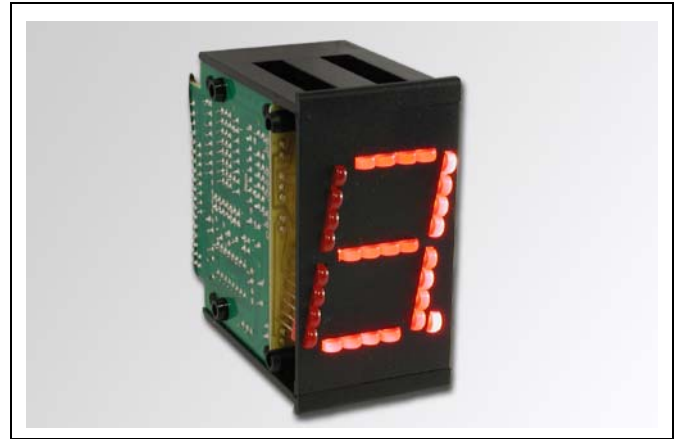


# Data Sheet

## 7-Segment-LED-Displays Codicount, Series 900

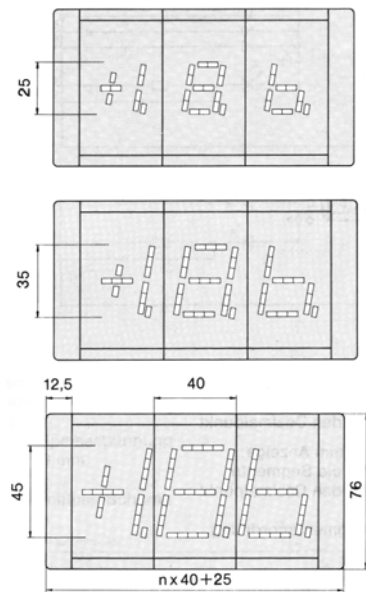
- ◆ Single digit red 7-segment LED display
- ◆ Character size 25, 35 and 45 mm, right hand decimal point
- ◆ Module width 40 mm
- ◆ Installation depth for all models 79 mm
- ◆ Housing black
- ◆ Operating voltages: 12, 15 and 24 V
- ◆ Combinable with Multiswitch G



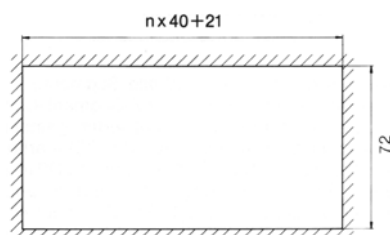
### Dimensions

Width	40 mm
Height	76 mm
Character height	25, 35, 45 mm
Depth behind panel	79 mm

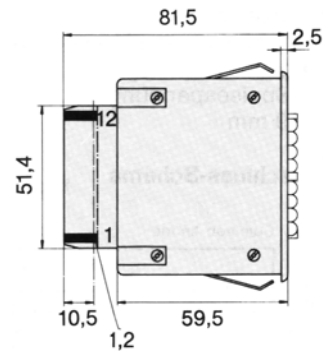
#### Front view



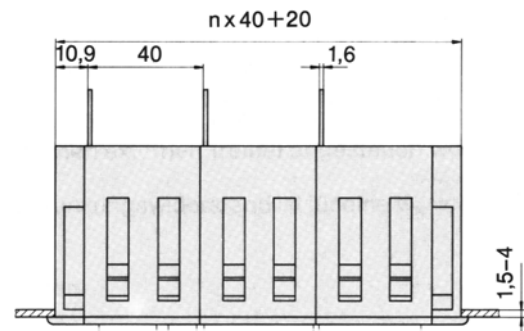
#### Panel cut-out



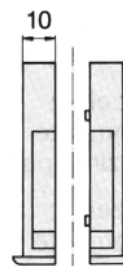
#### Side view



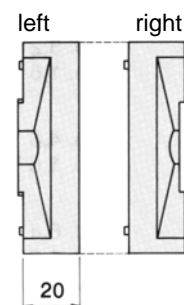
#### Top view



#### End bracket pair



#### Division modules



## 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 <sup>1)</sup>	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 <b>Series</b>	Series 900	<b>9</b>
② <b>Type</b>	Type 901 Type 902 Type 905 Type 906 Type 915 Type 916	01 02 05 06 15 16
③ <b>Character height</b>	25 mm 35 mm 45 mm	7 8 9
④ <b>Logics</b>	TTL C-MOS without logics, CA without logics, CC with adaptation	1 2 3 4 5
⑤ <b>Supply voltage</b>	+12 V +15 V +24 V	5 6 7
⑥ <b>Colour of housing</b>	black	2
⑦ <b>Connection</b>	plug in	1

