Codisplay parallel 60 mm with 2, 3 or 4 LED digits

Art. No 190162, 190163, 190164

- **60 mm LED digits**
- **Display colour red**
- **Assembled in ABS enclosure**
- **Protection degree IP54**
- **IP65 on request**
- **BCD parallel interface,**
- **PLC compatible interface**
- **8-bit operation, optional 4-bit**

Figure 1: Art. No 190164 P

Contents

1 Hardware

1.1 Ordering information

Description	Digits	Article No	
Display, free mounting	2	190162F	1)
Display, panel mounting	2	190162P	2)
Display, free mounting	3	190163F	1)
Display, panel mounting	3	190163P	2)
Display, free mounting	4	190164F	1)
Display, panel mounting	4	190164P	2)
Option			
Bending arm	2, 3, 4	on request	

Standard accessories:
1) Mounting brackets
2) Fixing set for panel mounting

1.2 Technical specifications

Display	
Type	LED, 7 segment
Character size	60 mm
Colour	red
Character set	0 – 9, A – F, blank and special characters
Brightness	presettable
Power supply	
Supply voltage	18 – 30 VDC
Supply current at	
24 VDC, 4 digits with PWM 2 %	max. 40 mADC
24 VDC, 4 digits with PWM 50 %	max. 100 mADC
24 VDC, 4 digits with PWM 98 %	max. 135 mADC
Digital inputs	
log 0	<2.5 VDC
log 1	>15 VDC
Maximum voltage	0 – 30 VDC
Input impedance	>10 kOhm
Environment	
Operating temperature range	0 – 50 °C
Humidity	0 – 90 % rH
Storage temperature range	0 – 70 °C

Enclosure	2 Digit	3 Digit	4 Digit
Enclosure material	ABS/Steel		
Colour	Black or customer-specific		
Ingress protection front	IP54, IP65 on request		
Ingress protection rear	IP40		
Approximate weight [g]			
Free mounting type	540	740	920
Panel mounting type	480	670	840

1.3 Dimensions and mounting

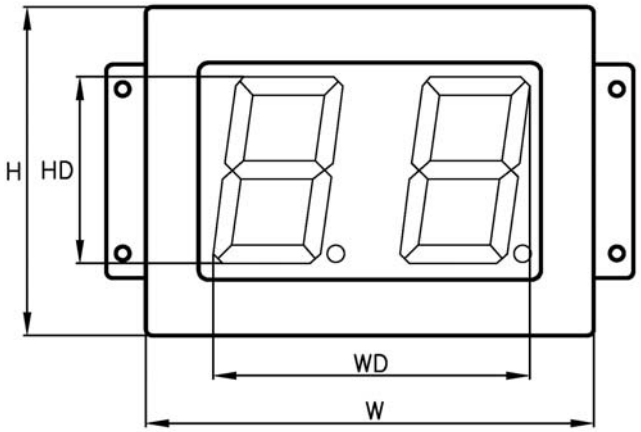

Figure 2: Enclosure and character dimensions

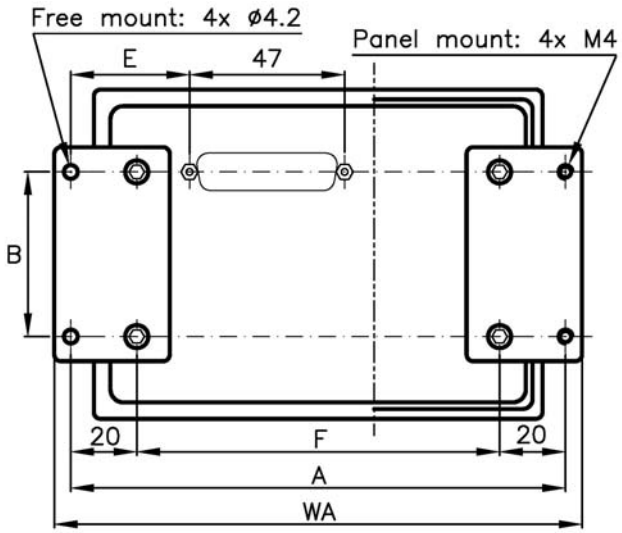

Figure 3: Mounting dimensions

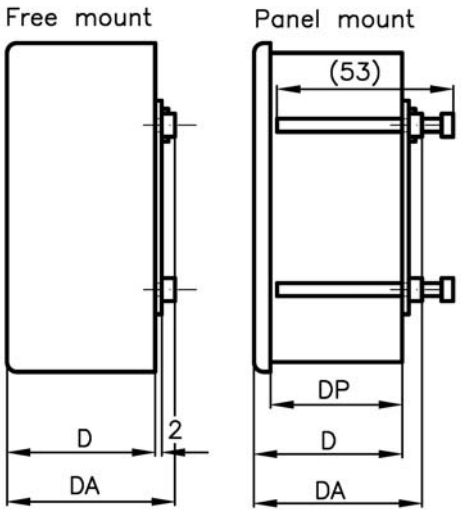

Figure 4: Enclosure depth

Enclosure dimensions in mm		2 Digit	3 Digit	4 Digit
Width	W	136	193	250
Height	H	100	100	100
Depth	D	45	45	45
Depth over all	DA	51	51	51
Height of display	HD	60	60	60
Width of display	WD	100	157	215
Panel mounting: Enclosure depth behind front (without connector)	DP	40	40	40

