

User Manual

cito Air Cooled RF Generator



Important information!

*This manual is required for safe use of the cito Air Cooled RF generator.
Please keep it at hand in the vicinity of the generator.*

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a company of the COMET Group - Plasma Control Technologie, D-52224 Stolberg-Vicht, Germany*

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Important Information

Intended use of this manual

This user manual is intended for all persons working with a cito Air Cooled RF generator, in particular during installation, standard operation and maintenance.

Important safety information



WARNING:

To ensure safe installation, operation and maintenance of the cito Air Cooled RF generator, read and understand this entire manual before attempting to install, operate, or maintain this equipment.

In particular, carefully read the safety instructions in Chapter 3 prior to any activity regarding this product.

Failure to follow the instructions can cause death, personal injury and /or property damage.

If the equipment is used in a way not specified by the manufacturer, the protection provided by the equipment may be impaired. All personnel who work with or who are exposed to this equipment must take precautions to protect themselves against serious or possibly fatal bodily injury.

Follow all applicable safety practices and standards which are prescribed by your country's laws, general work rules, and safety rules of your company.

YXLON International provides information on its products and associated hazards, but it assumes no responsibility for the after-sale operation of the equipment or the safety practices of the owner or user.

INTERLOCKS OR GROUNDS MUST NEVER BE DEFEATED.

If you need help

Please contact YXLON International's customer service if you need any help in installing, operating or maintaining one of our products, or if you have any other question related to our products.

Prior to contacting our service, please record the exact part number and serial number of the unit.

The part number and the serial number are printed on the product label on the back of unit.

The contact information for YXLON International's service is given in the next section.

YXLON International Customer Service

Please contact one of the following offices if you have questions.

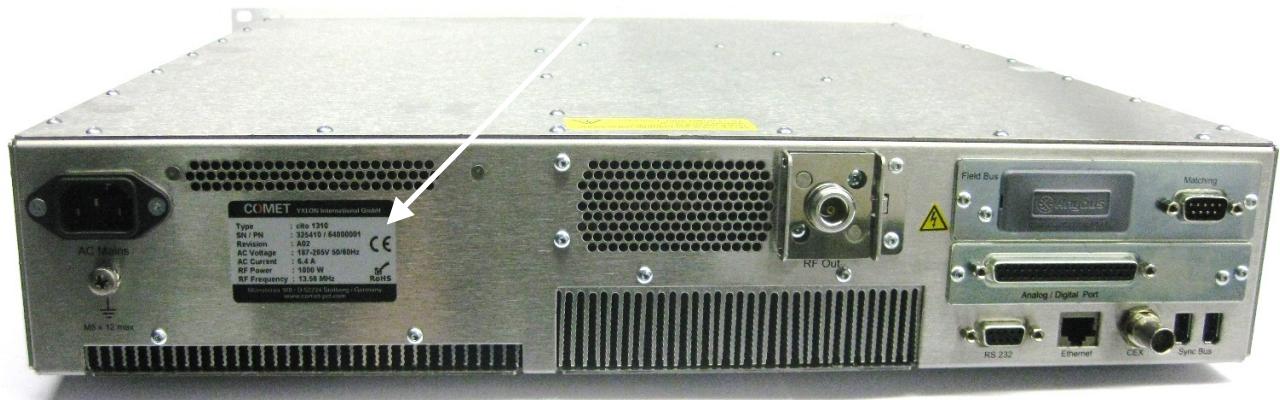
Table 1-1: Technical Support locations

Region	Office	Contact
Europe	YXLON International GmbH a company of the COMET Group Plasma Control Technologies Münsterau 168 D-52224 Stolberg-Vicht Germany	Phone : +49 2402 99 777-0 or Fax: +49 2402 99 777 900 Email: technical.support@comet-pct.com
Asia Pacific Region	COMET China 1201 Guiqiao Road Building 10, 1 st floor Pudong, Shanghai 201206 P. R. China	Phone: +86 21 6879 9000 Fax: +86 21 6879 9009 Email: info@comet-pct.com
North America	COMET Technologies USA, Inc. 2370 Bering Drive San Jose, CA 95131 USA	Phone: +1 408 325 8770 Fax: +1 408 325 8773 Email: info@comet-pct.com

For local technical support by YXLON International partners, please refer to the listing on COMET's web page www.comet-pct.com.

Note:

When calling YXLON International Technical Support, make sure to have the unit serial number and part number. These numbers are available on the product label (typically on the rear panel of the unit).



For returns and repairs, please call Technical Support to obtain the correct shipping address

Reference Documents

- [1] Product specification(s) cito Air Cooled
- [2] RS232, Profibus or Stolberg Commander Guide

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Chapter 1 Before you start

Ensure safe installation and operation of the cito Air Cooled RF generator. Please read and understand the instructions in this document before attempting to install or operate this product.

In particular, carefully read the safety instructions in Chapter 3 prior to any activity at this product.

Chapter 2 General information

This chapter is intended for all persons who are installing, operating or maintaining a cito Air Cooled RF generator according to this user manual. It contains general information on the product and the user manual

Section 2.1 Manufacturer information

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a company of the COMET Group
Plasma Control Technologies
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D-52224 Stolberg-Vicht
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Fax: +49 (0)2402 99777 - 900
E-mail: stolberg@comet-pct.com
Internet: <http://www.stolberg-hf.com>

Section 2.2 Copyright

This manual and the information contained herein is the proprietary property of YXLON International.

No part of this manual may be reproduced or copied without the express written permission of COMET. Any unauthorized use of this manual or its contents is strictly prohibited.

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Section 2.3 Design and document control

The cito Air Cooled RF generator as well as the related documents are under strict revision control. This document may be revised as more data or information becomes available. Any changes to this document will be detailed as a revision change.

Section 2.4 Disclaimer and Limitation of Liability

The information contained in this manual is subject to change by YXLON International without prior notice.

Section 2.5 Trademarks

- **Modbus®** is a registered trademark of Gould, Inc.

Section 2.6 Customer Feedback

YXLON International's technical writing staff has carefully developed this manual using research-based document design principles. However, improvement is ongoing, and the writing staff welcomes and appreciates customer feedback. Please send any comments on the content, organization, or format of this user manual to:

- sales@comet-pct.com

To order a manual, please contact Technical Support:

- technical.support@comet-pct.com

Section 2.7 Description of safety related terms used in this manual

The following terms in this manual and on the marking of the equipment have special meanings which the user needs to understand before starting to work with the equipment.

DANGER This term indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. DANGER is limited to the most extreme situations.

WARNING This term indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and/or property damage.
Always read the associated information very carefully before performing the indicated procedure.

CAUTION This term indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury, and/or damage to property.
CAUTION is also used for property-damage-only accidents.

QUALIFIED SERVICE TECHNICIAN, QUALIFIED ELECTRICIAN, QUALIFIED PERSONNEL

These terms indicate persons specifically trained by YXLON International or the customer to install, service, or maintain equipment of the character and hazard potential of this unit.

Section 2.8 Description of safety and hazard symbol details



This symbol indicates important notes on potential harm to people, this unit, or associated equipment. YXLON International includes this symbol in Danger, Warning, and Caution boxes to identify specific levels of hazard seriousness.



DANGER:
This label indicates the presence of high voltages.



WARNING:
This symbol indicates the presence of non-ionizing, high frequency radiation.

Section 2.9 Description of further symbols on the product

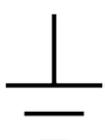
The following symbols are used on the outside of the product:

No operator serviceable parts inside.
Refer servicing to service
trained personnel!
Discharged after 3 minutes.

2971

This label indicates that there are no user serviceable parts within the unit, and that servicing has to be carried out by service trained personnel.

Voltages present internally within the unit will be discharged after three minutes.



Earth Ground



CE Label

Section 2.10 Description of further symbols in the manual



Important Information!

This symbol indicates important information

Section 2.11 Abbreviations and special terms

The following special terms and abbreviations may appear on the cito Air Cooled RF generator or in this manual

Table 2-1: Special terms

Interlock	Control circuit with several switches which are in series. If the control circuit is open, RF power operation is disabled.
Matchbox	Matching network for optimum adaptation of the load impedance towards the RF generator.

Table 2-2: Abbreviations

DC	Direct Current
Forw. and $P_{\text{Forw.}}$	Forward Power
Refl. and $P_{\text{Refl.}}$	Reflected Power
RF	radio frequency

Chapter 3 Safety instructions

This chapter is intended for all persons who are installing, operating or maintaining a cito Air Cooled RF generator according to this user manual. It contains general information for safely working with the product.

Section 3.1 Scope of this product



DANGER!

The safety of the operating personnel and the equipment is at risk if the RF generator is not employed according to its intended use.



The RF generator may only be operated by QUALIFIED PERSONNEL which is trained according to this user manual.



Improper use of this product may seriously impact the warranty (see warranty statement in Appendix B).

3.1.1 Function and operating mode

The cito Air Cooled RF generator is an adjustable source of radio-frequency power into a $50\ \Omega$ load.

It is operated either by direct operator input or via an external control system.

3.1.2 Intended use of this product

The cito Air Cooled RF generator is a high efficient power generator for radio frequency (RF) and is designed as an energy source for plasma excitation. It is used in general plasma processing, and in particular in thin film deposition and etch processes in semiconductor, flat panel display, and solar cell production.

An RF generator is intended for installation, operation, and maintenance by technically trained personnel

3.1.3 Improper use of this product

The cito Air Cooled RF generator must only be employed within the frame of its intended use. Not allowed are, for example:

- Opening the enclosure of the product
- Performing any work on the product which exceeds the activities described in this user manual
- Modification and manipulation of the product
- Use of the product for medical purposes
- Use of the product for radio and telecommunication purposes
- Use of the product in environments with explosive atmosphere

The above list contains only examples and is not complete.

Section 3.2 Rules for safe installation and operation

The following instructions have to be observed by the user at all times:

- Do not attempt to install or operate this equipment without proper training.
- Ensure that this unit is properly grounded.
- Ensure that all cables are properly connected.
- Verify that input line voltage and current capacity are within specifications before turning on the power supplies.
- Use proper electrostatic discharge (ESD) precautions.
- Always be careful around this equipment.
- There are no user-serviceable parts inside the cito generator. Do not attempt any repair! Do not remove any protective metallic housing for any reason!
- Please contact YXLON International technical support for assistance in case of any defect!



DANGER! - RISK OF DEATH OR BODILY INJURY.

Disconnect and lockout/tagout all sources of input power before working on this unit or anything connected to it.

- Before making any other connection to this device, connect the earth terminal to a local earth with a copper wire that is sized according to the applicable requirements.
- Install and operate this device in an overvoltage category II installation only.
- Install and operate this device only in a pollution degree 2 or better environment, which means an indoor location such as a computer room, office, or factory floor where only nonconductive pollution occurs during operation. Occasionally, condensation causes temporary conductivity when the device is not operating.
- Prior to cleaning, switch off the mains supply! Use a mild cleaning agent with a moist cloth for cleaning. Never clean dripping wet!
- For overcurrent protection you must provide an external circuit breaker to AC (Mains) input. For rating see "Electrical Specifications" in Section A.4.
- The **ON/OFF** power switch does not completely disconnect the **Mains**.
- Install and operate this device with a disconnect switch that conforms to the applicable requirements. The switch must be easily accessible and near the device.
- Use only shielded cables (coaxial) on the RF output connector.
- Use shielded cables wherever it is applicable.
- Install the AC line cord so that it is fixed.

Section 3.3 Warning labels on the product

On the unit, the following labels are present:



DANGER:

This label indicates the presence of high voltages.

No operator serviceable parts inside.
Refer servicing to service
trained personnel!

Discharged after 3 minutes.

2971

This label indicates that there are no user serviceable parts within the unit, and that servicing has to be carried out by service trained personnel.

Voltages present internally within the unit will be discharged after three minutes.

These labels are warnings on hazards due to high voltage which are described in Section 3.4 more detail.

Ensure always that both hazard labels are present and legible.

If either one or both of these labels are missing or illegible: Please contact YXLON International to obtain new hazard labels.

Section 3.4 High voltage hazards



DANGER: High Voltage

The high voltages present in this product are absolutely dangerous to life!

The RF generator produces high voltage which poses a risk of death or bodily injury. These voltages are present within the generator as well as at the RF output.

The mains connection of the generator carries voltages which are dangerous to life.

Any person who comes into contact with high-voltage parts of the generator, can be killed or severely injured.

3.4.1 Protective measures by the manufacturer

The generator is built into a closed metallic housing.

3.4.2 Safety instructions for the user

The following instructions have to be observed by the user at all times:

- Employ the generator exclusively within the conditions which are described in the technical specifications
- Never open the generator while it is connected to the electrical power mains.
- Operate the generator always with the housing closed.
- For the connection of the RF output, use exclusively a fully intact cable without any flaws
- The RF cable has to be properly connected on both ends
- The RF cable shielding has to be grounded on both ends (generator and load side)

Section 3.5 Radio frequency hazards



DANGER: Radio-frequency hazard

In the vicinity of the generator, high-frequency electromagnetic fields are present which pose a health risk.

Electromagnetic fields are present within the generator as well as at the RF output of the generator.

High-frequency electromagnetic fields are absorbed by biological organisms and might have an impact on them. The thermal effect of electromagnetic fields is proven. If certain levels of field strength are exceeded, damage to the human body is possible.

If certain levels are exceeded, electromagnetic fields can interfere with the environment and may have an influence on the function of electrical devices, for example heart pace makers or other electronic devices which are implanted into the human body.

3.5.1 Protective measures by the manufacturer

The generator is built into a closed metallic housing.

This measure ensures that electromagnetic fields, which are present outside of the generator, are reduced to a level which excludes bodily damage as well as interference with electrical devices.

However, these protective measures cannot prevent the occurrence of high electromagnetic fields on the load side (e. g. within the plasma chamber). The effective reduction of this hazard remains the responsibility of the user, i. e. **YOUR RESPONSIBILITY**.

3.5.2 Safety instructions for the user

The following instructions have to be observed by the user at all times:

- Employ the generator exclusively within the conditions which are described in the technical specifications
- Never open the generator while it is connected to the electrical power mains.
- Operate the generator always with the housing closed.
- For the connection of the RF output, use exclusively a fully intact cable without any flaws
- The RF cable has to be properly connected on both ends
- The RF cable shielding has to be grounded on both ends (generator and load side)
- Take appropriate precautions against electrostatic discharge

Section 3.6 Further safety instructions

3.6.1 Inspection prior to installation

Prior to installation, ensure that the shipping container does not show evidence of damage. If damage is evident, follow your company's procedure for damage claims.



WARNING: A damaged RF generator may result in health hazards

Section 3.7 Interlock circuit

3.7.1 General information on interlocks



YXLON International RF products only include interlocks when required by product specification. Interlocks in YXLON International products are not intended to meet or satisfy safety requirements. Where interlocks exist, you must still meet and satisfy safety requirements. The presence of interlocks does not imply operator protection.

Cito generators have an interlock switch at the RF output which disables RF power if it is open. It is actuated by appropriately connecting an RF cable to the output of the generator. If the cable is missing or inappropriately connected, the interlock switch is open and RF power is disabled.

All cito generators have an **Interlock** interface (part of the user port and match control options). This interface allows the user to integrate any cito generator into a system interlock loop that can interrupt the delivered RF power. Even if you decide to not connect this cito generator into a larger system interlock loop, you must make the proper interlock loop connections for the unit to enable RF power.

The cito generator is shipped with an interlock jumper dummy plug that provides a connection between the interlock pins. This plug can be used to satisfy the interlock and enable operation in situations where it is not intended to connect the user port.



DANGER!

Using the interlock jumper plug disables the interlock function. Dangerous situations can result if the generator is allowed to supply power into the user's system with inadequate safety precautions.

3.7.2 Interlock devices in the customer's system

Whenever the RF generator is connected to the customer's system, any applicable interlock circuitry must be connected to the generator in a way which under all circumstances disables the power source as soon as the interlock circuit is interrupted.



WARNING: Disabling, bypassing, or modifying the interlock chain to the generator partially or completely, can lead to severe injury or death to the operator.

On a plasma processing tool, interlock protection devices / switches might be located at the RF input of the impedance matching network, within the impedance matching network, and at the mounting surface of the matching network towards the plasma chamber. Such devices can be included in the interlock string on the RF generator's user port to disrupt RF power if any of the interlocks is tripped.

Section 3.8 Lockout and tagout RF power to the unit

Prior to performing maintenance, repair or any other service operation on the RF delivery system (RF generator, matching network, and/or RF input of the plasma chamber), the RF generator must be locked out and tagged out to prevent powering up the unit by accident.



WARNING: The lockout device has to stay in place until the service operation is completed and the system is ready to be powered up and to be operated.

Section 3.9 Service and maintenance

There are no user or operator serviceable parts inside this equipment. Refer all service or repair of internal components to a qualified YXLON International service technician or engineer.



Service and maintenance of an YXLON International RF generator must always be performed by qualified and trained personnel.



Breaking the tamper seal of RF generator will make the warranty void.

Section 3.10 Responsibility of the user

The generator is designed such as to fulfill the applicable EC directives, in particular the EMC directive with its limits for radiated emission according to EN 55011.

The operating company is responsible for the conformance with the applicable laws at the work place.

As a result of integrating the generator into an industrial installation, e. g. a plasma processing tool, changes might be caused which can only be verified by specific on-site measurements. The execution of such measurements is the responsibility of the manufacturer or the operating company of the industrial installation.

Section 3.11 Emergency procedures

In an emergency, immediately perform the following actions in the sequence given below:

1. Turn-off the external circuit breaker of the generator
2. Extinguish fires with a suitable extinguishing medium



CAUTION: High Voltage

Due to the high-voltages present, never use water but a different suitable extinguishing medium to extinguish fires.

Section 3.12 Limiting conditions

Table 3-1: *cito limits*

Limit	Unit Response and User Resolution
RF power limit	When the cito reaches the forward or reflected power limit, the unit reduces forward power to remain within the limits. Output is not at set point.
Over temperature	When the cito exceeds the specified maximum internal operating temperature, it shuts off RF power, and the unit displays an error code. RF power does not return without user action.
DC limit	When the voltage or current exceeds the limit of the internal SMPS, the unit reduces forward power to remain within the limits. Output is not at set point.
External Pulse frequency limit	When the external pulse signal exceeds the limit of the specified pulse widths, the cito controller displays a warning and modifies the pulse within the allowed limits.

Chapter 4 Product compliance

The following sections include information about unit compliance and certification, including the conditions of use required to be in compliance with the standards and directives.

Section 4.1 Product certification

The product complies with the following standards and directives:

- CE conformity
- 2004/108/ EC (EMC directive):
 - EN55011:2009 (RF emission characteristics)
 - EN61000-6-2:2005 (Immunity standard)
- 73/23/EEC (Low voltage directive):
 - EN61010-1:2010 (Safety)

Testing was performed at external laboratories; CE marking is done according to self-assessment by YXLON International Corporate Compliance.

For more information, refer to the CE declaration of conformity in Appendix D.



This equipment must be installed and used in accordance with the Conditions of Use described in this manual. If this equipment is expanded, modified, or installed into a larger system, the user is responsible to guarantee the compliance of the overall system. If this equipment is used with external components, the user must ensure that the Safety and EMC requirements are not violated.

Section 4.2 Electromagnetic compatibility (EMC) directives and standards

Table 4-1: Electromagnetic compatibility (EMC) directives and standards

Reference Number	Description
2004/108/EC	EC council directive on the approximation of the laws of the Member States relating to electromagnetic compatibility
EN 55011:2009	Industrial, scientific, and medical (ISM) radio-frequency equipment—Radio disturbance characteristics—Limits and methods of measurement (Classification of RF generators: Class A, Group 2)
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments

Section 4.3 Safety directives and standards

Table 4-2: Safety directives and standards

Reference Number	Description
2006/95/EC	EC Council directive on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits (LVD - Low Voltage Directive)
EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

Chapter 5 Product overview and theory of operation

This chapter is intended for all persons who are installing, operating or maintaining a cito Air Cooled RF generator according to this user manual. It contains general information about the product and its operation.

Section 5.1 Product description

The cito Air Cooled RF generator is an adjustable source of radio-frequency power into a 50 Ohm load.

It is operated either by direct operator input or via an external control system.

The cito Air Cooled is a high efficient power generator for radio frequency (RF) and is designed as an energy source for plasma excitation.

Typical applications include sputtering, reactive ion-etching, RF bias, plasma polymerization, plasma surface treatment and thin film deposition.

