TAJIMA TECHNICAL DOCUMENT

TFMX SERIES 2-8 HEAD TEMX-C MULTI-HEAD MACHINES

TECHNICAL DOCUMENT (ELECTRICAL SYSTEMS)



FOREWORD

This document deals with the electrical component parts of TFMX series 2-8 head and TEMX-C Multi-head machines. It describes the functions, setting method and electrical block diagrams for cards and other devices.

Please use this manual effectively for your after-sale services.

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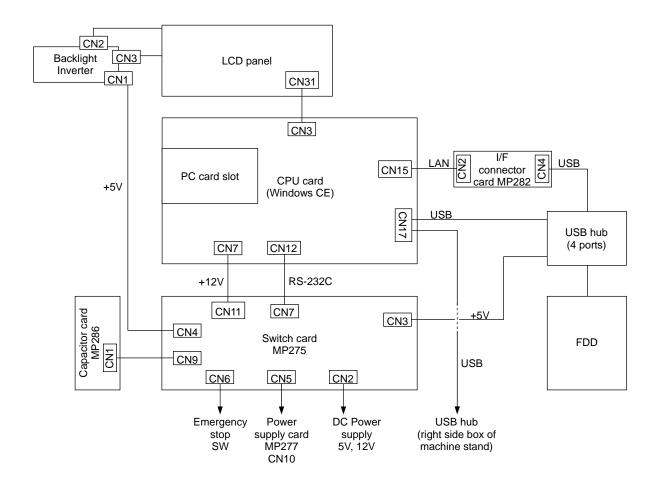
1. Controller (Operation panel)

We have ever adopted 3 kinds of the controller (operation panel) for TFMX series 2-8 head and TEMX-C Multi-head machines.

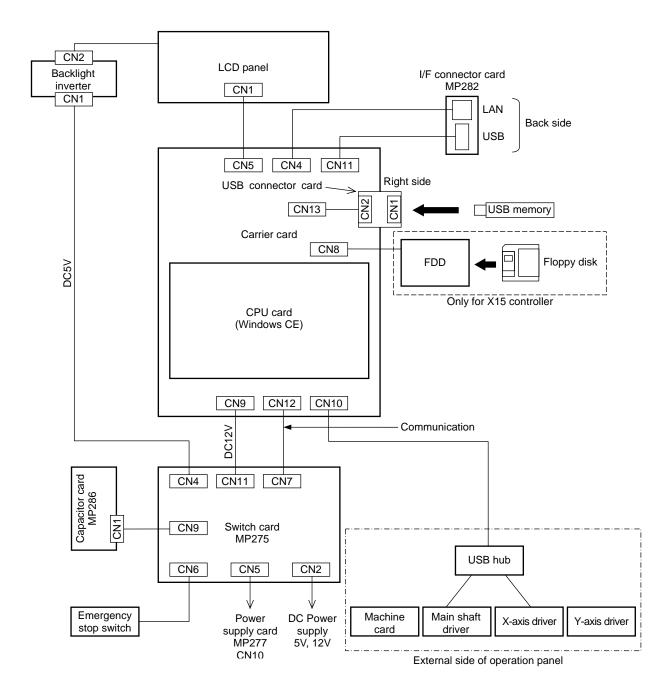
Please refer to the below table for the major differences among the controllers.

Controller	Applicable Model	Applicable recording media	Description	TTI No.
X14	TFMX series 2-8 head	Compact flash Floppy disk	This controller is adopted to TFMX series 2-8 head machine from the beginning of mass- production. DOM (Disk On Module) is mounted for the storage device of OS and the system software.	
X15	TFMX series 2-8 head, TEMX-C Multi-head	USB memory Floppy disk	This controller is introduced according to the introduction of Rotary disk that has changed the number of slits from100 to 50 for the thread breakage detection. Compact flash is mounted for the storage device of OS and system software and CPU performance is increased, compared with X14 controller.	3359
X16		USB memory Floppy disk (FDD is the option)	Controller where the FDD is removed from the X15 controller.	3400

Electrical block diagram for X14 controller



• Electrical block diagram for X15/X16 controller

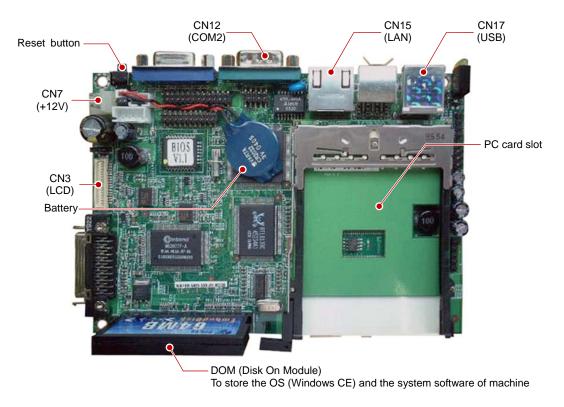


2. CPU card

CPU card provides the area where the OS and system software are stored, and deals with overall machine control. CPU card to be mounted to the controller differs depending on the type of controller.

