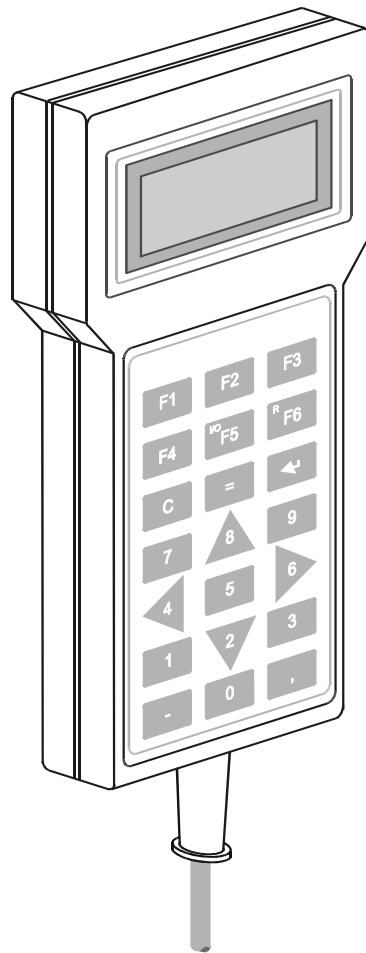


LCD 52

User Interface



PROCESS-PLC

Operator's Manual



Edition 1.1

Jetter AG reserves the right to make alterations to its products in the interest of technical progress. These alterations need not be documented in every single case.

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This Operator's Manual is an Integral Part of the LCD 52:

Model: _____
Serial No: _____
Year of Manufacture: _____
Order No.: _____



To be entered by the customer:

Inventory No: _____
Place of operation: _____

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Significance of this Operator's Manual

This manual is an integral part of the LCD 52 user interface, and

- must be kept in a way that it is always at hand until the LCD 52 user interface will be disposed of.
- If the LCD 52 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 suggestions and contributions on your part and would ask you to contact 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 52 user interface. For this reason, any person who has to deal with the operation, transport, installation, maintenance and repair of the LCD 52 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.

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1 Safety Instructions

The LCD 52 user interface is in line with the current state of the art. The LCD 52 user interface complies with the valid safety regulations and standards. 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 52 user interface is designed and approved for operation in an electric cabinet only. The LCD 52 only works together with a PROCESS-PLC by Jetter AG. The user interface LCD 52 serves to control machinery such as dosing and hardening equipment, stage technique and logistic centres.

Usage Other Than Agreed Upon

The LCD 52 user interface must not be used in technical systems which to a high degree have to be fail-safe, e.g. ropeways and aeroplanes. If the LCD 52 user interface is to be run under operating conditions, which differ from the conditions mentioned in chapter 4, page 18, the manufacturer is to be contacted beforehand.

Who is Permitted to Operate the LCD 52 User Interface?

Only instructed, trained and authorised persons are permitted to operate the LCD 52 user interface.

Mounting and backfitting may only be carried out by specially trained personnel, as specific know-how will be required.

Maintaining the LCD 52 User Interface

The LCD 52 user interface is maintenance-free. Therefore, no inspection or maintenance are required for the operation of the module.

Decommissioning and Disposing of the LCD 52 User Interface

Decommissioning and disposing of the LCD 52 user interface are subject to the environmental legislation of the respective country in effect for the operator's premises.

Description of Symbols



Danger

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



Caution

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



Important

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



Note

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



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.



Keys on the user interface.

Ensure Your Own Safety

Isolate the LCD 52 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 52 user interface and its functions are permitted. Any modifications to the LCD 52 user interface not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.
- The original parts are specifically designed for the LCD 52 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 52 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 immediately.
- Safeguard the LCD 52 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 interference:

- Only use **originally shielded** cables as bus cables.
- Both sides of the cables must be shielded.
- 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 Fig. 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

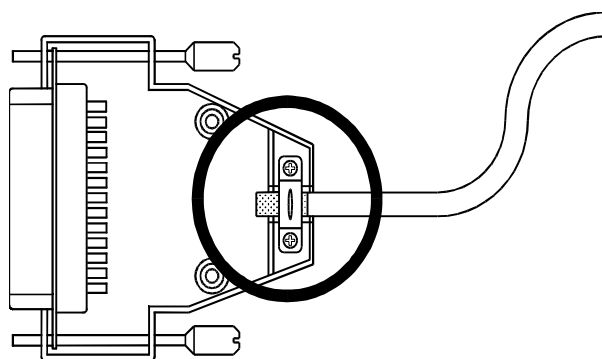


Fig. 1: Shielding in Conformity with EMC Standards



Important!

