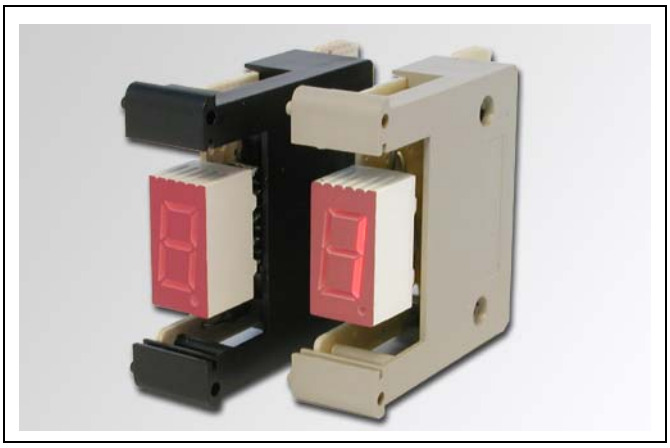
Data Sheet

7-Segment-LED-Displays Codicount, Series 500

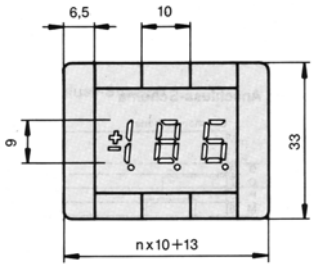


- Single digit red 7-segment LED display
- Character size 9 mm, right hand decimal point
- Module width 10 mm
- Contrast filters for 1 to 4 modules
- Compatible in size with Multiswitch Type H
- Combinable with Multiswitch ranges H, M, R and S

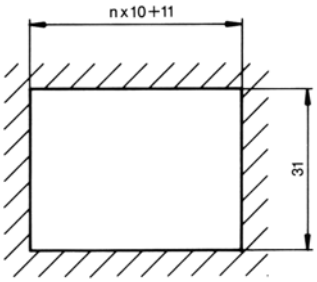
Dimensions

Width	10 mm
Height	33 mm
Character height	9 mm
Depth behind panel	
Type 501, 502, 504, 505	38 mm
Type 516	64 mm
Type 545	74 mm

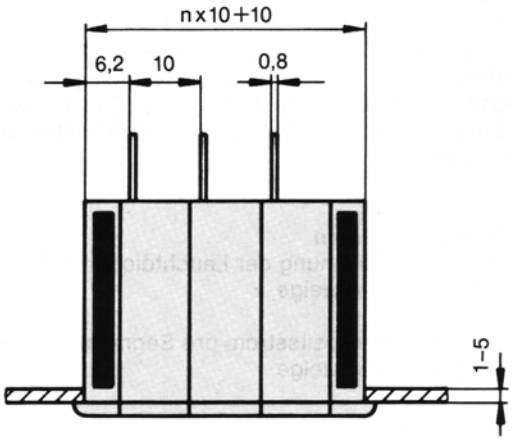
Front view



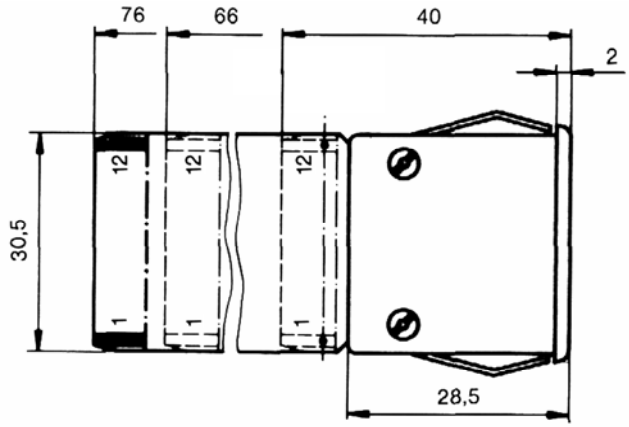
Panel cut-out



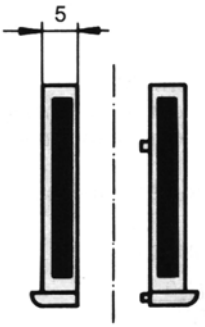
Top view



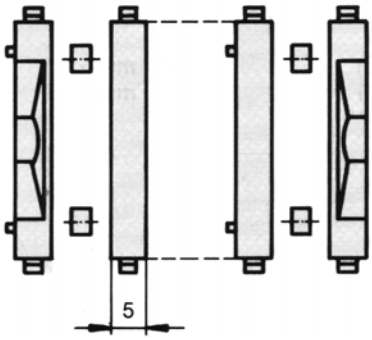
Side view



End bracket pair



Thumbwheel switch adapters



General data

Depending on the type and series involved, the modules are available with TTL or CMOS logic. The program also includes modules with matching elements for expanded supply voltage ranges.

