

Chapter 1 Introduction

1.1. Characteristics of IEC 1131-3 language	1-1
1.2. Language type.....	1-1

Chapter 2 Software structure

2.1. Overview	2-1
2.2. Project.....	2-1
2.3. Configuration.....	2-1
2.3.1. Resource	2-2
2.3.1.1. Program	2-2
2.3.1.2. Resource global variable.....	2-2
2.3.1.3. Task	2-3
2.3.2. Configuration global variable	2-4
2.3.3. Access variable	2-4

Chapter 3 Common element

3.1. Expression	3-1
3.1.1. Identifiers.....	3-1
3.1.2. Data expression	3-1
3.1.2.1. Numeric literals	3-2
3.1.2.2. Character strings literals	3-2
3.1.2.3. Time literals.....	3-2
3.1.2.3.1. Duration	3-2
3.1.2.3.2. Time of day and date	3-3
3.2. Data types	3-4
3.2.1. Elementary data types	3-4
3.2.2. Data type hierarchy	3-5
3.2.3. Initial value.....	3-5
3.2.4. Data type structure	3-6
3.3. Variable	3-8
3.3.1. Representation	3-8
3.3.2. Variable declaration.....	3-9
3.3.4. Reserve variable	3-11

3.4. Keywords	3-16
3.5. Program type	3-17
3.5.1. Functions	3-17
3.5.2. Function blocks	3-18
3.5.3. Program blocks	3-19

Chapter 4 SFC(Sequential Function Chart)

4.1. Overview	4-1
4.2. SFC structure	4-1
4.2.1. Steps	4-1
4.2.2. Transitions	4-2
4.2.3. Actions	4-2
4.2.4. Action Qualifiers	4-3
4.3. Rules of evolution	4-8
4.3.1. Serial connection	4-8
4.3.2. Selection branch	4-8
4.3.3. Parallel branch	4-9
4.3.4. Jump	4-9

Chapter 5 IL(Instruction List)

5.1. Overview	5-1
5.2. Current Result(CR)	5-1
5.3. Instructions	5-2
5.3.1. Lable	5-2
5.3.2. Modifiers	5-2
5.3.3. Operators	5-3
5.3.3.1. Details of operator	5-5
5.4. Calling functions and function blocks	5-24

Chapter 6 LD(Ladder Diagram)

6.1. Overview	6-1
6.2. Power rails	6-1
6.3. Connection line	6-2
6.4. Contacts	6-3

6.5. Coils	6-4
6.6. Calling functions and function blocks	6-5

Chapter 7 Functions and function blocks

7.1. Function	7-1
7.1.1. Type conversion function	7-1
7.1.2. Numerical operation function.....	7-10
7.1.2.1. Numerical operation function with single input.....	7-10
7.1.2.2. Basic numerical operation function	7-10
7.1.3. Bit function.....	7-11
7.1.3.1. Bit shift function.....	7-11
7.1.3.2. Bit operation function	7-11
7.1.4. Selection function	7-11
7.1.5. Comparison function	7-12
7.1.6. Character function.....	7-12
7.1.7. Functions of time data types	7-13
7.1.8. System control function	7-13
7.2. MK(MASTER-K) function libraries	7-14
7.3. Function blocks	7-14
7.3.1. Bistable function block.....	7-14
7.3.2. Edge detection function block	7-14
7.3.3. Counter function block.....	7-14
7.3.4. Timer function block	7-14
7.4. Analog function blocks(For special module only).....	7-15
7.4.1. A/D function block	7-15
7.4.2. A/T(Analog Timer) function block.....	7-15
7.4.3. D/A function block	7-15
7.4.4. T/C(Thermo-Couple) function block.....	7-15
7.4.5. RTD(Resistor Temperature Detection) function block	7-15
7.4.6. PID function block	7-16
7.4.7. High-speed counter function block.....	7-16
7.4.8. Position control(Analog output) function block	7-16
7.4.9. Position control(Pulse output) function block	7-17
7.5. Communication function blocks	7-18
7.6. Computer communication module function blocks	7-18

