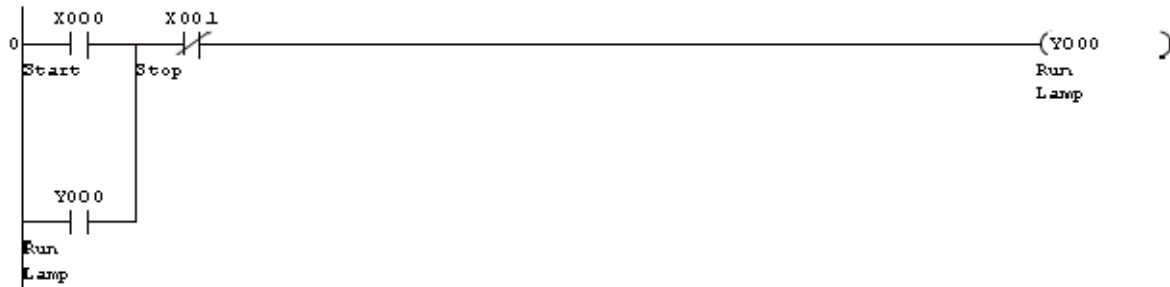# Mitsubishi FX1S, FX3G & FX3U PLC
Basic Addressing, Instruction, Device List Quick Reference

Inputs:
The input device numbers are octal with prefix of 'X'. Example: X0 to X7, X10 to X17, X20 to X27 etc.

Outputs:
The output device numbers are octal with prefix of 'Y'. For example: Y0 to Y7, Y10 to Y17, Y20 to Y27 etc.


Internal Relays / Flags:
Commence at M0. See attached device lists in performance specifications for FX1S, FX3G and FX3U for detail of addressing numbers general, latching and special relays.
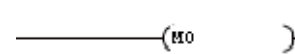
Timers:
These are on-delay. Example instruction; apply to an output coil "T0 K50" for a 5 second timer. The 'K' is constant (i.e) decimal. T0 is a 100 millisecond timer, thus setting it to a 'constant of 50' provides for 5 seconds.

Refer to attached device lists in performance specifications for FX1S, FX3G and FX3U Timer addressing numbers for the 100ms, 10ms and 1ms type as well as general / latching.
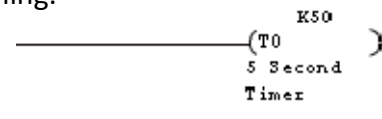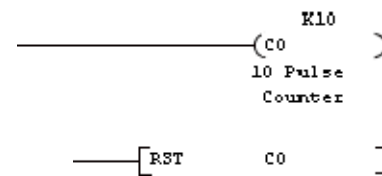

Counters:
Example instruction; apply to an output coil "C0 K10" for a 10 pulse count-up counter. The 'K' is constant (i.e) decimal.

To reset the above counter use the output instruction "RST C0".
Refer to attached device lists for further information.

Have PLC Change Screen of a connected GOT:
First the Screen Switching data memory location needs to be identified from the GOT 'environmental settings' in GT Works3. For this example we will use D100.

Example instruction; To have the PLC change the GOT to its number 2 screen, apply an output instruction "MOV K2 D100". This instruction moves a value of '2' to data memory 100. The GOT will immediately change to screen '2'. Caution: the GOT will remain on screen number '2' for as long as this instruction remains high. (Tip: initiate instruction from a one shot rising / positive edge trigger contact)
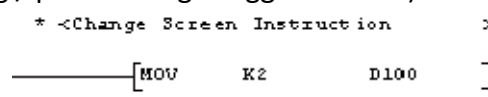
Manuals can be downloaded from the Mitsubishi Technical Section of our website:
www.automationsystemsandcontrols.net.au