The 7-Segment-LED-Displays with character heights of 9 mm, 16 mm, 25 mm, 35 mm and 45 mm feature parallax-free reading.

The individual modules are 8 mm, 10 mm, 20 mm and 40 mm wide. They can be assembled to form blocks of any size. They are particularly suitable for combination assemblies with the Multiswitches.

Low-power-Schottky logic (LS-TTL) is used in various TTL modules to reduce the supply current.

The inputs of the CMOS modules in series 800 are terminated with resistors. This puts non-used or non-connected inputs on a defined potential level.

The following logic condition definitions apply in the descriptions:

logic 0 = «0» = «L» = 0 V – U_{in} «0» max
logic 1 = «1» = «H» = U_{in} «1» min – V_{CC}

The following functions generally apply to decoders:

– LT (Lamp Test) When this input is set to «0», the character 8 will appear. This instruction is used to check the proper function of the segments.

– RBI (Ripple Blanking Input)
This instruction is used to automatically blank zeros over an arbitrary number of digits. If this terminal is on «0»and if the BCD value is also «0000», the display will be blank.

– BI (Blanking Input) (for CMOS only)
If this input is set to «0», the display will extinguish and overwrite all other available information with the exception of the «LT» instruction. Brightness control can be achieved by a clock with variable pulse width.

– RBO/BI (for TTL only)
This terminal can be used either as an output or input.
RBO (ripple blanking output)
For zero blanking, this output is connected with the «RBI» terminal of the next lower decade.
BI (blanking input)
This input operates in a manner similar to the input for CMOS logic modules; it overwrites **all** other instructions. The basic distinction is in the control mode. Since this terminal can be an input or an output, access must be via integrated circuits with **open collectors**. Termination resistances should not be used, because they are already contained in the decoder. If this function is not needed, the terminal **must** remain open.

General technical data

	TTL	CMOS
Maximum permissible ambient temperature[1)]	0 °C ... +50 °C	0 °C ... +50 °C
Supply voltage V_{CC} *	+5 C ± 5 %	+ 5 V ± 5 % + 10 V ± 10 % + 12 V ± 10 % + 15 V ± 10 %
Count frequency	≤ 5 MHz	≤ 100 kHz

1) Separate or forced ventilation must be provided if the temperature increases beyond the specified limit.

	TTL	CMOS
Input voltage U_{in}	max. 5.5 V	max. V_{CC} +0.5 V
Rise and fall time on pulses	max. 40 ns	max. 15 µs
Pulse width	min. 50 ns	min. 1 µs

* Only the term V_{CC} is used for TTL and CMOS supply in all data and circuit diagrams.

All further deviating data are listed in the descriptions of the individual modules.

IMPORTANT

General handling directions

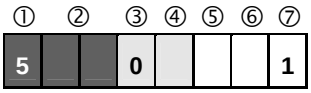
When using components in CMOS logic the strict observation of the following points are indispensable:

- Persons and equipment must be earthed.
- The relative humidity should be within the range between 40 and 50 %.
- Do not touch elements beyond the housing.
- The conductive rubber on the connector should not be removed but immediately before plug-in.
- Modules which are not incorporated in a circuitry have to be connected by conductive rubber with the connector.
- Modules in CMOS logic should be mounted in a circuit in the end.
- All inputs not used should be put to GND or V_{CC}.
- The maximum signal voltage should never be exceeded (see general technical data).
- Do never connect any outputs to V_{CC} or GND.
- Do not exceed the maximum values of the supply voltage (see general technical data).