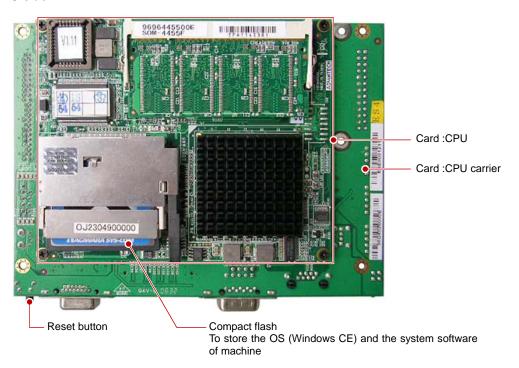
2-1. CPU card for X14 controller

• External view and connector allocation

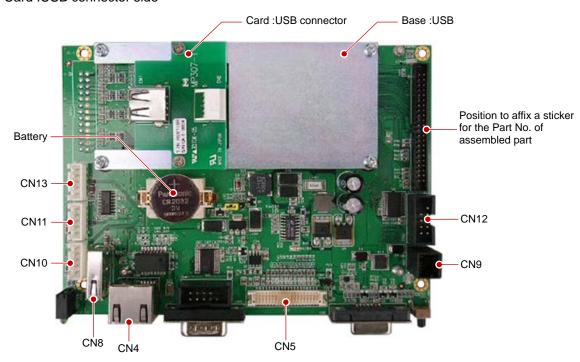


2-2. CPU card for X15/X16 controller

- External view and connector allocation
 - Card :CPU side

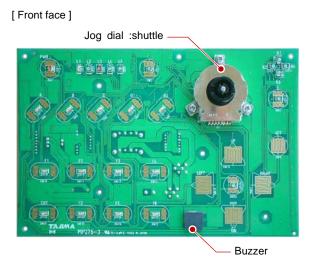


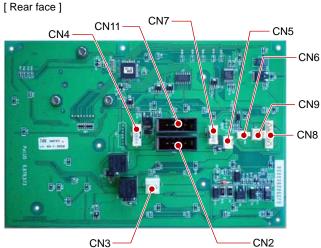
■ Card: USB connector side



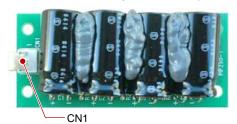
3. Switch card (MP275), Capacitor card (MP286)

• Exterior view and connector allocation of Switch card (MP275)





Exterior view and Connector allocation of Capacitor card (MP286)



Major functions of Switch card

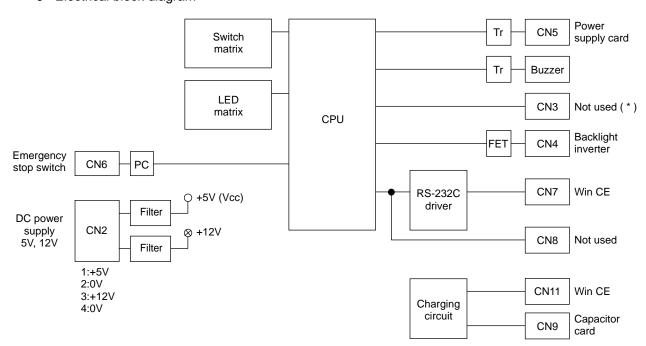
Switch card communicates with the CPU card and controls the

- To input key signal from the Operation panel.
 To turn ON/OFF the LED.
- To input Emergency stop switch signal.
- To control the sleep mode relay of the Power supply card.
- To control the buzzer.
- To charge the Capacitor card.

Major function of Capacitor card

Capacitor card supplies power until writing to the flash memory is completed when turning OFF the power.

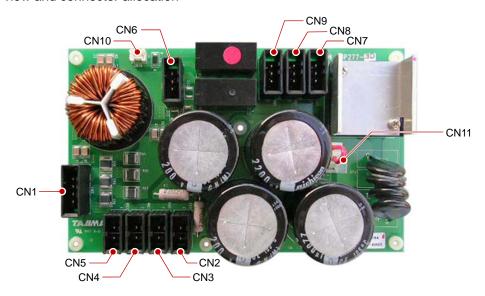
Electrical block diagram



(*) On TFMX series 2-8 head machine where the X14 controller is equipped, CN3 is connected wih the USB hub inside the controller.

