Device handbook
SIRAX BT5700

Operating Instructions SIRAX BT5700

CAMILLE BAUER

Camille Bauer Metrawatt AG
Aargauerstrasse 7
CH-5610 Wohlen/Switzerland

Tel: +41 56 618 21 11
Fax: +41 56 618 21 21

info@cbmag.com
www.camillebauer.com

Legal information

Warning notices

In this document warning notices are used, which you have to observe to ensure personal safety and to prevent damage to property. Depending on the degree of danger the following symbols are used:

If the warning notice is not followed death or severe personal injury **will** result.

If the warning notice is not followed damage to property or severe personal injury **may** result.

If the warning notice is not followed the device **may** be damaged or **may** not fulfill the expected functionality.

Qualified personnel

The product described in this document may be handled by personnel only, which is qualified for the respective task. Qualified personnel have the training and experience to identify risks and potential hazards when working with the product. Qualified personnel are also able to understand and follow the given safety and warning notices.

Intended use

The product described in this document may be used only for the application specified. The maximum electrical supply data and ambient conditions specified in the technical data section must be adhered. For the perfect and safe operation of the device proper transport and storage as well as professional assembly, installation, handling and maintenance are required.

Disclaimer of liability

The content of this document has been reviewed to ensure correctness. Nevertheless it may contain errors or inconsistencies and we cannot guarantee completeness and correctness. This is especially true for different language versions of this document. This document is regularly reviewed and updated. Necessary corrections will be included in subsequent version and are available via our webpage http://www.camillebauer.com.

Feedback

If you detect errors in this document or if there is necessary information missing, please inform us via e-mail to:
customer-support@camillebauer.com

Table of content

1. Introduction

1.1 Purpose of this document

This document describes the universal measurement device SIRAX BT5700. It is intended to be used by:
- Installation personnel and commissioning engineers
- Service and maintenance personnel
- Planners

Scope

This handbook is valid for all hardware versions of the BT5700. Some of the functions described in this document are available only, if the necessary optional components are included in the device.

Required knowledge

A general knowledge in the field of electrical engineering is required. For assembly and installation of the device knowledge of applicable national safety regulations and installation standard is required.

1.2 Scope of supply

- Measurement device SIRAX BT5700
- Safety instructions (multiple languages)

1.3 Further documents

The following documents are provided electronically via www.camillebauer.com:
- Safety instructions SIRAX BT5700
- Operating Instructions SIRAX BT5700
- Data sheet SIRAX BT5700

2. Safety notes

Device may only be disposed in a professional manner!

The installation and commissioning should only be carried out by trained personnel.
Check the following points before commissioning:

- that the maximum values for all the connections are not exceeded, see „Technical data“ section,
- that the connection wires are not damaged, and that they are not live during wiring,
- that the power flow direction and the phase rotation are correct.

The instrument must be taken out of service if safe operation is no longer possible (e.g. visible damage). In this case, all the connections must be switched off. The instrument must be returned to the factory or to an authorized service dealer.

It is forbidden to open the housing and to make modifications to the instrument. The instrument is not equipped with an integrated circuit breaker. During installation check that a labeled switch is installed and that it can easily be reached by the operators.

Unauthorized repair or alteration of the unit invalidates the warranty.

3. Device overview

3.1 Brief description

The universal measuring device SIRAX BT5700 is suited for fixed mounting and the measurement of Voltage, current, frequency, power, energy (active / reactive / apparent), power factor, phase angle, etc in low voltage switchgear. The units are designed for unbalanced load network forms of 3-phase mains with 3- or 4-wire.

3.2 Available measurement data

Measured Parameters	**Units**	**3P 4W**	**3P 3W**
System Voltage	V	•	•
Voltage UL1-N / UL2-N / UL3-N	V	•	x
Voltage UL1-2 / UL2-3 / UL3-1	V	•	•
System Current	A	•	•
Current IL1 / IL2 / IL3	A	•	•
Neutral Current	A	•	x
Frequency	Hz	•	•
Active Power	kW	•	only system
Reactive Power	kVAr	•	only system
Apparent Power	kVA	•	only system
Power Factor	–	•	only system
Phase Angle	degree	•	only system
Active Import Energy (8 Digit resolution)	kWh	•	•
Active Export Energy (8 Digit resolution)	kWh	•	•
Capacitive Reactive Energy (8 Digit resolution)	kVArh	•	•
Inductive Reactive Energy (8 Digit resolution)	kVArh	•	•
Apparent Energy (8 Digit resolution)	kVAh	•	•
Current Demand	A	•	•
Max Current Demand	A	•	•
Apparent Power Demand	kVA	•	•
Max Apparent Power Demand	kVA	•	•
Import Active Power Demand	kW	•	•
Export Active Power Demand	kW	•	•
Max Import Active Power Demand	kW	•	•
Max Export Active Power Demand	kW	•	•
Voltage THD	%	•	•
Current THD	%	•	•
Min / Max System Voltage	V	•	•
Min / Max System Current	A	•	•

4. Mechanical mounting

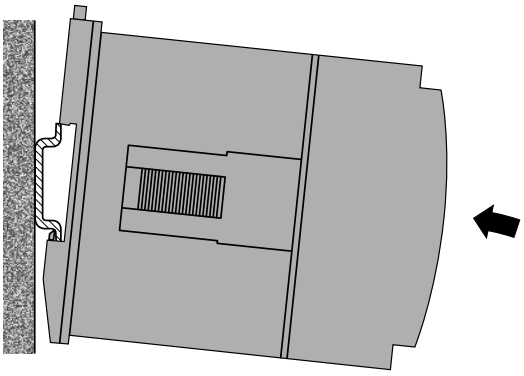
The SIRAX BT5700 is designed for panel mounting.

Please ensure that the operating temperature limits are not exceeded when determining the place of mounting (place of measurement): **–10 … +55° C**

4.1 Mounting

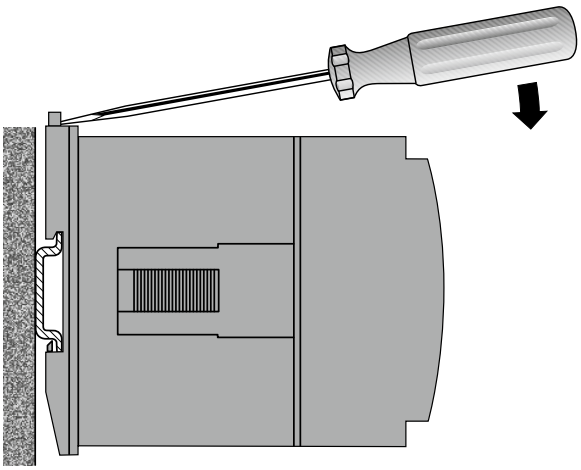
Dimensional drawing BT5700: See section 16

Any mounting position is possible. Device may be clipped onto a top-hat rail according EN50022 in a cabinet.



4.2 Demounting of the device

Disassembly of the device requires that all connected wires be without current. First, remove all push terminals and the wires of the current and voltage inputs. Ensure that possible current transformers are short-circuited before the current connections on the device are opened.



5. Electrical connections

Ensure under all circumstances that the leads are free of potential when connecting them!

5.1 General safety notes

Please observe that the data on the type plate must be adhered to!

The national provisions have to be observed in the installation and material selection of electric lines!

Symbol	Meaning
	Device may only be disposed of in a professional manner!
	Double insulation, device of protection class 2
CAT III	Measurement category CAT III for current / voltage inputs, power supply and relay outputs
	CE conformity mark. The device fulfills the requirements of the applicable EC directives. See declaration of conformity.
	Caution! General hazard point. Read the operating instructions.
	Attention: Danger to life!
	Please note

5.2 Cross sections and tightening torques

Inputs L1(2), L2(5), L3(8), N(11), I1(1/3), I2(4/6), I3(7/9), Power supply (13/14)

- Single wire: 1 x 0.5 … 4.0mm^2 or 2 x 0.5 … 2.5mm^2
- Multiwire with end splices: 1 x 0,5 … 2.5mm^2 or 2 x 0.5 … 1.5mm^2

Torque

- Torque: 0.5 … 0.6Nm rsp. 4.42 … 5.31 lbf in

5.3 Inputs

All voltage measurement inputs must originate at circuit breakers or fuses rated by 1 Amps. This does not apply to the neutral connector. You have to provide a method for manually removing power from the device, such as a clearly labeled circuit breaker or a fused disconnect switch.

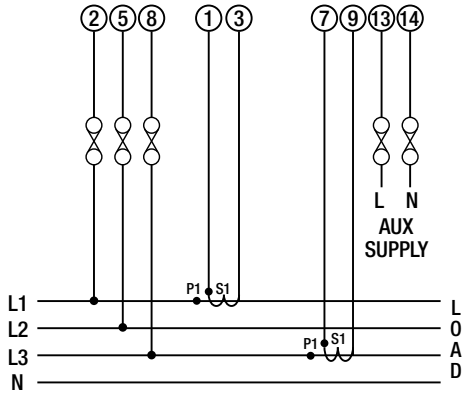
When using **voltage transformers** you have to ensure that their secondary connections never will be short-circuited.

No fuse may be connected upstream of the **current measurement inputs!**

When using **current transformers** their secondary connectors must be short-circuited during installation and before removing the device. Never open the secondary circuit under load.

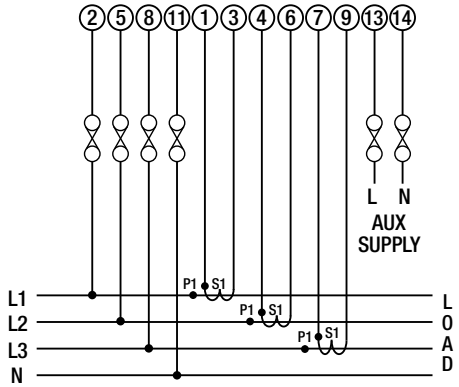
The connection of the inputs depends on the configured system (connection type).