This RF generator employs latest technology circuitry in a compact standard 19“ rack-mountable design.

Section 5.2 Control modes

You can control the cito using either of the following methods:

- Remotely, using the analog/digital user port.
- Remotely, using digital communication ports such as RS232, Ethernet TCP/IP, or any module plugged into the Anybus Module slot (optional)
- Manually, using the front panel display with its easy to use menu.

For operation instructions, see Chapter 7.

Section 5.3 Required supplies and interfaces

The cito generator operates from a 1-phase 230VAC, 50-60 Hz power source. The cito generator is air-cooled and has all power and interface connections at the rear side of the generator.

Section 5.4 Self-protection of the product

The generator has several self-protection conditions. All errors are visible on the LC Display on the front panel or can be monitored via the analog/digital user port or digital remote interfaces. cito generators use a protection circuit that checks the real limits for a safe and reliable operation, including:

- Excessive DC power
- Reflected RF power
- Excessive forward RF power
- Excessive pulse length
- Thermal overload

Section 5.5 Theory of operation

The cito Air Cooled RF generator includes following functional blocks:

- Digital controller with host port interfaces
- Analog and digital user port
- Sensor Electronics
- Driver / Exciter RF section
- RF power amplifier (PA section)
- RF power measurement

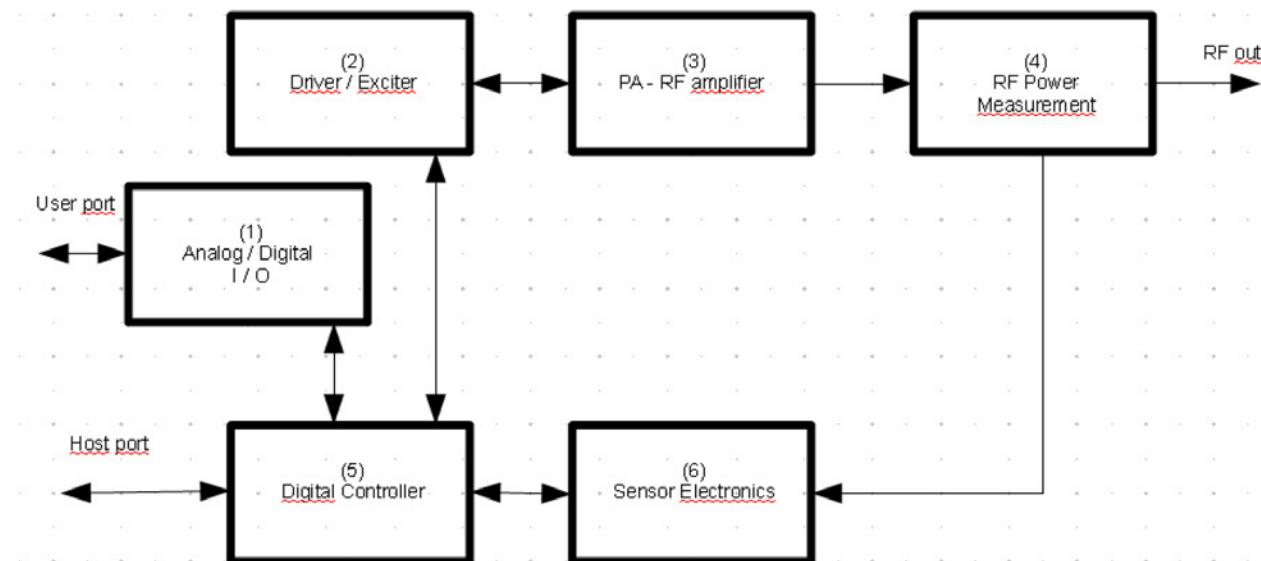


Figure 5-1: cito theory of operation block diagram

Chapter 6 Installation

Section 6.1 Packaging

The shipping container is a double layered cardboard box.



Section 6.2 Unpacking the Unit

Inside the cardboard box, you will find the RF generator packed with all accessories. Please keep the packaging for a possible return shipment.



For best protection the product is embedded in form fitted foam.



Section 6.3 Visual Inspection

The customer is encouraged to make a thorough inspection of the shipping container for all YXLON International products BEFORE opening the box. Any evidence of damage to the shipping container should be documented (photographed and described in writing). Any claims of damage during shipping should be made to the shipper.

Once the shipping container is opened, the unit should be thoroughly inspected for:

- Cosmetic surface damage including scratches and other surface blemishes
- Any dents that may have been caused by damage during shipping
- Loose or missing screws and connectors

Finally, the customer should verify part and revision number on the product label.

Section 6.4 Accessories shipped with the product

Each RF generator is accompanied by the following parts:

- Printed user manual
- Interlock jumper plug
- For water-cooled units: 2 mating nuts for the inlet and outlet fittings
- Air-cooled: Mains cable with CEE 7/4 & IEC 60320 C13 connectors

If any of these items should be missing upon receipt, or if they cannot be found for other reasons, please contact customer service for a replacement.

Section 6.5 Disposal of packaging material

The following materials are used in the packaging material of RF generators:

- Outer box / shipping container: double-layered cardboard
- Fixation parts for product: polyethylene foam

It is recommended to store the original package of the generator for later use, e. g. for returning the product to YXLON International for service, repair, or disposal.

If the package shall be disposed of, observe all local regulations regarding separation and disposal of the individual materials.

Section 6.6 Connection and Verification

All connections to the cito generator are made on the rear panel where all interfaces are located. The following photographs give an overview:

Rear panel view of air-cooled cito generator:



6.6.1 Sequence of installation

Upon connecting the RF generator, the following critical items need to be observed:



DANGER!

The following sequence for the installation of a cito RF generator must be observed. If the prescribed sequence is not followed, dangerous situations with risk of bodily injury or death might result.

The individual connections have to be made in the following sequence:

1. Connect earth ground
2. Connect generator interlock string to system control
3. Connect any applicable interfaces (user port, digital interfaces)
4. Connect cooling water (for water-cooled units)
5. Check for any leakage in the cooling water system (for water-cooled units)
6. Connect RF power cable to generator output
7. Connect AC mains

6.6.2 Connect earth ground



The generator is classified as protection class 1 equipment and requires a protective earth ground connection. This line is part of the mains cable.

In addition you have to use the earth ground connector terminal at the rear side of the generator chassis to install a redundant ground to the ground of your system. Ensure that the earth connection is set up appropriately. Use a wire with min. 2.5mm² cross section.

**DANGER!**

To avoid any dangerous situations during connecting to AC mains, the earth connection has to be in place as the first element during installation.



6.6.3 Connect generator interlock string to system control

The interlock string of the generator is within the 25-pin or 37-pin user port and should be handled by the system control



If there is no system interlock control please use the delivered interlock plug to satisfy the interlock



6.6.4 Connect applicable interfaces

Location of interfaces on air-cooled generators:



Depending on the customer's specific situation, systems control can be connected to the generator via the analog user port, via Ethernet, via the serial RS232 interface, or via an optional field bus (e. g. ProfiBus).

If the generator is operated together with a COMET matching network, the matching network has to be connected to the appropriately labeled connector via a special serial interface cable.

6.6.5 Connect RF power cable



Screw RF cable onto the connector of the RF generator until the interlock switch is fully depressed.



Make sure that low inductance, high conductivity conductors and connectors are used on all connectors.



Make sure that the RF cable connector is fully engaged and completely screwed onto the output connector of the generator such that it actuates the interlock switch at the generator output.



Make sure that the RF cable is connected also on the plasma-system side. The cable has to be grounded on both ends.

6.6.6 Connect AC mains



Use the delivered CEE 7/4 & IEC 60320 C13 mains cable to connect the generator to a power plug.



Ensure that the AC power connector is correctly installed and engaged into the easy assessable power outlet. If the AC connection is fixed without a plug, ensure that the connection to the power grid is only made by a qualified electrician. An external disconnecting device which disconnects all current-carrying conductors in shutdown mode must be installed in the power supply for the generator. The external disconnect device must confirm to standards IEC 60947-1 and IEC 60947-3. It must not be installed in the mains cable, easily accessible by the user and marked as the disconnecting device for the equipment. A switch or circuit breaker shall not interrupt the protective conductor.

6.6.7 Ventilation



Ensure that there is sufficient air flow possible to and from the generator. Fans and vent holes must not be covered by adjacent surfaces.

Chapter 7 Operation

Section 7.1 Modes of operation

Manual operation via the front panel: The generator is operated via the front panel

Remote-control operation via the user port: The generator is operated via the user port.

Remote-control operation via a digital interface: The generator is operated via one of the installed digital interfaces.

The cito generator can be parameterized to one operation mode exclusively or different control sources are valid simultaneous

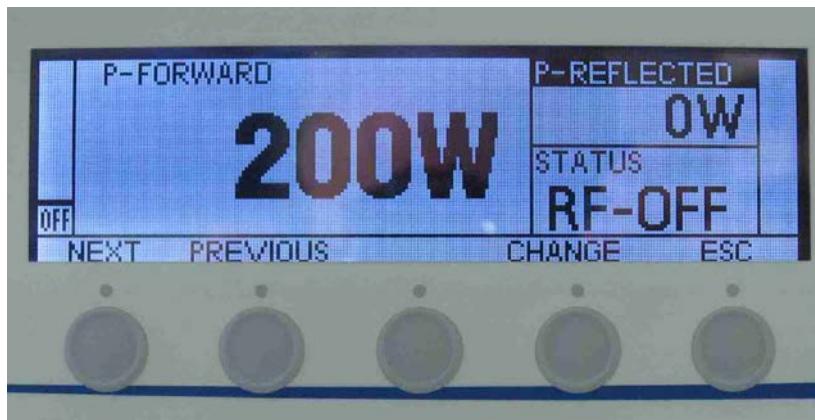
Section 7.2 Basic front-panel operation



1. Press the Main Power button
2. Adjust the power level through RF Control
3. Adjust the power level through RF Control
4. Monitor the output status
5. Record the Forward, Reflected powers, Match CT/CL positions if the RF doesn't ignite the plasma successfully

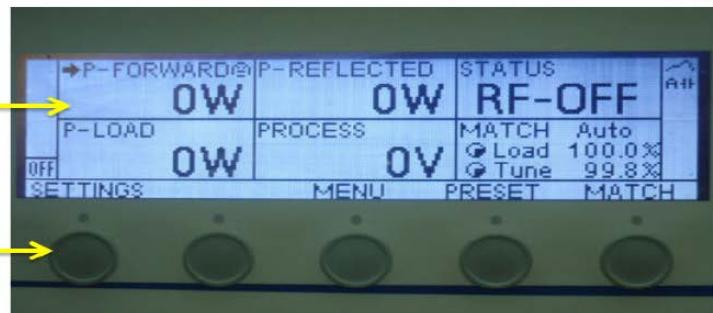
Section 7.3 Front-panel overview

The factory default front panel layout is with 3 data fields: P-FORWARD, P-REFLECTED and STATUS



The user can modify the front panel layout to 5 or 6 data fields via the Menu, see following example

- Status
 - P-FORWARD
 - P-REFLECTED
 - STATUS (ON or OFF)
 - P-LOAD
 - PROCESS (DC Bias)
 - MATCH Status
- Function Menu
 - SETTINGS
 - MENU
 - PRESET
 - MATCH (Only Active when match is connected)



Section 7.4 Basic operation via front-panel functions

7.4.1 Quick summary – RF Power Control

Basic Control of RF generator (cito)

	<p>RF power control of cito RF generator:</p> <ul style="list-style-type: none"> ➤ Adjust RF power level via “RF control” control pad ➤ Switch on the RF by pressing the “On” button ➤ Switch off the RF by pressing the “Off” button ➤ Get corresponding power readings (“P-FORWARD”, “P-REFLECTED” and “P-LOAD” from front display
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7.4.2 Quick summary – Set “Internal” Pulse Mode

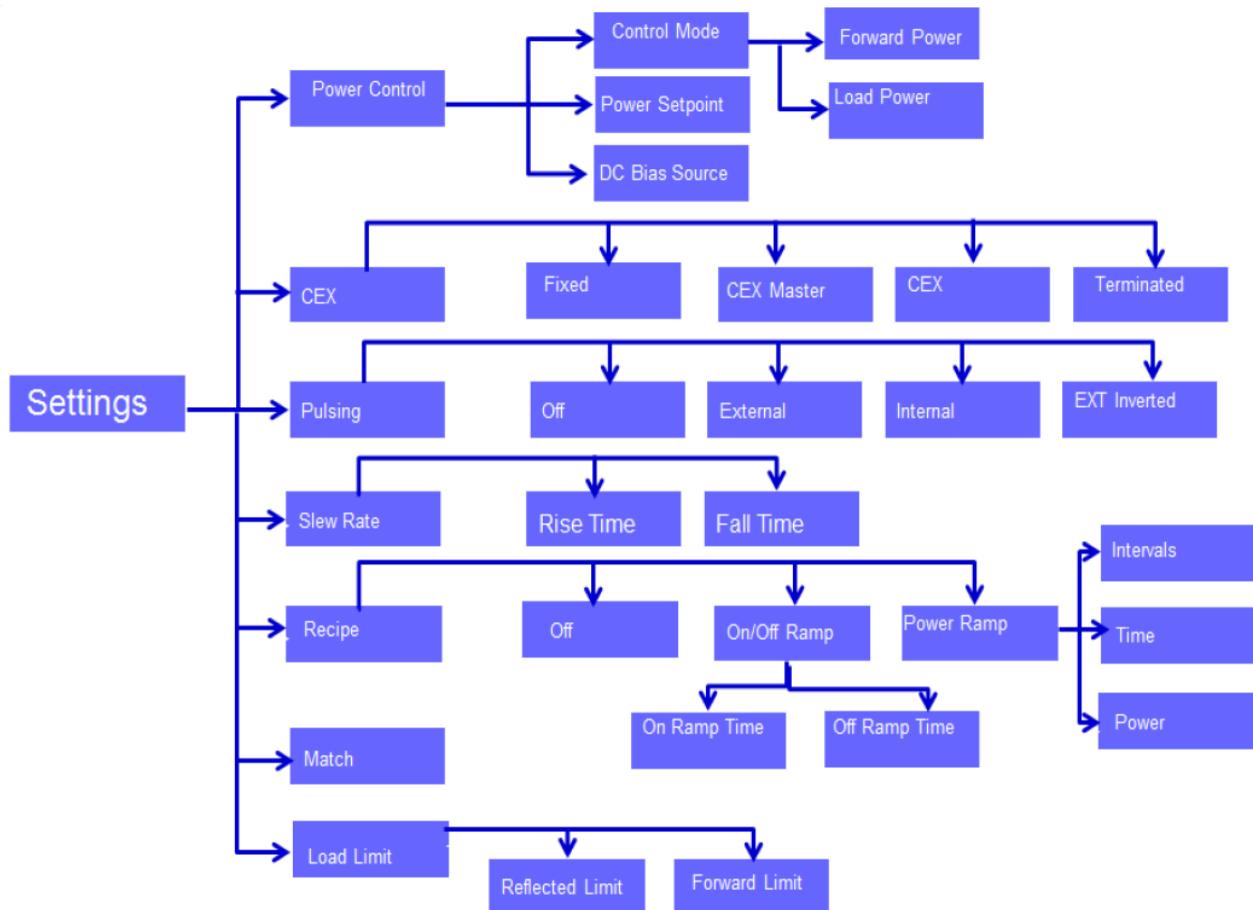
Activate Pulse Mode “Internal” of RF generator	
Settings → Pulsing → Pulse mode	
	<p>Select the following “Pulse mode” option:</p> <ul style="list-style-type: none"> ➤ “Internal”: Pulse mode is activated, cito takes its internally created pulse signal ➤ Default: “Off” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Pulsing → Pulse period	
	<p>Enter the “Pulse period” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “0.0333ms” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Pulsing → Duty cycle	
	<p>Description: “Duty cycle” defines the ratio [%] between “RF-ON” to “Cycle Period” A ratio of 60% means 60% RF-ON and 40% RF-OFF per cycle</p>
	<p>Enter the “Duty cycle” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “50.0%” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

7.4.3 Quick summary – Control of “Matching Network”

Basic Control of Matching Network	
	<p>If Matching Network is connected:</p> <ul style="list-style-type: none"> ➤ Control “Load” capacitor position with the two left arrows in section “Load Match Cap. Tune” ➤ Control “Tune” capacitor position with the two right arrows in section “Load Match Cap. Tune”

Section 7.5 Description of all front-panel functions

7.5.1 Settings Menu Overview



Settings Menu

1. Power Control: Set output power mode and DC bias source
2. CEX: Set for multi-RF operation
 - Fixed: Single RF operation
 - CEX Master: CEX signal output for multi-RF operation
 - CEX: CEX for multi-RF operation
 - CEX Terminated: CEX signal termination for multi-RF operation
 - Example: To run 3 Citos in CEX, set CEX master for 1st RF, CEX for 2nd RF and CEX Terminated for 3rd RF
3. Pulsing: Control output in pulsing mode
4. Slew Rate: Program output raising & falling edge of RF power
5. Recipe: Set the On/Off Ramp & Power Ramp to create a specific output profile
6. Load Limit: Set the Forward & Reflected power limits
7. Match: Same as described in Page 7

7.5.2 Settings - Power Control

Settings → Power Control	
Settings → Power Control → Control mode	
	<p>Select one of the following “Control modes”:</p> <ul style="list-style-type: none"> ➤ “Forward power”: RF generator sets output forward power acc. to input of “Power set point” ➤ “Load power”: RF generator will deliver the requested RF power (Power set point = Pforw. – Prefl.) ➤ “Process control”: The output power will be regulated dependent on any external process parameter (e.g. DC bias voltage) ➤ Default: “Forward power” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Power Control → Power set point	
	<p>Enter the power set point:</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “0 W” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

7.5.3 Settings - CEX

Settings → CEX	
	<p>Description: CEX operating mode allows to operate a certain number of cito RF generators in a master-slave configuration.</p>
Settings → CEX → Frequency mode	
	<p>Select one of the following “Frequency modes”:</p> <ul style="list-style-type: none"> ➤ “Fixed”: using the internal, fix oscillator frequency ➤ “Fixed CEX Master”: cito operates as “Master” in a CEX group (one master and up to four slaves) CEX BNC connector at rear of RF generator delivers the CEX master clock ➤ “CEX”: cito operates as “Slave” in a CEX group (one master and up to four slaves) CEX BNC connector at rear of RF generator requires the input of the CEX master clock ➤ “CEX terminated”: cito operates as “Last Slave” in a CEX group (one master and up to four slaves) CEX BNC connector at rear of RF generator requires the input of the CEX master clock ➤ Default: “Fixed” ➤ Confirm with “OK”

- Return to upper menu with “ESC”

7.5.4 Settings - Pulsing

Settings → Pulsing	
	Description: The RF generator can be operated in the CW-mode (continuous wave) or in a pulse mode (RF output signal is pulsed)
Settings → Pulsing → Pulse mode	
	<p>Select one of the following “Pulse mode” options:</p> <ul style="list-style-type: none">➤ “Off”: Pulse mode is switched off➤ “External”: Pulse mode is activated, cito gets the external pulse signal via the “Sync Bus Interface”➤ “Internal”: Pulse mode is activated, cito takes its internally created pulse signal➤ “External inverted”: Pulse mode is activated, cito inverts the external pulse signal provided via the “Sync Bus Interface”➤ Default: “Off”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

Settings → Pulsing (Pulse mode = “Off”, “External” or “External inverted”)	
Settings → Pulsing → Duty cycle high res	
	<p>Enter the “Duty cycle high res” (0% ... 99.9%):</p> <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “50%”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
Settings → Pulsing → Duty cycle select	
	<p>Select one of the “Duty cycle select” options:</p> <ul style="list-style-type: none">➤ “Low res”: Duty cycle can be entered in 0.1 increments➤ “High res”: Duty cycle can be entered in 0.01 increments➤ Default: “Low res”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

Settings → Pulsing (Pulse mode = “Internal”)**Settings → Pulsing → Pulse period**

	Enter the “Pulse period” within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “0.0333ms”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
--	--

Settings → Pulsing → Duty cycle

	Description: “Duty cycle” defines the ratio [%] between “RF-ON” to “Cycle Period” A ratio of 60% means 60% RF-ON and 40% RF-OFF per cycle
--	--

	Enter the “Duty cycle” within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “50.0%”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
--	---

Settings → Pulsing → Duty cycle high res

	Enter the “Duty cycle high res” within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “50.00%”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
--	---