To avoid malfunctions the following must be ensured:

- The shielding must be clamped under a strain relief with the greatest possible surface area.
- 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 52 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 52 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 52 User Interface
- Operator's Manual

Installation Steps

- Please check the delivery package for completeness and make sure that the LCD 52 is not damaged.
- Connect the LCD 52 user interface to your control system (LCD port) with the user interface cable.
- Connect the control system, for example a NANO-B, to your computer with the programming cable EM-PK.
- Activate the control system and load a program, for example a SYMPAS program, from your computer to your PROCESS-PLC.
- Check the function of the control system.

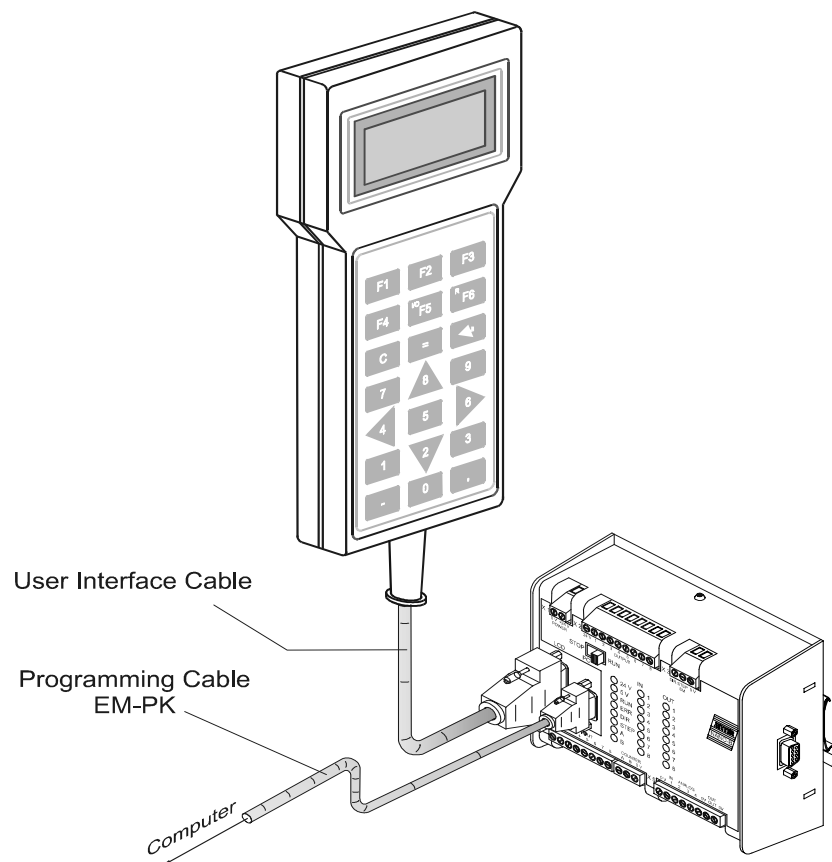


Fig. 2: Example: Connection of LCD 52 with PROCESS-PLC NANO-B

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 holder LCD 52-H
- Computer
- PROCESS-PLC

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 52 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 52 from the mains (pull out the user interface cable) when working on the control system.
- **Prior to commissioning, please do the following:**
 - Reattach dismantled safety equipment and check it for proper functioning.
 - Secure the LCD 52 against accidental contact with conductive parts and components.
 - Only connect units or electric components with the signal lines of the LCD 52 user interface when they are insulated properly against the connected electric circuit.
 - Establish a permanent connection from the LCD 52 to the PROCESS-PLC with the user interface cable DK-422, see Fig. 2, page 12.



