LCD 54

User Interface

PROCESS-PLC

Operator's Manual

Jetter
Automation. Made easy.

Edition 1.1

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This Operator's Manual is an Integral Part of the LCD 54:

Type:

Serial No:

Year of construction:

Order No.:

To be entered by the customer:

Inventory #:

Place of operation:

Significance of these Operating Instructions

This manual is an integral part of the LCD 54 user interface, and

- must be kept in a way that it is always at hand until the LCD 54 user interface will be disposed of.
- if the LCD 54 user interface is sold, alienated or loaned, this manual must be handed over.

In any case you encounter difficulties to clearly understand the manual, please contact the manufacturer.
We would appreciate any kind of suggestion and contributions on your part and would ask you to inform us or the write us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

Unavoidable residual hazards for persons and material may result from the LCD 54 user interface. For this reason, any person who has to deal with the operation, transport, installation, maintenance and repair of the LCD 54 user interface must have been familiarised with it and must be aware of these dangers.
Therefore, this person must carefully read, understand and observe this manual, and especially the safety instructions.

Missing or inadequate knowledge of the manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

Table of Contents

Appendices

1   Safety Instructions

The LCD 54 user interface is in line with the current state of the art. This LCD 54 user interface complies w ith the safety regulations and standards in force. Special emphasis was given to the safety of the users.

Of course, the following regulations apply to the user:

* relevant accident prevention regulations;
* accepted safety rules;
* EC guidelines and other country-specific regulations.

Usage as Agreed Upon

Usage as agreed upon includes operation in accordance with the operating instructions.
The LCD 54 user interface is designed and permitted for operation in connection with the electric cabinet only. The LCD 54 only works together with a PROCESS-PLC by Jetter AG. The user interface LCD 54 serves to control machinery such as dosing and hardening equipment, stage technique and logistic centres.

Usage Other Than Agreed Upon

The LCD 54 user interface must not be used in technical systems which to a high degree have to be fail-save, e.g. ropeways and aeroplanes. If the LCD 54 user interface is to be run under operating conditions, which differ from the conditions mentioned in chapter4, page18, the manufacturer is to be contacted beforehand.

Who is Permitted to Operate the LCD 54 User Interface

Only instructed, trained and authorised persons are permitted to operate the LCD 54 user interface.
Mounting and backfitting may only be carried out by specially trained personnel, as specific know-how will be required.

Maintaining the LCD 54 User Interface

The LCD 54 user interface is maintenance-free. Therefore, no inspection or maintenance are required for the operation of the module .

Decommissioning and Disposing of the LCD 54 User Interface

Decommissioning and disposing of the LCD 54 user interface are subject to the environmental legislation of the respective country in effect for the operator's premises.

Description of Symbols

This sign is to indicate a possible impending danger of serious physical damage or death.

Danger

This sign is to indicate a possible impending danger of light physical damage. This sign is also to warn you of material damage.

Caution

This sign is to indicate a possible impending situation which might bring damage to the product or to its surroundings.

Important!

This sign is to indicate an application, e.g installation, and other useful information.

Note!

. / -   Enumerations are marked by full stops, strokes or scores.

Operating instructions are marked by this arrow.

Automatically running processes or results to be achieved are marked by this arrow.

0   Keys on the user interface.

Ensure Your Own Safety

Isolate the LCD 54 user interface or the PROCESS-PLC from the mains, if maintenance works have to be carried out. By doing so, you will prevent accidents resulting from electric voltage and moving parts.

Modifications and Alterations to the Module

- For safety reasons, no modifications and changes to the LCD 54 user interface and its functions are permitted. Any modifications to the LCD 54 user interface not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.

- The original parts are specially designed for the LCD 54 user interface . Parts and equipment of other manufacturers are not tested on our part, and are, therefore, not released by us. The installation of such parts may impair the safety and the proper functioning of the LCD 54 user interface .

- For any damages resulting from **usage other than agreed upon**, e.g. the use of non original parts and equipment, any claims with respect to liability of Jetter AG are excluded.

Malfunctions

➢ Malfunctions or other damages are to be reported to an authorised person at once.

