MANUAL FOR THE LCA 042

TEXT DISPLAY LCA 042

The attractively designed LCA 042, incorporates many interesting features. One of the successful LCA series of text displays.

Text displays are not exotic addons, but tools, with which you can considerably improve the service quality of machines and systems. Text displays

- avoid malfunctions,
- indicate how faults can be eliminated,
- provide operator guidance,
- give important set-up information,
- show what the machine is currently doing,
- support maintenance and servicing,
- issue instructions for carrying out adjustments,
- combine variable values with fixed texts

LCA text displays save time and money. Neither designers nor production personnel can do without text displays. Therefore they are part of the standard equipment of every machine.

With the LCA 042 text display you can invoke up to 200 messages. It can be driven by any programmable con-troller or by individual contacts or proximity switches.

All text displays are unobtrusive and have an unmistakable appearance. LCA text displays are functional, well-designed units that can be integrated harmoniously into your machines.

042 PRINT 01/11.89

TEXT DISPLAY LCA 042

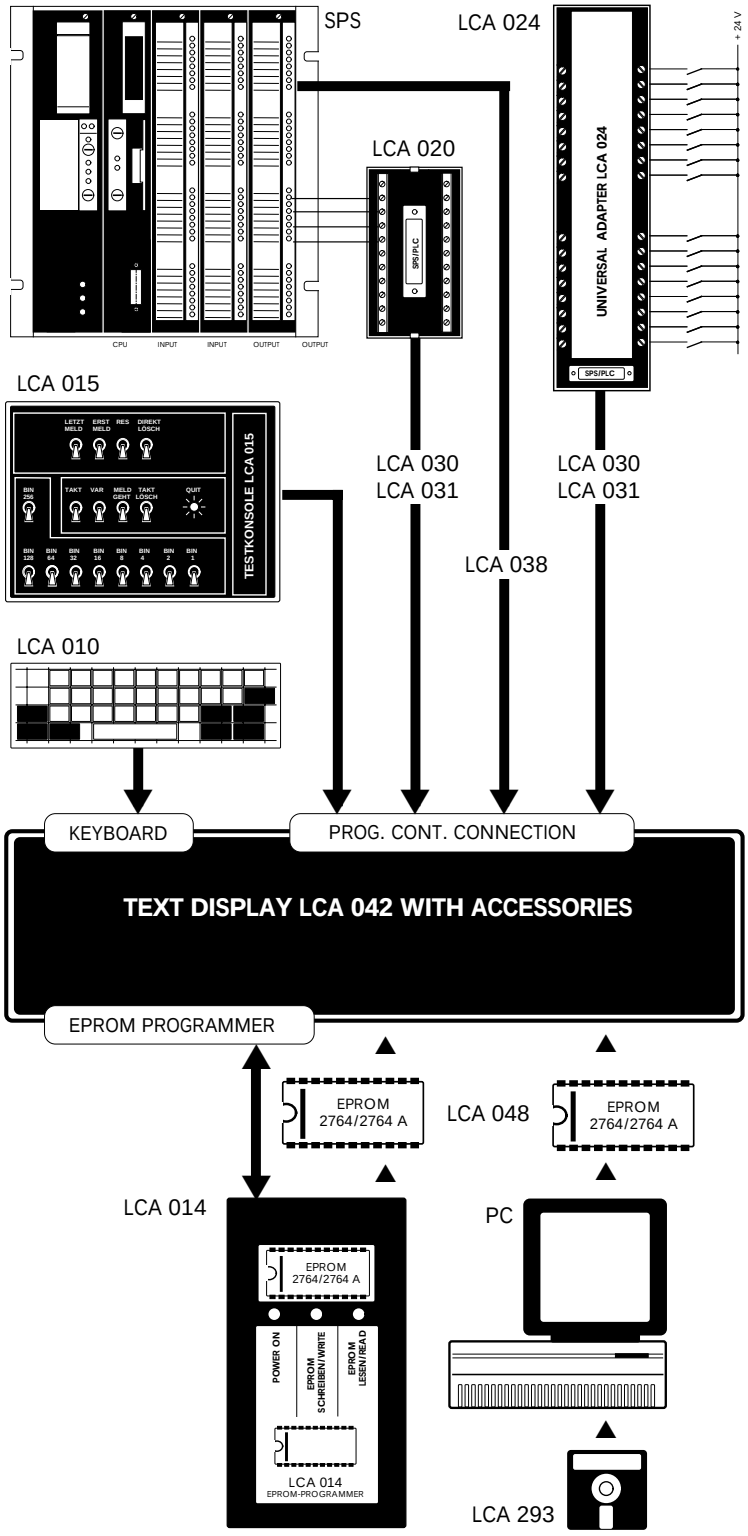
INTERFACING
PROGRAMMING
ACCESSORIES

Text display LCA 042 can ...

- **display 200 messages** with **40 characters** each - the message texts can be transfered either into the RAM by means of a keyboard or into the EPROM using the LCA 014 (or a PC)
- **display texts directly** - the text of a message is displayed for as long as the coded message number is present on the inputs of the LCA 042
- **store 19 messages and display them cyclically** - the number of messages invoked is dis-played in the last two columns of a text line
- **display the first message and store the others** - the other messages are requested and displayed via the clock input
- **display messages on several lines** - the first line contains the main information, the other two lines additional information
- **combine external variables and fixed texts in one line** - all ASCII and BCD characters are permissible as variables
- be driven by any programmable controller using **BCD/BIN-code** or by **universal adapter LCA 024** (using contacts, proximity switches etc.)

ACCESSORIES

LCA 010	POCKET KEYBOARD
LCA 014	EPROM-PROGRAMMER
LCA 048	EPROM 2764
LCA 015	TEST CONSOLE
LCA 020	INDUSTRIAL ADAPTER
LCA 024	UNIVERSAL ADAPTER
LCA 025	ADAPTER EXPANDER
LCA 293	P-SOFTWARE FOR LCA 042
LCA 030	FLAT CABLE 200 cm
LCA 031	FLAT CABLE 30 cm
LCA 038.2	ROUND CABLE 200 cm
LCA 038.4	ROUND CABLE 400 cm
LCA 038.6	ROUND CABLE 600 cm
LCA 038.8	ROUND CABLE 800 cm



TEXT DISPLAY LCA 042

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TEXT DISPLAY LCA 042

FURTHER PRODUCTS FROM OUR RANGE

1 TEXT DISPLAY LCA 044

2 TEXT DISPLAY LCA 045

3 TEXT DISPLAY LCA 143

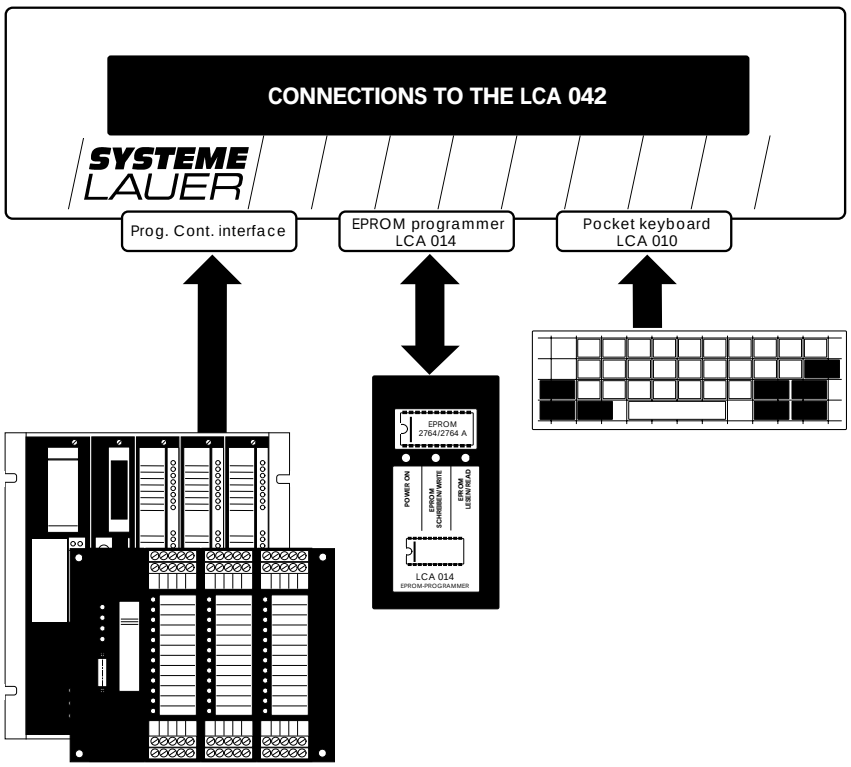
4 TEXT DISPLAY LCA 145

5 TEXT DISPLAY LCA 245

6 TEXT DISPLAY LCA 265

7 DIAGNOSTIC SYSTEM LCA 285

8 INDUSTRIAL PRINTER LCA 710



1.0 CONNECTIONS TO THE LCA 042

There are three plug-type connectors on the rear of the LCA 042:

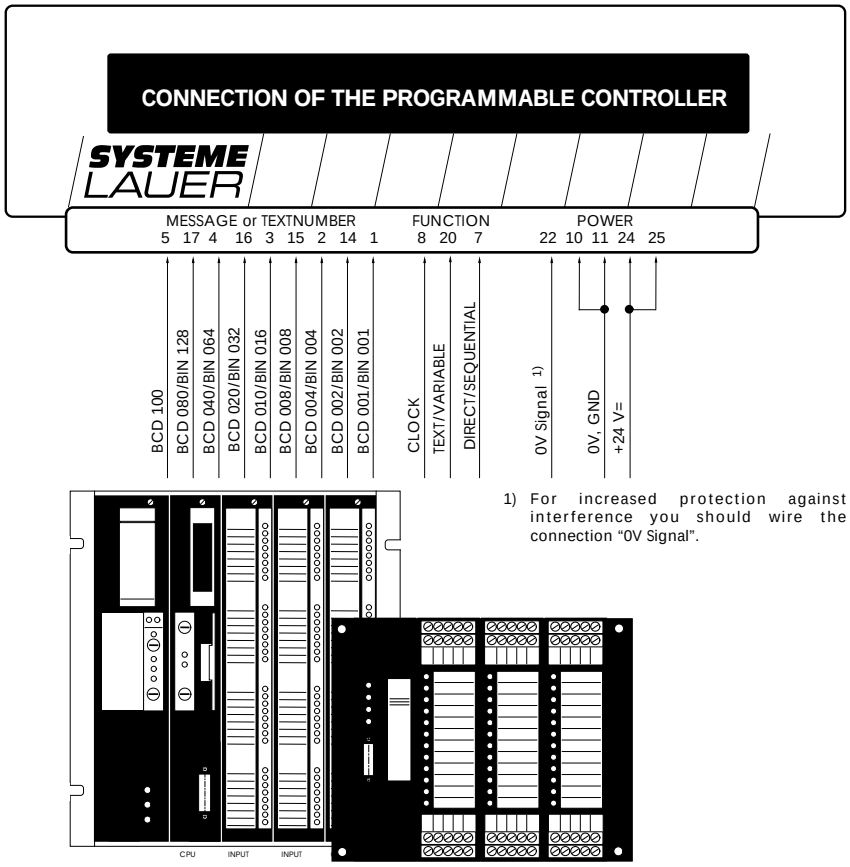
- **Connector for programmable controller**
  25-pin DIN plug
- **Connector for pocket keyboard LCA 010**
  20-pin plug
- **Connector for EPROM programmer LCA 014**
  10-pin plug

We recommend out text display LCA 042 for use with programmable controllers made by the following manufacturers:

AEG
April
ABB
B & R
Eberle
Festo
IFM
Inter Control
Klaschka
Klöckner-Moeller
Kunke
Mitsubishi
Texas Instruments
Selectron
Schiele
Siemens
Omron
Philips

and many others

TEXT DISPLAY LCA 042



1) For increased protection against interference you should wire the connection "0V Signal".

1.1 CONNECTION OF THE PROG. CONT.

The parallel interface is the most important connection be-tween the machine (controller) and the text display LCA 042. All significant functions of the LCA 042 are performed via this interface. These functions are:

- invoking the message texts (max. 200)
- invoking the message variants (functions)
- entering external variables

All inputs are high-active (Ri = 2.6kΩ)

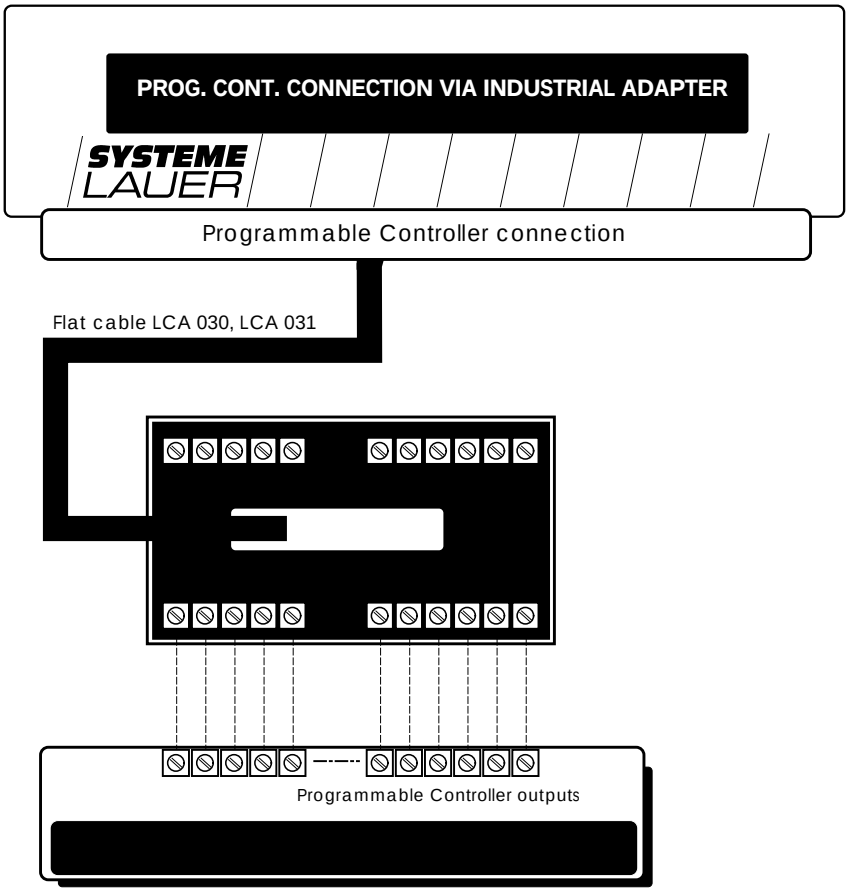
BIN	**0... 199**	
BCD	**0... 199**	= coded message number
CLOCK		= 1. invoke additional messages 2. display external variables on text display 3. invoke further messages (at first message)
TEXT/VARIABLE		= switch between message text and external variable
DIRECT/SEQUENTIAL		= switch between direct message and first message (sequential display)

The connection to the programmable controller is made via industrial adapter LCA 020 or round cable LCA 038.

Text display LCA 042 distinguishes between PROGRAMMING and OPERATION. During programming operation of the LCA 042 is not possible.

