

TORQUE INVERTER

Fumore AC Motor Torque Inverter Variable speed & Torque Ac Motor Drive

INSTALLATION AND OPERATING INSTRUCTIONS

FEVF Series : FEVF-89TX-1
FEVF-89TX
FEVF-89T
FEVF-89T-ND
FEVF-89T-1
FEVF-89F(Inverter)



Preface

Thanks for using Fumore FEVF series Torque Inverter.
Please read these operating instructions before you proceed.

You should attach the manual to machine for correctly
operating and safety using.

It can also make maintenance much easier.

Please keep this manual carefully.

Table of content.....	3
-----------------------	---

Table of content

Security Notice.....	4
Product Confirmation and Examination.....	5
Wiring and operating.....	6
FEVF series Panel Function.....	7
FEVF-89TX-1 Characteristics.....	7
Types Illustration and Specification.....	8
LED instruction and Function Instruction.....	9
FEVF-89TX-1 Adjustment and Setting.....	10
FEVF-89TX-1 Wiring Terminals Function.....	11
FEVF-89TX-1 Application Examples.....	12
FEVF-89TX-1 Function Adjustment Operating Illustration...	14
FEVF-89T Wiring Diagram.....	15
FEVF-89T-1 Wiring Diagram.....	16
FEVF-89TX Wiring Diagram.....	17
FEVF-89F Wiring Diagram.....	18
FEVF-89F Wiring Terminal Function.....	19
FEVF-89F Instruction Illustration.....	20
FEVE Series Dimensions.....	21
Braking Resistor.....	22
Setting Parameter.....	23
Warranty and Note.....	24

SAFETY WARNING

This product should be installed and serviced by a qualified technician.

Take notice of  Danger Mark  Caution Mark.

 Danger	It may cause personal casualty or serious damage if operating without following the rules of the manual.
 Caution	It may cause product damage if operating without following the rules of the manual.

Caution :

- 1.It must be installed in fire protecting material of metal surface in the environment which the temperature less than 45°C, and prevent it from installing in high temperature, oil gas, corrosiveness gas or metal dust environment.
- 2.Power wires and control wires must be wiring separately .You should use shielded wires to avoid the interference of the noise.
- 3.The output of FEVF series inverter is three phase voltage, and can't be connected to single phase.
- 4.You can't do test of voltage endurance on the inverter.
- 5.The control substrate of inverter is easily to be damaged by static electricity. Please don't touch control panel.

Danger :

- 1.The input terminal of power supply must be connected to R/L1, S/L2, T/L3 with proper no fuse breaker, and connected to R/L1, S/L2 if the power source is single phase.
Motor wires connected to U/T1, V/T2, W/T3, can't mis-connected.
- 2.We can't do wiring or disconnecting when the inverter is still working.
- 3.The grounding terminal  must be grounded practically.
- 4.When an inverter drives multiple motors, please install proper thermal relay between the motor and inverter.
- 5.Please don't connect surge absorber, static condenser or single phase induction motor to terminals U/T1, V/T2, W/T3.
- 6.When the power of the inverter turns off, don't touch or do disconnect movement before the "CHG" indicator extinguish.
- 7.Please attach the upper lid before input the power source, please don't take off the upper lid when the inverter is working.
- 8.The output of the inverter can be set to high frequency. You should confirm the specification of rotational speed before adjusting the frequency to prevent the motor form damaging.
- 9.There will be high temperature on hot sink of the inverter, please don't touch it with hands.



 When external operating forward, reverse and adjust frequency, torque, please disassemble J1, J2, J3 socket and select any one of them.

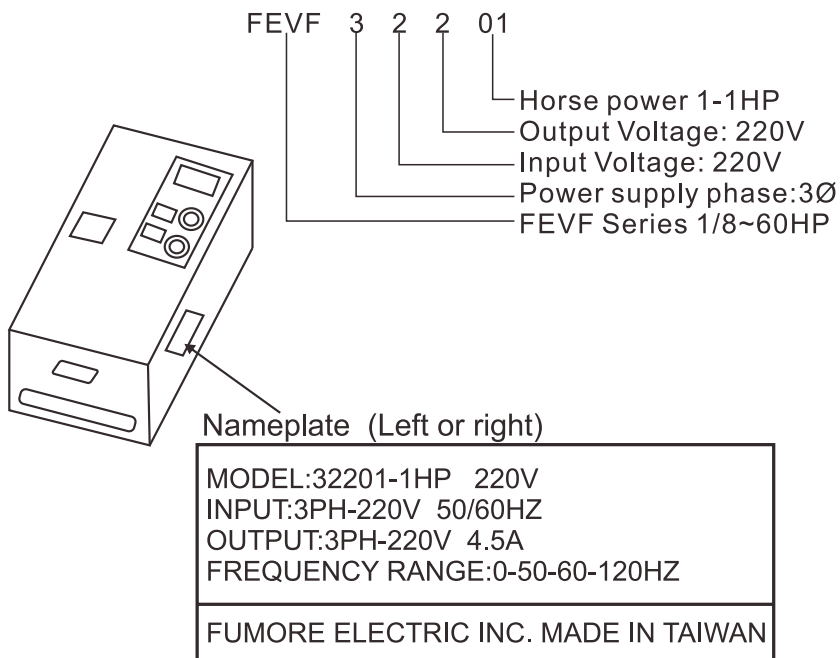
Product confirmation and examination

Before FEVF Torque Inverter leave the factory, all strictly QC and test concerned about crash, vibration and other unpredictable factors when transporting.

a. Appearance confirmation:

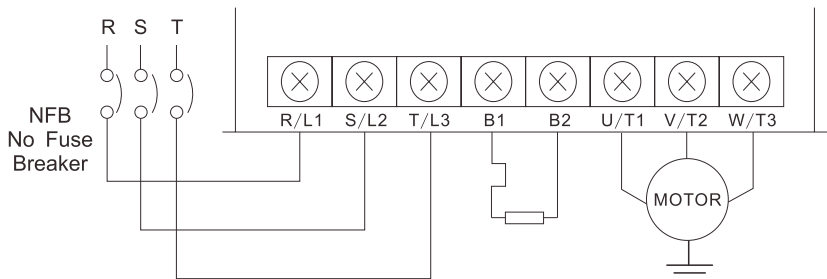
Check if there is blot or damage on appearance.

b. To check whether the specification of the nameplate is correct.