➢ Safeguard the LCD 54 user interface against misuse or accidental use.

➢ Only qualified experts are allowed to carry out repairs.

➢ Safety and protective devices, e.g. the barrier and cover of the terminal box must not in any case be shunted or by-passed.

➢ Dismantled safety devices must be reattached prior to commissioning and checked for proper functioning.

Information Signs and Labels

➢ Writings, information signs, and labels always have to be observed and kept readable.

➢ Damaged or unreadable information signs and labels are to be exchanged.

Instructions on EMI

The noise immunity of a system corresponds to the weakest component of the system. For this reason, correct wiring and shielding of the cables is important.

Important!

Measures for increasing immunity to interfering in electric plants:

➢ Only use **originally shielded cables**, especially as bus cables.

➢ Shielding must be done on both ends of the applicable cables.

➢ The **entire** shield must be drawn behind the isolation, and then be clamped under a strain relief with the **greatest possible surface area**.

➢ When **connecting the signal line to the terminal block** it is important that the strain relief is directly connected to a grounded surface with the greatest possible surface area.

➢ When **using connectors**, metallised connectors are to be used only, e.g. SUB-D connectors with metallised housing according to Abb. 1. Make sure that the strain relief is directly connected with the housing here as well.

**Male/Female SUB-D Connectors (9, 15 or 25 pins) with Metallised Housing.**
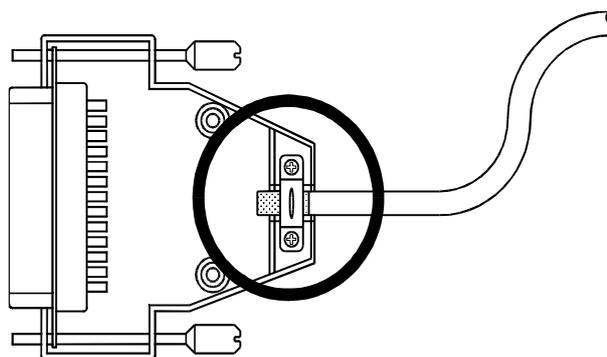
Fig. 1: Shielding in conformity with the EMC standards

Important!

To avoid malfunctions the following must be ensured:

➢ The shielding must be extensively clamped under a strain relief.

➢ The distance between unshielded conductor ends must be as short as possible.

Residual Dangers

Hazards during Operation

Danger resulting from electric shock!

If the LCD 54 is not connected-up correctly or is not isolated from the mains, for example during installation, maintenance, and repair, you can get an electric shock. Please observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill, and possibly death:

➢ Isolate the LCD 54 from the mains (pull out the mains plug) when working on the control system.

➢ Do not touch the female connectors during operation.

➢ Have works on the electric and electronic system performed by qualified personnel only.

2   Installing the User Interface

Scope of Delivery

- LCD 54 user interface
- Operator's manual

Installation Steps

➢ Please check the delivery package for completeness; check the LCD 54 for possible damages.

➢ Connect the LCD 54 user interface to your control system (LCD port) with the user interface cable.

➢ Connect the four wires of the user interface cable with the emergency safety relay.

➢ Connect the control system, e.g. a NANO-B to your computer with the programming cable EM-PK.

➢ Activate the control system and transfer a SYMPAS program, for example, from your computer to your PROCESS-PLC.