Order Number Configuration

① **Series**	Series 500	**5**
② **Type**	Type 501	01
	Type 502	02
	Type 504	04
	Type 505	05
	Type 516	16
	Type 545	45
③ **Display**	red	0
④ **Logics**	TTL	1
	C-MOS	2
	without logics, CA	3
	without logics, CC	4
	with adaptation	5
⑤ **Supply voltage**	+5 V	0
	+12 V	5
	+24 V	7
⑥ **Colour of housing**	grey	1
	black	2
⑦ **Connection**	plug in	1

Ordering Key



① Series 500
② Type
③ Display red
④ Logics
⑤ Supply voltage
⑥ Colour of housing
⑦ Plug in connection

Accessories

Codicounts and/or Multiswitches can be assembled to blocks with the following accessories. Based on customer specification, Crameda provides block assembly of Codicount and Multiswitch to "ready to install" units.
For details see section block assembly.
.

Division Plates

If Codicounts and Multiswitches are joined to a block, division plates for Codicount and Multiswitche must be used.

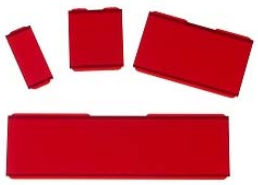
Order No. 1 pair	Colour of housing	Front panel thickness	Front frame width	Module width
500-04-301	grey	1 – 3 mm	5 mm	5 mm
500-04-302	black			
500-04-801	grey	3 – 5 mm		
500-04-802	black			

End Brackets

The display assemblies are completed with end brackets on either side and held together with two threaded rods with slotted nuts. The display assemblies are secured in the front panel by retaining springs.

Order No. 1 pair	Colour of housing	Front panel thickness	Front frame width	Module width
500-03-301	grey	1 – 3 mm	6.5 mm	5 mm
500-03-302	black			
500-03-801	grey	3 – 5 mm		
500-03-802	black			

Contrast Filter



Contrast filters are available for 1 to 4 decades.

Order No. 1 piece	Number of Decades	Length
500-06-010	1	10 mm
500-06-020	2	20 mm
500-06-030	3	30 mm
500-06-040	4	40 mm

Threaded Rods

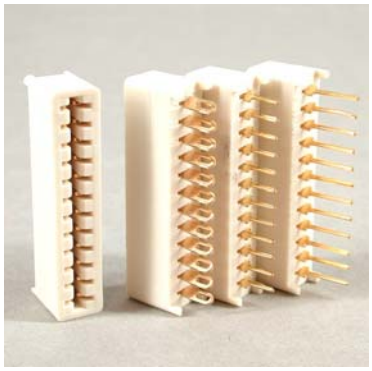
Order No. 1 piece	
G2x LLL mm	LLL = 020 to 130 mm / 2 pieces are required per block.

Slotted Nuts

Order No. 1 pair	Order No. 10 pairs	Order No. 50 pairs
M2A002	M2A020	M2A100

Plug in Connectors

Connectors are available with or without flange and different soldering pins.
Details see Online Catalogue <Plug-in Connectors>.



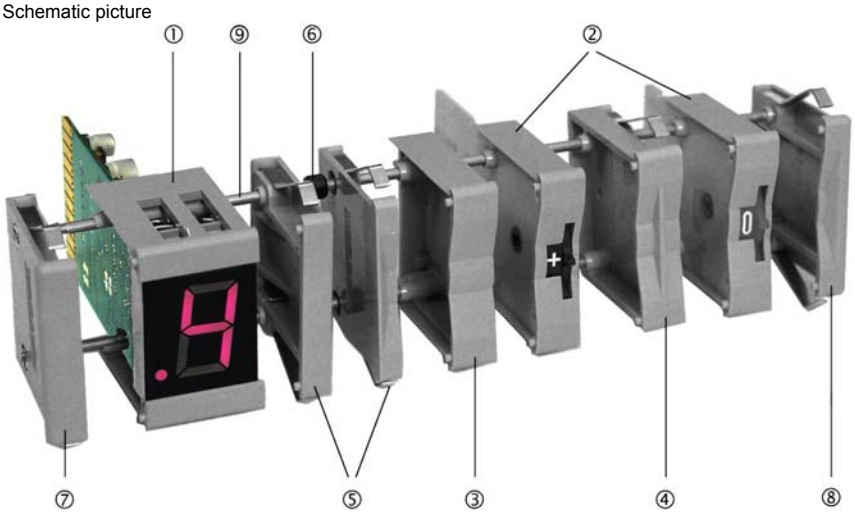
Block Assembly: Mounting of Codicount and Multiswitch

Codicount Series 500 and **Multiswitch Ranges H, M, R and S**

Ready to install blocks are built-up by line up the individual modules (Codicount, Multiswitch, division plates, left and right end brackets). The blocks are secured with threaded rods. The completed blocks are inserted into the cut-out of the front panel. Spring catches locate the block in the front panel.

