

Controls EcoPLC

for motion automation
GEL 8190 and GEL 8310/8610

MOTIONLINE

LENORD+BAUER

Technical information

version 02.05



EcoPLC

What is an EcoPLC?

EcoPLC for motion automation is a concept involving hardware and software which allows the user to automate processes. The properties of typical fixed programme position controllers were combined with those of freely programmable microcontrols. Additional microcontrols are not required with the EcoPLC.

The EcoPLC integrates the requirements for an efficient axis control and incorporates digital process control, operation and observation functions. All functions necessary for efficiently automating motions are combined in one unit and have only one programming interface, without requiring large expenditures for software and hardware connections:

- inputs and outputs
- acquisition of length and position
- output of manipulated variables
- control functions
- functions for operating and observing
- serial communication
- control functions, such as positioning, speed ratio control, circular interpolation, etc.

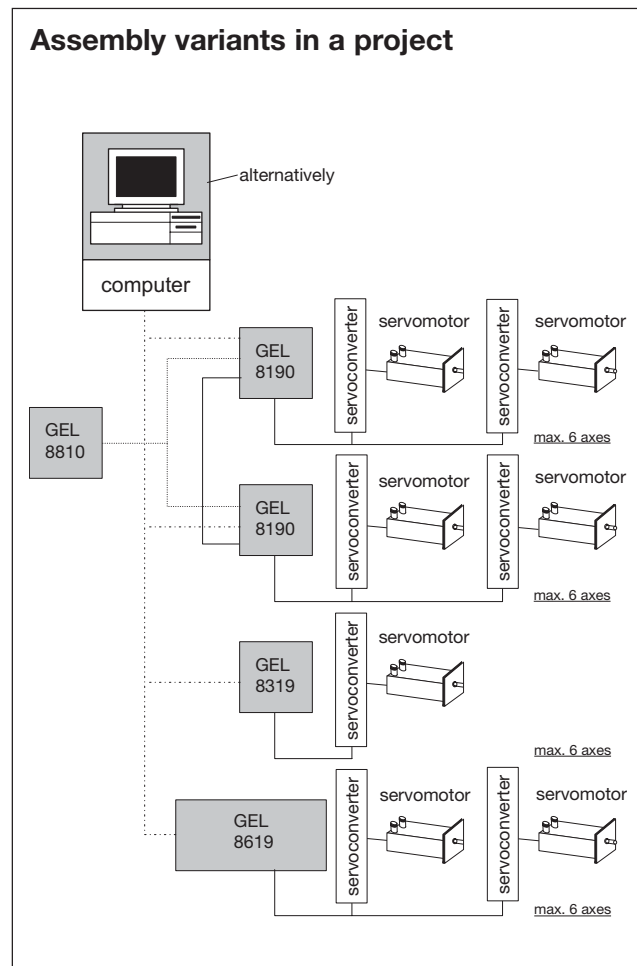
More special features of the EcoPLC:

- interfaces (keyboard and display layouts) can be individually designed, including various languages
- large array of functions
- simple, structured, plain-text programming, following IEC 61131-3, structured text
- one ms control scanning time per axis
- multitasking
- up to 200 kHz input frequency for encoder signals
- highly dynamic control
- high EMC

Hardware

There are two different types of EcoPLC available: On the one hand, there is a compact device with integrated keypad and LED display designed for being inserted in a control panel. The other device type is prepared for being mounted on top hat rails in a switch cabinet, optionally using a separate operator terminal.

With the GEL 8190 you are able to control and interpolate up to 2 conventional drives using the analogue 10 V outputs or up to 6 axes via CAN bus.



EcoPLC GEL 8190



- sixteen inputs, sixteen outputs, eight input/outputs (expandable)
- actual value inputs (two incremental or two SSI or six by way of CAN bus or combined)
- nominal value outputs (two analogue, six by way of CAN bus)
- PROFIBUS DP slave interface connection
- InterBus-S
- CAN bus
- two x RS 485, one x RS 422 (375 kBaud), one x RS 232
- free protocol
- GEL 8810 operator terminal can be connected
- the EcoPLC can be cascaded for multi-axes applications

Operator terminal GEL 8810



- freely programmable keyboard and display layouts
- customized key assignments
- alphanumeric LCD display with four lines à 20 places
- communication with up to thirty-one EcoPLCs

