User Manual – LTR-1200

19’’ Rack Enclosure for Meerstetter Engineering devices

meerstetter engineering

Member of Berndorf Group

Developed, assembled, and tested in Switzerland

Index

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1 Safety Information

The following parts of the user manual for the LTR-1200 rack (“device”) from Meerstetter Engineering GmbH (“manufacturer”) contain important information for the owner and person operating the device (“user”).

1.1 Safety Instructions

To ensure that the device stays in that state and a safe operation is guaranteed, the user must read and follow safety instructions as well as usage instructions.

Opening and modifying the device is not permitted. For modifications and adaptations, the user must contact the manufacturer.

The device must be stored in a dry place at room temperature (up to 40°C, 80% humidity).

In the following cases the user must put the device out of operation and further usage is no more permitted. For repairs the manufacturer must be contacted.

- External damage of the casing,
- Damage of any connectors,
- Loose parts inside the device,
- Non-operable device,
- Long-time storage in non-optimal conditions (e.g. outdoors or in humid environments).

Use the device only with the provided mains supply cord.

1.2 Intended Use

The device is—depending on the configuration—solely intended as driver for Peltier elements or laser diodes.

- Claims against the manufacturer cannot be made for damages caused by inappropriate use of the device.
- The user is responsible for any damages resulting from inappropriate use of the device.

The user must observe limits specified in the section technical data for a safe use of the device.

1.3 User Groups

Inappropriate use of the device can lead to damage to persons and to material damage.

Requirements on the users:

- Only personnel having sufficient know-how or training are allowed to use the device.
- Users of the device are responsible for their own safety and for the safety of all other persons in proximity of the operated device.
- Users are responsible that all necessary security precautions are taken, especially when lasers are operated with the device.

1.4 Disposal of Device

Electrical devices must be disposed and recycled correctly after the end of usage. The user must return the device to the dealer, importer, or manufacturer or to a recycling company.

1.5 Output Limitation

TEC controllers and laser diode drivers are—depending on the configuration of the LTR-1200—limited in output power if necessary, such that overloading of the internal power supplies is prevented.

The controllers themselves feature a built-in temperature monitoring function, which disables the output when the temperature of the controller gets too high.

2 Functional Description

2.1 Device-specific Documentation

The functional description and the technical data of the devices mounted in the LTR-1200 are documented in their own specific Datasheets, User Manuals and other documentation.

The devices mounted in the LTR-1200 are controlled with their own software.

Some of these device channels can be connected in parallel to achieve higher output currents.

Refer to the relevant product page for more information.

2.2 Getting Started

The following symbols are used to categorize the steps of the guide:

- Actions to be performed by the user
- Reactions from the soft- or hardware, as indication that an action was successful
- Additional background information on the step to be performed

Step	Action	Information/Feedback
1	**Hardware Setup**	
1.1	Connect the LTR-1200 to the mains power and switch it on.	The display shows the start screen
1.2	Wait until the LTR-1200 has finished startup.	The display now shows the main screen No error is indicated (both LEDs are green)
1.3	Use the navigation switches to browse through the Menu. The Menu structure is documented in chapter 3.3 Menu Structure	
1.4	Connect to an internal device (choose one of the two options below):	For more information about how to connect please refer to 3.4 Communication Interfaces)
1.4.1	Ethernet (preferred)	Simultaneous connections (multiple applications) to several devices are possible. Simultaneous connections (multiple PCs) to one device are possible.
1.4.1.1	Set up the IP configuration (See chapter 3.4.2 Connecting LTR-1200 over Ethernet)	
1.4.1.2	Connect the Ethernet cable.	
1.4.2	USB	Easy on-site connection. Only one device at the same time.
1.4.2.1	Connect the USB cable.	

