

F11.02Integration0 -100000.1ms310PSYou can set up the integration time constant of velocity loop, Smaller the set up, faster you can
dog-in deviation at stall to 0.The integration will be maintained by setting to "9999". The integration

	ect will												
D1	0.2	1 с+ Г	iltor of Valo	it (Dotoctic	20		Rang	ge un	it	defau	lt	Rel contro	ated
^o r I	.03	ISLF	ilter of Veloo	Thy Detection	חו	Ē	0 -32	L –		15		P	S
	You ca	n set u	p the time con	stant of the lo	w pass filte	r (LPF	-) after	the spe	eec	detect	tior	n. in 32	
			, gher the setup		•	-	-	-					
•		-	however, resp	-		•				•			
	You ca	n set tl	he filter param	eters through	the loop ga	in, re	ferring	to the f	ol	lowing	tab	le:	
	Sot	/alue	Speed Dete	ction Filter	Set Value			etectio					
	Jetv	alue	Cut-off Free	quency(Hz)	Set value	Ci	ut-off l	reque	ncy	/(Hz)			
	7	'2	120	00	67			850					
		71 1100 66 800											
	7	'0	100	00	65			750					
		59	95		64			700					
	6	68	90	0	63			650	_				
2~1	.10		city feed for	wordgoin		Rai	nge	unit		defau	lt	Rel contro	ated I mode
11	.10	velo	city leed for	waru gam	Ī	0 - 1	000	0.1%		300)	P	
Лul	ltiplyt	he velo	ocity control co	mmand calcu	lated accord	ingto	othe ir	ternal	200	sitional	co	mman	d bv
		•	parameter and	the ratio of this parameter and add the result to the speed command resulting from the positional control process.									
	Range unit default ^{Related}												
Pr1	.11	Velo	city feed for	ward filter			-				lt	contro	
Set usa The	a ge ex a veloci	ne cons ample ity feed	city feed for stant of 1st del of velocity fee d forward will b ne speed feed f	ay filter which d forward) become effecti	ive as the ve	0-64 input	400 t of spe y feed f	0.01m eed feed	d fo	50 orward iin is gra	adı	P P Jally	
Set usa The ncr duri the Pos	the tin age exa veloci reased ing op value ition d	me cons ample ity feed l with theration of velo leviation	stant of 1st del of velocity fee d forward will b ne speed feed f n at a constant s icity feed forwa n [unit of com	ay filter which d forward) become effection forward filters speed is reduct ard gain. mand]=comm	ive as the ve set at appros ced as shown nand speed [0-64 input locity x.50 (n in th	400 t of spe y feed f 0.5ms) ne equ	0.01m eed feed orward . The po ation be	d fo ga osi elo	50 prward. in is gra tional o win pro	adu dev opc	P Jally iation	I mode
Set usa The ncr duri the Sos gair	the tin age exa veloci reased ing ope value ition d n[1/s]×	me cons ample ity feed with the eration of velo leviation (100-sp	stant of 1st del of velocity fee d forward will b ne speed feed f n at a constant s city feed forwa on [unit of com peed feed forwa	ay filter which d forward) ecome effecti forward filter speed is reduc ard gain. mand]=comm ard gain[%]/10	ive as the ve set at appros ced as shown nand speed [0-6 input locity x.50 (n in th	400 t of spe y feed f 0.5ms) ne equ of com	0.01m eed feed orward . The po ation be	d fo ga osi elo	50 prward. in is gra tional o win pro	dev opc	contro P Jally iation portion oop	to
Set usa The ncr duri the Pos gair	the tin age exa veloci reased ing op value ition d	me cons ample ity feed with the eration of velo leviation (100-sp	stant of 1st del of velocity fee d forward will b ne speed feed f n at a constant s icity feed forwa n [unit of com	ay filter which d forward) ecome effecti forward filter speed is reduc ard gain. mand]=comm ard gain[%]/10	ive as the ve set at appros ced as shown nand speed [0 -6 inpu locity x.50 (n in th unit Rai	400 t of spe y feed f 0.5ms) ne equ of com	0.01m eed feed orward . The po ation bo nmand , unit	ga osi elo /s],	50 orward. iin is gra tional c win pro /positic defau	dev opc	contro P Jally iation prtion oop Rel contro	to