Three Phase - three wire system, unbalanced load



Direct connection

Three Phase - four wire system, unbalanced load



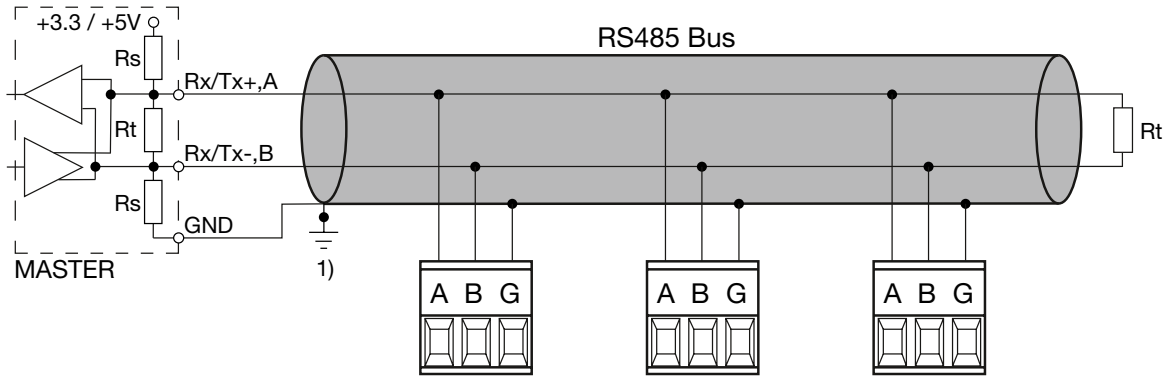
Direct connection

5.4 Power supply

A marked and easily accessible current limiting switch has to be arranged in the vicinity of the device for turning off the power supply. Fusing should be 10 Amps or less and must be rated for the available voltage and fault current.

5.5 Modbus interface RS485

Via the optional Modbus interface measurement data may be provided for a superior system.



1) One ground connection only. This is possibly made within the master (PC).

Rt: Termination resistors: 120 Ω each for long cables (> approx. 10 m)

Rs: Bus supply resistors, 390 Ω each

The signal wires (A, B) have to be twisted. GND (G) can be connected via a wire or via the cable screen. In disturbed environments shielded cables must be used. Supply resistors (Rs) have to be present in bus master (PC) interface. Stubs should be avoided when connecting the devices. A pure daisy chain network is ideal.

You may connect up to 32 Modbus devices to the bus. A proper operation requires that all devices connected to the bus have equal communication settings (baud rate, transmission format) and unique Modbus addresses.

The bus system is operated half duplex and may be extended to a maximum length of 1200 m without repeater.

6. Commissioning

Before commissioning you have to check if the connection data of the device match the data of the plant.
If so, you can start to put the device into operation by switching on the power supply and the measurement inputs.

SIRAX BT5700	
ORDER CODE: 175275	
SR No.: 15/11/0001	
CLASS: 0.5 CAT III 300V Max. V40.05	
INPUT: 3PH. 440 V L - L, 5A/1A, 45...65Hz	
OPTION: RS485	
AUXILIARY: 12...48V DC, 4VA	

Label version RS485
(175 275)

SIRAX BT5700	
ORDER CODE: 175134	
SR No.: 15/11/0001	
CLASS: 0.5 CAT III 300V Max. V40.05	
INPUT: 3PH. 440 V L - L, 5A/1A, 45...65Hz	
OPTION: RS485	
AUXILIARY: 100...250V AC/DC, 4VA	

Label version RS485
(175 134)

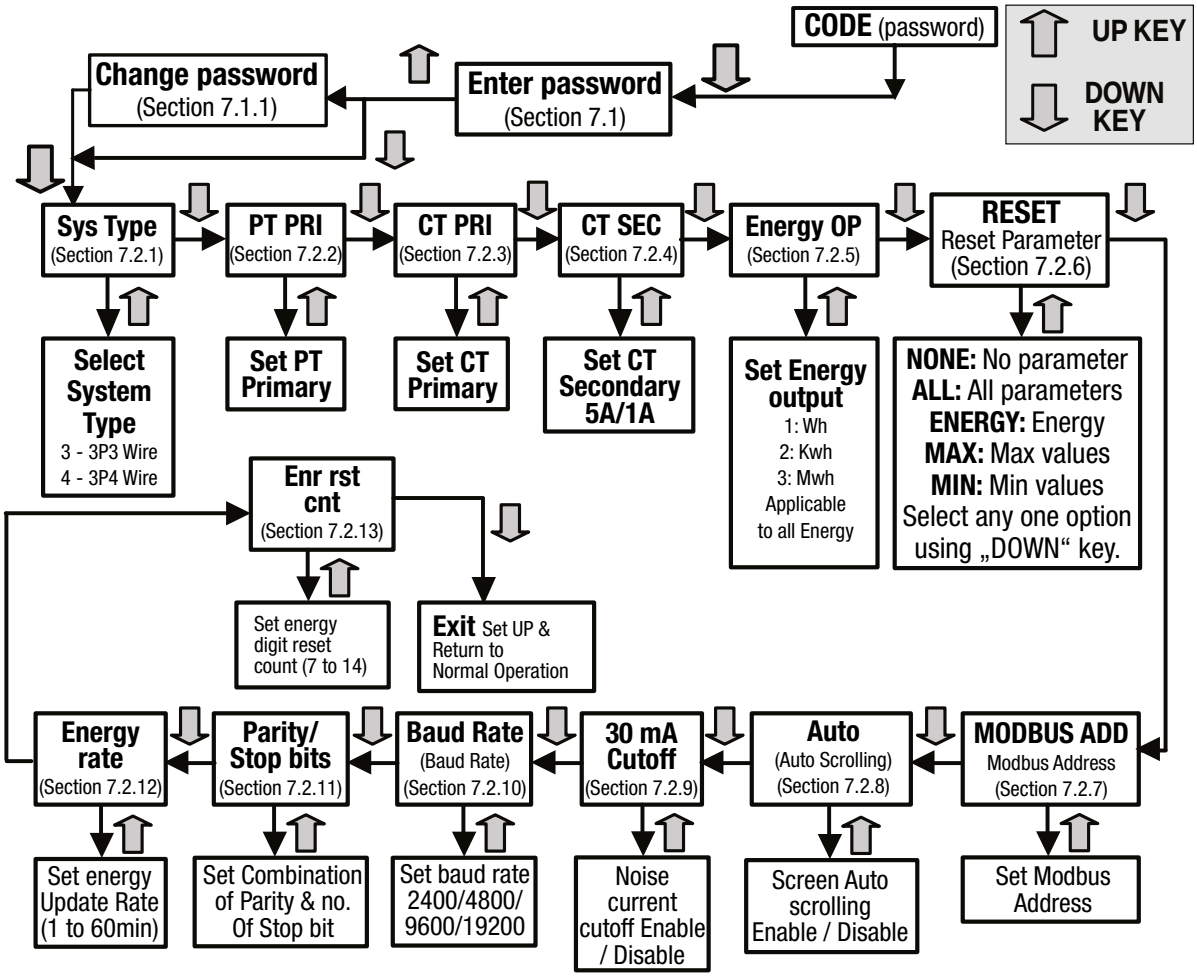
6.1 Operating the device

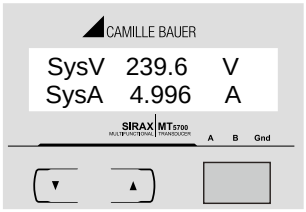
SIRAX BT5700 can be configured and programmed at site for the following: PT Primary, CT Primary, CT Secondary (5A or 1A) & 3 phase 3W or 3 Phase 4W System. The front panel has two push buttons through which the User may scroll through the available measurement readings, reset the energy (Import/Export) Min/Max (System Voltage & System Current) & configure the product.

Operation is performed by means of 2 keys:

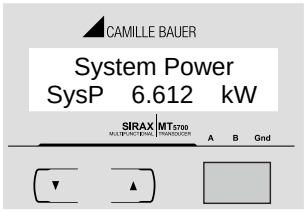
2 keys “ UP” und “ DOWN” for navigation and for the selection of values.

6.2 Setup Parameter Screen

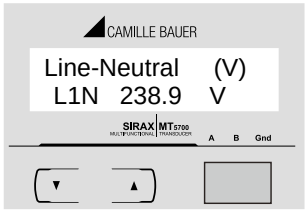




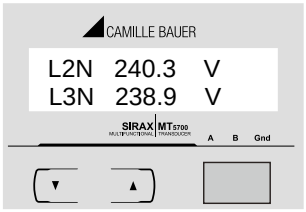
Screen 1: System screen (System Voltage, System Current)



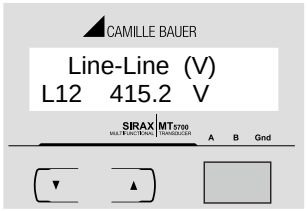
Screen 2: System Power



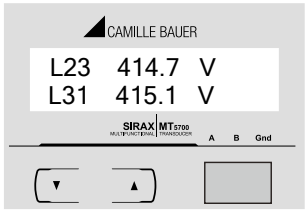
Screen 3: Line to neutral Voltage (VL1-N) (4 Wire only)



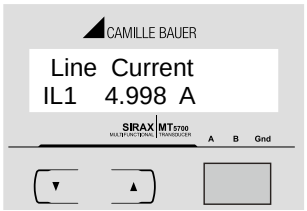
Screen 4: Line to neutral Voltage (VL2-N, VL3-N) (4 Wire only)



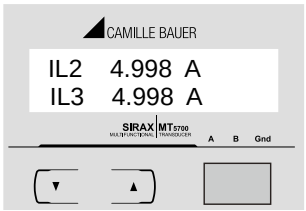
Screen 5: Line to line Voltage (VL1-L2)



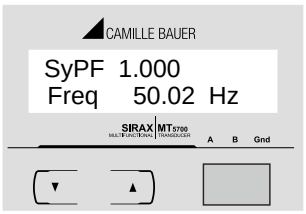
Screen 6: Line to line (VL2-L3, VL3-L1) Voltage



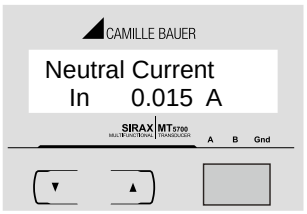
Screen 7: Line Current (L1)



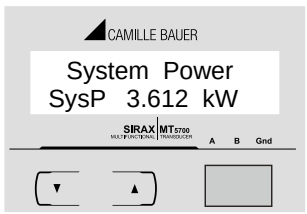
Screen 8: line Currents (L2, L3)



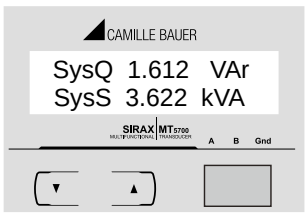
Screen 9: System Power factor, Frequency



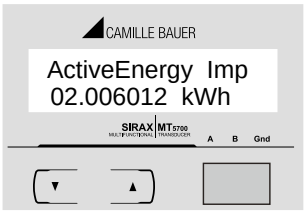
Screen 10: Neutral Current (4 Wire only)



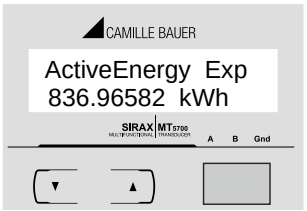
Screen 11: System Active Power



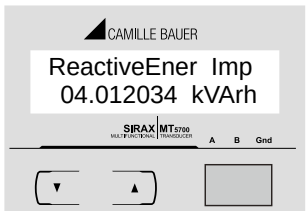
Screen 12: System Powers (Reactive & Apparent)