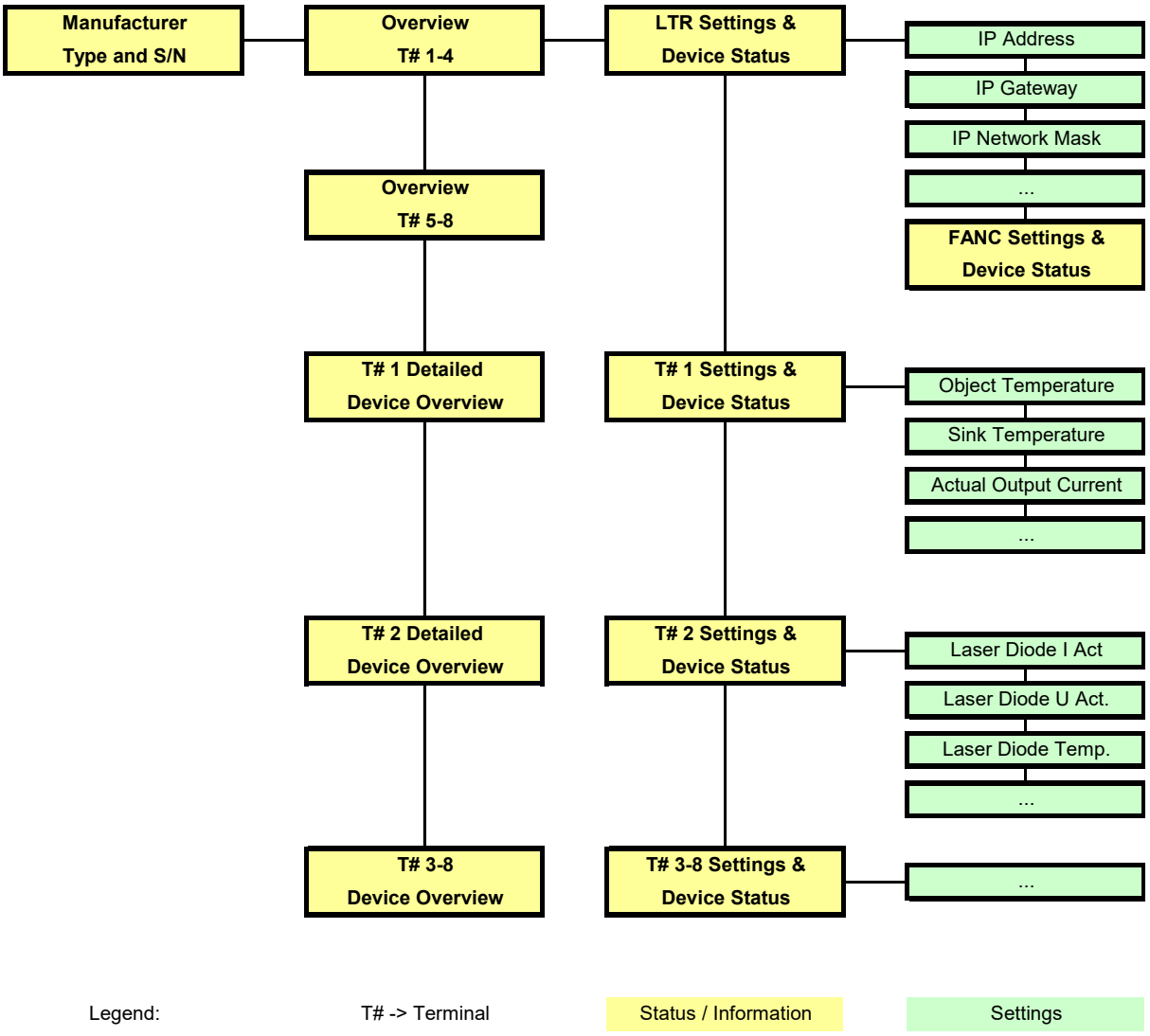
Step	Action	Information/Feedback
2	**Software**	
	✕ Connect the corresponding (TEC or LDD) Service/Configuration Software to a device	ⓘ (Notice that you establish a connection to a device. “Device” and “Terminal” have different meanings. See chapter 3.4.1 LTR-1200 Communication)
	✕ Set up the Service/Configuration Software connection in the Maintenance Tab (See chapter 3.1 Device-specific Documentation)	🔍 When the Software is successfully connected, it will show a green status “Connected” and the Monitor tab will be updated periodically. ⓘ If you connect over Ethernet and wish to connect to multiple devices, repeat this procedure for all devices to connect. ⓘ Now the device(s) are connected. The device configuration and the various setting options are described in the device-specific User Manuals. (See chapter 3.1 Device-specific Documentation)

2.3 Menu Structure

The Menu is created dynamically depending on the installed devices. Only the Terminals to which a device is connected are shown in the Menu. Each Terminal has its own Menu entry where the most important settings of this Terminal can be adjusted. There is also a small overview for each Terminal.

Because there are so many parameters for each Terminal there is only a small selection of parameters available through the display menu.

Below there is an example of the Menu structure with a TEC controller connected to Terminal 1 and an LDD connected to Terminal 2.



To navigate through the menu use the 5-way navigation switch.

Settings marked with [-/R] have read only permissions.