et usa he ncr luri he cos cair	the tin age exa veloci reased ing ope value ition d n[1/s]×	me cons ample ity feed with the ratior of velo deviation (100-sp Regi	stant of 1st del of velocity fee d forward will b ne speed feed f nat a constant s city feed forwa on [unit of com peed feed forw ster for spec	ay filter which d forward) ecome effecti forward filter speed is reduc ard gain. mand]=comm ard gain[%]/10	ive as the ve set at appros ced as shown nand speed [0-6 input locity x.50 (n in th	400 t of spe y feed f 0.5ms) ne equ of com	0.01m eed feed orward . The po ation bo nmand ,	ga osi elo /s],	50 prward. iin is gra tional c win pro /positic	dev opc	contro P Jally iation portion oop	to
et usa he ncr luri he cos cair	the tin age exa veloci reased ing ope value ition d n[1/s]×	me cons ample ity feed with the ratior of velo deviation (100-sp Regi	stant of 1st del of velocity fee d forward will b ne speed feed f n at a constant s city feed forwa on [unit of com peed feed forwa	ay filter which d forward) ecome effecti forward filter speed is reduc ard gain. mand]=comm ard gain[%]/10	ive as the ve set at appros ced as shown nand speed [0 -6 inpu locity x.50 (n in th unit Rai	400 t of spe y feed f 0.5ms) ne equ of com	0.01m eed feed orward . The po ation bo nmand , unit	ga osi elo /s],	50 orward. iin is gra tional c win pro /positic defau	dev opc	contro P Jally iation prtion oop Rel contro	to
et usa he ncr luri he cos cair Pr1	the tin age exa veloci reased ing opo value ition d n[1/s]× .37 specia	me cons ample ity feed l with the ratior of velo leviatios (100-sp Regi l settin	stant of 1st del of velocity fee d forward will b ne speed feed f nat a constant s ncity feed forwa on [unit of com peed feed forw ster for spec g as below :	ay filter which d forward) ecome effecti forward filter speed is reduc ard gain. mand]=comm ard gain[%]/10	ive as the ve set at appros ced as shown nand speed [0 -6 inpu locity x.50 (n in th unit Rai	400 t of spe t of spe feed f 0.5ms) ne equ of com	0.01m eed feed orward . The po ation bo umand / unit 0.01m	ga osi elo /s],	50 orward. iin is gra tional c win pro /positic defau	dev opc	contro P Jally iation prtion oop Rel contro	to
Set usa he ncr luri he Pos gair Pr1	the tin age exa veloci reased ing opo value ition d n[1/s]× .37 specia	me cons ample ity feed with the ratior of velo deviation (100-sp Regi	stant of 1st del of velocity fee d forward will b ne speed feed f nat a constant s ncity feed forwa on [unit of com peed feed forw ster for spec g as below :	ay filter which d forward) ecome effection forward filters speed is reduce ard gain. mand]=comm ard gain[%]/10 ial function	ive as the ve set at approx ced as shown nand speed [00	0 -6 inpu locity x.50 (n in th unit Rai 0 - 1	400 t of speed f 0.5ms) ne equ of com nge	0.01m eed feed orward . The po ation bo nmand / unit 0.01m	ga osi elo /s],	50 orward. iin is gra tional c win pro /positic defau	dev opc	contro P Jally iation prtion oop Rel contro	to
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Set usa fhe ncr duri the Pos gair Pr1	the tin age exa veloci reased ing opo value ition d n[1/s]× .37 specia	me cons ample ity feed with the ratior of velo leviatio (100-sp Regi I settin	stant of 1st del of velocity fee d forward will b ne speed feed f nat a constant s ncity feed forwa on [unit of com oeed feed forw ster for spec g as below :	ay filter which d forward) eecome effecti forward filters speed is reduce ard gain. mand]=comm ard gain[%]/10 ial function =0: Velocit =1: Velocit	ive as the ve set at approx ced as shown nand speed [00 y Feedforwa y Feedforwa	0-6 input locity x.50 (n in th unit Ran 0 - 1	400 t of spee f o.5ms) ne equ of com nge	0.01m eed feed orward . The po ation bo amand , unit 0.01m j述 ole, den;	ga osi elo /s],	50 orward. iin is gra tional c win pro /positic defau	dev opc	contro P Jally iation prtion oop Rel contro	to
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3.2.3 Vibration Suppression