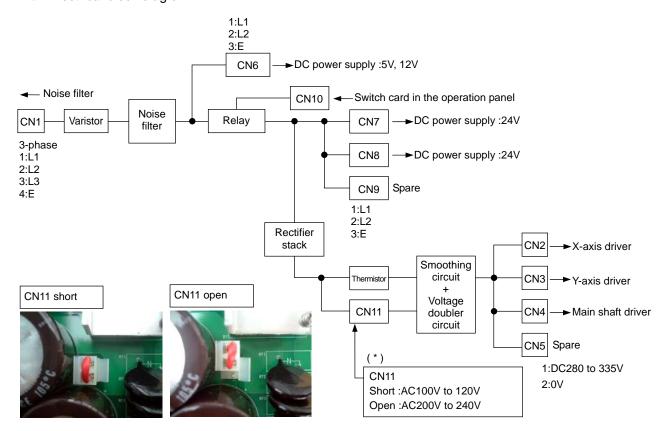
4. Power supply card (MP277)

• Exterior view and connector allocation



- Major functions
 - To remove the noise from AC power supply.
 - To distribute AC power.
 - To control ON/OFF of high-voltage DC power supply. (for the sleep mode)
 - To generate high-voltage DC power supply for the Main shaft/X-axis/Y-axis motor.

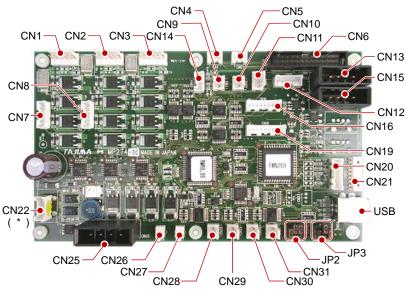
• Electrical block diagram



(*) Be sure to open the CN11 for TEMX-C Multi-head machine.

5. Machine card (MP274)

Exterior view and connector allocation



(*) A yellow sticker is affixed to CN22 on the Machine card for TEMX-C Multi-head machine.

JP	No.	Contents	ON	OFF		
JP3	1	Head card	Equipped	Not Equipped		
	2	Extension machine card	Equipped	Not Equipped		
	3	Not used	-	-		
	4	Sequin device 3 (*)	Equipped	Not Equipped		
JP2	5		Equipped	Not Equipped		
	6	Spare	Equipped	Not Equipped		
	7		Equipped	Not Equipped		
	8	Beam sensor	Equipped	Not Equipped		
(*) 0 (TENY 0 : 00						

(*) Only for TFMX-C series 2-8 head machine

Settings for shipment

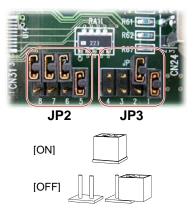
Major functions

- To relay communication with Head card.
- To control and output to the small size motors listed below.
 - -Color change motor
 - -ATH motor (only for TEMX-C Multi-head machine)
- To control and output to the solenoids listed below.
- -ATH solenoid (only for TFMX series 2-8 head machine)
- -Picker solenoid
- -Sequin air valve (option)
- To Input the signals from the devices listed below.
- -ATH knife retracting sensor (Magnetic sensor card)
- -Color change potentiometer
- -Closed sensor
- -Start/stop switch
- -Beam sensor (option)
- -Seguin air sensor (option)
- -Jog remote-controller (option)

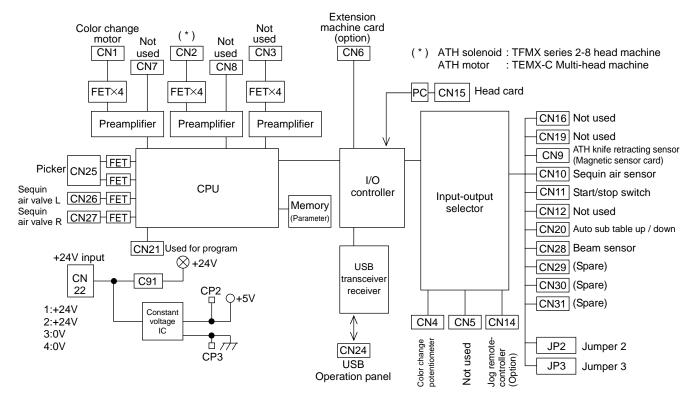
Where to supply power

DC5V is generated from DC24V on the Machine card.

- DC24V : Driving power for small size motors,
 - solenoids etc.
- DC5V : Power for IC related parts

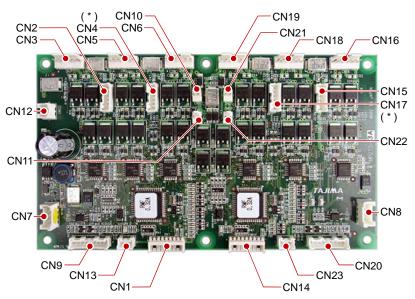


Electrical block diagram



6. Head card (MP273)

Exterior view and connector allocation



(*) To CN4 and CN17 on the Head card for TEMX-C Multi-head machine, Short connectors are connected to set the communication speed. Do not disconnect these short connectors.



Major functions

- 1 head card controls 2 heads.
- To control and output to the small size motors listed below.
- -Thread holding motor
- -Jump motor -Seguin motor (*)

Sequin L or R : Direct output.

Sequin L+R :To output the power after

switching the device to L or R

on the Extension head card.

