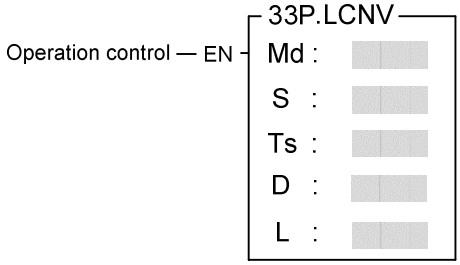
FUN33 P LCNV	Linear Conversion (LCNV)	FUN33 P LCNV

Ladder symbol



Md：Operation mode，0～3

S ：Starting address of the source data

Ts：Starting address of the parameter table for conversion

D ：Starting address to store the result

L ：Quantity of conversion entry，1～64

Operand \ Range	HR	IR	ROR	DR	K
	R0 | R3839	R3840 | R3903	R5000 | R8071	D0 | D3999	
Md					0～3
S	○	○	○	○	
Ts	○		○	○	
D	○		○*	○	
L	○		○	○	1～64

- When the analog input module being used for the analog measurement, the raw reading value of the analog input can be converted into the engineering range through this instruction for display or for proceeding control operation.
- For process measurement calibration, making the linear conversion for the engineering process variable, which the measurement value from the PLC's can be corrected by the value from the standard meter's through this instruction.
- When execution control "EN"=1or from 0→1(P instruction), this instruction will perform the linear conversion operation according to the mode selection, where S is the starting address of the source data, Ts is the starting address of the conversion parameter table, D is the starting address to store the converted result, and L is the quantity of conversion entry.
- There are two expressions to meet the suitable application**:**

Expression 1 : Two points calibration method

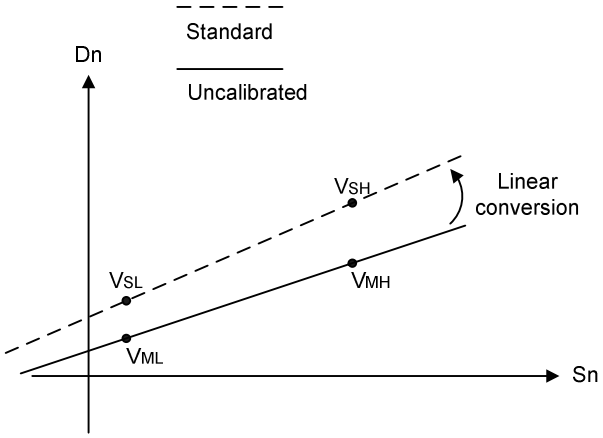
Fill the conversion parameter table with the low value of measurement(V_{ML}), high value of measurement(V_{MH}), and the corresponding low value of standard (V_{SL}), high value of standard(V_{SH}); the converted result(Dn) will be generated from the source data(Sn) through the formula shown below:

$A = (V_{SL} - V_{SH} / V_{ML} - V_{MH}) \times 10000$

$B = V_{SL} - (V_{ML} \times A / 10000)$

$Dn = (Sn \times A / 10000) + B$

- The range of operands V_{SL},V_{SH}, V_{ML},V_{MH},Sn and Dn are between -32768 ~ 32767
- For analog input scaling, where
  V_{ML}=Minmum of analog input
  V_{MH}=Maximum of analog input
  V_{SL}=Minmum of engineering range
  V_{SH}=Maximum of engineering range



FUN33 P LCNV	Linear Conversion （LCNV）	FUN33 P LCNV

Expression 2 : Multiplicator＋Offset method

Fill the conversion parameter table with the values of multiplier(A), divisor(B) and offset(C);
The converted result(Dn) will be generated from the source data(Sn) through the formula shown below:

Dn =[(Sn×A)／B]＋C

The range of each operand as below:

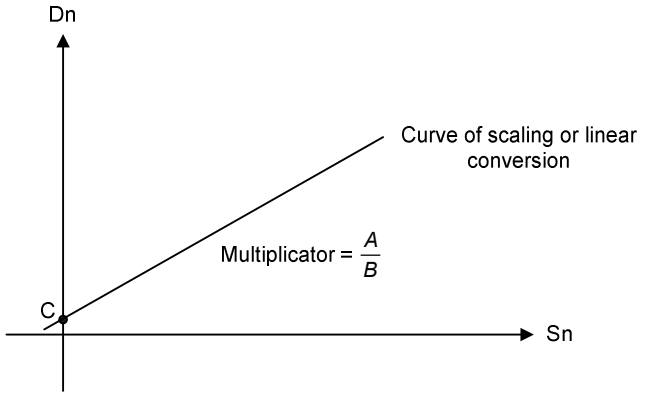
A = 1 ～ 65535

B = 1 ～ 65535

C = -32768 ～ 32767

Sn = 0 ～ 65535

Dn = -32768 ～ 32767

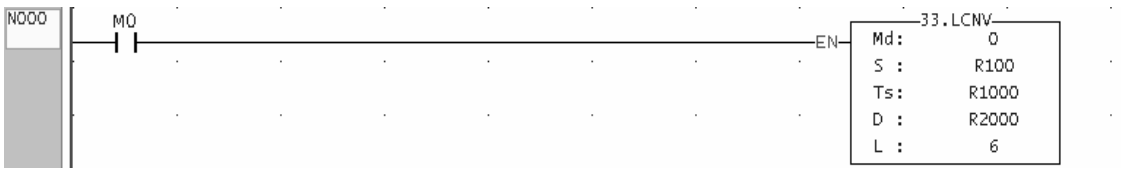


Description of operation mode :

