Technical Bulletin

FX2N to FX3U Conversion Programming Considerations

Program Considerations

- FX2N series and FX3U series programming functional differences.
  The FX3U series can use the same commands as the FX2N series, but there are differences in their functionality. Please modify and check the behavior of the program according to the hardware configuration and program content.

Important points on program and system functionality differences

Item		Functional Difference		Important Points
		FX2N Series	**FX3U Series**	
System Related				
Initialization	Default settings for D8008 when using DC power supply	Requires K-1 to be written to D8008 for initialization	No initialization required	FX3U DC power supply types do not require D8008 to be initialized, so please delete the program initialization.
	Error detection devices monitored by M8004	M8060～ M8067, except M8062	M8060～ M8067, except M8062 and M8063	If M8004 was used to check M8063, please add a program to check for M8063.
High-speed Input	Specifying 32bit counters in word instructions	If a double word C200～ C255 is specified in a word instruction, an operation error occurs at instruction execution.	A syntax error occurs prior to RUN if a double word C200～ C255 is specified in a word command. However, C200～ C255 can be specified in the ZRST command.	FX3U has better error detection prior to RUN. Please check the program, and revise it so that there are no errors.

Item		Functional Difference		Important Points
		FX2N Series	**FX3U Series**	
	Pulse catch function	The pulse catch function is enabled after the EI instruction is executed.	If the EI instruction is anywhere in the sequence program, the pulse catch function is always enabled.	In the FX3U, the pulse catch function is enabled even in the DI state.
Communication	Clear timing for serial communication error M8063, D8063	STOP → RUN	Power OFF	Please add program to use the RST instruction if you need these devices to clear at STOP → RUN.
	Parallel link / Baud rate	19,200bps	115,200bps	Please note that communication may be affected by noise due to faster communication.
	Parallel link / Link time for normal parallel link mode	70ms + master operation cycle (ms) + slave operation cycle (ms)	15ms + master operation cycle (ms) + slave operation cycle (ms)	Because link time has shortened, please reconfirm the update timing of the link device.

Item			Functional Difference		Important Points
			FX2N Series	**FX3U Series**	
	Parallel link	Link time for high-speed parallel link mode	20ms + master operation cycle (ms) + slave operation cycle (ms)	5ms + master operation cycle (ms) + slave operation cycle (ms)	
Instruction Related					
Step Ladder Program	Programs with STL instruction parallel recombination		There is no parallel recombination if an NOP instruction is inserted between two STL instructions.	There is still parallel recombination is an NOP instruction is inserted between two STL instructions.	If an NOP instruction is inserted between two STL instructions in the FX2N program, please insert a dummy program other than NOP between the two STL instructions in the FX3U program.
	ON state conditions for M8046		M8047 is ON, and any state S0～ S899 is active	M8047 is ON, and any state S0～ S899 or S1000～ S4095 is active	Target device range changes, so please initialize S1000～ S4095
	Range of STL states stored in D8040～ D8047 when M8047 is ON		Active STL states S0～ S899 in ascending numerical order	Active STL states S0～ S899 and S1000～ S4095 in ascending numerical order	Target device range changes, so please initialize S1000～ S4095

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Item		Functional Difference		Important Points
		FX2N Series	**FX3U Series**	
Timing	Instruction execution time	Refer to "FX1S/FX1N/FX2N Series Programming Manual" Section 7: Execution Times and Instructional Hierarchy.	Refer to "FX3G/FX3U/FX3UC Series Programming Manual" Appendix B: Instruction Execution Time.	Instruction execution time changes. Care must be taken if the system operates synchronously with scan time. Furthermore, the watchdog timer is not refreshed during BMOV instruction execution. If necessary, please take appropriate measures, such as inserting the WDT instruction.
Program Flow	FNC00/01	If there is no jump or call destination, an operation error occurs when CJ or CALL is executed	If there is no jump or call destination, a syntax error occurs. However, if an index is added to P, then an operation error occurs at instruction execution.	FX3U has better error detection prior to RUN. Please check the program, and revise it so that there are no errors.
	Error detection for unused CJ and CALL pointers			
Transfer Comparison	FNC15	10～20ms to write data in one continuous block (8 points)	66～132ms to write data in one continuous block (500 points)* * : Execution of the program is paused during this period.	When writing to a file register using the BMOV command and a memory cassette, the scan time may be prolonged during BMOV instruction execution.
	BMOV instruction file register write execution time (when a memory cassette is installed)			