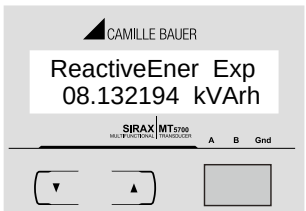
Screen 13: Active Energy (Import)



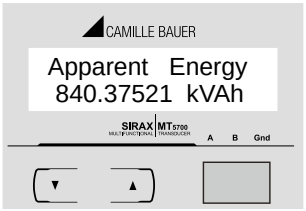
Screen 14: Active energy (export)



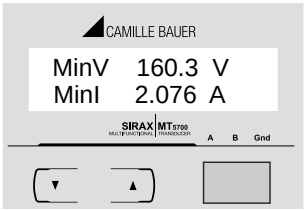
Screen 15: Reactive Energy (Import)



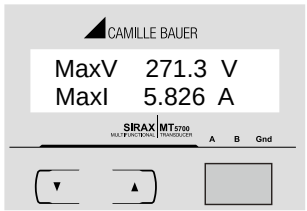
Screen 16: Reactive energy (export)



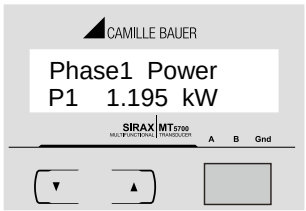
Screen 17: Apparent energy



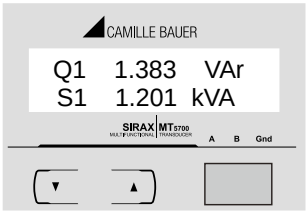
Screen 18: Min values (System Voltage, Current)



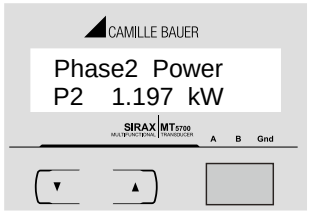
Screen 19: Max values (System Voltage, Current)



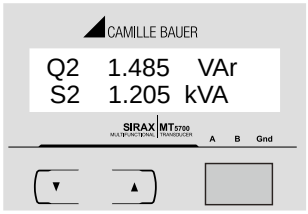
Screen 20: Phase 1 Active Power (4 Wire only)



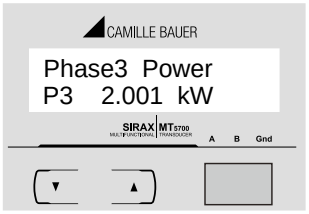
Screen 21: Phase 1 Power (Reactive / Apparent) (4 wire only)



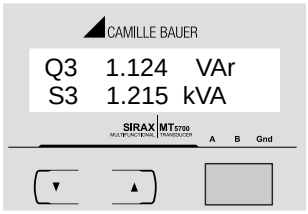
Screen 22: Phase 2 Active Power (4 wire only)



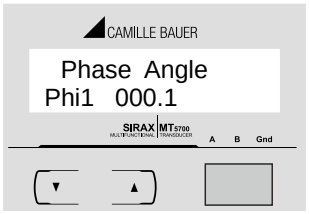
Screen 23: Phase 2 Power (Reactive/Apparent) (4 wire only)



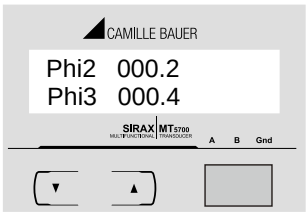
Screen 24: Phase 3 Power Active (for 4 Wire only)



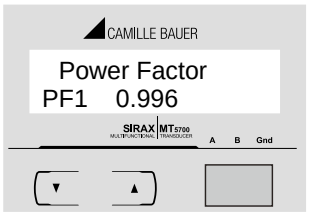
Screen 25: Phase 3 Power (Reactive/Apparent) (4wire only)



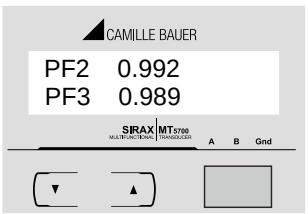
Screen 26: Phase angle (phase 1) (for 4 Wire only)



Screen 27: Phase angle (phase 2, 3) (for 4 Wire only)



Screen 28: Power factor (phase 1) (for 4 Wire only)



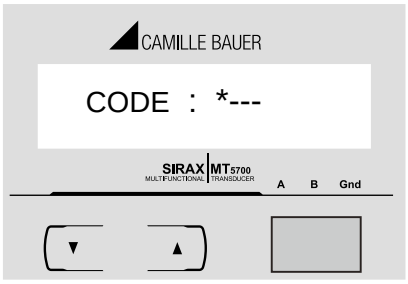
Screen 29: Power factor (phase 2, 3) (for 4 Wire only)

7. Programming

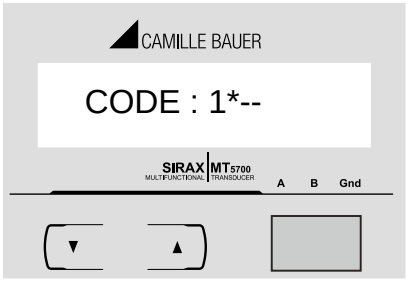
The following sections comprise step by step procedures for configuring the SIRAX BT5700 for individual user requirements.
To access the set-UP screens, press and hold the "▼ DOWN" and "▲ UP" Key simultaneously for 5 seconds. This will take the User into the Password Protection Entry Stage (Section 7.1).

7.1. Password Protection

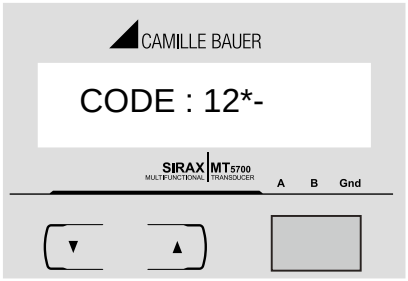
Password protection can be enabled to prevent unauthorised access to set-UP screens, by default password protection is not enabled. Password protection is enabled by selecting a four digit number other than 0000, setting a password of 0000 disables the password protection.



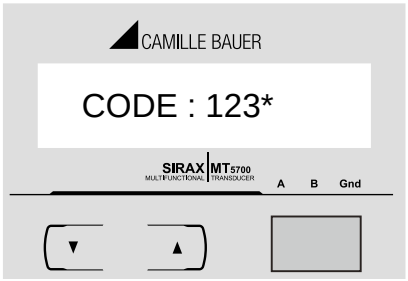
Enter Password, prompt for first digit. (*Denotes that the digit will be flashing.
Press " (DOWN) " key to scroll the value of the first digit From 0 through 9, the value will wrap from 9 round to 0. Press "UP " key to advance to next digit.
In the special case, where password is "0000", pressing the "UP" key when prompted for first digit will advance to the password "confirmed" screen.



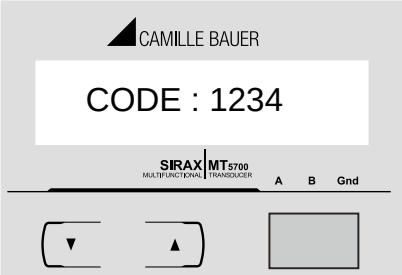
Enter Password, first digit entered, prompt for second digit.
(*Denotes that the digit will be flashing).
Press "(DOWN) " key to scroll the value of the first digit From 0 through 9, the value will wrap from 9 round to 0. Press "UP" key to advance to next digit.



Enter Password, second digit entered, prompt for third digit.
(*Denotes that the digit will be flashing.
Press " DOWN " key to scroll the value of the first digit From 0 through 9, the value will wrap from 9 round to 0.
Press "UP " key to advance to next digit.

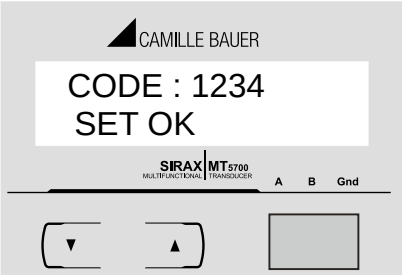


Enter Password, third digit entered, prompt for fourth digit.
(* Denotes that digit will be flashing).
Use the "DOWN" key to scroll the value of the fourth digit from 0 through to 9, the value will wrap from 9 round to 0.
Press the "UP" key to advance to verification of the password.



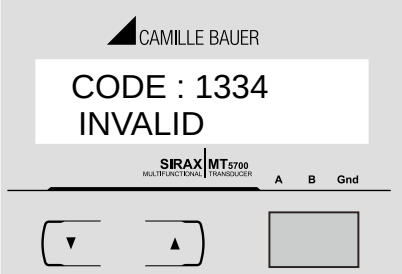
Enter Password, fourth digit entered, awaiting verification of the password.

Password confirmed



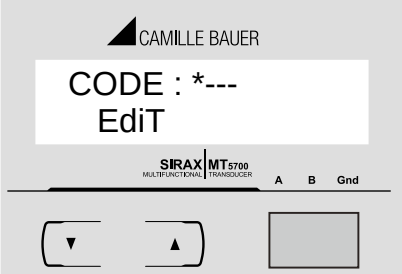
Pressing “DOWN” key will advance to the “New/change Password” entry stage (section 3.1.1)
Pressing the “UP” key will advance to the Menu selection screen. (See section 3.2).

Password Incorrect

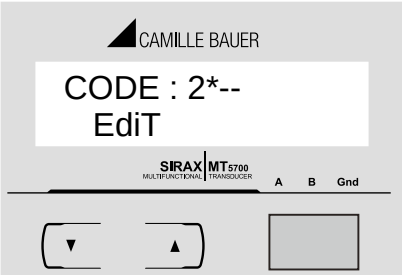


The unit has not accepted the Password entered. Pressing the “DOWN” key will return to the Enter Password stage.
Pressing the “UP” key exits the Password menu & returns operation to the measurement reading mode.

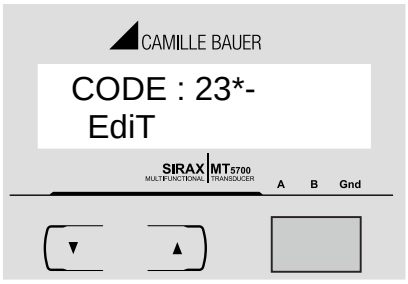
7.1.1 Change Password New / Change Password



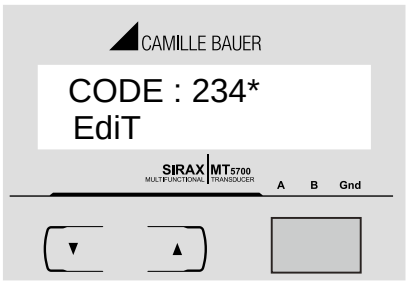
(* indicates that this digit will be flashing).
Pressing the “DOWN” key will scroll the value of the first digit from 0 through to 9, the value will wrap from 9 round to 0. Pressing the “UP” key to advance the operation to the next digit & sets the first digit, in this case “2”.