Settings → Pulsing → Duty cycle select

	Select one of the “Duty cycle select” options: <ul style="list-style-type: none">➤ “Low res”: Duty cycle can be entered in 0.1 increments➤ “High res”: Duty cycle can be entered in 0.01 increments➤ Default: “Low res”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
--	---

7.5.5 Settings - Slew Rate

Settings → Slew Rate	
	Description: The slew rate defines the power-up resp. power-down time
Settings → Slew Rate → Rise time	
	<p>Enter the “Rise time” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “0.000s”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
Settings → Slew Rate → Fall time	
	<p>Enter the “Fall time” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “0.000s”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

7.5.6 Settings - Recipe

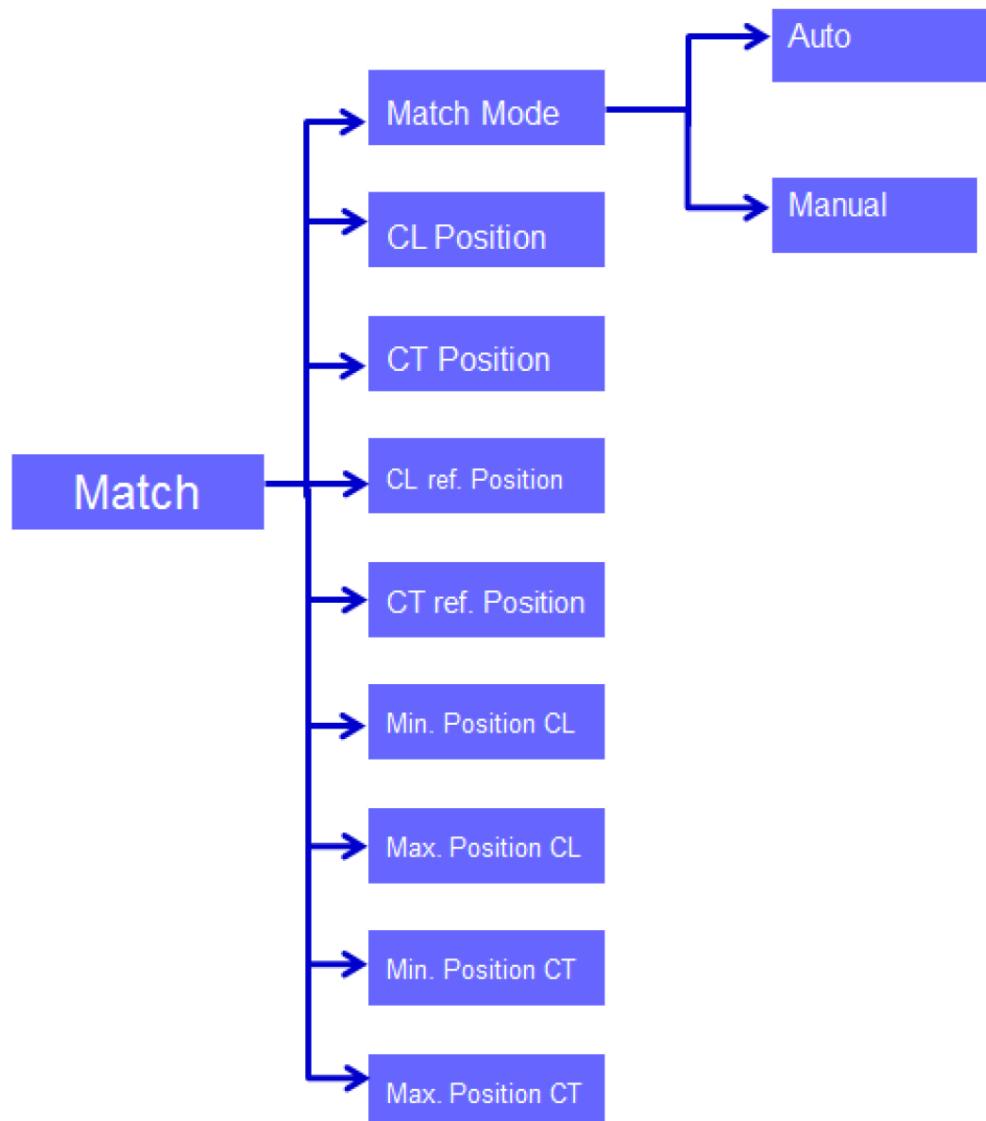
Settings → Recipe	
	Description: The user can create his own power recipe
Settings → Recipe → Recipe mode	
	<p>Select one of the “Recipe mode” options:</p> <ul style="list-style-type: none">➤ “Off”: No recipe selected➤ “RF on/off ramp”➤ “Power ramping”➤ Default: “Off”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

7.5.7 Settings – Load Limits

Settings → Load Limits	
	Description: “Load Limits” defines power limitation (forwarded and reflected)
Settings → Load Limits → RF on time	
	<p>Description: “RF on time” defines the maximum time that RF remains on (select 0s if RF shall remain on until RF is switched off)</p> <p>Enter the “RF on time” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “0.0s” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Load Limits → Forward power limit	
	<p>Enter the “Forward power limit” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “6500W” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Load Limits → Reflected power limit	
	<p>Description: RF power will be limited once reflected power exceeds the reflected power limit</p> <p>Enter the “Reflected power limit” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “1200W” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
Settings → Load Limits → Reflected threshold	
	<p>Description: TBD</p> <p>Enter the “Reflected threshold” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “1200W” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

Settings → Load Limits → Reflected shutoff

	Description: RF power will be switched off automatically once reflected power exceeds the reflected shutoff limit
	<p>Enter the “Reflected shutoff” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “0.0s” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

7.5.8 Settings – Match-mode – Overview

Match

Match Mode: Tuning mode (Automatic or manual)

CL/CT Position: CL/CT actual position (0%-100%)

CL/CT ref. Position: CL/CT default position

Min. Position CL/CT: CL/CT minimum position

Max. Position CL/CT: CL/CT maximum position

Settings → Match-mode	
	Description: "Match-mode" allows to set various parameters of the matching network (if connected)
Settings → Match-mode → Matching mode	
	Description: "Matching mode" defines the various modes of operation of the matching network (if connected)
	Select one of the "Matching mode" options: <ul style="list-style-type: none">➤ "Manual": Matching network is in manual mode (error signals from phase-mag detector are disabled – matching network will not tune for minimum reflected power)➤ "Auto": Matching network is in auto-control mode (error signals from phase-mag detector are enabled - matching network will tune for minimum reflected power)➤ Default: "Auto"➤ Confirm with "OK"➤ Return to upper menu with "ESC"

Settings → Match-mode → Matching error handling

	Description: "Matching error handling" defines the reaction of the RF generator when receiving an error from the matching network (if connected)
	Select one of the "Matching error handling" options: <ul style="list-style-type: none"> ➤ "Ignore": Ignores the error message received from the matching network ➤ "Error": TBD ➤ "Time out + error": TBD ➤ Default: "Error" ➤ Confirm with "OK" ➤ Return to upper menu with "ESC"

Settings → Match-mode → Prefl mode autoswitch

	Description: TBD
	Select one of the "Prefl mode autoswitch" options: <ul style="list-style-type: none"> ➤ "On": TBD ➤ "Off": TBD ➤ Default: "Off" ➤ Confirm with "OK" ➤ Return to upper menu with "ESC"

Settings → Match-mode → Prefl mode autoswitch val

	Description: TBD
	Enter the "Prefl mode autoswitch val" within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none"> ➤ Select digit using "Left" resp. "Right" button ➤ Enter digit using the "RF control" knob ➤ Default: "0.000W" ➤ Confirm with "OK" ➤ Return to upper menu with "ESC"

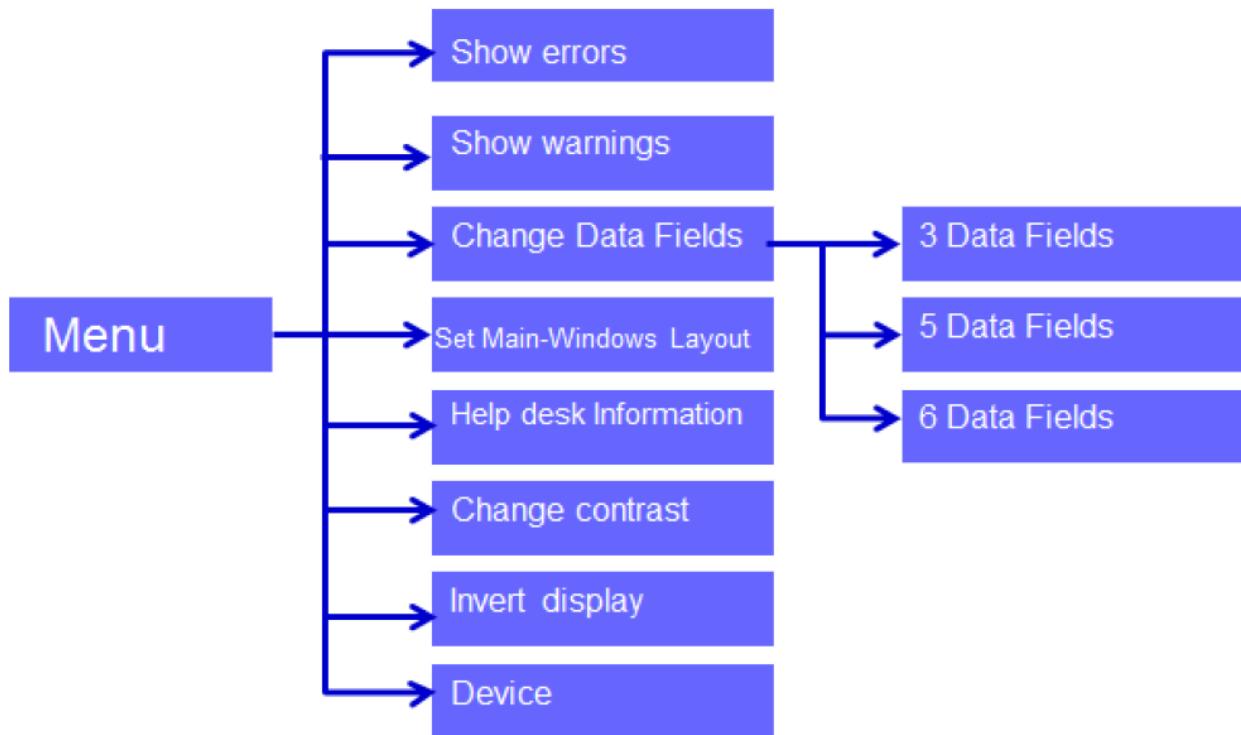
Settings → Match-mode → Prefl mode autoswitch time

	Description: TBD
	Enter the "Prefl mode autoswitch time" within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none"> ➤ Select digit using "Left" resp. "Right" button ➤ Enter digit using the "RF control" knob ➤ Default: "1000ms" ➤ Confirm with "OK" ➤ Return to upper menu with "ESC"

7.5.9 Settings – Match-position

Settings → Match-position	
	Description: “Match-position” allows to run the variable capacitors of the matching network to a certain position (if match connected)
Settings → Match- position → Act. C load position	
	Displays the actual position of load capacitor of matching network (if match connected)
Settings → Match- position → Act. C tune position	
	Displays the actual position of tune capacitor of matching network (if match connected)
Settings → Match- position → C load ref position	
	Description: “C load ref position” defines the preset position of the load capacitor of the matching network (if match connected)
	Enter the “C load ref position” within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “0.0%”➤ Confirm with “OK”➤ Return to upper menu with “ESC”
Settings → Match- position → C tune ref position	
	Description: “C tune ref position” defines the preset position of the tune capacitor of the matching network (if match connected)
	Enter the “C tune ref position” within the given range (refer to specification or limits shown on screen): <ul style="list-style-type: none">➤ Select digit using “Left” resp. “Right” button➤ Enter digit using the “RF control” knob➤ Default: “0.0%”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

7.5.10 Menu overview



Menu

1. Show errors: Check if any errors
2. Show warnings: Check if any warnings
3. Change Data Fields: Change the main display column
4. Set Main-Windows Layout: Change the main display format; 3, 5, & 6 data fields to select and show in the main display
5. Help desk Information: Check the contact information
6. Change contrast: Change the relative difference between the light and dark portions
7. Invert display: Invert the display
8. Device: Check the device information

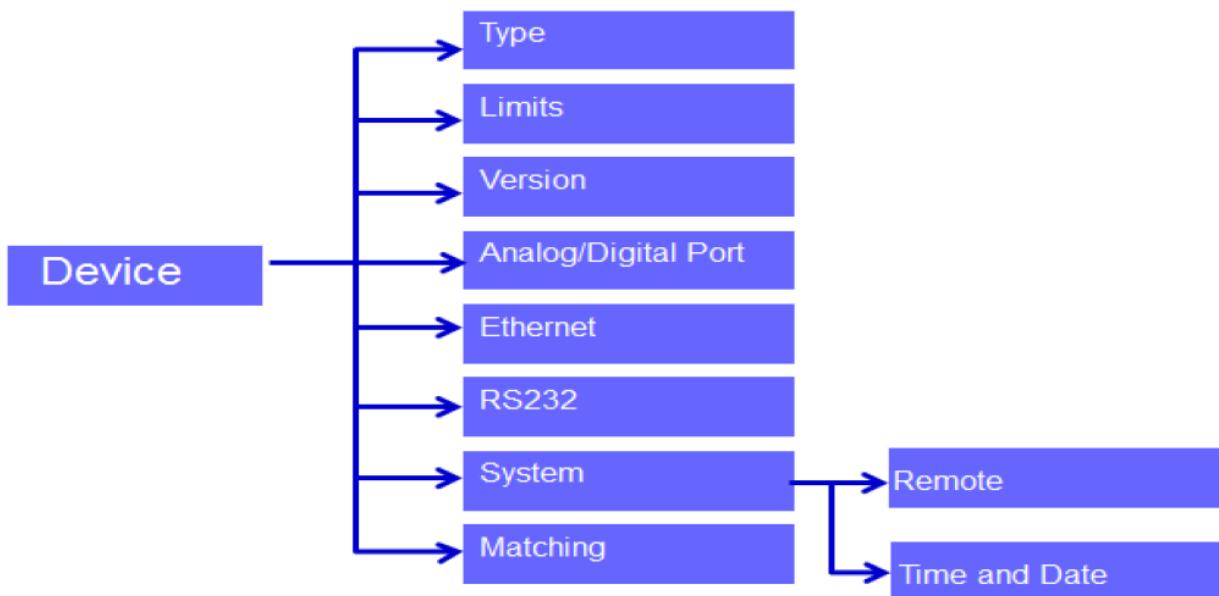
7.5.11 Menu – Show Errors

MENU → Show Errors	
	Description: Displays all errors (list is empty if there are no errors)

7.5.12 Menu – Show Warnings

MENU → Show Warnings	
	Description: Displays all warnings (list is empty if there are no warnings)

7.5.13 Menu – Device



Menu

1. Type: Check the RF type
2. Limit: Check the limitation
3. Version: Check the RF power version
4. Analog/Digital Port: Set the Analog/Digital Pin function
5. Ethernet: Check & set Ethernet function
6. RS232: Check & set RS232 (Baud rate, address)
7. System: Check & set the Time/Date and set the control source priority
8. Matching: Check matching box type & information

MENU → Device	
	Description: Allows to read-out several device parameters and limits
MENU → Device → Type	
	<p>Displays all relevant device type parameters such as:</p> <ul style="list-style-type: none"> ➤ “Model”: e.g. “cito” ➤ “Type”: e.g. “4060” ➤ “Serial number” of the RF generator ➤ “Nominal power”: e.g. “6500 W” ➤ “Nominal frequency”: e.g. “40680 Hz”
MENU → Device → Limits	

7.5.14 Menu – Device - Analog / Digital Port

MENU → Device → Analog / Digital Port

MENU → Device → Analog / Digital Port → Analog Outputs → Analog Output 1..8

	<p>Description: Select the analog signal which shall be applied to the corresponding analog output port</p>
	<p>Select one of the “Analog Output” options:</p> <ul style="list-style-type: none">➤ “RF Power”: Apply the “RF Power” signal to the selected analog port➤ “Forward Power”: Apply the “Forward Power” signal to the selected analog port➤ “Reflected Power”: Apply the “Reflected Power” signal to the selected analog port➤ “Load Power”: Apply the “Load Power” signal to the selected analog port➤ “Frequency”: Apply the “Frequency” signal to the selected analog port➤ “Match Tune Pos”: Apply the “Match Tune Pos” signal to the selected analog port➤ “Match Load Pos”: Apply the “Match Load Pos” signal to the selected analog port➤ “Process Monitor”: Apply the “Process Monitor” signal to the selected analog port➤ “5V”: Apply the +5VDC signal to the selected analog port➤ “10V”: Apply the +10VDC signal to the selected analog port➤ “Off”: Do not apply any signal to the selected analog port
	<ul style="list-style-type: none">➤ Default: Analog output 1: RF Power Analog output 2: Reflected Power Analog output 3: Process Monitor Analog output 4: Match Tune Pos Analog output 5: Match Load Pos Analog output 6: Off Analog output 7: Off Analog output 8: Off➤ Confirm with “OK”➤ Return to upper menu with “ESC”

MENU → Device → Analog / Digital Port → Analog Outputs → Analog 1..8 scaling

	Description: Select the scaling of the corresponding analog output signal
	<ul style="list-style-type: none"> ➤ Default: <ul style="list-style-type: none"> Analog 1 scaling: 100% Analog 2 scaling: 100% Analog 3 scaling: 100% Analog 4 scaling: 100% Analog 5 scaling: 100% Analog 6 scaling: 100% Analog 7 scaling: 100% Analog 8 scaling: 100% ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Analog / Digital Port**MENU → Device → Analog / Digital Port → Digital Outputs → Digital Output 1..7**

	Description: Select the digital signal which shall be applied to the corresponding digital output port
	<p>Select one of the “Digital Output” options:</p> <ul style="list-style-type: none"> ➤ “Ready Status”: Apply the “Ready Status” status to the selected digital port ➤ “Interl. satisfied”: Apply the “Interl. satisfied” status to the selected digital port ➤ “CEX locked”: Apply the “CEX locked” status to the selected digital port ➤ “Setpoint warn”: Apply the “Setpoint warn” status to the selected digital port ➤ “Error”: Apply the “Error” status to the selected digital port ➤ “Overtemp error”: Apply the “Overtemp error” status to the selected digital port ➤ “Matching active”: Apply the “Matching active” status to the selected digital port ➤ “AGS matching error”: Apply the “AGS matching error” status to the selected digital port ➤ “Warning”: Apply the “Warning” status to the selected digital port ➤ “RF On”: Apply the “RF On” status to the selected digital port ➤ “On”: Apply the “On” status to the selected digital port ➤ “Off”: Do not apply any status signal to the selected digital port
	<ul style="list-style-type: none"> ➤ Default: <ul style="list-style-type: none"> Digital output 1: Ready status Digital output 2: Interl. satisfied Digital output 3: CEX locked Digital output 4: Setpoint warn Digital output 5: Error Digital output 6: Overtemp error Digital output 7: Matching active ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Analog / Digital Port → Digital Outputs → Digital 1..7 scaling

	Description: Select whether the selected digital output signal shall be inverted or not
	<ul style="list-style-type: none"> ➤ Default: <ul style="list-style-type: none"> Digital 1 scaling: non inverted Digital 2 scaling: non inverted Digital 3 scaling: non inverted Digital 4 scaling: non inverted Digital 5 scaling: non inverted Digital 6 scaling: non inverted Digital 7 scaling: non inverted ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Analog / Digital Port → Analog Inputs → AIn 1..5 scaling

	Description: Select the scaling of the corresponding analog input signal
	<ul style="list-style-type: none"> ➤ Default: <ul style="list-style-type: none"> AIn 1 scaling: 100% AIn 2 scaling: 100% AIn 3 scaling: 100% AIn 4 scaling: 100% AIn 5 scaling: 100% ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Analog / Digital Port → Digital Inputs → DIn 1..6 scaling

	Description: Select whether the selected digital input signal shall be inverted or not
	<ul style="list-style-type: none"> ➤ Default: <ul style="list-style-type: none"> DIn 1 scaling: non inverted DIn 2 scaling: non inverted DIn 3 scaling: non inverted DIn 4 scaling: non inverted DIn 5 scaling: non inverted DIn 6 scaling: non inverted ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