Settings marked with [R/W] can be modified through the menu. Simply press the OK Button to switch to the editing mode. Use left and right to switch between the digit positions. Use up and down to change the digit's value. Press OK to confirm the setting change.

Errors are shown on the overview screen with a symbol. For a description of the different Symbols see 4.2.1 LCD. A detailed Error Report will be shown on the device specific Menu screen.

2.3.1 Available Device Parameter

Additional Parameters are available on request. Please contact Meerstetter Engineering for an inquiry

2.3.1.1 LTR-1200

- IPv4 Address
- Gateway IPv4 Address
- IPv4 Network Mask
- Service Software Default Device
- Interface RS232 Baud Rate
- Interface RS485 Baud Rate
- HMI Device Address
- Internal Maximal Temperature
- Internal Maximal Fan-Speed

2.3.1.2 LDD

- Laser Diode Current Actual
- Laser Diode Voltage Actual
- Laser Diode Temperature
- Laser Power Actual
- Laser Diode Driver Enable
- Laser Diode Current CW
- Laser Diode Power CW

2.3.1.3 TEC

- Object Temperature
- Sink Temperature
- Actual Output Current
- Actual Output Voltage
- Output Stage Enable
- Target Object Temp

2.4 Communication Interfaces

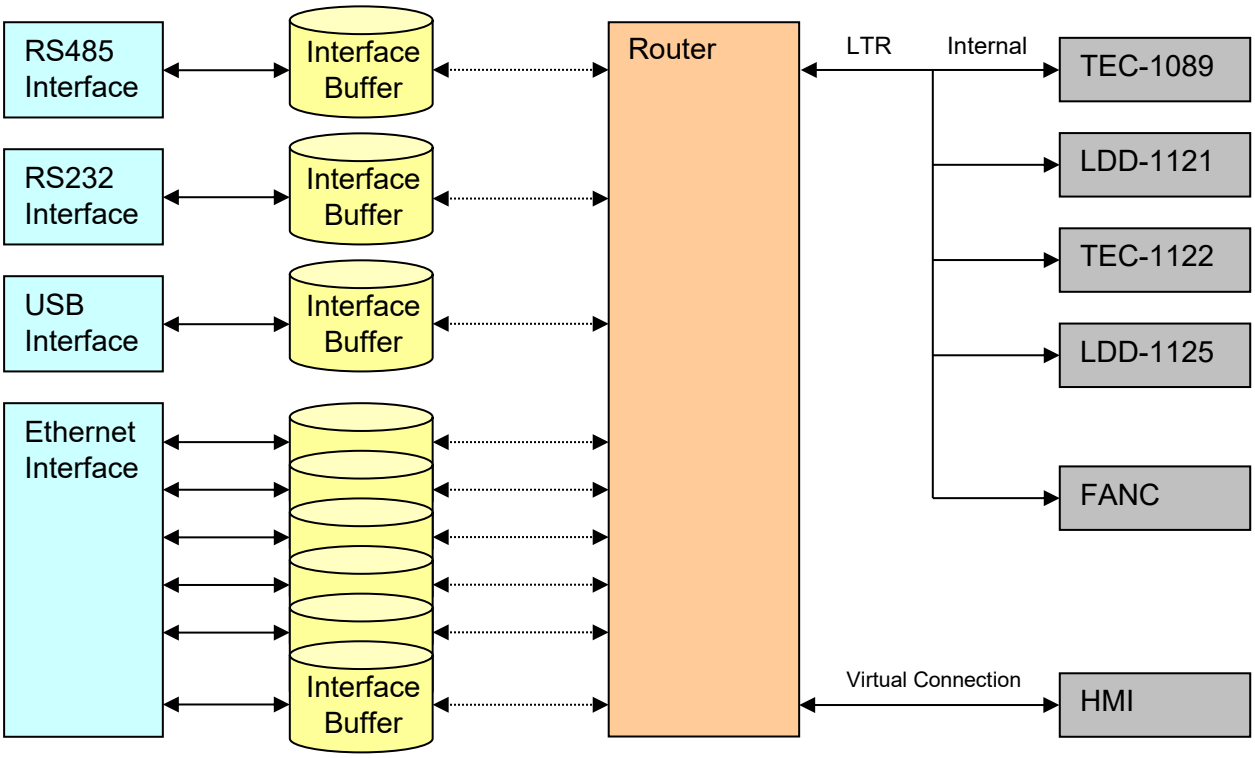
2.4.1 LTR-1200 Communication Concept

The LTR-1200 is equipped with several communication interfaces, which can be used simultaneously.