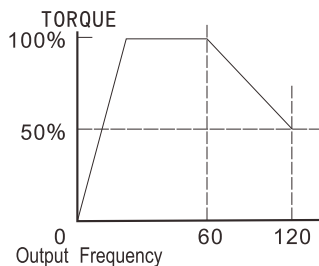
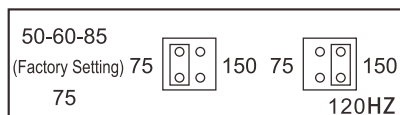
Wiring installation and operation

1. Connect three phase AC power supply to R/L1, S/L2, T/L3 (with proper NFB).
Connect single phase AC power supply to R/L1, S/L2.
Connect motor wires to U/T1, V/T2, W/T3 terminals.
(Please don't connect motor wires and inverter to contactor to do ON/OFF movement)
2. B1, B2 are Braking Resistors (Optional).



Connect R/L1, S/L2 for single phase power supply.

Motor Frequency Selection. Torque and Frequency Diagram

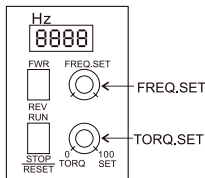


Note:

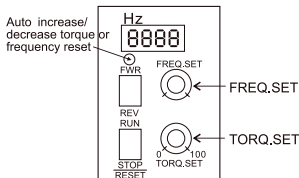
1. When Motor output frequency reach to 120HZ,
torque decrease to 50% (50/60HZ) gradually.
2. For Torque control, place jumper in the 75HZ position
3. For FEVF general inverter, you should upgrade the inverter if
operating in 85HZ or more.

FEVF SERIES Function of Panel *TORQUE INVERTER*

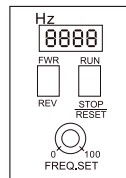
a FEVF-89TX-1
FEVF-89TX,FEVF-89T
Torque Inverter



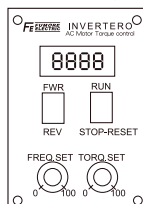
b FEVF-89TX-1,FEVF-89TX
Auto increase/decrease
torque or frequency



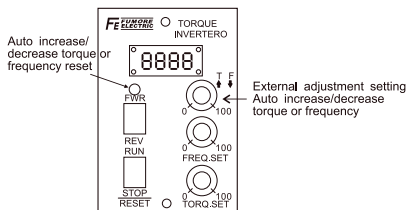
c FEVF-89F Inverter



d FEVF-89TX-1,
FEVF-89TX,FEVF-89T
Torque Inverter
external operating panel



e FEVF-89TX-1,FEVF-89TX
Auto increase or decrease
torque or frequency



f FEVF-89T-ND



FEVF SERIES Characteristics *TORQUE INVERTER*

- 1** Torque Inverter(FEVF-89TX-1): Simple, and easy to operate with wires. When connect to the three phase(R,S,T) or single phase(R,S) power, and then connect to three phase AC Motors or Torque Motors(U,V,W). It will do variable torque and variable frequency adjustment.It doesn't need any accessories and variables adjustment setting and it will do any control of coiling. (Center coiling or surface coiling) There is function of preventing it from loosing or shaking.
- 2** Torque signal DC(0~10V), Frequency signal (0~10V) Do 0~100% frequency and torque control.
- 3** There are both two signal input terminals in each torque or frequency function, and it can do multi-external input control. Frequency terminals(F2,Fx), Torque terminals(T2,Tx).
- 4** There are functions of start torque/frequency compensation (promotion) in FEVF-89TX-1 Torque Inverter which starts to run (FEVF-89T, FEVF89TX don't have this kind of function).
- 5** FEVF-89TX-1 Torque Inverter can do auto-increment/decrement with (LOAD CELL) Tension Controller or Proximity Switch + control (Load Cell Tension Controller is added).
- 6** There are functions of simulating auto-increment or auto-decrement in FEVF-89TX-1 Torque inverter Example [pic 8 and pic 9(optional)]. For coiling, when the coil material increase we must increase/decrease torque, increase/decrease frequency.
- 7** There is functions of preventing from loosing in torque limitation function in FEVF-89TX-1 Torque inverter and when feeding machine stop feeding, there is excellent Torque from loosing in the motor which FEVF-89TX-1 Torque Inverter drives.
PS: There is no vibration like the movement up and down or back and forth in transmission shaft.
- 8** There is active operating function in FEVF-89TX-1 Torque inverter and there is low resistance 、 low tension following with operating function.
PS: Braking resistor is needed
- 9** FEVF-89TX-1 Torque Inverter is proved to be used in torque control of Electronic Grade Glass Fabric .

Standard Connection Diagram TORQUE INVERTER



Types Illustration FEV

POWER SOURCE

3

Voltage

2

Phase of Power

- 1 : 1-Phase
- 3 : 3-Phase

Input Voltage

- 1 : 110V(AC)
- 2 : 220V(AC)
- 3 : 380V(AC)
- 4 : 400V(AC)
- 5 : 415V(AC)
- 6 : 440V(AC)
- 7 : 460V(AC)