7.5.15 Menu – Device - Ethernet

MENU → Device → Ethernet	
MENU → Device → Ethernet → TCP/IP	
MENU → Device → Ethernet → TCP/IP → Current IP address	
	Displays the actual IP address of the RF generator:
MENU → Device → Ethernet → TCP/IP → IP address	
	<p>Enter the “IP address” of the RF generator:</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “169.254.1.1” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → Ethernet → TCP/IP → Net mask	
	<p>Enter the “IP address” of the RF generator:</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “0.0.0.0” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → Ethernet → TCP/IP → Gateway	
	<p>Enter the “Gateway” of the RF generator:</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “0.0.0.0” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → Ethernet → TCP/IP → DNS	
	<p>Enter the “DNS” of the RF generator:</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “0.0.0.0” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Ethernet → TCP/IP → Host Name

	Enter the “Host Name” of the RF generator: <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Ethernet → TCP/IP → Domain Name

	Enter the “Domain Name” of the RF generator: <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob
	<ul style="list-style-type: none"> ➤ Default: “” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Ethernet → UPnP**MENU → Device → Ethernet → UPnP → UPnP mode**

	Description: TBD
	Select the “UPnP mode” of the RF generator: <ul style="list-style-type: none"> ➤ “Off”: TBD ➤ “Active”: TBD ➤ “Passive”: TBD
	<ul style="list-style-type: none"> ➤ Default: “Active” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → Ethernet → Mac address

	“Mac address” cannot be changed manually
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7.5.16 Menu – Device – RS232/Fieldbus/SD-Card

MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter	
MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter → Protocol	
	<p>Select the “Protocol” for RS232 communication:</p> <ul style="list-style-type: none"> ➤ “Modbus RTU” ➤ “Off”
	<ul style="list-style-type: none"> ➤ Default: “Modbus RTU” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter → Baud Rate	
	<p>Select one of the predefined “Baud Rate” of the RF generator:</p> <ul style="list-style-type: none"> ➤ “2400 bps”, “4800 bps”, “9600 bps”, “19200 bps”, “38400 bps”, “57600 bps”, “115200 bps”
	<ul style="list-style-type: none"> ➤ Default: “115200 bps” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter → Data Bits	
	<p>Select one of the predefined number of “Data Bits” of the RF generator:</p> <ul style="list-style-type: none"> ➤ “7” or “8”
	<ul style="list-style-type: none"> ➤ Default: “8” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter → Parity	
	<p>Select one of the predefined “Parity” of the RF generator:</p> <ul style="list-style-type: none"> ➤ “No” ➤ “Even” ➤ “Odd”
	<ul style="list-style-type: none"> ➤ Default: “Even” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → RS232 Parameter → Stop Bits	
	<p>Select one of the predefined number of “Stop Bits” of the RF generator:</p> <ul style="list-style-type: none"> ➤ “1” or “2”
	<ul style="list-style-type: none"> ➤ Default: “1” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter	
MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter → Bustype	
	“Bustype” cannot be changed manually
MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter → Address	
	<p>Enter the “Address” within the given range (refer to specification or limits shown on screen):</p> <ul style="list-style-type: none"> ➤ Select digit using “Left” resp. “Right” button ➤ Enter digit using the “RF control” knob ➤ Default: “3” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter → Profibus protocol	
	<p>Select the “Profibus Protocol” for Fieldbus communication:</p> <ul style="list-style-type: none"> ➤ “Protocol SHFT”: TBD ➤ “Protocol cus1” : TBD ➤ “Protocol cus2” : TBD
	<ul style="list-style-type: none"> ➤ Default: “Protocol SHFT” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter → Cus1.2: ignore matchmode	
	<p>Enable or disable the “Cus1.2: ignore matchmode” communication protocol:</p> <ul style="list-style-type: none"> ➤ “On” ➤ “Off”
	<ul style="list-style-type: none"> ➤ Default: “Off” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → RS232/Fieldbus/SD-Card → Fieldbus Parameter → Cus1.2: ignore setpoint	
	<p>Enable or disable the “Cus1.2: ignore setpoint” communication protocol:</p> <ul style="list-style-type: none"> ➤ “On” ➤ “Off”
	<ul style="list-style-type: none"> ➤ Default: “Off” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → RS232/Fieldbus/SD-Card → SD-Card Parameter
MENU → Device → RS232/Fieldbus/SD-Card → SD-Card Parameter → Card detect
“Card detect” cannot be changed manually
MENU → Device → RS232/Fieldbus/SD-Card → SD-Card Parameter → Fat mount
“Fat mount” cannot be changed manually

7.5.17 Menu – Device – System

MENU → Device → System
MENU → Device → System → Remote
MENU → Device → System → Remote → Syn Bus
Description: Up to 110 citos can be synchronized using the “Sync Bus” connector on the rear of the RF generator. “Sync Bus” can trigger on events such as Arcing, RF On/Off, Pulse and Error
Select one of the “Sync Bus” options: <ul style="list-style-type: none"> ➤ “Off”: Sync Bus is disabled ➤ “Master” : Sync Bus of RF generator is set as master ➤ “Slave” : Sync Bus of RF generator is set as slave
<ul style="list-style-type: none"> ➤ Default: “Off” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
MENU → Device → System → Remote → Control source
Description: Defines or limits the way of remote / manually controlling the RF generator
Select one of the “Control source” options: <ul style="list-style-type: none"> ➤ “Each”: RF generator can be controlled via all interfaces ➤ “Front Panel”: RF generator can only be controlled via the front panel ➤ “Modbus-TCP”: RF generator can only be controlled via the Modbus-TCP interface ➤ “Modbus-RTU”: RF generator can only be controlled via the Modbus-RTU interface ➤ “Analog Port”: RF generator can only be controlled via the analog port ➤ “Fieldbus”: RF generator can only be controlled via the Fieldbus interface
<ul style="list-style-type: none"> ➤ Default: “Each” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Remote → RF on/off source

	Description: Defines or limits the way of switching on/off the RF generator
	<p>Select one of the “RF on/off source” options:</p> <ul style="list-style-type: none"> ➤ “No override”: TBD ➤ “Each”: RF generator can be switched on/off via all interfaces ➤ “Front Panel”: RF generator can only be switched on/off via the front panel ➤ “Modbus-TCP”: RF generator can only be switched on/off via the Modbus-TCP interface ➤ “Modbus-RTU”: RF generator can only be switched on/off via the Modbus-RTU interface ➤ “Analog Port”: RF generator can only be switched on/off via the analog port ➤ “Fieldbus”: RF generator can only be switched on/off via the Fieldbus interface
	<ul style="list-style-type: none"> ➤ Default: “No override” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Remote → Setpoints source

	Description: Defines or limits the way of setting the “Setpoint” (RF power) of the RF generator
	Selection as for “RF on/off source”
	<ul style="list-style-type: none"> ➤ Default: “No override” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Remote → Matching source

	Description: Defines or limits the way of setting the “Matching” parameters of the RF generator
	Selection as for “RF on/off source”
	<ul style="list-style-type: none"> ➤ Default: “No override” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Remote → Settings source

	Description: Defines or limits the way of setting the “Settings” parameters of the RF generator
	Selection as for “RF on/off source”
	<ul style="list-style-type: none"> ➤ Default: “No override” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Remote → Control mode source

	Description: Defines or limits the way of setting the “Control mode” parameters of the RF generator
	Selection as for “RF on/off source”
	<ul style="list-style-type: none"> ➤ Default: “No override” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

MENU → Device → System → Time and Date**MENU → Device → System → Time and Date → Time**

	Displays the actual time [hh:mm:ss]
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MENU → Device → System → Time and Date → Date

	Displays the actual date [yyyy-mm-dd]
--	---------------------------------------

MENU → Device → System → Time and Date → Set time

	Enter the actual time
--	-----------------------

MENU → Device → System → Time and Date → Set date

	Enter the actual date
--	-----------------------

MENU → Device → System → Time and Date → Time format

	Select one of the “Time format” options:
	<ul style="list-style-type: none"> ➤ “hh:mm:ss” ➤ “12:mm:ss PM” ➤ “hhmmss” ➤ “PM 12:mm:ss”

	<ul style="list-style-type: none"> ➤ Default: “hh:mm:ss” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
--	---

MENU → Device → System → Time and Date → Date format

	Select one of the “Time format” options:
	<ul style="list-style-type: none"> ➤ “yyyy-mm-dd” ➤ “mm/dd/yyyy” ➤ “dd/mm/yyyy” ➤ “dd.mm.yyyy”

	<ul style="list-style-type: none"> ➤ Default: “yyyy-mm-dd” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”
--	---

MENU → Device → System → Error handling**MENU → Device → System → Error handling → Error auto quit**

	Enable or disable the “Error auto quit” option: <ul style="list-style-type: none"> ➤ “On” ➤ “Off”
	<ul style="list-style-type: none"> ➤ Default: “Off” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

7.5.18 Menu – Device – Version**MENU → Device → Version**

	Displays the following “Version” information: <ul style="list-style-type: none"> ➤ “cito version” ➤ “User board” ➤ “Field bus board”
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7.5.19 Menu – Display Settings – Overview

This menu allows the user to change the displayed fields and the layout of the front panel LCD screen

7.5.20 Menu – Display Settings – Change Data Fields**MENU → Display Settings → Change Data Fields**

	Select the Front Panel Data Field that shall be changed – use the “NEXT” and “PREVIOUS” buttons to navigate. Hit the “CHANGE” button if you want to change a data field. Select one of the following “Data Field” options: <ul style="list-style-type: none"> ➤ “P-Forward” ➤ “P-Load” ➤ “P-Reflected” ➤ “Status” ➤ “Match” ➤ “Process Feedback” ➤ “Pulse Parameters”
	<ul style="list-style-type: none"> ➤ Confirm with “SELECT” ➤ Return to upper menu with “ESC”

7.5.21 Menu – Display Settings – Setup Menu-Window Layout

MENU → Display Settings → Setup Menu-Window Layout	
	Select the number of “Front Panel Data Fields”. <ul style="list-style-type: none"> ➤ “Select 3 Data Fields” ➤ “Select 5 Data Fields” ➤ “Select 6 Data Fields”
	<ul style="list-style-type: none"> ➤ Confirm with “SELECT” ➤ Return to upper menu with “ESC”

7.5.22 Menu – Display Settings – Change Contrast

MENU → Display Settings → Change Contrast	
	Adjust the contrast of the display using the “← -” and ”+ →” buttons.
	<ul style="list-style-type: none"> ➤ Set default contrast with “DEFAULT” ➤ Confirm with “OK” ➤ Return to upper menu with “ESC”

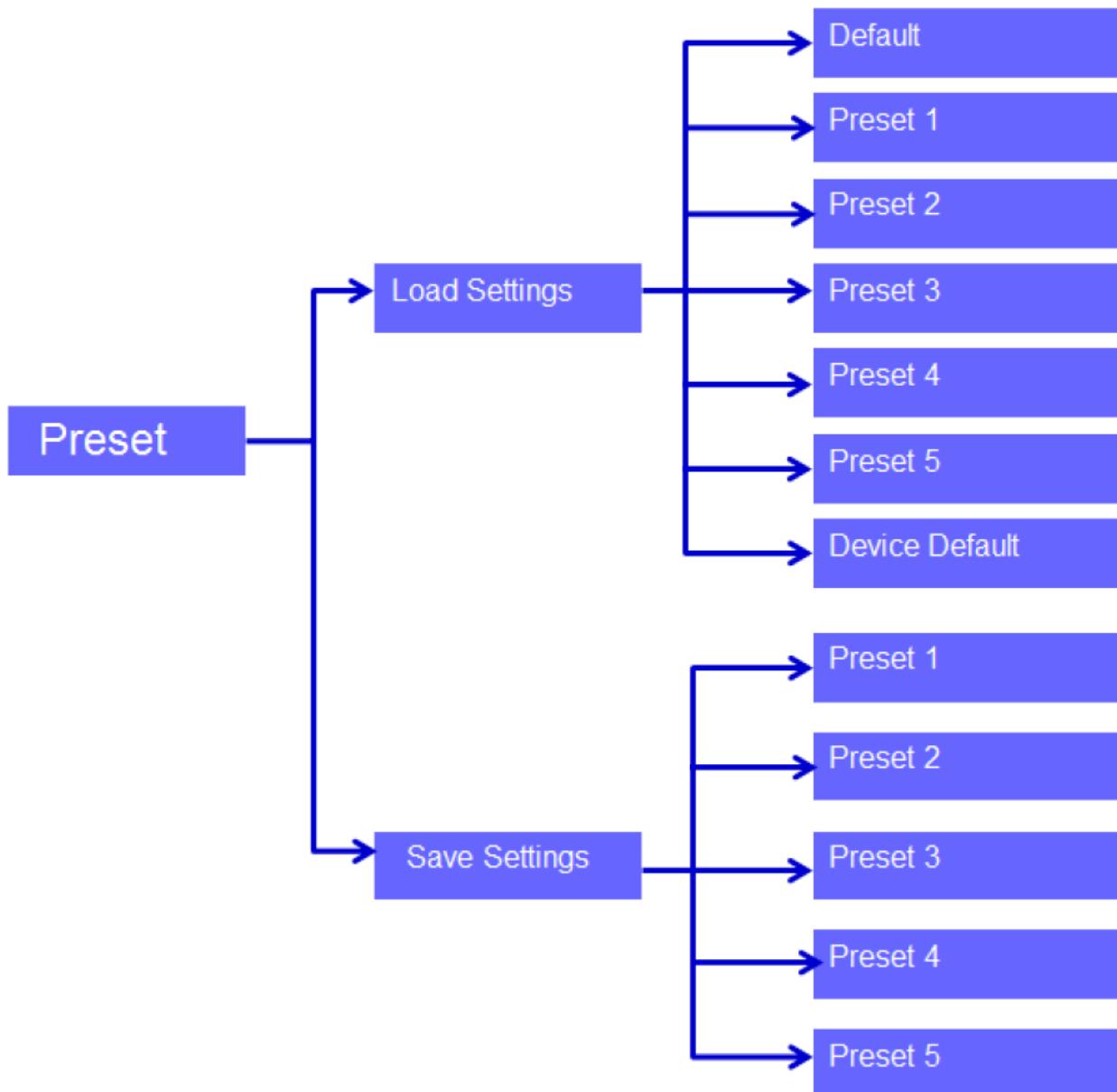
7.5.23 Menu – Display Settings – Invert Display

MENU → Display Settings → Invert Display	
	Invert the display
	<ul style="list-style-type: none"> ➤ Confirm with “SELECT” ➤ Return to upper menu with “ESC”

7.5.24 Menu – Help Desk Info

MENU → Help Desk Info	
	Shows several “Help Desk” information such as: <ul style="list-style-type: none"> ➤ “Telefone” ➤ “Telefax” ➤ “Email” ➤ “Internet” ➤ “Name” ➤ “Street” ➤ “ZIP/Town” ➤ “Country”
	<ul style="list-style-type: none"> ➤ Return to upper menu with “ESC”

7.5.25 Preset overview



Preset Menu

1. Load Setting: Load the parameters (operation mode & power level) from RF
2. Save Setting: Save the parameters (operation mode & power level) into RF

7.5.26 Preset – Load Settings

Preset → Load Settings

	<p>Select one of the following settings that shall be loaded:</p> <ul style="list-style-type: none">➤ “Default”: factory preset settings➤ “Preset 1”: Load settings which have been previously saved as “Preset 1”➤ “Preset 2”: Load settings which have been previously saved as “Preset 2”➤ “Preset 3”: Load settings which have been previously saved as “Preset 3”➤ “Preset 4”: Load settings which have been previously saved as “Preset 4”➤ “Preset 5”: Load settings which have been previously saved as “Preset 5”
	<ul style="list-style-type: none">➤ Default: “Default”➤ Confirm with “OK”➤ Return to upper menu with “ESC”

7.5.27 Preset – Save Settings

Preset → Save Settings	
	<p>Save settings in one of the following states:</p> <ul style="list-style-type: none">➤ “Preset 1”: Save all settings as “Preset 1”➤ “Preset 2”: Save all settings as “Preset 2”➤ “Preset 3”: Save all settings as “Preset 3”➤ “Preset 4”: Save all settings as “Preset 4”➤ “Preset 5”: Save all settings as “Preset 5”
	<ul style="list-style-type: none">➤ Confirm with “OK”➤ Return to upper menu with “ESC”

Section 7.6 Remote-control operation via the user port

The generator can be operated via the 37-pin user port. Please refer to section A.7.2 for the detailed pin-out of the user port.

Section 7.7 Remote-control operation via digital interface

The generator can be operated via the installed digital interfaces. Please refer to Section A.7 for detailed information on the available commands.

Chapter 8 Maintenance

There are no regular adjustments and maintenance to be performed on cito RF generators.

There are no user serviceable parts within the unit.

Any servicing has to be carried out by YXLON International technical support.

Prior to cleaning, switch off the mains supply! Use a mild cleaning agent with a moist cloth for cleaning. Never clean dripping wet!

Chapter 9 Troubleshooting Guide

This chapter contains basic troubleshooting information.

Before contacting Customer Support, follow the steps in General Troubleshooting.



DANGER!

Using the interlock jumper plug disables the interlock function. Dangerous situations can result if the generator is allowed to supply power into the user's system with inadequate safety precautions.

Section 9.1 General Troubleshooting

Prior to specific troubleshooting procedures, verify the following:

- Verify that you installed the cito according to the installation instructions in this manual. See "Installing the cito" on page 5-1.
- Verify that the AC Mains voltage is within specifications. See "Connecting AC mains and turning on the unit" on page 5-2.

Section 9.2 Checks with the power off

1. Ensure that the power to the unit is off.



DANGER! – RISK OF DEATH OR BODILY INJURY.

Disconnect and lockout/tagout all sources of input power before working on this unit or anything connected to it..

2. Check for visible damage to the unit, cables, and connectors.
3. Ensure that all unit connectors are installed correctly and fastened tightly.
4. Check to determine whether any system-related circuit breaker has been tripped.
5. Verify that the input power to the unit meets specifications.
6. Ensure ground connections are adequate and secure.

Section 9.3 Checks with the power on

1. Check the unit's input and remote power connections to ensure the proper power is being supplied to the unit.
2. Check the front panel display for errors (see Error codes).

Section 9.4 Error codes

All errors and warning messages are shown in the format: xxx (three decimal characters).

All errors turn off RF output and can be quitted as soon as the error condition revokes via front panel or remote control

Table 6-1. *Error codes*

Number	Error type	Issued by
0xx	depending on application	application
1xx	depending on application	application
2xx	surveillance errors	shft lib
3xx	user errors	shft lib/cito
4xx	depending on application	application
5xx	depending on application	application
6xx	depending on application	application
7xx	depending on application	application
8xx	initialization and hardware errors	shft lib
900-959	software errors	shft lib
960-999	software errors/depending on application	application

E101, NOT READY

There was an „RF on“ command while the device was not ready.

This error occurs if an RF on command was sent during a firmware update or while the device is still in initialization phase.

E160, NO MATCHING

There is no connection to a (AGS) matching. This is considered an error due to the current setting of parameter 8221.

Check matching connection and matching power supply. If you want to operate the generator without matching, change setting of parameter 8211 „matching error“.

The longer the pulse, the smaller the amplitude can be. Power * time. Area stays the same for each pulse.

E161, AGS CASE INTERLOCK

The connected AGS matching reports an error: The AGS case is not closed. This is considered an error due to the current setting of parameter 8221.

Close the cover of the AGS matching to operate matching and generator.

E162, AGS TEMPERATURE TOO HIGH

The connected AGS matching reports an error: Temperature too high. This is considered an error due to the current setting of parameter 8221.

Check matching inlet air temperature and RF fan.

E163, AGS HUMIDITY TOO HIGH

The connected AGS matching reports an error: Humidity too high. This is considered an error due to the current setting of parameter 8221.

Check matching for residues of water and dry matching before operation.

E163, AGS CPLD FAILURE

The connected AGS matching reports an error: CPLD failure. This is considered an error due to the current setting of parameter 8221.

E163, AGS CALIBRATION FAILURE

The connected AGS matching reports an error: Calibration data failure. This is considered an error due to the current setting of parameter 8221.

E163, AGS ELECTRONIC SUPPLY FAILURE

The connected AGS matching reports an error: Electronic supply failure. This is considered an error due to the current setting of parameter 8221.

E160, AGS MOVEMENT FAILURE

The connected AGS matching reports an error: Capacitor movement failure. This is considered an error due to the current setting of parameter 8221.

E201, INTERLOCK LOOP OPEN

Primary Interlock loop is not satisfied. The interlock was interrupted during RF on this causing an error shutdown

Check User port interlock connection.