Mounting dimensions in mm		2 Digit	3 Digit	4 Digit
Distance of mounting holes	A	150	207	264
Distance of mounting holes	B	50	50	50
Width over all	WA	160	217	274
Position of the Connector	E	36	36	36
Distance of mounting screws	F	110	167	224

Panel cut out dimensions in mm		2 Digit	3 Digit	4 Digit
Width of cut out	WC	131	188	245
Height of cut out	HC	95	95	95

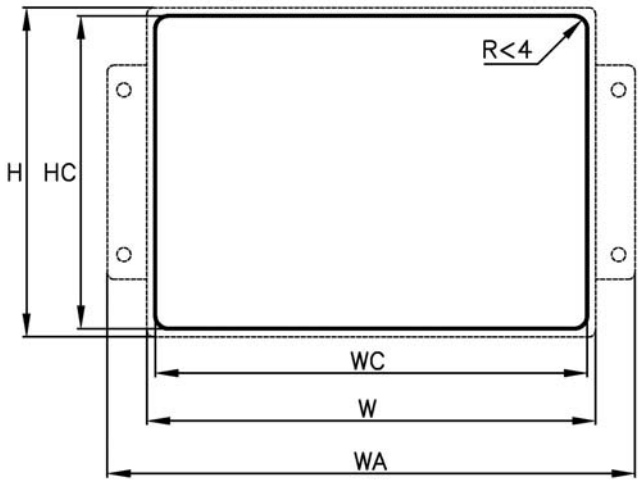

Figure 5: Panel cut out for panel mounting type

Figure 6: Panel mounting type

Figure 7: Free mounting type

1.4 Pin assignment

Pin	Function	8-bit bus	4-bit bus
14 - 25	Power supply 1)	0 V	0 V
10, 13		+24V	+24V
1	Signal GND	GND	GND
2	Data ports	DI 0	-- 2)
3		DI 1	-- 2)
4		DI 2	-- 2)
5		DI 3	-- 2)
6		DI 4	DI 4
7		DI 5	DI 5
8		DI 6	DI 6
9		DI 7	DI 7
11	Chip select	CS	CS
12	Data-/control-register select	RS	RS 2)

Table 1: **Connector for power and signals**
D-Sub 25 pins / male

Notes:
1) The power supply input is protected against improper connection.
2) Not used pins have to be connected to GND.

1.5 Jumpers

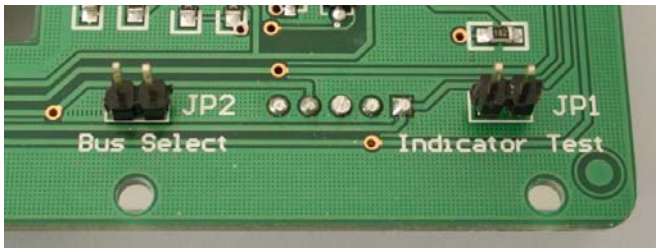

Figure 8: **Jumpers**

Jumper	Function	no jumper or open	Jumper set
JP1	Indicator test	Normal operation	Test 1)
JP2	Bus select	8-bit	4-bit

Table 2: **Jumper functions**

1) Indicator Test: All segments and decimal points are lit with full brightness.

1.6 Indicator numbering

Data entry mode	P6	Digit address			
Right to left	0	3	2	1	0
Left to right	1	0	1	2	3
		8.8.8.8.			

Figure 9: **Indicator numbering**

2 Control and data bytes

2.1 Data byte

RS = 0: Data register is selected (see 3.1)

Input No	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0
Bit	DP	A1	A0	D4	D3	D2	D1	D0
Function	DP	Digit address		Data				

Table 3: **Data Byte**

D0 – D4 Data for the selected digit
A0, A1 Address of digit
DP Decimal point

2.2 Character set

The internal character generator converts D0 … D4 in 32 different characters:
0 – 9, A – F, blank and special characters.

