WECON

LX3VE E-GEAR

1. General

An electronic gear-shifting system (also known as EGEAR) is a method of changing gear's output on the EGEAR of PLC. The EGEAR's control is depended on the gear's ratio. It can simulate the real gear function to output pulse between master shaft and slave shaft.

2. Functional description

2.1 Conditions

The EGEAR achieve synchronized output for two electronic gears. The input shaft is master, and output shaft is the slave. The slave shaft runs according to the preset gear ratio. If the ratio equals to 1, it means one pulse input and one pulse output. If the gear's ratio equals to 0.5, it means two pulse input and one pulse output.

2.2 Detailed description

2.2.1 Format instruction

Table 2-1

Name	Function	Bit	Pulse type	Instruction format
DEGEAR	Electronic gear	32bit	no	DEGEAR S1 S2 S3 D1 D2

Parameters:
- **S1:** [C and D register available] high speed pulse input
- When the EGEAR value (Master shaft) read from high speed counter, the value can be changed when PLC is running. But the value could be changed if read from data resister (D) or regular counter (C).
- **S2:** [D register available] data saving
- **S3:** [D register and constant K, H available] response time. Range: 0 ~500ms
- For example: when the value is 0 or 1, it means 1ms.
- **D1:** Pulse output terminal: Y0 ~ Y4
- **D2:** Pulse output direction: Any Y registers but different with pulse output terminal D1 above.

2.2.2 Function instruction

When EGEAR instruction is executing, PLC would calculate the average frequency according to input pulse amount per unit time. And output pulse based on EGEAR ratio, Slave shaft frequency could not exceed the highest frequency.

2.2.3 Parameter instruction

Table 2-2

Address offset	Content	Instruction	Range	Read/Write
0	EGEAR's ratio (numerator)	Output pulse amount = input pulse amount (unit time) * numerator / denominator	0~32767	Read/Write
1	EGEAR's ratio (denominator)			
2	Highest output pulse frequency(high byte)	the highest output frequency of slave shaft	0~200000	Read/Write
3	highest output pulse frequency(low byte)	the highest output frequency of slave shaft		
4	average frequency of master shaft(high byte)	Average frequency of master shaft	-	Read
5	average frequency of master shaft (low byte)	Average frequency of master shaft	-	
6	Counted input pulse amount of master shaft (High byte)	Counted input pulse amount of master shaft	-	Read
7	Counted input pulse amount of master shaft (Low byte)		-	
8	flag	Reserved	Reserved	Reserved
9	interval time	Actual value	-	Read
10	EGEAR's ratio (numerator)	Actual value	-	Read
11	EGEAR's ratio (denominator)	Actual value	-	Read
12	highest output pulse frequency(high byte)	Actual value	0~200,000	Read
13	highest output pulse frequency (low byte)			

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2.3 Note

When the EGEAR value (Master shaft) read from high speed counter, the value can be changed when PLC is running. But the value could be changed if read from data resister (D) or regular counter (C).

3. Function demo

The demo below shows the follow-up control between Y0 and Y3 (1:1 ratio).

1) Wiring: Connect Y3 with X0

2) Control instruction:

- Step1: set M1 ON.
- Step2: set M2 ON.

