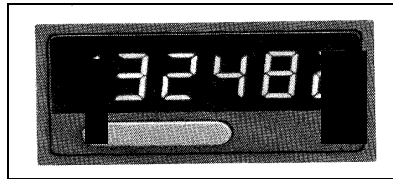


8.3 PCA2.D12 Display module with 4 digits

General



The PCA2.D12 module is a remote display which can be controlled via SAIA°PCD outputs. It has a red 4-digit LED-Display and is able to indicate a decimal point.

The display can be built in anywhere at a greater distance to the PCD e.g. in the door of a control cabinet or an operating panel. Due to data transmission being effected via outputs, several displays can be controlled by one PCD.

Structure and function

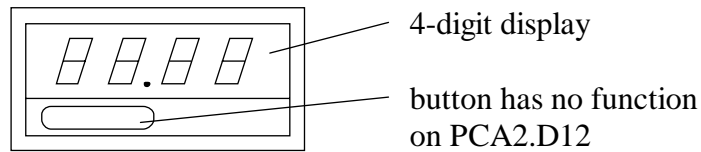
The module D12 consists of the following main components :

- power supply 24 VDC
- 3 inputs for 24 VDC (Enable "EN", Clock "Clk" and Data "D")
- decoder/driver
- 4-digit, 7-segment LED display with decimal point

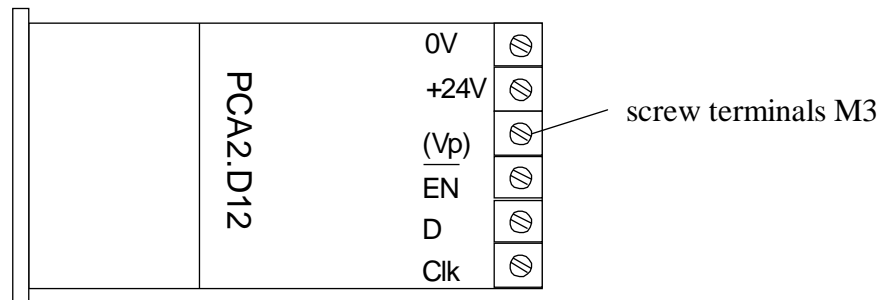
To control the D12 module 3 digital PCD outputs are required. For every additional D12 module only 1 additional output is needed.

The following 16 characters can be presented per segment :

Character	Code	Character	Code
0	0000	A	1010
1	0001	I	1011
2	0010	II	1100
3	0011	U	1101
4	0100	-	1110
5	0101	"blank"	1111
6	0110		
7	0111		
8	1000		
9	1001		

Presentation and terminal arrangement

Frame : 28 x 52 mm
 Panel cutout : 4.5 x 48.5 mm



Depth : 90 mm

Technical data

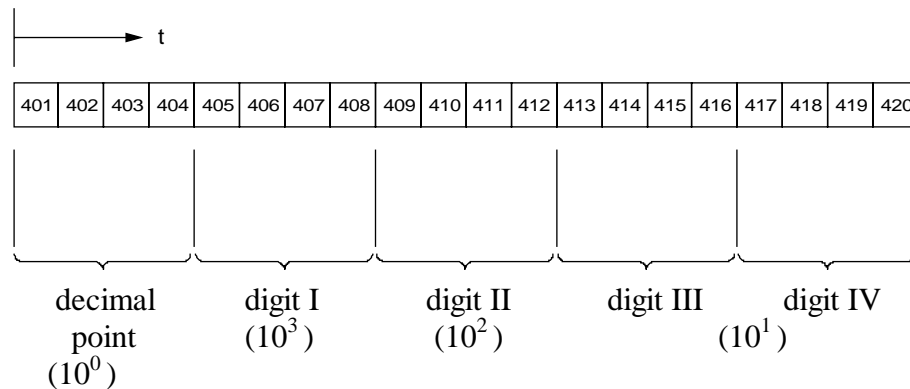
Display	4-digit, 7 segment LED's
Digit height	10 mm
Supply voltage	24 VDC \pm 20%. two-way rectification is sufficient
Current at 24 VDC	60 mA
Input voltage for EN, D, CLK	24 VDC, smoothed
Input current for 24 VDC	10 mA
Definition of the input level	"H" : 19 to 32V "L" : 0 to 4V
Input delay	< 1 ms
Usable SAIA [®] PCD output modules	PCD2.A400 PCD4.A400, B900 PCD6.A400
Control	serially via 3 SAIA [®] PCD-outputs, for every additional display only 1 additional PCD-output is required.