Every communication interface has its own receiving buffer.

The router will process every received message. The message is forwarded to the desired device. As soon as the router task has received the responding message from the device, the message is forwarded to the corresponding interface.

Every communication interface has the same priority. All messages are processed successively.



A connection is always between *one control software and one device*. The Terminal, device number and Channel are not directly associated.

Terminal represents only the output on the backplane of the LTR-1200. One device can be connected to more than one Terminal.

Channel represents the output channel of one device (*e.g.,* CH1 or CH2 in the case of TEC controllers.)

Please consult the “LTR-1200 Configuration Sheet” (which was supplied with the LTR-1200) to find out which device channel is connected to which Terminal.

2.4.2 Maximum Cable Length for RS232, RS485 and I/O

For proper functioning, the maximum cable length for RS232, RS485 and I/O connections is 3.00 m.

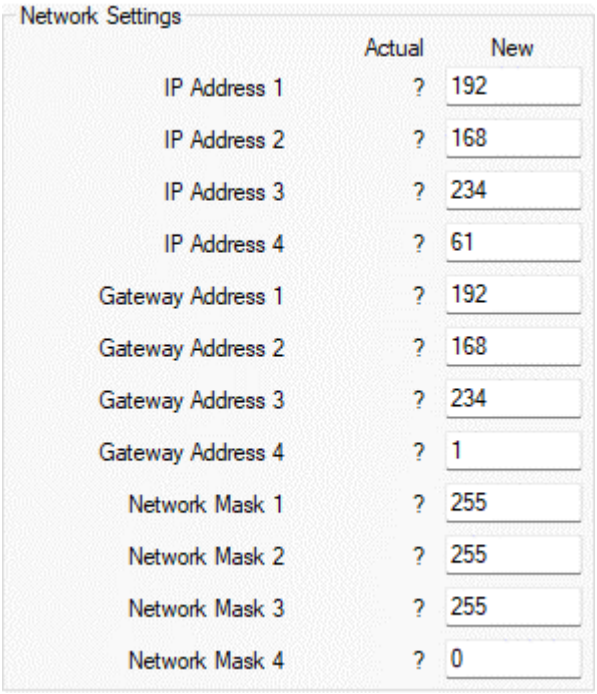
2.4.3 Connecting LTR-1200 over Ethernet

The LTR-1200 does not support DHCP. A fixed IP Address configuration must be set over the display menu. Please set the following settings:

- IP Address
- Gateway Address (required for routing)
- Network Mask

Please try to access the built-in LTR-1200 web server by entering the previously configured IP Address to your web browser.

You can also set the network settings in the HMI Service software (version 1.07 or higher) in the field “Network Settings”. Like the following pictures below shows.



2.4.3.1 Ethernet Connection

Please refer to 2.1 Device-specific Documentation to connect the Service Software over Ethernet. The Device Address (Device to be addressed) can be found on the LTR-1200 Menu or on the Built-in web site. It usually is the same as the Terminal Number of the first channel of the device. The LTR-1200 provides a total of six connections (TCP/IP, Port 50000, Timeout: 10s) to control the LDD/TEC Drivers over Ethernet. For Third Party Software communication please refer to the MeCom communication protocol specifications (See chapter 2.1 Device-specific Documentation).

2.4.4 Service Software Default Address

In some cases, it may be helpful to configure a default LDD/TED driver as standard device. This can be done by setting the 'Service Software Default Device' parameter to a specific LDD/TEC Device Address in the Display menu. In this case the Device Address 0 will be routed to the 'Service Software Default Device'.

2.4.5 Access over Third-Party Software

For Third Party Software communication please refer to the MeCom communication protocol specifications (See chapter 2.1 Device-specific Documentation).

2.4.6 Communication Fault Management

2.4.6.1 For RS485, RS232 and USB Interfaces

A received MeCom-Package with a wrong CRC is not being processed, no error is generated. If a MeCom-Package is being forwarded to a device (LDD/TEC) and no answer is received from the device, no error is generated. The sending host must repeat the MeCom-Package.

2.4.6.2 For Ethernet Interface

A received MeCom-Package with an incorrect CRC results in closing the corresponding TCP connection. If a MeCom-Package is being forwarded to a device (LDD/TEC) and no answer is received from the device, the MeCom-Package is being sent to the device two more times. If still no answer is received, the TCP connection is closed by the LTR-1200.