New / Change Password, first digit entered, prompting for second digit.
(* indicates that this digit will be flashing).
Pressing the “DOWN” key will scroll the value of the second digit from 0 through to 9, the value will wrap from 9 round to 0.
Pressing the “UP” key to advance the operation to the next digit and sets the second digit, in this case to “3”.

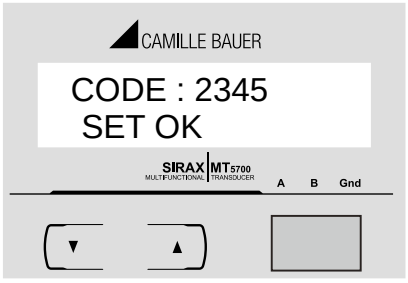


New / Change Password, second digit entered, prompting for third digit. (* indicates that this digit will be flashing).
Pressing the " DOWN" key will scroll the value of the third digit from 0 through to 9, the value will wrap from 9 round to 0.
Pressing the "UP" key to advance the operation to the next digit and sets the third digit, in this case to "4"



New / Change Password, third digit entered, prompting for fourth digit. (* indicates that this digit will be flashing).
Pressing the "DOWN" key will scroll the value of the fourth digit from 0 through to 9, the value will wrap from 9 round to 0.
Pressing the "UP" key to advance the operation to the "New Password Confirmed" and sets the fourth digit, in this case to "5"

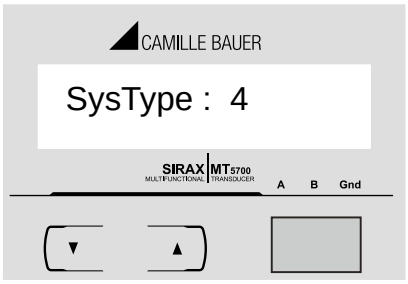
New Password confirmed



Pressing the "DOWN" key will return to the "New/Change Password".
Pressing the "UP" key will advances to the system type Selection screen.(see section 7.2.1).

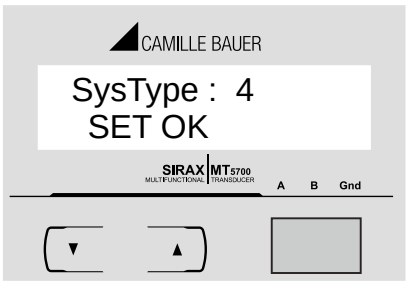
7.2 Menu selection

7.2.1 System type selection



This screen is used to set the system type.
System type "3" for 3 phase 3 wire & "4" for 3 phase 4 wire system. Pressing "UP" key accepts the present value and advances to the "Potential transformer Primary value edit menu 7.2.2
Pressing "DOWN" key will enter system type Edit mode and scroll between 3 and 4.
Pressing "UP" key advances to the system type confirmation menu.

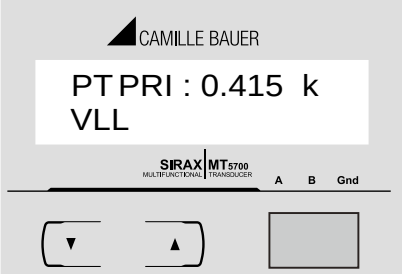
System Type Conformation



Pressing "UP" sets the displayed value and will advance to "Potential Transformer Primary Value Edit" menu. (See section 7.2.2)
Pressing "DOWN" key will return to the system type "Edit" menu.

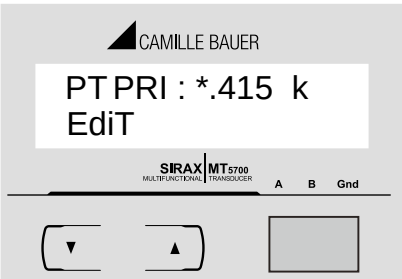
7.2.2 Potential Transformer primary Value

The nominal full scale voltage which will be displayed as Line to Line voltage in four wire or 3 wire system. The value represent the voltage in KVLL.
Maximum Potential transformer primary value can be set to 692.8 KVLL or restricted to 666 MVA depends on previously set Current transformer (CT) primary value. The minimum value allowed is 100VLL.



Pressing “UP” key accepts the present value and then advances to Current transformer (CT) Primary value edit menu (section 7.2.3).
Pressing “DOWN” key enters into “Potential Transformer Primary Value Edit” mode.
Initially the multiplier must be selected. Pressing the “DOWN” key will move the decimal point position to the right unit it reaches # # # .# after which it will return to # # # #.
Pressing “UP” key selects the present multiplier (decimal point position) and advances to the “potential Transformer primary digit Edit” mode.

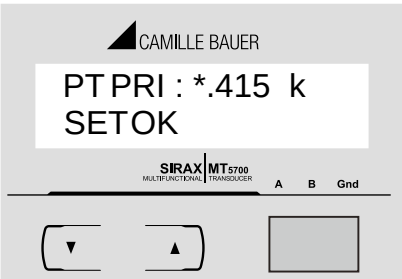
Potential Transformer Primary Digit edit



(* denotes that the digit will be flashing)
Pressing the “DOWN” key will scroll the value of the most significant digit from 0 through to 9 unless the presently displayed Potential Transformer Primary Value together with the Current Transformer Primary Value, previously set, would result in maximum power of greater than 666MVA per phase, in which case the digit range will be restricted.

Pressing “UP” key accepts the present value at the cursor position and advances the cursor to the next less significant digit.
When the least significant digit has been set, pressing “DOWN” key will advance to the “Potential Transformer Primary Value Confirmation” stage.

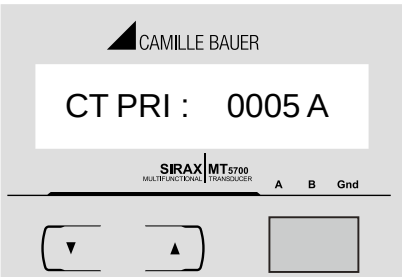
Potential transformer Primary value Confirmation



If scaling is to be corrected, pressing “DOWN” key will return to the “Potential Transformer Primary Value Edit” stage with the digits flashing indicating that the multiplier (decimal point position) should be selected.
Pressing “UP” key sets the displayed value and then it will advance to Current transformer Primary Value selection menu (section 7.2.3).

7.2.3 Current Transformer Primary Value

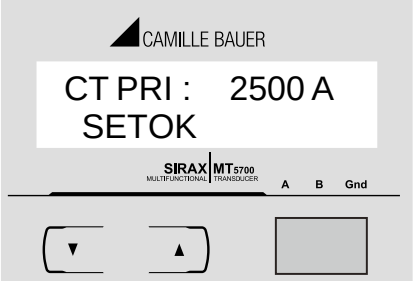
The nominal Full Scale Current that will be displayed as the Line currents. This screen enables the user to display the Line currents inclusive of the transformer ratios, the values displayed represent the Current in Amps.
Maximum Current transformer primary value can be set to 9999 A or restricted to 666 MVAdepends on previously set Potential transformer (PT) Primary value.
Pressing “UP” key accepts the present value and advances to the Current transformer Secondary value menu (section 7.2.4)



Pressing “DOWN” key will enter the “Current transformer Transformer Primary Value Edit” mode. This will scroll the value of the most significant digit from 0 through to 9, unless the presently displayed Current Transformer Primary Value together with the Potential Transformer Primary Value results in a maximum power of greater than 666MVA in which case the digit range will be restricted, the value will wrap.

Example:
If primary value of PT is set as 692.8 KVLL (max value) then primary value of Current is restricted to 1157A.

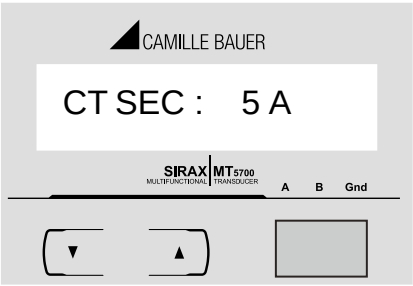
Pressing “UP” key will advance curser to next less significant digit. (*Denotes that decimal point will be flashing).
The Maximum Power restriction of 666 MVA referr to 120% of nominal current and 120% of Nominal voltage, i.e. 462.8MVA nominal power per phase.
When the least significant digit has been set, pressing “UP” key will advance to the “Current Transformer Primary Value Confirmation” stage.
The minimum value allowed is 1, the value will be forced to 1 if the display contains zero



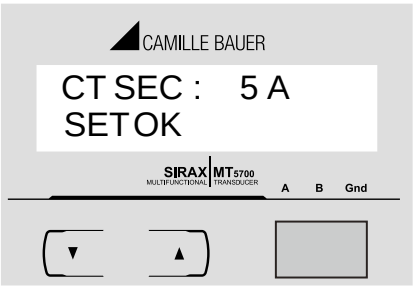
Current Transformer Primary value confirmation

If the set value is to be corrected, pressing “DOWN” key Will re-enter the CT primary value edit stage.
Pressing “UP” key, sets the displayed value as CT primary and advances to Current transformer Secondary menu (section 7.2.4).

7.2.4 Current Transformer Secondary Value



The screen is used to set the secondary value for Current Transformer.
Pressing “UP” key accepts the present value and advances to Energy display on modbus menu. (section 7.2.5).
Pressing “DOWN” key enter into CT secondary value Edit and scrolls the value between 1 (OR) 5.
After selecting the desired value, Pressing “UP” Enters into CT secondary value confirmation screen.

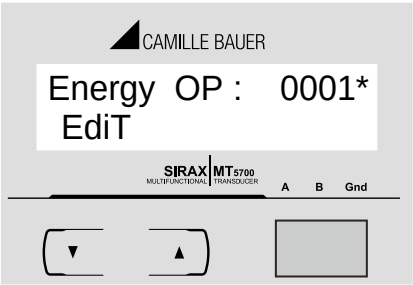


CT Secondary value confirmation

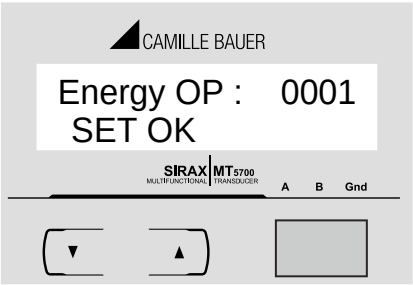
Pressing “DOWN” key reenters the CT secondary value edit menu.
Pressing “UP” key sets the displayed value as CT secondary and advances to Energy display on modbus menu (section 7.2.5).

7.2.5 Energy Display on modbus

This screen enable user to set energy in terms of Wh / KWh / MWh on RS 485 Output depending as per the requirement. Same applicable for all types of energy.