### Ordering key

①	②	③	④	⑤	⑥	⑦
9					2	1

- ① Series 900
- ② Type
- ③ Character height
- ④ Logics
- ⑤ Supply voltage
- ⑥ Housing black
- 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 Modules



If Codicounts and Multiswitches are joined to a block, division modules must be used.

Order No. 1 piece	Colour of housing	Assembly	Front frame width	Module width
900-04-321	black	left side of the display	20 mm	20 mm
900-04-322	black	right side of the display		

### End Brackets



The display assemblies are completed with end brackets on either side and held together with four 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
900-03-302	black	1.5 – 4 mm	12.5 mm	10 mm

### Threaded Rods



Order No. 1 piece	
G25x LLL mm	LLL = 060 to 260 mm / 4 pieces are required per block.

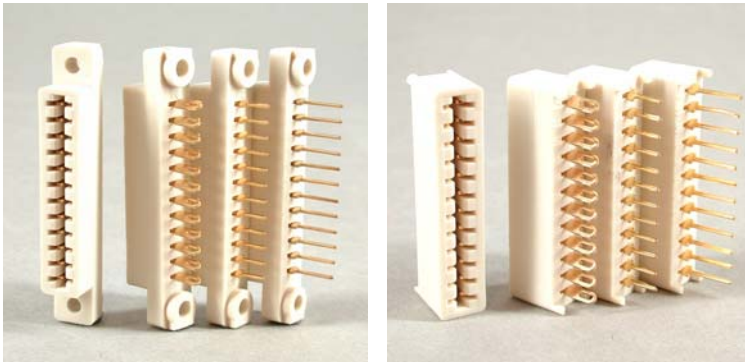
### Slotted Nuts



Order No. 4 pieces	Order No. 20 pieces	Order No. 100 pieces
M25A004	M25A020	M25A100

**Plug in Connectors**

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



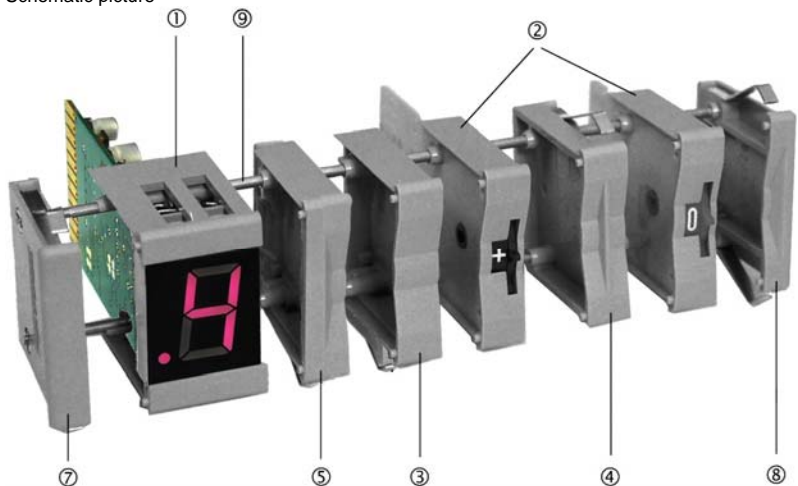
**Block Assembly: Mounting of Codicount and Multiswitch**

**Codicount Series 900 and Multiswitch Range G**

Ready to install blocks are built-up by line up the individual modules (Codicount, Multiswitch, division module, 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



