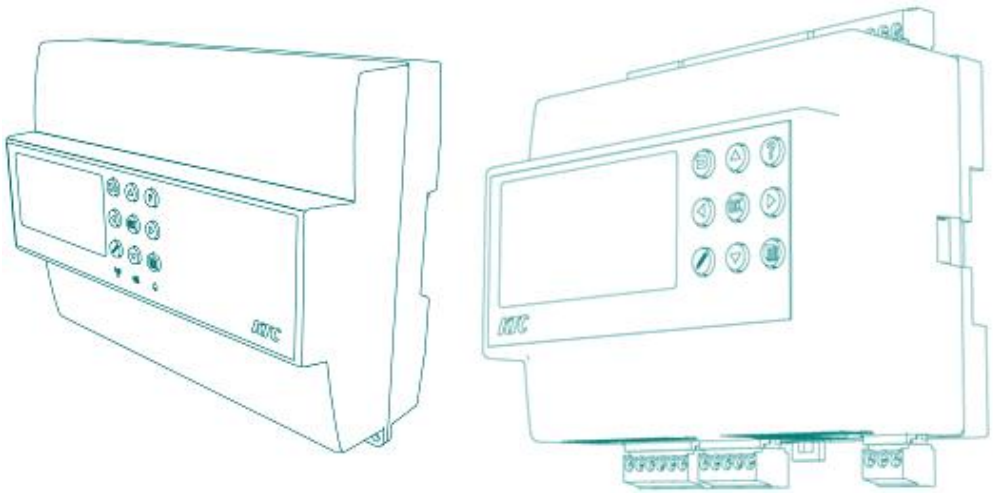


User Manual

KTC Object

Contents

Introduction

KTC's products are constructed of a number of pre-defined function blocks known as objects. The objects are common to all of KTC's products, which makes the units user-friendly and easy to configure. Applications in the products are built up by connecting and configuring the objects. The objects each product includes is specified in the product's unique user manual, Part 2.

Manual structure

To make these manuals as simple and easy to read as possible, we have tried to avoid the use of brackets and other characters that disrupt reading. The same words, abbreviations and symbols that are used in the KTC unit are used in the manual.

User Manual Part 1, KTC Object

User Manual Part 1, KTC Object, describes facts common to the KTC units named under "User Manual Part 2" below.

Part 1 of the user manual contains:

- Login levels and passwords.
- Logged values
- Alarm management
- Description of all KTC objects.

User Manual Part 2, KTC *Product Name*

User Manual Part 2, KTC *Product Name* describes unique facts about your KTC unit and is available for the following products:

- **User Manual Part 2 KTC SRD5000**
- **User Manual Part 2 KTC RCU1111**
- **User Manual Part 2 KTC RCU2111**
- **User Manual Part 2 KTC COM1111**
- **User Manual Part 2 KTC COM1235**

Part 2 of the user manual contains:

- Description of the KTC unit
- Technical Data
- Terminal position
- Connection instructions
- Menu tree
- Keys
- Indication symbols, and
- Character set
- Unit's Object structure
- Logging of values
- Explanation Product Variants
- Explanation Home Page
- Login/Password
- Expansion units, *only KTC-SRD5000.*

Editing

General information

The values that can be edited are changed with keys on the unit and clearly shown in the display. You can always cancel an edit provided that the change has not been confirmed using OK. To cancel, use ⮌.
If you want to save an edited parameter, this must be done with OK before you leave edit mode. Otherwise the parameter returns to the value it had before you made the change.
To edit a parameter, use ✎. Mark the parameter to be edited and press ✎. Next use ▲, ▼, ▶ and ◀ to make the changes to be carried out. Then confirm with OK.
After OK has confirmed an edit, these figures, categories or texts are the default value. If a factory set figure or list option is required, mark the parameter and import it with ✎ ✎. Then confirm with OK.

Figure

Mark the menu row containing the figure to be edited. Press ✎, choose a new value with ▲ or ▼ and move the cursor in the text with ◀ and ▶. To import the factory setting for the value, press ✎ again. Save changes with OK or return to the original value with ⮌.

List option

Mark the menu row containing the list option to be edited. Press ✎. The marked list option flashes. Use ▲ or ▼ to make a new selection in the pre-defined list. To import the factory setting for the list value, press ✎ again. Save changes with OK or return to the original value with ⮌.