Motor Specification

2

- 1 : 1-Phase 220V
- 3 : 3-Phase 380V
- 4 : 3-Phase 440V

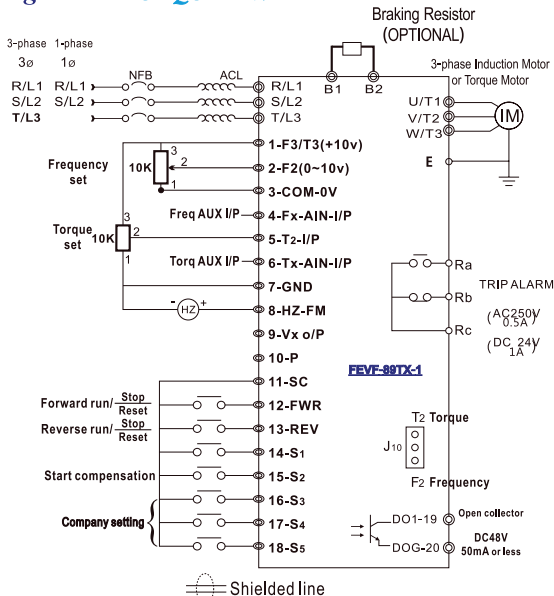
P5-05

- P5: 1/2HP
- 01: 1HP
- 02: 2HP
- 03: 3HP
- 05: 5HP
- 07: 7.5HP
- 10: 10HP

60:60HP

Specification

TYPE	322P5	32201	32202	32203	32205	32207	32210	32215	32220	32203	32203	32240	32250	32260
Motor Output	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Motor Hp	1/2	1	2	3	5	7.5	10	15	20	25	30	40	50	60
Rated output current	3.1	4.5	7	10.5	16	24	32	45	60	72	85	110	140	170
Inverter Capacity	1.2	1.4	2.7	4	6	10	13.7	17.9	22	27.5	33	43	52	65
Line Source	3-Phase 220~230V±10% 50/60HZ±5%													
Max output Voltage	3-Phase 0~230V Three phase 0-230V													
TYPE	333P5	33301	33302	33303	33305	33307	33310	33315	33320	33325	33330	33340	33350	33360
Motor Output	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
Motor Hp	1/2	1	2	3	5	7.5	10	15	20	25	30	40	50	60
Rated output current	1.5	2.3	3.8	5.2	8.8	12	16	24	30	39	45	60	73	85
Inverter Capacity	1	1.7	2.9	4	6.7	10.3	12.3	17.9	22	28	34	44	53	65
Line Source	3-Phase 380~440V±10% 50/60HZ±5%													
Max output Voltage	3-Phase 0~230V Three phase 0-380 0-460V													
Control Method	Sine Wave Pwm (V/F control)													
Torque Signal(MAN)	Manual Dc 0-10V Aut Dc 0-10V or 0~20mA													
Accel/Decel Time	1~11sec, for torque priority, acceleration or deceleration will harmonize without limited by ACCEL/DECEL.													
Braking Torque	Lower then 20% (with optional braking resistor) be related to Torque magnitude when torque control.													
Overload Capacity	150% Rated output current resistor													
Over Voltage	DC Voltage >410V (Power supply 110/220V AC) DC Voltage >810V (Power supply 380/440V AC) DC Bus voltage exceed													
Operating temperature	-10~40℃/0~90℃ Relative humidity not dewing													
Vibration-Proof	1G(9.8m/s ²) or less													



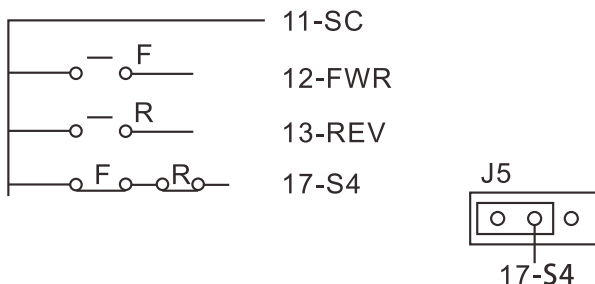
LED Instructions and Function Display

When FEVF inverter terminal R/L1 S/L2 T/L3 connect to AC power “POW” and “CHG”. The indicator “POW” “CHG” radiates

NO	LED Instructions		Color	Abnormal Condition
1	POW	Normal	Green	Radiates when Power Transmission
2	FWR	Normal	Green	Forward RUN Indicator
3	REV	Normal	Green	Reverse RUN Indicator
4	CHG	Normal	Green	Radiates when Power Transmission
5	OCT	Abnormal Trip	RED	Over current Trip
6	OVT	Abnormal Trip	RED	Over voltage Trip DC410V(AC220V) DC810V(AC440V)
7	IPF	Abnormal Trip	RED	Instantaneous Power Failure
8	OTT/OL	Abnormal Trip	RED	OTT: Heat sink over Temperature Trip OL: Motor Overload Trip

P.S.

For braking motor or mechanical braking, the wiring of start/stop is:

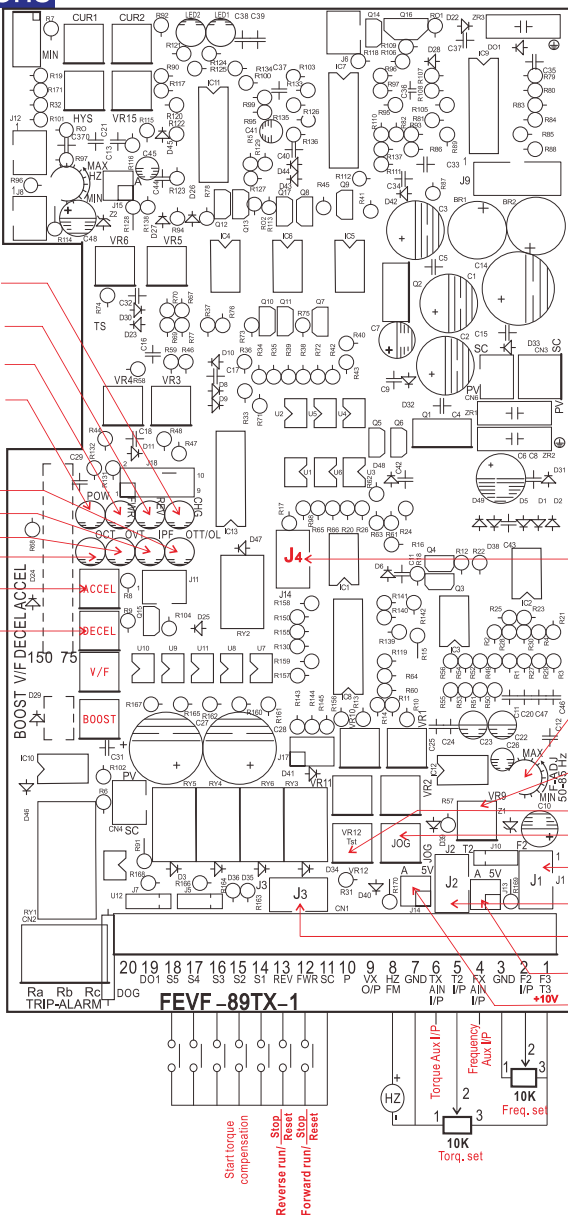


Instructions

Indicator and J1,J2,J3,J4 Sockets

- Charge Indicator
- Reverse Indicator
- Forward Indicator
- Power Indicator
- Motor over-load/Inverter Over-temperature trip
- Instantaneous power failure
- DC Bus Over-voltage trip
- DC Bus Over-current trip
- Acceleration time
- Deceleration time

