Operating instructions

Series S302

Numeric large size displays for time, date and temperature

Time base radio signal DCF77

1 Contact

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2 Legal note

This operation manual has been prepared with the utmost care. However, we do not accept any liability for possible errors. We always appreciate your suggestions for improvement, corrections, comments and proposals. Please contact us: editing@siebert-group.com

Table of contents

3 Safety precautions

Important information

Read these operating instructions before starting the unit. They provide you with important information on the use, safety and maintenance of the units. This helps you to protect yourself and prevent damage to the unit.

Information intended to help you to avoid death, bodily harm or considerable damage to property is highlighted by the warning triangle shown here; it is imperative that this information be properly heeded.

The operating instructions are intended for trained professional electricians familiar with the safety standards of electrical technology and industrial electronics.

Store these operating instructions in an appropriate place.

The manufacturer is not liable if the information in these operating instructions is not complied with.

Safety

Components inside the units are energized with electricity during operation. For this reason, mounting and maintenance work may only be performed by professionally-trained personnel while observing the corresponding safety regulations.

The repair and replacement of components and modules may only be carried out by the manufacturer for safety reasons and due to the required compliance with the documented unit properties.

The units do not have a power switch. They are operative as soon as the operating voltage is applied.

Intended use

The units are intended for use in industrial environments. They may only be operated within the limit values stipulated by the technical data.

When configuring, installing, maintaining and testing the units, the safety and accident-prevention regulations relevant to use in each individual case must be complied with.

Trouble-free, safe operation of the units requires proper transport, storage, installation, mounting and careful operation and maintenance of the units.

Mounting and installation

The attachment options for the units were conceived in such a way as to ensure safe, reliable mounting.

The user must ensure that the attachment hardware, the unit carrier and the anchoring at the unit carrier are sufficient to securely support the unit under the given surrounding conditions.

The units are to be mounted in such a way that they can be opened up while mounted. Sufficient space for the cables must be available in the unit near the cable entries.

Sufficient space is to be kept clear around the units to ensure air circulation and to prevent the build-up of heat resulting from use. The relevant information must be heeded in the case of units ventilated by other means.

When the housing fasteners are opened, the front frame of the housing hinges out upward or downward (depending on the unit version) automatically.

Grounding

All devices are equipped with a metal housing. They comply with safety class I and require a protective earth connection. The connecting cable for the operating voltage must contain a protective earth wire of a sufficient cross section (DIN VDE 0106 part 1, DIN VDE 0411 part 1).

EMC measures

The devices comply with the EU Directive 2004/108/EC (EMC Directive) and provide the required interference immunity. Observe the following when connecting the operating voltage and data cables:

Use shielded data cables.

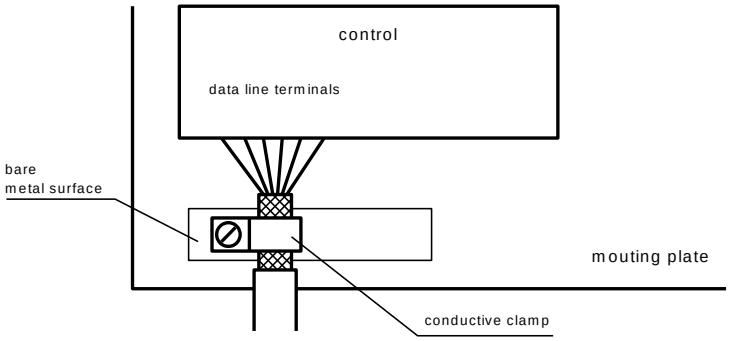
The data and operating voltage cables must be laid separately. They may not be laid together with heavy-current cables or other interference-producing cables.

The cable thickness must be properly assessed (DIN VDE 0100 Part 540).

The cable lengths inside the units are to be kept as short as possible to prevent interference. This applies especially to unshielded operating voltage cables. Shielded cables are also to be kept short due to any interference which might be emitted by the shielding.