Pressing “ UP ” key accepts the presents value
and advances to the “Reset parameter”menu (See section 7.2.6).
Pressing the “ DOWN ” key will enter the “Energy Display
On Modbus Edit” mode and scroll the value through the values 1,2 & 3 wrapping back to 1
1: Energy In Wh
2: Energy in KWh
3: Energy in MWh.
Pressing the “ UP” key advances to the “Energy Display On Modbus Confirmation” menu.

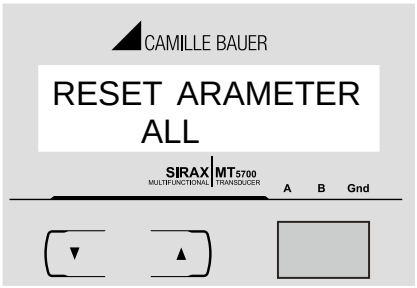


Energy Display On Modbus Confirmation.

This screen will only appear following an edit of the Energy Display On Modbus.
Pressing the “DOWN” key will enter the “Energy Display
On Modbus Edit” stage by blanking the bottom line of the display.
Pressing “UP” key sets the displayed value and will advance to the “Reset parameter” menu. (See section 7.2.6)

Note: Default value is set to ‘2’ i.e. Energy on Modbus will be in terms of KWh/KVArh/ KVAh resp.

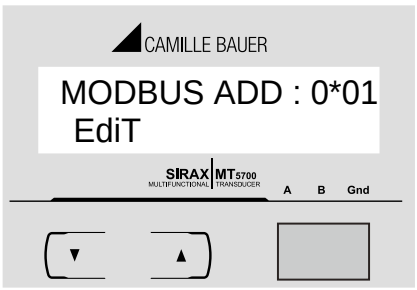
7.2.6 RESET of parameters



This screen is used to Reset the different parameters .
Pressing “UP” key resets the displayed parameters and advances to modbus address menu (section 7.2.7).
Pressing “DOWN” key scrolls the parameters to Reset From None, Energy, Min, Max, All and back to None.
Select the parameters which is to be Reset with “DOWN” Key. To reset the selected parameter press “UP” key.
After pressing “UP” key, it acknowledges the reset of parameter with “DONE” on display as shown.

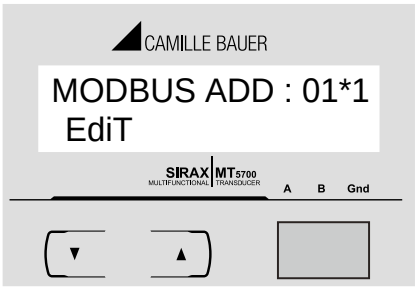
Further if another parameter is to be reset, press “DOWN” Key to scroll the parameter again.
Pressing “UP” key after DONE message displayed, advances the operation to modbus address menu. (Section 7.2.7)

7.2.7 Modbus Address

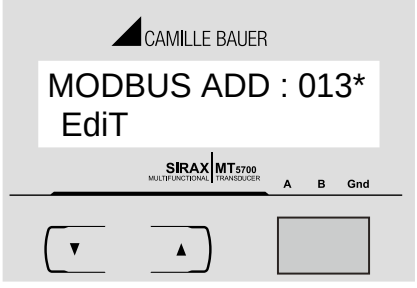


This screen allows the user to set device address of instrument for RS 485 communication. The range of allowable address is 1 to 247. Pressing “DOWN” key enters into the Modbus Address edit mode.

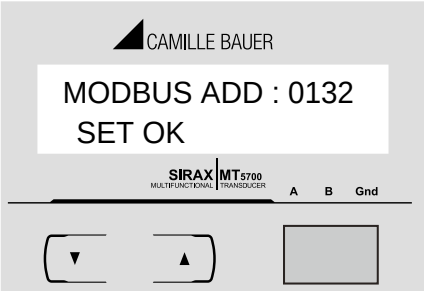
Enter Address, prompt for first digit.
* denotes that the Digit will be flashing.
Pressing “DOWN” key scrolls the value of flashing digit from 0 to 2 and back to 0.
Pressing “UP” key changes the curser position to next Less significant digit.



Enter Address, first digit entered, prompt for second digit
* denotes that the Digit will be flashing.
Pressing “DOWN” key scrolls the value of flashing digit from 0 to 9 and back to 0.
Pressing “UP” key changes the curser position to next Less significant digit.



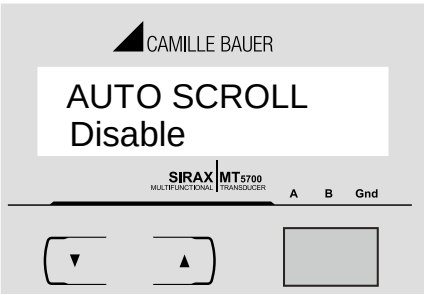
Enter address, second digit entered, prompt for third digit.
* denotes that the Digit will be flashing.
Pressing “DOWN” key scrolls the value of flashing digit from 0 to 9 and back to 0.
Pressing “UP” key enters the modbus address Confirmation screen.



Modbus address Confirmation

Pressing “UP” key sets the modbus address & enters Into Auto scrolling selection menu (section 7.2.8).
Pressing “DOWN” key re-enters into Modbus address Setting menu.

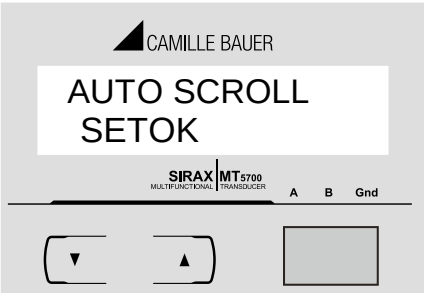
7.2.8 Auto scrolling



This screen allows user to enable screen scrolling.

Auto scrolling Edit.

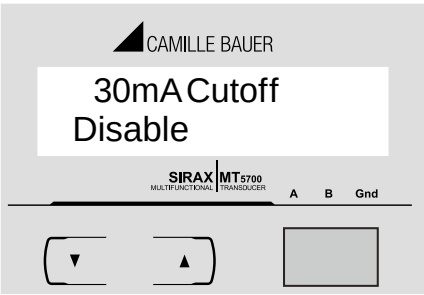
Pressing “DOWN” key scrolls between enable and disable. Select enable for Auto scrolling of screen and select Disable for fixed screen.
Pressing “UP” key enters into Auto scrolling Confirmation screen



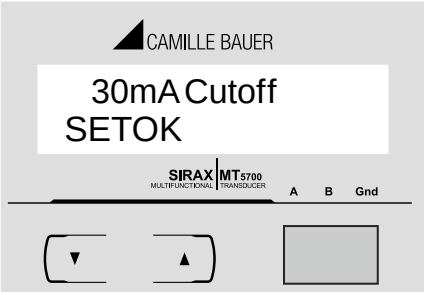
Auto Scrolling Confirmation

Pressing “UP” key, sets the selected option and advances to noise current cutoff menu (section 7.2.9)
Pressing “DOWN” key re-enters the auto scroll menu.

7.2.9 Noise current Cut-off



This screen allows user to set low noise current cutoff at 30mA. Pressing “DOWN” key enters into edit mode and scrolls between Enable and disable.
Pressing “UP” key accepts the selected option and enters Into 30mA cutoff confirmation screen.

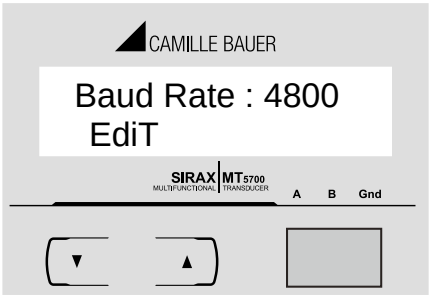


30mA cutoff confirmation

Pressing “UP” key sets the selected option and advances to Baud rate selection menu (section 7.2.10).

Pressing “DOWN” key re-enters into 30mA cutoff selection menu.

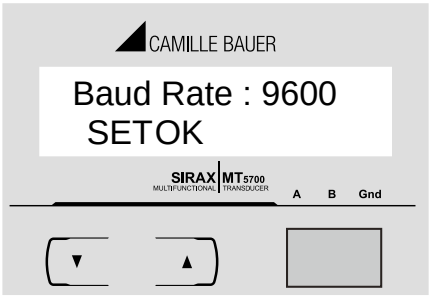
7.2.10 Baud Rate



This screen allows user to set the baud rate for Rs485 communication.
Pressing “UP” key sets the present value and advances to Parity and stop bits menu (Section 7.2.11).
Pressing “DOWN” key enters into Baud rate Edit mode & scrolls The values from 2400, 4800, 9600 to 19200 & Back to 2400.

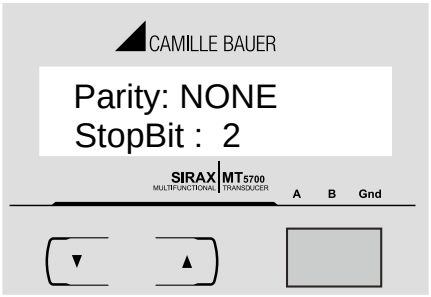
Pressing ‘UP’ key will advance to baud rate Confirmation screen.

Baud rate Confirmation



Pressing “DOWN” keys re-enters into baud rate edit mode.
Pressing “UP” key sets the displayed value as baud rate and advances the operation to parity and stop bit menu (section 7.2.11).

7.2.11 Parity and Stop bits

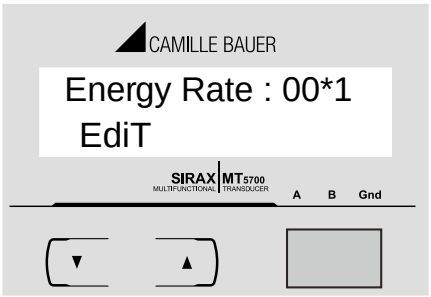


This menu allows user to set parity and number of stop bits for Rs485 communication interface.
The parity and number of stop bits are to be set in same menu.
Pressing “UP” key sets the displayed combination of Parity and stop bits and advances the operation to Energy rate selection menu (section 7.2.12).
Pressing “DOWN” key enters into edit mode and scrolls the Combination from Parity: None Stop bit:1, Parity: None Stop bit: 2
Parity: Even Stop bit: 1, Parity: Odd Stop bit:1 and back to Parity: None Stop bit: 1. After selecting the desired combination, pressing “UP” Key enters into parity and number of stop bit confirmation screen.
Parity and number of stop bit confirmation.

Parity and number of stop bit confirmation

Pressing “DOWN” key re-enters into the Parity and stop bit Edit menu.
Pressing “UP” key, sets the displayed values and advances the operation to Energy rate selection menu. (section 7.2.12).