➢ Check the function of the control system and the function of the emergency safety relay; also refer to the description on page 14.
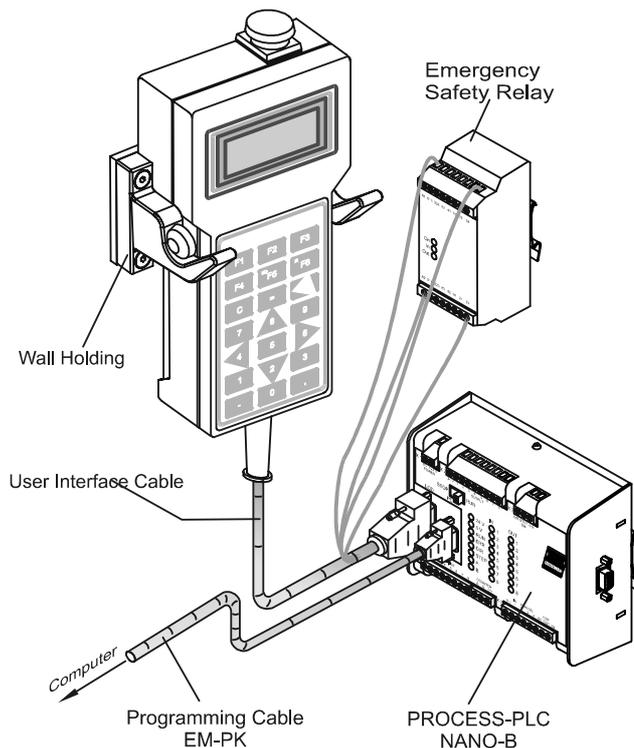

Fig. 2: Example: Connection of LCD 54 with PROCESS-PLC NANO-B

Mounting and Startup Accessories (not included in the scope of delivery)

- Programming cable EM-PK, 0.5 m, 2.5 m or 5 m
- Wall mounting LCD 54-H
- Computer
- PROCESS-PLC
- Emergency safety relay

Troubleshooting

➢ Check whether the programming cable EM-PK and the user interface cables are connected properly according to the manual.

➢ Check the function of the user interface with your control system.

Notes on Safety as regards the Installation

Danger resulting from electric shock!

If the digital LCD 54 user interface is not isolated from the mains, for example during installation, maintenance, and repair, you can get an electric shock. Please observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill, and possibly death:

➢ Have works on the electric and electronic system performed by qualified personnel only.

➢ Isolate the LCD 54 from the mains (pull out the user interface cable) when working on the control system.

➢ **Prior to commissioning, do the following:**

- Reattach dismantled safety equipment and check it for proper functioning.

- Secure the LCD 54 against accidental contact with conductive parts and components.

- Only connect units or electric components with the signal lines of the LCD 54 user interface when they are insulated properly against the connected electric circuit.

- Establish a permanent connection from the LCD 54 to the PROCESS-PLC and to the emergency safety relay with the user interface cable , see Abb. 2, Seite 12.

Important

Never plug or unplug **the user interface cable** of the LCD 54 **when** the **controller is switched on**.
Doing so could damage the LCD 54 unser interface.
Therefore, only carry out installation and maintenance work at the LCD 54 user interface when the controller is isolated from the mains.

Emergency Safety Relay

If the emergency safety relay has not been activated, the two different NCCs are closed. If the emergency safety relay button is pressed, the two connections (brown-blue and white-black) will be interrupted.
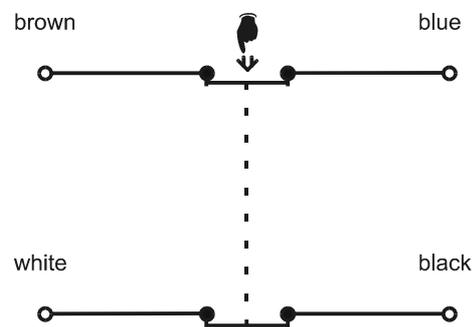