EcoPLC GEL 8319/8619



GEL 8319

- 16 inputs, 6 outputs, 6 input/outputs (expandable)
- PROFIBUS DP slave interface connection
- actual value inputs (3 incremental, 3 SSI, 3 absolute or combined)
- nominal value outputs (6 analogue)
- RS 422/485 and RS 232
- free protocol
- freely programmable keyboard layout

GEL 8619

- 32 inputs, 12 outputs, 12 inputs/outputs (expandable)
- PROFIBUS DP slave interface connection
- actual value inputs (6 incremental, 6 SSI, 6 absolute or combined)
- nominal value outputs (6 analogue)
- RS 422/485 and RS 232
- free protocol
- enhanced keyboard
- freely programmable keyboard layout

Programming

Programming

The GEL 8319, GEL 8619 and GEL 8190 EcoPLC are programmed in the structured plain-text programming language LB-Flex following the standard IEC 1131-3, structured text. It only deviates from this standard when it is better or easier to do so.

When we speak of plain-text programming, we mean that natural elements of language are incorporated, letting you create executable programmes quickly once you have learned a few basic rules.

Hence simple or even complex instructions necessary for programming an EcoPLC are programmed in a clearly arranged and practically self-explanatory display by means of the structured plain-text programming language LB-Flex. LB-Flex employs elements and conventions taken from algebra and higher programming languages, so it is easy to understand both how to set an output and how to perform the complicated calculations for a desired position.

It uses symbolic variables and constants whose names the user defines, enabling complete transparency in the programmes.

Elements of the programming language

- mnemonic and symbolic variables of the following data types: Bit, Byte, Word, Dword, Float and Pointer
- constants and symbolic constants
- arithmetical, logical, bit and address operators
- procedure and structure commands for structuring the programmes
- time functions
- mathematical functions
- conversion functions
- functions for operating and observing
- functions specific to the unit
- control functions for traverse, positioning, synchronisation and circular interpolation
- functions for free protocol by way of serial interfaces
- functions for accessing control variables
- functions for data management
- include instructions for definition and library files

Example

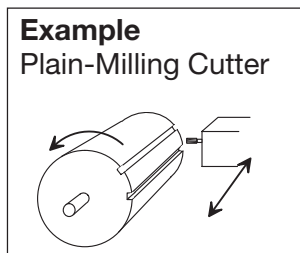
```
moving_right := true
```

or

```
set_start := input_start AND axis_not_runs
```

The „motion_right“ output, which was assigned to a specific terminal, is set.

The „set_start“ output is set if the AND link of the „input_start“ input terminal yields Result 1 (true) with the „axis_not_runs“



Example
Plain-Milling Cutter

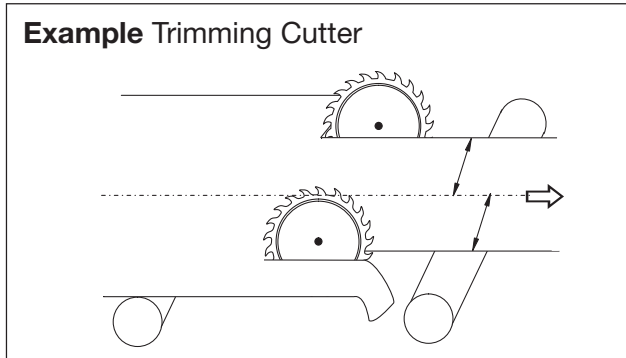
Description

Cylindrical blanks are clamped in so that they can turn and are grooved with a plain-milling cutter along the axis of rotation. The desired position of the next groove must be recalculated after each complete milling process and the blank positioned on it.

variable.

Programme

```
IF (x_ready) THEN ; Wenn "x_fertig" wahr ist,  
  actualxno := actualxno + 1 ; dann x-Ist-Anzahl erhöhen,  
  nominalposition := actualxno/nominalxno * y+nullposition ; nominalposition der nächsten x berechnen  
  POS (nominal speed, nominal position) ; und Positionierung  
END_IF ; starten.
```



Description

A production process supplies continuous foil whose edges are supposed to be cut off by two blades, one on the left and one on the right side of the foil. The blades can be advanced individually by means of the appropriate drives. The foil breadth after the trimming cut and the actual positions of the two blades must be displayed. The nominal values for the blade positions are calculated from the „breadth“ and „offset“ defaults which the operator sets by way of the keyboard. Then he triggers the positioning process by means of a start key. A stop key enables the positioning run to be interrupted at any time.