E202, INTERLOCK 2 FAILURE

Secondary Interlock loop is not satisfied. The interlock was interrupted during RF on this causing an error shutdown

Check User port interlock connection 2.

E203, RF INTERLOCK FAILURE

RF connector Interlock is not satisfied. The interlock was interrupted during RF on this causing an error shutdown

Check RF connector and its interlock connection.

E205, MAINS FAILURE

Mains fault during RF on.

Check mains. Switching off the RF generator during RF on will cause this failure too.

E207, RF TEMPERATURE TOO HIGH

RF stage heat sink temperature exceeded its limit.

Ensure proper cooling (air flow, air temperature). Error can be reset only after device cooled down below warning level.

E208, SMPS TEMPERATURE TOO HIGH

Power supply temperature exceeded its limit.

This error can be disabled by setting Device.Surveillance.SMPS surveillance to “disable”. Then a warning with the same number is displayed instead of this error.

Ensure proper cooling (air flow, air temperature).

E219, REFLECTED LIMIT FAILURE

Reflected power limit controller failed. The reflected power was above the limit that the control was to keep.

Instable operation of the forward power control loop may cause this error. Measurement problems of forward or reflected power or DC voltage may cause instable operation.

E253, RF FREQUENCY ERROR

DDS output was high for more than twice the maximum on time.

When operating with CEX: Interrupted or highly distorted CEX signal could cause this failure. When operating with fixed frequency: DDS defective?

E254, DDS UNLOCKED

DDS was not in a stable operating point while RF was switched on.

Give system more time after changing frequency mode or switching on CEX frequency.

E255, CEX UNLOCKED

CEX was not in a stable operating point while RF was switched on.

Give system more time after changing frequency mode to CEX or switching on CEX frequency.

E257, CEX SIGNAL MISSING

No CEX frequency can be measured.

Connect common exciter (CEX) frequency.

E258, CEX FREQUENCY TOO HIGH

CEX frequency is higher than allowed.

Check specification and common exciter (CEX) frequency.

E259, CEX FREQUENCY TOO LOW

CEX frequency is lower than allowed.

Check specification and common exciter (CEX) frequency.

E260, CEX LEVEL TOO LOW

CEX signal has not enough amplitude to allow for save operation.

Check specification and common exciter (CEX) frequency.

E270, SYNCBUS SLAVE FAULT

The SyncBus master has detected a slave error during RF on.

A slave on the SyncBus had an error: eliminate reason for slave error and reset error at slave. Reset slave error at master afterwards.

E272, SYNCBUS TOO MANY MASTERS

The SyncBus master has detected an RF on or a pulse on signal on the SyncBus that was not set by itself.

This error is persistent and can be reset by power down, only!

Check SyncBus configuration on all devices at this SyncBus, check SyncBus cabling.

E273, SYNCBUS RF ON SIGNAL

A SyncBus master has detected an RF on signal on the SyncBus while the error signal was set. A SyncBus slave has detected an RF on signal on the SyncBus before it detected a master in RF off state.

This error is persistent and can be reset by power down, only!

Check SyncBus cabling. Detach devices one by one to identify a device with a defective transceiver. Switching on RF before all devices on the SyncBus are ready may cause this error, too.

E274, SYNCBUS PULSE SIGNAL

A SyncBus master or slave has detected a pulse on signal on the SyncBus while the error signal was set.

This error is persistent and can be reset by power down, only!

Check SyncBus cabling. Detach devices one by one to identify a device with a defective transceiver.

E275, SYNCBUS ERROR SIGNAL

A SyncBus master or slave has detected no error signal on the SyncBus while it tried to set the error signal.

This error is persistent and can be reset by power down, only!

Check SyncBus cabling. Detach devices one by one to identify a device with a defective transceiver.

E311, USER RF ON TIME REACHED

RF on time exceeded the user limit.

This error can be disabled by setting Settings.Load Limits.RF on time (Parameter 1701) to zero. A user set limit was reached. Ether the RF off command came too late or the limit was set to low. Check Settings.Load Limits.RF on time (Parameter 1701).

E312, USER REFLECTED SHUTOFF

The actual value of reflected power exceeded to user limit for more than the shutoff time set by the user.

This error can be disabled by setting Settings.Load Limits.Reflected shutoff (Parameter 1707) to zero.

A user set limit was reached. Ether to Process didn't work as expected to the limit was set too low. Check Settings.Load Limits.Reflected threshold (Parameter 1706) and Settings.Load Limits.Reflected shutoff (Parameter 1707).

Chapter 10 Repair of RF generators

This chapter contains information on the repair of cito RF generators.

Section 10.1 General instructions

Cito RF generators can be sent back to YXLON International for repair if they are found to have malfunctions.

Before returning any product for repair and/or adjustment, first follow all troubleshooting procedures.

If, after following these procedures, you still have a problem, or if the procedure instructs you to, contact YXLON International Technical Support and discuss the problem with a representative. Be prepared to give them the model number and serial number of the unit as well as the reason for the proposed return.

This consultation call will allow Technical Support to determine if the unit must actually be returned for the problem to be corrected

For more detailed information about the product warranty and return policy, see section "Warranty Statement and Terms" (Appendix B).

Section 10.2 Administrative procedures

Before returning a cito RF generator to YXLON International, please contact our Technical Support group to receive:

- RMA (reject material analysis) number
- Problem statement form

Completed problem statement forms are required to initiate any failure analysis activities. Generators shipped without problem statements will likely experience delays in processing.

The customer is also required to provide a Purchase Order for an amount not to exceed \$500.00. This purchase order will cover the cost of evaluating a failure should the warranty not be in effect on the product. If the product is deemed to be under warranty, no evaluation charges will be processed.

For a warranty claim to be valid, it must:

- be made within the applicable warranty period (see Appendix B)
- include the product serial number and a full description of the circumstances giving rise to the claim
- have been assigned a reject material authorization number by YXLON International Technical Support

Section 10.3 Authorized repair locations

No third parties are authorized to repair YXLON International products. Any attempt, by any third party, to repair an YXLON International product will immediately void the warranty.

Upon receipt of an RMA number request, YXLON International will assign the repair site to which a defective or malfunctioning unit has to be returned.

Section 10.4 Shipment of RMA units

All products must be returned to the YXLON International facility (or partner facility) as directed by the Technical Support Team. All products must be packaged in the original packaging to avoid compromising any remaining product warranty due to damage caused by insufficient packaging. YXLON International will not be responsible for damage incurred in shipping if any other than the original packaging is used.

Section 10.5 Failure analysis of returned units

Upon request, YXLON International will perform a failure analysis of a repair unit. Depending on the results of the analysis and the warranty decision, the cost for the evaluation will either be charged to the customer or will be covered by YXLON International.

Section 10.6 Claims of shipping or handling damage

In order to claim shipping or handling damage, you must inspect the delivered goods and report such damage to YXLON International within 3 days of your receipt of the goods.

If the outer packaging of the product is visibly damaged, you have to make your claim of shipping or handling damage immediately upon receipt of the goods with the transport agent (see Section 6.3).

Failing to report any damage within this period is the same as acknowledging that the goods were received undamaged.

Section 10.7 Repair

All warranty work will be performed at an authorized YXLON International service center (see list of contacts at the beginning of this user manual). The customer is responsible for obtaining authorization to return any defective units, prepaying the freight costs, and ensuring that the units are returned to an authorized YXLON International service center.

Units that are returned without authorization from YXLON International Technical Support and that are found to be functional will not be covered under the warranty. That is, the customer will have to pay a retest and calibration fee, and all shipping charges.

YXLON International will return the repaired unit (freight prepaid) to the customer; warranty repair parts and labor will be provided free of charge. Whoever ships the unit (either the customer or YXLON International) is responsible for properly packaging and adequately insuring the unit.

YXLON International will endeavor to provide a preliminary status on RMA returns within ten working days of receipt. Warranty repairs typically are completed in a two to three week cycle-time.

Customer approval and a purchase order for the quoted repair price are required prior to the commencement of any non-warranty work.

Chapter 11 Disposal of the product

For information on hazardous materials, disassembly, and disposal contact Customer Support.

YXLON International products which are defective or are to be scrapped for other reasons can be returned to YXLON International for recycling and disposal.

YXLON International will make sure that the individual components are handled adequately during disposal to protect the environment.

Please contact YXLON International technical support or customer service to request a quote for the disposal of YXLON International product.

Upon request, a certificate of disposal can be issued to confirm that a unit has been scrapped.

If the customer decides to take care of the disposal himself or via an external partner, all local regulations regarding handling, separating, recycling, and disposal of the individual components of the product have to be followed.

Most countries have special regulations for the recycling and disposal of electronic products which need to be observed.

Appendix A Technical Specification

This chapter contains physical, electrical, cooling, and environmental specifications for the cito generator.

Section A.1 Physical specifications

Table A-1: Physical specifications

Description	Specification
Cito	
Size	88 mm (H) x 440 mm (W) x 490 mm (D) 3.46" (H) x 17.38" (W) x 19.29" (D)
Weight	16.3 kg (35.94 lb.)
Clearance	See following Section A.2 “Spacing and airflow requirements” on page 81
Mounting	19“ Rack Mounting
Connector specifications	
Mains AC input power	IEC320
RF Out	Female, type N coaxial.
Analog/Digital Interface □	37-pin D-sub Female, see A.7.2 “37-pin user interface” on page 90
CEX In/Out	BNC female, see A.7.3 “CEX in/out interface” on page 97
Sync. Bus	IEEE 1394, see A.7.6 “SYNC bus interface” on page 97
Matching Interface	9-pin D-sub Female, see A.7.7 “Matching interface” on page 98
RS232	9-pin D-sub Female, see A.7.8 “RS232 interface” on page 98
Ethernet	RJ45, see A.7.10 “Ethernet (ModBus TCP/IP) interface” on page 98
Front panel display	LCD graphic display

Section A.2 Spacing and airflow requirements

The cito needs the following space to provide room for connections and to meet cooling requirements:

- 10.16 cm (4") required at rear panel to allow connectors.
- 6 cm (2.36") required on the left side to ensure proper airflow.
- The air intake opening is on the left side of the unit, and air outflow is at rear. Ensure nothing is blocking air intake or outflow.

Section A.3 Dimensional drawings

The following figures illustrate the physical dimensions of the cito.

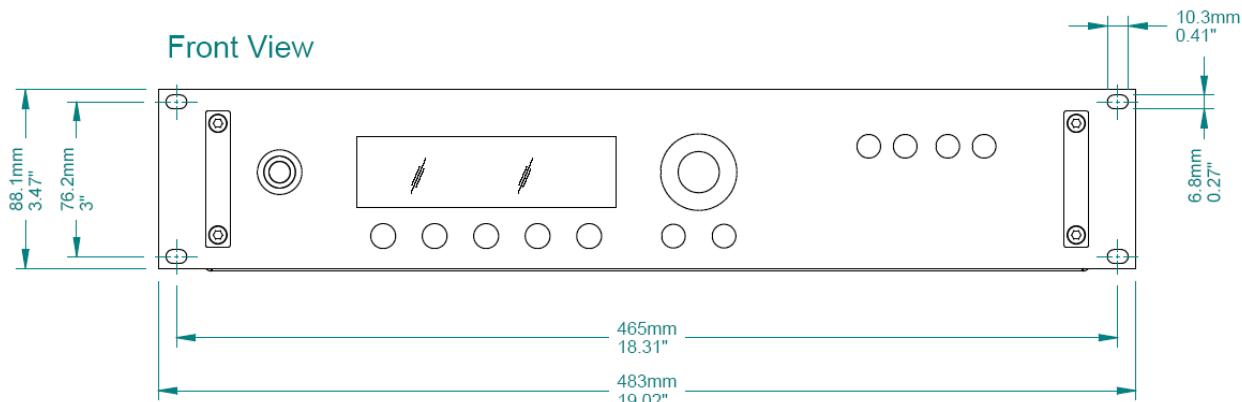


Figure A-1: Front view of the cito

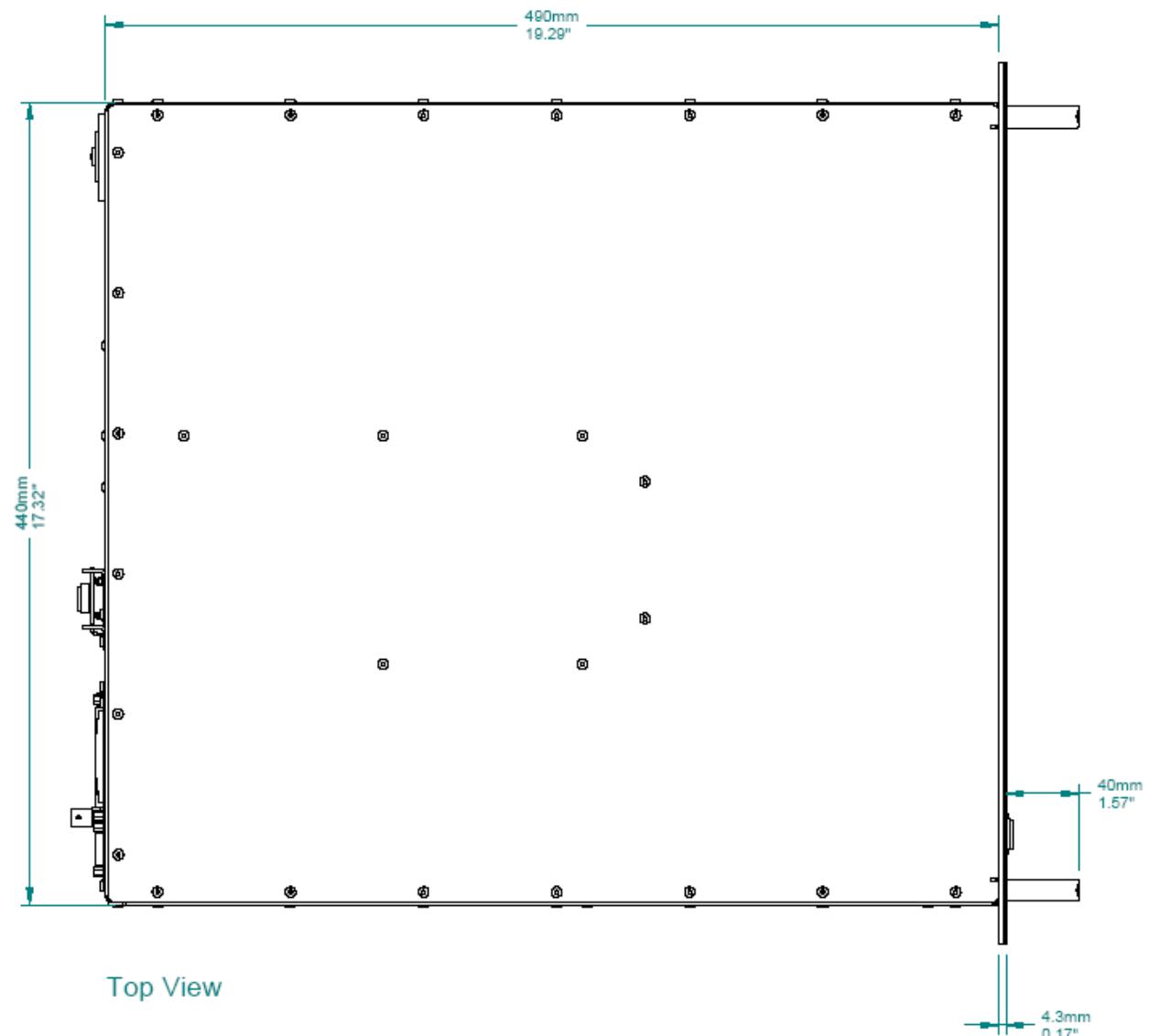


Figure A-2: Top view of the cito

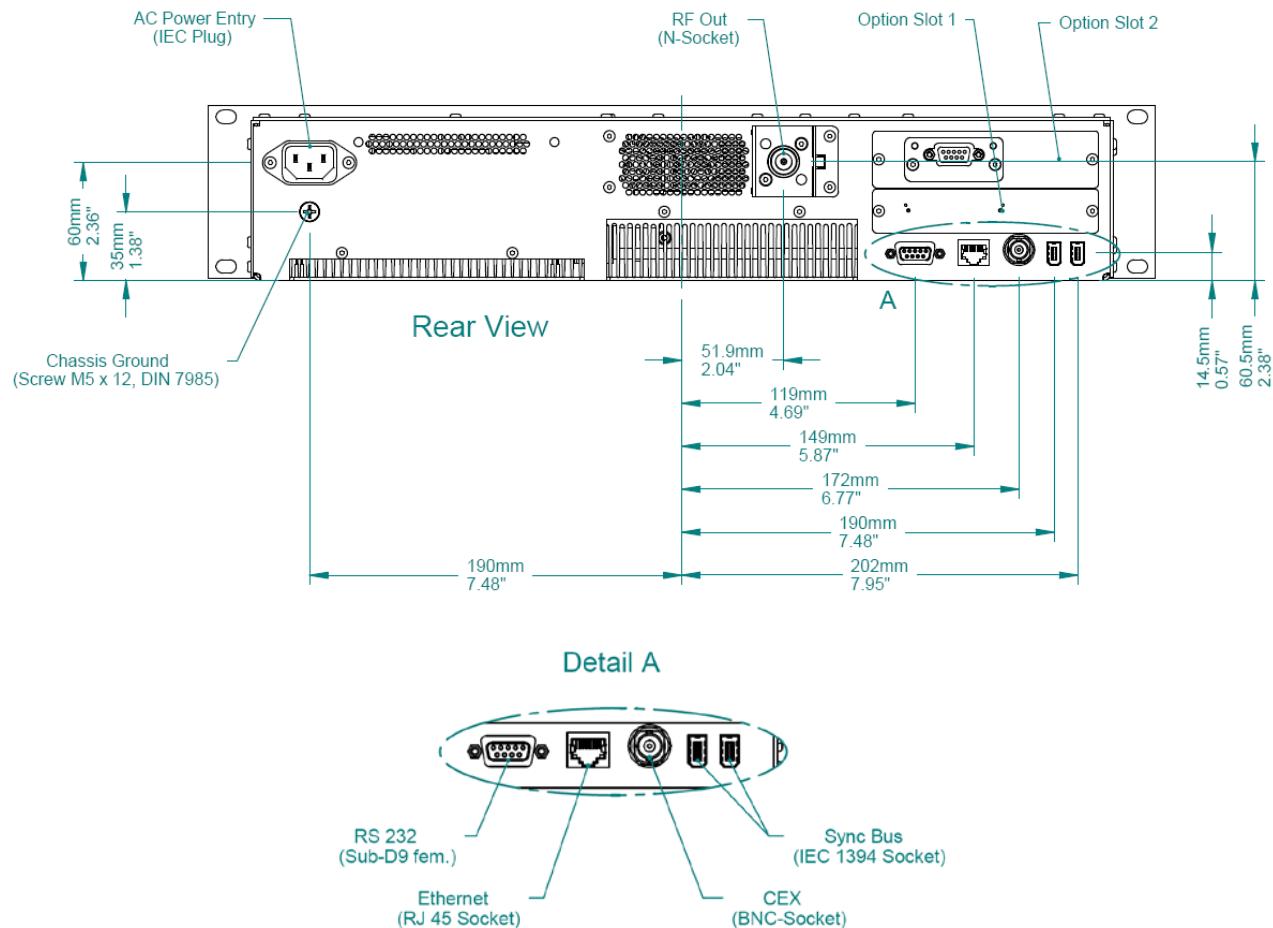


Figure A-3: Rear view of the cito

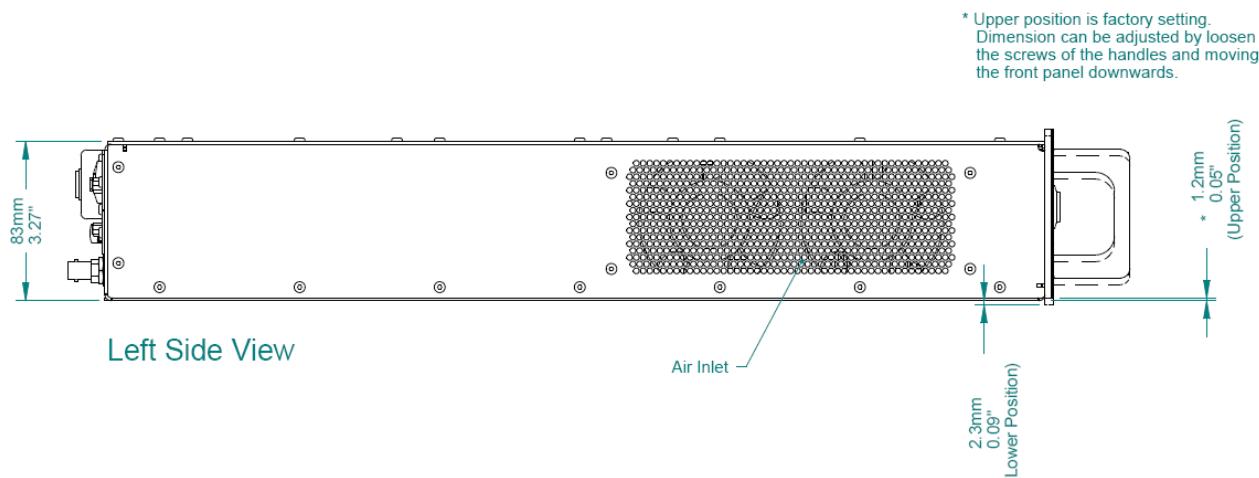


Figure A-4: Left side view of the cito

Section A.4 Electrical specifications

The following sections describe the electrical specifications of the cito.