3 Technical Data

3.1 Operating Conditions

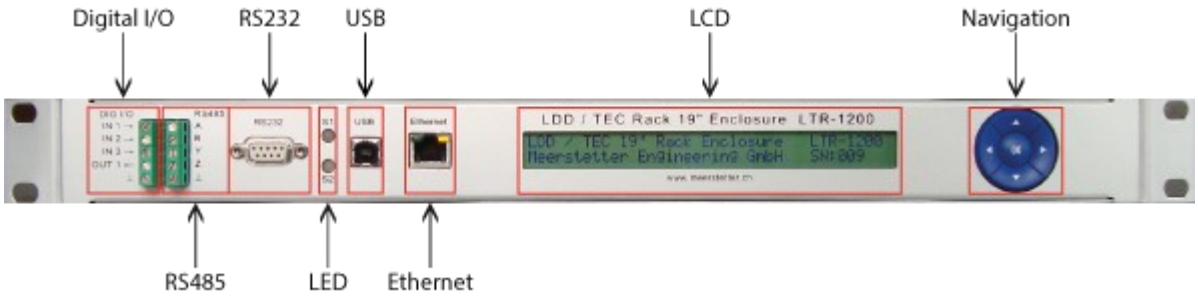
AC Input Voltage: 90–240 V / 47–63 Hz

Max Ambient Temperature: full load up to 35 °C, half load up to 40 °C.

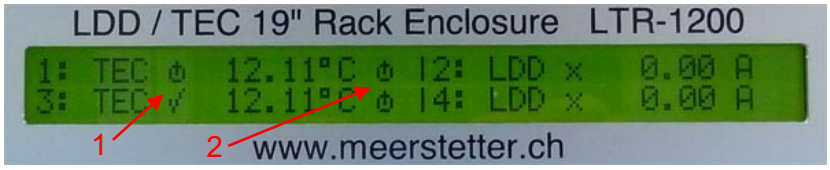
Humidity: 5–80%, non-condensing.

IP Code (per IEC 60529): 20

3.2 Front Panel



3.2.1 LCD



The picture shows the LCD display of an LTR-1200 with 4 devices built-in.

Symbols on the LCD Display				
	⏱	⧗	√	✕
First Symbol (refer to no. 1 in picture above)	Device is 'Ready'	Other (Reset, Restart, Bootloader, …)	Device is 'Running'	Device has an Error
Second Symbol (refer to no. 2 in picture above)	Not in Temperature Control Mode	'Wait' (not stable, yet)	Stability Reached	-

3.2.2 Navigation

There is a five-point navigation switch available to browse through the Menu. This can be used to change the most important settings of the internal devices.

3.2.3 LED

Dual Color Status LEDs	
LED	**Sources (grouped)**
S1 (top)	LTR Components (HMI, Fan Controller)
S2 (bottom)	Built-in Devices (LDDs, TECs)

Grouped status code is prioritized, i.e., if one output stage is running, the grouped LED shows 'Run', if one device has an error, the grouped LED shows 'Error'.

LED Status Description (S1, S2)		
Color	**Pattern**	**Signification**
Green	Slowly blinking	'Ready' status (no Error)
Green	Blinking fast	'Run' status (no Error)
Red	Static on	'Error' status, output stages disabled
Red	Slowly blinking	Unknown Device Status, but no Error

3.2.4 Digital I/O

3.2.4.1 Pinout

Type	DIG IO Label	LDD-112x	TEC-1122/1123	TEC-1089/1090	LTR-1200
Input 1	IN1 →	RES8	GPIO8	GPIO1	Special Function available on request
Input 2	IN2 →	RES7	GPIO7	GPIO2	
Input 3	IN3 →	RES6	GPIO6	GPIO3	
Output 1	OUT ←	RES5	GPIO5	GPIO4	
GND	⊥	Digital IO Ground			

All digital I/Os are ESD-protected and have a series and pull-down resistor.

3.2.4.2 Characteristics

Symbol	Parameter	Comments	Min	Typ	Max	Units
Digital Isolator Characteristics						
$f_{TRANSFER}$	Transfer Frequency	NRZ (No Return to Zero)	0		25	MHz
t_{PHL}, t_{PLH}	Propagation Delay			45	60	ns
Input Characteristics (Digital Isolator)						
V_{IH}	Logic High Input Threshold		2.31			V
V_{IL}	Logic Low Input Threshold				0.99	V
V_{IMAX}	Max Input Voltage		-0.5		5.5	V
Output Characteristics (Digital Isolator)						
V_{OH}	Logic High Output Voltage	Output Current 20uA	3	3.3		V
V_{OL}	Logic Low Output Voltage	Input Current 20uA		0	0.1	V
V_{OHL}	Logic High Output Voltage (Hi Load)	Output Current 4mA	2.8	3.1		V
V_{OLL}	Logic Low Output Voltage (Hi Load)	Input Current 4mA		0	0.4	V
ESD Protection (between Digital Isolator and Connector)						
V_{PP}	ESD Discharge	IEC61000−4−2			100	kV
R_A	Series Resistance		170	200	230	Ω