Neither excessively long cables nor cable loops may be placed inside the units.

The connection of the cable shielding to the functional ground (PE) must be as short and low-impedance as possible. It should be made directly to the mounting plate over a large area with a conductive clip:



The cable shielding is to be connected at both cable ends. If equipotential bonding currents are expected due to the cable arrangement, electrical isolation is to be performed on one side. In this case, capacitive connection (approx. 0.1µF/600 V AC) of the shielding on the isolated side must occur.

Disposal

Units or unit parts which are no longer needed are to be disposed of in accordance with the regulations in effect in your country.

4 Unit description

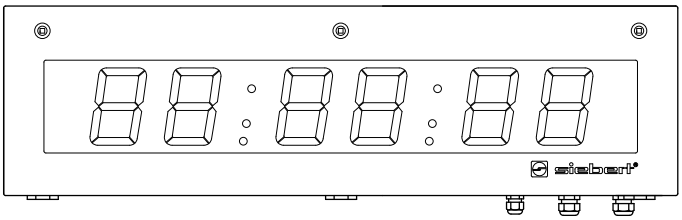
Model designation

This manual applies to units with the following model designation (x = the 'x's in the model designation indicate the size and design of the units (see Chapter 7):

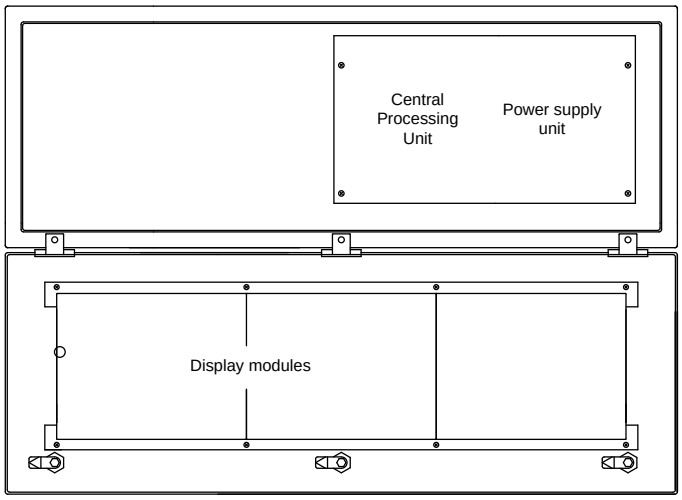
S302-xx/xx/xx-xxx/xx-U3

Unit construction

The following figure shows model type S302-06/10/0x-xxx/xx-xx as example for the other model types. The front frame of the housing is locked with quick-action releases. When opening the unit the front frame hinges downward.