Fig. 3: Emergency Stop of the LCD 54

3   Setup in Multi-Display Mode
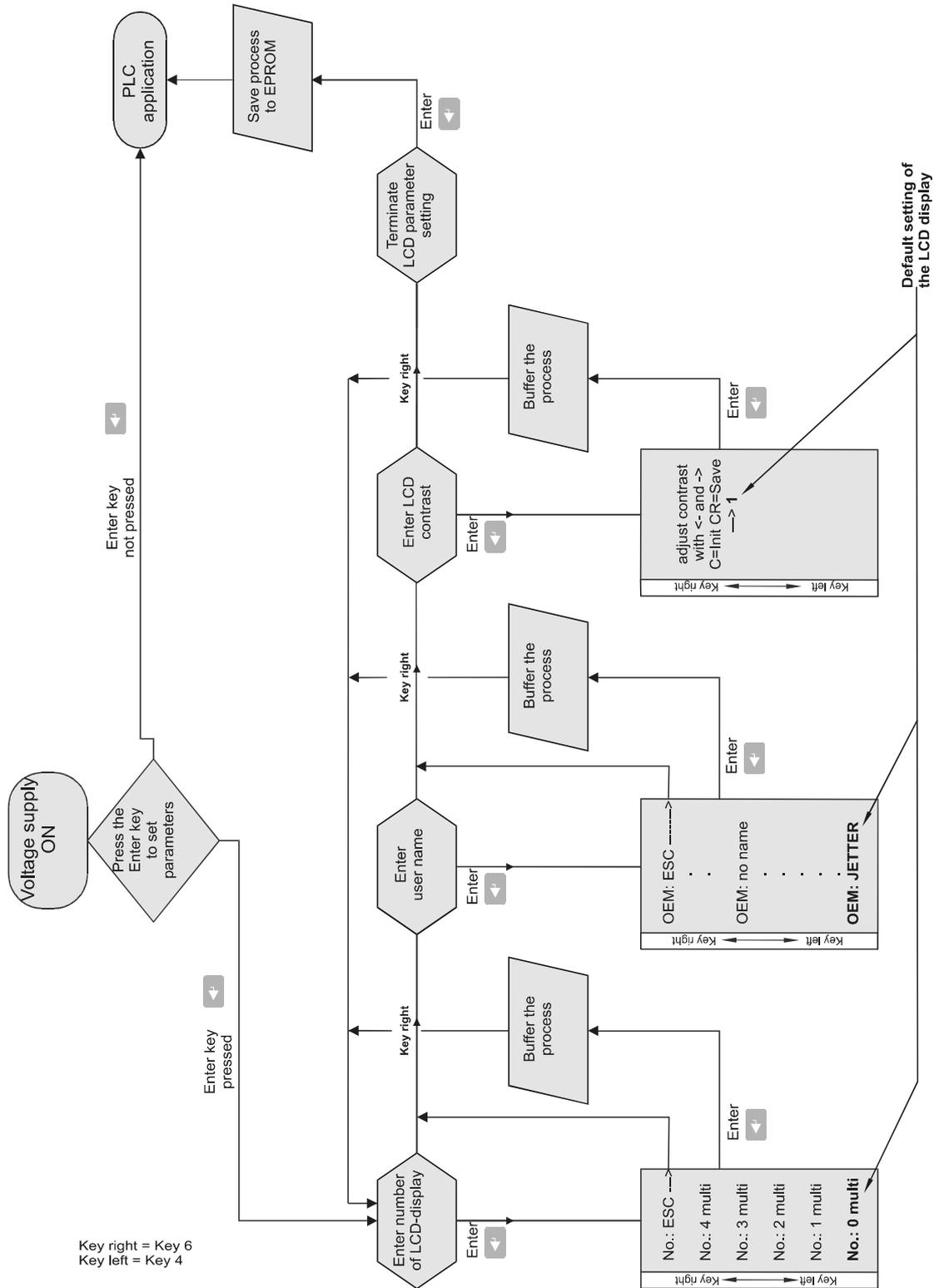
Fig. 4: Flow Chart: LCD Parameterizing

With the help of the multi-display mode, up to four LCD user interfaces can be operated by a PROCESS-PLC of the NANO-A, NANO-B, NANO-C, DELTA or any other type of an automation control by which the pcom5 protocol can be processed. During processing, either identical or different texts and/or register contents can be displayed.

> The parameters of the LCD 54 user interface must be entered according to the flow chart shown on Abb. 4, Seite 15.

> Each LCD user interface must be assigned its individual number.

> If there is only one LCD user interface, value 0 will always have to be assigned.

> If there are more than one LCD user interfaces, each LCD user interface must be assigned a value between 1 and 4 in ascending order; there must always be a display number 1.

The display that has been assigned number 1 is the master LCD. After power up, only the first LCD user interface will be synchronized with the PROCESS-PLC. The other LCDs will remain deactivated, until they are given command signals.

Note!