Chapter 8 Function/Function block libraries

8.1	Function libraries.....	8-1
	ABS.....	8-2
	ACOS.....	8-3
	ADD.....	8-4
	ADD_TIME.....	8-5
	AND.....	8-6
	ASIN.....	8-7
	ATAN.....	8-8
	BCD_TO_***.....	8-9
	BOOL_TO_***.....	8-10
	BYTE_TO_***.....	8-11
	CONCAT.....	8-12
	CONCAT_TIME.....	8-13
	COS.....	8-14
	DATE_TO_***.....	8-15
	DELETE.....	8-16
	DI.....	8-17
	DINT_TO_***.....	8-19
	DIREC_IN.....	8-21
	DIREC_IN5.....	8-24
	DIREC_O.....	8-26
	DIREC_O5.....	8-28
	DIV.....	8-30
	DIV_TIME.....	8-31
	DT_TO_***.....	8-32
	DWORD_TO_***.....	8-33
	EI.....	8-35
	EQ.....	8-36
	ESTOP.....	8-37
	EXP.....	8-38
	EXPT.....	8-39
	FIND.....	8-40
	GE.....	8-41
	GT.....	8-42
	INSERT.....	8-43
	INT_TO_***.....	8-44
	LE.....	8-46
	LEFT.....	8-47
	LEN.....	8-48
	LIMIT.....	8-49

LINT_TO_***	8-50
LN	8-52
LOG	8-53
LREAL_TO_***	8-54
LT.....	8-56
LWORD_TO_***	8-57
MAX	8-59
MID	8-60
MIN	8-61
MOD	8-62
MOVE	8-63
MUL	8-64
MUL_TIME.....	8-65
MUX.....	8-66
NE.....	8-67
NOT	8-68
NUM_TO_STRING.....	8-69
OR	8-70
REAL_TO_***	8-71
REPLACE	8-73
RIGHT	8-75
ROL	8-76
ROR.....	8-77
SEL	8-78
SHL.....	8-79
SHR	8-80
SIN.....	8-81
SINT_TO_***	8-82
SQRT.....	8-84
STOP	8-85
STRING_TO_***	8-86
SUB	8-88
SUB_DATE.....	8-89
SUB_DT.....	8-90
SUB_TIME.....	8-91
SUB_TOD.....	8-92
TAN.....	8-93
TIME_TO_***	8-94
TOD_TO_***	8-95
TRUNC	8-96
UDINT_TO_***	8-97
UINT_TO_***	8-99
ULINT_TO_***	8-101

Content

USINT_TO_***	8-103
WDT_RST.....	8-105
WORD_TO_***	8-107
XOR	8-108
8.2. Function block libraries.....	8-109
CTD	8-110
CTU	8-112
CTUD.....	8-114
F_TRIG.....	8-116
I_HSC.....	8-117
RS.....	8-120
R_TRIG	8-121
SEMA.....	8-122
SR.....	8-125
TOF	8-126
TON.....	8-128
TP	8-130
8.3 MK(MASTER-K) function libraries	8-132
BMOV_B,W,D,L	8-133
BSUM_B,W,D,L.....	8-135
DEC_B,W,D,L	8-136
DECO_B,W,D,L.....	8-137
ENCO_B,W,D,L.....	8-138
INC_B,W,D,L.....	8-139
SEG	8-140

Chapter 9 Analog function block libraries

AD2ARD	9-2
AD2ARD	9-3
AD2INI	9-4
AD2INI	9-5
AD2RD	9-6
AD2RD	9-7
AD4ARD	9-8
AD4INI	9-9
AD4RD	9-10
ADR2INI	9-11
ADR2RD.....	9-12
ADR4INI	9-13
ADR4RD.....	9-14