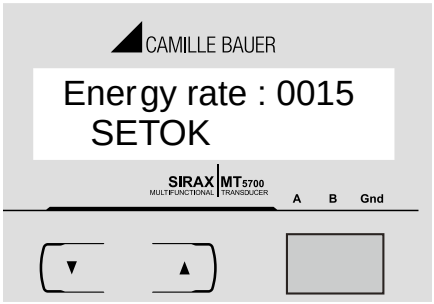
7.2.12 Energy rate



This menu allows user to set the energy reading Update rate from 1 to 60 minutes.
Pressing “DOWN” key enters into energy rate edit menu and scrolls the value of 10s digit from 0 to 6. If 1st digit is greater than 0 then 10s digit will wrap back to 0 from 5.
* denotes that the digit will be flashing.

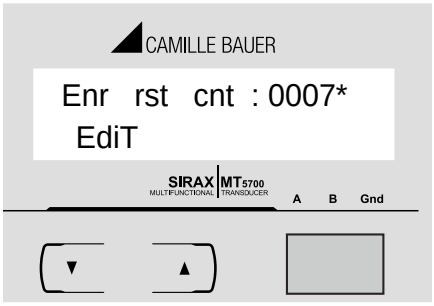
Pressing “UP” key shifts the curser position from 10s digit to 1s digit. Value of 1st digit scrolls from 0 to 9 and again Wraps back to 0.
After setting desired value of 1s digit pressing “UP” key Enters into energy rate confirmation screen.

Energy rate confirmation



Pressing “DOWN” key re-enters into energy rate edit menu.
Pressing “UP” key sets the displayed value as energy update rate and then advance the operation to Energy digit reset count menu (section 7.2.13).
If energy rate is set to “00”, then it sets “01” min as default value.

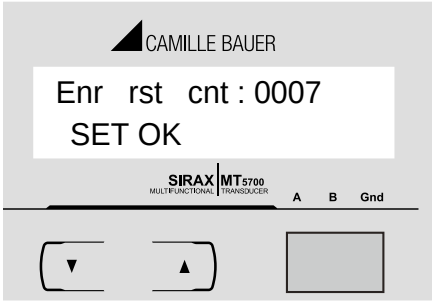
7.2.13 Energy Digit reset count



This screen enables user for setting maximum energy count after which energy will rollback to zero depends upon setting of Wh,KWh, & MWh.
Pressing the “ UP” key sets the displayed value and then
SIRAX BT5700 exits from setup menu and starts normal operation.
Pressing the “DOWN” key will enter the Energy digit reset count edit mode. This will scroll the value of reset count **from 7 to 14 for Wh, from 7 to 12 for KWh & from 7 to 9 for MWh.**

E.g. If energy display on modbus is set Wh & If you set Energy digit count to 10 then energy will reset after “9,999,999,999” & then will Rollback to zero. Pressing “UP ” key will advance to Energy digit reset count confirmation screen.

Energy digit reset count confirmation



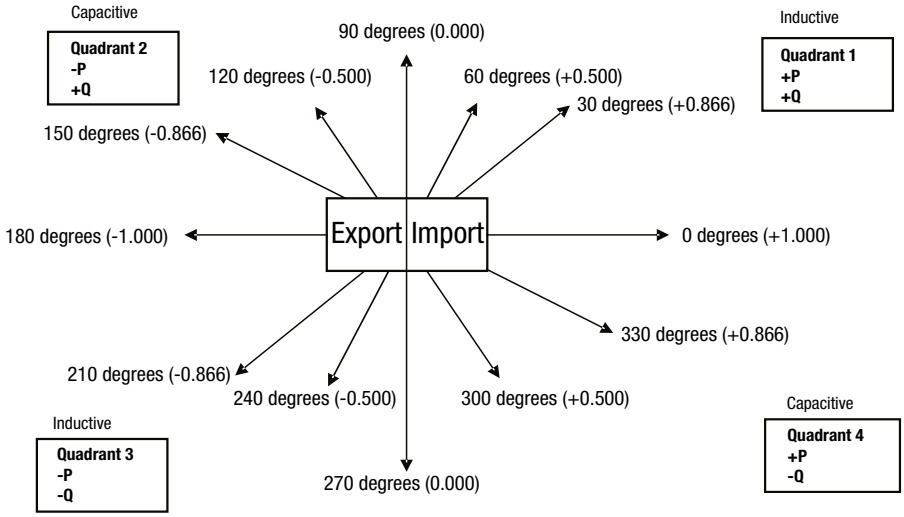
Pressing the “ DOWN ” key will re-enter Energy digit reset count edit mode.
Pressing the “ UP ” key sets the displayed value and will exits from setup menu and starts normal operation.

Note:
1) Default value is set to “8” i.e if energy count crosses 8 digit it will rollback to zero.
2) If Energy displays on modbus is set to (2) & energy digit reset count is set to 12. Energy screen on display will show “-------” i.e energy overflow when energy crosses the 11 digit count.....
3) If Energy displays on modbus is set to (3) & energy digit reset count is set to 9. Energy screen on display will show “-------” i.e energy overflow when energy crosses the 8 digit count.....

8. Phasor Diagram

Quadrant 1: 0° to 90°
Quadrant 2: 90° to 180°
Quadrant 3: 180° to 270°
Quadrant 4: 270° to 360°

In this diagram a technical visualization of the current and voltage phasors is shown, using a clockwise rotation.



Connections	Quadrant	Sign of Active Power (P)	Sign of Reactive Power (Q)	Sign of Power Factor (PF)	Inductive/ Capacitive
Import	1	+ P	+ Q	+	L
Import	4	+ P	- Q	+	C
Export	2	- P	+ Q	-	C
Export	3	- P	- Q	-	L

Inductive means Current lags Voltage
Capacitive means Current leads Voltage

When the instrument displays Active power (P)with " + " (positive sign) , the connection is " **Import** " .
When the instrument displays Active power (P)with " - " (negative sign) , the connection is " **Export** " .

9. Service, maintenance and disposal

For devices that have not been opened in the factory, no warranty or guarantee can be assumed.

9.1 Repair work and modifications

Repair work and modifications shall exclusively be carried out by the manufacturer. Do not open the housing of the device. In case of any tampering with the device, the guaranty claim shall lapse. We reserve the right of changing the product to improve it.

9.2 Calibration and new adjustment

Each device is adjusted and checked before delivery. The condition as supplied to the customer is measured and stored in electronic form.

The uncertainty of measurement devices may be altered during normal operation if, for example, the specified ambient conditions are not met.

9.3 Cleaning

The display and the operating keys should be cleaned in regular intervals. Use a dry or slightly moist cloth for this.

Damage due to detergents

Detergents may not only affect the clearness of the display but also can damage the device. Therefore, do not use detergents.

9.4 Disposal

The disposal of devices and components may only be realised in accordance with good professional practice observing the country-specifi c regulations. Incorrect disposal can cause environmental risks.

9.5 Return

All devices delivered to Camille Bauer Metrawatt AG shall be free of any hazardous contaminants (acids, lyes, solutions, etc.).
Use original packaging or suitable transport packaging to return the device.

Damage by returning

Damages caused by improper returning, no warranties or guarantees can be given.

10. Technical data

System

Connection types:	3-Phase 3-Wire unbalanced load 3-Phase 4-Wire unbalanced load

Inputs

Nominal current:	1 A / 5 A AC RMS
Maximum continuous input current:	120% of Rated value
Nominal input current burden:	0,6 VA per Phase
Max short duration current input:	20 x Rated Value (1s application repeated 5 times at 5 min. intervals)
System CT Primary values:	Std. Values 1 to 9999 A (1 or 5 A secondaries)
Nominal voltage:	110 V_{L-L} (63.5 V_{LN})
Max continuous input voltage:	120% of Rated Value
Max short duration input voltage:	2 x Rated Value (1S application repeated 10 times at 10s intervals)
Nominal input voltage burden:	0.2VA approx. per phase
System PT primary value:	100 V_{LL} to 692.8 KV_{LL}
Auxiliary Supply	12 … 48V DC ±10% (175 275) 100 … 250V AC/DC ± 10% (175 134)
Auxiliary supply burden:	<4VA approx.

Operating Measuring Ranges

Voltage:	5 … 120% of Rated Value
Current:	5 … 120% of Rated Value
Frequency:	40 … 70 Hz
Power factor:	0.6 Lag … 1 … 0.6 Lead

Accuracy

Voltage:	± 0,5% of range
Current:	± 0,5% of range
Frequency:	± 0,15% of mid frequency
Active power:	± 0,5% of range
Re-active power:	± 0,5% of range
Apparent Power:	± 0,5% of range
Active energy:	± 0,5% of range
Re-active energy:	± 0,5% of range
Apparent energy:	± 0,5% of range
Power Factor:	± 1 % of Unity
Angle:	± 1 % of range (0 - 360)

Variation due to influence quantity is 100% of class index for all other parameters except energy.

Mechanical attributes

Orientation:	Any
Bezel size:	96 mm x 96 mm
Panel cut out:	92+0.8 mm x 92+0.8 mm detail see cut out drawing
Overall depth:	<80mm
Housing material:	PC 10% unfilled
Weight:	ca. 460 g
Dimensions:	see dimensional drawings

Display:	2 Line Display with backlight
	Update rate approx. 1 sec.
User interface:	2 push buttons
Terminals:	Screw-type terminals

Reference conditions for Accuracy

Reference:	23 °C ± 2 °C
temperature Input frequency:	50 or 60Hz ± 2%
Input waveform:	Sinusoidal (distortion factor 0.005)
Input Voltage:	Rated value
Auxiliary supply voltage:	Rated Value ± 1 %
Auxiliary supply frequency:	Rated Value ± 1 %
Power Factor:	0.8 Lag…1…0.8 Lead

Nominal range of use of influence quantities for measurands

Voltage:	5 … 120 % of Rated Value
Current:	5 … 120 % of Rated Value
Input frequency:	Rated Value ± 10 %
Temperature:	0 to 50 °C
Auxiliary supply voltage:	Rated Value ± 10 %
Auxiliary supply frequency:	Rated Value ± 10 %
Temperature Coefficient:	0.025% / °C for Voltage (50 … 120% of Rated Value)
(For Rated value range of use 0... 50 °C)	0.05% / °C for Current (10..120% of Rated Value)
Error change due to variation of	
an influence quantity:	2 * Error allowed for the reference condition applied in the test

Standards

Terms, definitions and test methods:	IEC60688
EMC Immunity:	IEC 61326
	10V/m min-Level 3 industrial low level electromagnetic radiation environment IEC 61000-4-3
Safety:	IEC 61010-1 : 2010
IP for water & dust:	IEC 60529

Isolation

Dielectric voltage withstand test	2.2 kV RMS 50 Hz for 1 minute
between circuits and accessible surfaces	between all electrical circuits