Based on customer specification, Crameda provides block assembly of Codicount and Multiswitch to "ready to install" units.

Schematic picture



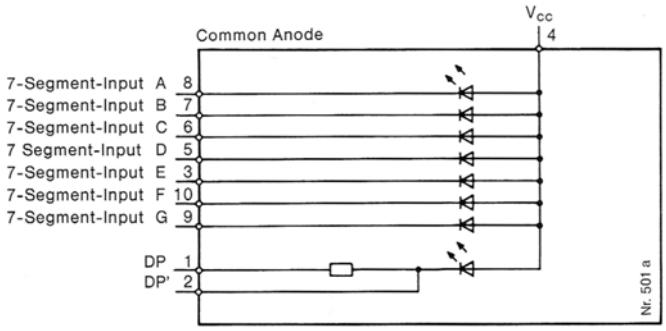
1 Codicount
2 Multiswitch
3 Blank spacing module Multiswitch
4 Ribbed division module for Multiswitch
5 Division plate Codicount*
  Division plate Multiswitch*
6 Guide sleeves for division plates (are included)
7 End bracket Codicount*
8 End bracket Multiswitch*
9 Threaded rods

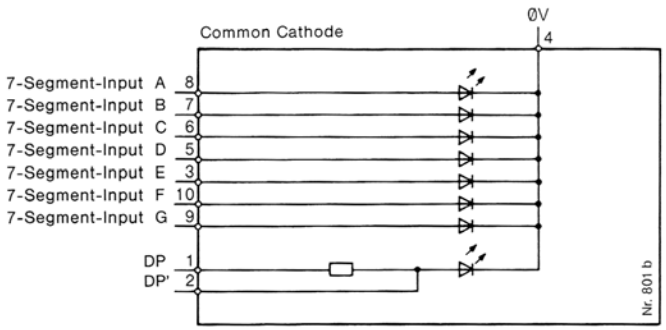
* These modules are available in pairs only.

Type 501

- 7-segment display
- Direct input
- 5, 10, 12 or 15 V supply voltage

Circuit diagram





In these display modules, all segments are wired directly to the PCB terminations.

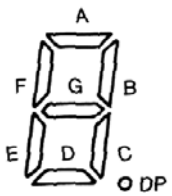
They are operated with the 7-segment code.

For a fixed decimal point, input DP is connected to 0 V or to $+V_{CC}$ via the built-in current limiting resistor, depending on the model involved.

For the floating decimal point mode and particularly in multiplex operation, input DP' must be wired to an external driver.

The display modules are available with common anode (CA) or with common cathode (CC).

Segment configuration



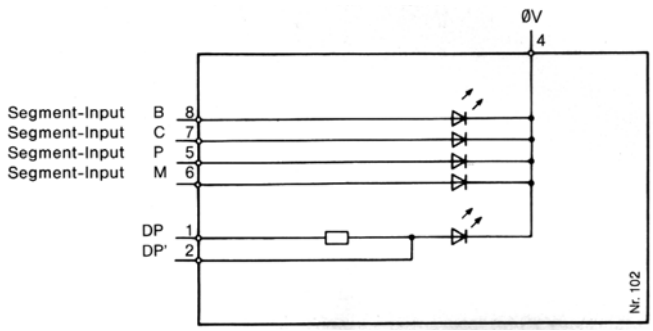
Technical data

Forward voltage of LEDs with $I_{nom.}$	typ. 1.7 V
Recommended operating current per segment	
Display Common Cathode (CC)	5-7 mA DC
Display Common Anode (CA)	10-12 mA DC
Inverse voltage	
Display Common Cathode (CC)	max. 3 V
Display Common Anode (CA)	max. 5 V
Character height	
Display Common Cathode (CC)	9 mm
Display Common Anode (CA)	7.6 mm
Depth behind panel	38 mm

Type 502

- Sign and overflow display
- Direct input
- 5, 10, 12 or 15 V supply voltage

Circuit diagram

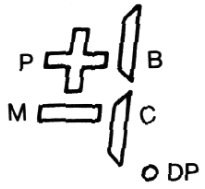


This display is used to display sign and overflow (±1).