3.2.5 RS485

3.2.5.1 Pinout

RS485 Label	Half-Duplex Connection	
A		A
B		B
Y		
Z		
⊥		GND

3.2.5.2 Characteristic

Sym-bol	Parameter	Comments	Min	Typ	Max	Units
Digital Isolator Characteristics						
Speed	Communication Speed (Baud Rate)	Software Setting	4800		1M	bps
VPP	ESD Protection	Human Body Model			+-15	kV
Input Characteristics (Receiver)						
VTH	Differential Input Threshold Voltage		-200	-125	-30	mV
VHYS	Input Voltage Hysteresis			15		mV
RIN	Line Input Resistance		96			kΩ
Output Characteristics (Driver)						
VOD1	Differential Output Voltage, Loaded	RL = 100Ω (RS422)	2.0		3.6	V
VOD2	Differential Output Voltage, Loaded	RL = 54Ω (RS485)	1.5		3.6	V

3.2.6 RS232

3.2.6.1 Pinout

Pin	Function
2	TxD (Data from LTR)
3	RxD (Data to LTR)
5	Signal Ground (GND)
other	Not Connected

3.2.6.2 Characteristic

Symbol	Parameter	Comments	Min	Typ	Max	Units
Protection Characteristics						
VPP	ESD Protection	Human Body Model			+/-15	kV
Electrical Characteristics						
Speed	Communication Speed (Baud Rate)	Software Setting	4800		1M	bps
VOH	High-level Output Voltage	TxD at RL = 3kΩ to GND	5	5.5		V
VOL	Low-level Output voltage	TxD at RL = 3kΩ to GND	-5	-5.4		V
VIT+	Positive Input Threshold Voltage			1.5	2.4	V
VIT-	Negative Input Threshold Voltage		0.6	1.2		V

3.2.7 USB

The USB interface is electrically isolated. A virtual COM Port is provided for communication with a host PC. The drivers are the same as the ones already required / installed for the individual internal devices. (Used chip: FTDI FT232RQ)

3.2.7.1 Characteristic

Symbol	Parameter	Comments	Min	Typ	Max	Units
Protection Characteristics						
VISO	Isolation Voltage		1	-	2.5	kV
VPP	ESD Protection	Human Body Model			+/-15	kV
Electrical Characteristics						
Speed	Communication Speed (Baud Rate)	Software Setting	4800		1M	bps

3.2.8 Ethernet

3.2.8.1 Specifications

The Ethernet meets the following specifications:

- IEEE 802.3 compliance
- 100BASE-TX and 10BASE-T compliance
- Auto Negotiation (Automatically switch between 10Mbit/s / 100Mbit/s, Half -/ Full-Duplex)
- Auto MDIX (Auto crossover)
- Optional VLAN (available on request)
- Optional IEEE 1588: Precision Time Protocol (available on request)

3.2.8.2 LED Description

	Green	Orange
Off	Not connected	10Mbit/s
Blink	Activity	-
On	Connected	100Mbit/s

3.2.8.3 Available Features

- Small embedded website
- Service/Configuration Software communication
- MeCom protocol

3.3 Back Panel

Picture of 4 Terminal Version. (Only approx., the sensor connectors are wrong)

Picture of the 8 Terminal Version

By standard, the GND potentials of all built-in TEC and LDD devices are interconnected. Consequently, *all external loads and sensors to be attached to the back panel should be potential-free*. At the most, only one single potential (e.g. GND of one laser diode) may be tied to a given potential; it is however recommended to keep all loads and sensors potential-free.
Upon customer request, individual outputs can be equipped such that they are potential-free (i.e. independent of other built-in devices). Please contact Meerstetter Engineering with your enquiry.

3.3.1 TEC Sensors Pinout

Fully pre-confectioned cables are available from Meerstetter Engineering at request.