A.4.1 Electrical specifications table

RF can be defined as either W or dBm. In this case, rated output RF is shown in W, but input RF is shown as dBm so it is easier to multiply with the gain (which is dBm).

Table A-2: Electrical specifications

Description	Specification
Input power specifications	
Line voltage	230 VAC, (187 - 265), one-phase
Line frequency	50/60 Hz ±5%
Line current	600W models- 6A nominal line, full power 1000W models- 10A nominal line, full power
Input power	600W models – 1000 VA at full rated power and nominal line into a 50Ω load 1000W models - 1600 VA at full rated power and nominal line into a 50Ω load
Power factor	97% to 99% at full rated power and nominal line into a 50 Ω load
Overcurrent protection	User must provide circuit breaker: 600W models - 1-phase 10A 1000W models - 1-phase 16A
Efficiency (line to load)	66%, typical at full-rated power, nominal line, into a 50 Ω load
IEC protection class	
Electric shock class	Class I

RF specifications	
Output frequency	Refer to Unit label for RF frequency, accuracy ±0,005%
Minimum output power	1W, delivered into a 50 Ω, nonreactive load.
Maximum output power	600 W models - 600W delivered into a 50 Ω, nonreactive load 1000 W models - 1000W delivered into a 50 Ω, nonreactive load.
Delivered Power into mismatch	20% of nominal power
Reflected power limit	600W models - 120 W 1000W models – 200 W
Output impedance	50 Ω nominal
RF power regulation	1.0% of setpoint or 0.1% of full rated output power, whichever is greater.
RF power stability	1.0% of setpoint or 0.2% of full rated output power, whichever is greater.
RF power response time	<=1ms
Harmonics	At full rated output, all harmonics are 45dB below the RF output signal when operated into the nominal 50Ω nonreactive load. All spurious outputs are 60dB below the RF output signal.

CEX specifications	
CEX input signal	3 to +10dBm
CEX output signal	+7 +/- 2dBm

A.4.2 Pulse characteristics

Table A-3: Pulse characteristics

Description	Specification
Pulse frequency	1Hz to 30kHz
Pulse period resolution	0.1µs
Duty cycle	0.1% to 99%
Minimum pulse on time	16 µs
Timing	
RF rise time	<10us
RF fall time	<1us

Duty cycle is the pulse length (T_{on}) divided by the repetition time period (T).

$$DutyCycle = \frac{T_{on}}{T}$$

Section A.5 Cooling specifications

This section describes the cooling specifications of the cito.

Table A-4: Cooling specifications

Description	Specification
Cooling medium	Air Forced air intake: bottom of amplifier; exhaust: top of rear door of amplifier.
Minimum air flow	118 m ³ /h

Section A.6 Environmental specifications

The following sections describe the environmental specifications for cito RF generators.

A.6.1 Cooling and Environmental Specifications

Table A-5: Climatic specifications

	Temperature	Relative Humidity	Air Pressure
Operating	+5°C to +35°C +41°F to +95°F	5% to 85% ^{Note1}	78 kPa to 106 kPa Equivalent altitude: 2000 m to -500 m (6562 ft. to -1640 ft.)
Storage	-25°C to +60°C -13°F to +140°F	10% to 95%	78 kPa to 106 kPa Equivalent altitude: 1400 m to -500 m (4593 ft. to -1640 ft.)
Transportation	-25°C to +70°C -13°F to +158°F	95% ^{Note 2} +60 g/m ³ ^{Note3}	70 kPa to 106 kPa 700 mbar to 1060 mbar

¹ Noncondensing, no formation of ice
² Maximum relative humidity when the unit temperature slowly increases, or when the unit temperature directly increases from -25°C to +30°C
³ Maximum absolute humidity when the unit temperature directly decreases from +70°C to +15°C

Table A-6: Environmental specifications

Description	Specification
Overvoltage	Category II
Pollution degree	2

A.6.2 Vibration and shock

The numbers given in the following table are valid only for the fully mounted cabinet, single modules may be tested according to the transportation requirements. Shock is defined according to DIN EN 60721-3-2, class 2M2.

Table A-7: Vibration and shock

Vibration	2 m/s ² (0.2 g)	in frequency range of 2 Hz to 100 Hz
	5 g vertical	during transportation, in frequency range of 2 Hz to 100 Hz
	2 g horizontal	
Shock	5 g vertical	for 20 ms, applicable only if amplifier is correctly mounted inside the transportation crate
	2 g horizontal	

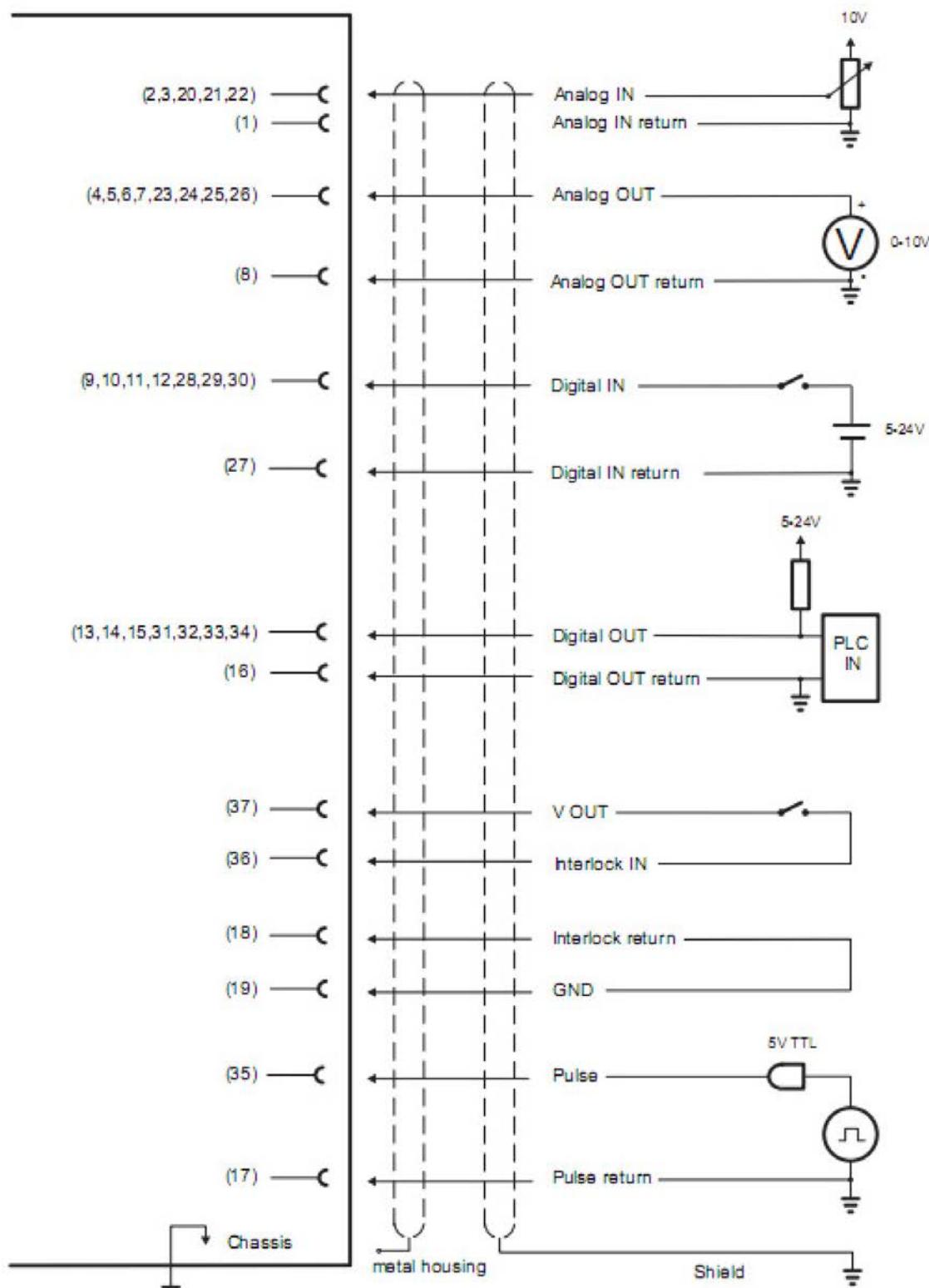
Section A.7 Communication interfaces

A.7.1 Overview of interface section



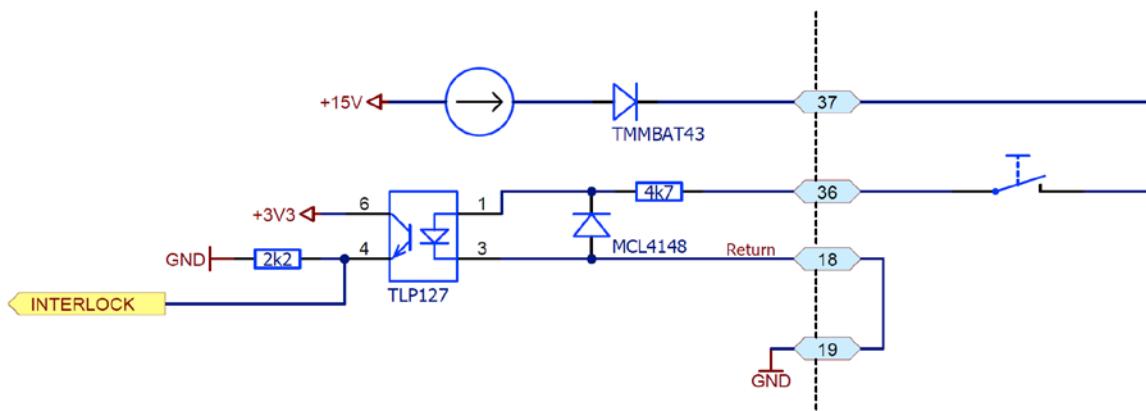
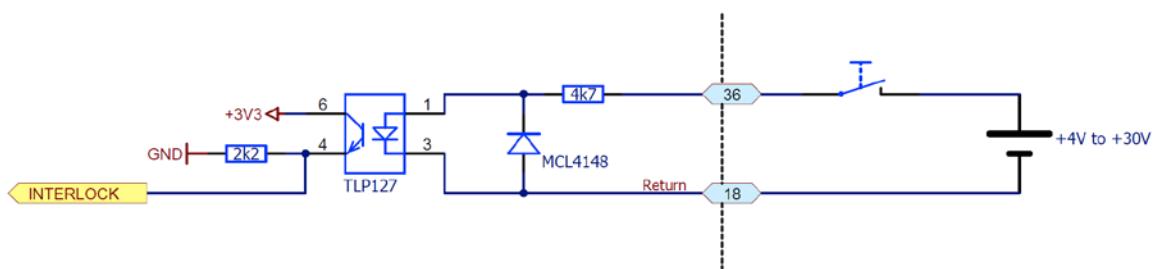
A.7.2 37-pin user interface (Optional)

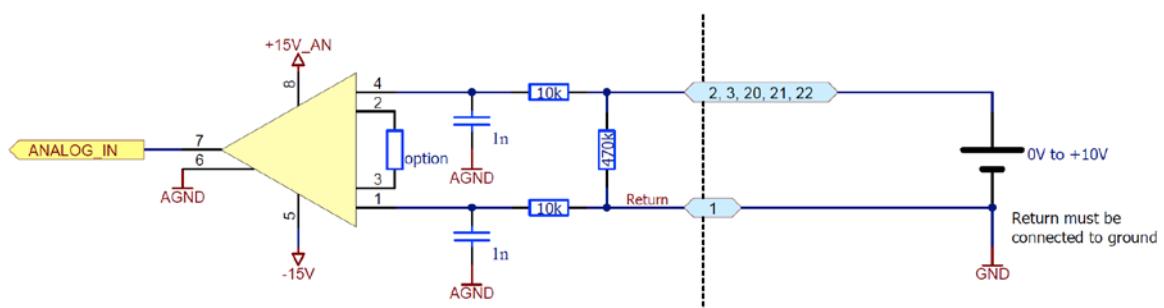
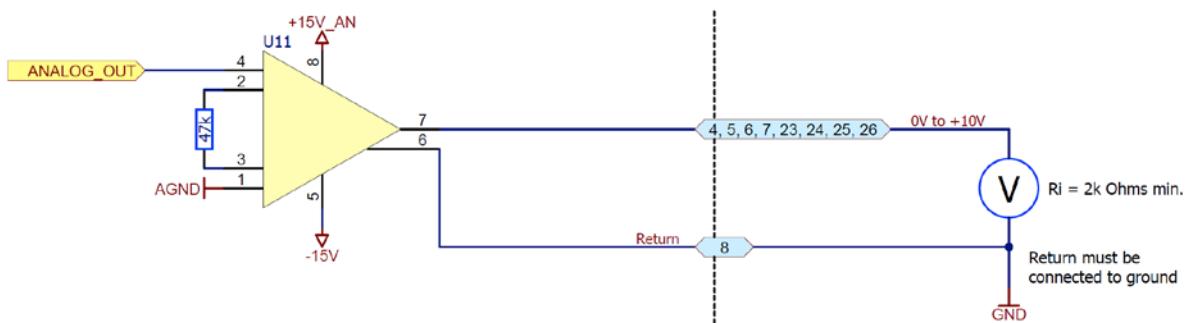
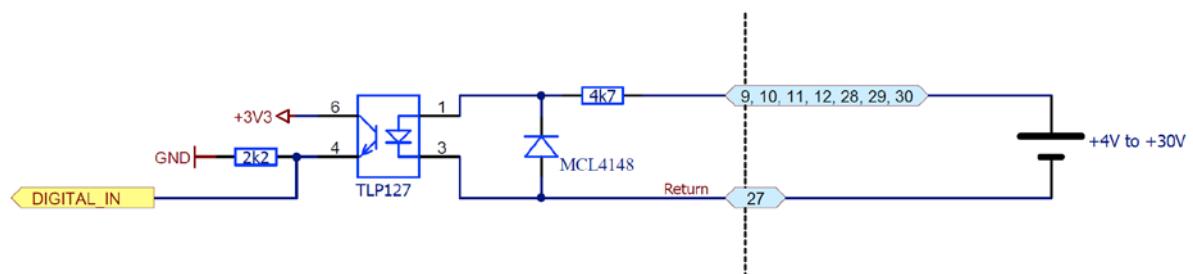
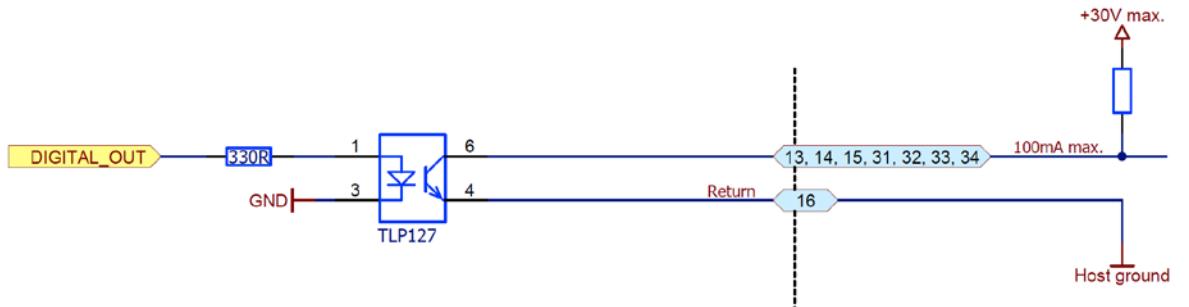
General overview of the 37-pin user port.

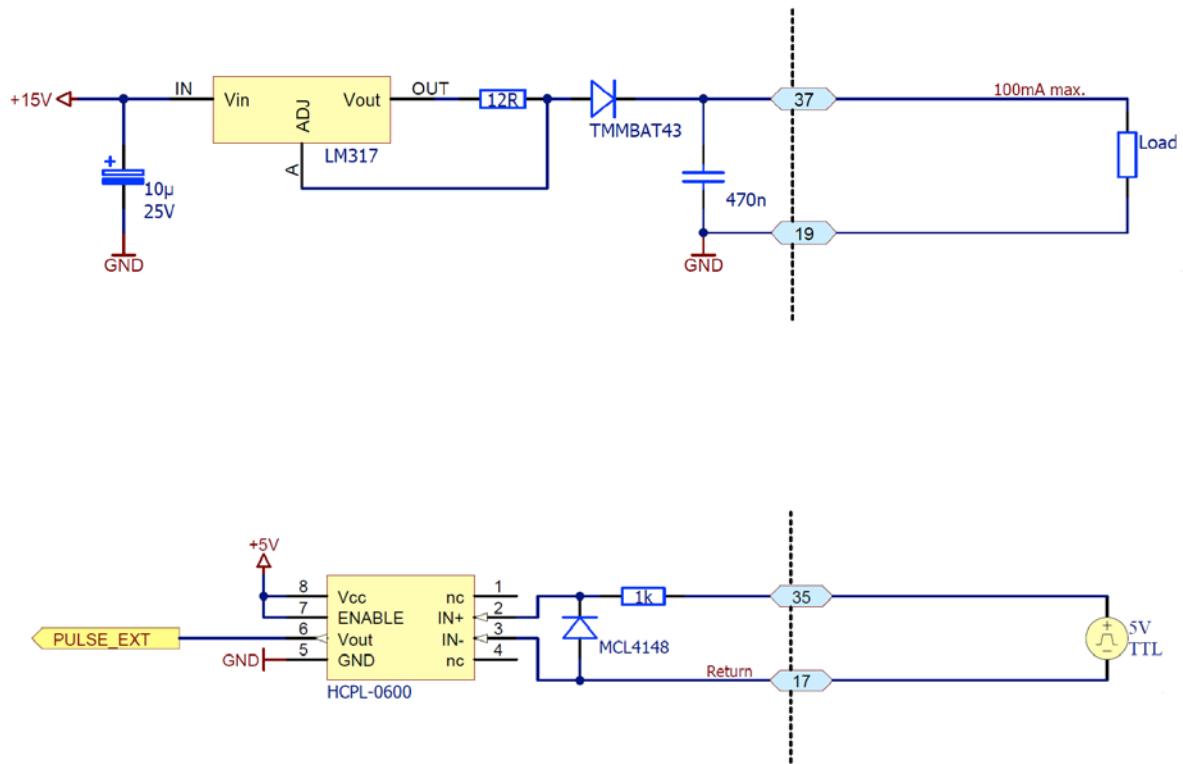


Signal	I/O type	PIN
RF POWER MONITOR	Analog Out	4
REFLECTED POWER MONITOR	Analog Out	23
PROCESS FEEDBACK MONITOR	Analog Out	5
MATCHING POS. TUNE (or FREQUENCY MON.)	Analog Out	24
MATCHING POS. LOAD	Analog Out	6
Not used (factory default) (reserved for PHASE MONITOR)	Analog Out	25
Not used (factory default) (reserved for I-RF MONITOR)	Analog Out	7
Not used (factory default) (reserved for U-RF MONITOR)	Analog Out	26
<i>Analog Output Return PIN</i>	Return	8
RF POWER SETPOINT	Analog In	20
PROCESS FEEDBACK SETPOINT	Analog In	2
SET MATCHING POS. TUNE	Analog In	21
SET MATCHING POS. LOAD	Analog In	3
PROCESS FEEDBACK INPUT EXTERNAL (or FREQUENCY SETPOINT)	Analog In	22
<i>Analog Input Return PIN</i>	Return	1
REMOTE	Digital In	9
RF POWER ON	Digital In	28
LOAD POWER CONTROL	Digital In	10
PROCESS CONTROL MONITOR	Digital In	29
ERROR RESET	Digital In	11
MATCHING CAPACITOR SET	Digital In	30
FREQUENCY SET	Digital In	12
PRESET SELECT1	Digital In	n/c
PRESET SELECT2	Digital In	n/c
<i>Digital Input Return PIN</i>	Return	27
READY STATUS	Digital Out	34
INTERLOCK SATISFIED	Digital Out	15
CEX LOCKED	Digital Out	33
SETPOINT WARNING	Digital Out	14
ERROR	Digital Out	32

Signal	I/O type	PIN
OVERTEMP ERROR	Digital Out	13
MATCHING ACTIVE	Digital Out	31
RF POWER PRESENT	Digital Out	n/c
WARNING	Digital Out	n/c
MATCHING ERROR	Digital Out	n/c
<i>Digital Output Return PIN</i>	Return	16
BLANKING / PULSING	Digital In	35
	Return	17
INTERLOCK IN	Voltage In	36
	Return	18
SUPPLY VOLTAGE(13,8V)	Supply	37
	GND	19







25-pin user interface (Optional)

General overview of the 25-pin user port.