1. When Md = 0, the linear conversion works by expression 1, and all source data share the same parameters VML、VMH、VSL and VSH for conversion.
2. When Md = 1, the linear conversion works by expression 1, and each source data has the independent corresponding parameters VML、VMH、VSL、VSH for conversion; if there are N entries of source data, the conversion parameter table should have N groups of VML、VMH、VSL、VSH for working, there are N×4 registers in the conversion parameter table.
3. When Md = 2, the linear conversion works by expression 2, and all source data share the same parameters A、B and C for conversion.
4. When Md = 3, the linear conversion works by expression 2, and each source data has the independent corresponding parameters A、B、C for conversion; if there are N entries of source data, the conversion parameter table should have N groups of A、B、C for working, there are N×3 registers in the conversion parameter table.

FUN33 P LCNV	Linear Conversion (LCNV)	FUN33 P LCNV

Example program 1 : Mode 0 of linear conversion



Description : When M0 = 1, it will perform the mode 0 operation of linear conversion, where R100 is the starting address of the source data, R1000 is the starting address of the table of the conversion parameters V_{ML}、V_{MH}、V_{SL}、V_{SH}, the quantity is 6, and R2000～R2005 will store the converted results.

Ts

R1000	282	V_{ML}
R1001	3530	V_{MH}
R1002	260	V_{SL}
R1003	3650	V_{SH}

S			D	
R100	282	⇨	R2000	260
R101	3530		R2001	3650
R102	1906		R2002	1955
R103	0		R2003	-34
R104	5000		R2004	5184
R105	-115		R2005	-154

FUN33 P LCNV	Linear Conversion (LCNV)	FUN33 P LCNV

Example program 2 : Mode 1 of linear conversion

Description : When M0 = 1, it will perform the mode 1 operation of linear conversion, where R100 is the starting address of the source data, R1000 is the starting address of the table of the conversion parameters V_{ML}、V_{MH}、V_{SL}、V_{SH}, the quantity is 3, and R2000～R2002 will store the converted results.

	Ts	
R1000	282	V_{ML_0}
R1001	3530	V_{MH_0}
R1002	260	V_{SL_0}
R1003	3650	V_{SH_0}
R1004	-52	V_{ML_1}
R1005	1208	V_{MH_1}
R1006	-38	V_{SL_1}
R1007	1101	V_{SH_1}
R1008	235	V_{ML_2}
R1009	4563	V_{MH_2}
R1010	264	V_{SL_2}
R1011	4588	V_{SH_2}

	S			D
R100	282	⇨	R2000	260
R101	1208		R2001	1100
R102	2399		R2002	2426

FUN33 P LCNV	Linear Conversion (LCNV)	FUN33 P LCNV

Example program 3 : Mode 2 of linear conversion

Description : When M0 = 1, it will perform the mode 2 operation of linear conversion, where R100 is the starting address of the source data, R1000 is the starting address of the table of the conversion parameters A、B、C, the quantity is 6, and R2000～R2005 will store the converted results.

Ts

R1000	985	A
R1001	1000	B
R1002	22	C

S		⇨	D	
R100	1000		R2000	1005
R101	2345		R2001	2329
R102	3560		R2002	3526
R103	401		R2003	414
R104	568		R2004	579
R105	2680		R2005	2659

FUN33 P LCNV	Linear Conversion (LCNV)	FUN33 P LCNV

Example program 4 : Mode 3 of linear conversion

Description : When M0 = 1, it will perform the mode 3 operation of linear conversion, where R100 is the starting address of the source data, R1000 is the starting address of the table of the conversion parameters A、B、C, the quantity is 4, and R2000～R2003 will store the converted results.

Ts

R1000	5000	A_0
R1001	16380	B_0
R1002	0	C_0
R1003	10000	A_1
R1004	16383	B_1
R1005	0	C_1
R1006	2200	A_2
R1007	16380	B_2
R1008	-200	C_2
R1009	1600	A_3
R1010	16383	B_3
R1011	-100	C_3

S			D	
R100	8192	⇨	R2000	2500
R101	16383		R2001	10000
R102	8190		R2002	900
R103	0		R2003	-100