- To control and output for the Upper thread lock solenoid.
- Switching Sequin (L/R)
 For the sequin L+R, L/R switching signal is transmitted to Extension head card.
- To control and input the signals listed below to the Tension base card.
 - -To input the signal to the Tension base switch.
- -To control lighting of LED on the Tension base
- -To detect upper/under thread breakage using the signal input from TC sensor card.
- To light Position marker. (option)

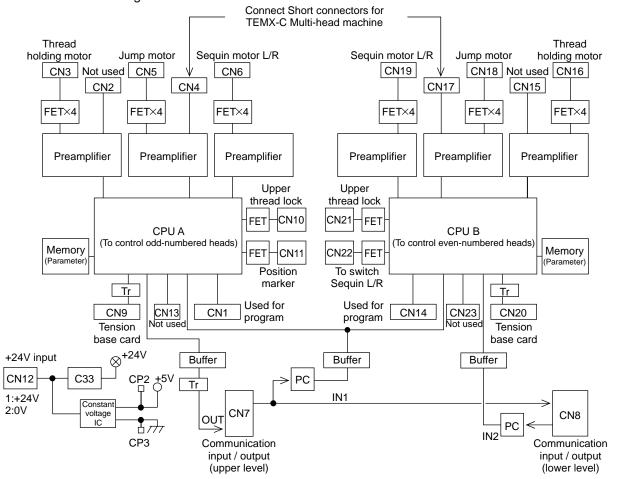
Where to supply power

DC5V is generated from DC24V on the Head card.

 DC24V Driving power for small size motors, solenoids etc.

DC5V Power for IC and related parts.

Electrical block diagram

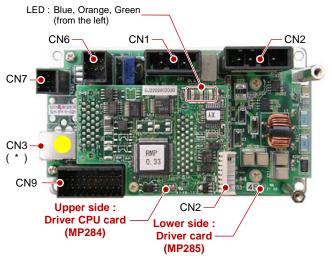


7. Driver (MP284 + MP285, MP284 + MP291)

Driver consists of Driver CPU card (MP284) and Driver card (MP285 or MP291) to control Main shaft and X/Y- axis drive.

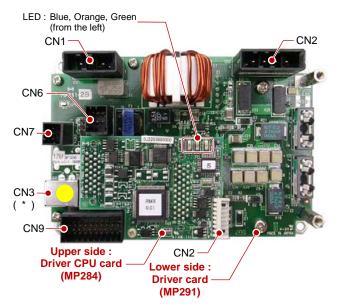
Exterior view and connector allocation

X/Y-axis driver Main shaft driver for TFMX series 2-8 head machine (MP284+MP285)



(*) A yellow sticker is affixed to CN3 on the Driver for TEMX-C Multi-head machine.

Main shaft driver for TEMX-C Multi-head machine (MP284+MP291)



Note 1) Do not open and adjust the motor sensors.

Note 2) Do not remove the cover of the card. (Card Covers are removed in the above photos.)

Major functions

Main shaft driver

- Servo control for the main shaft motor.
- To send Asig (Main shaft synchronizing pulse) to the Machine card and X/Y-axis drivers.
- The value of Asig is 100 pulses per revolution of the Main shaft motor.

However, depending on the pulley ratio of the Main shaft, value of Asig varies as follows

Main shart, value of 7 tolg varies as follows:						
	Number	Value of Asig				
Model	of	(per revolution of				
	heads	Main shaft motor)				
TFMX series	2	250 pulses				
2-8 head	4 to 8	375 pulses				
machine	7 10 0	373 puises				
TEMX-C Multi-I	333 pulses					
machine	333 puises					

- To input the signal of Main shaft fixed position sensor.
- To control Main shaft stop at the fixed position and transmit the signal to the operation panel.

X/Y-axis driver

- Closed control for the X/Y-axis motor.
- Number of teeth of Sensor gear for closed control of the X/Y-axis motors is 50.
- Motor resolution: 8000 steps (Default)
- To input Frame origin sensor, and search operation.
- To recognize the coordinate of the frame position.
- To input frame limit. (Only for TFMX series L spec. models, TEMX-C Multi-head machine)

Where to supply power

DC5V, 12V and 15V are generated from DC240V on the Driver.

DC240 to 335V : Main shaft motor and X/Y-axis

motors.

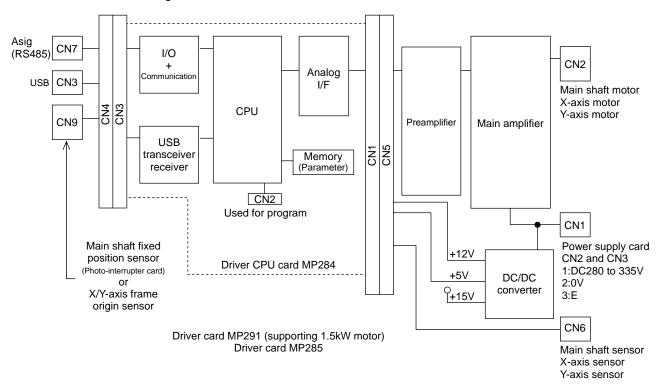
DC5V : IC, sensors etc. DC12V : Not used.