Before the LCA 042 is put into operation the following preparations must be made:

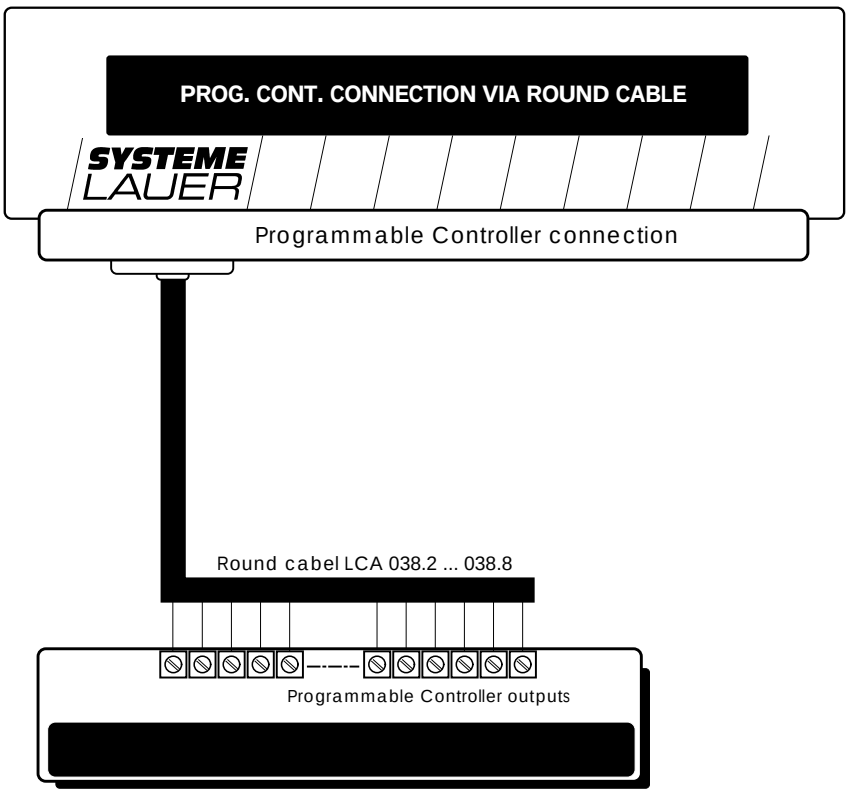
1. initialize
2. store message texts
3. determine positions of variables by means of place holders



1.1.1 INDUSTRIAL ADAPTER LCA 020

When using control cabinet techniques, connections are normally made by means of screw terminals. To enable the use of this type of installation with the text display LCA 042 we supply the industrial adapter LCA 020.

The electrical connections between the programmable controller and the LCA 020 are made using the well-tried wiring method via terminals and the connections between the LCA 020 and the text display LCA 042 are by means of ready-made flat cables (LCA 030 or LCA 031).

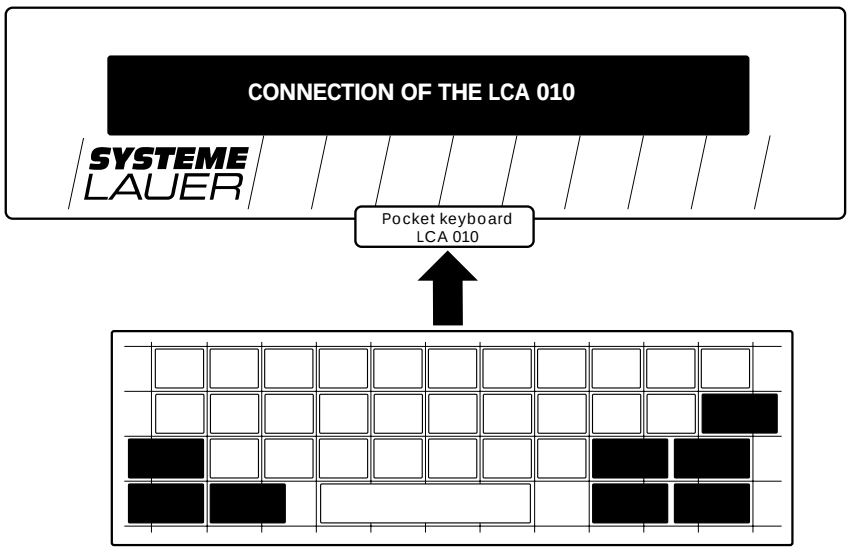


1.1.2 ROUND CABLE LCA 038

The simplest and most economical way of connecting the text display to the programmable controller is by means of ready-made round cables.

We supply round cable LCA 038 in 4 standard lengths (from 200 to 800 cm) and a suitable plug for the text display.

Further details can be found in the description of the round cable.



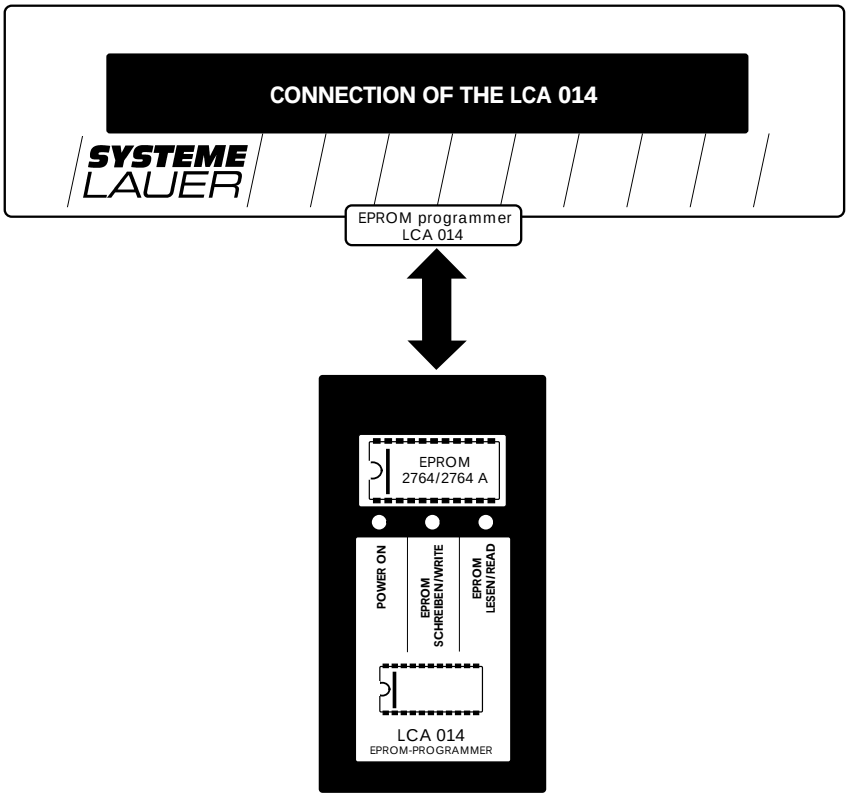
1.2 CONNECTION OF THE LCA 010

The simplest way of entering and correcting message texts is by means of the pocket keyboard LCA 010. The LCA 010 is connected to the LCA 042 via a cable. As long as the two units are connected together, no messages can be invoked.

The pocket keyboard has 27 brown keys for alphanumeric characters and 8 red function keys. Following is a description of the function keys:

	Backwards in program
	Forwards in program or invoke program
	Cursor forwards; together with SHIFT key, backwards
ŧ	Program selection
SHIFT	Shift key
ENTER	Flash/delete

See also Section 3.1 of this manual.

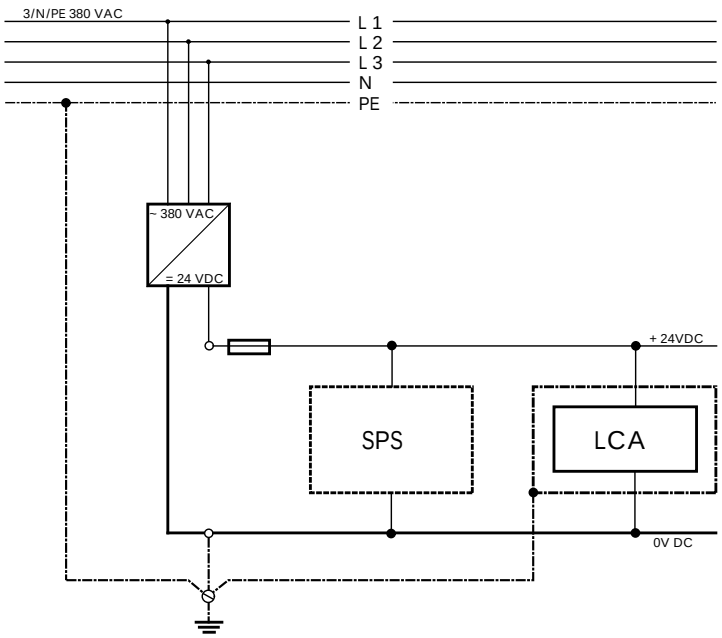


1.3 CONNECTION OF THE LCA 014

Using EPROM programmer LCA 014 the message text stored in the RAM can be copied into a suitable EPROM. The LCA 014 does not require an additional voltage supply, it is simply connected to text display LCA 042 with a cable. As long as the two units are connected together, no message can be invoked.