Programming and example

The 4-digit value to be displayed, with the possibility of a decimal point, is most easily stored at 20 consecutive flags, e.g. F 401 - 420, in binary or BCD format.

Since this display value is normally located in a register, the content of this register should first be transferred to the flags.

The 20 bits have the following meaning :



Programming example

Increment register R 500 every half-second up to a value of 9999 and then reset to zero. The content of this register should be displayed on the PCA2.D12 display module, with a decimal point in the 2nd position.

The following elements are used :

Clock	PCD-output O 45
Data	PCD-output O 46
Enable	PCD-output O 47
Flags	F 401 - 420
Register	R 500

For instruction list programming (IL) this task can be written in the form shown below, where the main emphasis is on program block PB 10.

Use of the FUPLA programming tool makes handling the D12/D14 significantly simpler.

PCD program :

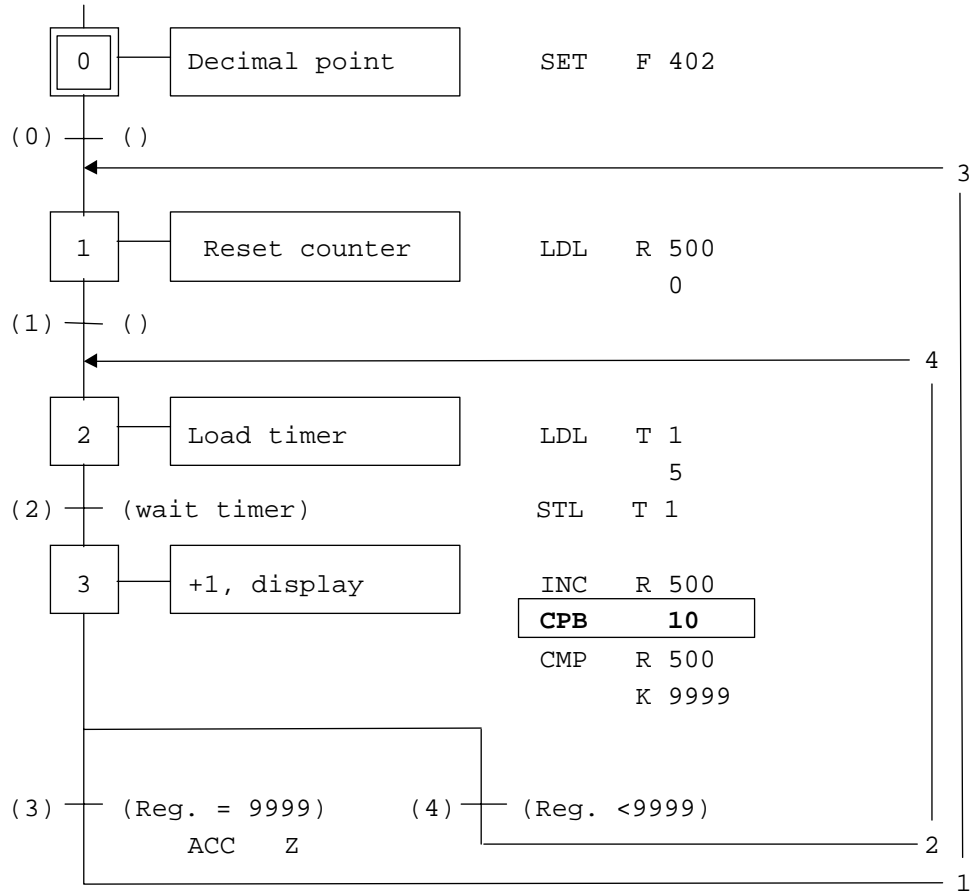
COB 0 ; Main program
0

CSB 1

ECOB

; -----

SB 1 ; GRAFTEC program



```
BA      equ 0 45      ; Basisadresse

PB      10      ; Display routine for PCA2.D12

DIGOR   4
        R 500
        F 405

RES     BA+2      ; ENABLE
SEI     K 0
LOOP:   STHX     F 401
        OUT     BA+1      ; DATA
        ACC     H
        SET     BA+0      ; CLOCK
        RES     BA+0      ; CLOCK