 DC15V : Power for preamplifier.

Status of drivers by LED

LED	Status				
Blue	Driver is operating				
Orange	Error (overcurrent, overload etc.)				
Green	Transmitting/receiving data via USB				

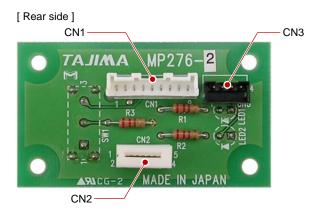
• Electrical block diagram



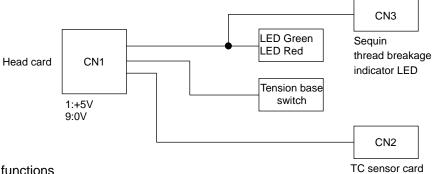
8. Tension base card (MP276)

• Exterior view and connector allocation





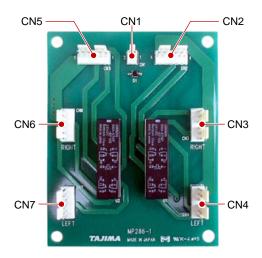
• Electrical block diagram



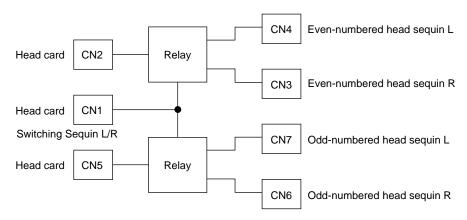
- Major functions
 - To switch ON/OFF of Tension base switch.
 - To light Tension base LED.
 - To relay signals with TC sensor card.

9. Extension head card (MP286)

• Exterior view and connector allocation



Electrical block diagram

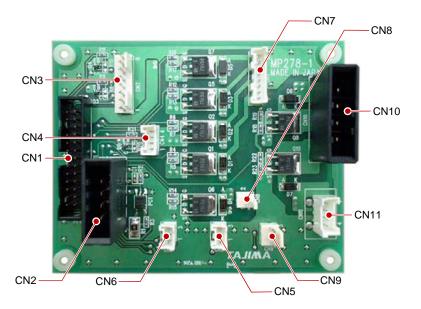


Major functions

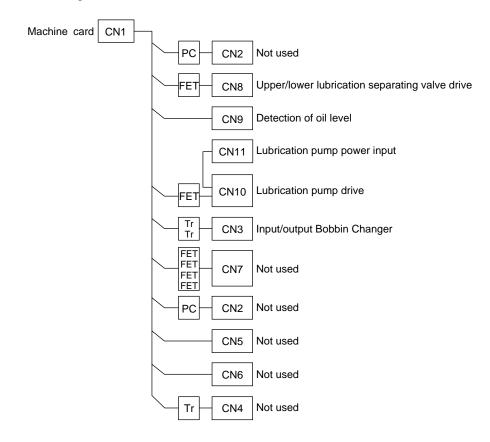
- When Sequin device L+R is equipped, Extension head card outputs the power to the sequin motor L or R, according to the sequin L/R switching signal (CN1) from the Head card.
- 1 Extension head card controls 2 heads.

10. Extension machine card (MP278, only for TFMX series 2-8 head machine)

• Exterior view and connector allocation



Electrical block diagram



Major functions

Extension machine card is equipped for the optional devices listed below to perform input/output operation.

- Automatic lubrication system
- Bobbin changer (Currently not supported)

11. Compatibility of cards and sensors (As of November 2008)

© : Complete compatibility

O: These cards are available with upgraded system software

→: This card is available between the machine (B) and (C)