Analog Connector			
<u>Pin #</u>	<u>Signal Name</u>	<u>Signal Type</u>	<u>Description</u>
1	Return for pin 14		
2	Reflected Power Monitor	AO	0 to +10 VDC = 0 to 1000 W, Linear
3	Forward/Load Power Monitor	AO	0 to +10 VDC = 0 to 1000 W, Linear
4	RF Enable	DI	The signal enables or disables RF output power. A positive voltage of 4V to 30V will enable RF output. A voltage of 1.5 or less will disable RF output
5	Setpoint	AI	0 to +10VDC = 0 to 1000 W linear.
6	Forward Power / Process Control	DI	The signal selects Process Control or RF power regulation. A positive voltage of 4V to 30V will enable Process Control. A voltage of 1.5 or less will enable RF power regulation.
7	Process Feedback	AI	This 0 V to 10 V signal closes the control loop around external components in the RF path. The input level is 0-10 VDC.
8	Forward/Load Power Regulation	DI	The signal selects Forward Power or Load Power regulation. A positive voltage of 4V to 30V will enable Load Power regulation. A voltage of 1.5 or less will enable Forward Power regulation.
9	Return for pin 22		
10	Interlock in	Interlock In	A contact closure of less than 15 ohms between pins 10 & 23 to closes the interlock loop. Also a voltage of 5V to 24V (referenced to Ground) can be applied to satisfy the interlock. An interlock string can be supplied from Pin 23.
11	Return for pin 24		

12	N/C		
13	+15 VDC supply	Supply	A nominal +12 VDC output reference to ground, auxiliary supply for external use (100mA maximum).
14	Setpoint Status	DO	When the cito cannot achieve setpoint, a low impedance (opto-coupler output, 8 mA maximum) is created between this pin and pin 1.
15	Return for pin 2		
16	Return for pin 3		
17	Return for pin 4		
18	Return for pin 5		
19	DC Ground Return for pin 25 Return for pin 5	Chassis Ground	DC ground connection common to chassis ground
20	Return for pin 7		
21	DC Ground	Chassis Ground	DC ground connection common to chassis ground
22	Over temp	DO	When the cito detects an over temp, a low impedance (opto-coupler output, 8 mA maximum) is created between this pin and pin 9.
23	Interlock Supply	Interlock Out	Supply for an interlock string ending at pin 10.
24	Interlock Satisfied	DO	When the cito detects a satisfied interlock, a low impedance (opto-coupler output, 8 mA maximum) is created between this pin and pin 11.
25	Pulse	DI	An external 5V TTL pulse signal can be applied to pulse the RF output power

A.7.3 9-pin user interface (Optional)

General overview of the 9-pin user port.

	Analog Interface	9 pin subminiature "D" type (female) receptacle	
<u>Pin #</u>	<u>Signal Name</u>	<u>Signal Type</u>	<u>Description</u>
1	Pulse gate input	Input	5V TTL
2	N/C		
3	N/C		
4	Interlock return	Return	Reference input for the

			Interlock signal. If +12VDC from Pin 9 is used for the interlock loop supply this pin has to be connected to DC-Ground (Pin 5)
5	DC Ground	Chassis Ground	DC ground connection common to chassis ground
6	Pulse gate return	Return	Reference input for 5V TTL
7	N/C		
8	Interlock input	Input	A voltage of 5V to 24V has to be applied to satisfy the interlock. An interlock loop can be supplied from +12VDC (Pin 9)
9	+12 VDC supply	Supply	A nominal +12 VDC output referenced to ground. Auxiliary supply for external use Current limited to 100mA.

A.7.4 CEX in/out interface

CEX (BNC connector - located at rear of the generator) means „Common Exciter“, and by means of this connector you can define a cito RF generator either to a „CEX Master“ (in this case it provides the CEX signal to up to x slaves) or to a „CEX Slave“ (or in case it is the last slave in a row of multiple slave - „CEX Slave terminated“)

A.7.5 SYNC bus interface

The SyncBus module allows a number of cito RF Generators to act parallel in terms of activating or passivation the RF output power. This can be an important requirement when a set of RF generators works into the same load configuration.

As soon as one of the set of cito RF power supplies will switch its RF Power to off, all other cito power supplies also will follow within a negligible time delay of less than 10 microseconds.

The Real Time Sync. Bus will trigger on the following events :

RF on/off

- Switching the RF Power on or off will effect to all cito RF generators at the same time

Pulsing

- Pulsing of RF Power will be synchronized between a set of citos

Error conditions

- Any error which may occur to one cito RF generator will passivate all the other citos as well

A.7.6 Matching interface –AGS (optional)

Here you can connect an AGS Matching network, so that it can be controlled via the cito generator.

Please only use original cable, which can be obtained at YXLON International sales or service department. For details on available lengths see the website or contact YXLON International.

A.7.7 Matching interface –Comet Matches (optional)

Here you can connect a Comet Matching network, so that it can be controlled via the cito generator.

Please only use original cable, which can be obtained at YXLON International sales or service department. For details on available lengths see the website or contact YXLON International.

** Special Note – Pin 4 and 8 are part of the interlock string. If the interface is not being used, then pin 4 and 8 must be connected together to satisfy the interlock.

A.7.8 RS232 interface

The RS232 interface (9-pin Sub-D connector at the rear of the generator) can be used to control the cito RF Generator via ModBus TCP/IP protocol.

Description of control parameters see below.

A.7.9 Ethernet (ModBus TCP/IP) interface

The Ethernet interface (RJ45 connector at the rear of the generator) can be used to control the cito RF Generator via ModBus TCP/IP protocol.

It is also used to control the cito RF generator remotely with a PC program called *Stolberg Commander*.

Working with the *Stolberg Commander* is described in a separate documentation.

Description of control parameters see below.

A.7.10 Field bus interface (optional)

A basic cito will come with RS232 and Ethernet as the standard.

In addition to those two Fieldbuses as equipped on delivery, the user can add one more Fieldbus any time later. You can choose from the following additional Fieldbuses (hardware modules) which can be conveniently slide into the slot at the rear panel without opening the generator

AnyBus slide in modules:

- Profibus
- CAN
- RS 485
- others on request

Description of control parameters see below.

A.7.11 Communication with cito through Ethernet or RS232 (or optional fieldbus) via ModBus TCP/IP

A.7.11.1 Cito Modbus-Communication

The Modbus-Communication is implemented as point to point communication channel between a host (e.g. standard PC) and the cito, configured as a slave.

For communication via this channel there is a protocol implemented, based on standard from the Modbus organization (www.modbus.org).

The main differences are as follows:

- Using function codes to transfer the actual intend of the communication to the cito (e.g. reading or writing a register)
- All registers to be read or written are 32 bit registers
- Implemented additional exception codes

A.7.11.2 Connector and Pin Descriptions

The connector is located on the rear side of the cito. It is a serial RS 232 port carried out as a 9-pin, female, subminiature-D connector. The cito RxD has to be connected to the TxD of the host and the TxD to the RxD.

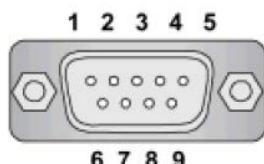


Figure A-5: RS-232 connector located on cito rear side.

Table A-8: RS-232 pin description

Signal / Pin	Name	Description
1	n.c.	-
2	TxD	Transmit data
3	RxD	Receive data

4	n.c.	-
5	Com / Gnd	Data common
6	n.c.	-
7	n.c.	-
8	n.c.	-
9	n.c.	-

A.7.11.3 Communication cycle

The host computer starts a communication by sending a message packet including a function code which implies the format of the answer from the cito. The cito registers the end of a message packet when, after receiving the first message byte, a pause of at least 1,5 * time / sign¹ with no more incoming data occurs.

Through this the timing depends on the used bitrate. Regarding the fixed bitrate of 115.200, the pause must be at least 78.12 µs. The same applies for the host, when the cito is transmitting data. An answer from the cito to the host will be send within 0 and 50 ms (timeout = 50 ms). If no package is being received by the host in this time period, some error on the communication channel is the most likely answer to this behavior.

There is no message cue implemented in the cito. This concludes to the necessity for the host of waiting for the answer from the cito or the 50 ms timeout before transmitting a new message packet.

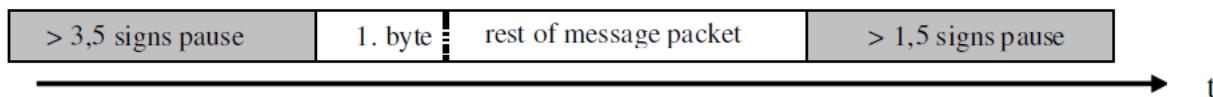


Figure A-6: Timing for one message packet

A.7.11.4 Message packet from host to cito

A message packet consists of the following blocks:

- Header (2 bytes)
 - Address (1 byte)
 - Function code (1 byte)
- Command number (2 bytes)
- Data (1 to 249 bytes)
- CRC16 (2 bytes)

Header:

¹ 1 sign = 9 bits (8 data & one stop bit)

The header consists of a one byte address of the cito which is always fixed (0x0A) and a one byte function code. The function codes can be separated into writing and reading functions.

Executing a writing function a value (or function) of the Cito can be set (or activated). Using a reading function the cito returns the requested value, e.g. the “forward power setpoint”.

Command number:

The command number is a 2 byte number which defines the cito command/value to be set or read. It corresponds to the number in the “Stolberg commander”.

A.7.11.5 Parameter Settings

Default parameters:

- Bitrate: 115.200 bit/s
- Eight data bits
- One Stop bit
- No Parity
- No start bit
- Low order bytes are first transmitted

A.7.11.6 Protocol

The protocol is based on the Modbus-RTU (RTU: Remote Terminal Unit) specification from the Modbus organization. The cito is always configured as slave, the connected PC as host.

A.7.11.7 Sample implementation of CRC16

All data is coded in pure binary. The protocol supports reading and writing of only one command number (register) at a time.

```
static const WORD Crc16tab[256] =
{
    0x0000, 0xC0C1, 0xC181, 0x0140, 0xC301, 0x03C0, 0x0280, 0xC241, 0xC601,
    0x06C0, 0x0780, 0xC741, 0x0500, 0xC5C1,
    0xC481, 0x0440, 0xCC01, 0x0CC0, 0x0D80, 0xCD41, 0x0F00, 0xCFC1, 0xCE81,
    0x0E40, 0x0A00, 0xCAC1, 0xCB81, 0x0B40,
    0xC901, 0x09C0, 0x0880, 0xC841, 0xD801, 0x18C0, 0x1980, 0xD941, 0x1B00,
    0xDBC1, 0xDA81, 0x1A40, 0x1E00, 0xDEC1,
    0xDF81, 0x1F40, 0xDD01, 0x1DC0, 0x1C80, 0xDC41, 0x1400, 0xD4C1, 0xD581,
    0x1540, 0xD701, 0x17C0, 0x1680, 0xD641,
    0xD201, 0x12C0, 0x1380, 0xD341, 0x1100, 0xD1C1, 0xD081, 0x1040, 0xF001,
    0x30C0, 0x3180, 0xF141, 0x3300, 0xF3C1,
    0xF281, 0x3240, 0x3600, 0xF6C1, 0xF781, 0x3740, 0xF501, 0x35C0, 0x3480,
    0xF441, 0x3C00, 0xFCC1, 0xFD81, 0x3D40,
    0xFF01, 0x3FC0, 0x3E80, 0xFE41, 0xFA01, 0x3AC0, 0x3B80, 0xFB41, 0x3900,
    0xF9C1, 0xF881, 0x3840, 0x2800, 0xE8C1,
    0xE981, 0x2940, 0xEB01, 0x2BC0, 0x2A80, 0xEA41, 0xEE01, 0x2EC0, 0x2F80,
    0xEF41, 0x2D00, 0xEDC1, 0xEC81, 0x2C40,
    0xE401, 0x24C0, 0x2580, 0xE541, 0x2700, 0xE7C1, 0xE681, 0x2640, 0x2200,
    0xE2C1, 0xE381, 0x2340, 0xE101, 0x21C0,
    0x2080, 0xE041, 0xA001, 0x60C0, 0x6180, 0xA141, 0x6300, 0xA3C1, 0xA281,
```

```

0x6240, 0x6600, 0xA6C1, 0xA781, 0x6740,
    0xA501, 0x65C0, 0x6480, 0xA441, 0x6C00, 0xACC1, 0xAD81, 0x6D40, 0xAF01,
0x6FC0, 0x6E80, 0xAE41, 0xAA01, 0x6AC0,
    0x6B80, 0xAB41, 0x6900, 0xA9C1, 0xA881, 0x6840, 0x7800, 0xB8C1, 0xB981,
0x7940, 0xBB01, 0x7BC0, 0x7A80, 0xBA41,
    0xBE01, 0x7EC0, 0x7F80, 0xBF41, 0x7D00, 0xBDC1, 0xBC81, 0x7C40, 0xB401,
0x74C0, 0x7580, 0xB541, 0x7700, 0xB7C1,
    0xB681, 0x7640, 0x7200, 0xB2C1, 0xB381, 0x7340, 0xB101, 0x71C0, 0x7080,
0xB041, 0x5000, 0x90C1, 0x9181, 0x5140,
    0x9301, 0x53C0, 0x5280, 0x9241, 0x9601, 0x56C0, 0x5780, 0x9741, 0x5500,
0x95C1, 0x9481, 0x5440, 0x9C01, 0x5CC0,
    0x5D80, 0x9D41, 0x5F00, 0x9FC1, 0x9E81, 0x5E40, 0x5A00, 0x9AC1, 0x9B81,
0x5B40, 0x9901, 0x59C0, 0x5880, 0x9841,
    0x8801, 0x48C0, 0x4980, 0x8941, 0x4B00, 0x8BC1, 0x8A81, 0x4A40, 0x4E00,
0x8EC1, 0x8F81, 0x4F40, 0x8D01, 0x4DC0,
    0x4C80, 0x8C41, 0x4400, 0x84C1, 0x8581, 0x4540, 0x8701, 0x47C0, 0x4680,
0x8641, 0x8201, 0x42C0, 0x4380, 0x8341,
    0x4100, 0x81C1, 0x8081, 0x4040
};

//-----
/** Sample implementation of the CRC16 calculation
 */
unsigned short crc16(
    const void *data, ///< Array of bytes
    int bytes ///< Number of bytes in array
)
{
    unsigned short crc = 0;
    int count;
    for (count = 0; count < bytes; count++)
    {
        unsigned char tmp = (unsigned char)(crc ^ ((const unsigned char*)data)[count]);
        crc = (unsigned short)((crc >> 8) ^ Crc16tab[tmp]);
    }
    return crc;
}

```

Data

The data block includes the data to be written to the cito or a fixed 2 byte answer, when a read function code is being used.

The length of the data block depends on the function code and the command number. It can be seen in following table. The length of the data being written to the cito will be checked in the cito itself regarding the min. / max. values.

Signal / Pin	Name	Description
0x42	Write	one to n bytes, depending on the command number
0x41	Read	Always 2 bytes: 0x0001

CRC16

The CRC16 checksum consists of two bytes and is based on the CRC-16-ANSI with a reversed representation (0xA001) of the polynomial $p(x) = x^{16} + x^{15} + x^2 + 1$ (also: http://en.wikipedia.org/wiki/Cyclic_redundancy_check).

The checksum must be built over the hole message packet excluding the CRC16 itself.

A.7.11.8 Cito answer to a host message packet

The cito answers in a maximum time period of 50 ms with a message packet which differs by the received function code. The answer includes the corresponding data to the answer itself or additional exception codes.

Answer to a read function code:

The answer packet to a read command consists of the following blocks:

- Header (3 bytes)
 - Address (1 byte)
 - Received function code (1 byte)
 - Length (1 byte: number of data bytes)
- Data (n bytes, max. 249)
- CRC16 (2 bytes)

If the length of the data and the data itself is being correct must be checked by the host itself.

Answer to a write function code:

The answer packet equals the send message packet by the host if a correct package is being transmitted and received ("Message packet from Host to Cito").

Exception answer and codes

If an exception code occurs the following exception answer will be send.

- Header (3 bytes)
 - Address (1 byte)
 - Exception function code (1 byte)
 - Exception code (1 byte)
- CRC16 (2 bytes)

The exception function code is the received function code by the cito with the most significant bit set to one.

The exception code can be as follows:

OK	0x00
Illegal function code	0x01
Illegal data address	0x02
Illegal data value	0x03
Slave device failure	0x04
Slave device busy	0x05
Memory parity error	0x08
Device exception	0x80

Communication example

The following communication example shows the sent and received message packets From the host to the cito (--->) and from the cito to the host (<-OK--). The transmitted byte blocks are hexadecimal encoded (each byte separated by brackets) and do not include the two CRC16 bytes. The result is the interpreted result by the host.

```
-----> Read Label
<-OK-- [0A][41][00][0A][00][01]
Result [0A][41][18][63][69][74][6F][20][31][33][31][30][20][23][36][34][30][30][30][30][31][30][30][31][00]
      cito 1310 #640000010001

-----> Read State
<-OK-- [0A][41][1F][40][00][01]
Result [0A][41][04][00][00][00][01]
      1 (0x00000001)

-----> Read Power
<-OK-- [0A][41][1F][55][00][01]
Result [0A][41][04][00][00][00][00]
      0 (0x00000000)

-----> RF on
<-OK-- [0A][42][03][E9][00][00][00][01]
Result [0A][42][03][E9][00][00][00][01]
      OK

-----> RF off
<-OK-- [0A][42][03][E9][00][00][00][00]
Result [0A][42][03][E9][00][00][00][00]
      OK
```

For an actual list of commands see separate document „List of commands“ provided besides this manual.

If you do not have this document - please contact YXLON International technical support to obtain the latest version.

Section A.8 List of command numbers

List of Command numbers

The following table shows the possible commands to be written or read from / to the cito.
Special value tables for some command numbers are given after listed after this table.