3.3.1.1 Part List

Description	Manufacturer	Manufacturer Part Nr.
Connector Solder 7-Way	Binder	99-4925-00-07
Cable 6-Way, Shielded	Kabeltronik	2-LifYCY TP (820600800)

3.3.1.2 Pinout

Function	Pin	Cable Color
Object Voltage Sense +	1	White
Object Voltage Sense -	2	Brown
Object Current Output	3	Green
Object Current Return	4	Yellow
Sink Sense A	5	Grey
Sink Sense B	6	Pink
NC	7	-

Please connect “Current Output” and “Voltage Sense +” together to one side of the thermistor/RTD,

and “Current Return” and “Voltage Sense –“ together to the other side of the thermistor/RTD.

3.3.2 LDD Sensors Pinout

Fully pre-confectioned cables are available from Meerstetter Engineering at request.

3.3.2.1 Part List

Description	Manufacturer	Manufacturer Part Nr.
Connector Solder 4-Way	Binder	99-4909-00-04
Cable 4-Way, Shielded	Kabeltronik	2-LifYCY TP (820400800)

3.3.2.2 Pinout

Function	Pin	Cable Color
Temperature Sense A	1	White
Temperature Sense B	2	Brown
Photodiode Cathode	3	Green
Photodiode Anode	4	Yellow

3.3.3 AC Mains Supply

The main power connector is a 3-pol Connector for IEC C13 Cables

Symbol	Parameter	Comments	Min	Typ	Max	Units
Electrical Characteristics						
V_{ACnom}	Nominal Input Voltage	Single Phase	100		240	V
V_{AC}	Input Voltage	Continuous	90		250	V
$V_{ACtrans}$	Input Transients	60ms			300	V
f_{AC}	Input Frequency		47	50/60	63	Hz
P_{IN}	Input Power*	1 - 4 Power Supplies	400		1600*	W
P_{IN110}	Input Power ($110V_{AC}$)	1 - 4 Power Supplies	400		1100	W
Protection Characteristics						
Fuse	Slow Fuse	Integrated into Connector		10		A

* When operated on $110V_{AC}$ mains supply, the max input power is derated to 1100W due to the 10A fuse built into the standard IEC C13 housing.

3.4 Error Numbers

Error Numbers 1 to 99 are universal error numbers, which are identically on each device. For all other universal error numbers please refer to the LDD-Family or TEC-Family User Manuals. Error Numbers 100 and above are HMI (LTR)-specific.

3.4.1 RTOS Errors

#	Code	Description	Error Condition, Remedy
80	`RTOS_STACKOVERFLOW`	One task has a stack overflow	Please contact Meerstetter Engineering
81	`RTOS_MALLOCFAIL`	Cannot allocate memory	Please contact Meerstetter Engineering