- J4: Frequency display socket
- The highest frequency higher than 60HZ, internal adjustment highest 85HZ
- VR9: Start compensation time
- VR12: Start compensation Torque
- JOG: JOG frequency Instruction
- J1: Frequency Instruction Socket
- J2: Torque instruction Socket
- J3: Forward/Reverse Instruction socket
- J13: Frequency set I/P DC5V or AIN
- J14: Torque set I/p DC5V or AIN

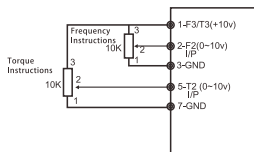


Terminal Function

FEVF-89TX-1

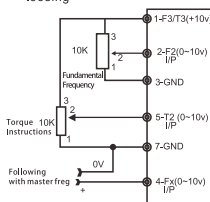
Terminal Types	Terminal Symbol	Terminal	Description
Main Circuits Terminal	Power	R/L1.S/L2.T/L3	AC power input terminal
	Motor	U/T1.V/T2.W/T3	Motor wires terminal
	Brake unit	B1 . B2	Braking resistor terminal
		P . N	External braking module
	Ground	E 	Ground terminal
Control Circuit Terminal	Frequency instruction input terminal	1-F3/T3(+10v) 2-F2/(0~10v) 3-GND	1-F3/T3:Frequency and Torque source. 2-F2:Input terminal
		4-Fx	Frequency instruction auxiliary input terminal.
	Torque instruction input terminal	1-F3/T3(+10v) 5-T2(0~10v) 7-GND	Torque instruction source and input terminal.
		6-Tx	Torque auxiliary input terminal.
	Forward Run Reverse Run	12-FWR 13-REV 11-SC	SC  12-FWR 11  13-REV
	Start Torque compensation	11-SC  15-S2	11-SC  15-S2 close:Start torque compensation See FEVF-89TX-1 Application Example.
	Frequency Meter	7-GND 8-Hz-FM	 7
	10-P	10-P +15v	Voltage +15v 20mA or less
	Torque / Frequency voltage output	9-Vx (0~10v) 4-Fx 6-Tx	Auto increment / decrement for Torque / Frequency
	Torque / Frequency increment or decrement	 11-SC  16-S3 4-Fx 9-Vx	Open:increment Close:decrement
		 11-SC  17-S4 9-Vx 6-Tx	Open:increment Close:decrement
		 11-SC  18-S5 J7	Torque / Frequency increment or decrement reset Terminal
	TRIP ALARM	Rc Rb Ra 19-DO1 20-DOG	TRIP ALARM terminal
	Inverter abnormal trip reset	11-SC  12-FWR  13-REV	close: run open: <u>STOP</u> <u>RESET</u>

1. Manual: Variable frequency and variable torque setting



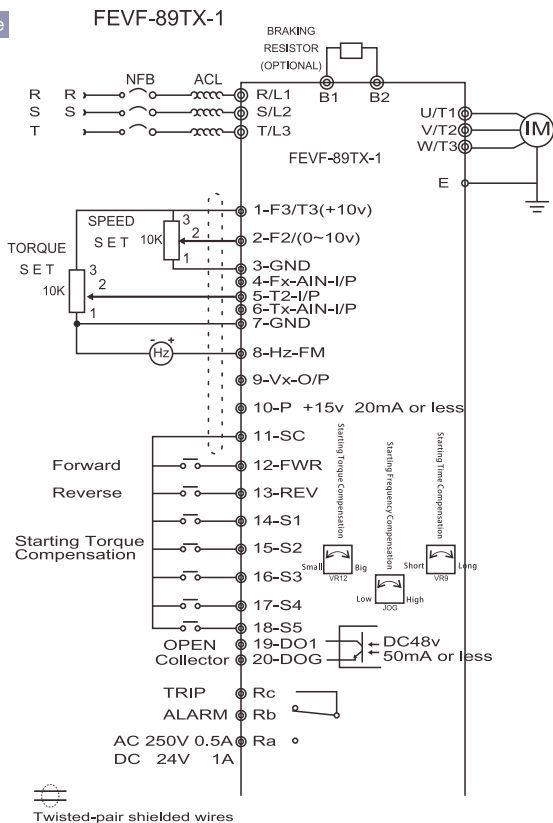
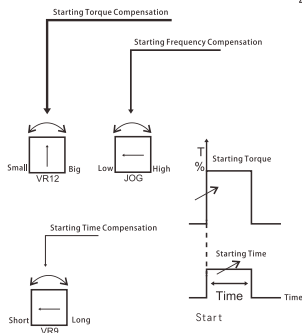
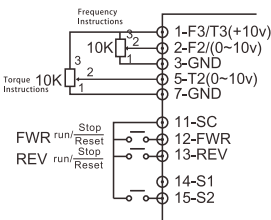
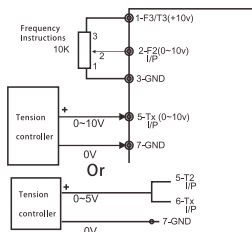
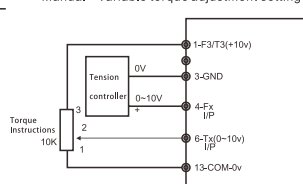
2.a. Manual : Variable torque adjustment setting, fundamental frequency (what is needed for the min torque)

b. Frequency following with master machine
c. There is functions of preventing from loosing

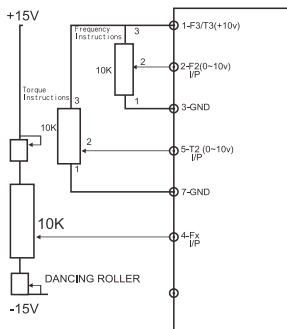


3. Manual : Variable frequency and variable torque setting

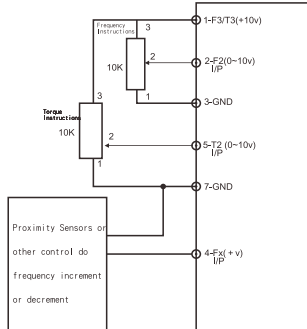
Start compensation : For some machines, when coiling material increase, the starting torque must larger than normal operating torque.