Important

Never plug or unplug the user interface cable of the LCD 52 when the controller is switched on.

Doing so could damage the LCD 52 user interface.

Therefore, only carry out installation and maintenance work at the LCD 52 user interface when the controller is isolated from the mains.

3 Setting Up the User Interface in Multi-Display Mode

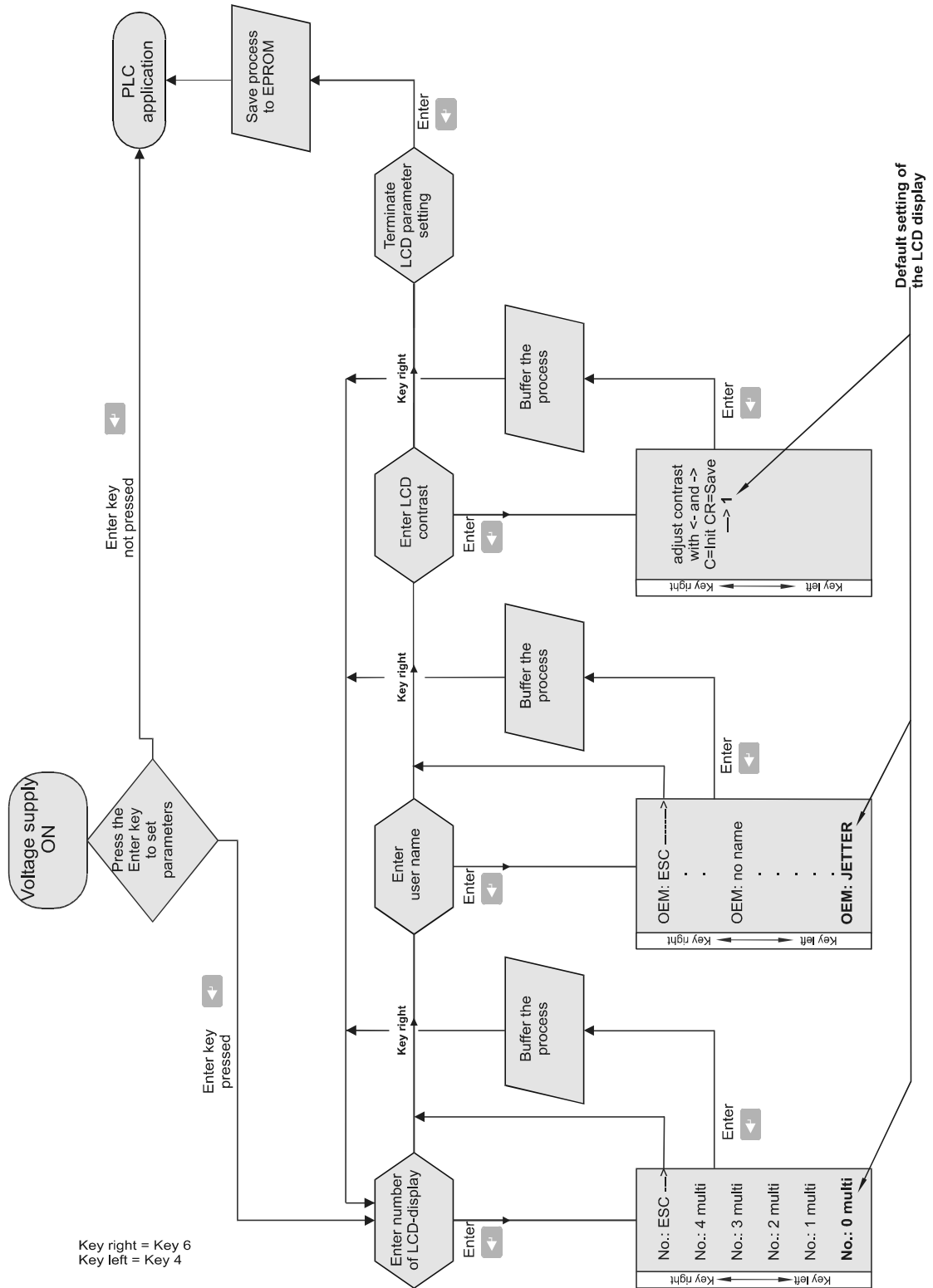


Fig. 3: Flow Chart of LCD Parameterizing

By means 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 which is able to process the pcom5 protocol. Identical or different texts and/or register contents can be displayed.