Command No	Parameter	Type	read/ write	Min	Max	Unit	example value
Device->Type							
10	Label	string	r				"cito 1310
11	Model	string	r				#64000001xxxx"
12	Type	string	r				"cito"
13	Serial number	string	r				"1310"
15	Nominal power	int (32 bit)	r				"64000001xxxx"
16	Nominal frequency	int (32 bit)	r				W
Device->Limits							1000
35	Max reflected power	int (32 bit)	r				kHz
41	Min frequency	int (32 bit)	r				200
42	Max frequency	int (32 bit)	r				13560
Device->Analog / Digital Port->Analog Outputs							13560
3301	Analog output 1	int (32 bit)	r/w	value table Analog Output			RF Power
3302	Analog output 2	int (32 bit)	r/w	value table Analog Output			Reflected Power
3303	Analog output 3	int (32 bit)	r/w	value table Analog Output			DC Bias
3304	Analog output 4	int (32 bit)	r/w	value table Analog Output			Load Power
3305	Analog output 5	int (32 bit)	r/w	value table Analog Output			Matching Position 1
3306	Analog output 6	int (32 bit)	r/w	value table Analog Output			Matching Position 2
3307	Analog output 7	int (32 bit)	r/w	value table Analog Output			Off
3308	Analog output 8	int (32 bit)	r/w	value table Analog Output			Off
Device->Analog / Digital Port->Digital Outputs							
3401	Digital output 1	int (32 bit)	r/w	value table Digital Output			Ready status
3402	Digital output 2	int (32 bit)	r/w	value table Digital Output			Interlock satisfied
3403	Digital output 3	int (32 bit)	r/w	value table Digital Output			CEX locked
3404	Digital output 4	int (32 bit)	r/w	value table Digital Output			Setpoint warning
3405	Digital output 5	int (32 bit)	r/w	value table Digital Output			Error
3406	Digital output 6	int (32 bit)	r/w	value table Digital Output			Overtemp error
3407	Digital output 7	int (32 bit)	r/w	value table Digital Output			Matching active
3408	Digital output 8	int (32 bit)	r/w	value table Digital Output			Off
Device->Ethernet- >TCP/IP							
5100	Current IP address	int (32 bit)	r				172.18.100.16
5101	IP address	int (32 bit)	r/w				0.0.0.0
5102	Net mask	int (32 bit)	r/w				0.0.0.0

5103	Gateway	int (32 bit)	r/w				0.0.0.0
5104	DNS	int (32 bit)	r/w				0.0.0.0
5105	Host Name	string	r/w	80 characters			""
5106	Domain Name	string	r/w	80 characters			""
Device->Ethernet->UPnP							
5801	UPnP mode	int (32 bit)	r/w	value table UPnP			Active
Device->RS232->RS232 Parameter							
6101	Protocol	int (32 bit)	r/w	value table Protocol			Modbus RTU
6102	Baud Rate	int (32 bit)	r/w	value table BdRate			115200 bps
6103	Data Bits	int (32 bit)	r/w	value table DataBits			8
6104	Parity	int (32 bit)	r/w	value table Parity			Even
6105	Stop bits	int (32 bit)	r/w	value table StopBits			1
Device->System->Remote							
7001	Sync bus	int (32 bit)	r/w	value table SyncBus			Off
7002	Control Source	int (32 bit)	r/w	value table ControlSrc			Each
7003	RFon/off source	int (32 bit)	r/w	value table ControlSrc			No override
7004	Setpoints source	int (32 bit)	r/w	value table ControlSrc			No override
7005	Matching source	int (32 bit)	r/w	value table ControlSrc			No override
7006	Settings source	int (32 bit)	r/w	value table ControlSrc			No override
7007	Control mode source	int (32 bit)	r/w	value table ControlSrc			No override
Device->System->Time and Date							
7101	Time	string	r/w				"00:03:29"
7102	Date	string	r/w				"1970-01-01"
7103	Set time	int (32 bit)	r/w	0	235959		329
7104	Set date	int (32 bit)	r/w	19700100	20991200		19700101
7105	Time format	int (32 bit)	r/w	value table TimeFormat			hh:mm:ss
7106	Date format	int (32 bit)	r/w	value table DateFormat			yyyy-mm-dd
Device->System->Presets							
7901	Load settings	int (32 bit)	r/w	value table LoadSetting			""
7902	Save settings	int (32 bit)	r/w	value table SaveSettings			""
Device->Matching							
25501	Type	string	r				""
25502	Model	string	r				""
25503	Serial	string	r				""
25511	Power	int (32 bit)	r				W
25512	Frequency	int (32 bit)	r				KHz
25518	Firmware version	int (32 bit)	r				0
Device->Version							-0.01
501	cito version	string	r				"1.13a(MOD5270, build 3047, release)"
590	User board	string	r				"shft standard I/O"
595	Field bus board	string	r				"Fieldbus / agilo interface"
Control							
1001	Command	int (32 bit)	r/w	value table Command			
Settings->Power Control							
1201	Control mode	int (32 bit)	r/w	value table CtrlMode	1000000 (=1000.000 W)		Forward power
1206	Power set point	int (32 bit)	r/w	0 (=0.000 W)	W		0
1211	DC bias source	int (32 bit)	r/w	value table DC_Src			agilo
1212	DC bias set point	int (32 bit)	r/w	0 (=0.000 V)	V		0
Process feedback source		int (32 bit)	r/w	value table Process_Src	4000000 (=4000.000 V)		agilo
1222	Process set point	int (32 bit)	r/w	0 (=0.000 V)	V		0
1225	Process feedback max	int (32 bit)	r/w	0 (=0.000 V)	20000000 (=20000.000 V)		4.000.000
1226	Process feedback unit	int (32 bit)	r/w	value table Process_Unit	V		
1231	Gain factor	int (32 bit)	r/w	1 (=0.01)	10000 (=100.00)		1.00
1232	Integral action factor	int (32 bit)	r/w	1 (=0.01)	10000 (=100.00)		1.00
Settings->CEX							
1101	Frequency mode	int (32 bit)	r/w	value table FreqMode			Fixed
1102	Frequency set point	int (32 bit)	r/w	13560000 (=13560.000 kHz)	13560000 (=13560.000 kHz)		13560
1112	CEX phase shift	int (32 bit)	r/w	-360 °	kHz		0
1113	Master RF phase	int (32 bit)	r/w	0 °	°		0
1114	RF phase	int (32 bit)	r/w	360 °	°		0
Settings->Pulsing							
1301	Pulse mode	int (32 bit)	r/w	value table PulseMode			Off
1302	Pulse period	int (32 bit)	r/w	200 (=0.0200 ms)	600000000 (=6000.0000 ms)		0.0333
1303	Duty cycle	int (32 bit)	r/w	1 (=0.1 %)	ms		50.0
Settings->Slew Rate							
1491	Rise time	int (32 bit)	r/w	0 (=0.000 s)	60000 (=60.000 s)		0.000
1492	Fall time	int (32 bit)	r/w	0 (=0.000 s)	60000 (=60.000 s)		0.000
Settings->Recipe							
1501	Recipe mode	int (32 bit)	r/w	value table Rec_Mode			Off
1502	On ramp time	int (32 bit)	r/w	0 (=0.000 s)	3600000 (=36.000 s)		0.100
1503	Off ramp time	int (32 bit)	r/w	0 (=0.000 s)	s		0.100
1504	Intervals	int (32 bit)	r/w	1	10		1
1505	Time 1	int (32 bit)	r/w	0 (=0.000 s)	3600000 (=3600.000 s)		0.100
1506	Power 1	int (32 bit)	r/w	0 (=0.000 W)	1000000 (=1000.000 W)		8

1507	Time 2	int (32 bit)	r/w	0 (=0.000 s)	3600000 (=3600.000 s) 1000000	s	0.100	
1508	Power 2	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1509	Time 3	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1510	Power 3	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1511	Time 4	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1512	Power 4	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1513	Time 5	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1514	Power 5	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1515	Time 6	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1516	Power 6	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1517	Time 7	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1518	Power 7	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1519	Time 8	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1520	Power 8	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1521	Time 9	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1522	Power 9	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W) 3600000	W		8
1523	Time 10	int (32 bit)	r/w	0 (=0.000 s)	(=3600.000 s) 1000000	s	0.100	
1524	Power 10	int (32 bit)	r/w	0 (=0.000 W)	(=1000.000 W)	W		8
Settings->Load Limits								
1701	RF on time	int (32 bit)	r/w	0 (=0.0 s)	36000 (=3600.0 s)	s	0.0	
1702	Forward power limit	int (32 bit)	r/w	0 (=0.000 W)	0 (=0.000 W)	W		1100
1703	Reflected power limit	int (32 bit)	r/w	0 (=0.000 W)	0 (=0.000 W)	W		200
1706	Reflected threshold	int (32 bit)	r/w	0 (=0.000 W)	0 (=0.000 W)	W		200
1707	Reflected shutoff	int (32 bit)	r/w	0 (=0.0 s)	36000 (=3600.0 s)	s	0.0	
1710	Set point deviation	int (32 bit)	r/w	10 (=1.0 %)	500 (=50.0 %)	%	2.0	
Settings->Matching								
8201	Matching mode	int (32 bit)	r/w	value table Match_Mode			Auto	
8213	C load position	int (32 bit)	r/w			%	-0.1	
8214	C tune position	int (32 bit)	r/w			%	-0.1	
8203	C load ref. position	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	5.0	
8204	C tune ref. position	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	5.0	
8205	Min. position c load	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	0.0	
8206	Max. position c load	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	100.0	
8207	Min. position c tune	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	0.0	
8208	Max. position c tune	int (32 bit)	r/w	0 (=0.0 %)	1000 (=100.0 %)	%	100.0	
8221	Matching error	int (32 bit)	r/w	value table Match_Err			Error	
Actual Values->Control								
8000	State	int (32 bit)	r				RF off	
8011	Frequency	int (32 bit)	r			kHz	13560	
8021	Forward power	int (32 bit)	r			W	0	
8022	Reflected power	int (32 bit)	r			W	0	
8023	Load power	int (32 bit)	r			W	0	
8041	CEX frequency	int (32 bit)	r			kHz	0	
8301	DC bias	int (32 bit)	r			V	0	
8302	External feedback	int (32 bit)	r			V	0	
Actual Values->Errors								
8100	Number of errors	int (32 bit)	r				...	0
8101	Error 1	string	r				...	
8102	Error 1 state	int (32 bit)	r				...	
8103	Error 2	string	r				...	
8104	Error 2 state	int (32 bit)	r				...	
8105	Error 3	string	r				...	
8106	Error 3 state	int (32 bit)	r				...	
8107	Error 4	string	r				...	
8108	Error 4 state	int (32 bit)	r				...	
8109	Error 5	string	r				...	
8110	Error 5 state	int (32 bit)	r				...	
8111	Error 6	string	r				...	
8112	Error 6 state	int (32 bit)	r				...	
8113	Error 7	string	r				...	
8114	Error 7 state	int (32 bit)	r				...	
8115	Error 8	string	r				...	
8116	Error 8 state	int (32 bit)	r				...	
8117	Error 9	string	r				...	
8118	Error 9 state	int (32 bit)	r				...	
8119	Error 10	string	r				...	
8120	Error 10 state	int (32 bit)	r				...	
8121	Error 11	string	r				...	
8122	Error 11 state	int (32 bit)	r				...	

```
value table Analog Output
    "0">>Off;Analog output off
    "1">>RF Power;RF Power Monitor
    "2">>Forward Power;Forward Power Monitor
    "3">>Reflected Power;Reflected Power Monitor
    "4">>Load Power;Load Power Monitor
    "5">>DC Bias;DC Bias Monitor
    "9">>Frequency;Frequency Monitor
    "10">>Matching Position 1;Matching Position 1
    "11">>Matching Position 2;Matching Position 2
    "12">>External Feedback;Process Feedback Monitor
    "50">>5V;Analog output 5V
    "100">>10V;Analog output 10V

value table Digital Output
    "0">>Off;Digital output off
    "1">>Ready status;Ready status
    "2">>Interlock satisfied;Interlock satisfied
    "3">>CEX locked;CEX locked
    "5">>Setpoint warning;Setpoint warning
    "6">>Error;Error
    "7">>Overtemp error;Overtemp error
    "8">>Matching active;Matching active
    "9">>Matching error;Matching error
    "4">>Warning;Warning
    "100">>On;Digital output on
    "101">>Not Ready status;Ready status inverted
    "102">>Not Interlock satisfied;Interlock satisfied inverted
    "103">>Not CEX locked;CEX locked inverted
    "105">>Not Setpoint warning;Setpoint warning inverted
    "106">>Not Error;Error inverted
    "107">>Not Overtemp error;Overtemp error inverted
    "108">>Not Matching active;Matching active inverted
    "109">>Not Matching error;Matching error inverted
    "104">>Not Warning;Warning inverted

value table UPnP
    "0">>Off;No UPnP
    "1">>Passive;No UPnP notify
    "2">>Active;Full UPnP features

value table Protocol
    "0">>Off;Protocol is off
    "1">>Modbus RTU;Protocol is Modbus RTU

value table BdRate
    "2400">>2400 bps;Baudrate 2400 bps
    "4800">>4800 bps;Baudrate 4800 bps
    "9600">>9600 bps;Baudrate 9600 bps
    "19200">>19200 bps;Baudrate 19200 bps
    "38400">>38400 bps;Baudrate 38400 bps
    "57600">>57600 bps;Baudrate 57600 bps
    "115200">>115200 bps;Baudrate 115200 bps

value table DataBits
    "6103" "7">>7;Data bits: 7
    "6103" "8">>8;Data bits: 8

value table Parity
    "6104" "0">>No;No parity
    "6104" "1">>Odd;Parity odd
    "6104" "2">>Even;Parity even
```

8124	Error 12 state	int (32 bit)	r			
8125	Error 13	string	r			
8126	Error 13 state	int (32 bit)	r			
8127	Error 14	string	r			
8128	Error 14 state	int (32 bit)	r			
8129	Error 15	string	r			
8130	Error 15 state	int (32 bit)	r			
8131	Error 16	string	r			
8132	Error 16 state	int (32 bit)	r			
Actual Values->Warnings						2
8150	Number of warnings	int (32 bit)	r			
8151	Warning 1	string	r			
8152	Warning 2	string	r			
8153	Warning 3	string	r			
8154	Warning 4	string	r			
8155	Warning 5	string	r			
8156	Warning 6	string	r			
8157	Warning 7	string	r			
8158	Warning 8	string	r			
8159	Warning 9	string	r			
8160	Warning 10	string	r			
8161	Warning 11	string	r			
8162	Warning 12	string	r			
8163	Warning 13	string	r			
8164	Warning 14	string	r			
8165	Warning 15	string	r			
8166	Warning 16	string	r			
Actual Values->Matching						No matching
9201	Matching state	int (32 bit)	r			
9203	C load position	int (32 bit)	r	0.1%	42	
9204	C tune position	int (32 bit)	r	0.1%	42	
9205	C load	int (32 bit)	r	pF	42	
9206	C tune	int (32 bit)	r	pF	42	
9251	DC bias matching	int (32 bit)	r	mV		0
Diagnostic->Actual Values						
20421	Fan 1 speed	int (32 bit)	r	rpm		2800
20422	Fan 2 speed	int (32 bit)	r	rpm		3720

"5">Analog 5;Analog input 5

value table Process_Src

"0">Off;Off
"11">agilo;agilo
"1">Analog 1;Analog input 1
"2">Analog 2;Analog input 2
"3">Analog 3;Analog input 3
"4">Analog 4;Analog input 4
"5">Analog 5;Analog input 5

value table Process_Unit

"0">>;No unit
"1">W;Power in Watt
"2">V;Voltage in Volt
"3">A;Current in Ampere
"7">°C;Temperature in °C
"10">%;Percent
"13">kWh;Energy in kWh

value table FreqMode

"0">Fixed;Frequency is fixed
"1">Fixed CEX Master;Frequency is fixed, CEX output activated
"10">CEX;Frequency is set by CEX
"11">CEX terminated;Frequency is set by CEX, CEX input termination activated

value table PulseMode

"0">Off;Continuous wave (cw) mode
"1">External;External pulsing by pulse input on user board
"2">Internal;Internal pulsing by internal pulse generator
"11">External inverted;External pulsing by inverted pulse input on user board

value table Rec_Mode

"0">Off;Recipe off
"1">RF on/off ramp;RF on/off ramp
"2">Power ramping;Power ramping

value table Match_Mode

"1">Manual;Manual matching mode
"2">Auto;Automatic matching mode

value table Match_Err

"0">Ignore;Ignore matching error
"1">Error;Issue error on matching error
"2">Time out + error;Issue error on time out and matching error

value table StopBits
"6105" "1">>1;Stop bits: 1
"6105" "2">>2;Stop bits: 2

value table SyncBus
"7001" "0">>Off;System bus off
"7001" "1">>Master;System bus master
"7001" "2">>Slave;System bus slave

value table ControlSrc
"0">>Each;Each interface except analog is in control
"1">>Front Panel;Front Panel is in control
"2">>Modbus-TCP;Modbus TCP is in control
"3">>Modbus-RTU;Modbus RTU is in control
"4">>Analog Port;Analog / digital port is in control

value table TimeFormat
"0">>hh:mm:ss;hours:minutes:seconds e.g. 18:01:02
"1">>12:mm:ss PM;hours:minutes:seconds AM or PM e.g. 06:01:02 PM
"2">>hhmmss;hoursminutesseconds e.g. 180102
"3">>PM 12:mm:ss;AM or PM hours:minutes:seconds e.g. PM 06:01:02

value table DateFormat
"0">>yyyy-mm-dd;year-month-day e.g. 1999-12-31
"1">>mm/dd/yyyy;month/day/year e.g. 12/31/1999
"2">>dd/mm/yyyy;day/month/year e.g. 31/12/1999
"3">>dd.mm.yyyy;day.month.year e.g. 31.12.1999

value table LoadSetting
"0">>Default;Default preset
"1">>Preset 1;Preset 1
"2">>Preset 2;Preset 2
"3">>Preset 3;Preset 3
"4">>Preset 4;Preset 4
"5">>Preset 5;Preset 5

value table SaveSettings
"1">>Preset 1;Preset 1
"2">>Preset 2;Preset 2
"3">>Preset 3;Preset 3
"4">>Preset 4;Preset 4
"5">>Preset 5;Preset 5

value table Command
"0">>RF off;Switch off RF
"1">>RF on;Switch on RF
"9">>Reset;Reset errors

value table CtrlMode
"0">>Forward power;Set point is forward power
"1">>Load power;Set point is load power
"2">>DC Bias;Set point is DC Bias
"3">>Process control;Set point is external feedback

value table DC_Src
"0">>Off;Off
"1">>agilo;agilo
"1">>Analog 1;Analog input 1
"2">>Analog 2;Analog input 2
"3">>Analog 3;Analog input 3
"4">>Analog 4;Analog input 4

Section A.9 Software configuration

All generator limits, features, interface communications and even the RF output performance are dependent on the firmware revision and factory device setting parameters. To find out the firmware revision of the generator see chapter 7.5.18.

Appendix B Warranty Statement and Terms

YXLON International products are warranted to be free from failures due to defects in material and workmanship after they are shipped from the factory.

Warranty is only applicable if the product is operated under the specified operating conditions. Operation outside of specified conditions will void this warranty.

There are no user serviceable parts in this product. All repairs must be done by YXLON International authorized repair centers. Any unauthorized repair will void this warranty.

YXLON International makes no express or implied warranty that the goods are merchantable or fit for any particular purpose except as specifically stated in printed YXLON International specifications. The sole responsibility of YXLON International shall be that it will manufacture the goods in accordance with its published specifications and that the goods will be free from defects in material and workmanship.

YXLON International's liability for breach of an expressed warranty shall exist only if the goods are installed, started in operation, and tested in conformity with YXLON International's published instructions.

YXLON International expressly excludes any warranty whatsoever concerning goods that have been subject to misuse, negligence, or accident, or that have been altered or repaired by anyone other than YXLON International or YXLON International's duly authorized agent.

This warranty is expressly made in lieu of any and all other warranties, express or implied, unless otherwise agreed to in writing. The warranty period is 12 months after the date the goods are shipped from YXLON International. In all cases, YXLON International has sole responsibility for determining the cause and nature of the failure, and YXLON International's determination with regard thereto shall be final. The YXLON International warranty statement may be superseded by a service agreement entered into between YXLON International and the customer.

Appendix C Customer Service

Please contact one of the following offices if you have questions.

Table A-9: Technical Support locations

Region	Office	Contact
Europe	YXLON International GmbH a company of the COMET GroupPlasma Control Technologies Münsterau 168 D-52224 Stolberg-Vicht Germany	Phone : +49 2402 99 777-0 or Fax: +49 2402 99 777 900 Email: technical.support@comet-pct.com
Asia Pacific Region	COMET China 1201 Guiqiao Road Building 10, 1 st floor Pudong, Shanghai 201206 P. R. China	Phone: +86 21 6879 9000 Fax: +86 21 6879 9009 Email: info@comet-pct.com
North America	COMET Technologies USA, Inc. 2370 Bering Drive San Jose, CA 95131 USA	Phone: +1 408 325 8770 Fax: +1 408 325 8773 Email: info@comet-pct.com

Notes:

When calling YXLON International Technical Support, make sure to have the unit serial number and part number. These numbers are available on the product label (typically on the rear panel of the unit).

For returns and repairs, please call Technical Support to obtain the correct shipping address

Appendix D EC declaration of conformity

Document Information

Document Information

Author H. Landes / T. Fink / T. Fenske / A. Hartmann
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Comment Revised Version

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Doc. Rev.	Product Rev.	Date	Author	Change(s)	Status
01	A00	Nov. 2010	H. Landes	Initial document	in progress
02	A00	2013-01-11	T. Fink / T. Fenske	Various sections added	in progress
03	A00	Mar. 2013	A. Hartmann	Various modifications	In progress
04	A00	June 2013	S Ivins	Various modifications	In progress