Texts

Mark the menu row containing the text to be edited. Press ✎, and the last character in the selected text flashes. Use ▲ or ▼ to choose new characters. Use ◀ or ▶ to move the cursor in the text. Delete marked characters with ✎. Use ⧉ to copy marked characters and enter text to the right of the marking. This is useful if you want to edit in the middle of a text. Save changes with OK or return to the original text with ⮌.

Value references

A parameter can be a reference to another value, for example the input value for an analog output. This type of parameter can be set to refer to a variable value, set as a constant or as an invalid value (deactivated).
The reference to a variable value is displayed in the form OOnnvv, where:

- OO is an object type, e.g. AI.
- nn is the index within the type, e.g. 01
- vv is a value description within the object, e.g. va.

You can place the cursor on object type and use ▲ and ▼ to choose between available types.
To change between variable values and constants, set the cursor at the far right and then press ▶.
You can use ✎ again to import the factory setting for the value. This is often the right way to deactivate a value.
You can set the cursor on the tens or units digit in the index and use ▲ or ▼ to change the index within available limits.
You can set the cursor on the value description and use ▲ and ▼ to choose between the available values. The most useful are the following:

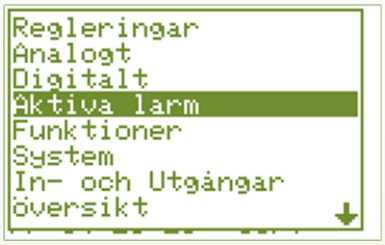
- va: the object's primary value. For an input or output this is the current level. For a regulator, this is the current reference value.
- V0: Freeze guard.
- v1-v6: for objects with several values, such as MB. For a regulator, v1 is the current control signal (the output signal from the regulator).

Acknowledge an active alarm.

When an error signal configured against an alarm in the unit occurs, this is indicated by a flashing red alarm LED in the lower right-hand corner. This continues to flash until the alarm is acknowledged, even if the alarm has returned to normal.
If the alarm has been acknowledged but is still active, the LED shines constant red, unless there are other unacknowledged alarms in which case the red LED continues to flash until these alarms are also acknowledged.

To reach the alarm list, on the home page you mark the clock icon or press the menu button and scroll down to *Active alarms*.

If a KTC unit with *Customised homepage On* is used, you can also choose *Active alarms* via the menu button from this home page.



Alarm P1 RAD	Frame text on object giving the alarm.
DV01 A Dig Active	Describes what is giving the alarm, the alarm priority and the status of the alarm.
On 2012-12-03 11:32:07	Date and time when the alarm is activated
Ack 2012-12-03 11:33:20	Date and time when the alarm is acknowledged
Ret 2012-12-03 11:36:23	Date and time when the alarm is rectified/returned to normal.

To acknowledge the active alarm, mark *Acknowledge* and press *OK*. The alarm status changes to *Ack*, acknowledged**.** When the cause of the alarm has been rectified, the alarm returns to normal and Status changes to *OK*. If several alarms are active, you can move between these using the right and left arrows.

To access alarm settings: Mark the alarm object and press *OK*.

Navigating the menus

Option 1

Move with the , , and keys in the symbol menu and when you have marked the menu you want to access, confirm this with .

Option 2

If you instead want to follow the text menu, press and mark the menu you want to access, confirm with .

P Band, I Time and D Factor.

P band	The P Band is the control error that immediately gives full deflection 100%. A smaller P Band gives quicker regulation, but can cause instability, i.e. between rapid oscillations. In an RC object, a P Band set to zero means that the control step is not used.
I Time	The integration time is the time it takes to integrate 100% of the output signal with a control difference equal to the P Band. This means, for example that if the difference is a tenth of the P Band, the control signal will increase by ten percentage units for each I Time. A shorter I Time gives quicker regulation, but increased risk of instability, i.e. relatively slow oscillations.
D Time	If the derivation time is greater than zero, the In Value's change speed will affect the deflection, as the In Value will be considered to be the current In Value plus the change speed multiplied by the D Time. You can say that the D Time is an attempt to predict the control error. Correctly used, the D factor can give both greater rapidity and stability. However, a D factor that is too large can cause instability, i.e. rapid oscillations.

KTC Object

Each KTC Object type has a configuration page and is identified by two letters and two figures, e.g. AI01. The two letters state the type of object, in this case Analog Input, and the figures are an index that indicates which of several similar items is involved. You can change the index with the left and right arrows. The KTC Objects are grouped into different menus, which are presented below.

Below is a description of the menu under which the different KTC Objects can be found for configuration. Depending on which KTC unit you have, a number of these menus and KTC objects are available.