The EPROM is programmed, written to, compared with or read out in dialog with the LCA 042. The Pocket keyboard LCA 010 is therefore required.

See also Section 3.2 of this manual.



Operating voltage acc. to DIN 19240	U_B	:	24V= (<=5% residual ripple)
	U_{Bmax}	:	33V=
	U_{Bmin}	:	19V=
Current consumption		:	≤ 350 mA (+24V=)

2.1 VOLTAGE SUPPLY

To ensure correct operation of the text display LCA 042 observe the following instructions as regards the voltage supply:

Use the LCA 042 only with operating voltages in the range indicated.

Undervoltage transients of down to 9.5V for <= 1ms are permissible.

An operating voltage U_B of 35V= is permissible for <= 100ms (repetition frequency approx. 1Hz).

The LCA units may be driven only with “protective low voltage” in accordance with German Electrical Standard VDE 100. The driver transformer must conform to German Electrical Standard VDE 0551. According to this standard one side of the operating voltage may be grounded: we recommend that this be done when working with our units.

If one side of the operating voltage is not grounded, you will require your own driver transformer to operate the LCA 042.

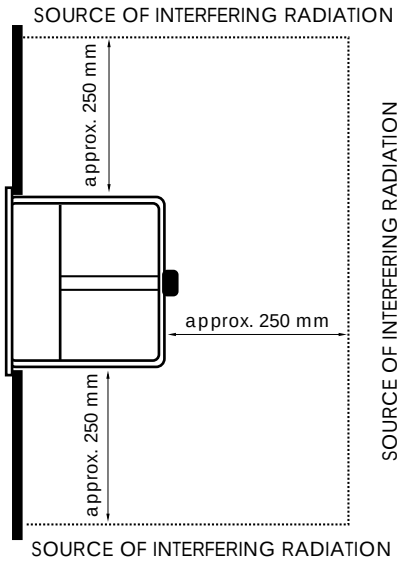
The LCA 042 is grounded via the housing. Use a short ground connection wire with a large cross-sectional area (>= 2.5mm^2)

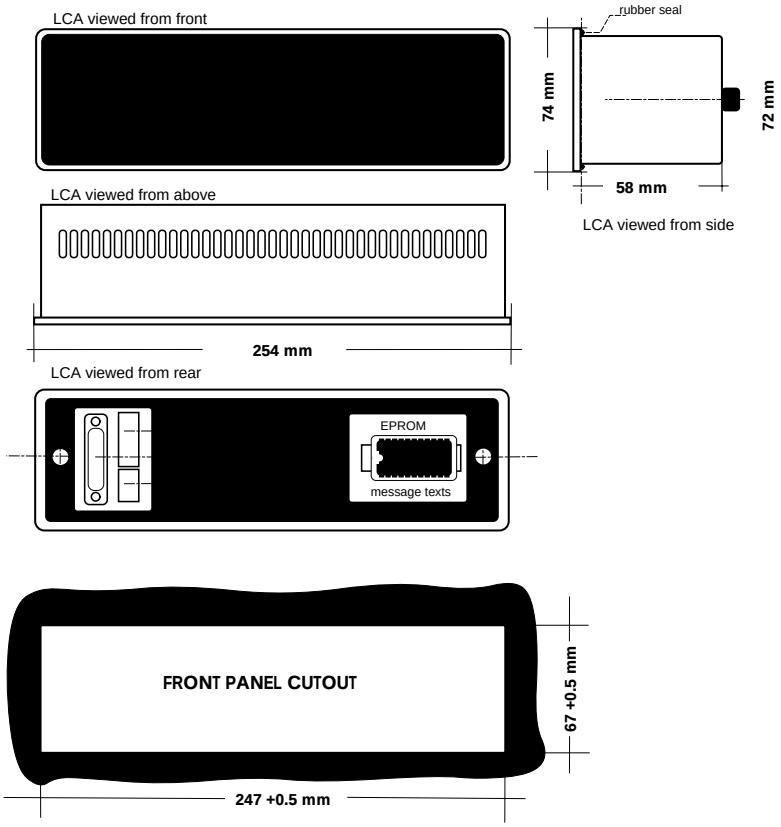
If the operating voltage is also used to drive inductances, protective circuitry must be incorporated for them (recovery diode, etc.).

Operating voltages greater than those indicated (+33V) can destroy the unit. In this case our guarantee does not apply.

2.2 INSTALLATION INSTRUCTIONS

In order to reduce the effects of interfering signals radiated by electric and magnetic fields, the minimum distance from high-voltage or high-frequency carrying cables and consumers should be >= 250mm. The input wires to the LCA 042 should not be routed together with high-voltage or high-frequency carrying cables.





2.3 SPECIFICATIONS

A high degree of immunity[1] to interference and of electrical protection (IP 65) ensure correct functioning, even in rough industrial environments.

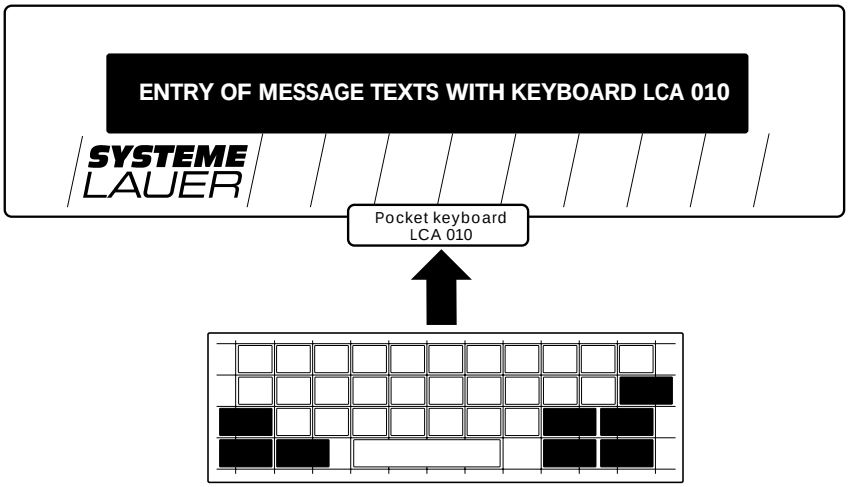
TECHNICAL DATA

Operating Voltage	19 ... 33	V
Power consumption	8	W
Signal voltage	19 ... 33	V=
Signal current (U_B = 24V)	9	mA
Display	flourescent	
Characters per line	40	
Character depiction	5 x 7	matrix
Character height	7	mm
Character set	ASCII	
Message invocation	BCD / BINÄR 1 AKTIV / Ø AKTIV	
Messages	max 200	
Messages text memory	RAM/EPROM	
External variables	max. 40 characters	
Operating temperature	0 ... 50	°C
Storage temperature	-25 ... 70	°C
Connections	plug-type	
Electrical protection	IP 65	
Weight	approx. 1000	g
Dimensions	see dim. drawing	

Installation is simple, all that is needed is a cutout in the front panel. The rugged housing consists of two parts which are separated for installation.

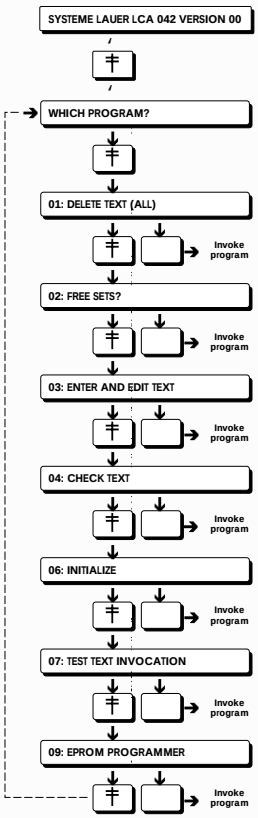
1) In order to ensure the maximum degree of immunity to interference, the keyboard LCA 010 and the EPROM programmer should not remain connected during operation of the text display.