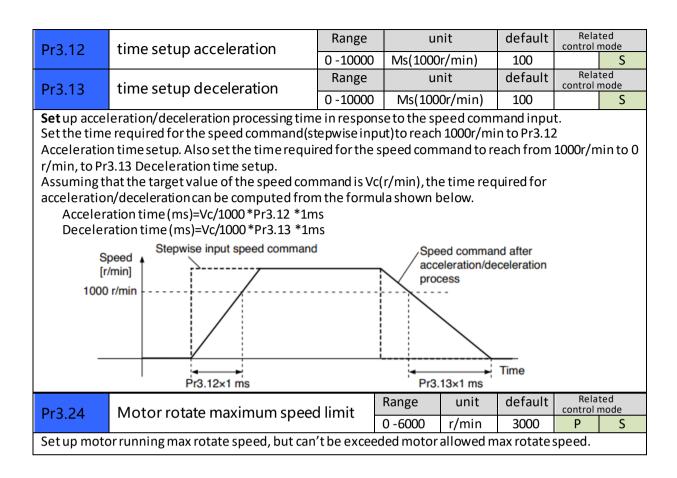
3.2.4 Velocity Control

Pr3.03	Reversal of speed command input			Range	unit	default	R conti	elate rol m	
115.05	i.e	versui er speed	command input	0 -1	-	0		S	
Specify the polarity of the voltage applied to the analog speed command (SPR).									
Setup value Motor rotating direction									
0		Non-reversal	[+voltage] — [+ direction]	[-voltage] →[-	direction]			
1		reversal	[+voltage] —{-direction]	[-voltage]	→ [+	direction]			
Caution: When you compose the servo drive system with this driver set to velocity control mode									
and external positioning unit, the motor might perform an abnormal action if the polarity of the									
speed cor	nmar	nd signal from the	unit and the polarity of this p	barameter	setup	does not n	natch	ı.	

Pr3.04	1th speed of speed setup	Range	unit	default	-	lated I mode
113.04		-20000 -20000	r/min	0		S
Pr3.05	2th speed of speed setup	Range	unit	default	-	lated I mode
113.05		-20000 -20000	r/min	3000		S
Pr3.06	3th speed of speed setup	Range	unit	default	-	lated I mode
115.00	strispeed of speed setup	-20000 -20000	r/min	0		S
Pr3.07	4th speed of speed setup	Range	unit	default		lated I mode
113.07	the second second	-20000 -20000	r/min	0		S

Set up internal command speeds, 1st to 4th

selection 1 of internal command speed(INTSPD1)	selection 2 of internal command speed (INTSPD2)	selection of Speed command
OFF	OFF	1st speed
ON	OFF	2nd speed
OFF	ON	3rd speed
ON	ON	4th speed



3.2.5 I/F Monitoring Function

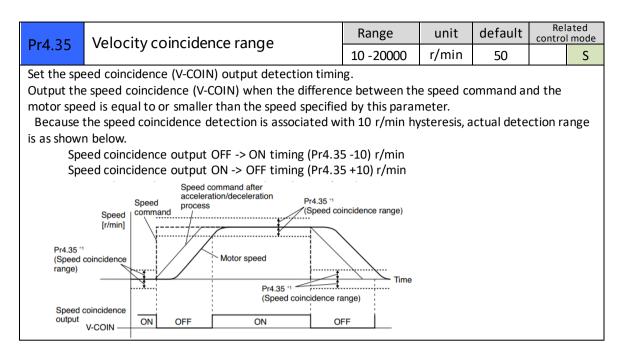
Pr4.06	DIR+/DIR- Input Selection	Range	unit	Default	Related control mode
114.00		0-00FFFFFFh	ı –	0x1200	S
	or works in position mode , pls make s or works in velocity mode , pls make s				
Signal na	ame	symbol	value		
Selectio	n 1 input of internal command speed	INTSPD1	8E**h		
Selectio	n 2 input of internal command speed	INTSPD2	8F**h		
For exam	ple , Pr406 set as 0x8E00 or 0x8F00 .				
	1) Power need to be restarted to make		vailable		
	The value of Pr406 can't be set equ	allv to Pr407.			