Object structure

Regulators

RL	Regulator Loop
RC	Reg. Sequence
FV	Freeze Guard

Analog

AV	Analog values
AQ	Calculated values
LR	Linear control functions
KV	Curves

Digital

DV	Digital values
TR	Time Relays
DQ	Bool Expr.
AZ	Inc/Dec output
SK	Step Coupler
PU	Pump Output
TM	Thermostats

Toolbox

TU	Time Channels
VX	Mutables
TO	Time Object
HR	Event Counter
MT	Exercise Block
TB	Trend Buffer
KL	Calendar

Data IO

DI	Digital inputs
AI	Analog inputs
UI	Universal inputs
DU	Digital outputs
AU	Analog outputs
MB	M-Bus
MV	Modbus
RD	Radio data
VK	Value from communication

System menu

LS **Alarm Sending**

RT **Real Time Clock**

SL **Slave DDC**

KP **Connection**

Installation

- Info
- Network
- XMPP
- RS485
- SRD/RCU/COM*
- Parameters
- M-Bus
- Modbus
- Radio
- XE Expansion

* Depending on the KTC unit being used. The menu is named according to the product.

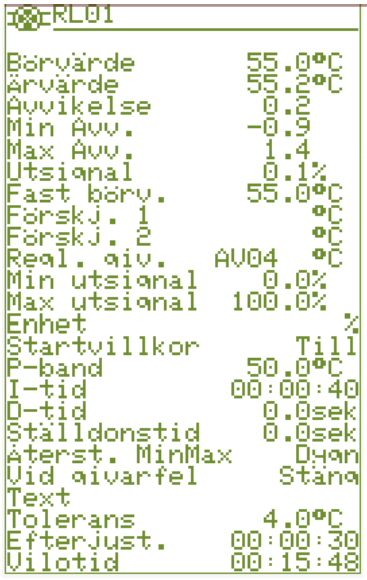
Regulators

RL Regulator Loop

A regulator creates an output value on the basis of the set current reference value and current value. The output signal is limited by the set Max and Min limits. Both input and output values can be given a unit. The output value can be used, for example for an analog output, an inc/dec function or as the input for another regulator. The output value is called v1, e.g. RL03v1.

Reverse control direction, e.g. a cooling step, is achieved by setting the Output Max to a lower value than the Output Min in RL.

In RL you can also set a tolerance. This means that the regulation calms down and, after a set adjustment period, entirely stops working as long as the error remains within the set tolerance. This makes regulation fast, but still calm during stable conditions.



RL01	Regulator loop 1
Curr. ref	Current reference value from selected signal
Curr. value	Current value
Diff	Current difference.
Min Diff	Largest negative difference.
Max Diff	Largest positive difference.
Output signal	Signal on regulator loop output.
Setpoint	The current reference value is set to a fixed value, unit depending on the *Selected Val*.
Added Ref. 1/ Added Ref. 2	Current reference value that can be selected from all values in the system, or set to a fixed value. These values are added to the first.
Selected Val.	The value to be regulated can be selected from all the values in the system.
Output Min	The value achieved when the regulator gives 0 %. The minimum value can be greater or less than the maximum value. Both values can either be selected from the system's values or be a set value.
Output Max	The value the regulator goes to at 100 %,
Unit	Unit for output value. Max and Min values follow automatically.
Enable condition	An enable condition can be selected from the system's different values, or set to a fixed value. If the selected value is zero, the output signal always gives 0, regardless of the limits set for the output signal.
P Band	See the page 7, Regulators, General.
I Time	See the page 7, Regulators, General.
D Time	See the page 7, Regulators, General.
Act. Time	The run time from 0-100% for the actuator. If the actuator is slow in relation to the regulated system/control object, it can be good for stability if the regulator takes this into account. If the actuator time is set to 0, this value is ignored.
Reset MinMax	- Never: The value of *Min/Max* is never reset. - Hour: The value of *Min/Max* is reset every full hour. - Day: The value of *Min/Max* is reset at 11:00 every day. - Now: The value of *Min/Max* is reset immediately, after which the setting automatically returns to the choice made for *Reset MinMax* before the *NOW* selection was made.
At sensor error	The reaction to a sensor error can be set, either to give output signal 0 or to freeze the output signal.
Text	Frame text, displayed at the top of the menu page, on the row after RL01.
Tolerance	Accepted error in regulation. 0 means normal regulation the entire time. Can be a fixed or variable value.
Adj time.	Time for adjustment after entering stable mode.
Resting	Counts the time from the regulator entering stable mode. When this time is greater than the adjustment time, no regulation takes place.