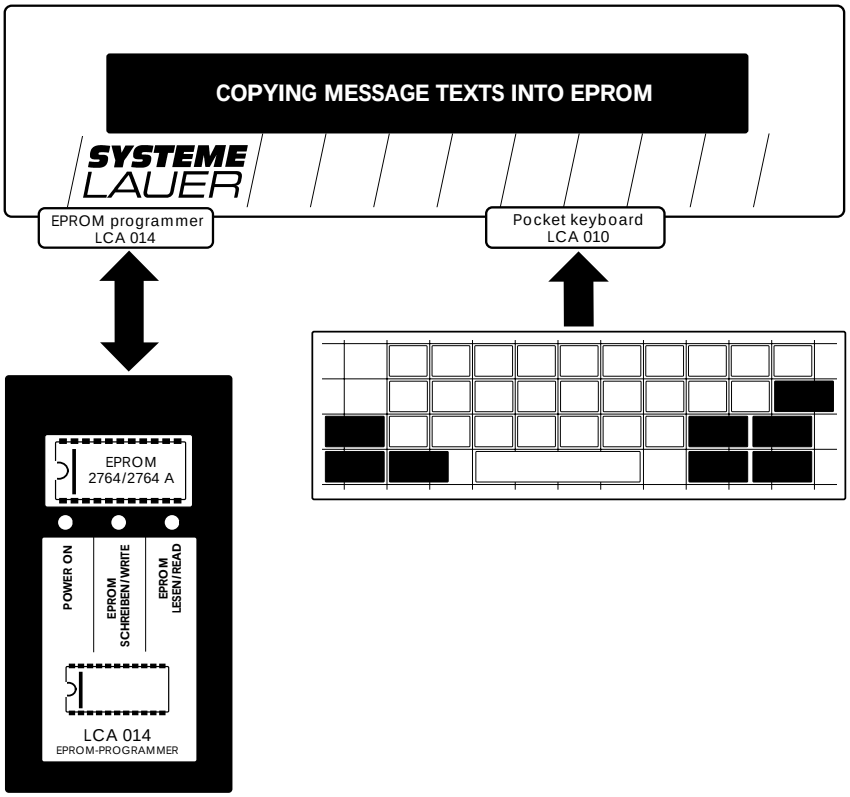
TEXT DISPLAY LCA 042



3.1 ENTRY OF MESSAGE TEXTS WITH KEYBOARD LCA 010

Using the pocket keyboard LCA 010 you can invoke the various programs of the text display LCA 042 in an easily understandable dialog process. Before entering message texts you should first delete all texts (program 1) and then initialize the LCA 042 (program 6). This procedure is not necessary if you only want to correct or expand message texts. The individual programs are described in detail in the programming instructions, which are supplied with every text display.





3.2 COPYING MESSAGE TEXTS INTO EPROM

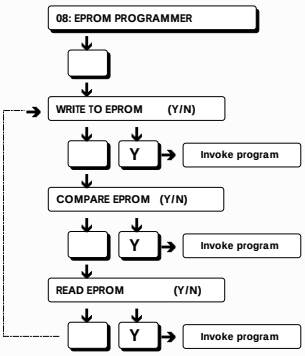
The texts entered using pocket keyboard LCA 010 are stored in a battery-backed-up RAM. They can be deleted, edited or expanded as often as you wish.

The contents of the RAM can be rapidly copied into an EPROM using EPROM programmer LCA 014:

1. *Program initialization and message texts using the pocket keyboard.*

2. *Plug an empty EPROM 2764 (e.g. LCA 048) into the LCA 014 socket.*

3. *Using the LCA010 invoke program 8 in text display LCA 014.*



4. *Plug programmed EPROM into socket of LCA 042.*

As long as there is an EPROM in the LCA 042, its contents are valid and the LCA 010 is not accessed. If the EPROM is removed, the contents of the RAM become valid. With program 8 (READ EPROM) the contents of an EPROM can also be copied into the RAM.

ASCII

	20	30	40	50	60	70	
0	SPACE	0	@	P	°	p	0
1	!	1	A	Q	a	q	1
2	"	2	B	R	b	r	2
3	#	3	C	S	c	s	3
4	$	4	D	T	d	t	4
5	%	5	E	U	e	u	5
6	&	6	F	V	f	v	6
7	«	7	G	W	g	w	7
8	(	8	H	X	h	x	8
9	)	9	I	Y	i	y	9
A	❁	:	J	Z	j	z	A
B	+	;	K	€	k	Š	B
C	,	<	L	..	l	š	C
D	-	=	M	†	m	Ÿ	D
E	.	>	N	▲	n	§	E
F	/	?	O	▼	o	■	F

BCD

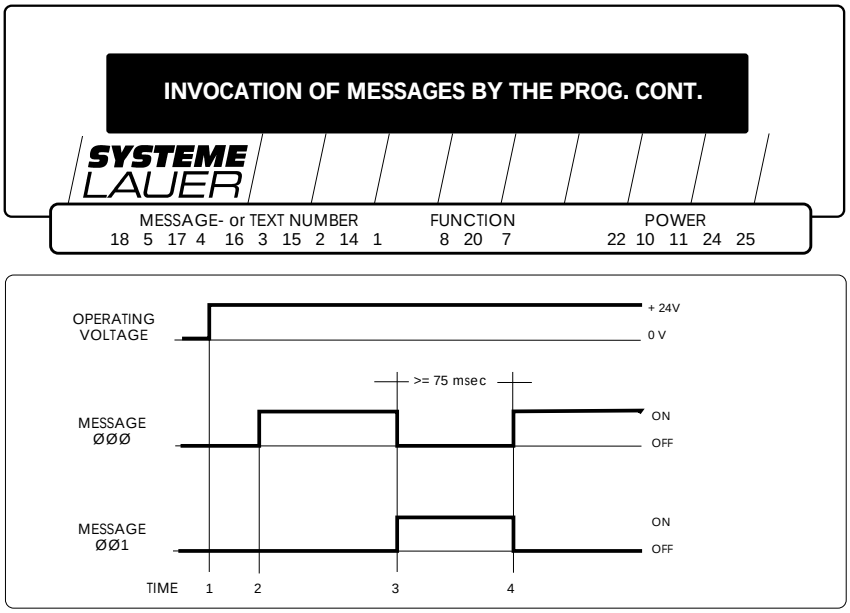
	00
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
CR	A
▲	B
-	C
+	D
.	E
SPACE	F

3.3 ASCII CHARACTER CHART

The chart opposite shows the set of characters for message texts and variables that can be depicted on text display LCA 042. The complete character set is available only via the EPROM. When using pocket keyboard LCA 010, only the characters shown in outline in the chart are available.

The variables can be ASCII-coded or BCD-coded. The BCD chart for variables is thus shown separately.

Other country-specific character sets (German, Italian, Spanish, Scandinavian) are available on request.



TIME 1: Operating voltage is switched on. The LCA 042 is ready to operate after approx. 0.7s.

TIME 2: The message text of message ØØØ is displayed.

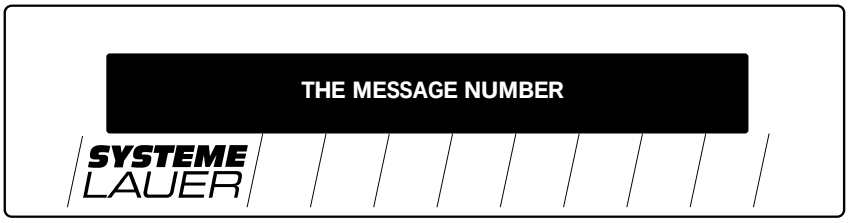
TIME 3: The message number of message ØØ1 is placed on the inputs of the LCA 042.

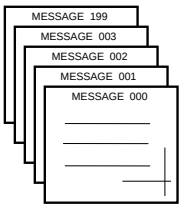
TIME 4: The message number must remain on the inputs for a minimum period of **>= 75ms**, after this the message can change.

4.1 INVOCATION OF MESSAGES BY THE BY PROG. CONT.

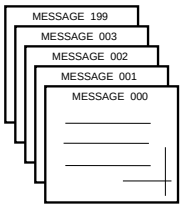
In order to invoke a message or a message text, the coded message number must simply be placed on the message inputs. Every time the message number is changed, a new message is displayed or stored, depending on the messa-ge variants.