programme:

```

modul (task_0)
include variable.def
:
endless loop:
    left:= -read_reg_val(axis_1, actualposition)           ; actualposition read axis_1
    right:= read_reg_val(axis_2, actualposition)          ; actualposition read axis_2
    actualbreadth:= left + right
    display_a("breadth:%8.8ld", actualbreadth)
    display_b("Pos. left:%8.8ld", left)
    display_c("Pos. right:%8.8ld", right)
    if(in_key()= F1)
        call(breadth_input)
    end_if
    if(in_key()= F2)
        call(offset_input)
    end_if
    jump(endlessloop)
breadth_input:
    display_b("input breadth")
    nominalbreadth:= input_line_xy(column, row, digits, decimals, nominalbreadth)
    nominal_right := nominalbreadth / 2 + offset
    nominal_left := nominal_right - nominalbreadth
    return()
offset_input
    display_b("input offset")
    offset:= input_line_xy(column, row, digits, decimals, offset)
    nominal_right:= nominalbreadth / 2 + offset
    nominal_left:= nominal_right - nominalbreadth
    return()

modul(task_10)
include variable.def
endless loop:
:
    if(stop = true)
        if(edge_start)
            status:= start
            pos(axis_1, nominalspeed, nominal_left)           ; pos start axis_1
            pos(axis_2, nominalspeed, nominal_right)          ; pos start axis_2
        end_if
    end_if
:
    jump(loop)

```

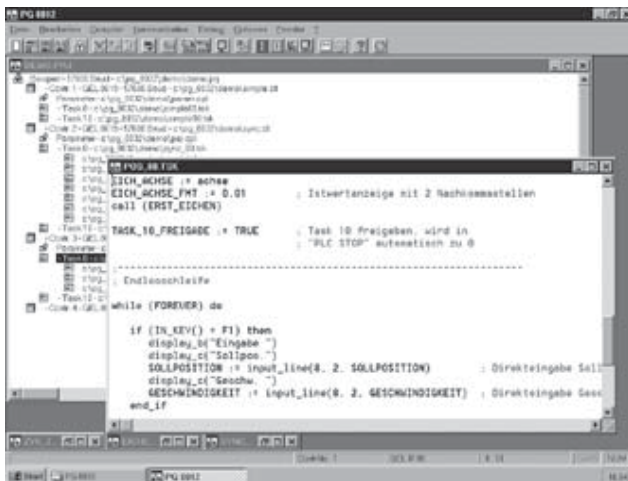
Programming systems PG 8032

The PG 8032 programming systems

Our PG 8032 programming systems will provide you with an ideal programming environment. They run on Windows 95/98/NT and support the entire development and startup processes of a user project. The main components of this PC software are the editor, compiler, communication and archiving tools, as well as on-line help. The integrated project structures also help to keep complex projects under control. The management of networks, units, task programmes and sets of parameters is extremely user-friendly.

The possibilities available on Windows are fully supported by PG 8032; for example,

- multi-window technology
- pull-down menus
- scrolling and zooming
- dialogues
- on-line help



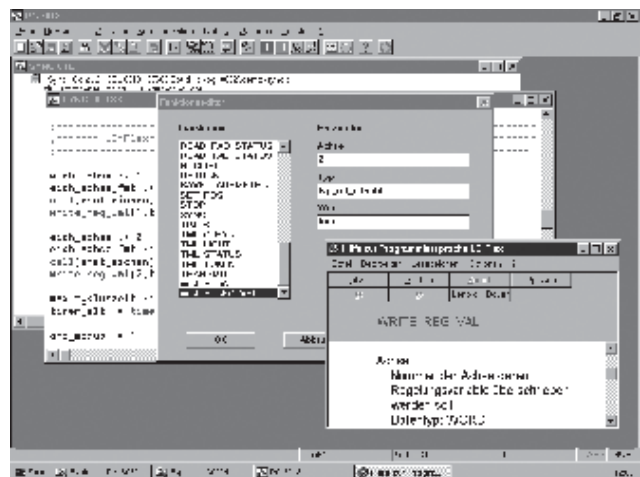
In addition, there are helpful integrated tools, such as

- unit search function to find units in a network
- function assistant for fast help during input
- parameter assistant for managing the system and axis parameters

The Editor

This built-in editor has all conventional file, editing and printing functions. In addition, the insertion of definition and library files by means of editing dialogues for include files is automated.