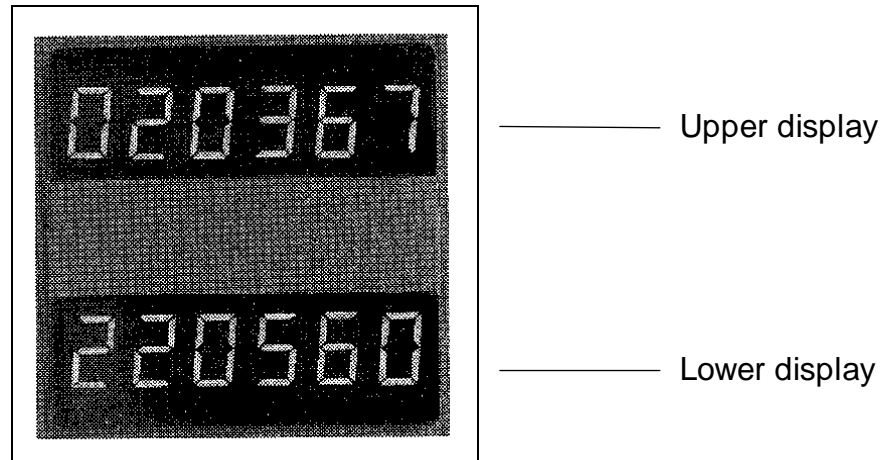
MOV     R 0      ; |
        N 0      ; | delay
        R 0      ; | instruction
        N 0      ; |

INI     K 19
JR      H LOOP
ACC     H
SET     BA+2      ; ENABLE

EPB
```

Notes :

8.4. PCA2.D14 Display module with 2 x 6 digits



General

The PCA2.D14 module is a remote display module which is controlled via 3 outputs of any SAIA°PCD. The module has two red 6-digit LED displays. Several PCA2.D14 can be connected in series in case of more than two displays.

Application and control

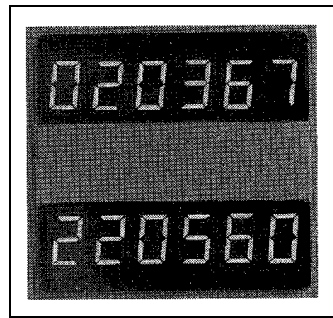
This module is especially useful to display counter values using the PCD4.Hxxx modules. The D14 can also be used with any 3 digital outputs to display process information.

When the PCA2.D14 is used without the H-modules, the information to be displayed is most easily transmitted serially with a standard program routine from a flag field via 3 SAIA°PCD outputs.

The following 16 characters per segment can be presented :

Character	Code	Character	Code
0	0000	A	1010
1	0001	I	1011
2	0010	II	1100
3	0011	U	1101
4	0100	-	1110
5	0101	"blank"	1111
6	0110		
7	0111		
8	1000		
9	1001		

Dimension



Frame : 52 x 52 mm
 Panel cutout : 48.5 x 48.5 mm
 Depth : 120 mm

PCD-output	Clock	→	Clk	PCA2.D14
PCD-output	Data-In	→	D-IN	
PCD-output	Enable	→	EN	
Carry	Data-Out	←	D-OUT	
Voltage supply	+24 V	→	+24 V	
Voltage supply	0 V	→	0 V	