Pr4.07	PUL+/PUL-Input Selection	Range	unit	Default	Related control mode					
114.07		-	0x0E00	S						
If ISV mot	If ISV motor works in position mode , pls make sure Pr407 set as default setting 0x0E00.									
If ISV mot	If ISV motor works in velocity mode , pls make sure Pr407 set as below :									
Signal na	Signal name symbol value									
Selectio	n 1 input of internal command speed	INTSPD1	8E**h							
Selectio	n 2 input of internal command speed	INTSPD2	8F**h							
	For example , Pr406 set as 0x8E00 or 0x8F00 .									
Notice : 1) Power need to be restarted to make new value available .										
2	2) The value of Pr407 can't be set equally to Pr406.									

	Sarva on status for anabling	Range	unit	Default	Related control mode	
Pr4.08	Servo on status for enabling	0-00FFFFFFh	-	0x8383	S	
This parameter set the status of servo on for enabling , enabling means the shaft of motor is lock , disabling means the shaft of motor is free and can be run with hand .						
Setvalue	Details	Details				
0x8383	Servo on are ready for both posit	Servo on are ready for both position mode and velocity mode after power on				
0x0383	Servo on is ready for position mo	Servo on is ready for position mode , but not for velocity mode after power on.				
0x8303	Servo on is ready for velocity mo	Servo on is ready for velocity mode , but not for position mode after power on				
0x303	Servo on is unavailable for both position mode and velocity mode after power on					
0x303 Servo on is unavailable for both position mode and velocity mode after power on Notice : new value is available without restarting the power.						

Dr 4 10	Pr4.10 Output selection of ALM+/ALM-		Range	è	unit		Rel contro	ated mode
P14.10			0-00FF	FFFFh	-	0x1111	Р	S
Assign fu	inctions to SO outputs.							
This para	meter use 16 binary system do	setup, a	as follow	ing:				
00 *	* h: position control			-				
00 * *	h: velocity control							
Please at	<pre>[**] partition set up function i</pre>	number.						
Signal	name	symb	ol	Setup	/alue			
Invalio	b	-		00h				
Alarm	output(a contact)	Alm		01h				
Alarm	output(b contact)	Alm		11h				
Positi	oning complete output	INP		04h				
At-spe	At-speed output AT-SP		PPED	05h				
Veloci	Velocity coincidence output V-COIN 08h							
Notice	Notice : 1) New value will be available imediately.							
	2) The value of Pr410 can't be	e set equ	ially to o	ther IO s	etting	•		

Dr/ 21	Positioning complete range	Range	unit	default		ated I mode
Pr4.31		0 -10000	Encoder unit	10	Р	
Set up the timing of positional deviation at which the positioning complete signal (INP1) is output.						



3.2.6 Extending setup

Pr5.13	Over-speed level setup	Range	unit	default	Rel contro	ated I mode
PI5.15	Over-speed lever setup	0-20000	r/min	0	Р	S
If the motor speed exceeds this setup value, Err1A.0[over-speed protect] occurs.						
The over-speed level becomes 1.2 times of the motor max, speed by setting up this to 0.						

Chapter 4 Alarm

The green light turns on when iSVxxx is powered on and functions normally. In any case that drive protection is activated, the red LED blinks periodically (in every 4 seconds) to indicate the error type. In each blink, red light is on for 0.2 second and then off for 0.3 second.

