

## Instruction List of FB-PLC

Advanced functions	The following classified functions with parentheses “( )” are basic function instructions. Nevertheless, for the classification relations, they were also classified into the following instructions.
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### ■ Arithmetical operation instructions

FUN#	Instruction Name	Operand	Derivative instruction	Function Descriptions
(11)	(+)	Sa,Sb,D	DP	Please refer to basic application instructions for details
(12)	(-)	Sa,Sb,D	DP	
(13)	(*)	Sa,Sb,D	DP	
(14)	(/)	Sa,Sb,D	DP	
23	DIV48	Sa,Sb,D	P	48 bits division instruction(Sa÷Sb→D)
24	SUM	S,N,D	DP	Make the summation of successive N values beginning from S, and store it to D
25	MEAN	S,N,D	DP	Make the mean average of the successive N values beginning from S, and store it to D
26	SQRT	S,D	DP	Make the square root out of value S, and store it to D
27	NEG	D	DP	Make the 2's complement of value D, and store it back to D.
28	ABS	D	DP	Make the absolute value of D, and store it back to D
29	EXT	D	P	Make the 16 bit numerical value and extend it to 32 bit numerical value (the value unchanged)
30	PID	Ts,SR,OR, PR,WR		General purpose PID loop control instruction

### ■ Logical operation instructions

(18)	AND	Sa,Sb,D	DP	Please refer to basic application instructions for details
(19)	OR	Sa,Sb,D	DP	
35	XOR	Sa,Sb,D	DP	Make the Exclusive OR logical operation over Sa and SB, and store the result to D
36	XNR	Sa,Sb,D	DP	Make the Inclusive OR logical operation over Sa and SB, and store the result to D

### ■ Comparative instructions

(17)	CMP	Sa,Sb	DP	Please refer to basic application instructions for details
37	ZNCMP	S,SU,SL	DP	Compare S with the zones formed by the upper limit Su and lower limit SL, and transfer the result to FO0~FO2

### ■ Data movement instructions

(8)	MOV	S,D	DP	Please refer to basic application instructions for details
(9)	MOV/	S,D	DP	
40	BITRD	S,N	DP	Take out the status of the bits specified by N within S, and transfer it to FO0
41	BITWR	D,N	DP	Write the INB input status to the bits specified by N within D
42	BITMV	S,Ns,D,Nd	DP	Move the Ns bit status within S to Nd bit location within D
43	NBMV	S,Ns,D,Nd	DP	Move the nibble specified by Ns within S to the nibble location specified by Nd within D
44	BYMV	S,Ns,D,Nd	DP	Move the Byte specified by Ns within S to the Byte specified by Nd within D
45	XCHG	Da,Db	DP	Exchange the values of Da and Db
46	SWAP	D	P	Swap the data of the High-Byte and Low-Byte within D
47	UNIT	S,N,D	P	Take the nibble0 (NB0) of the successive N words beginning from S, cascade to connect them orderly, and store to D
48	DIST	S,N,D	P	Store the successive N nibbles beginning from nibble 0 of S into the nibble 0 of N Words beginning from D.

■ Shifting/rotating instructions

FUN#	Instruction Name	Operand	Derivative instruction	Function Descriptions
(6)	BSHF	D	DP	Please refer to basic application instructions for details
51	SHFL	D,N	DP	Shift left (toward high bit) the D operand N bits and restore back into D, move the shifted out bits to FO0, and fill up empty positions with input bits
52	SHFR	D,N	DP	Shift right (toward low bit) the D operand N bits and restore back into D, move the shifted out bits to FO0, and fill up empty positions with input bits
53	ROTL	D,N	DP	Rotate left (toward high bit) the D operand N bits and restore back into D, move the rotated out bits to FO0
54	ROTR	D,N	DP	Rotate right (toward low bit) the D operand N bits and restore back into D, move the rotated out bits to FO0