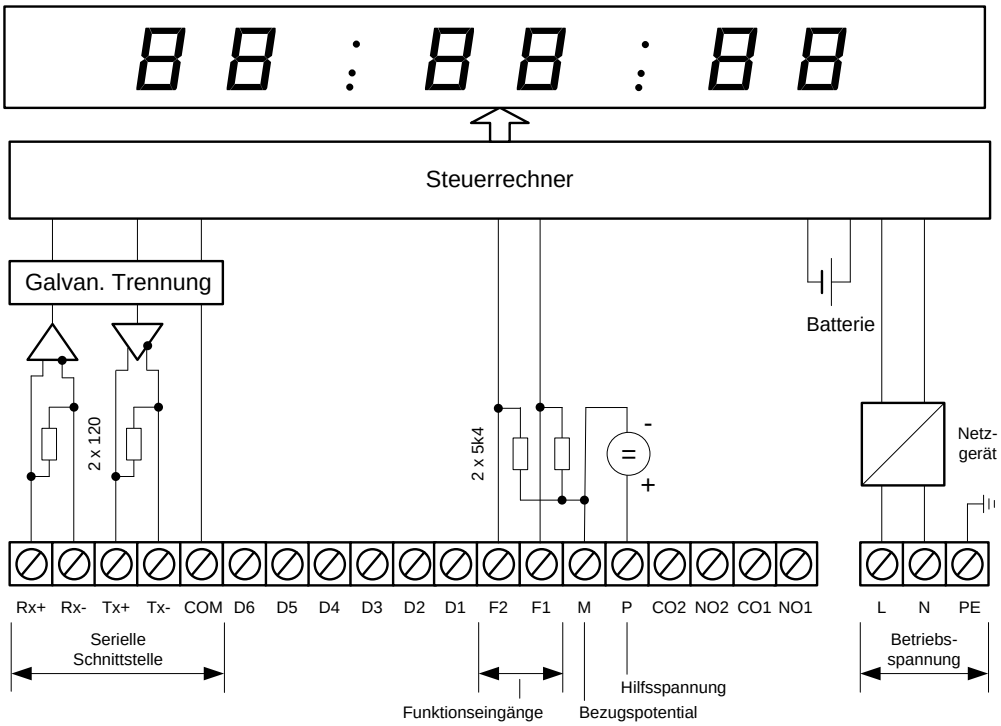


The following figure shows the unit when open.



Units with double-sided display show the same information on the front and on the rear side.

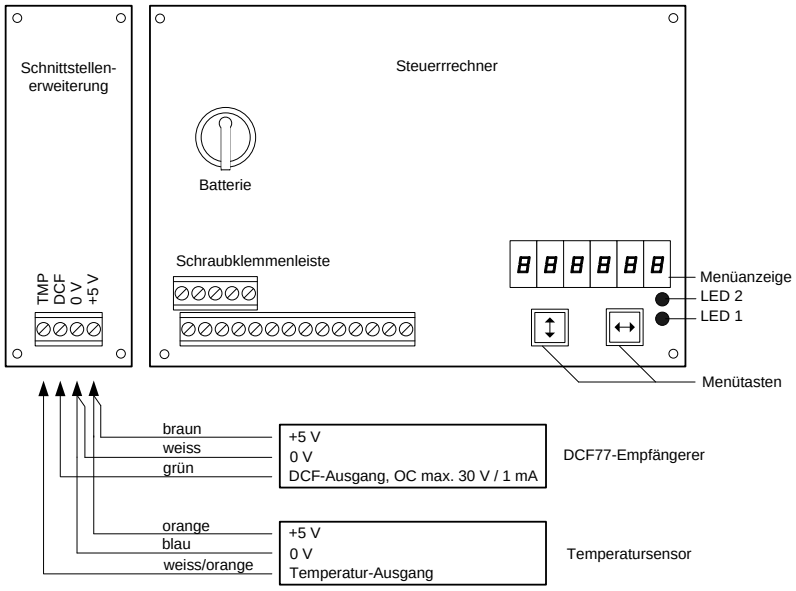
Principle circuit diagram



Steuerrechner	Central Processing Unit
Galvan. Trennung	Galvanic isolation
Serielle Schnittstelle	Serial interface
Funktionseingänge	Function inputs
Bezugspotential	Reference potential
Hilfsspannung	Auxiliary voltage
Batterie	Battery
Netzgerät	Power supply unit
Betriebsspannung	Power supply

Central Processing Unit

The following figure shows the Central Processing Unit, located in the lower part of the housing, with interface extension for connection of the DCF77 receiver and for connection of the temperature sensor.



Schnittstellenerweiterung	interface extension
Steuerrechner	Central Processing Unit
Batterie	battery
Schraubklemmleiste	screw-type terminal strip
Menüanzeige	menu display
Menütasten	menu buttons
braun	brown
weiss	white
grün	green
DCF77-Empfänger	DCF77 receiver
DCF-Ausgang	DCF output
orange	orange
blau	blue
weiss/orange	white/orange
Temperatur-Ausgang	temperature output
Temperatursensor	temperature sensor

Function inputs

The function inputs are located on the screw-type terminal strip of the control computer.