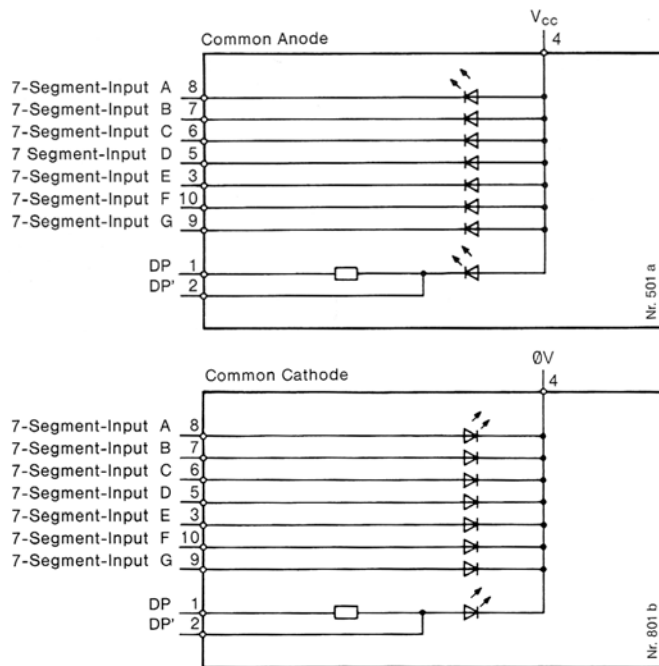
- 1 Codicount
- 2 Multiswitch
- 3 Blank spacing module Multiswitch
- 4 Ribbed division module for Multiswitch
- 5 Division module
- 7 End bracket Codicount\*
- 8 End bracket Multiswitch\*
- 9 Threaded rods

\* These modules are available in pairs only.

## Type 901

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

### Circuit Diagram



### Technical Data

Forward voltage of LEDs with  $I_{nom}$ .

25 mm display:		
for segments	typ.	3.2 V
for decimal point	typ.	1.6 V
35 mm display:		
for segments	typ.	4.8 V
for decimal point	typ.	1.6 V
45 mm display:		
for segments	typ.	6.4 V
for decimal point	typ.	1.6 V

Recommended operating current per segment for all displays

typ. 12-15 mA

Inverse voltage of LEDs

25 mm display:		
for segments	max.	10 V
for decimal point	max.	5 V
35 mm display:		
for segments	max.	15 V
for decimal point	max.	5 V
45 mm display:		
for segments	max.	20 V
for decimal point	max.	5 V
Character height		25, 35, 45 mm
Depth behind panel		79 mm

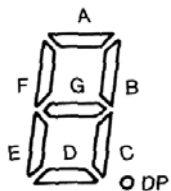
In these modules, all segments are wired directly to the terminations. They are operated with the 7-segment code. Two versions are available: with common anode (CA) or with common cathode (CC).

For a fixed decimal point, input DP is connected to 0 V or  $+V_{CC}$  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 via an external driver.

\*The current limiting resistor value is adapted to 12 V DC.

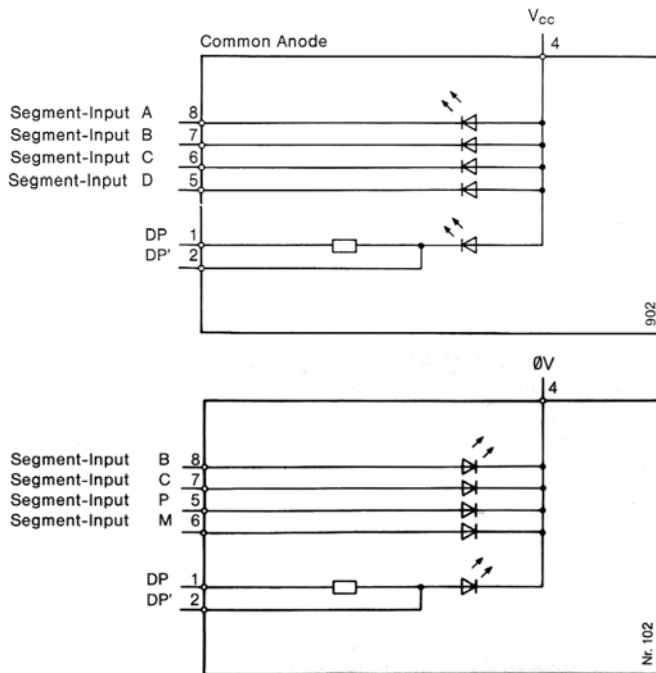
### Segment configuration



## Type 902

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

### Circuit Diagram



### Technical Data

Forward voltage of LEDs with  $I_{nom}$ .