FX1S

7.10   Device List

Table 7.9:   Device List

Device Type		Specification	Remarks
Program capacity		2k steps by FX1S internal EEPROM or 2k steps by FX1N-EEPROM-8L	
I/O configuration		Max total I/O set by Main Processing Unit	
Auxiliary relay (M coils)	General	384 points	M0 to M383
	Latched (EEPROM backed-up)	128 points	M384 to M511
	Special	256 points	From the range M8000 to M8255
State relays (S coils)	Latched (EEPROM backed-up)	128 points	S0 to S127
	Initial	10 points (subset)	S0 to S9
Timers (T)	100 msec	63 points Range: 0.1 to 3,276.7 sec	T0 to T62
	10 msec	31 points Range: 0.01 to 327.67 sec	T32 to T62 when special M coil M8028 is driven ON
	1 msec	1 point Range: 0.001 to 32.767 sec	T63

Device Type		Specification	Remarks
Counters (C)	General	16 points Range: 1 to 32,767 counts	C0 to C15 Type: 16 bit up counter
	Latched (EEPROM backed-up)	16 points Range: 1 to 32,767 counts	C16 to C31 Type: 16 bit up counter
High speed counters (C) Max. 6 points	1 phase	Range: -2,147,483,648 to +2,147,483,647 counts General rule: Select counter combinations with a combined counting frequency of 60kHz or less. Note; all counters are latched (EEPROM backed-up) If high speed counter is used with the HSCS or HSCR instruction, a combined counting frequency of 30kHz or less.	C235 to C240, 6 points
	1 phase c/w start stop input		C241to C245, 5 points
	2 phase		C246 to C250, 5 points
	A/B phase		C251 to C255, 5 points

FX1S

Device Type		Specification	Remarks
Data registers (D)	General	128 points	D0 to D127 Type: 16 bit data storage register pair for 32 bit device
	Latched (EEPROM backed-up)	128 points	D128 to D255 Type: 16 bit data storage register pair for 32 bit device
	File	Maximum 1500 points	D1000 to D2499 set by parameter in 3 blocks of 500 program steps Type: 16 bit data storage register
	Externally adjusted	2 points Range: 0 to 255	D8030 & D8031 Data is entered indirectly through the external setting potentiometer
	Special	256 points (inclusive of D8013)	From the range D8000 to D8255 Type: 16 bit data storage register
	Index	16 points	V0 to V7, Z0 to Z7 Type: 16 bit data storage register
Pointers (P)	For use with CJ, CALL	64 points	P0 to P63
	For use with interrupts	6 points	I00❏ to I50❏ (rising trigger ❏ = 1, falling trigger ❏ = 0)
Nest levels		8 points for use with MC and MCR	N0 to N7

Device Type		Specification	Remarks
Constants	Decimal K	16 bit: -32,768 to +32,767 32 bit: -2,147,483,648 to +2,147,483,647	
	Hexadecimal H	16 bit: 0000 to FFFF 32 bit: 00000000 to FFFFFFFF	

FX3G

4.5 Performance Specifications

The main unit performance specifications are explained below.