The function inputs are designed for the following signal voltages:

Signal voltage: L = -3.5...+5 V (open input = L)

H = +18...30 V (active H), M = reference potential

The function inputs are debounced for interference suppression. They have a fixed debouncing time. A signal has to be there for at least 10ms to be safely realized.

Auxiliary voltage

The units supply terminal P with an auxiliary voltage galvanically isolated from the operating voltage (24 V ± 20%, max. 50 mA, M = reference potential). It can be used for supplying power to the current loop or as H signal for the function inputs.

Serial interface

The devices have a serial interface RS422. It is located on the screw-type terminal strip of the control computer.

The interface RS422 serves to forwarding the display values and for data input of control commands.

The serial interface is galvanically isolated and due to its physical properties it provides optimal conditions for reliable and safe operation of the units.

Menu display

The parameterization of the units is carried out in a menu of the menu display (see Chapter 6).In normal mode, the menu display corresponds to the main display. For devices with more than six positions, OnlinE is shown in the menu display in normal operation.

Menu buttons

The menu buttons are used to control the menu (see Chapter 6).

Status indicators

The status indicators (LEDs) of the control computer have the following meaning:

LED 1 The clock is synchronized with the DCF77 receiver.
LED 2 The DCF77 receiver receives faulty data.

Battery

The lithium battery (type CR2032) provides a power reserve for the real-time clock. It is located in a battery holder. The battery is to be replaced after three years.

Power supply

The screw-type terminals for the power supply are located on the power supply unit in the bottom section of the housing. They have the following designations:

Devices for a power supply 115 V AC or 230 V AC	L, N and PE
Devices for a power supply 24 V DC	+, – and PE

Screw-type terminal strip

Terminals D6…D1 as well as CO2, NO2; CO1 and NO1 are without function and not be used.

5 Functions

Features

These displays are used to show time, date and temperature. It is set in the menu if only one of the information is to be displayed or if the information is displayed in successive intervals.

Time and date are received with an external DCF77 receiver, included in delivery. The time can be shown in 12-hour or in 24-hour format. Time-zone corrections are done with the menu.

The temperature is measured with a temperature sensor, included in delivery. The temperature can be displayed in °C or °F. External parasitic errors on the temperature sensor can be compensated via the menu.

Repeaters can be controlled with the help of a serial interface and commands to set and read back time or date can be received.

Signal reception

A perfect reception of the DCF77 signal is required for operation of the devices. The DCF77 receiver must be mounted in a suitable place. The DCF77 receiver must be aligned to Frankfurt/Main. Normally the DCF77 signal is to be received within 1.500 up to 2.000 km around Frankfurt. Inside buildings it might be possible that you have no reception.

Parameterization

The parameterization of the units is done with a menu in the menu display (see Chapter 6).

Display format

The displays can either show off the information time, date and temperature solely or display them in up to three successive intervals.

Solely display time, date or temperature:

In menu item 1 select the time, the date or the temperature (°C or °F).
In menu item 2 deactivate the interval 2.
In menu item 3 deactivate the interval 3.

Succeeding display of time and date:

In menu item 1 select the time.
In menu item 2 select the date.
In menu item 3 deactivate the interval 3.

Succeeding display of time and temperature:

In menu item 1 select the time.
In menu item 2 select the temperature (°C or °F).
In menu item 3 deactivate the interval 3.

Succeeding display of time, date and temperature:

In menu item 1 select the time.
In menu item 2 select the date.
In menu item 3 select the temperature (°C or °F).

Display interval

In menu item 4 the length of the intervals is set. If interval 2 is deactivated, the setting in menu item 4 is of no meaning.

12h or 24h format

Whether time is in 12h or 24h format is set in menu item 5.