25 mm display:		
for segments	typ.	3.2 V
for decimal point	typ.	1.6 V
35 mm display:		
for all segments except segment D	typ.	4.8 V
for segment D	typ.	3.2 V
for decimal point	typ.	1.6 V
45 mm display:		
for segments	typ.	6.4 V
for decimal point	typ.	1.6 V

Recommended operating current per segment

for all displays typ. 12-15 mA

Inverse voltage of LEDs

25 mm display:		
for segments	max.	10 V
for decimal point	max.	5 V
35 mm display:		
for segments except segment D	max.	15 V
for segment D	max.	10 V
for decimal point	max.	5 V
45 mm display:		
for segments	max.	20 V
for decimal point	max.	5 V
Character height		25, 35, 45 mm
Depth behind panel		79 mm

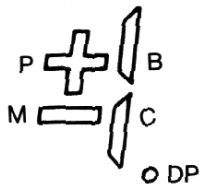
This module is used to display sign and overflow ( $\pm 1$ ) and has been designed to match Type 01. All segments are wired directly to the terminations.

For a fixed decimal point, input DP is connected to 0 V or  $+V_{CC}$ , depending on the model involved.

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

DP current limiting resistor value is adapted to 12 V DC.

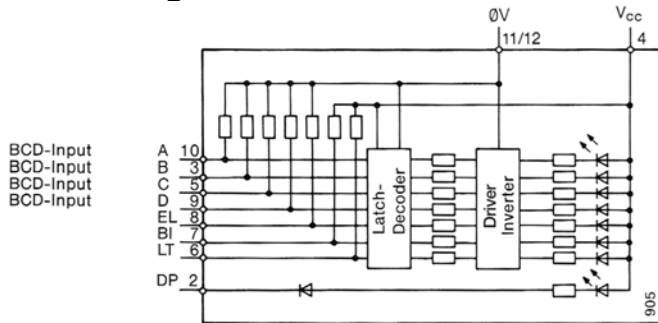
### Segment configuration



## Type 905

- 7-segment display
- BCD input
- Memory
- 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 without inhibiting the BCD input signals. The model features CMOS logic. All inputs are terminated with resistors.

**Caution:** The connections for TTL and CMOS logics are not identical.

Observe the General handling directions for CMOS logic elements (s. page Fehler! Textmarke nicht definiert.).

### Technical Data

Supply current $I_{CC}$	
$V_{CC} = 12 V \pm 10 \%$	max. 126 mA
$V_{CC} = 15 V \pm 10 \%$	max. 133 mA
Character height	25, 35, 45 mm
Depth behind panel	79 mm

#### Input data

Input voltage (all inputs)	
Pull-up/Pull-down Resistors	100 k $\Omega$
$U_{in}$ «0» with $V_{CC} = 12 V$	max. 3.6 V
$V_{CC} = 15 V$	max. 4.5 V
$U_{in}$ «1» with $V_{CC} = 12 V$	min. 8.4 V
$V_{CC} = 15 V$	min. 10.5 V

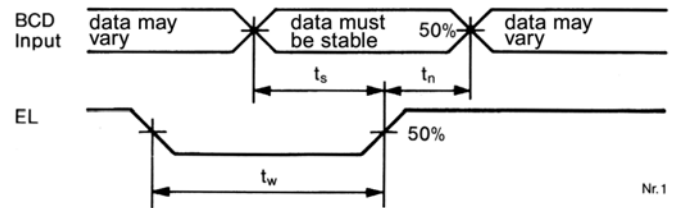
#### Input currents

BCD-Inputs and EL			
$I_{in}$ «0» with $U_{in} = 3.6 V$		max.	40 $\mu A$
$U_{in} = 4.5 V$		max.	46 $\mu A$
$I_{in}$ «1» with $U_{in} = 8.4 V$		max.	86 $\mu A$
$U_{in} = 10.5 V$		max.	108 $\mu A$

#### Inputs LT and BI

$I_{in}$ «0» with $U_{in} = 3.6 V$		max.	86 $\mu A$
$U_{in} = 4.5 V$		max.	108 $\mu A$
$I_{in}$ «1» with $U_{in} = 8.4 V$		max.	40 $\mu A$
$U_{in} = 10.5 V$		max.	46 $\mu A$

Length of memory instruction	$t_w$	min.	160 ns
Length of setting time	$t_s$	min.	70 ns
Length of holding time	$t_h$	min.	25 ns



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

«DP» on «0»	Decimal point on
«DP» on «1»	Decimal point off
$I_{in}$	max. -23 mA

### Truth table

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

x = «0» or «1»