Simultaneous function of both user input and monitor mode is only possible on one display.

Note!

- Voltage for more than one LCD user interfaces cannot be supplied any more with the help of the controller only.
- For voltage supply of the LCD user interfaces, an individual power supply unit of a voltage of DC 15 V to DC 30 V must be used.
- For each LCD 54 user interface, a power consumption of approximately 400 mA must be expected.
- For connecting more than one user interfaces to the LCD port of the PROCESS-PLC, either an adapter or modified connection cables will be needed.
- Different from the standard design, the connection cables must be altered according to Abb. 5, Seite 17 .

Note!
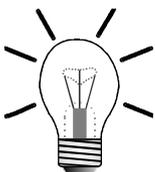
In multi-display mode, only LCD devices that have been equipped with an RS 422 interface can be used.
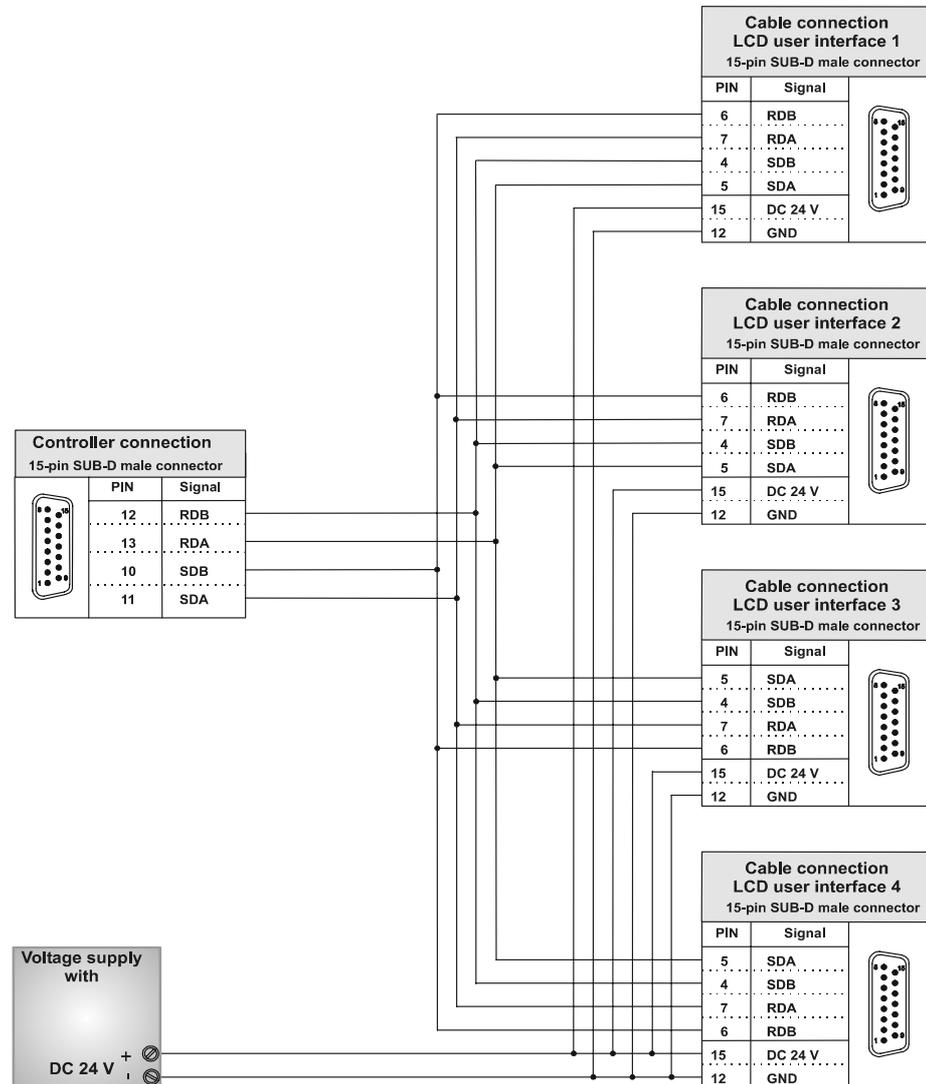
Fig. 5: PIN Assignment of the Connection Cables for More than One LCD User Interfaces

Important!