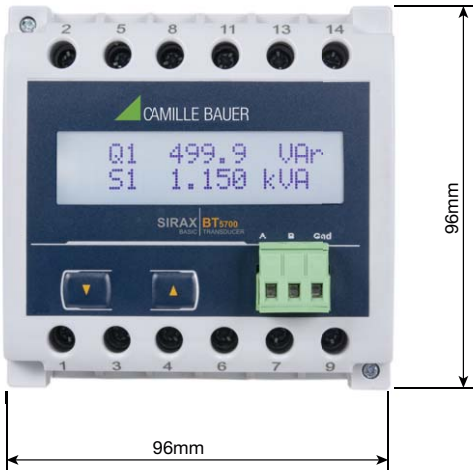
Environmental

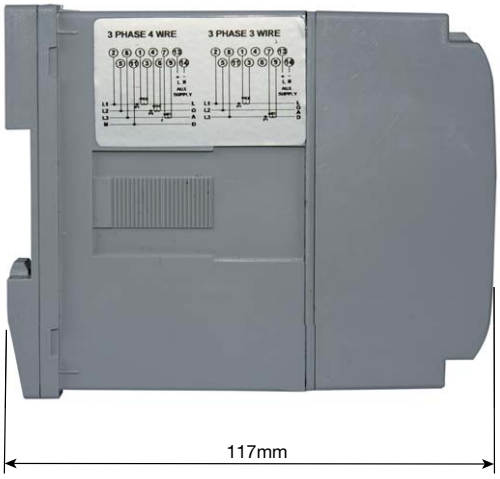
Operating temperature:	-5 to 60 °C
Storage temperature:	- 20 to +65 0C
Relative humidity:	0 … 90 % RH
Warm UP time:	3 minute (minimum)
Shock :	15g in 3 planes
Vibration:	10 … 55 Hz, 0.15mm amplitude

Outputs

Modbus (RS485)	via plug-in terminal (B, A, G)
Protocol:	Modbus (RS485)
Baud rate:	2‘400 , 4‘800, 9‘600, 19‘200 Baud (programmable)
Parity:	Odd or even, with 1 Stop Bit, or None with 1 or 2 Stop Bits
Format of databytes:	4 bytes per parameter floating point format as per IEEE 754

11. Dimensional drawings





12. Interface Definition Modbus (RS485)

SIRAX BT5700 supports MODBUS (RS485) RTU protocol (2-wire).

Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. The screens should also be connected to the “Gnd” terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for the BT5700 is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time of an BT5700 is 200ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master), it must allow 200ms of time to elapse before assuming that the BT5700 is not going to respond. If slave does not respond within 200 ms, Master can ignore the previous query and can issue fresh query to the slave.

The each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 2400, 4800, 9600, 19200 bps.

Function code:

03	Read Holding Registers	Read content of read /write location (4X)
04	Read input Registers	Read content of read only location (3X)
16	Presets Multiple Registers	Set the content of read / write locations (4X)

Exception Cases: An exception code will be generated when BT5700 receives ModBus query with valid parity and error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be “Function code” ORed with HEX (80H). The exception codes are listed below

01	Illegal function	The function code is not supported by BT5700
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal DataValue	Attempt to set a floating point variable to an invalid value

12.1 Accessing 3 X register for reading measured values

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1: 3 X register addresses** (Parameters measured by the instruments). Each parameter is held in the 3X registers. Modbus Code 04 is used to access all parameters.

Example :
To read parameter ,
Volts 3 : Start address = 04 (Hex) Number of registers = 02

Note : Number of registers = Number of parameters x 2
Each Query for reading the data must be restricted to 20 parameters or less. Exceeding the 20 parameter limit will cause a ModBus exception code to be returned.

Query :

01 (Hex)	04 (Hex)	00 (Hex)	04 (Hex)	00 (Hex)	02 (Hex)	30 (Hex)	0A (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Response: Volt3 (219.25V)

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	5B (Hex)	41 (Hex)	21 (Hex)	6F (Hex)	9B (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count: Total number of data bytes received.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

TABLE 1: 3 X register addresses (measured parameters)

Adress (Register)	Parameter No.	Parameter	Modbus Start Adress Hex		3P 4W	3P 3W
			High Byte	Low Byte		
30001	1	Volts 1	00	0	•	•
30003	2	Volts 2	00	2	•	•
30005	3	Volts 3	00	4	•	•
30007	4	Current 1	00	6	•	•
30009	5	Current 2	00	8	•	•
30011	6	Current 3	00	A	•	•
30013	7	KW1	00	C	•	x
30015	8	KW2	00	E	•	x
30017	9	KW3	00	10	•	x
30019	10	KVA 1	00	12	•	x
30021	11	KVA 2	00	14	•	x
30023	12	KVA 3	00	16	•	x
30025	13	KVAR 1	00	18	•	x
30027	14	KVAR 2	00	1A	•	x
30029	15	KVAR 3	00	1C	•	x
30031	16	PF 1	00	1E	•	x
30033	17	PF 2	00	20	•	x
30035	18	PF 3	00	22	•	x
30037	19	Phase Angle 1	00	24	•	x
30039	20	Phase Angle 2	00	26	•	x
30041	21	Phase Angle 3	00	28	•	x
30043	22	Volts Ave	00	2A	•	•
30045	23	Volts Sum	00	2C	•	•
30047	24	Current Ave	00	2E	•	•
30049	25	Current Sum	00	30	•	•
30051	26	KWatt Ave	00	32	•	•
30053	27	KWatt Sum	00	34	•	•
30055	28	KVA Ave	00	36	•	•
30057	29	KVA Sum	00	38	•	•
30059	30	KVAR Ave	00	3A	•	•
30061	31	KVAR Sum	00	3C	•	•
30063	32	PF Ave	00	3E	•	•
30065	33	PF Sum	00	40	•	x
30067	34	Phase Angle Ave	00	42	•	•
30069	35	Phase Angle Sum	00	44	•	x
30071	36	Freq	00	46	•	•
30073	37	KWh Import	00	48	•	•
30075	38	KWh Export	00	4A	•	•
30077	39	KVARh import	00	4C	•	•
30079	40	KVARh export	00	4E	•	•
30081	41	KVARh	00	50	•	•
30083	42	–	–	–	–	–
30085	43	–	–	–	–	–
30087	44	–	–	–	–	–

Adress (Register)	Parameter No.	Parameter	Modbus Start Adress Hex		3P 4W	3P 3W
			High Byte	Low Byte		
30089	45	–	–	–	–	–
30091	46	–	–	–	–	–
30093	47	–	–	–	–	–
30095	48	–	–	–	–	–
30097	49	–	–	–	–	–
30099	50	–	–	–	–	–
30101	51	–	–	–	–	–
30103	52	–	–	–	–	–
30105	53	–	–	–	–	–
30107	54	–	–	–	–	–
30133	67	Volts Ave Max.	00	84	•	•
30135	68	Volts Ave Min.	00	86	•	•
30141	71	Current Ave Max.	00	8C	•	•
30143	72	Current Ave Min.	00	8E	•	•
30145	73	Active Import Energy (KWh) *	00	90	•	•
30147	74	Active Export Energy (KWh) *	00	92	•	•
30149	75	Reactive Import Energy (KVARh) *	00	94	•	•
30151	76	Reactive Export Energy (KVARh) *	00	96	•	•
30153	77	Apparent Energy (KVARh) *	00	98	•	•
30201	101	VL 1 - 2 (Calculated)	00	C8	•	x
30203	102	VL 2 - 3 (Calculated)	00	CA	•	x
30205	103	VL 3- 1 (Calculated)	00	CC	•	x
30225	113	I Neutral	00	E0	•	x
30227	114	–	–	–	–	–
30229	115	–	–	–	–	–
30231	116	–	–	–	–	–

Note :
Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W.
If product of CT_Primary and PT_Primary(VLN for 3P 4W & 3P 3W) is less than 1200 then limit for voltage and power are as shown in above table 1.
If product of CT_Primary and PT_Primary(VLN for 3P 4W & 3P 3W) is greater than or equal to 1200 then all voltages are in KV and all powers are in Mega(M) & other parameter remain same.

*Note1 :
The values are updated depending on update rate which is settable by user.
For example, if user set update rate 15 mins, then the values on these registers
(marked with *) will get updated on every 15 mins.

12.2 Accessing 4 X register for reading & Writing

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 2** for 4X Register addresses.

Example: Reading System type

System type: Start address = 0A (Hex)
Number of registers = 02

Note : Number of registers = Number of parameters x 2

Query:

01 (Hex)	03 (Hex)	00 (Hex)	0A (Hex)	00 (Hex)	02 (Hex)	E4 (Hex)	09 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Response: System Type (3phase 4 wire = 3)

01 (Hex)	03 (Hex)	04 (Hex)	40 (Hex)	40 (Hex)	00 (Hex)	00 (Hex)	EE (Hex)	27 (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count : Total number of data bytes received.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Example : Writing System type

System type : Start address = 0A (Hex)
Number of registers = 02

Query: (Change System type to 3phase 3wire = 2)

01 (Hex)	10 (Hex)	00 (Hex)	0A (Hex)	00 (Hex)	02 (Hex)	04 (Hex)	40 (Hex)	00 (Hex)	00 (Hex)	00 (Hex)	66 (Hex)	10 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count: Total number of data bytes received.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Response:

01 (Hex)	10 (Hex)	00 (Hex)	0A (Hex)	00 (Hex)	02 (Hex)	61 (Hex)	CA (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	Data Register2 Low Byte	CRC Low

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.
(Note: Two consecutive 16 bit register represent one parameter.)