4. Manual : Manual variable frequency setting
Auto : Torque accept tension automatic control5. Auto : Frequency signal accept tension controller
Manual : Variable torque adjustment setting

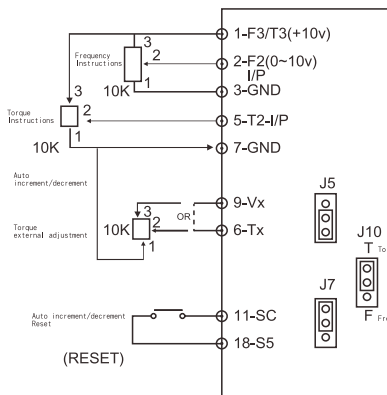
6. Manual : Variable frequency and variable torque adjustment setting + Dancing Roller control



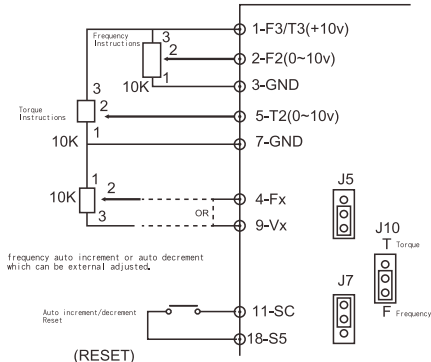
7. Manual : Variable frequency and variable torque adjustment set external input increment or decrement frequency



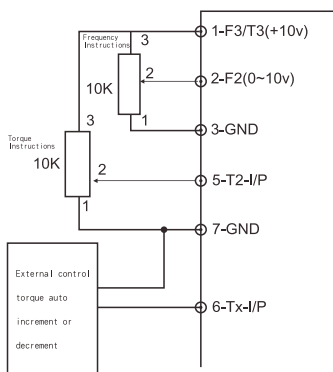
8. Manual : Variable frequency or variable torque adjustment setting Auto: Functions of torque auto increment or auto decrement



9. Manual : Variable frequency and variable torque adjustment setting Auto: Functions of frequency auto increment or auto decrement

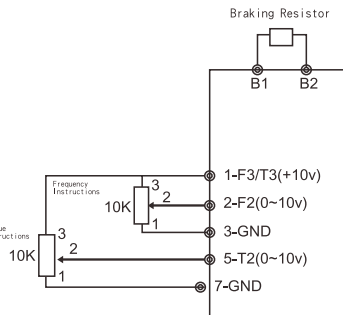


10. Manual : Variable frequency and variable torque adjustment setting functions of torque increment or decrement



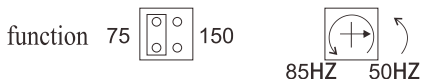
11. Master : Variable frequency and variable torque adjustment setting Slave follow : There is operating funtions of low obstruction, low tension when being slave follows.

PS:Braking Resistor is needed



FEVF-89TX-1 Functions, Adjustment and Operating Illustration

1. The Torque control function of DC motor and drives can totally replaced by FEVF-89TX-1+Three phase induction motors.
2. We suggest that the highest frequency set on 85HZ or less when doing torque

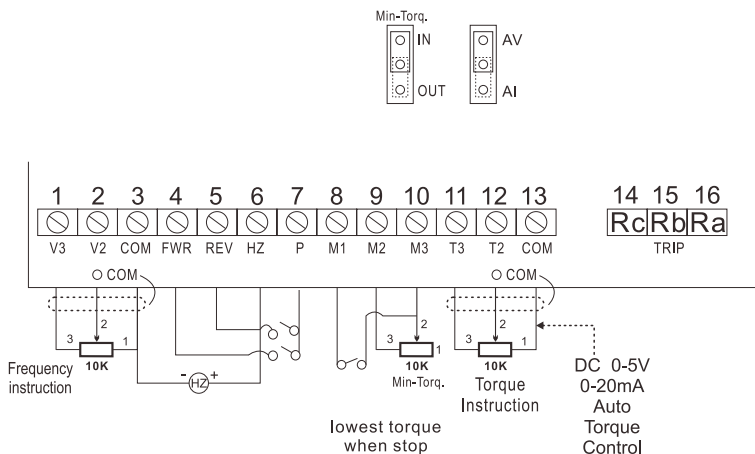


The factory setting of the highest frequency is 1800rpm(60HZ).

3. ACCEL is acceleration time. DECEL is deceleration time, are start time and stop time, absolutely related to the setting of Torque. For prior torque control, the acceleration time and deceleration time is auto harmonized by inverter, not be influenced by ACCEL or DECEL.
4. When coiling machine do the functions to prevent it from loosing. FEVF-89T inverter must be in the running status. You should adjust proper frequency and lowest torque in advance. When feeding machine stops, it can maintain the best movement to prevent it from loosing, and there is no looseness ,tension vibration occurs in coiling material.
5. When FEVF-89TX-1 do unwinding torque control and following motion control, you should install braking resistor which has enough Watt.
6. There is function of starting torque larger than running torque in FEVF-89TX-1 Inverter (FEVF-89T doesn't have this kind of function). The starting time and the additional starting gaining torque all can be set and adjusted.
7. There are both two independent terminals in each frequency or torque instruction input terminal of FEVF-89TX-1, to facilitate automation.
8. FEVF-89TX-1 : There is function of auto-increment/auto-decrement on Torque or Frequency (optional). This is simulation, so you have to know the situation of increment or decrement before do simulation.
9. For torque controlling motor which prevents it from loosing or running with low speed for long time. You should install the forced cooling fan to help motor cooling and heat dissipated.