- When fabricating the connection cable, the following minimum requirements for EMC conformity apply:

  1. Number of cores: 6
  2. Core cross-sectional area: 0.25 mm²
  3. Connector (male):   Sub-D, metallised
  4. Maximum cable length: 10 m
  5. Shield: complete shielding, no paired shielding

- The shield must be connected to the metallised connector housings on both ends of the cable with the greatest possible surface area.

4   Operating Conditions

Environmental Operating Parameters

Parameters:	Value	Reference
Operating Temperature Range	0 °C up to +50 °C with max. 3 K/min	
Storage Temperature Range	-10 °C (max. 48 h) up to +70 ° C (max. 168 h)	DIN EN 60068-2-1 DIN EN 60068-2-2
Air Humidity / Humidity Rating	5 % to 90 %, no condensation	
Pollution degree	II	DIN EN 61131-2
Corrosion Immunity/ Chemical Resistance	No special protection against corrosion. Ambient air must be free from higher concentrations of acids, alcaline solutions, corrosive agents, salts, metal vapours, or other corrosive or electroconductive contaminants.	
Operating Altitude	max. 2000 m above sea level	DIN EN 61131-2

Mechanical Operating Parameters

Parameters:	Value	Reference
Free Falls Withstanding Test	Height of fall (units within packing): 1 m	DIN EN 60068-2-32
Vibration resistance	0.5 g constant acceleration for continuous operation, all 3 spatial axes	Technical data of the LCD display
Shock resistance	3 g occasionally, all 3 spatial axes	Technical data of the LCD display
Protective system	IP 65	EN 60529

Electrical Safety Operating Parameters

Parameters:	Value	Reference
Category of protection	III	DIN EN 61131-2
Overvoltage Category	II	DIN EN 50178

EMC - Emitted Interference Operating Parameters		
Parameters:	**Value**	**Reference**
Housing	• Frequency band 30 MHz to 230 MHz, limit 30 dB (μV/m) at 10 m distance • Frequency band 230 MHz to 1000 MHz, limit 37 dB (μV/m) at 10 m distance (class B)	DIN EN 50081-1 DIN EN 50081-2 DIN EN 55011

| EMC - Immunity to Interference Operating Parameters		
Interference Immunity: Enclosure		
Parameters:	**Value**	**Reference**
Electromagnetic RF field, amplitude modulated	Frequency band 27 -1000 MHz; test signal strength 10 V/m AM 80 % with 1 kHz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-3
Magnetic Field with Mains Frequency	50 Hz 30 A/m	DIN EN 61000-6-2 DIN EN 61000-4-8
ESD	Discharge through air: Test peak voltage 15 kV (Humidity Rating RH-2 / ESD-4) Contact discharge: Test peak voltage 4 kV (severity level 2) Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-2
Interference Immunity: Signal Ports		
Parameters:	**Value**	**Reference**
Asymmetric RF, amplitude-modulated	Frequency 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 Ω Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 1 kV tr/tn 5/50 ns Repetition rate 5 Hz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-4