Item		Performance		
Operation control system		Stored program repetitive operation system with interruption function		
Input/output control system		Batch processing system (when END instruction is executed) Input/output refresh instruction and pulse catch function are provided.		
Programming language		Relay symbol system + step-ladder system (SFC notation possible)		
Program memory	Max. memory capacity/type	32000-step/EEPROM memory Max. allowable write: 20,000 times		
	Memory cassette (Option)	32000-step/EEPROM memory (with loader function) Max. allowable write: 10,000 times		
	Writing function during running	Provided (Program can be modified while the PLC is running.)		
	Keyword function	With keyword/Customer keyword function		
Real-time clock	Clock function[*1]	Built-in 1980 to 2079 (with correction for leap year) 2- or 4-digit year, accuracy within ±45 seconds/month at 25°C		
Kinds of instructions	Basic instructions	Sequence instructions: 29 Step-ladder instructions: 2		
	Applied instructions	123 kinds		
Processing speed	Basic instructions	Standard mode[*3] : 0.21μs/instruction Extension mode[*3] : 0.42μs/instruction		
	Applied instructions	Standard mode[*3] : 0.5μs/instruction Extension mode[*3] : 1.2μs/instruction		
Number of input/output points	(1)Extension-combined number of input points	128 points or less	(3)Total points	(1) + (2) ≤ (3) total number of points is 128 or less.
	(2)Extension-combined number of output points	128 points or less		
	(4)Remote I/O number of points (CC-Link)	128 points or less	-	
	(3) + (4) total number of points	256 points or less		
Input/output relay	Input relay	X000 to X177	The device numbers are octal.	
	Output relay	Y000 to Y177		
Auxiliary relay	For general	M0 to M383	384 points	-
	EEPROM keep	M384 to M1535	1152 points	-
	For general[*2]	M1536 to M7679	6144 points	-
	For special	M8000 to M8511	512 points	-
State	For initial state (EEPROM keep)	S0 to S9	10 points	-
	EEPROM keep	S10 to S999	990 points	-
	For general[*2]	S1000 to S4095	3096 points	-
Timer (on-delay timer)	100ms	T0 to T199	200 points	0.1 to 3,276.7 sec
	10ms	T200 to T245	46 points	0.01 to 327.67 sec
	1ms accumulating type (EEPROM keep)	T246 to T249	4 points	0.001 to 32.767 sec
	100ms accumulating type (EEPROM keep)	T250 to T255	6 points	0.1 to 3,276.7 sec
	1ms	T256 to T319	64 points	0.01 to 327.67 sec
Variable analog potentiometers		Available as analog timers VR1 : D8030 VR2 : D8031		
Counter	16 bits up (For general)	C0 to C15	16 points	Counting from 0 to 32,767
	16 bits up (EEPROM keep)	C16 to C199	184 points	Counting from 0 to 32,767

FX3G

Item			Performance		
Counter	32 bits up/down (For general)	C200 to C219	20 points	Counting from -2,147,483,648 to +2,147,483,647	
	32 bits up/down (EEPROM keep)	C220 to C234	15 points		
High-speed counter	1-phase 1-count input in both directions (32 bits up/down) (EEPROM keep)	C235 to C245	Counting from -2,147,483,648 to +2,147,483,647		
	1-phase 2-count input in both directions (32 bits up/down) (EEPROM keep)	C246 to C250			
	2-phase 2-count input in both directions (32 bits up/down) (EEPROM keep)	C251 to C255			
Data register (32 bits when paired)	For general (16 bits)	D0 to D127	128 points	-	
	For EEPROM keep (16 bits)	D128 to D1099	972 points	-	
	For general[*2] (16 bits)	D1100 to D7999	6900 points	-	
	File register (EEPROM keep)	D1000 to D7999	Maximum 7000 points	Can be set as file registers in units of 500 points from D1000 in the program area (EEPROM) using parameters.	
	For special (16 bits)	D8000 to D8511	512 points	-	
	For index (16 bits)	V0 to V7 Z0 to Z7	16 points	-	
Extension register	For general[*2] (16 bits)	R0 to R23999	24000 points	-	
Extension file register	For EEPROM keep (16 bits)	ER0 to ER23999	24000 points	Stored in the EEPROM built-in the main unit, or stored in the EEPROM in the memory cassette when the memory cassette is used.	
Pointer	For branching of JUMP and CALL	P0 to P2047	2048 points	For CJ instructions and CALL instructions	
	Input interruption	I0□□ to I5□□	6 points	-	
	Timer interruption	I6□□ to I8□□	3 points		
Nesting	For master control	N0 to N7	8 points	For MC instructions	
Constant	Decimal number (K)	16bits	-32,768 to +32,767		
		32bits	-2,147,483,648 to +2,147,483,647		
	Hexadecimal number (H)	16bits	0 to FFFF		
		32bits	0 to FFFFFFFF		
	Real number (E)[*4]	32bits	-1.0×2^{128} to -1.0×2^{-126}, 0 , 1.0×2^{-126} to 1.0×2^{128} Decimal-point and exponential notations are possible.		