The only condition for correct invocation of a message is that the message number must be present on the message inputs for a minimum period.





BCD 100	BCD 80	BCD 40	BCD 20	BCD 10	BCD 8	BCD 4	BCD 2	BCD 1	Mess. number
0	0	0	0	0	0	0	0	0	000
0	0	0	0	0	0	0	0	1	001
0	0	0	0	0	0	0	1	0	002
0	0	0	0	0	0	0	1	1	003
0	0	0	0	0	0	1	0	0	004
0	0	0	0	0	0	1	0	1	005
0	0	0	0	0	0	1	1	0	006
0	0	0	0	0	0	1	1	1	007
to									
1	1	0	0	1	1	0	0	0	198
1	1	0	0	1	1	0	0	1	199



BIN 128	BIN 64	BIN 32	BIN 16	BIN 8	BIN 4	BIN 2	BIN 1	Mess. number
0	0	0	0	0	0	0	0	000
0	0	0	0	0	0	0	1	001
0	0	0	0	0	0	1	0	002
0	0	0	0	0	0	1	1	003
0	0	0	0	0	1	0	0	004
0	0	0	0	0	1	0	1	005
0	0	0	0	0	1	1	0	006
0	0	0	0	0	1	1	1	007
to								
1	1	0	0	0	1	1	0	198
1	1	0	0	0	1	1	1	199

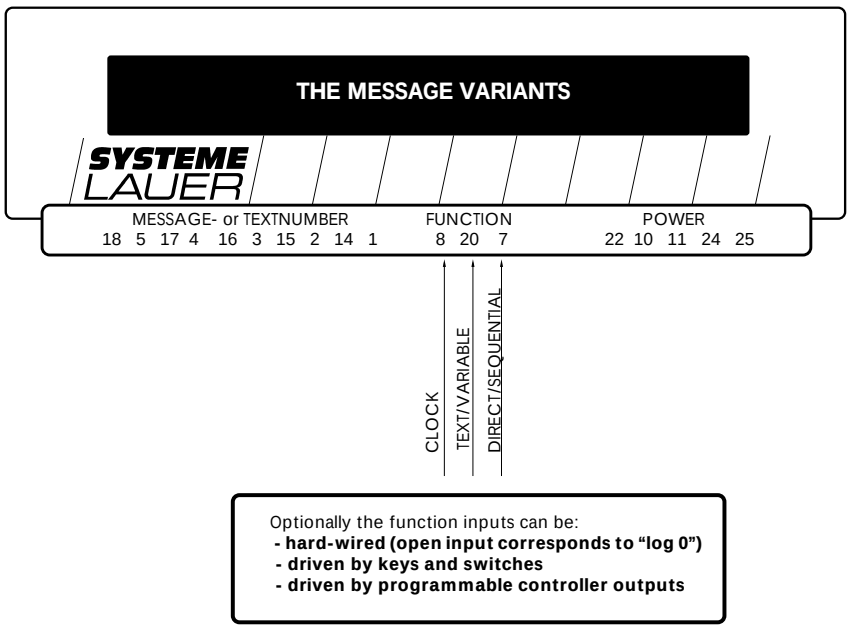
4.2 THE MESSAGE NUMBER

The message number determines which message text is invoked. The message number is coded to allow the maximum quantity of messages to be invoked with the minimum of message inputs.

Text display LCA 042 offers the of two coding options:

- BIN-coded message numbers, up to 199 pages
- BCD-coded message numbers, up to 199 pages

200 messages are available with the LCA 042. They have the message numbers 000 ... 199. You can join up to 3 message text lines into one message text. The first line contains the main information, the other two lines the additional information.



Optionally the function inputs can be:
- **hard-wired (open input corresponds to "log 0")**
- **driven by keys and switches**
- **driven by programmable controller outputs**

1) Due to standardization of the input signals the designations have been altered. The old designations are given in brackets. You may still find these designations on some LCA units.

4.3 THE MESSAGE VARIANTS

You determine the message variant or operating mode of text display LCA 042 using the 3 function inputs

- **DIRECT/SEQUENTIAL**
- **TEXT/VARIABLE (TEXT/DATA)[1)]**
- **CLOCK (DATA-CLOCK)[1)]**

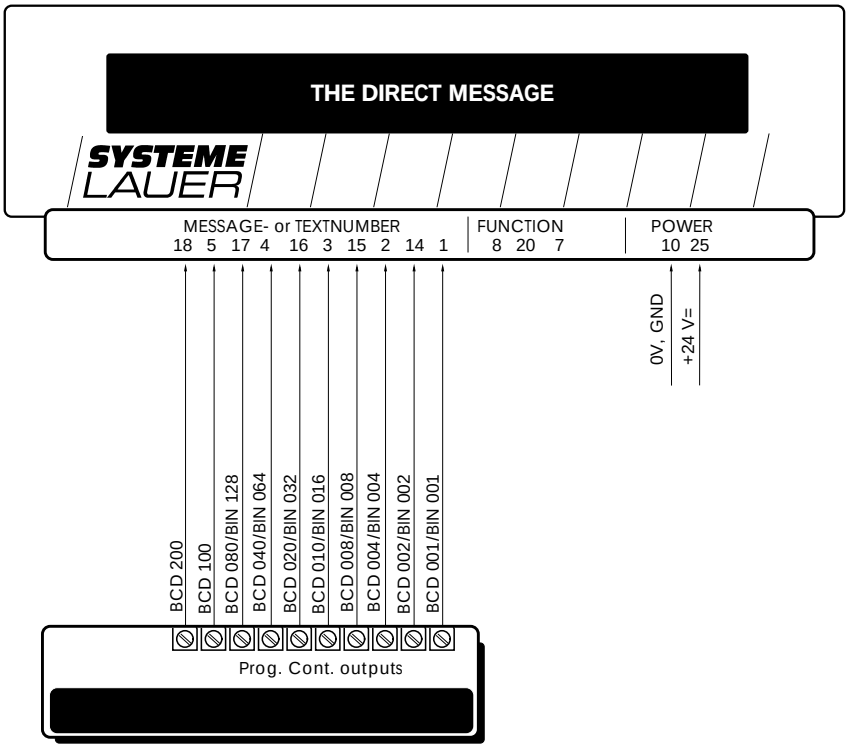
DIRECT MESSAGE
A message is invoked and displayed for as long as the coded message number is present on the LCA 042.

MULTI-LINE MESSAGE
If one line per message is not enough, then to each main message two additional messages, two additional lines, can be invoked with CLOCK.

FIRST MESSAGE
The LCA 042 displays the first message first, all other messages (max. 19) are registered in the order of their appearance in the message memory. The last two columns of the messa-ge line give information on the number of messages registe-red. These messages are invoked one after the other with CLOCK.

CYCLIC MESSAGE
All messages (max. 19) are registered in the message memory and displayed in rotation. The last two columns of the message line give information on the number of messages registered. The CLOCK must be at log 1 (+24V).

EXTERNAL VARIABLES
The LCA 042 can combine fixed texts with external variables. The number of variables and their position on the message line can be determined using place holders.