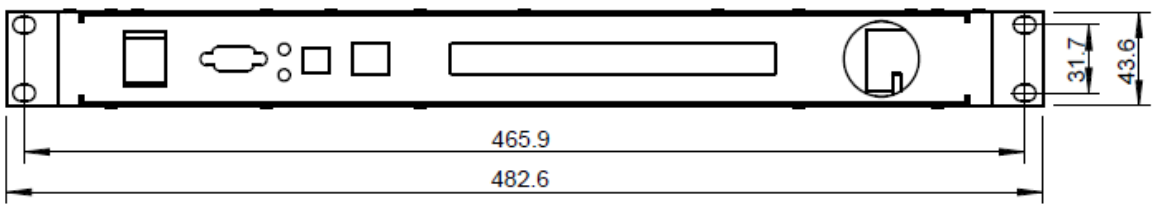
3.4.2 Routing Errors

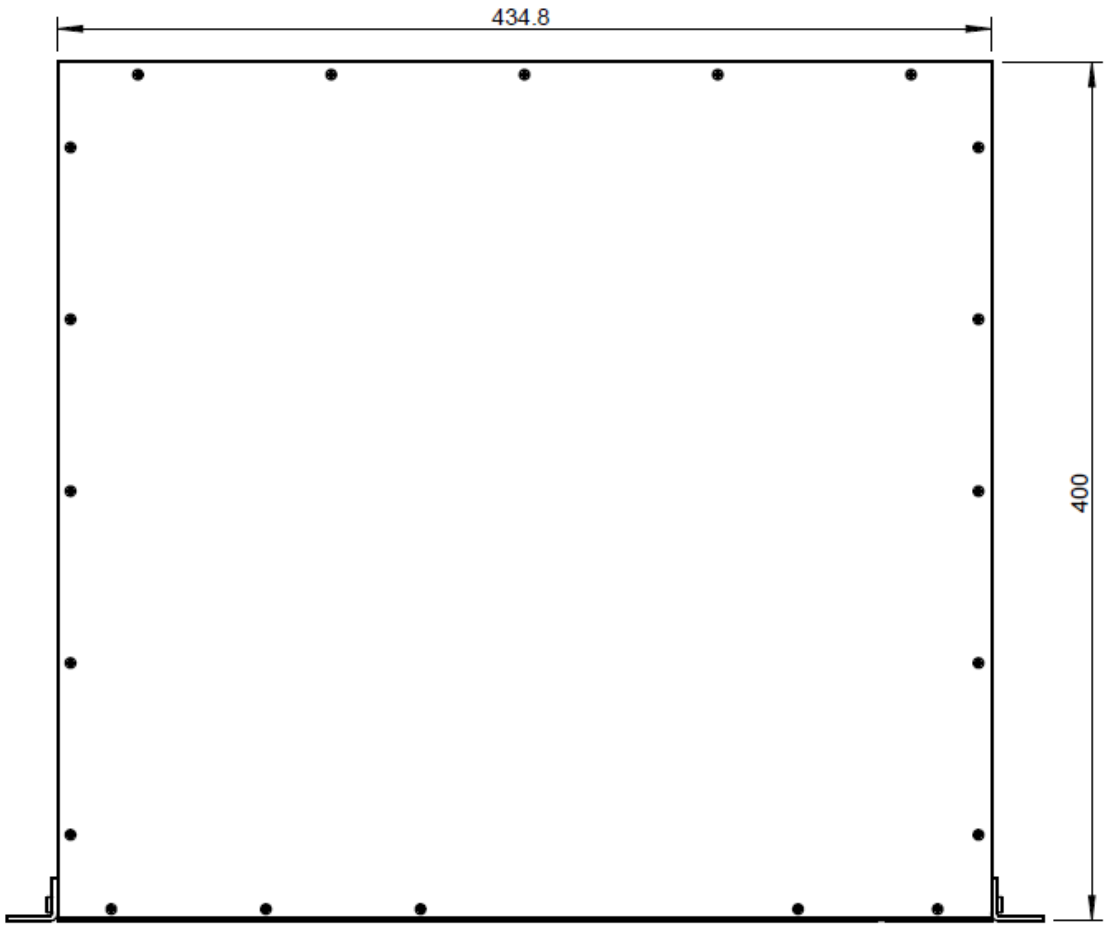
#	Code	Description	Error Condition, Remedy
100	`ROUTING_LOSTFRAME`	The routing task has lost a frame	Lost frame on internal bus
101	`COM_TIMEOUT`	Communication timeout to an internal device occurred	No answer for 3x100 ms
102	`ADDRESS_CONFLICT`	Two internal devices use the same address on the bus	Two identically addresses detected

3.4.3 HMI Errors

#	Code	Description	Error Condition, Remedy
110	DEVICE_VERSION	HMI and device firmware versions not compatible	Update all device firmware to the actual version.
111	DEVICE_MISSING	Unassigned rack output terminal detected	Try to reboot the LTR-1200
112	MENU_OWERFLOW	Menu memory overflow	Please contact Meerstetter Engineering
113	UNKNOWN_DEVICE	Unknown internal device recognized	Please contact Meerstetter Engineering

3.5 Physical Dimensions





All dimensions are in mm.

Rack mounting brackets are removable.

3.6 License Notice

The LTR-1200 Software is built on FreeRTOS (http://www.freertos.org).

A Change History

Date of change	Doc/Version	Changed/ Approved	Change / Reason
12 Feb 2019	D		• Various format changes • SWISS MADE replaced by Developed, assembled in Switzerland • Add specs: Humidity and IP Code • Add: Safety Information • Add: Maximum cable length information • Mod: RES signals renamed to GPIO
18 Nov 2020	D	ML	• Add: Change history
27 Jan 2023	D	RS / LS	• Fix formatting and index • Remove misleading isolation rating of digital isolator ICs
30 Jan 2023	D	LS /RS	• Replace old Logo
01 Feb 2023	D	LS / RS	• Delete Chapter 5 • Transferred to new template
16 May 2025	E	NZ / ML	• Added TEC- 1091, 1162, 1163, 1166, 1167 • Added the text about the Network Settings, which are now available for the user.
14 Nov 2025	F	MBU / RS	• Features: AC Input Voltage = 240 typ / 250V max, Max Ambient Temperature = Full load 35 °C / half load 40 °C, Humidity: up to 80% • Configuration Software is option for Remote control • Use of mains supply cord
23 Dec 2025	G	RS / NZ	• Move overview and configurations to catalog 5342A • Small corrections