For a fixed decimal point, input DP is connected to 0 V or to $+V_{CC}$ via the built-in current limiting resistor, depending on the model involved.

For the floating decimal point mode and particularly in multiplex operation, input DP' must be wired to an external driver.

Segment configuration



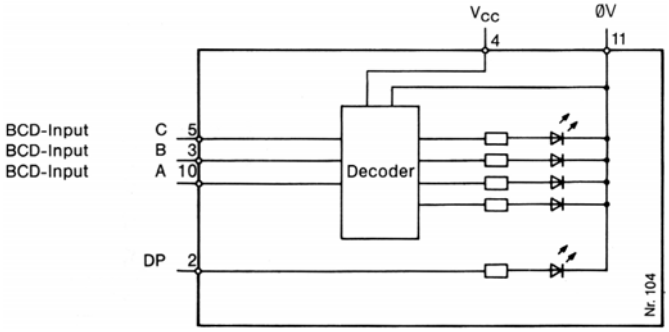
Technical data

Forward voltage of LEDs with $I_{nom.}$	typ. 1.7 V
Recommended operating current per segment	5-7 mA DC
Inverse voltage	max. 3 V
Character height	9 mm
Depth behind panel	38 mm

Type 504

- Sign and overflow display
- BCD input
- 5, 10, 12 or 15 V supply voltage

Circuit diagram



This module is used to display sign and overflow (±1). It is operated with the BCD code in positive logic. All inputs are TTL- or CMOS compatible.

Technical data

Supply current I_{CC}			typ. 24 mA
Character height			9 mm
Depth behind panel			38 mm

Input data

Input voltage (all inputs)			
U_{in} «0» applies to all supply voltages		max.	1 V
U_{in} «1» with V_{CC}	= 5 V	min.	4 V
	= 10 V	min.	8 V
	= 12 V	min.	9.8 V
	= 15 V	min.	12 V
Input current			
I_{in} «0» with U_{in}	= 1 V	max.	0.1 µA
I_{in} «1» with U_{in}	= 4 V	max.	16 µA
	= 8 V	max.	17 µA
	= 9.8 V	max.	17 µA
	= 12 V	max.	18 µA

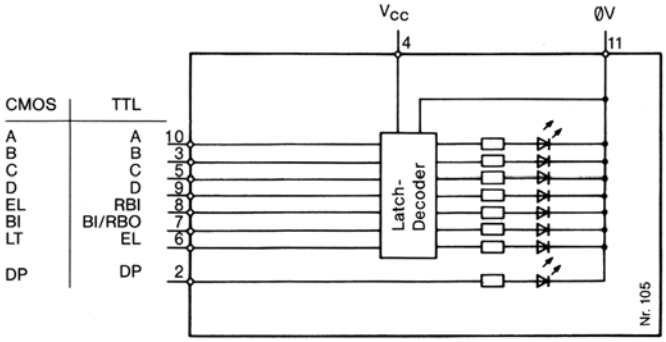
Truth table

Inputs			Outputs
C 2^2	B 2^1	A 2^0	Display
0	0	0	none
0	0	1	–
0	1	0	1
0	1	1	-1
1	0	0	+
1	0	1	±
1	1	0	+1
1	1	1	±1 (Test)

Type 505

- 7-segment display
- BCD input
- Memory
- 5, 10, 12 or 15 V supply voltage

Circuit diagram



In this module, the display is operated by the BCD code in positive logic. A control signal (input EL) makes it possible to freeze the display and suppress response to changing BCD input signals.

Caution: The terminals for TTL and CMOS are not identical. Observe the General handling directions for CMOS logic elements (s. page 2).