4.3.1 DIRECT MESSAGE

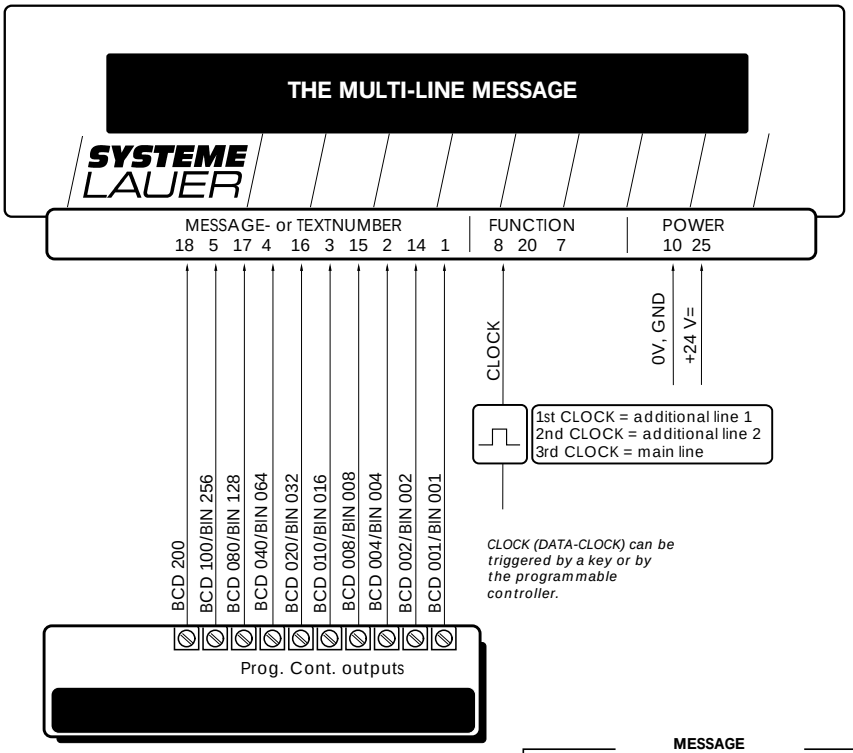
DIRECT/SEQUENTIAL	(7)	=	0 [1]
TEXT/VARIABLE	(20)	=	0
CLOCK	(8)	=	0

The simplest operating mode is the “direct message”. A message is displayed for as long as the coded message number is present on the LCA 042. The display changes analogously to the changing of the message number.

Message number 000 indicates that no message has been invoked.

TEXT DISPLAY LCA 042

1) log 0 = OV, open input
log 1 = +24 V
⎍⎍ = CLOCK



	MESSAGE							
	0	**1**	**2**	**3**		**63**	**64**	**65**
Main line	000	003	006	009		189	192	195
1st add. line	001	004	007	010	to	190	193	196
2nd add. line	002	005	008	011		191	194	197

4.3.2 MULTI-LINE MESSAGE

DIRECT/SEQUENTIAL	(7) =	0 [1]
TEXT/VARIABLE	(20) =	0
CLOCK	(8)	⎍

Multi-line messages consist of a main message and two addi-tional messages. For certain messages a multi-line display is advantageous, for example:

- to display message texts in three different languages
- to give information on the fault in the main message and information on fault elimination in the additional messa-ge
- to indicate an operation in the main message and adjust-ment values in the additional message.

The main message is always invoked using message num-ber (003)[2]. The two message numbers (004 + 005)[2] which follow this main message are reserved for the two addi-tional mes-sages. The additional messages are invoked simply with CLOCK.

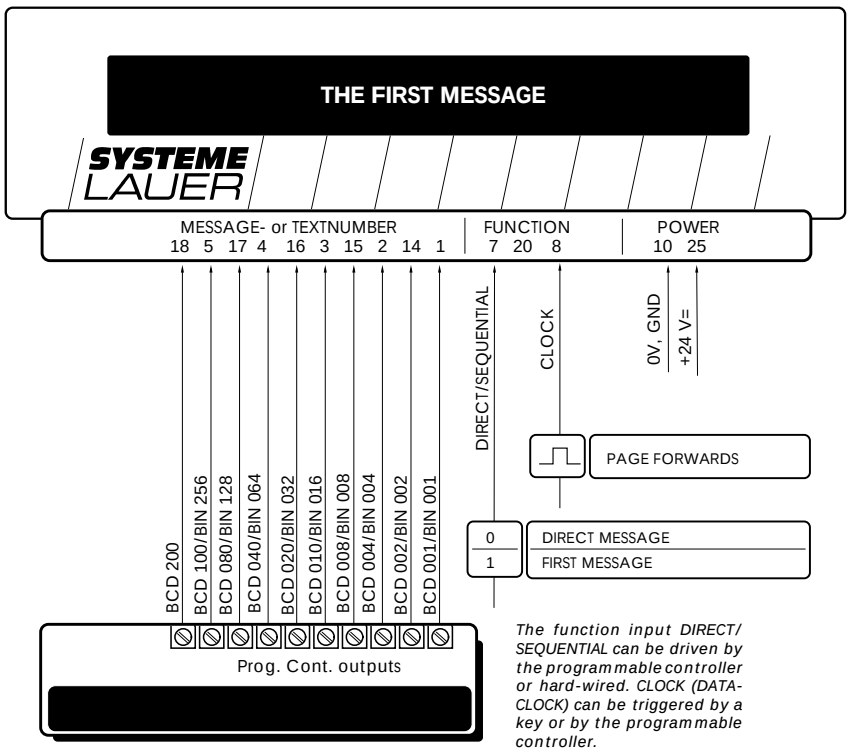
In this message variant each message occupies three lines. The LCA 042 can thus display a maximum of 65 x 3 messages. In principle the main line can be positioned using any messa-ge number pattern. It is however advan-tageous to use the allocation: **000, 003, 006 ...**

If a new message is invoked while the LCA 042 is displaying an additional message, the display of the addi-tional message is immediately stopped and the new main message dis-played.

1) log 0 = OV, open input
log 1 = +24 V
⎍ = CLOCK

2) Example

TEXT DISPLAY LCA 042



The function input DIRECT/ SEQUENTIAL can be driven by the programmable controller or hard-wired. CLOCK (DATA-CLOCK) can be triggered by a key or by the programmable controller.

4.3.3 FIRST MESSAGE

DIRECT/SEQUENTIAL	(7)	=	1 [1]
TEXT/VARIABLE	(20)	=	0
CLOCK	(8)	=	⎍

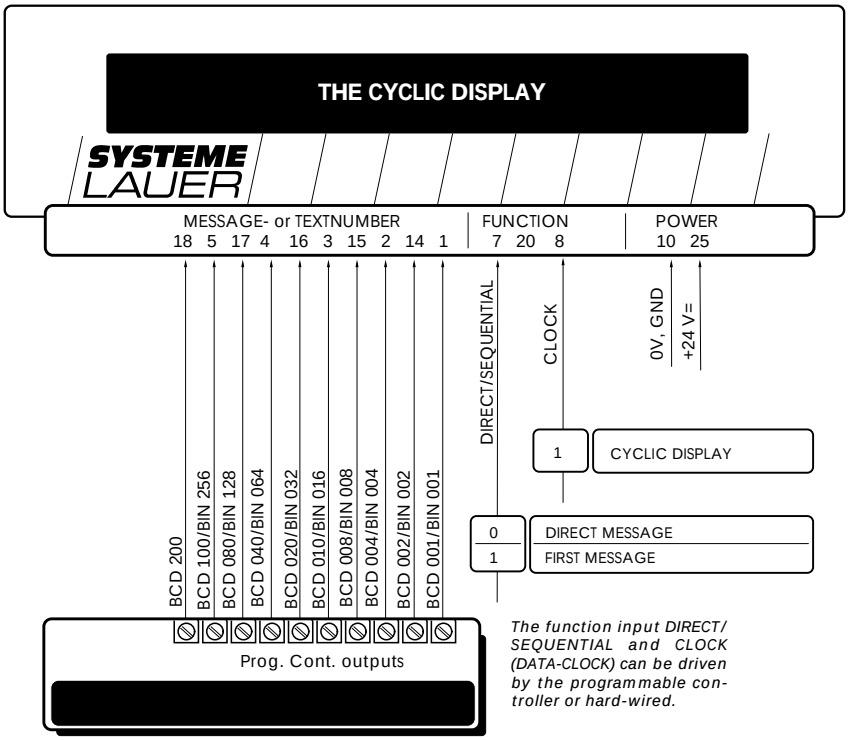
With this message variant the LCA 042 can register a maximum of 19 messages in the message memory.

All messages are stored one after the other and the first message is continuously displayed. The other messages can be invoked and displayed as often as desired with function input CLOCK.

When function input DIRECT/SEQUENTIAL becomes "logical 1", the registration of the messages begins. With a "logic 0" on the input the registration ends and the internal messa-ge memory is erased. The LCA 042 then displays the text of message number 000.

The message memory always registers the last 19 messages. Message 000 is not stored. CLOCK must not last longer than 2s, otherwise cyclic display will take place.

1) log 0 = OV, open input
log 1 = +24 V
⎍ = CLOCK



The function input DIRECT/ SEQUENTIAL and CLOCK (DATA-CLOCK) can be driven by the programmable controller or hard-wired.