TABLE 2: 4 X register addresses

Adress (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Adress Hex	
				High Byte	Low Byte
40001	1	–	–	–	–
40003	2	–	–	–	–
40005	3	Energy display on MODBUS	R/Wp	00	04
40007	4	System Voltage	R	00	06
40009	5	System Current	R	00	08
40011	6	System Type	R/Wp	00	0A
40013	7	–	–	–	–
40015	8	Energy reset	W	00	0E
40017	9	–	–	–	–
40019	10	RS485 Set-up Code	R/Wp	00	12
40021	11	Node Address	R/Wp	00	14
40023	12	–	–	–	–
40025	13	Min. Reset	Wp	00	18
40027	14	Max. Reset	Wp	00	1A
40029	15	–	–	–	–
40031	16	–	–	–	–
40033	17	PT Primary	R/Wp	00	20
40035	18	CT Primary	R/Wp	00	22
40037	19	System Power	R	00	24
40039	20	Energy digit reset count	R/Wp	00	26
40041	21	Register Order/Word Order	R/Wp	00	28
40043	22	CT Secondary	R/Wp	00	2A
40045	23	–	–	–	–
40047	24	–	–	–	–
40049	25	–	–	–	–
40051	26	–	–	–	–
40053	27	–	–	–	–
40055	28	–	–	–	–
40057	29	–	–	–	–
40059	30	–	–	–	–
40061	31	–	–	–	–
40063	32	–	–	–	–
40065	33	–	–	–	–
40067	34	–	–	–	–
40069	35	–	–	–	–
40071	36	Password	R/W	00	46
40073	37	–	–	–	–
40075	38	–	–	–	–
40077	39	Auto Scroll	R/Wp	00	4C
40079	40	30mA Noise Current Elimination	R/Wp	00	4E
40081	41	Energy Update Rate	R/Wp	00	50

Explanation for 4X register:

Adress	Parameter	Description
40001	–	–
40003	–	–
40005	Energy Display On MODBUS	This address is used to set energy output in Wh,kWh & MWh. Write one of the following value to this address. 1: Energy in Wh. 2: Energy in KWh. 3: Energy in MWh. Applicable for all Energy type
40007	System Voltage	This address is read only and displays System Voltage
40009	System Current	This address is read only and displays System Current
40011	System Type	This address is used to set the System type. Write one of the following value to this address. 2: 3 Phase 3 Wire 3: 3 Phase 4 Wire. Writing any other value will return error.
40013	–	–
40015	Reset Energy Counter	This address is used to reset the Energy Counter. Write zero value to this register to reset the energy counter. Writing any other value will return an error.
40017	–	–
40019	Rs485 Set-up Code	This address is used to set the baud rate, Parity, Number of stop bits. Refer to TABLE 3 for details.
40021	Node Address	This register address is used to set Device address between 1 to 247 .
40023	–	–
40025	Min - Reset	This address is used to reset the Min parameters value. Write Zero value to this register to reset the Min parameters. Writing any other value will return an error.
40027	Max - Reset	This address is used to reset the Max parameters value. Write Zero value to this register to reset the Max parameters. Writing any other value will return an error.
40029	–	–
40031	–	–
40033	PT Primary	This address allows the user to set PT Primary value. The maximum settable value is 692.8kV & also depends on the per phase 666 MVA Restriction of power combined with CT primary.
40035	CT Pimary	This address allows the user to set CT Primary value. The maximum settable value is 9999 & also depends on the per phase 666 MVA Restriction of power combined with PT primary.
40037	Sys Power	System Power (Read Only) is the Nominal system power based on the values of Nominal system volts and Nominal system current.
40039	Energy Digit Reset Count	This address is used to set the rollover count for energy. If Energy on Modbus is in Wh ,rollover count can be from 7 to 14.If it is in KWh then rollover count can be from 7 to 12 & for MWh rollover count can be from 7 to 9.
40041	Word Order	Word Order controls the order in which SIRAX BT5700 receives or sends floating - point numbers:- normal or reversed register order. In normal mode, the two registers that make UP a floating point numbers are sent most significant bytes first. In reversed register mode, the two registers that make UP a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register-the instrument will detect the order used to send this value and set that order for all ModBus transaction involving floating point numbers.

Continue Explanation for 4X register:

Adress	Parameter	Description
40043	CT secondary	This address is used to read and write the CT secondary value. Write one of the following values to this address. 1: 1A CT secondary 5: 5A CT secondary writing any other value will return an error.
40045	–	–
40071	Password	This address is used to set & reset the password. Valid Range of Pass-word can be set is 0000 - 9999 . 1) If password lock is present & if this location is read it will return zero. 2) If Password lock is absent & if this location is read it will return One. 3) If password lock is present & to disable this lock first send valid pas word to this location then write “0000” to this location 4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification. 5) If for in any of the above case invalid password is send then meter will return exceptional error 2.
40077	Auto scroll	This address is used to activate or de-activate the auto scrolling. Write 0: Deactivate 1: Activate, Writing any other value will return an error.
40079	30mA Noise current Elimination	This address is used to activate or de-activate the 30 mA noise current elimination write 0: Deactivate 30 (Decimal): Activate Writing any other value will return an error.
40080	Energy Update Rate	This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min. Writing any other value will return an error.

Table 3: RS485 Set-up Code

Baud Rate	Parity	Stop Bit	Decimal value
2400	NONE	01	0
2400	NONE	02	1
2400	EVEN	01	2
2400	ODD	01	3
4800	NONE	01	4
4800	NONE	02	5
4800	EVEN	01	6
4800	ODD	01	7
9600	NONE	01	8
9600	NONE	02	9
9600	EVEN	01	10
9600	ODD	01	11
19200	NONE	01	12
19200	NONE	02	13
19200	EVEN	01	14
19200	ODD	01	15

NOTE: Codes not listed in the table above may give rise to unpredictable results including loss of communication. Exercise caution when attempting to change mode via direct Modbus writes.

12.3 User Assignable Modbus Register

The SIRAX BT5700 contains the 20 user assignable registers in the address range of 0x200 (30513) to 0x226 (30551) (see Table 4).
Any of the parameter addresses (3X register addresses Table 1) accessible in the instrument can be mapped to these 20 user assignable registers.
Parameters (3X registers addresses) that resides in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.
The actual address of the parameters (3X registers addresses) which are to be assessed via address 0x200 to 0x226 are specified in 4x Register 0x200 to 0x213 (see Table 5).

TABLE 4: User Assignable 3X Data Registers

Adress (Register)	Assignable Register	Modbus Start Adress Hex	
		High Byte	Low Byte
30513	Assignable Reg 1	02	00
30515	Assignable Reg 2	02	02
30517	Assignable Reg 3	02	04
30519	Assignable Reg 4	02	06
30521	Assignable Reg 5	02	08
30523	Assignable Reg 6	02	0A
30525	Assignable Reg 7	02	0C
30527	Assignable Reg 8	02	0E
30529	Assignable Reg 9	02	10
30531	Assignable Reg 10	02	12
30533	Assignable Reg 11	02	14
30535	Assignable Reg 12	02	16
30537	Assignable Reg 13	02	18
30539	Assignable Reg 14	02	1A
30541	Assignable Reg 15	02	1C
30543	Assignable Reg 16	02	1E
30545	Assignable Reg 17	02	20
30547	Assignable Reg 18	02	22
30549	Assignable Reg 19	02	24
30551	Assignable Reg 20	02	26

TABLE 5: User Assignable mapping register (4X register)

Adress (Register)	Assignable Register	Modbus Start Adress Hex	
		High Byte	Low Byte
40513	Mapped Add for register #0x0200	02	00
40514	Mapped Add for register #0x0202	02	01
40515	Mapped Add for register #0x0204	02	02
40516	Mapped Add for register #0x0206	02	03
40517	Mapped Add for register #0x0208	02	04
40518	Mapped Add for register #0x020A	02	05
40519	Mapped Add for register #0x020C	02	06
40520	Mapped Add for register #0x020E	02	07
50521	Mapped Add for register #0x0210	02	08
40522	Mapped Add for register #0x0212	02	09
40523	Mapped Add for register #0x0214	02	0A
40524	Mapped Add for register #0x0216	02	0B
40527	Mapped Add for register #0x0218	02	0C
40528	Mapped Add for register #0x021A	02	0D
40529	Mapped Add for register #0x021C	02	0E
40530	Mapped Add for register #0x021E	02	0F
40531	Mapped Add for register #0x0220	02	10
40532	Mapped Add for register #0x0222	02	11
40533	Mapped Add for register #0x0224	02	12
40534	Mapped Add for register #0x0226	02	13

Assigning parameter to User Assignable Registers:

To access the voltage2 (3X address 0x0002) and Power Factor1 (3X address 0x001E) through user assignable register assign these addresses to 4x register 0x0200 and 0x0201 respectively.

Assigning Query:

							Voltage 2* (3X Adress 0x0002)		Voltage 2* (3X Adress 0x0002)			
01 (Hex)	10 (Hex)	02 (Hex)	00 (Hex)*	00 (Hex)*	02 (Hex)*	04 (Hex)	00 (Hex)	02 (Hex)	00 (Hex)	1E (Hex)	CB (Hex)	07 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....20.

Response:

01 (Hex)	10 (Hex)	02 (Hex)	00 (Hex)	00 (Hex)	02 (Hex)	40 (Hex)	70 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	CRC Low	CRC High

Reading Parameter data through User Assignable Registers:

In assigning query Voltage 2 & Power Factor 1 parameters were assigned to 0x 200 & 0x201 which will point to user assignable 3x registers 0x200 and 0x202 (TABLE 1). So to read Voltage2 and Power Factor1 data reading query should be as below.

Query:

01 (Hex)	04 (Hex)	02 (Hex)	00 (Hex)	00 (Hex)	04 (Hex)**	F0 (Hex)	71 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Low	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of User assignable register.
Start Address low: Least significant 8 bits of starting address of User assignable register.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Low: Least significant 8 bits of Number of registers requested.

**Note: Two consecutive 16 bit register represent one parameter. Since two parameters are requested four regis-ters are required.

Response:

			Voltage 2 Data				Power Factor 1 Data					
01 (Hex)	04 (Hex)	08 (Hex)	43 (Hex)*	5B (Hex)*	4E (Hex)*	04 (Hex)	3F (Hex)	80 (Hex)	00 (Hex)	00 (Hex)	79 (Hex)	3F (Hex)
Device Address	Function Code	Byte Count	Data Register-1 High Byte	Data Register-1 Low Byte	Data Register-2	Data Register-2 Low Byte	Data Register-3 High Byte	Data Register-3 Low Byte	Data Register-4	Data Register-4 Low Byte	CRC Low	CRC High

(Starting Address)	User Assignable mapping Register (4x Register Table13)		(Starting Address)	User Assignable mapping Register (4x Register Table11)	
0x200	Voltage 2 (0x0002)	→	0x200	0x200 (16 bit)	0x201 (16 bit)
0x201	Power factor 1 (0x001E)	→	0x202	0x202 (16 bit)	0x203 (16 bit)
0x202	Wh Import (0x0048)	→	0x204	0x204 (16 bit)	0x205 (16 bit)
0x203	Frequency (0x0046)	→	0x206	0x206 (16 bit)	0x207 (16 bit)
⋮	⋮		⋮	⋮	
0x212	Current 1 (0x0006)	→	0x224	0x224 (16 bit)	0x225 (16 bit)
0x213	VAh (0x0050)	→	0x226	0x226 (16 bit)	0x227 (16 bit)

To get the data through User Assignable Register go through the following steps:

1) Assign starting addresses (TABLE 1) of parameters of interest to "User assignable mapping registers" in a sequence in which they are to be accessed (see section **"Assigning Parameter to User Assignable Registers").**
2) Once the parameters are mapped, data can be acquired by using "User assignable data register" Starting address. i.e to access data of Voltage2, Power factor1,Wh import, Frequency send query with starting address 0x200 with number of register 8 or individually parameters can be accessed. For example, if current1 is to be accessed use starting address 0x212. (See section **Reading Parameter data through User Assignable Registers).**

12.4 Connection for RS485 Output