Correction of the temperature

If the temperature sensor is mounted at a too great height above the ground, or if it is exposed to external parasitic errors (installation height, sunlight, air circulation, devices waste heat, etc.), the measured temperature can differ from the actual temperature. In this case it is possible to set a correction value of ±3° in menu item 6.

Time zone correction

If the installation site of the DCF77 receiver is in a different time zone the time received differs from the local time. In this case a correction value of ±3 hours can be set in menu item 7.

Leading zero suppression

In menu item C it is set if leading zeros are to be displayed or suppressed.

Display test

In menu item F, you can set whether a display test is to be performed after the operating voltage is applied.

Demo operation mode

If in menu item F setting PLAY is selected random characters show on the unit. Then a control of the unit is not possible.

Function inputs

The function inputs allow the following functions:

Function inputs		F2	F1
Normal display	[1]	L	L
Blinking of the display (only units with LED display)	[2]	X	H
Reduction of brightness (only units with LED display)	[3]	H	X

L = L-Signal, H = H-Signal, X = L- or H-Signal

With L signal on the inputs F2 and F1 the display is static and in normal brightness [1]. With an H-signal at the input F1, the display flashes [2]. With an H-signal at the input F2, the brightness of the display is reduced [3].

For units with LRD® display flashing and reducing of the brightness are not possible.

Serial interface

The units have a galvanically isolated RS422 serial interface. It transmits the current display value as ASCII data telegram with final <CR/LF> (**xxxxxx<CR><LF>**) in intervals of approx. 0.5 sec. The number of characters (**x**) is equal to the number of digits of the unit.

The following commands can be transmitted to the display via the interface:

$SHhhmmss<CR/LF>	Set time	(hhmmss)
$SDmmddyy<CR/LF>	Set date	(ddmmyy)
$RH<CR/LF>	Read out time	(hhmmss)
$RD<CR/LF>	Read our date	(ddmmyy)

The telegram ending <CR/LF> may be a single <CR>, a single <LF> or the combination <CR><LF> = 13dez = $0D_h$. <LF> = 10dez = $0A_h$.

Example:

If the time is to be set to 14:23:00 the command is: **$SH142300<CR/LF>**

The parameters of the serial interface are set as follows: 9600 baud, no parity, 8 data bits, 1 stop bit.

6 Parametrization

Menu

The parameterization of the devices is carried out in a menu in the menu display.

Menu operation

To start the menu, press both menu buttons simultaneously (approx. 1 sec.) until the first menu item appears in the menu display. It is now possible to navigate in the menu as follows:

Next menu item	Shortly press key [↕]
Page menu items forward	Press key [↕] long
Previous menu item	Double-click on key [↕]
Page menu items backward	Double-click on key [↕] and keep it pressed
Next setting	Shortly press key [↔]
Page settings forward	Press key [↔] long
Previous setting	Double-click on key [↔]
Page setting backward	Double-click on key [↔] and keep it pressed

To exit the menu shortly press the key [↕] in menu item U. Depending on the setting in menu item U the settings made are either saved (set) or not saved (escape) or the factory settings are reset (default).

Canceling the menu without saving the settings made is possible by pressing both menu buttons simultaneously (approx. 1 sec.). It will occur automatically if 60 seconds pass without a menu button being pressed.

Once the menu is closed, the device behaves in the same manner as when the operating voltage was applied.

In the menu mode the character Ξ appears in the main display. Control of the display is not possible in menu mode.

Menu table

The menu items are displayed in the following menu table. The factory settings are marked with an *. Individual menu items or settings can be suppressed in another menu item, depending on the unit version or setting.