Technical data

Supply current I_{CC}	for TTL	typ. 93 mA
	for CMOS	typ. 48 mA
Character height		9 mm
Depth behind panel		38 mm

Input data

Input voltage (all inputs)

		TTL	CMOS
U_{in} «0» with V_{CC}	= 5 V	max. 0.8 V	1.5 V
	= 10 V	max.	3 V
	= 12 V	max.	3.6 V
	= 15 V	max.	4.5 V
U_{in} «1» with V_{CC}	= 5 V	min. 2 V	3.5 V
	= 10 V	min.	7 V
	= 12 V	min.	8.4 V
	= 15 V	min.	10.5 V

Input currents TTL logic:

BCD-inputs with EL = «0»

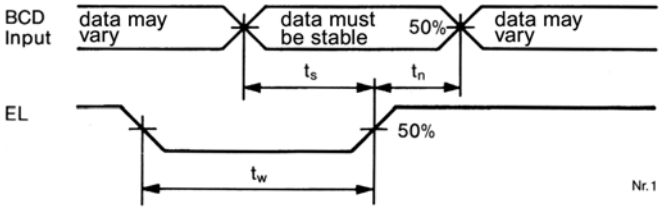
I_{in} «0» with U_{in} = 0.4 V	max.	-1.6 mA
I_{in} «1» with U_{in} = 2.4 V	max.	80 µA
With EL = «1» I_{in} «0» and «1»	max.	-0.1 mA

inputs EL and RBI

I_{in} «0» with U_{in} = 0.4 V	max.	-1.6 mA
I_{in} «1» with U_{in} = 2.4 V	max.	40 µA

Input BI

I_{in} «0» with U_{in} = 0.4 V	max.	-3.2 mA
I_{in} «1» with U_{in} = 2.4 V	max.	80 µA

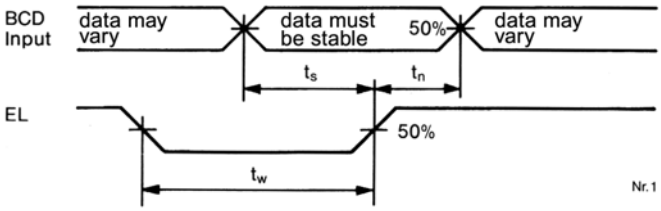


Length of storage instruction	t_w	min.	45 ns
Length of setting time	t_s	min.	30 ns
Length of holding time	t_n	min.	0 ns

Input currents CMOS logic:

all inputs

I_{in} «0» and I_{in} «1»	typ.	10 pA
Input capacitance C_{in}	typ.	5 pF



		V_{CC}		
Length of storage instruction	t_w	5	min.	400 ns
		10	min.	160 ns
		15	min.	100 ns
Length of setting time	t_s	5	min.	150 ns
		10	min.	70 ns
		15	min.	40 ns
Length of holding time	t_n	5	min.	75 ns
		10	min.	35 ns
		15	min.	20 ns

Output data (RBO only)

Output voltage

U_{out} «0» with I_{out} = -3.2 mA	max.	0.4 V
U_{out} «1» with I_{out} = -80 µA	min.	2.4 V

Output current

I_{out} «0»	max.	-3.2 mA
I_{out} «1»	max.	-80 µA

Description of Enable Latch (EL) and Decimal Point (DP):

EL (Enable Latch): This instruction will freeze the display and suppress further response to changes of the BCD input.

- «EL» on «0» The display responds to the BCD input value.
- «EL» on «1» The display freezes on the last value.

DP (Decimal Point): The decimal point must be controlled externally. The module features an integral current limiting resistor.

- «DP» on «0» Decimal point off
- «DP» on «1» Decimal point on

Truth table CMOS logic

Inputs							Outputs
EL	LT	D 2^3	C 2^2	B 2^1	A 2^0	BI	Display
x	0	x	x	x	x	x	8 (Test)
x	1	x	x	x	x	0	none
0	1	0	0	0	0	1	0
0	1	0	0	0	1	1	1
0	1	0	0	1	0	1	2
0	1	0	0	1	1	1	3
0	1	0	1	0	0	1	4
0	1	0	1	0	1	1	5
0	1	0	1	1	0	1	6
0	1	0	1	1	1	1	7
0	1	1	0	0	0	1	8
0	1	1	0	0	1	1	9
1	1	x	x	x	x	1	stored*

x = «0» or «1»

* controlled by applied BCD code during the leading edge of the «EL» instruction signal.