X: No compatibility

-- : Not used

	TEN 0/ 0		TEN 10/		TEM 0/ 0		TENO/ 0		
Part name	TEMX-C Multi-head machine (A)	Compatibility between machine	TFMX series 2-8 head machine (B)	Compatibility between machine	TFMX-C Single head machine (C)	Compatibility between machine	TEMX-C Single head machine (D)	Compatibility between machine	Type, remark
	Part No.	(A) and (B)	Part No.	(B) and (C)	Part No.	(C) and (D)	Part No.	(D) and (A)	
Card :CPU-A			0J2304200011	0	0J2304200011				With Japanese OS (*1)
Card :CPU-J [A]	0J2304800A13	0	0J2304800A13	0	0J2304800A13	0	0J2304800A13	0	With Japanese OS (*2)
Card :CPU-J :X16 [A]	0J2304802A13	0	0J2304802A13	0	0J2304802A13	0	0J2304802A13	0	With Japanese OS (*3)
Card :CPU-B			0J2304201011	0	0J2304201011				With English OS (*1)
Card :CPU-E [A]	0J2304801A13	0	0J2304801A13	0	0J2304801A13	0	0J2304801A13	0	With English OS (*2)
Card :CPU-E :X16 [A]	0J2304803A13	0	0J2304803A13	0	0J2304803A13	0	0J2304803A13	0	With English OS (*3)
Card :Switch	0J3502000012	0	0J3502000012	0	0J3502000012	0	0J3502000012	0	MP275-4
Card :I/F Connector	0J3200700011	0	0J3200700011	0	0J3200700011	0	0J3200700011	0	MP282-2
Card :Capacitor	0J3502600011	0	0J3502600011	0	0J3502600011	0	0J3502600011	0	MP290-2
Card :Power supply : Single-phase		1	0J2101601011	\rightarrow	0J2101602011	0	0J2101602011		(B) MP277-3B (C) MP277-3C (D) MP277-3C
Card :Power supply : 3-phase			0J2101600011						MP277-3A
Card :Power supply : 3-phase :A	0J2102200011								MP277-3D
DC Power Supply : 5V, +/-12V	645300030000	0	645300030000	0	645300030000	0	645300030000	0	LDC60F-1
DC Power Supply :24V	645300191011	×	645300190011	×	645300191011	0	645300191011	0	(B) LEP150F-24-XMUSB (C) LEP150F-24-XMUS2 (D) LEP150F-24-XMUS2
DC Power Supply :24V :240W	645300220011								LEP240F-24-XMUS2
Офр.у			0J2502300022	×	0J2502301033				(B) MP274-3A (C) MP274-3B
Card :Machine			0J2502300033	×	0J2502301055	0	0J2502301055		(B) MP274-3A2 (*5) (C) MP274-3B3 (*5) (D) MP274-3B3 (*5)
Card :Machine : Single head P3				×	0J2503401000	×			MP274-3H (*4)
Card :Machine :S5A	0J2503300000								MP274-3E (*5)
			0J2702600022	×	0J2702301044				(B) MP273-3A (C) MP273-3B
Card :Head		-	0J2703300000	×	0J2702301055	0	0J2702301055		(B) MP273-3A2 (*5) (C) MP273-3B2 (*5) (D) MP273-3B2 (*5)
Card :Head :S5B	0J2703300000	0	0J2703300000						MP273-3A2 (*5)
Card :Tension base	0J2601900012	0	0J2601900012	0	0J2601900012	0	0J2601900012		MP276-2
Driver :X12-F [A]		0	0J0302500A22	0	0J0302500A22	0	0J0302500A22		To control Main shaft (200W)
Driver :X12-G [A]			0J0302600A22						To control Main shaft (400W)
Driver :X12-H [A]		-	0J0302400A33						To control X/Y-axis
Driver :X12-K [A]	0J0302800A00								To control Main shaft (1.5kW)
Driver :X12-L [A]	0J0302900A00								To control X/Y-axis
Card :Photo-interrupter	0J4201600022	0	0J4201600022	0	0J4201600022	0	0J4201600022		To detect Main shaft fixed position
Card :TC sensor	0J2602100012	0	0J2602100012	0	0J2602100012	0	0J2602100012		To detect thread breakage
Potentiometer	640900010001	0	640900010001	0	640900010001	0	640900010001		M22S10-029-102
Potentiometer					640900030001				VP-12
Potentiometer	640900040001								JC22E-1K
Card :Magnetic sensor A	0J4200800012	0	0Ј4200800012	0	0J4200800012	0	0Ј4200800012		For ATH knife retraction To detect X/Y-axis origin
Card :Magnetic sensor B	0J4200801022	0	0J4200801022						To detect frame limit

^(*1) Cards, mounted to X14 controller.

^(*2) Cards, mounted to X15 controller.

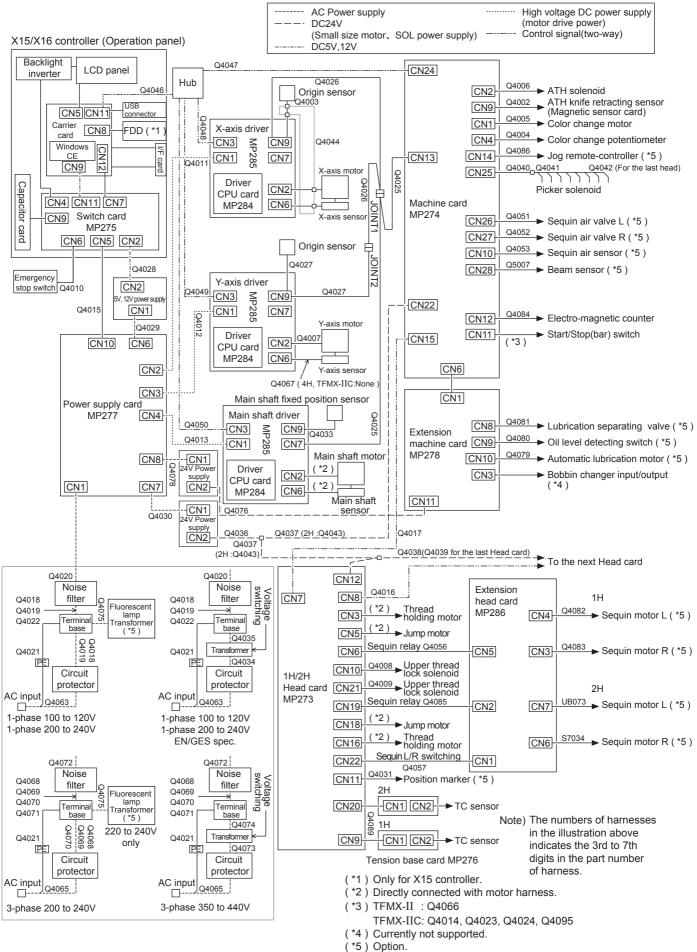
^(*3) Cards, mounted to X16 controller.