*1. The current time of the clock is backed up by the capacitor built-in the PLC. Supply the power to the PLC for 30 minutes or more to completely charge this large-capacity capacitor.
(The capacitor works for 10 days (atmosphere: 25°C)
The current time can be backed up by the battery when the optional battery is incorporated.
→ **For details on the battery, refer to Chapter 22.**

*2. These devices can be changed to the keep (battery backup) type using a parameter when the optional battery is used.
→ **For the parameter setting method, refer to Chapter 22.**

*3. The standard mode is selected when the program capacity is set to 16000 steps or less using a parameter.
The extension mode is selected when the program capacity is set to 16001 steps or more using a parameter.
→ **For parameter settings, refer to the Programming Manual.**

*4. Supported in Ver. 1.10 or later

FX3U

4.5   Performance Specifications

The performance specifications are common to FX3U Series PLCs.

Item		Performance
Operation control system		Stored program repetitive operation system (dedicated LSI) with interruption function
Input/output control system		Batch processing system (when END instruction is executed) Input/output refresh instruction and pulse catch function are provided.
Programming language		Relay symbol system + step-ladder system (SFC notation possible)
Program memory	Max. memory capacity	64000-step (2k-, 4k-, 8k-, 16k- or 32k-step memory can be selected by parameter settings.) Comments and file registers can be created in the program memory by parameter settings. • Comments: Up to 6350 points (50 points/500 steps) • File registers: Up to 7000 points (500 points/500 steps)
	Built-in memory capacity/type	64000-step RAM (backed up by built-in lithium battery) • Battery life: Approx. 5 years (For details refer to Subsection 22.3.1) • With password protection function (with entry code function)
	Memory cassette (Option)	Flash memory (The max. memory capacity varies depending on the model of the memory cassette.) • FX3U-FLROM-64L:64000 steps (with loader function) • FX3U-FLROM-64: 64000 steps (without loader function) • FX3U-FLROM-16: 16000 steps (without loader function) Max. allowable write: 10,000 times
	Writing function during running	Provided (Program can be modified while the PLC is running.) → **For the writing function during running, refer to Subsection 5.2.5.**
Real-time clock	Clock function	Built-in 1980 to 2079 (with correction for leap year) 2- or 4-digit year, accuracy within ±45 seconds/month at 25°C
Kinds of instructions	Basic instructions	Ver.2.30 or later • Sequence instructions: 29 • Step-ladder instructions: 2 Former than Ver. 2.30 • Sequence instructions: 27 • Step-ladder instructions: 2
	Applied instructions	215 kinds, 492 instructions
Processing speed	Basic instructions	0.065 μs/instruction
	Applied instructions	0.642 μs to several hundred μs/instruction

Number of input/output points	(1) Extension-combined number of input points	248 points	(3) total points	(1) + (2) ≤ (3) total number of points is 256 or less.
	(2) Extension-combined number of output points	248 points		
	(4) Remote I/O number of points (CC-Link)	224 points or less		Either the CC-Link or AS-i master can be used (the two cannot be used concurrently)
	(4) Remote I/O number of points (AS-i)	248 points or less		
	(3) + (4) total number of points	384 points or less		

Input/output relay	Input relay	X000 to X367	248 points	The device numbers are octal. The total number of input and output points is 256.
	Output relay	Y000 to Y367	248 points	