Priority	Time(s) of Blink	Sequence wave of red LED	Description
1st	1	0.5s 5s 0.5s	Hardware Over-current protection activated when peak current is greater than 18A
2nd	2	0.580.580.58 58 0.58	Over-voltage protection activated when drive working voltage is greater than 60VDC
3rd	3	0.5s0.5s	Software over-current protection
4th	4		Over-load protection
5th	5		Encoder error activated when encoder connection or feedback is not correct
6 th	6	0.550.55 +++++ +	number of pole-pairs error activated when the number of pole-pairs setting is wrong
7th	7		Position following error activated when position following error limit exceeded the pre-set value (4000 pulses by default, or value set value by a customer)
8th	1 short 1 long	0.580.58 1.58 58 0.580.58 1.58	Motor stall protection
9th	1 short 2 long	0.550.5s 1.5s 5s 0.5s0.5s 1.5s	Current null shift protection
10th	1 short 3 long		Parameter saving error
11th	1 short 4 long		Others error

ALM	Over current(hardware)	Over voltage	Over current (software)	Overload
Code in Protuner	Er0E1	Er0C0	Er0E0	Er100
LED Blink	1 short	2 short	3 short	4 short

ALM	Enocder err	Poles err	Pos following err	Over speed
Code in Protuner	Er150/Er151	Er0D1	Er180	Er1A0/Er1A1

Chapter 5 Run

5.1 Inspection Before trial Run

No	ltem	Content
1	Inspection on wiring	Power cable , tuning cable , signal cable
2	Confirmation of power supply	The voltage between Vdc and Gnd is no more than 36Vdc .
3	Fixing of position	Motor installation
4	Inspection without load	Motor shaft doesn't connect the load

5.2 Run

ISV**** can work in both position mode and internal velocity mode .

5.2.1 Position control

connection

Port	Default
+Vdc	+24V~+36Vdc
GND	Power GND
PUL+/PUL-	Pulse input signal
DIR+/DIR-	Direction input signal
ALM+/ALM-	Alm output signal
SW1	Microstep setting
SW2	Microstep setting
SW3	Microstep setting
SW4	Stiffness selection 1
SW5	Stiffness selection 2
SW6	Running direction

Steps:

Connect the motor with tuning cable (CABLE-PC-i)

a) How to find the ratio of inertia for one axis

It is very important to find ratio of inertia for one axis in order to make best performance before setting other parameter (for example, setting PID of position loop or velocity loop).

Here below is step to find ratio.

Connect motor with load if you need to test one axis.

Do make the axis can be moved in safe distance, any interference should be avoided to ensure safety and accuracy of testing.

- 1.1 set the driver working in position loop (pr0.01=20).
- 1.2 click "run test" , then set the following value below :

WLeadshine EL5Series	
Communication Display Tools Language Help	
Run Test	×
PositionEmor(p) PositionCommandVel	elocty(pm) Select Channel
20 4100	900 1900 🔽 1 RositionError(p)
16 3280	520 1520 🔽 2 PositionCommandVelocity(rpm) 💌
12 2460 114	140 1140 🔽 3 VelocityFeedback(rpm)
	60 760
	Sampling Setup
y Andrewski a statistické statistické statistické statistické statistické statistické statistické statistické s	irigger Source VeLocityFeedback 💌
	hisingEdgelFigger
	180 -380 Trigger Rank 100
-1640 ····································	
-12 -2460	140 -1140
-16 -3280	520 -1520 Cycle Sampling(ns) 1000 💌
	900 -1900
0 375 750 1125 1500 1875 2250 2625 3000 3375 3750 Cumultreeback(v) Time(ms) VelocityF	Feedback(pm)
Position Gain	Velocity Mode
1stPositionLoopGain 175 1stVelocityLoopGain 140 1stTorqueFilter 200 1stVelocityLoopIntegration	Parities Hada
2ndPositionLoopGain 220 2ndVelocityLoopGain 140 2ndTorqueFilter 200 2ndVelocityLoopIntegration VelocityFeedforwardGain 300 TorqueFeedforwardGain 159 ControlSwitchingMode 10 Ratio	onTineConstant 10000 Jog Hode
RealtimentionaticAdjustmentMode Locate V RealtimeAutomaticAdjustmentRigid 10 V	
Speed Trapezoidal Parameters	Start
Velocity (rpm) 1500 AccelerationAndDecelerationTime (ns/Krpm) 100 IntervalTime (ns) 4	
Distance (0. 1rev) 500 RepeatTimes 3 RunningMode P.	PositiveAndNegative Press the start button the motor will start.