The editor offers the possibility of a coloured, language-sensitive display for qualifier, operators, structure commands, functions, variables and any user comments you may desire. It also has a structure generator which can be switched on or off and which inserts the entire configuration of the structure after the first key word is entered, for example, IF or WHILE.



Help instructing communications

Tools integrated in PG 8032, such as the automatic network configuration and the unit search function help in setting up a network topology as well as in adjusting interface parameters for communication with the EcoPLC.

Commissioning help

A service window offers you an overview of all necessary control variables, as well as of the inputs and outputs of an EcoPLC on-line. In addition, all user variables can be observed and influenced on-line.

Type code EcoPLC GEL 8190, Accessories

8190	A	-	--	-	-	description
						CAN bus 0 not mounted 1 CAN bus 2 CAN bus extended
						Extension input/output 0 not mounted 6 48 inputs, 48 outputs 20 mA 8 InterBus-S 9 intelligent interface RS 485 for PROFIBUS DP
						Actual value inputs A counting input 24 V B counting input 5 V S absolute encoder with synchronous serial interface (SSI)
						Analogue outputs 0 not mounted B 2 analogue outputs 0 ... ± 10 V, 14 bits

Accessories EcoPLC GEL 8190

mains transformer	GEL 7923
mounting plate for mains transformer	GEL 7922
line filter	GEL 7925
converter incl. power supply (V24/RS485)	GEL 89010
converter with galvanic insulation and power supply (V24/RS485)	GEL 89011

D-subminiature adapter:

● 25-pole plug on 9-pole socket	GEL 89025
● 25-pole plug on 25-pole plug	GEL 89026
● 9-pole plug on 9-pole plug	GEL 89027
● 9-pole terminator PROFIBUS DP	GEL 89030

Cable

RS 485	
cable between converter and EcoPLC, 5 m	GEL 89015
RS 232	
cable between PC and EcoPLC, 5 m	GEL 89022
cable between converter and EcoPLC receiver/receiver	GEL 89016 EED
cable between EcoPLC and EcoPLC transmitter/receiver	GEL 89016 SED
cabel between operator terminal and EcoPLC	GEL 89019

Type code

EcoPLC GEL 8319/8619

Accessories

8_19	Description			
				Inputs/Outputs 0 - 1 24 inputs, 24 outputs 10 mA 3 24 outputs 10 mA 5 24 inputs 10 mA 7 serial interface RS 232 C and RS 422/485 (only possible once) 9 intelligent interface RS 485 for PROFIBUS DP (only possible once) L 24 power outputs (500 mA per output) R 12 relay outputs 240 V~, 1 A
				Addition modules/Actual value inputs 0 - A 1 counting input 24 V B 2 counting input 24 V C 3 counting input 24 V D 1 counting input 5 V/24 V E 2 counting input 5 V/24 V F 3 counting input 5 V/24 V P input for 1 ... 3 absolute encoders with active high level, multiplex procedure S input for 1 ... 3 absolute encoders with with synchronous serial interface (SSI)
				Addition modules/Analogue outputs 0 - (-/-) no module A 1 (1/-) 1 module B 2 (2/-) 1 module C 3 (3/-) 1 module D 4 (3/1) 2 module E 5 (3/2) 2 module F 6 (3/3) 2 module
				Digital inputs/outputs (terminals) C 15 inputs, 6 outputs 300 mA, 6 combined inputs/outputs without Memory Card F 31 inputs, 12 outputs 300 mA, 12 combined inputs/outputs without Memory Card only for GEL 8619 J 15 outputs, 6 outputs 300 mA, 6 combined inputs/outputs with Memory Card M 31 inputs, 12 outputs 300 mA, 12 combined inputs/outputs with Memory Card only for GEL 8619
				Standard version 3 EcoPLC GEL 8319 with housing 144x144 mm incl. power supply card, with control inputs/outputs and five free additional modules 6 EcoPLC GEL 8619 with housing 288x144 mm incl. power supply card, two cards with inputs/outputs and ten free additional modules

Accessories

mounting plate for mains transformer	GEL 7922
line filter	GEL 7925
mains transformer	GEL 89033
mains transformer	GEL 89036
memory card (EEPROM)	GEL 89001

Subject to technical modifications and typographical errors.
 For the latest version please visit our web site : www.lenord.de.