- The parameters of the LCD 52 user interface are to be entered as shown in the flow chart on Fig. 3, page 15.
- An individual number must be assigned to each LCD user interface.
- If only one LCD user interface is used, value 0 is always assigned.
- If more than one LCD user interface is used, a value in ascending order between 1 and 4 is assigned to each LCD user interface; a display with the number 1 is obligatory.

The display with number 1 is the master LCD. After power up, only the first LCD user interface is synchronized with the PROCESS-PLC. The other LCDs remain inactive until they receive command signals.

Note!



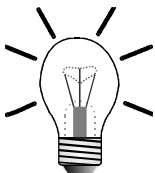
Simultaneous function of both user input and monitor mode is only possible on one display.

Note!



- The voltage for several LCD user interfaces cannot be supplied anymore from the controller only.
- Therefore, the LCD user interfaces need to be supplied by a separate power supply with a DC voltage of 15 V to 30 V.
- Each LCD 52 user interface has a current consumption of about 200 mA.
- An adapter or modified connection cables are necessary to connect several user interfaces to the LCD interface of the PROCESS-PLC.
- Different from the standard design, the connection cables must be altered, see Fig. 4, page 17.

Note!



Only user interfaces with RS 422 interface can be used in multi-display mode.

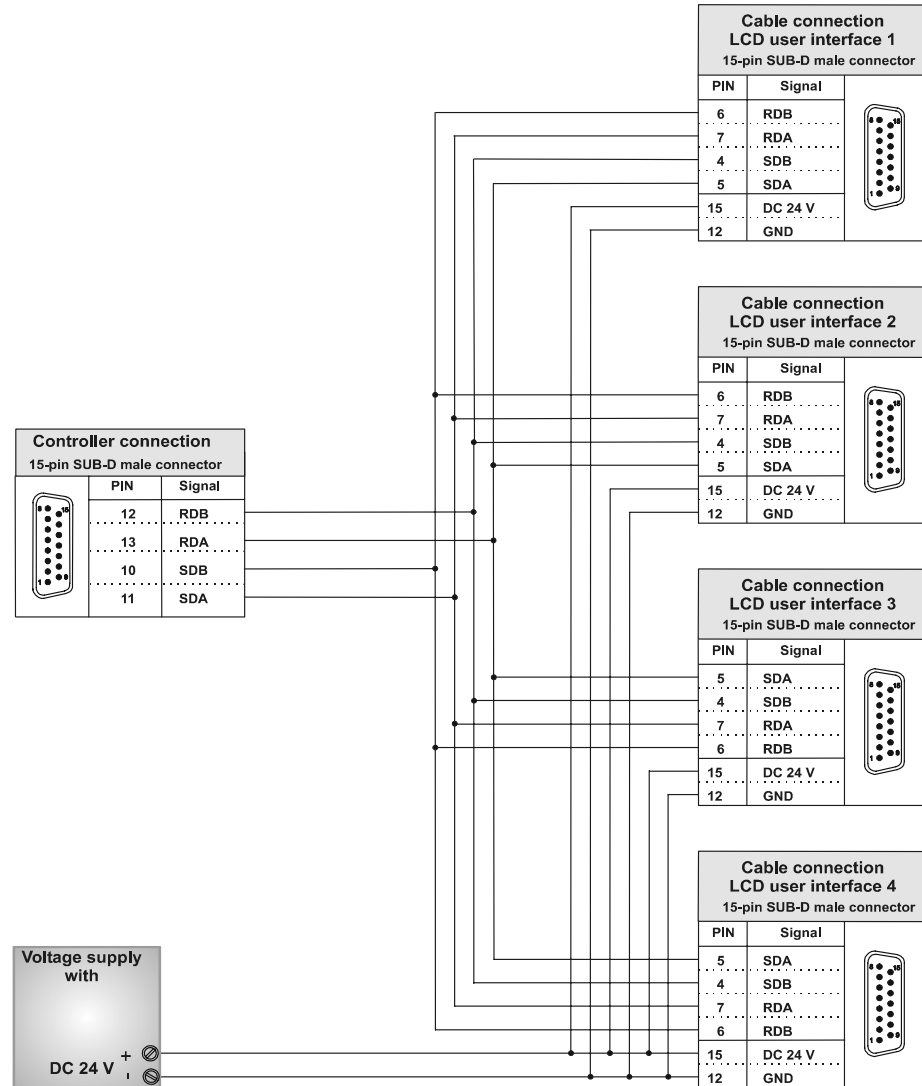


Fig. 4: PIN Assignment of the Connecting Cable for Several LCD User Interfaces



Important!

- When fabricating the connecting cable, the following minimum requirements apply (also for EMC):
 1. Number of cores: 6
 2. Core cross-sectional area: 0.25 mm²
 3. Connector (male): Sub-D, metallised
 4. Max. cable length: 100 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		
Parameter	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 %, non-condensing	
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, alkaline 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		
Parameter	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 3 g occasionally, all 3 spatial axes	Technical Data of the LCD Display
Degree of Protection	IP 65	EN 60529
Mounting Position	unassigned	

Electrical Safety Operating Parameters		
Parameter	Value	Reference
Protection Class	III	DIN EN 61131-2
Overvoltage Category	II	DIN EN 50178

EMC - Emitted Interference Operating Parameters		
Parameter	Value	Reference
Enclosure	<ul style="list-style-type: none"> Frequency band 30 MHz to 230 MHz, limit 30 dB ($\mu\text{V}/\text{m}$) at 10 m distance Frequency band 230 MHz to 1000 MHz, limit 37 dB ($\mu\text{V}/\text{m}$) 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		
Parameter	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		
Parameter	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	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