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		FX2N Series	**FX3U Series**	
Shift	FNC34～37	When the S and D device ranges overlap, operation result is not correct, but the operation is still performed.	When the S and D device ranges overlap, an operation error (6710) occurs, and the operation is not performed.	Because the result is abnormal, the commands are changed so that an operation error occurs in the FX3U. Please correct and avoid the operation error.
	Behavior when the S and D device range of a SFTR, SFTL, WSFR, WSFL command overlap			
Data Handling	FNC40	ZRST instruction does not clear timers or counters even if the operand is specified as timers or counters.	ZRST instruction clear timers or counters if the operand is specified as timers or counter.	In the FX2N, RST must be used to order to clear the timers and counters. In the FX3U, ZRST can be used to reset a range once.
	Using ZRST to clear coils			
	FNC40	The ZRST command resets the specified device, but not the last state of PLS, PLF commands. Even if a ZRST command is programmed before a PLS command specifying the same device, the PLS command is not driven until its driving contact is OFF → ON.	The ZRST command resets not only the specified devices but also the last state for PLS, PLF commands. When a ZRST command is programmed before a PLS command specifying the same device, the PLS command is repeatedly driven while its driving contact is ON.	Please change the driving contact of PLS to LDP, or add the MEP instruction between PLS and the driving contact.
	Combined operation of ZRST and PLS			

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Item		Functional Difference		Important Points
		FX2N Series	**FX3U Series**	
	FNC48			To refer to M8020 and M8021 data before it is cleared after executing SQR or DSQR, please copy M8020 and M8021 to other devices before instruction execution.
	SQR, DSQR command flag clear timing	At the beginning of instruction execution, M8020 (zero flag) and M2021 (borrow flag) are not cleared.	At the beginning of instruction execution, M8020 (zero flag) and M2021 (borrow flag) are cleared.	
High-speed Handling	FNC53/54/55	When the same comparison value is used in DHSCS, DHSCR, and DHSZ instructions and interrupt handling timing overlaps, instructions are performed sequentially as written in the program.	When the same comparison value is used in DHSCS, DHSCR, DHSZ, and DHCT instructions and interrupt handling timing overlaps, instructions are performed in the following order of priority: ①DHSCR (self-reset) ② DHSZ ③ DHCT ④ DHSCS ⑤ DHSCR	Please see part 6 in "Common cautions on using instructions for high-speed counter" in the FX3G/FX3U/FX3UC programming manual section 13.4.
	Comparison of high-speed counter application instructions DHSCS, DHSCR, DHSZ			

Item		Functional Difference		Important Points
		FX2N Series	FX3U Series	
	FNC56	If an indirect operand specified (count time) for SPD is changed while the instruction is driven, it is not reflected until the driving contact turns ON again.	If an indirect operand specified (count time) for SPD is changed while the instruction is driven, it is immediately reflected.	If the immediately reflected timing is an issue, then please change the count time when the SPD drive contact is OFF.
	Reflection of count time when the SPD instruction is driven			
External I/O Device	FNC70～75, 77	If the device number required for operation is beyond the range of the device specified in the operand, an error occurs and the operation is carried out to the extent possible.	If the device number required for operation is beyond the range of the device specified in the operand, an operation error (6706) occurs and the operation is not performed.	The FX3U has enhanced instruction execution error detection. Please check the program and change the assigned device to avoid any errors.
	TKY, HKY, DSW, SEGL, ARWS, PR commands			
	FNC78/79	When M8164 is ON, the value in D8164 is used as the number of FROM/TO transfer points.	D and R can be specified as the number of transfer points.	D and R can be specified as the number for transfer points, so please modify the program to use D or R.
	FROM/TO commands number of transfer points			

Item		Functional Difference		Important Points
		FX2N Series	**FX3U Series**	
External Serial Devices	FNC80	In the case of 1-pair wiring for half-duplex interface, echo occurs using the RS command.	In the case of 1-pair wiring for half-duplex interface, echo does not occur using the RS command.	In the case of one pair wiring used with RS commands, a program to discard echo data is needed in the FX2N, but unnecessary for the FX3U. Please delete the program to discard echo data.
	RS command echo using RS-485 communication board and 1-pair wiring			
	FNC81	When D or S are specified as the M device and the device number required for the operation is beyond the M device range, no error occurs, and the operation is performed to the extent possible.	When D or S are specified as the M device and the device number required for the operation is beyond the M device range, an operation error occurs, and the operation is not performed.	The FX3U has enhanced instruction execution error detection. Please check the program and change the assigned device to avoid any errors.
	PRUN command			
	FNC88	25 points from S3	29 points from S3	Because the number of points occupied has increased, please re-check device assignments.
	Number of points occupied by S3 in the PID command			

Item			Functional Difference		Important Points
			FX2N Series	**FX3U Series**	
Data Conversion	FNC129		When conversion overflows, the D contains largest positive or negative value.	When conversion overflows, D is not updated. It will maintain the same value prior to instruction execution.	If M8022 is ON, please change the program to work without referring to D.
	What happens when the INT instruction results in overflow				
Extension	EXTR command inverter communication	Operation monitoring	EXTR(K10)	IVCK	Please replace with the supported inverter command. Refer to the inverter communication section of the User's Manual [Data Communication Edition] for details.
		Operation control	EXTR(K11)	IVDR	
		Parameter read	EXTR(K12)	IVRD	
		Parameter write	EXTR(K13)	IVWR	
		Communication flag	M8155	M8151(ch1)	Please change the assignment to a compatible device.
		Communication error	M8156	M8152(ch1)	Please change the assignment to a compatible device.