4.3.4 CYCLIC DISPLAY

DIRECT/SEQUENTIAL	(7)	=	1 [1]
TEXT/VARIABLE	(20)	=	0
CLOCK	(8)	=	1

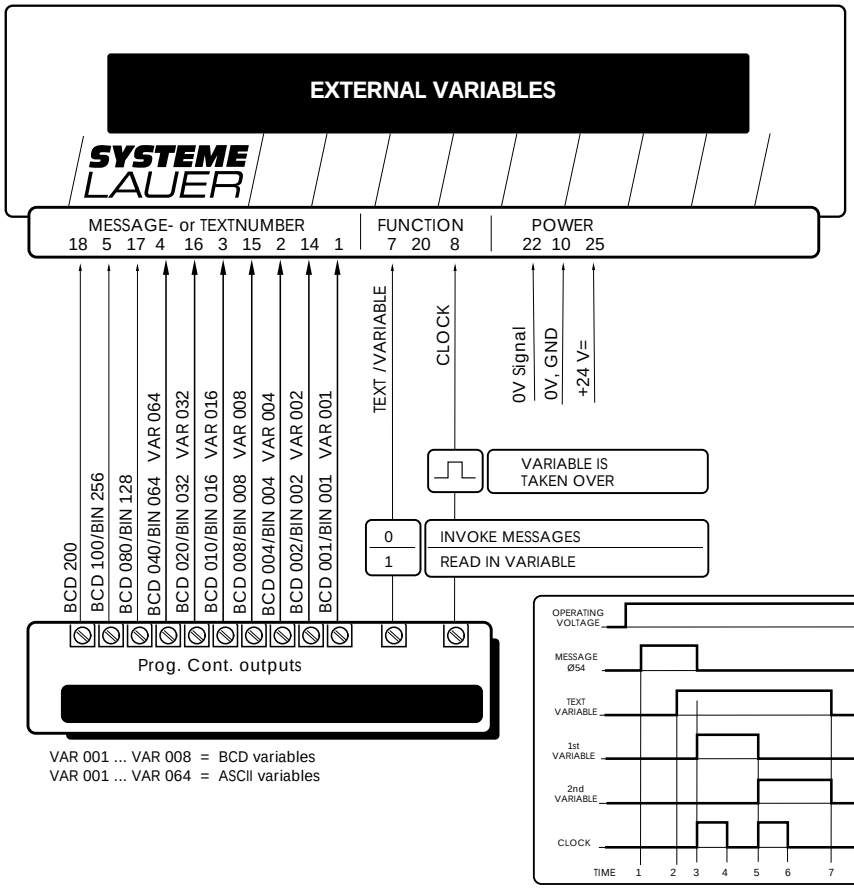
With this message variant the LCA 042 can register a maximum of 19 messages.

All messages are stored one after the other and are displayed cyclically.

When function input DIRECT/SEQUENTIAL becomes "logical 1", the registration of the messages begins. With a "logic 0" on the input the registration ends and the internal message memory is erased. The LCA 042 then displays only the text of message number 000 (information text).

The message memory always registers the last 19 messages. Each message is displayed for approx. 2.5s.

1) log 0 = OV, open input
log 1 = +24 V
⎍⎍ = CLOCK



VAR 001 ... VAR 008 = BCD variables
VAR 001 ... VAR 064 = ASCII variables

4.4 EXTERNAL VARIABLES

DIRECT/SEQUENTIAL	(7) =	0
TEXT/VARIABLE	(20) =	1
CLOCK	(8)	

External variables are pressures, temperatures, counter values etc. They can be read into any message text line. The variables in an invoked message can be updated as often as desired:

FOIL-TEMP = 85.4 °C (NOM-TEMP = 94.0 °C)

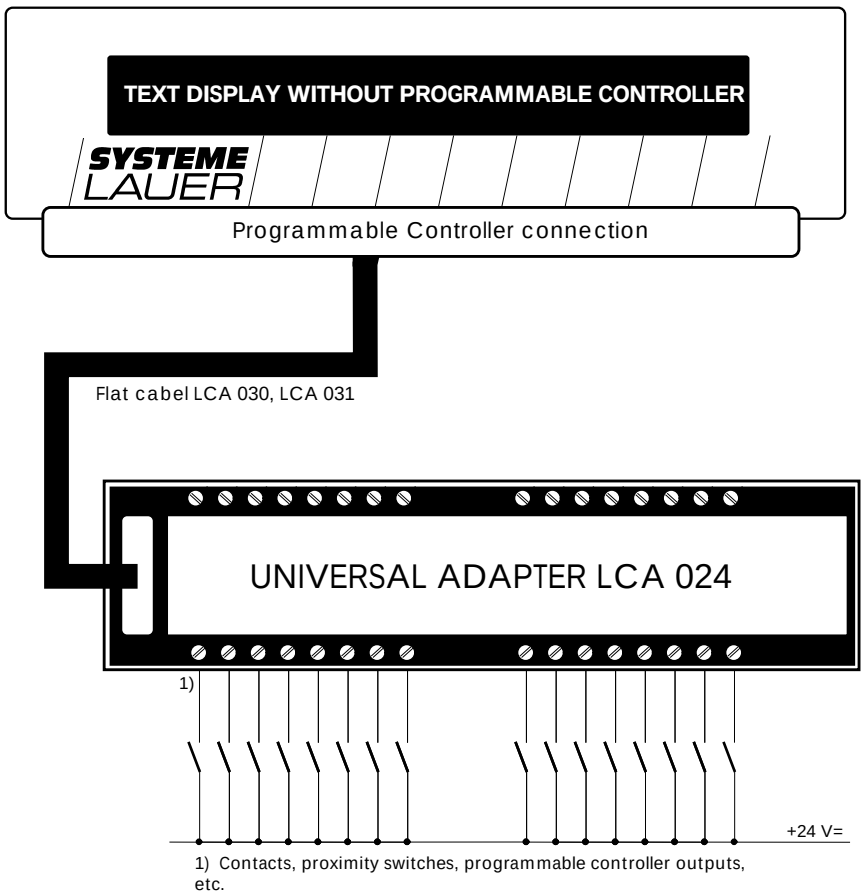
FOIL-TEMP = 96.0 °C (NOM-TEMP = 94.0 °C)

By means of place holders * (asterisks) you can determine the number and position of the variables in a text line:

FOIL-TEMP = ** * °C (NOM-TEMP = 94.0 °C)

A maximum of 40 external variables can be written into each text line.

TIME 1: The message 054 (for example) is invoked and displayed without variables (Time 1-2 **>= 74**ms)
TIME 2: The function input TEXT/VARIABLE is switched to variable (Time 2-3 **>= 21**ms)
TIME 3: The 1st variable is created, CLOCKed into the LCA042 in BCD/ASCII-code via the message inputs and displayed. The variables are written into the predetermined variable positions from left to right (Time 3-4 **>= 15**ms)
TIME 4: After the CLOCK there is an "idle time" (Time 4-5 **>= 15**ms)
TIME 5: The 2nd variable is created, CLOCKed into the LCA 042 in BCD/ASCII-code via the message inputs and displayed. The variables are written into the predetermined variable positions from left to right (Time 5-6 **>= 15**ms)
TIME 6: After the CLOCK there is an "idle time" (Time 6-7 **>= 15**ms)
TIME 7: The text is displayed with variables until time point 7



1) Contacts, proximity switches, programmable controller outputs, etc.

5.1 UNIVERSAL ADAPTER LCA 024/025

When text display LCA 042 can not be driven by a programmable controller, for example when used with conventional relay controllers, we recommend the use of the universal adapter LCA 024.

Up to 64 limit switches, proximity switches, relays and electronic outputs can be connected to the LCA 024. The text display and the universal adapter are organized in such a way that a “logical 1” on terminal 1 of the LCA 024 invokes message 01 in the text display. The same applies for inputs 3...64. **The terminal number corresponds to the message number. If logical 1 is present on several inputs simultaneously**, their messages can be displayed cyclically or invoked one after the other by means of a key.

If 64 message inputs are not enough, an extension up to 127 inputs is possible using universal adapter expander LCA 025.

For more detailed information see the description of the universal adapter.