5   Physical Dimensions
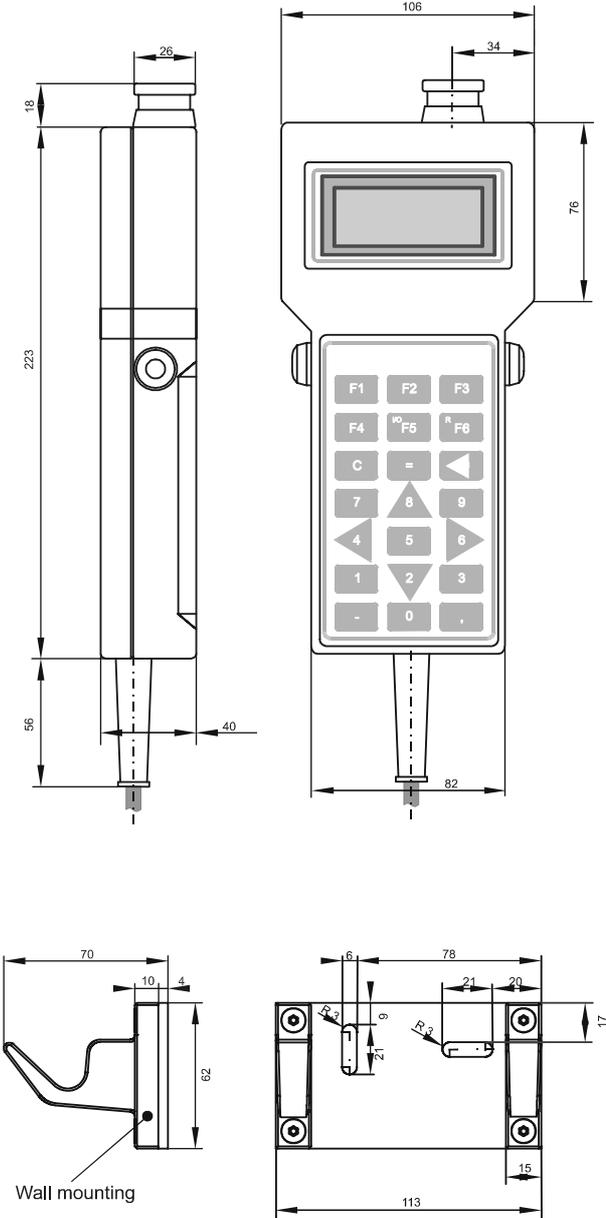
Fig. 6: Physical Dimensions of the LCD 54

6   Technical Data

General and Mechanical Specification	
Height	241 mm
Width	106 mm
Depth	40 mm
Screen Size	62 mm x 25 mm
Number of lines	4
Number of characters per line	16
Character height	4.74 mm
Load	app. 413 g
Keys	• 8 function keys • 15 entry keys
Touch pad pannel:	
Lifetime of the keys	> 1 Mio. operations
Switching pressure	3 N
Contact areas	Gold-coated snap connections
Cable:	
Cable length	3 m (shielded)
Cable material	LIYCY 6 x 0.25 mm² and 4 x 0.5 mm²
Colour of the cable / special features	RAL 7032, apt for drag chains

Electrical Specification	
Power supply	DC 24 V (12 V... 30 V) via the 15-pin user interface cable **Siehe hierzu "Note!"**
Power consumption	– max. 400 mA – 325 mA at 24 V and 20 °C
Display	LCD FSTN smartfluid technology with background lighting
Contrast	Dependent on the temperature, it will be compensated automatically.
Interfaces	15-pin SUB-D connectors: RS422
Emergency Stop Relay:	
Nominal voltage	max. AC/DC 25 V
Continuous rated current	max. 100 mA
Actuating force	max. 10 N
Mechanical stop resistance	> 100 N
Lifetime	> 1.5 x 100000 switching voltage
Chatter time	10 ms
Contact system	Snap-action contact, 2 NCCs (automatic disconnection)

Note!

Disconnection from the power supply leads to a reset of the LCD 54 user interface.

7   Display and Key Functions

The function keys are user-programmable.. They are used to display masks and/or activate control functions.

Flag Assignment of Keys			
Flag	**Key**	**Flag**	**Key**
2201	F1	2161	1
2202	F2	2162	2
2203	F3	2163	3
2204	F4	2164	4
2216	I/O F5	2165	5
2215	R F6	2166	6
2207	Permissive key left	2167	7
2208	Permissive key right	2168	8
2218	C	2169	9
2217	=	2220	-
2219	←	2222	,
2160	0		
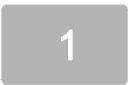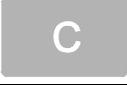
Note!

Extensive information on the use of the monitor mode for configuring the registers
and flags can be taken from the operator's instruction of the NANO-A, the NANO-
B, NANO-C, DELTA or of any other controller that is being used.

Important!