Menu item		Settings	Menu display
1	Data format interval 1	Time*	1 t IME
		Date	1 dAtE
		Temperature in degree Celsius	1 °C
		Temperature in degree Fahrenheit	1 °F
2	Data format interval 2	Interval 2 deactivated*	2 OFF
		Date	2 dAtE
		Temperature in degree Celsius	2 °C
		Temperature in degree Fahrenheit	2 °F
3	Data format interval 2	Interval 3 deactivated*	3 OFF
		Temperature in degree Celsius	3 °C
		Temperature in degree Fahrenheit	3 °F
4	Display interval	3 sec.	4 3
		↓	↓
		10 sec.*	4 10
		↓	↓
		30 sec.	4 30
5	12/24h display	12h display	5 12h
		24h display*	5 24h
6	Correction of temperature	Displayed value = measured value -3°	6 -3°
		Displayed value = measured value -2°	6 -2°
		Displayed value = measured value -1°	6 -1°
		Displayed value = measured value *	6 0°
		Displayed value = measured value +1°	6 1°
		Displayed value = measured value +2°	6 2°
		Displayed value = measured value +3°	6 3°
7	Time zone correction	Displayed value = transducer value -3h	7 -3h
		Displayed value = transducer value -2h	7 -2h
		Displayed value = transducer value -1h	7 -1h
		Displayed value = transducer value*	7 0h
		Displayed value = transducer value +1h	7 1h
		Displayed value = transducer value +2h	7 2h
		Displayed value = transducer value +3°	7 3h
C	Leading zeros	Leading zeros not displayed*	C 00
		Leading zeros displayed	C 0000
F	Display test	No display test at power-on*	F ----
		Display test at power-on	F 8888
		Demo operation mode	F PLAY
U	Save	Save parameters* (Set)	U SEt
		Not saving parameters (Escape)	U ESC
		Restore to factory settings (Default)	U dEF

7 Technical data

Unit properties

The model designation is structured as follows:

S302 – □□ / □□ / □□ – □□□ / □□ – □□

No dimension symbol	0													
Dimension symbol	F													
1 Digit		1												
2 Digits		2												
↓		↓												
8 Digits		8												
Character height 25 mm			0	3										
Character height 57 mm			0	6										
Character height 100 mm			1	0										
Character height 160 mm			1	6										
Character height 250 mm			2	5										
LED Standard					0									
LED, SMD technology														
LED for outdoor use					2									
LRD®					4									
Character color red						R								
Character color green						G								
Character color white						W								
Character color red/green/orange switchable						M								
Display readable on one side							1							
Display readable on both sides							2							
Steel sheet housing, coated								0						
Steel sheet housing, bilayer painting								1						
Stainless steel housing V2A, coated								2						
Stainless steel housing V2A, brushed								3						
Stainless steel housing V4A, brushed								5						
Protection type IP54									0					
Protection type IP65									1					
Protection type IP54 with climate adjustment									2					
Protection type IP54 with climate adjustment and heating									4					
Wall mounting, cable entry point from the bottom										0				
Wall mounting, cable entry point from the top										1				
Hanging installation, cable entry point from the bottom										2				
Hanging installation, cable entry point from the top										3				
Wall mounting and hanging installation, cable entry point from the bottom										4				
Wall mounting and hanging installation, cable entry point from the top										5				
Power supply 230 V AC ±15 %, 50 Hz											A			
Power supply 24 V DC ±15 %											B			
Power supply 115 V AC ±15 %, 60 Hz											C			
Interface													x	x