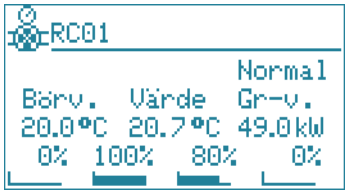
RC Reg. Sequence

Regulation in sequence, with limitation. The RC is a PID regulator that can control up to four outputs in sequence. The output sequences have individual P Band settings but share settings for I Time and D factor. Each sequence can be set to give an increasing output for increasing input (cooling regulation) or increasing output for decreasing input (heating regulation).

Each regulator sequence has its own current setpoint offset which is an imported or set value. This can be used, for example, to create a gap between heating and cooling.
You can, for example connect analog outputs AU, Step Coupler SK or Inc/Dec control AZ, to the output sequences via AV. An enable condition controls the start of the RC block. The RC has two sensor inputs; a primary sensor and a limiting sensor. The primary sensor determines the deflection as long as the value from the limiting sensor is within the set boundaries. The freeze guard function is also available (linked to AV).

RC Overview

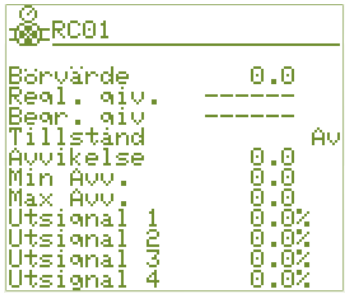
The menu key makes it possible to go to the page for ***RC Overview***, the configuration page *RC Settings*, or the page *RC Data* for data in table form.



The display example on the left shows regulation in three steps, where the first step is a cooling step. The second step is a heating step with 100% output and the third step is a heating step with 80% output.
You can see the current reference value, current input value and current limit value, and the output signal for the four regulation steps. The output signal shown is the one the output is on, even if this is set manually.

RC Info

The menu key makes it possible to go to the page for *RC Overview*, the configuration page *RC Settings*, or the page ***RC Data*** for data in table form.



RC01	Reg. Sequence 1
Curr. ref	Current reference value
Selected Val.	Current input value
Limit Sens	Current limit value
State	State: *Off*, *Normal* or *Limit*.
Diff	Current control difference
Min Diff	Minimum difference.
Max Diff	Maximum difference.
Output 1 **Output 2** **Output 3** **Output 4**	The four output values from the regulator, or the manually set value.

RC Settings

The menu key makes it possible to go to the page for *RC Overview*, the configuration page ***RC Settings***, or the page *RC Data* for data in table form.

RC01	Reg. Sequence 1
Setpoint	The current reference value is set to a fixed value, unit depending on the *Selected Val*.
Added Ref. 1	Current reference value that can be selected from all values in the system, or set
Added Ref. 2	to a fixed value. These values are added to the first.
Selected Val.	The input value is selected from all values in the system.
Limit Sens.	Value for limit regulation, selected from all values in the system.
Min Limit	Lower boundary of the limit regulation, selected as a fixed value or among all values in the system.
Max Limit	Upper boundary of the limit regulation, selected as a fixed value or among all values in the system.
Enable condition	A fixed value or any other value is selected as an enable condition. If the enable condition is Off, or equal to 0, the RC is set to the first heating stage, with all output values to 0.

I Time	The integration time. The four control steps have the same value. See the page 7, Regulators, General.
D Time	Derivation time (D factor). The four control steps have the same value.
P Band s1-s4	P Band for each control step. Each step has its own P Band. See the page 7, Regulators, General.
Neg.dir. s1-s4	If *On* has cooling regulation: larger input value gives larger output value.
Added Ref. 1-4	A value added to the current reference value. Different for each control step. See the page 7, Regulators, General.
P Band Lim.	P Band limitation control. See the page 7, Regulators, General.
I Time Lim.	Integration time limitation control. See the page 7, Regulators, General.
D Time Lim.	Derivation time limitation control. See the page 7, Regulators, General.

Reset MinMax

- Never: The value of *Min/Max* is never reset.
- Hour: The value of *Min/Max* is reset every full hour.
- Day: The value of *Min/Max* is reset at 11:00 every day.
- Now: The value of *Min/Max* is reset immediately, after which the setting automatically returns to the choice made for *Reset MinMax* before the *NOW* selection was made.