^(*4) Card, mounted to the machine with the Sequin device 3.

^(*5) Cards, supporting 50-slit rotary disk.

12. Electrical system diagram 12-1.TFMX, TFMX-C AC Power supply High voltage DC power supply DC24\/ (motor drive power) Control signal(two-way) (Small size motor, SOL power supply) X15/X16 controller (Operation panel) DC5V,12V Backlight Q4047 CN24 LCD panel inverter Hub Frame limit(L spec. only) Q4006 ► ATH solenoid Q4046 CN2 +X -X Origin sensor ATH knife retracting sensor (Magnetic sensor card) **USB** CN9 Q4048 CN5 CN11 Q4091 connecto CN1 ► Color change motor Carrier X-axis driver CN8 FDD (*1 card Q4091 CN4 Color change potentiometer CN3 MP285 ICN9 Windows CN12 I/F card Q4011 → Jog remote-controller (*6) CN13 CN14 CN1 CN7 IR026 CN9 Q4042 (For the last head) -axis motor CN25 Q4091 Driver Capacitor CN2 Picker solenoid CPU card CN4 CN11 CN7 CN₆ MP284 Machine card MP274 Switch card ► Sequin air valve L (*6) CN9 X-axis senso CN26 MP275 UB030 card ► Sequin air valve R (*6) CN27 CN6 CN5 CN2 Frame limit(L spec. only) ► Sequin air sensor (*6) CN10 -Y +Y Origin sensor Q5007 Q4028 Q4090 ▶ Beam sensor (*6) CN28 Emergency stop switch Q4010 Y-axis driver CN2 Q4049 Q4090 CN3 MP285 CN9 -CN22 Q4012 CN1 ·CN1 CN7 Ω4007 → Electro-magnetic counter CN12 Y-axis motor Q4029 CN11 Start/Stop(bar) switch Driver CN15 CN10 CN6 CN2 CPU card MP284 CN6 CN6 CN2 Y-axis sensor CN3 Main shaft fixed position sensor CN1 Power supply card Main shaft driver CN4 MP277 Q4025 Q4081 ► Lubrication separating valve (*6) Q4050 CN8 CN3 CN9 MP285 Ω4033 Extension Q4080 ► Oil level detecting switch (*6) machine card CN9 CN1 CN7 MP278 Main shaft motor Q4079 ► Automatic lubrication motor (*6) CN10 CN8 Driver UB027 CN3 ► Bobbin changer input/output CN2 CPU card (*5) CN1 CN7 CN2 S7008 MP284 CN6 *3) Main shaft CN11 -CN1 Q4076 Q4030 O4036 O4017 O4037 Q4038(Q4039 for the last Head card) (2H:Q4043) To the next Head card Q4020 Q4020 CN12 Voltage – switching Noise Noise Extension Q4016 filter filter CN7 CN8 Q4018 Q4018 head card Fluorescent Thread holding motor Q4019 Q4019 MP286 Q4082 CN3 CN4 Sequin motor L (*6) Terminal Terminal Q4022 Q4022 (*2) ►Jump motor base CN₅ Q4035 Q4018 Q4019 Sequin relay Q4056 Q4083 Transformer CN6 CN5 Sequin motor R (*6) CN3 Q4021 Q4021 Q4034 PE PE Q4008 Upper thread lock solenoid CN10 Circuit Circuit 1H/2H Q4009 Upper thread lock solenoid protector protector Head card CN21 2H AC input Q4063 AC input MP273 Sequin relay Q4085 UB073 ► Sequin motor L (*6) CN7 CN19 CN2 П 1-phase 100 to 120V 1-phase 100 to 120V CN18 → Jump motor 1-phase 200 to 240V 1-phase 200 to 240V Thread holding motor Sequin motor R (*6) EN/GES spec CN16 CN6 Sequin L/R switching CN1 Q4072 CN22 Q4072 Q4057 Position marker (*6) Noise Noise Voltage — switching CN11 Q4068 Q4068 filter filter Q4075 2H Q4069 Q4069 Fluorescent lamp Transformer (*6) Q4070 O4070 Terminal CN1 CN2 CN20 ►TC sensor Q4071 Q4071 base base Note) The numbers of harnesses Q4074 1H Q4068 Q4069 220 to 240\ in the illustration above Q4021 Q4021 Transformer -CN1 CN2 CN9 only indicates the 3rd to 7th Q4073 PE PE Circuit Circuit digits in the part number Tension base card MP276 protector protector of harness. (*1) Only for X15 controller. AC input AC input Q4065 Q4065 (*2) Directly connected with motor harness. (*3) Harness may not be used depending on the model. 3-phase 350 to 440V 3-phase 200 to 240V *4) TFMX : Q4066, Q4093, Q4094 TFMX-C: Q4023 (*5) Currently not supported. (*6) Option. (14/16)