Max. power consumption

Units with one-sided display	[VA][1)]
1 digit	
S302-x1/10/xx-1xx/xx-xx	12 (50)
S302-x1/16/xx-1xx/xx-xx	22 (50)
S302-x1/25/xx-1xx/xx-xx	26
2 digits	
S302-x2/06/xx-1xx/xx-xx	12
S302-x2/10/xx-1xx/xx-xx	15 (50)
S302-x2/16/xx-1xx/xx-xx	37 (50)
S302-x2/25/xx-1xx/xx-xx	46
3 digits	
S302-x3/06/xx-1xx/xx-xx	13
S302-x3/10/xx-1xx/xx-xx	17 (50)
S302-x3/16/xx-1xx/xx-xx	51 (50)
S302-x3/25/xx-1xx/xx-xx	63
4 digits	
S302-x4/06/xx-1xx/xx-xx	14
S302-x4/10/xx-1xx/xx-xx	21 (50)
S302-x4/16/xx-1xx/xx-xx	64 (50)
S302-x4/25/xx-1xx/xx-xx	79
5 digits	
S302-x5/06/xx-1xx/xx-xx	15
S302-x5/10/xx-1xx/xx-xx	23 (50)
S302-x5/16/xx-1xx/xx-xx	77 (50)
S302-x5/25/xx-1xx/xx-xx	96
6 digits	
S302-x6/03/xx-1xx/xx-xx	16
S302-x6/06/xx-1xx/xx-xx	16
S302-x6/10/xx-1xx/xx-xx	26 (50)
S302-x6/16/xx-1xx/xx-xx	91 (50)
S302-x6/25/xx-1xx/xx-xx	113
7 digits	
S302-x7/06/xx-1xx/xx-xx	17
S302-x7/10/xx-1xx/xx-xx	30 (50)
S302-x7/16/xx-1xx/xx-xx	104 (50)
S302-x7/25/xx-1xx/xx-xx	130
8 digits	
S302-x8/06/xx-1xx/xx-xx	18
S302-x8/10/xx-1xx/xx-xx	32 (50)

Units with double-sided display	[VA][1)]
1 digit	
S302-x1/10/xx-2xx/xx-xx	16 (91)
S302-x1/16/xx-2xx/xx-xx	35 (91)
S302-x1/25/xx-2xx/xx-xx	42
2 digits	
S302-x2/06/xx-2xx/xx-xx	15
S302-x2/10/xx-2xx/xx-xx	21 (91)
S302-x2/16/xx-2xx/xx-xx	66 (91)
S302-x2/25/xx-2xx/xx-xx	83
3 digits	
S302-x3/06/xx-2xx/xx-xx	17
S302-x3/10/xx-2xx/xx-xx	26 (91)
S302-x3/16/xx-2xx/xx-xx	92 (91)
S302-x3/25/xx-2xx/xx-xx	116
4 digits	
S302-x4/06/xx-2xx/xx-xx	19
S302-x4/10/xx-2xx/xx-xx	33 (91)
S302-x4/16/xx-2xx/xx-xx	119 (91)
S302-x4/25/xx-2xx/xx-xx	150
5 digits	
S302-x5/06/xx-2xx/xx-xx	21
S302-x5/10/xx-2xx/xx-xx	38 (91)
S302-x5/16/xx-2xx/xx-xx	146 (91)
S302-x5/25/xx-2xx/xx-xx	184
6 digits	
S302-x6/03/xx-2xx/xx-xx	23
S302-x6/06/xx-2xx/xx-xx	23
S302-x6/10/xx-2xx/xx-xx	43 (91)
S302-x6/16/xx-2xx/xx-xx	173 (91)
S302-x6/25/xx-2xx/xx-xx	217
7 digits	
S302-x7/06/xx-2xx/xx-xx	25
S302-x7/10/xx-2xx/xx-xx	51 (91)
S302-x7/16/xx-2xx/xx-xx	200 (91)
S302-x7/25/xx-2xx/xx-xx	250
8 digits	
S302-x8/06/xx-2xx/xx-xx	27
S302-x8/10/xx-2xx/xx-xx	55 (91)

[1)] The values given are approximate values. For units with built-in heating, the values for power consumption specified in the table increase by approx. 10 – 100 VA (exact values on request), depending on the unit size.

( ) Values in parentheses are valid for LRD® versions.

The power consumption for the unit version model S302-xx/xx/0x-xxx/xx-xx is also valid for the unit version S302-xx/xx/2x-xxx/xx-xx (LEDs for external use).