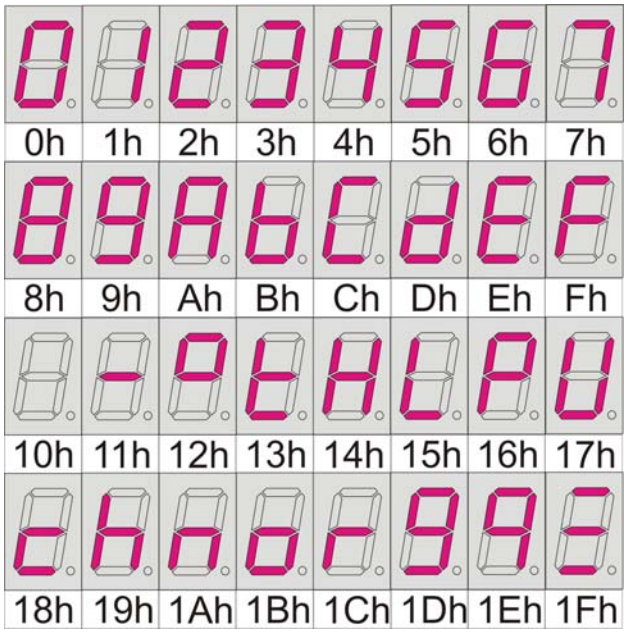

Figure 10: **Character set**

2.3 Control Byte

RS = 1: Control register is selected (see 3.1)

Input No	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0
Bit	P7	P6	P5	P4	P3	P2	P1	P0
Function	Initial display	Data entry mode	Nonvolatile memory write control bit	Display brightness control				

Table 4: **Control byte**

P0 – P4 Display brightness control (see 2.4)

P5 Nonvolatile memory (NVM) write control bit
P5 = 0 Enables the temporarily change of the data entry mode and of the display brightness.
P5 = 1 The value of the control byte is written into the control register and stored in the non-volatile memory as default value.

P6 Data entry mode (see 1.6)
P6 = 0 right to left
P6 = 1 left to right

P7 Initial display after power up
P7 = 0 Blank digits
P7 = 1 0000

Note: Factory default value of control register is binary 11001111 (hexadecimal value of CF). After power up the value of PWM is set to 50%, the display shows “0000” and data entry will be left to right.

2.4 Display brightness control

The brightness of the display is set by P0 to P4 in the control register.

P4	P3	P2	P1	P0	HEX	DEC	Intensity %
0	0	0	0	0	00	0	2
0	0	0	0	1	01	1	5
0	0	0	1	0	02	2	10
0	0	0	1	1	03	3	14
0	0	1	0	0	04	4	17
0	0	1	0	1	05	5	20
0	0	1	1	0	06	6	23
0	0	1	1	1	07	7	26
0	1	0	0	0	08	8	29
0	1	0	0	1	09	9	32
0	1	0	1	0	0A	10	35
0	1	0	1	1	0B	11	38
0	1	1	0	0	0C	12	41
0	1	1	0	1	0D	13	44
0	1	1	1	0	0E	14	47
0	1	1	1	1	0F	15	50
1	0	0	0	0	10	16	53
1	0	0	0	1	11	17	56
1	0	0	1	0	12	18	59
1	0	0	1	1	13	19	62
1	0	1	0	0	14	20	65
1	0	1	0	1	15	21	68
1	0	1	1	0	16	22	71
1	0	1	1	1	17	23	74
1	1	0	0	0	18	24	77
1	1	0	0	1	19	25	80
1	1	0	1	0	1A	26	83
1	1	0	1	1	1B	27	86
1	1	1	0	0	1C	28	89
1	1	1	0	1	1D	29	92
1	1	1	1	0	1E	30	95
1	1	1	1	1	1F	31	98

Table 5: Appropriate values for the brightness

3 Data transfer

In the 8-bit mode 10 output ports of the control unit will be used. In the 4-bit mode the number is reduced to 6.

3.1 Control signals

The access to the data and control register is controlled by the signals CS and RS:

CS "Chip select"
With the rising edge of CS the data is written in the internal register

RS "Register select" for data or control byte
RS = 0 Data is written to data register
RS = 1 Data is written to control register

See also Timing diagrams in section 3.4.

3.2 8-bit-Bus

Figure 11 shows access by the 8-bit bus. The data or control byte is transmitted by one cycle.

Note: To select 8-bit bus JP2 has to be left open.

3.3 4-bit-Bus

Figure 12 shows access by the 4-bit bus. The process of data transfer is done by two cycles. First lower nibble of data or control byte is transmitted and after that the upper nibble.

Note: To select 4-bit bus JP2 has to be closed.

3.4 Timing diagram

Figures below show the access by 8- and 4-bit bus. The time period for active 1 of CS (Time t2 in figure 11) should be at least 50 µs. t1 ≥0 µs.