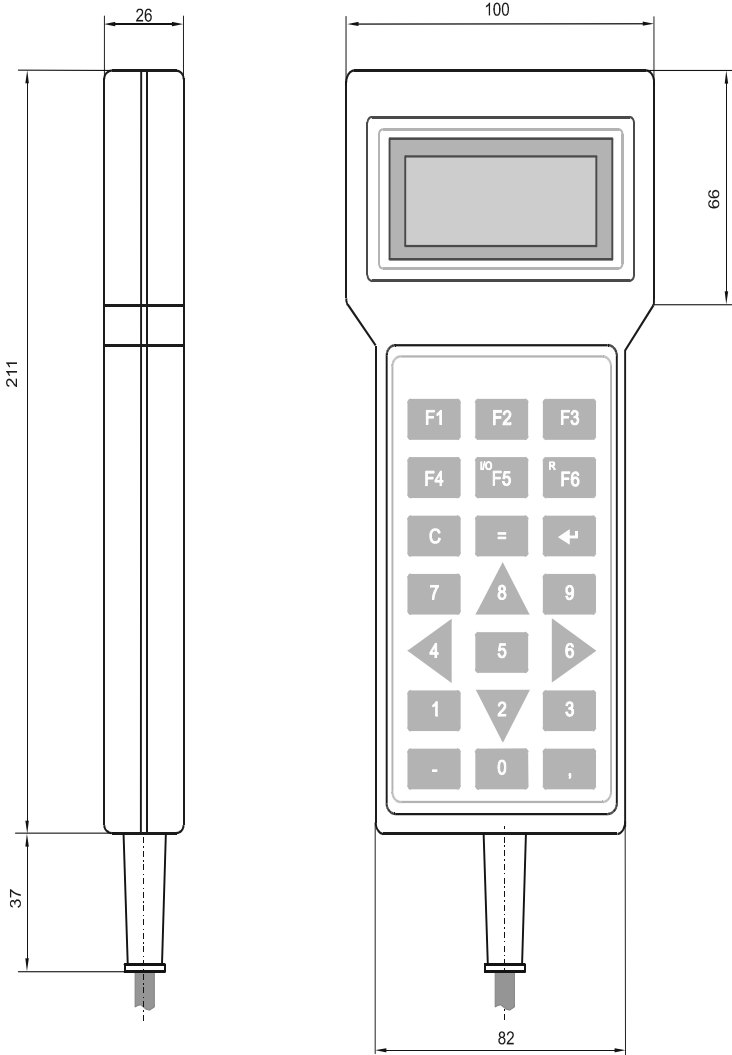


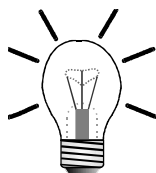
Fig. 5: Physical Dimensions LCD 52

6 Technical Data

General and Mechanical Specification	
Height	211 mm
Width	100 mm
Depth	26 mm
Screen size	62 mm x 25 mm
Number of lines	4
Number of characters per line	16
Character height	4.74 mm
Weight	approx. 275 g
Keys	<ul style="list-style-type: none"> • 6 function keys • 15 entry keys
<i>Touch pad panel:</i>	
Lifetime of the keys	> 1 mio. operations
Switching pressure	3 N
Contact areas	Gold-coated snap connections
<i>Cable:</i>	
Cable length	3 m, 5 m or 7 m (shielded)
Cable material	LIYCY 7 x 0.25 mm ²
Color 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 Please refer to "Note!"
Power consumption	<ul style="list-style-type: none"> – max. 200 mA – typically 85 mA at 12 V and 20 °C – typically 40 mA at 24 V and 20 °C
Display	LCD IF
Interfaces	15-pin SUB-D connector: RS422

Note!



Disconnection from the power supply leads to a reset of the LCD 52.

7 Display and Key Functions

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

Note!



For a detailed description on how to configure registers and flags, please refer to the operator's manual of NANO-A, NANO-B, NANO-C, Delta or respective other controller.

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

**Note!**

The F5 and F6 keys can only be used when the monitor mode of the controller in use was deactivated. For more details on the use of the monitor mode, please refer to the operator's manual of the respective controller.

**Important!**

Please observe the following to avoid malfunctions and damage of the device:



Disable the *monitor mode during operation of the LCD*. The monitor mode might change the state of the PROCESS-PLC. This way it is possible, for example, to set outputs or write flags and registers during operation.