AT3TON.....	9-15
AT4TON.....	9-16
DA1AWR.....	9-17
DA1AWR.....	9-18
DA1INI.....	9-19
DA1INI.....	9-20
DA1WR.....	9-21
DA1WR.....	9-22
DA4AWR.....	9-23
DA4INI.....	9-24
DA4WR.....	9-25
DAR1INI.....	9-26
DAR1WR.....	9-27
DAR4INI.....	9-28
DAR4WR.....	9-29
HSC_CMP.....	9-30
HSC_CMP.....	9-31
HSC_CMP.....	9-32
HSC_PRE.....	9-33
HSC_PRE.....	9-34
HSC_PRE.....	9-35
HSC_RD.....	9-36
HSC_RD.....	9-37
HSC_RD.....	9-38
HSC_WR.....	9-39
HSC_WR.....	9-40
HSC_WR.....	9-41
HSCR0CMP.....	9-42
HSCR0PRE.....	9-43
HSCR0RD.....	9-44
HSCR0WR.....	9-45
HSCR1CMP.....	9-46
HSCR1PRE.....	9-47
HSCR1RD.....	9-48
HSCR1WR.....	9-49
PID3ARD.....	9-50
PID3INI.....	9-51
PID3RD.....	9-52
PID5ARD.....	9-53
PID5INI.....	9-54
PID5RD.....	9-55
POS5_AST.....	9-56
POS5_CRD.....	9-57

Content

POS5_EMG.....	9-58
POS5_FLT.....	9-59
POS5_INC.....	9-60
POS5_JOG.....	9-61
POS5_MOF.....	9-62
POS5_NM.....	9-63
POS5_OFF.....	9-64
POS5_OR.....	9-65
POS5_ORG.....	9-66
POS5_PRE.....	9-67
POS5_RES.....	9-68
POS5_RTP.....	9-69
POS5_SMC.....	9-70
POS5_SRD.....	9-71
POS5_TEA.....	9-72
POS5_TMP.....	9-73
POS5_VCG.....	9-74
POS5_VLT.....	9-75
POSA_AST.....	9-76
POSA_CRD.....	9-77
POSA_EMG.....	9-78
POSA_FLT.....	9-79
POSA_JOG.....	9-80
POSA_MOF.....	9-81
POSA_NM.....	9-82
POSA_OR.....	9-83
POSA_ORG.....	9-84
POSA_RES.....	9-85
POSA_RTP.....	9-86
POSA_SMC.....	9-87
POSA_SRD.....	9-88
POSA_TEA.....	9-89
POSA_TMP.....	9-90
POSA_TPB.....	9-91
POSA_VCG.....	9-92
POSA_VLT.....	9-93
POSP_AST.....	9-94
POSP_CRD.....	9-95
POSP_EMG.....	9-96
POSP_FLT.....	9-97
POSP_INC.....	9-98
POSP_INT.....	9-99
POSP_JOG.....	9-100

POSP_MOF	9-101
POSP_MPG	9-102
POSP_NM.....	9-103
POSP_OFF	9-104
POSP_OR.....	9-105
POSP_ORG	9-106
POSP_PRE	9-107
POSP_RES.....	9-108
POSP_RTP	9-109
POS_SMC.....	9-110
POSP_SRD.....	9-111
POSP_TEA	9-112
POSP_TMP.....	9-113
POSP_VCG	9-114
POSP_VLT.....	9-115
RTD1ARD	9-116
RTD1INI	9-117
RTD1RD.....	9-118
RTD2ARD	9-119
RTD2INI	9-120
RTD2RD.....	9-121
RTD3ARD	9-122
RTD3INI	9-123
RTD3RD.....	9-124
RTDR2INI.....	9-125
RTDR3INI.....	9-126
RTDR3INI.....	9-127
RTDR3RD	9-128
TC2ARD.....	9-129
TC2ARD.....	9-130
TC2INI.....	9-131
TC2INI.....	9-132
TC2RD	9-133
TC2RD	9-134
TC4ARD.....	9-135
TC4INI.....	9-136
TC4RD	9-137
TCR2INI	9-138
TCR2RD.....	9-139
TCR4INI	9-140
TCR4RD.....	9-141

Chapter 10 Communication function block libraries

10.1. Communication function block libraries.....	10-1
RDTYPE(BOOL...DT).....	10-3
WRTYPE(BOOL...DT).....	10-6
RDARRAY.....	10-8
WRARRAY.....	10-10
RDBYBLK.....	10-12
WRBYBLK.....	10-14
STATUS.....	10-16
CONNECT.....	10-22
10.2. Computer link module function block libraries.....	10-27
SND_MSG.....	10-28
RCV_MSG.....	10-32