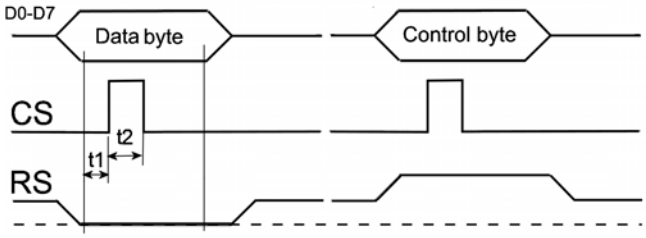

Figure 11: **Timing diagram for 8-bit bus**

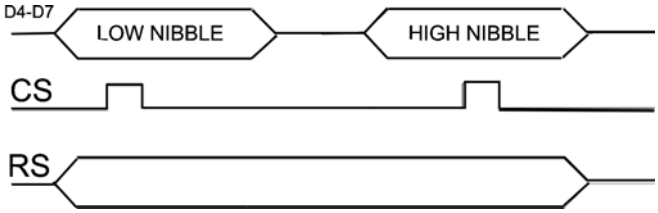

Figure 12: **Timing diagram for 4-bit bus**

4 CE Conformity and RoHS

Crameda Intersys AG declares that
Codisplay parallel 60 mm, Article No 19061xx, complies to the EMC Directive 2004/108/EC with amendments.

Applied standards:
EN 61000-6-2 Immunity standard for industrial environments
EN 61000-6-3 Emission standard for residential, commercial and light-industrial environments

All PCB boards, components and solder paste are manufactured with leadless technology and meet the requirements for RoHS.

Specifications are subject to change without notice.

5 Examples

Example 1 for the 4 digit Codisplay 190164

Remark: The sequence can be used too accordingly for the 2 and 3 digit Codisplay.
Display characters "**123.4**" in the left entry mode at a brightness level of 68 % (For details see table 6):
- Turn power off. If the Jumper JP2 if set: remove it to configure Codisplay for the 8-bit-Bus modus. Turn power on.
- Apply the initial sequence for temporarily set-up: **55** Hex, RS=**1** followed by CS = ⎍
- Apply the display data sequences: **01** Hex, RS=**0** followed by CS = ⎍
  22 Hex, RS=**0** followed by CS = ⎍
  C3 Hex, RS=**0** followed by CS = ⎍
  64 Hex, RS=**0** followed by CS = ⎍

Input	RS	CS	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0						
Signal	RS	CS	P7	P6	P5	P4	P3	P2	P1	P0						
	Control		initial display	entry mode	write NVM	Brightness										Remarks
Step											Hex					Temporarily set-up: - blank digits after power up - brightness 68% - left entry mode (Details see chapter 2.3)
01	1	0	0	1	0	1	0	1	0	1	55	x	x	x	x	
02	1	⎍	stable state								55	x	x	x	x	
	Control		DP	Digit Address		Data						Digit in left entry mode				
Signal	RS	CS	DP	A1	A0	D4	D3	D2	D1	D0		0	1	2	3	
Step											Hex	Display				
03	0	0	0	0	0	0	0	0	0	1	01					Write
04	0	⎍	stable state								01	**1**	x	x	x	character "1" in digit 0
05	0	0	0	0	1	0	0	0	1	0	22					Write
06	0	⎍	stable state								22	**1**	**2**	x	x	character "2" in digit 1
07	0	0	1	1	0	0	0	0	1	1	C3					Write
08	0	⎍	stable state								C3	**1**	**2**	**3.**	x	character "3." in digit 2
09	0	0	0	1	1	0	0	1	0	0	64					Write
10	0	⎍	stable state								64	**1**	**2**	**3.**	**4**	character "4" in digit 3

Table 6

0 = Signal of <2.5 VDC
1 = Signal of >15 VDC
⎍ = Apply control signal RS as described in the figure 11
x = Digits are blank or show "0" depending on the control byte default value stored in the nonvolatile memory (NVM)

Example 2 for the 4 digit Codisplay 190164

Display characters "**-13°**" on a 4 digit Codisplay 190164 in the right entry mode at a brightness level of 32 %:
- Apply the initial sequence for temporarily set-up: **29** Hex, RS=**1** followed by CS = ⎍
- Apply the display data sequences: **12** Hex, RS=**0** followed by CS = ⎍
  23 Hex, RS=**0** followed by CS = ⎍
  41 Hex, RS=**0** followed by CS = ⎍
  71 Hex, RS=**0** followed by CS = ⎍

Example 3

Configure the Codisplay with a new default control byte value stored in the nonvolatile memory (NVM):
- Initial display after power up "0000"
- Left data entry mode
- Overwrite value in nonvolatile memory
- Brightness: 68 %

- Apply the initial sequence: **F5** Hex, RS=**1** followed by CS = ⎍