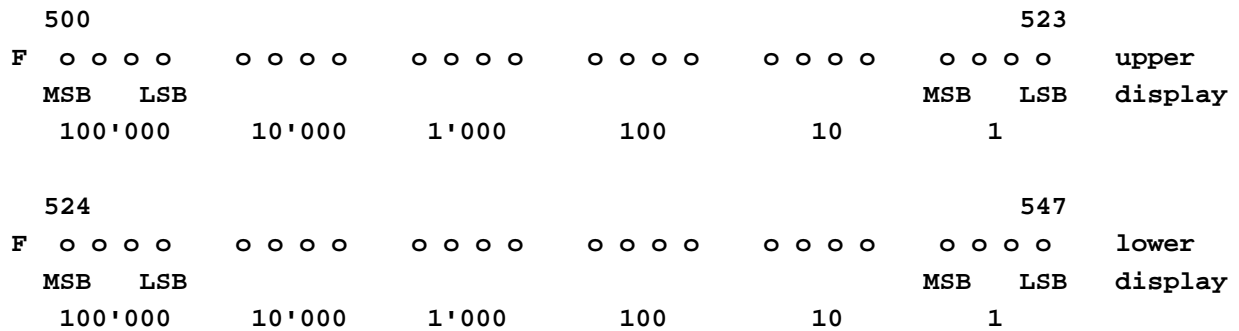
Technical data

Display	2 x 6 digits, 7-segment LED's
Digit height	10 mm
Supply voltage	24 VDC ± 20% full-wave rectified is sufficient
Current at 24 VDC	100 mA
Input voltage for EN, D, CLK	24 VDC, smoothed
Input current for 24 VDC	10 mA
Definition of the input level	"H" : 19 to 32V "L" : 0 to 4V
Input delay	< 1 ms
Usable SAIA® PCD output modules	PCD2.A400 PCD4.A400, B900 PCD6.A400
Control	serially via 3 SAIA® PCD-outputs irrespective of the number of D14

Programming and example

The value of 2 x 6 digits to be displayed is most easily stored at 48 consecutive flags, e.g. F 500 - 547 in BCD format.

Since these values to display are normally located in registers, the content of these registers should first be transferred to the flags.



Programming example

Using a PCA2.D14 display module, show time of day in the upper display and date on the lower. The data is taken from the PCD hardware clock.

The following elements are used :

Clock	PCD-output O 45
Data	PCD-output O 46
Enable	PCD-output O 47
Flags	F 500 - 547
Registers	R 200 et R 201
Counter	C 999

For instruction list programming (IL) this task can be written in the form shown below, where the main emphasis is on program block PB 20.

Use of the FUPLA programming tool makes handling the D12/D14 significantly simpler.

```

COB      0      ; Main program
          0

RTIME    R 200  ; Clock in R 200, date in R 201
CPB      20    ; Display routine for PCA2.D14

ECOB

; -----

BA      equ 0 45      ; Base address

PB      20    ; Display routine for PCA2.D14
          ; -----

DIGOR   6
          R 200  ; Value for upper display (6 digits)
          F 500  ; on flags 500-523

DIGOR   6
          R 201  ; Value for lower display (6 digits)
          F 524  ; on flags 524-547

ACC     H
RES     BA+2  ; ENABLE
SEI     K 0
L1:     ACC   H
        SET   BA+1  ; DATA
        LDL   C 999
          4
L2:     SET   BA+0  ; CLOCK
        RES   BA+0  ; CLOCK
        MOV   R 0   ; |
          N 0   ; | delay
          R 0   ; | instruction
          N 0   ; |
        DEC   C 999
        STH   C 999
        JR    H L2
        ACC   H
        LDL   C 999
          16
L3:     STHX  F 500
        OUT   BA+1  ; DATA
        ACC   H
        SET   BA+0  ; CLOCK
        RES   BA+0  ; CLOCK
        MOV   R 0   ; |
          N 0   ; | delay
          R 0   ; | instruction
          N 0   ; |
        INI   K 47
        JR    L L4
        DEC   C 999
        STH   C 999
        JR    H L3
        JR    L L1
L4:     ACC   H
        SET   BA+2  ; ENABLE

EPB

```