Set RealtimeAutomaticAdjustmentMode as Manual,

And set Real timeAutomaticAdjustmentRigid as 70 or 71.

Then set: Velocity = 1500 rpm, acceleration = 100, interval time = 1000,

distance = 500 (0.1 rev) Repeat time = 3, RunningMode : Positive and negative

Check the value of $\mathsf{Pr}020$, then minus 100 , the result means the value of $\mathsf{pr}004$.

For example,

Check the value of Pr020, if the value is 500, then pr004 =400, it means the ratio of inertia equals 4. (If you can't find the pr020, refer to appendix "How to find the hidden parameter")

b) Set electric ratio

Pr008 can be set for counts per rev if SW1 and SW2 are both OFF . Or change the status of SW1 and SW2 to change the counts per rev .

-) set running direction
- c) set running direction
 - Both SW6 and Pr006 can be used to set direction of running .
- d) download and save the new value , and restart the power to make values available .

5.2.2 Internal speed control

Port		
+Vdc	24-50 Vdc	
GND	Power gnd	
PUL+/PUL-	INTSPD1	Pr4.07=8E00
DIR+/DIR-	INTSPD2	Pr4.06=8F00
ALM+/ALM-	Alm output signal	
SW4	Stiffness selection1	
SW5	Stiffness selection2	

- a) set pr003 and pr004 in position mode (pr001=20)
- b) set pr001=21, set pr407 and pr406 as 8E00 and 8F00
- c) set the velocity value : set pr304=0 ,pr305=1000 , set pr306= -500 , pr307= 1500, there must be one velocity as 0 .
- d) set the value for acceleration and deceleration for Pr312 and Pr313

【INTSPD1】	【INTSPD2】	Veloctiy value
OFF	OFF	Pr3.04
ON	OFF	Pr3.05
OFF	ON	Pr3.06
ON	ON	Pr3.07

Chapter 6 Order information

Frame (mm)	Output power (W)	Type name	Rated Torque (N.M)	PeakTorque (N.M)
	90	ISV-B23090T-D4	0.3	0.8
57	130	ISV-B23130T-D4	0.45	1.1
	180	ISV-B23180T-D4	0.6	1.5
Cable	Cable for Tuning		Cable – PC-i	

Appendix

How to find the hidden parameter

The value of many parameters are forbidden to change , because usually the value has been set properly, however some parameters are needed to be checked or changed, for example , Pr715 need to be changed to match the motor type.

Here is the step to change the value of Pr020:

Run the software of ProTuner, we just find part of the parameter:

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rameter Manage	A [
ReadFile Savek	Unload		un et er Conpare	~ ~	Help		
Classify Select	Parameter N.	. ParameterName	Value	Range	Default	Units	Remark
asicSetting	Pr0.01	Control mode	1	0~5	0	-	Power of
ainAdjustment ibrationSuppression	Pr0.02	Real-time auto-gain tuning mo	2	0~2	0	-	No
ibrationSuppression elocityTorgueControl	Pr0.03	Real-time auto-gain tuning stiff	11	0~31	11	-	No
onitorSetting	Pr0.04	Ratio of inertia	250	0~10000	250	%	No
ctensionSetting pecialSetting	Pr0.06	Command pulse polar setup	0	0~1	0	-	Power of
sctorySetting	Pr0.07	Command pulse input mode s	3	0~3	3	-	Power off
	Pr0.08	Command pulse counts per o	0	0~ 32767	0	Pulse	Power off
	Pr0.09	1st numerator of electronic gear	1	1 ~ 32767	1	-	No
	Pr0.10	Denominator of electronic gear	1	1 ~ 32767	1	-	No
	Pr0.11	Output pulse counts per one m	2500	1 ~ 2500	2500	P/rev	Power off
	Pr0.12	Pulse output logic reverse	0	0~1	0	-	Power of
	Pr0.13	1st torque limit	300	0~500	300	-	No
	Pr0.14	Position deviation setup	200	0~500	200	0.1 rev	Encoder
	Pr0.16	Extenal regenerative resistor	50	10~500	50	9	Power off
	Pr0.17	Regeneration discharge resis	50	10~5000	50	w	Power off
	Pr0.18	Vibration suppression - N after	0	0~1000	10	Pulse	Encoder
	Pr0.19	Microseismic inhibition	0	0~1000	10	0.1Pulse	Encoder
Add Custom	1				_		