Truth table TTL logic

Inputs							Outputs	
EL	RBI	D 2^3	C 2^2	B 2^1	A 2^0	BI**	RBO	Display
x	x	x	x	x	x	0	0	none
0	0	0	0	0	0	x	0	none
0	1	0	0	0	0	1	1	0
0	x	0	0	0	1	1	1	1
0	x	0	0	1	0	1	1	2
0	x	0	0	1	1	1	1	3
0	x	0	1	0	0	1	1	4
0	x	0	1	0	1	1	1	5
0	x	0	1	1	0	1	1	6
0	x	0	1	1	1	1	1	7
0	x	1	0	0	0	1	1	8
0	x	1	0	0	1	1	1	9
0	x	1	0	1	0	1	1	A
0	x	1	0	1	1	1	1	b
0	x	1	1	0	0	1	1	C
0	x	1	1	0	1	1	1	d
0	x	1	1	1	0	1	1	E
0	x	1	1	1	1	1	1	F
1	x	x	x	x	x	1	1	stored*

x = «0» or «1 »

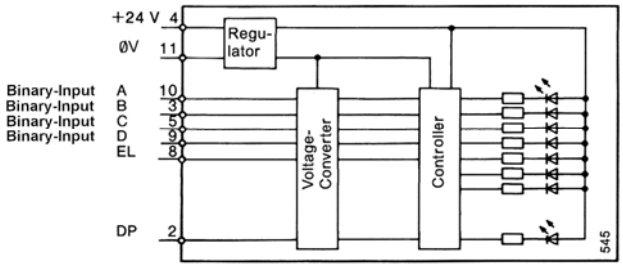
* controlled by applied BCD code during the leading edge of the «EL» instruction signal.

** Input BI should only be shifted to «0» to obtain blanking of the display irrespective to the BCD input. Further information on this input is provided in the general section.

Codicount Type 516

- Single digit red 7-segment LED sign and overflow display
- Character size 9 mm, right hand decimal point
- Module width 10 mm
- Data latch
- Binary input
- 24 V signal and supply voltage
- Depth behind panel 74 mm, 80 mm with connector
- Combinable with Multiswitch ranges H, M, R and S

Circuit Diagram



This module is used to display sign (-, 1, -1) and overflow (o)

Technical Data

Supply voltage V_{DC}	min.	12 V	max.	30 V
Supply current I_{DC}	at	12–30 V	max.	12 mA
Signal voltage	min.	12 V	max.	30 V
Ambient temperature	min.	0 °C	max.	+50 °C

Data and Control Inputs

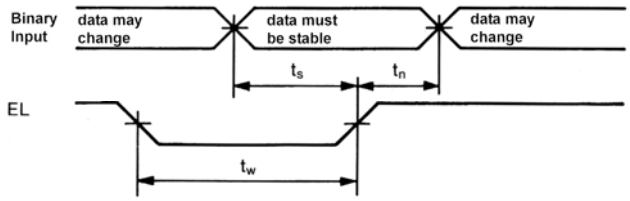
	Input Voltage Uin		Input Current Iin @ Uin	
Uin «0»	min.	-0,7 V	max.	-0,05 mA
	max.	2,0 V	max.	0,2 mA
Uin «1»	min.	12 V	max.	1,0 mA
	max.	30 V	max.	3,0 mA

Open inputs are logical «0»

Input resistance ≈15 kΩ

Switching Characteristics and Signal Waveforms

Length of storage instruction	t_w min.	100 µs
Length of setting time	t_s min.	0 µs
Length of holding time	t_n min.	20 µs



Truth Table

Inputs						Outputs	
EL	D 2^3	C 2^2	B 2^1	A 2^0	DP	Displayed Character	DP
0	0	0	0	0		o	
0	0	0	0	1		–	
0	0	0	1	0		o	
0	0	0	1	1		o	
0	0	1	0	0		–	
0	0	1	0	1		none	
0	0	1	1	0		none	
0	0	1	1	1		o	
0	1	0	0	0		o	
0	1	0	0	1		o	
0	1	0	1	0		o	
0	1	0	1	1		1	
0	1	1	0	0		1	
0	1	1	0	1		-1	
0	1	1	1	0		1	
0	1	1	1	1		1	
1	x	x	x	x		latched*	
x	x	x	x	x	0		OFF
x	x	x	x	x	open		OFF
x	x	x	x	x	1		ON

x = «0» or «1»

* controlled by applied Binary code during the leading edge of the «EL» instruction signal.