FEVF-89T Wiring Diagram

B Variable Torque & Speed Inverter

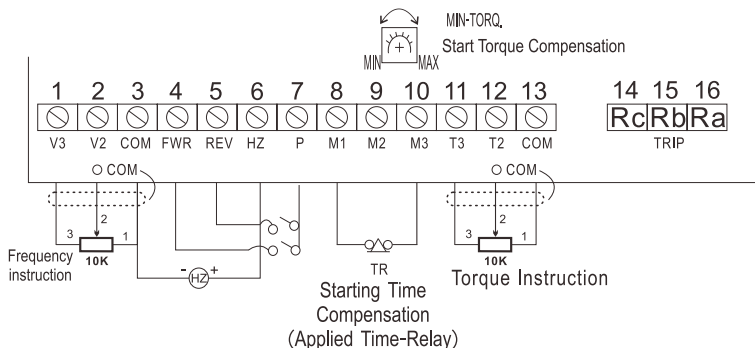


(8-M1 and 10-M3 Short Circuits when not use)

Note :  Use twisted-pair shielded wires

For Remote 1.Gray 2.Purple 3.Blue 4.Orange 5.Green 6.Black 7.White 11.Red 12.Yellow 13.Blue

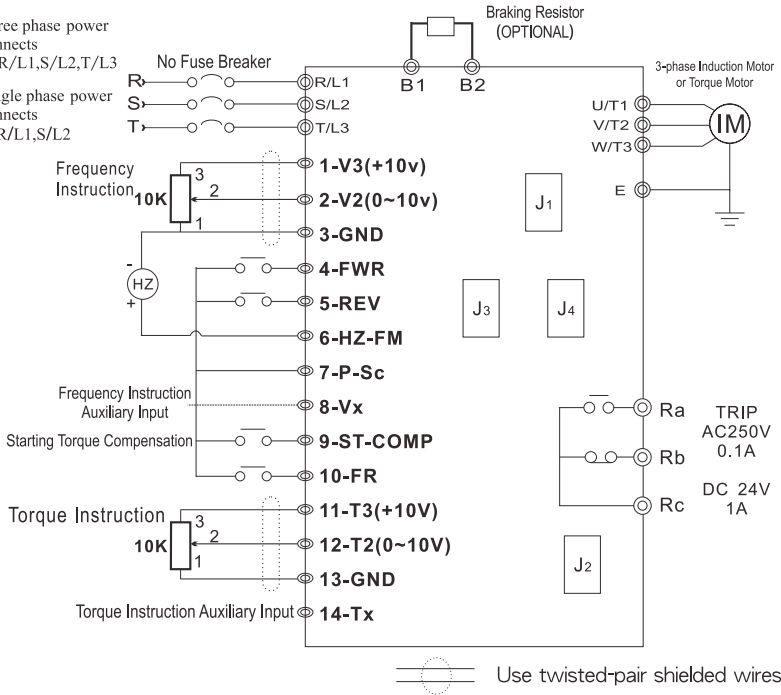
PS. For starting torque larger than operating torque is needed



FEVF-89T-1 Wiring Diagram

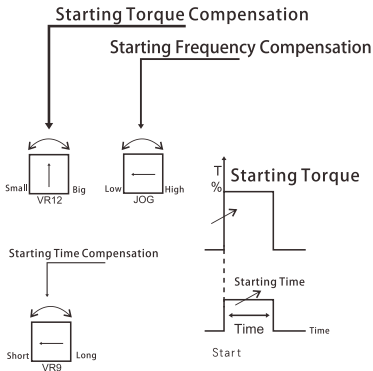
Three phase power connects to R/L1,S/L2,T/L3

Single phase power connects to R/L1,S/L2

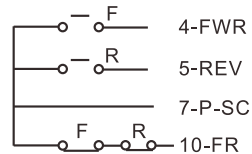


Use twisted-pair shielded wires

Starting torque, frequency, time compensation adjustment and setting

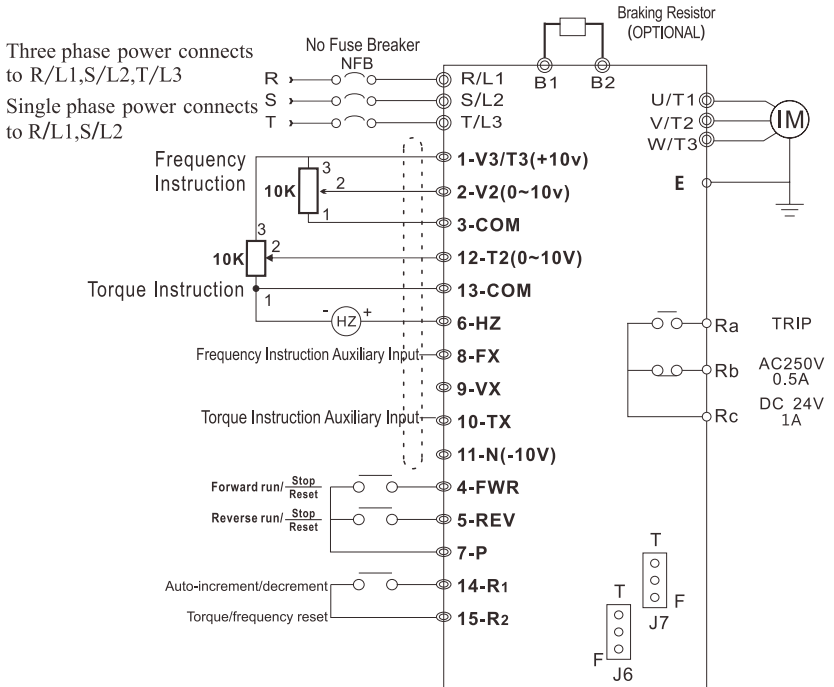


PS. For braking motor or mechanical braking, the wiring is:



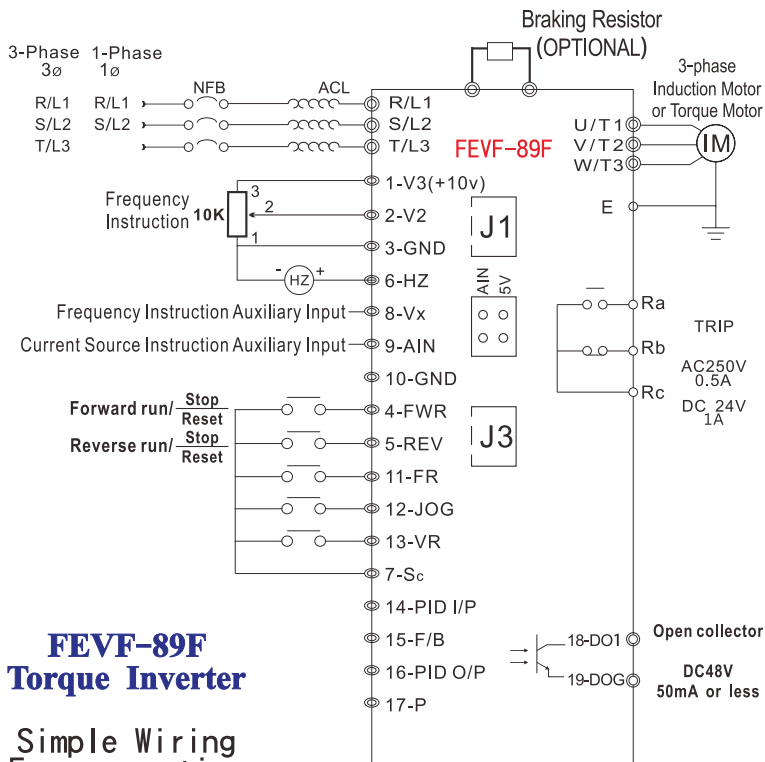
- J1 is equal to Frequency Instruction terminal 2-V2, please choose one.
- J2 is equal to Torque Instruction terminal 12-T2, please choose one.
- J3 is equal to terminal 4-FWR,5-REV , please choose one.
- External frequency meter displays when there is input in frequency instruction, and it doesn't accept start-stop control.

FEVF-89TX Wiring Diagram

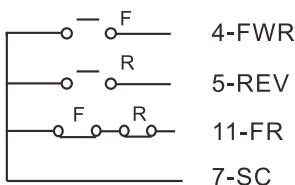


Note :  Use twisted-pair shielded wires

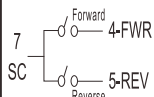
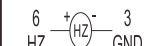
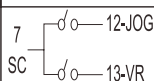
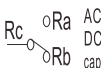
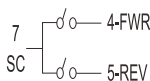
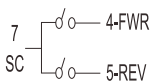
FEVF Torque Inverter (Variable Frequency)



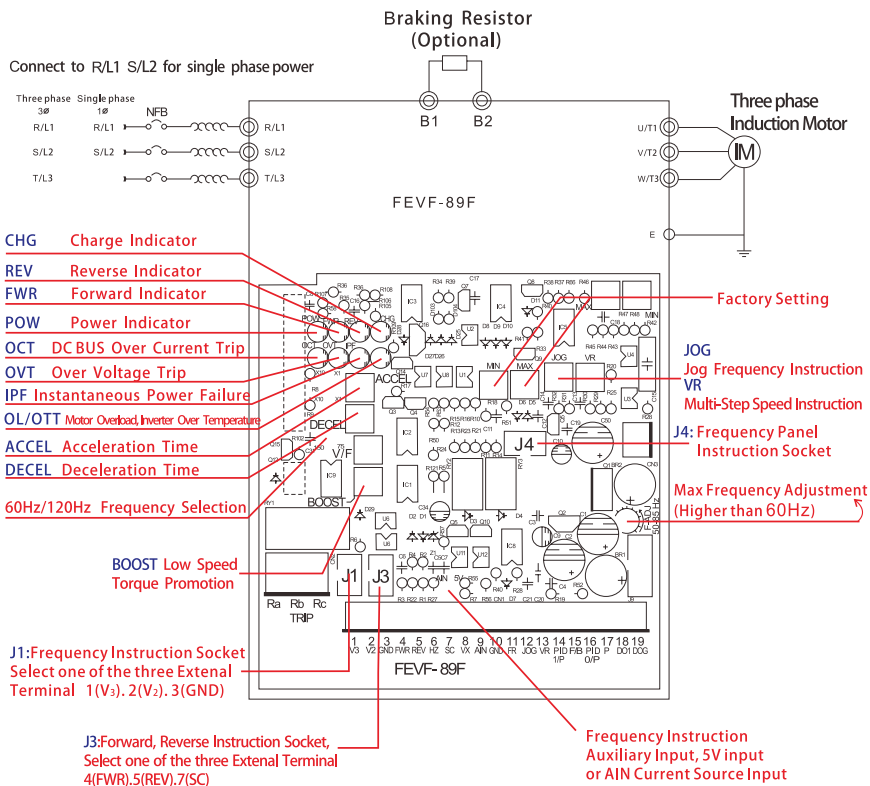
PS. For braking motor or external mechanical braking, the wiring is:



FEVF-89F Terminal Function

Terminals Types		Terminal	Terminal Name	Description
Main	Power Supply	R/L1,S/L2,T/L3	AC power supply input terminal	Three phase power supply. Drives with single 200V input use terminals R/L1 and S/L2 only.
	Motor	U/T1,V/T2,W/T3	Motor wire terminal	Three phase frequency variable, voltage variable, connect to motor.
Circuit	Braking	B1 B2	Braking resistor terminal	External Braking resistor.
	Resistor unit	PN	Braking resistor module	External Braking resistor module terminal.
Terminal	Ground	E	Grounding Terminal	The third kind of grounding 100Ω or less.
Control	Frequency Instruction	1-V3 +10V 2-V2 (0~10V) 3-GND (0V)	Frequency Instruction Source and Input Terminals	 External Input terminal 1-V3、2-V2、3-GND equivalent to J1 Socket, only one selected
	Input Terminals	8-Vx 9-AIN	Frequency Instruction Auxiliary Input Terminals	8-Vx:Frequency Instruction Voltage Input Terminals  9-AIN:Frequency Instruction Current Source Input Terminals
Circuit	Forward Reverse	4-FWR 5-REV 7-SC		Forward, Reverse external control input terminals => J3 (only one selected) Please use Relay contact to control Forward, Reverse 
	Frequency Meter	3-GND 6-HZ		External Frequency meter DC 0~10V
	JOG or multi-steps Frequency Control Terminal	12-JOG 13-VR		JOG Instruction Adjustment  VR Instruction Adjustment  Adjust set JOG、VR in advance
	PID Control	14-PID I/P 15-F/B 16-PID O/P	14-PID I/P (0~10V) 15-F/B (0~10V) 16-PID O/P (0~10V)	When PID control, don't connect J1,connect 16-PID O/P terminal to 2-V2 terminal,(16-PID O/P <=> 2-V2) and do PID control
	17-P, 10-GND	17-P, 10-GND	Digital frequency meter power supply DC+15V	When external control panel. Power of digital frequency meter DC +15V 20mA
Circuit	Abnormal alarm	Rc Rb Ra 18-DO1,19-DOG	Inverter abnormal alarm output terminals	 AC250V · 0.5A DC24V · 1A capacity  18-DO1 19-DOG Open Collector DC48V 50mA or less
	Inverter Abnormal Trip	 RUN- 	 RUN- 	Inverter abnormal Trip : OCT (Over Current),OVT (Over Voltage), IPF (Instantaneous Power Failure), OTT/OL (Over Temperature Trip/Overload) The red indicator radiates when the five circumstances occurs. When breakdown eliminates, only need to turn ON/OFF (run-stop/reset) again.The abnormal red indicator eliminates, and the inverter could be successfully operated.

FEVF-89F Torque Inverter(Variable frequency)



Dimensions (mm)

Model	W	H	D	W1	H1	H3/H2	d	Fig
122P5 11201	132	210	135/155	116	152	30	M4	1
122P5 11201	132	210	135/155	116	152	30	M4	1
322P5 32201	132	210	135/155	116	152	30	M4	1/2
32202 32203	160	210	135/155	116	152	30	M4	1
123P5 12301	132	210	135/155	116	152	30	M4	1
124P5 12401	132	210	135/155	116	152	30	M4	1
333P5 334P5	132	210	135/155	116	152	30	M4	1
333P5 334P5	132	210	135/155	116	152	30	M4	1
33301 33401	132	210	135/155	116	152	30	M4	1
33302 33402 33303 34403 32205	132	210 238	135/155	116	152	30	M4	2
33305 33405 33307 33007 34407	180	335	225	150	324	55	M4	3
32210 33310 34410	180	335	225	150	324	55	M4	3
32210 33315	180	335	225	150	324	55	M4	3
33315 34415 32220 33320 34420	255	395	250	210	375	10	M6	4
32225 33325 34425 32230 33330 34430	270	670	250	210	610	15	M6	4
32240 33340 34440 32250 33350 34450 32260 33360 34460	400	700	250	340	640	15	M8	4

FEVF

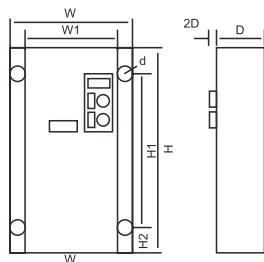


Fig1

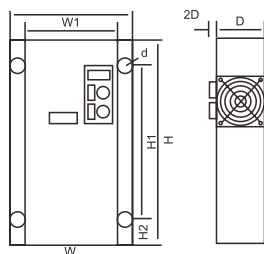


Fig2

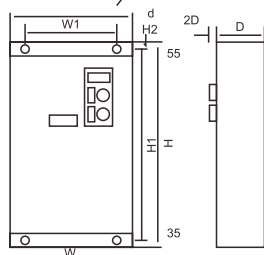


Fig3

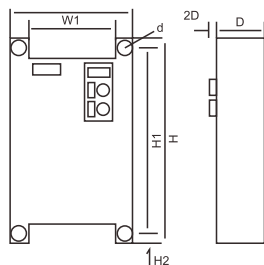


Fig4

The Transistor Type of Braking Resister in FEVF Series Inverter

Specification		The Lowest Standard	Watt
AC 200v class	1HP	200Ω	100W
	2HP	200Ω	200W
	3HP	150Ω	300W
	5HP	100Ω	400W
	7.5HP	100Ω	400W
	10HP	80Ω	500W
AC 400v class	1HP	800Ω	200W
	2HP	600Ω	300W
	3HP	400Ω	400W
	5HP	300Ω	400W
	7.5HP	250Ω	500W
	10HP	250Ω	600W

PS.

When FEVF-Torque Inverter operating in unwinding or FOLLOW SPEED motion, you should install braking resistor and upgrade the Watt.

FEVF Torque Inverter setting parameter

Type	Record, parameter, or control conditions, request
FEVF _____	
Horse Power _____HP	
C.T Current _____A	
Voltage _____V	

PS.

For Torque Motor, it depends on the current of the Nameplate on Torque Motor.



SINCE 1982
MANUFACTURE

FUMORE ELECTRIC CO.,LTD

No.2, Ln. 18, Baoqing St., Xitun Dist., Taichung City 407, Taiwan

TEL:886-4-27018533 · 886-4-27052660

FAX:886-4-27084920 E-mail:fumore1689@gmail.com

Http://www.fumore.com.tw

Warranty and Note

First, Thanks for supporting and cherishing to FEVF Inverter.

Everyone who buy inverter (The product).

Please confirm the content as bellow.

Content of warranty:

Warranty period:

For a period of 18 months from date of original purchase or a period of one year from the date of end user get.

Fumore Electric will repair or replace without charge devices which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused or improperly installed and has been used in accordance with the instructions and/or ratings supplied. The foregoing is in lieu of any other warranty or guarantee, expressed or implied, and we are not responsible for any expense, including installation and removal, inconvenience, or consequential damage, including injury to any person, caused by items of our manufacture or sale.