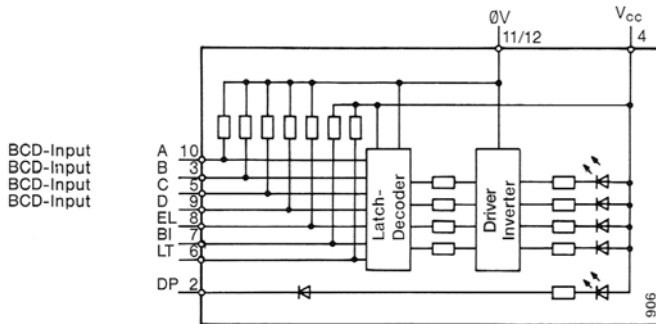
\* controlled by applied BCD code during the leading edge of the «EL» instruction signal.



## Type 906

- Sign and overflow display
- Memory
- BCD input
- CMOS logic
- 12 or 15 V supply voltage

### Circuit Diagram



This module was designed to match Type 05 and is used to display sign and overflow.(±1).

**Caution:** The connections for TTL and CMOS logics are not identical.

Observe the General handling directions for CMOS logic elements (s. page Fehler! Textmarke nicht definiert.).

### Technical Data

Supply current $I_{CC}$	
$V_{CC} = 12 V \pm 10 \%$	max. 82 mA
$V_{CC} = 15 V \pm 10 \%$	max. 87 mA
Character height	25, 35, 45 mm
Depth behind panel	79 mm

#### Input data

Input voltage (all inputs)

Pull-up/Pull-down Resistors	100 k $\Omega$
$U_{in}$ «0» with $V_{CC} = 12 V$	max. 3.6 V
$V_{CC} = 15 V$	max. 4.5 V
$U_{in}$ «1» with $V_{CC} = 12 V$	min. 8.4 V
$V_{CC} = 15 V$	min. 10.5 V

Input currents

BCD inputs and EL

$I_{in}$ «0» with $U_{in} = 3.6 V$	max. 40 $\mu A$
$U_{in} = 4.5 V$	max. 46 $\mu A$
$I_{in}$ «1» with $U_{in} = 8.4 V$	max. 86 $\mu A$
$U_{in} = 10.5 V$	max. 108 $\mu A$

Inputs LT and BI

$I_{in}$ «0» with $U_{in} = 3.6 V$	max. 86 $\mu A$
$U_{in} = 4.5 V$	max. 108 $\mu A$
$I_{in}$ «1» with $U_{in} = 8.4 V$	max. 40 $\mu A$
$U_{in} = 10.5 V$	max. 46 $\mu A$

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

«DP» on «0»	Decimal point on
«DP» on «1»	Decimal point off
$I_{in}$	max. -23 mA

### Truth table

Inputs						Outputs
LT	BI	C $2^2$	B $2^1$	A $2^0$	EL	Display
1	1	0	0	0	0	+1
1	1	0	0	1	0	-
1	1	0	1	0	0	1
1	1	0	1	1	0	-1
1	1	1	0	0	0	+
1	1	1	0	1	0	+1
1	1	1	1	0	0	+1
1	1	1	1	1	0	-
0	1	x	x	x		±1 (Test)
1	0	x	x	x	x	none
1	1	x	x	x	1	stored *

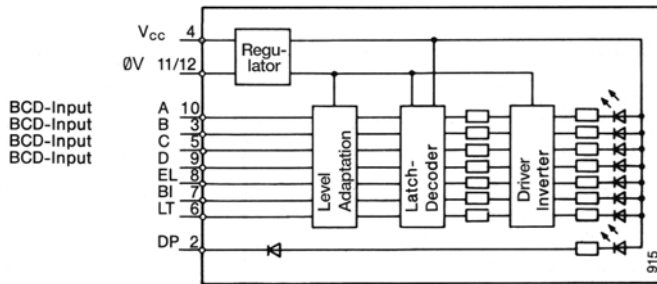
x = «0» or «1»

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

## Type 915

- 7-segment display
- Memory
- BCD input
- Signal level adaptation
- 24 V supply voltage

### Circuit Diagram



In this module, the display is controlled with the BCD code in positive logic. The advantage of this module is that the signal and supply voltage can be anywhere between 12 and 30 V.