Item			Functional Difference		Important Points
			FX2N Series	FX3U Series	
	EXTR command inverter communication	Communication error flag	M8157	M8153(ch1)	Please change the assignment to a compatible device.
		Response wait time	D8154	D8150(ch1)	Please change the assignment to a compatible device.
		Step No. while communicating	D8155	D8151(ch1)	Please change the assignment to a compatible device.
		Communication error code	D8156	D8152(ch1)	Please change the assignment to a compatible device.
		Step No. at which communication error occurs	D8157	D8153(ch1)	Please change the assignment to a compatible device.

Device Comparison

- Comparison of FX2N series and FX3U series devices
  The devices used in the FX2N series, including special devices, are also available in the FX3U series. The following comparison table also shows the improvements in FX3U series devices.

Device comparison (Grey shading indicates an item with a functional difference.)

Device			FX2N Series		FX3U Series	
Type	Use		Number	Points	Number	Points
M	Auxiliary relay	General purpose [variable]	M0～ M499	500	M0～ M499	500
		Latched [variable]	M500～ M1023	524	M500～ M1023	524
		Latched [fixed]	M1024～ M3071	2048	M1024～ M7679	6656
		Special	M8000～ M8255	256	M8000～ M8511	512
S	State relay	Initial (general) [variable]	S0～ S9	10	S0～ S9	10
		General [variable]	S10～ S499	490	S10～ S499	490
		Latched [variable]	S500～ S899	400	S500～ S899	400
		Annunciator (latched) [variable]	S900～ S999	100	S900～ S999	100
		Latched [fixed]	－	－	S1000～ S4095	3096
T	Timer	100ms	T0～ T191	192	T0～ T191	192
		100ms (routine program use)	T192～ T199	8	T192～ T199	8
		10ms	T200～ T245	46	T200～ T245	46
		1ms retentive	T246～ T249	4	T246～ T249	4
		100ms retentive	T250～ T255	6	T250～ T255	6
		10ms	－	－	T256～ T511	256

C	Counter	General up counter (16bit) [variable]	C0〜 C99	100	C0〜 C99	100
		Latched up counter (16bit) [variable]	C100〜 C199	100	C100〜 C199	100
		General bi-directional counter (32bit) [variable]	C200〜 C219	20	C200〜 C219	20
		Latched bi-directional counter (32bit) [variable]	C220〜 C234	15	C220〜 C234	15
	High-speed counter	1-phase 1-count input bidirectional (32bit) [variable]	C235〜 C245 60kHz 2pts +10kHz 4pts	6	C235〜 C245 100kHz 6pts +10kHz 2pts	8
		1-phase 2-count input bidirectional (32bit) [variable]	C246〜 C250 60kHz 1pt or 10kHz 2pts	2	C246〜 C250 100kHz 2pts or 40kHz 2pts	2
		2-phase 2-count input bidirectional (32bit) [variable]	C251〜 C255 5kHz 2pts	2	C251〜 C255 50kHz 2pts or 40kHz 2pts	2
D	Data register	General (16bit) [variable]	D0〜 D199	200	D0〜 D199	200
		Latched (16bit) [variable]	D200〜 D511	312	D200〜 D511	312
		Latched (16bit) [fixed]	D512〜 D7999	7488	D512〜 D7999	7488
		Special (16bit)	D8000〜 D8255	256	D8000〜 D8511	512
		Index (16bit)	V0〜 V7, Z0〜 Z7	16	V0〜 V7, Z0〜 Z7	16
		Extension register (16bit)	—	—	R0〜 R32767	32768
		Extension file register 16bit	—	—	ER0〜 ER32767 (with memory cassette)	32768

P	Pointer	Jump, Call branching	P0∼ P127	128	P0∼ P4095	4096
		Input interrupt	I00□∼ I50□	6	I00□∼ I50□	6 total
		Input delay interrupt	—	—	I00□∼ I50□	
		Timer interrupt	I6□□∼ I8□□	3	I6□□∼ I8□□	3
		Counter interrupt	I010∼ I060	6	I010∼ I060	6