- 1. Now here is the way to find all of them :

 - b. Click "description":

rameter Manage							
📑 BeadFile 💾 SaveAz	tuload 🚽	🖡 Download 🇱 Save 🕌	ParameterCompare	💣 Beset 🕜	Help		
Classify Select	Parameter N	ParameterName	Value	Range	Default	Units	Remark
BasicSetting	Pr7.15	Motor model input	8	0 ~ 7FFF	3	-	Hexadec
FainAdjustment	Pr7.16	Encoder selection	0	0~512	0	-	Power off
ibrationSuppression elocityTorqueControl							
NonitorSetting ExtensionSetting							
pecialSetting	-						
actorypatting							

c. Then double click "factorysetting", then we can find all parameter:

Classify Select	Parameter N	ParameterName	Value	Range	Default	Units	Rema
BasicSetting	Pr0.00	Mode loop gain	772	0 ~ 32767	1	0.1Hz	No
GainAdjustment	Pr0.01	Control mode	1286	0~10	0	-	Power
VibrationSuppression ValocityTorqueControl MonitorSetting ExtensionSetting SpecialSetting	Pr0.02	Real-time auto-gain tuning mo	1800	0~2	0	-	No
	Pr0.03	Selection of machine stiffness	2314	0 ~ 31	11	-	No
	Pr0.04	Ratio of inertia	2828	0~10000	250	%	No
actorySetting	Pr0.05	Command pulse input selection	3342	0~1	0	-	No
	Pr0.06	command pulse rotational dir	3856	0~1	0	-	Power
	Pr0.07	Command pulse input mode s	4370	0~3	3	-	Power
	Pr0.08	Command pulse counts per o	4884	0~32767	0	Pulse	Power
	Pr0.09	1 st numerator of electronic gear	5398	1 ~ 32767	1	-	No
	Pr0.10	Denominator of electronic gear	772	1 ~ 32767	1	-	No
	Pr0.11	Output pulse counts per one m	1286	1 ~ 2500	2500	P/rev	Power
	Pr0.12	Reversal of pulse output logic	1800	0~1	0	-	Power
	Pr0.13	1sttorque limit	2314	0~500	300	-	No
	Pr0.14	Position deviation setup	2828	0~500	200	0.1 rev	Encod
	Pr0.15	Absolute encoder setup	3342	0~2	0	-	No
	Pr0.16	Extenal regenerative resistor	3856	10~500	50	Ω	Power
	Pr0.17	Regeneration discharge resis	4370	10~5000	50	W	Power
	Pr0.18	Vibration suppression - N after	4884	0~1000	10	Pulse	Encod
τ	Pr0.19	Microseismic inhibition	5398	0~1000	10	0.1Pulse	Encod
	Pr0.20	Reserved parameter	772	0 ~ 32767	0	-	No
	Pr0.21	Reserved parameter	1286	0 ~ 32767	0	-	No
Add Custon	Pr0.22	Reserved parameter	1800	0 ~ 32767	0	-	No

Trouble shooting

Problem	Solution
Motor don't run	 ◇ If in position mode, : make sure pr408=8383, pr406=1200, pr407=E00; make sure voltage of input signal (pulse + direction) is between 5 - 24V. ◇ If in internal velocity mode : Make sure pr406 and pr407 are 8F** and 8E** ; Make sure pr304=0 Make sure pr408=8383
ALM	Refer to chapter 4 for details
Factory setting can't be set	Change the value of Pr408 to 303.
The stiffness can't be changed	Check the status of SW3-SW5.