In order to avoid malfunctions and damage of the device,

⮞   the *monitor mode must be inaccessible during the operation of the
         LCD.* The state of the PROCESS-PLC can be changed in the monitor
         mode. This way, it is possible, for example, to set outputs or to write
         into flags and registers during operation.

Note!

Please mind the characteristic feature of your PROCESS-PLC, which occurs in
the battery-buffered flag range of the keypad:

• The flags assigned to the keys are not automatically reset when the LCD 54 is
  switched on.

• When the LCD 54 is switched off while pressing a function key, the respective
  flag is set in the PROCESS-PLC when the LCD 54 is switched on again. This
  applies whether the respective key is pressed or not.

• In order to reset the flags assigned to the keys you can use e.g. the instruction
  at the beginning of a SYMPAS program
  `CLEAR_FLAGS [2201 to 2222].`

• Only use flags, e.g. in a SYMPAS program, that are not assigned to the
  reserved flags of the LCD 54 keys.

• The F5 and the F6 key can only be used, if the monitor mode of the respective
  controller has been deactivated.

Appendices

Appendix A: Glossary

Baud rate	1 Baud = 1 signal change per second. The baud rate is the number of signal changes that occur in one second, not the number of bits per second transmitted.
DELTA	PROCESS-PLC by Jetter AG
Electromagnetic Compatibility (EMC)	Definition according to the EMC regulations: "EMC is the ability of a device to function in a satisfactory way in electromagnetic surroundings without causing electromagnetic disturbances itself, which would be unbearable for other devices in these surroundings."
Flag	1 bit storage position for intermediate results which are required for linkage purposes. The state of the bit is either 0 or 1.
monitor mode	With the help of this function, registers, I/Os etc. can be monitored and changed during operation.
NANO-A, NANO-B, NANO-C	PROCESS-PLC by Jetter AG
pcom5	Communication protocol of Jetter AG
Process	A program or a part of it. A related sequence of steps carried out by program.
PROCESS-PLC	Advanced control system of the JETTER AG in contrast to the conventional programmable logic controller.
Register	A high-speed memory for a group of bits placed in a microprocessor or in another electronic device where data can be buffered for a specific purpose. On JETTER controllers, usually, these are 24 bit wide storage positions in a remanent RAM.

Appendix B: List of Abbreviations

DC	**D**irect **C**urrent: Direct current
DIN	**D**eutsches **I**nstitut für **N**ormung = German Industry Standard
EMC	**E**lectro **M**agnetic **C**ompatibility
FSTN	**F**ilm **S**uper **T**wisted **N**ematic
Gnd	**G**rou**nd**: Ground
Hz	Hertz
I/O	**I**nput/**O**utput: "Input/Output"
IEC	**I**nternational **E**lectrotechnical **C**ommission: "International Electrotechnical Commission"
IP	**I**nternational **P**rotection
LC	**L**iquid **C**rystal: "Liquid Crystal"
LCD	**L**iquid **C**rystal **D**isplay: "Liquid Crystal Display"
LED	**L**ight-**E**mitting **D**iode: "Light-emitting diode"
NN	**N**ormal **N**ull = Sea Level
PE	Protective Earth
RDA	Receive Data A: The first differential channel of the RS 422 interface
RDB	Receive Data B: The second differential channel of the RS 422 interface
RS 232	An accepted industry standard for serial data transmission.**RS**: **R**ecommended **S**tandardFor line lengths under 15 m. No differential evaluation. Transmitting and receiving on different lines.
RS 422	For line lengths over 15 m. Two differential evaluations each. Transmitting and receiving on different lines.
RXD	Receive (**RX**) **D**ata: "Receive Data"A line used to carry received serial data from one device to another.
SDA	**S**end **D**ata **A**: The first differential channel of the RS 422 interface
SDB	**S**end **D**ata **B**: The second differential channel of the RS 422 interface
PLC	**P**rogrammable **L**ogic **C**ontroller
SUB-D	Type designation of connectors
TXD	Transmit (**TX**) **D**ata: "Transmit data" A line used to transmit received serial data from one device to another; e.g. from a computer to a modem.

Appendix C: List of Illustrations

Appendix D: Index

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