**Note!**

Please take into account the following system characteristic of your PROCESS-PLC that occurs in the battery-buffered flag range of the keypad:

- The flags assigned to the keys are not automatically reset when the LCD 52 is switched on.
- When the LCD 52 is switched off while pressing a key, the corresponding flag is set in the PROCESS-PLC when the LCD 52 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 52 keys.

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 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	This function allows to view and modify registers, I/Os, etc. 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 a program.
PROCESS-PLC	Advanced control system of 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
DIN	D eutsches I nstitut für N ormung = German Industry Standard
EMI	E lectro M agnetic C ompatibility
FSTN	F ilm S uper T wisted N ematic
Gnd	G round
Hz	H ertz
IEC	I nternational E lectrotechnical C ommission
I/O	I nterface O utput
IP	I nternational P rotection
LC	L iquid C rystal
LCD	L iquid C rystal D isplay
LED	L ight- E mitting D iode
PE	P rotective E arth
PLC	P rogrammable L ogic C ontroller
RDA	R eceive D ata A : First differential channel of the RS 422 interface
RDB	R eceive D ata B : Second differential channel of the RS 422 interface
RS 232	Accepted industry standard for serial data transmission. RS : R ecommended S tandard For 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	R eceive (RX) D ata A line used to carry received serial data from one device to another.
SDA	S end D ata A : First differential channel of the RS 422 interface
SDB	S end D ata B : Second differential channel of the RS 422 interface
SUB-D	Type designation of connectors
TXD	T ransmit (TX) D ata A line used to transmit received serial data from one device to another; e.g. from a computer to a modem.

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