A control signal (input EL) makes it possible to freeze the display without inhibiting the incoming BCD signals.

### Technical Data

Supply voltage $V_{CC}$	12-30 V
Supply current $I_{CC}$	max. 95 mA
Signal voltage	10-30 V
Character height	25, 35, 45 mm
Depth behind panel	79 mm

#### Input data

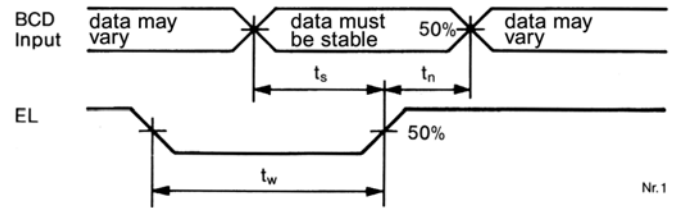
Input voltage (all inputs)	
$U_{in}$ «0»	max. -3.5 V max. 2.0 V or open
$U_{in}$ «1»	min. 10 V max. 30 V

#### Input currents (all inputs)

$i_{in}$ «0» with	$U_{in} = -3.5 V$	max. -0.4 mA
	$U_{in} = 2.0 V$	max. 0.7 mA
$i_{in}$ «1» with	$U_{in} = 10 V$	max. 1.2 mA
	$U_{in} = 30 V$	max. 4.8 mA

#### Switching times

Input EL		
Length of memory instruction	$t_w$	min. 160 ns
Length of setting time	$t_s$	min. 70 ns
Length of holding time	$t_h$	min. 25 ns



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

- «DP» on «0» Decimal point on
  - «DP» on «1» Decimal point off
- $I_{in}$  max. -23 mA

### Truth table

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

x = «0» or «1»

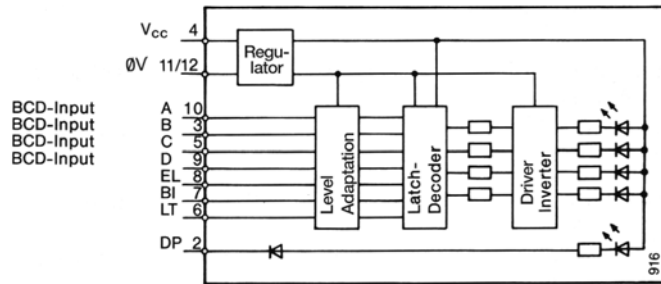
\* controlled by applied BCD code during the leading edge of the «EL» instruction signal.

Inputs LT and BI must be wired to  $V_{CC}$  if not used.

## Type 916

- Sign and overflow display
- Memory
- BCD input
- Signal level adaptation
- 24 V supply voltage

### Circuit Diagram



This module was designed to match Type 15 and is used to display sign and overflow ( $\pm 1$ ).

### Technical Data

Supply current $I_{CC}$	max. 70 mA
Supply voltage $V_{CC}$	12-30 V
Supply current 1	max. 95 mA
Signal voltage	10-30 V
Character height	25, 35, 45 mm
Depth behind panel	79 mm

#### Input data

Input voltage (all inputs)

$U_{in}$ «0»	max. -3.5 V
	max. 2.0 V or open
$U_{in}$ «1»	min. 10 V
	max. 30 V

Input currents (all inputs)

$I_{in}$ «0» with	$U_{in} = -3.5 V$	max. -0.4 mA
	$U_{in} = 2.0 V$	max. 0.7 mA
$I_{in}$ «1» with	$U_{in} = 10 V$	max. 1.2 mA
	$U_{in} = 30 V$	max. 4.8 mA

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

«DP» on «0»	Decimal point on
«DP» on «1»	Decimal point off
$I_{in}$	max. -23 mA

### Truth table

Inputs						Outputs
LT	BI	C $2^2$	B $2^1$	A $2^0$	EL	Display
1	1	0	0	0	0	+1
1	1	0	0	1	0	-
1	1	0	1	0	0	1
1	1	0	1	1	0	-1
1	1	1	0	0	0	+
1	1	1	0	1	0	+1
1	1	1	1	0	0	+1
1	1	1	1	1	0	-
0	1	x	x	x		$\pm 1$ (Test)
1	0	x	x	x	x	none
1	1	x	x	x	1	stored *

\*Inputs LT and BI must be wired to  $V_{CC}$  if not used.