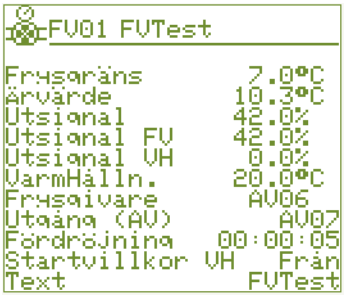
At Sens. Error Handling of sensor error can be set. If the current reference value or current value become invalid, the regulator reacts in one of two ways.

- Close: Reacts as if the enable condition was false: closes all outputs and sets itself to the first heating step.
- Freeze: All signals remain where they were until valid values are received again or until the system restarts.

Text Frame text, displayed at the top of the menu page, on the row after RC01.

FV Freeze Guard

The freeze guard is used to protect the air handling unit and water coil against freezing. If the temperature at the freeze guard sensor falls below the set temperature, an alarm is given. FV has an analog output which can be connected to an AV. This freeze guard signal will start to increase when the temperature at the freeze guard sensor is 5°C over the set freeze alarm temperature. The output signal rises by 25% per degree, which means that the valve is fully deflected when the temperature is one degree over the freeze alarm temperature.
The freeze guard also has a keep warm function, which only works when the regulator is not active. When the keep warm function is activated (normally when the air handling unit is not running), the FV acts as a PI regulator with P Band at 20°C and an I Time of one minute. This will control the analog output to maintain the temperature at the freeze guard sensor at the set current reference value. The keep warm function can be interlocked by a selectable interlocking signal.



FV01	Freeze Guard One
Freeze limit	Freeze alarm temperature
Curr. value	Temperature at FV sensor.
Output signal	Current output signal
Output FG	Output signal freeze guard
Output KW	Output signal to actuator for Keep Warm.
Keep Warm	Curr. Ref for keep warm regulation.
Sensor	Selection of input signal for sensor.
Output (AV)	The control signal the output value should go to
Delay	Alarm delay
Enable KW	Digital signal that can stop Keep Warm when it is Off.
Text	Frame text, displayed at the top of the menu page, on the row after FV01.

How a freeze guard is used in KTC

The sensor should be an AV. An A-alarm on this AV will be activated, and the alarm limit for Limit Min will be maintained at the set freeze limit. Any alarm interlocking is disconnected and the alarm delay is copied from the settings in FV.

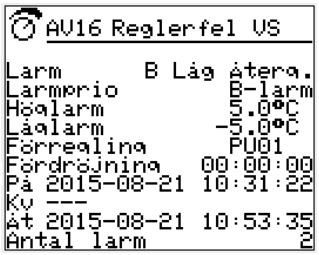
The freeze guard's output signal should be connected to the AV used as the regulator output, as the minimum limit. The signal to be used is named, for example, FV02v0. This is done by setting Output (AV) to the desired AV object in the freeze guard settings. The connection will then also be immediately visible from both directions. (If you only connect the freeze guard by setting the AV's minimum limit, the keep warm function will not work correctly.)
FV has a further two output signals, one for the freeze guard (e.g. FV02v1) and one for keep warm (e.g. FV02v2). The value of FV02v0 is the higher of the two others.

Analog

AV Analog values

Analog values are values with the name and set unit. These can be used, for example, as input/output values in regulators. Analog alarms are also programmed here. If a freeze guard is used, the minimum limit is set here.
E.g.: FV01v0

AV01	Analog value 1
Value	Actual output value
Alarm	Alarm status.
Min	Lowest analog output value
Max	Highest analog output value
Selected input	The input value is selected from all of the system's analog values, or set to a fixed value.
Min Limit/ Max Limit	Output value can be limited to lie within set limits. The limits can be set to fixed values or imported from any value in the system.
Unit	The unit can be selected from a list of units.
Reset MinMax	
- Never:	The value of *Min/Max* is never reset.
- Hour:	The value of *Min/Max* is reset every full hour.
- Day:	The value of *Min/Max* is reset at 11:00 every day.
- Now:	The value of *Min/Max* is reset immediately, after which the setting automatically returns to the choice made for Reset MinMax before the NOW selection was made.
Mode	Auto/Manual
Manual	Output value for *Mode* in *Manual*.
Cond. min	A digital condition can force the AV to adopt its set minimum limit.
Cond. Max	A digital condition can force the AV to adopt its set maximum limit.
Text	Frame text, displayed at the top of the menu page, on the row after *AV01*.
Category	Grouping of data, used for data collection, for example
Tag	A technical name which can be used, for example for data collection.