Ordering Information

Type	Colour of housing	Ordering code
516	grey	516-057-11
516	black	516-057-21

CE Conformity

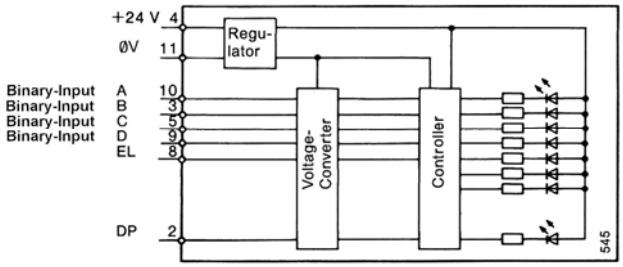
- EN 61000-6-3, EMV-Emission: (Residential environments/Class B)
- EN 61000-6-2, EMV-Immunity: (Industrial environments)
- RoHS

Specifications are subject to change without notice.

Codicount Type 545

- Single digit red 7-segment LED display
- Character size 9 mm, right hand decimal point
- Module width 10 mm
- Data latch
- Binary input
- 24 V signal and supply voltage
- Depth behind panel 74 mm, 80 mm with connector
- Combinable with Multiswitch ranges H, M, R and S

Circuit Diagram



Technical Data

Supply voltage V_{DC}	min.	12 V	max.	30 V
Supply current I_{DC}	at	12–30 V	max.	12 mA
Signal voltage	min.	12 V	max.	30 V
Ambient temperature	min.	0 °C	max.	+50 °C

Data and Control Inputs

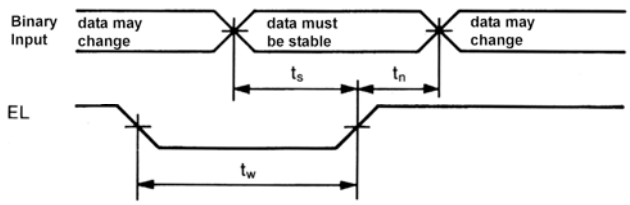
	Input Voltage Uin		Input Current Iin @ Uin	
Uin «0»	min.	-0,7 V	max.	-0,05 mA
	max.	2,0 V	max.	0,2 mA
Uin «1»	min.	12 V	max.	1,0 mA
	max.	30 V	max.	3,0 mA

Open inputs are logical «0»

Input resistance ≈15 kΩ

Switching Characteristics and Signal Waveforms

Length of storage instruction	t_w min.	100 µs
Length of setting time	t_s min.	0 µs
Length of holding time	t_n min.	20 µs



Truth Table

Inputs						Outputs	
EL	D 2^3	C 2^2	B 2^1	A 2^0	DP	Displayed Character	DP
0	0	0	0	0		0	
0	0	0	0	1		1	
0	0	0	1	0		2	
0	0	0	1	1		3	
0	0	1	0	0		4	
0	0	1	0	1		5	
0	0	1	1	0		6	
0	0	1	1	1		7	
0	1	0	0	0		8	
0	1	0	0	1		9	
0	1	0	1	0		A	
0	1	0	1	1		b	
0	1	1	0	0		C	
0	1	1	0	1		d	
0	1	1	1	0		E	
0	1	1	1	1		F	
1	x	x	x	x		latched*	
x	x	x	x	x	0		OFF
x	x	x	x	x	open		OFF
x	x	x	x	x	1		ON

x = «0» or «1»

* controlled by applied Binary code during the leading edge of the «EL» instruction signal.

Ordering Information

Type	Colour of housing	Ordering code
545	grey	545-057-11
545	black	545-057-21

CE Conformity

- EN 61000-6-3, EMV-Emission: (Residential environments/Class B)
- EN 61000-6-2, EMV-Immunity: (Industrial environments)
- RoHS

Specifications are subject to change without notice.