FX3U

Item				Performance	
Auxiliary relay	For general [changeable]	M0 to M499	500 points	The retentive status can be changed by parameter settings.	
	For keeping [changeable]	M500 to M1023	524 points		
	For keeping [fixed]	M1024 to M7679	6656 points	–	
	For special	M8000 to M8511	512 points	–	
State	Initial state (for general) [changeable]	S0 to S9	10 points	The retentive status can be changed by parameter settings.	
	For general [changeable]	S10 to S499	490 points		
	For keeping [changeable]	S500 to S899	400 points		
	For annunciator (For keeping) [changeable]	S900 to S999	100 points		
	For keeping [fixed]	S1000 to S4095	3096 points	–	
Timer (on-delay timer)	100 ms	T0 to T191	192 points	0.1 to 3,276.7 sec	
	100 ms [for subroutine/ interruption subroutine]	T192 to T199	8 points	0.1 to 3,276.7 sec	
	10 ms	T200 to T245	46 points	0.01 to 327.67 sec	
	1 ms accumulating type	T246 to T249	4 points	0.001 to 32.767 sec	
	100 ms accumulating type	T250 to T255	6 points	0.1 to 3,276.7 sec	
	1 ms	T256 to T511	256 points	0.001 to 32.767 sec	
Counter	Increment for general (16 bits) [changeable]	C0 to C99	100 points	Counting from 0 to 32,767 The retentive status can be changed by parameter settings.	
	Increment for keeping (16 bits) [changeable]	C100 to C199	100 points		
	Both directions for general (32 bits) [changeable]	C200 to C219	20 points	Counting from -2,147,483,648 to +2,147,483,647 The retentive status can be changed by parameter settings.	
	Increment for keeping (32 bits) [changeable]	C220 to C234	15 points		
High-speed counter	1-phase 1-count input in both directions (32 bits) [changeable]	C235 to C245	Up to 8 points can be used in range from C235 to C255.	Counting from -2,147,483,648 to +2.147,483,647 [For keeping] The retentive status can be changed by parameter settings. → **For the high-speed counter operating frequency, refer to the table shown in the next page.**	
	1-phase 2-count input in both directions (32 bits) [changeable]	C246 to C250			
	2-phase 2-count input in both directions (32 bits) [changeable]	C251 to C255			

FX3U

Item			Performance	
Data register (32 bits when paired)	For general (16 bits) [changeable]	D0 to D199	200 points	The retentive status can be changed by parameter settings.
	For keeping (16 bits) [changeable]	D200 to D511	312 points	
	For keeping (16 bits) [fixed] <File register>	D512 to D7999 <D1000 to D7999>	7488 points <7000 points>	D1000 and later in 7488 points of fixed data register for keeping can be set as file register points in 500-point units by changing the parameter settings.
	For special (16 bits)	D8000 to D8511	512 points	–
	For index (16 bits)	V0 to V7 Z0 to Z7	16 points	–
Extension register (16 bits)		R0 to R32767	32768 points	Retained by battery during power failure
Extension file register (16 bits)		ER0 to ER32767	32768 points	Usable only when memory cassette is mounted
Pointer	For branching of JUMP and CALL	P0 to P4095	4096 points	For CJ instructions and CALL instructions
	Input interruption and input delay interruption	I0□□ to I5□□	6 points	–
	Timer interruption	I6□□ to I8□□	3 points	
	Counter interruption	I010 to I060	6 points	For HSCS instructions
Nesting	For master control	N0 to N7	8 points	For MC instructions
Constant	Decimal number (K)	16 bits	-32,768 to +32,767	
		32 bits	-2,147,483,648 to +2,147,483,647	
	Hexadecimal number (H)	16 bits	0 to FFFF	
		32 bits	0 to FFFFFFFF	
	Real number (E)	32 bits	-1.0×2^{128} to -1.0×2^{-126}, 0, 1.0×2^{-126} to 1.0×2^{128} Decimal-point and exponential notations are possible.	
	Character string (" ")	Character string	Designation by characters enclosed with " " Up to 32 one-byte characters can be used for a constant in an instruction.	

Operating frequency of high-speed counter
For hardware and software counter device numbers, refer to the following section.

Kind of high-speed counter		Input terminals (X000 to X007) of main unit	High-speed input special adapter (FX3U-4HSX-ADP)
Hardware counter	1-phase	100 kHz x 6 points, 10 kHz x 2 points	200 kHz x 8 points
	2-phase	50 kHz (multiply by 1), 50 kHz (multiply by 4)	100 kHz (multiply by 1), 100 kHz (multiply by 4)
Software counter	1-phase	40 kHz	40 kHz
	2-phase	40 kHz (multiply by 1), 10 kHz (multiply by 4)	40 kHz (multiply by 1), 10 kHz (multiply by 4)