■ Code conversion instructions

(20)	→BCD	S,D	DP	Please refer to basic application instructions for details
(21)	→BIN	S,D	DP	
57	DECOD	S,Ns,NL,D	P	Decode the binary numerical value formed by the left-moving (toward high bit) NL bits starting from Ns within S, and store the result to the register starting from D
58	ENCOD	S,Ns,NL,D	P	Give priority level to encoding the left-moving (toward high bit) NL discrete starting from the discrete Ns within S, and store the result to D
59	→7SG	S,N,D	P	Convert the nibble value specified by N within S, into 7 segment code, then store in D
60	→ASC	S,D	P	After S (max. 12 alphanumeric or symbols) has been converted into ASCII code, store the result to the registers starting from D
61	→SEC	S,D	P	Convert the time values (hours, minutes, seconds) of the three successive registers starting from S into seconds, store them to D
62	→HMS	S,D	P	Convert the time values (seconds) of S into hours minutes, seconds, and store them to D
63	→HEX	S,N,D	P	Convert the successive N ASCII codes starting from S to be hexadecimal values and store it into D.
64	→ASC II	S,N,D	P	Convert the successive N hexadecimal values starting from S to be ASCII code and store it into D

■ Flow control instructions

(0)	MC	N		Please refer to basic application instructions for details
(1)	MCE	N		
(2)	SKP	N		
(3)	SKPE	N		
	END			End of the program execution (for debugging)
65	LBL	1~6 letters or numerals		Define the alphanumeric listed by the operand as a label
66	JMP	LBL	P	Jump to LBL and execute the program
67	CALL	LBL	P	Call LBL subroutine
68	RTS			Instruction for return from subroutine
69	RTI			Instruction for return from interrupt service subroutine

FUN#	Instruction Name	Operand	Derivative instruction	Function Descriptions
70	FOR	N		Loop instruction starting point and specified number (N) of loops executed
71	NEXT			Return instruction for a FOR-NEXT Loop

■ Temperature control instructions 1

72	TP4	Tp,PI,Sm, Ym,AR,TR, WR		Convenient instruction for temperature measurement of temperature modules FB-2AJ(K)4/FB-2AH(T)4
73	TSTC	Tp,PI,Sm, Ym,AR,TR, Yn,Sn,Zh, Sv,Os,PR, IR,DR,OR, WR		Convenient instruction for temperature measurement and PID control of temperature modules FB-2AJ(K)4/FB-2AH(T)4

■ I/O instructions

74	IMDIO	D,N	P	Refresh main unit I/O point status immediately
75	FILT	N	P	Set the input integral time constant for high speed input point X0~X15 to be N mS
76	TKEY	IN,D,KL	D	Instant instruction for 10 numeric keys input
77	HKEY	IN,OT, D,KL	D	Instant instruction for 16 keys (10 numeric, 6 control keys)
78	DSW	IN,OT,D	D	Instant instruction for dip switch input.
79	7SGDL	S,OT,N	D	Instant instruction of multi tasking scanning for 7 segment display
80	MUXI	IN,OT,N,D		Instant instruction for multi taking junction point input.
81	PLSO	MD, Fr, PC UY,DY,HO	D	Pulse output instruction (for bi-directional driving of stepping motor)
82	PWM	To,Tp,OT		Pulse width modulation instruction
83	SPD	S,TI,D		Pulse speed detection instruction
84	7SGMO	S,Yn,Dn, PT,IT,WS		Instant instruction of 7 segment displayer (FB-7SG-xx) module

■ Temperature control instructions 2

85	TPSNS	Tp,PI,Zn, Yn,SR,WR		Convenient instruction for temperature measurement of temperature module FB-4AJ(K)xx
86	TPCTL	Yn,Sn,Zn, Sv,Os,PR IR,DR,OR, WR		Convenient instruction for PID control of temperature module FB-4AJ(K)xx

■ Cumulative timer instructions

87	T.01S	CV,PV		Cumulative timer with 0.01 second time base
88	T.1S	CV,PV		Cumulative timer with 0.1 second time base
89	T1S	CV,PV		Cumulative timer with 1 second time base

■ Watchdog timer instructions

FUN#	Instruction Name	Operand	Derivative instruction	Function Descriptions
90	WDT	N	P	Set up the timing duration of WDT to be N mS
91	RSWDT		P	Reset WDT to make it start timing from 0.