3) Then Y0 and Y3 will output pulse synchronously. (Y0 pulse amount: Y1 pulse amount =1:1)
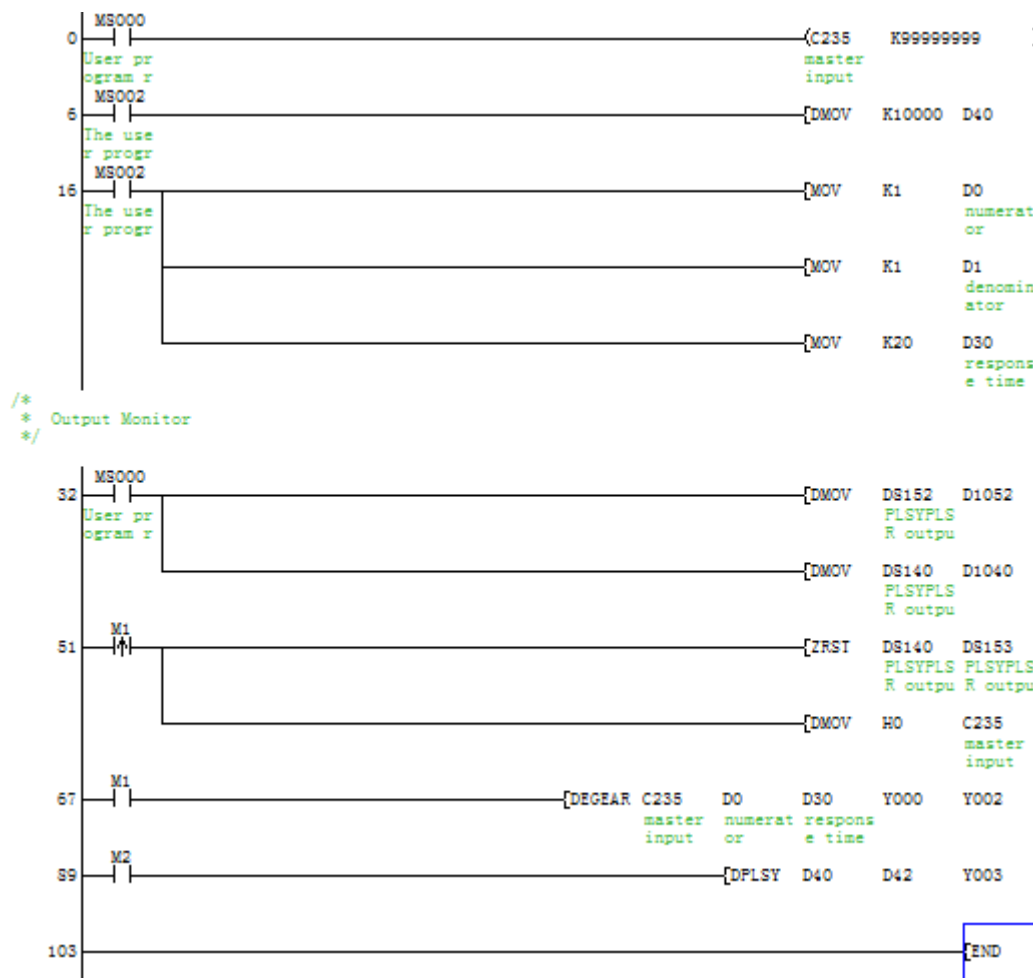
4. Special address

- D8141 (high byte), D8140 (low byte): The number of output pulse in Y000. It would be reduced during reversal. (32-bit)
- D8143 (high byte), D8142 (low byte): The number of output pulse in Y001. It would be reduced during reversal. (32-bit)
- D8151 (high byte), D8150 (low byte): The number of output pulse in Y002. It would be reduced during reversal. (32-bit)
- D8153 (high byte), D8152 (low byte): The number of output pulse in Y003. It would be reduced during reversal. (32-bit)
- D8155 (high byte), D8154 (low byte): The number of output pulse in Y004. It would be reduced during reversal. (32-bit)

- M8145: Stop output pulse in Y000 (stop immediately)
- M8146: Stop output pulse in Y001 (stop immediately)
- M8152: Stop output pulse in Y002 (stop immediately)
- M8153: Stop output pulse in Y003 (stop immediately)
- M8154: Stop output pulse in Y004 (stop immediately)

- M8147: Monitoring the output pulse in Y000 (BUSY/READY)
- M8148: Monitoring the output pulse in Y001 (BUSY/READY)
- M8149: Monitoring the output pulse in Y002 (BUSY/READY)
- M8150: Monitoring the output pulse in Y003 (BUSY/READY)
- M8151: Monitoring the output pulse in Y004 (BUSY/READY)

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