Screw-type terminals

Control computer	Capacity of terminals 0,14…1,5 mm²
Power supply	Capacity of terminals 0,2…4 mm²

Housing colors

Case front	RAL 5002 ultramarine
Case rear part	RAL 7035 light grey

Front frame

S302-xx/xx/xR-xxx/xx-xx	Plastic, tinted red, non-reflective
S302-xx/06/xG-xxx/xx-xx	Plastic, tinted green, non-reflective
S302-xx/10/xG-xxx/xx-xx	Plastic, tinted green, non-reflective
Other model types	Plastic, clear, non-reflective

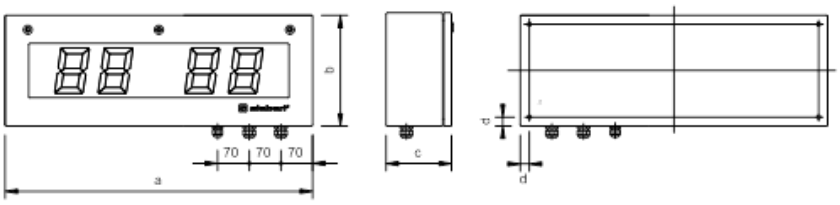
Ambient conditions

Operating temperature	0…55 °C
Storage temperature	-30…85 °C
Relative humidity	max. 95 % (non-condensing)

Measurements and Weights

Units with one-side display

The following figure shows unit version S302-04/10/4x-1xx/xx-xx, representing the other unit versions listed in the following table.

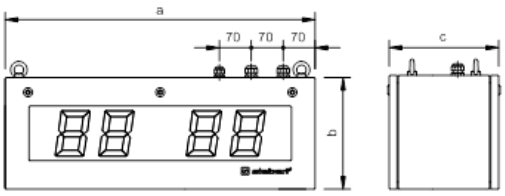


4 digits	a [mm]	b [mm]	c [mm]	d [mm]	Ø [mm]	Weight [kg][1)]
S302-04/06/xx-1xx/xx-xx	400	185	110	16	7	6
S302-04/10/xx-1xx/xx-xx	680	245	110 (145)	16	7	10 (12)
S302-04/16/xx-1xx/xx-xx	960	300	110 (145)	20	9	14 (17)
S302-04/25/xx-1xx/xx-xx	1500	400	110	20	9	24
6 digits						
S302-06/06/xx-1xx/xx-xx	510	185	110	16	7	7
S302-06/10/xx-1xx/xx-xx	870	245	110 (145)	16	7	12 (14)
S302-06/16/xx-1xx/xx-xx	1100	300	110 (145)	20	9	16 (20)
S302-06/25/xx-1xx/xx-xx	1730	400	110	20	9	28

1) The figures shown for weight are approximate.
( ) Values in round brackets are valid for LRD® versions.

Units with double-side display

The following figure shows unit version S302-04/10/4x-2xx/xx-xx, representing the other unit versions listed in the following table.



Units with character height of 57 mm
(S302-xx/06/xx-2xx/xx-xx) are provided with 2 eyes instead of 4

4 digits	a [mm]	b [mm]	c [mm]	Weight [kg][1)]
S302-04/06/xx-2xx/xx-xx	400	185	170	8
S302-04/10/xx-2xx/xx-xx	680	245	170 (240)	15 (19)
S302-04/16/xx-2xx/xx-xx	960	300	170 (240)	21 (27)
S302-04/25/xx-2xx/xx-xx	1500	400	170	36
6 digits				
S302-06/06/xx-2xx/xx-xx	510	185	170	9
S302-06/10/xx-2xx/xx-xx	870	245	170 (240)	18 (23)
S302-06/16/xx-2xx/xx-xx	1100	300	170 (240)	24 (29)
S302-06/25/xx-2xx/xx-xx	1730	400	170	42

1) The figures shown for weight are approximate.
( ) Values in round brackets are valid for LRD® versions.