■ High speed counting/timing instructions

92	HSCTR	CN	P	Read and put the CV current value of hardware high speed counter HSC0~HSC3 or HST in ASIC into internally PLC the corresponding to HSC or HST CV register
93	HSCTW	CN,D	P	Write the CV or PV register value of PLC internal HSC0~HSC3 or HST to ASIC hardware HSC or HST CV or PV register

■ Report printing instruction

94	ASCWR	MD,S,Pt		Transmit the ASCII data starting from address S to RS-232 communication port (port1) of main unit
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■ Slow up/Slow down instruction

95	RAMP	Tn,PV,SL, SU,D		Slow up/slow down instant instruction
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■ Communication instructions

96	LINK2	MD,S,Pt		Instant instruction for RS-485 (port2) general purpose communication
97	LINK1	MD,S,Pt		Instant instruction for RS-232 (port1) general purpose communication

■ Table instructions

100	R→T	Rs,Td,L,Pr	DP	Store the Rs value into the position specified by Pr within Td
101	T→R	Ts,L,Pr,Rd	DP	Take the value of the position specified by Pr within Ts and store it into Rd
102	T→T	Ts,Td,L,Pr	DP	Take the value of the position specified by Pr within Ts and store it into the position specified by Pr within Td
103	BT_M	Ts,Td,L	DP	Move the entire content of Ts into TD
104	T_SWP	Ta,Tb,L	DP	Swap completely the contents of Ta and Tb
105	R-T_S	Rs,Ts,L,Pr	DP	From top to bottom of Ts, search for positions that are different or similar to the Rs value, and store these position values into Pr
106	T-T_C	Ta,Tb,L,Pr	DP	From top to bottom of Ta and Tb, compare and search for that value are different or similar in positions, and store these position values in Pr
107	T_FIL	Rs,Td,L	DP	Fill the Rs value into each position within Td
108	T_SHF	IW,Ts,Td, L,OW	DP	Take out Ts, shift one position, and store the result to Td. Move the shifted out data into OW, and fill the emptied position with IW
109	T_ROT	Ts,Td,L	DP	Take out Ts, rotate one position, and store the result into Td
110	QUEUE	IW,QU,L, Pr,OW	DP	Push IW into queue or take the earliest data out of queue, and move to OW (first-in first-out device)
111	STACK	IW,ST,L, Pr,OW	DP	Push IW into stack or take the most recent data out of stack, and move to OW (last-in first-out device)
112	BKCMP	Rs,Ts,L,D	DP	Compare the Rs value with L pairs of upper/lower limit values formed by table Ts, Store the result from each comparison to the power relay specified by D (DRUM instruction)
113	SORT	S,D,L	DP	Instant instruction for sorting (in ascendant order or descendant order)

■ Matrix instructions

FUN#	Instruction Name	Operand	Derivative instruction	Function Descriptions
120	MAND	Ma,Mb,Md,L	P	Take the result of the logical AND operation made between Ma and Mb, and store it to Md
121	MOR	Ma,Mb,Md,L	P	Take the result of the logical OR operation made between Ma and Mb, and store it to Md
122	MXOR	Ma,Mb,Md,L	P	Take the result of the logical Exclusive OR operation made between Ma and Mb, and store it to Md
123	MXNR	Ma,Mb,Md,L	P	Take the result of the logical Inclusive OR operation made between Ma and Mb, and store it to Md
124	MINV	Ms,Md ,L	P	Invert Ms and store the result to Md
125	MCMP	Ma,Mb,L Pr	P	Compare Ma and Mb to find the positions with different values, and store these position values to Pr
126	MBRD	Ms,L,Pr	P	Take out the bit status of the position specified by Pr within Ms and send it to F00 output
127	MBWR	Md,L,Pr	P	Write the input status onto the bits specified by Pr within Md
128	MBSHF	Ms,Md,L	P	Shift Ms by one bit, and store the result to Md, move the squeezed out bit to F00 and fill the emptied bit with INB input status
129	MBROT	Ms,Md,L	P	Rotate Ms by one bit, and store the result to Md; move the rotated bit to F00
130	MBCNT	Ms,L,D	P	Calculated the total amount of 1 or 0 bits within Ms, and store it to D

■ NC positioning instructions

140	HPSO	Ps,SR,WR		High speed pulse output instruction for NC positioning control
141	MPARA	Ps,SR		Parameter table instruction for NC positioning control
142	PSOFF	Ps	P	The enforced pulse output shut off instruction for NC positioning control
143	PSCNV	Ps,D	P	Convert the NC positioning Ps location to mm, Inch or Deg

■ Enable/Disable instructions

145	EN	LBL	P	Enable HSC, HST and external INT etc. functions
146	DIS	LBL	P	Disable HSC, HST and external INT etc. functions