12-2.TFMX-II, TFMX-IIC



12-3.TEMX-C Multi-head machine AC Power supply High voltage DC power supply DC24V (motor drive power) Control signal(two-way) (Small size motor, SOL power supply) DC5V,12V X15/X16 controller (Operation panel) Clamp Filter Backlight Q4047 UB018 ► ATH solenoid LCD panel CN24 inverter CN2 **UB062** Hub ATH knife retracting sensor (Magnetic sensor card) Q4002 CN9 Q4046 Origin sensor **USB** Q4048 CN5 CN11 UB062 connecto Color change motor CN1 Carrier X-axis driver CN8 FDD (*1 **UB033** card CN7 Color change motor encoder CN3 MP285 CN9 Windows CN12 UB026 or UB049 I/F card Q4011 CN8 Color change potentiometer CN13 CN1 CN7 X-axis UB038 CN9 motor CN4 UB051 Driver **UB062** Q4086 Capacitor CN14 → Jog remote-controller (*3) CN2 CPU card Q4042 (For the last head) CN4 CN11 CN7 CN6 CN25 MP284 7777 Switch card X-axis CN9 Machine card Picker solenoid MP275 sensor MP274 card UB030(18H machine only) S7031 CN26 ➤ Sequin air valve L (*3) CN6 CN5 CN2 Sequin air valve R (*3) → Sequin air valve R (*3) CN27 Origin sensor Q4053 Q4028 UB061 CN10 ➤ Sequin air sensor (*3) Emergency Y-axis driver Q4098 → Table lift up/down limit CN2 CN20 stop switch Q4010 Q4049 **UB061** CN3 MP285 CN9 Q5007 CN28 → Beam sensor (*3) CN22 Q4012 CN1 CN1 CN7 Q4007 or UB050 Electro-magnetic counter CN12 Y-axis motor Q4029 CN11 Start/stop switch Driver CN15 CN10 CN6 CN2 CPU card Y-axis MP284 CN6 ^lsensor Q4095 or Q4096 CN2 0 Main shaft CN3 17H/18H Clamp filter fixed position sensor Head card Power supply card Main shaft driver CN4 MP273 MP277 Q4050 CN3 MP29 CN7 CN9 UB060 Q4013 CN1 CN7 UB043 Q 24V Power supply Main shaft motor CN8 9H/10H Driver (*2) supply CN2 CN2 Head card CPU card CN1 (*2) CN7 MP273 CN6 MP284 Q4030 CN7 Q4072 Main shaft sensor UB032(18H machine) CN1 Noise UB032(18H machine) Q4097(15H or less machine) ➤ To the next head card filter Q4068 CN2 O4069 Q4038(Last connection of Head card :Q4039) Q4071 Q4070 UB032 Q4038(7H/8H Head card :Q4039) Q4071 To the next head card CN12 UB065 Terminal Extension Q4016 CN8 CN7 1H head card UB074 UB075 UB076 (*2) Thread holding motor UB059 Fluorescent lamp Transformer Q4082 MP286 ➤ Seguin motor L (*3) Q4021 CN3 CN4 CN4 (*2) ► Jump motor PE CN5 No-fuse Q4099 Sequin relay Q4056 Q4083 ► Sequin motor R (*3) Breaker CN6 CN5 CN3 AC input UB064 Auto sub table Q4008 Upper thread lock solenoid CN10 up / down 1H/2H 1-phase 100 to 120V Power supply Upper thread lock solenoid Head card CN21 1-phase 200 to 240V MP273 Sequin relay Q4085 UB073 CN19 Sequin motor L (*3) CN2 CN7 Voltage UB058 CN18 → Jump motor switching CN17 Terminal Thread holding motor Sequin motor R (*3) CN16 CN6 base Q4074 Sequin L/R switching CN22 CN1 Q4021 Transformer Q4057 Position marker (*3) Q4099 UB068 CN11 No-fuse Auto sub table Note) The numbers of harnesses 2H Breaker up / down in the illustration above CN1 CN2 CN20 TC sensor AC input UB064 Power supply indicates the 3rd to 7th 1H digits in the part number 3-phase 350 to 440V CN1 CN2 CN9 ►TC sensor of harness. Tension base card MP276

(*1) Only for X15 controller.

(*3) Option.

(*2) Directly connected with motor harness.