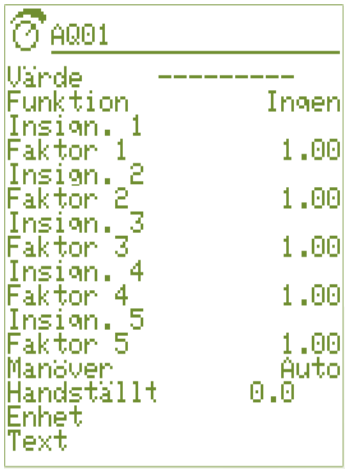
Alarm settings:

AV16	Analog value 16
Alarm	Alarm status. Also indicates whether it is a limit max, limit min or sensor error alarm, together with the alarm sending status.
Type	Alarm priority: Off, C, B or A
Limit Max	Upper alarm limit
Limit Min	Lower alarm limit
Interlock	Digital signal that must be On for the alarm to be taken into account. Invalid values are considered to be On.
Delay	Time with all conditions fulfilled before the alarm is tripped.
On	Time at which the alarm went from OK to active.
Ack	Time at which the alarm was first acknowledged.
Ret	Time at which the alarm first returned to normal.
Counter	Number of times the alarm has been active since it was OK.

AQ Analog calculations

Five input values, each with a constant, are added together into an analog value. One alarm can be linked to the value. The constants can, if you wish, be set to value references for increased flexibility.

In the *AQ Overview* menu, you can set the desired function and all constants and input values.



Value	Output signal
Function below	See explanation toolbox
Input signal 1-5	Selected signals
Factor 1-5	Factor for selected function and selected signal. Mode Auto/Manual
Manual	Value when manually set.
Unit	Unit for value.
Text	Frame text, displayed at the top of the menu page, on the row after *AV01*.

Toolbox:

Max	The largest value factor * input value is picked out.
Min	The smallest value factor * input value is picked out.
Average	The average value of the input values is returned, weighted with its constants.
Mid Avg	As for average, but the largest and smallest input values are ignored. Less than three input values produce an invalid result.
Sum	All valid constant * input values are totalled. Note that constants can be set as negative figures, in order to be able to calculate differences.

Toolbox, contd.:

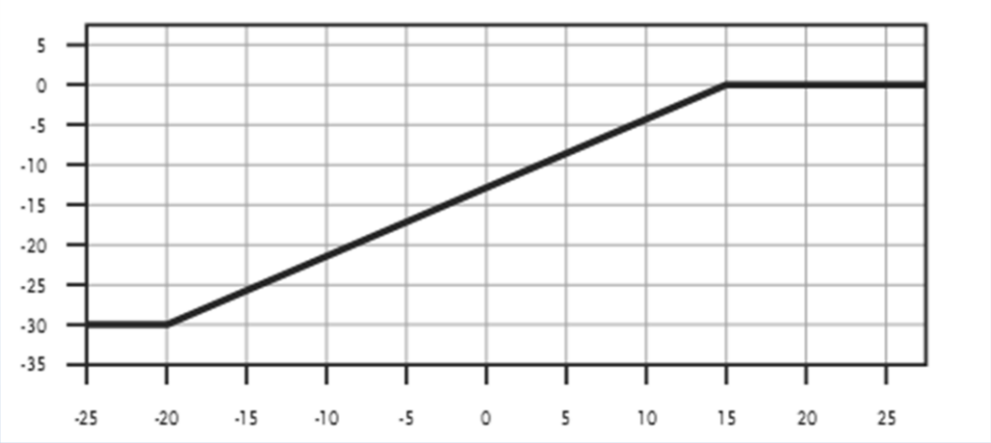
Diff	First factor * input value is added, the others are deducted. Pairs containing any invalid value are ignored.
Eff.	Efficiency. An indication of Efficiency in a heat exchanger can be obtained by comparing the temperature difference on the primary and secondary sides. If three input values are defined, the efficiency is calculated as follows: (v1 – v3) * 100 % /(v2 – v3). If there are four values: (v1 – v2) * 100 % / (v3 – v4). If any difference is less than 0, an efficiency of 0 is obtained. If the efficiency is more than 10%, the value is inverted. Constants are not used.
Multiply	All valid constants and input values are multiplied.
Division	The first constant * input value is divided by all other valid constants and input values.
Dew Pt	Dew point calculation. Input 1 is assumed to be The current temperature in degrees Celsius. Input 2 is relative air humidity in %. Other input values and all constants are ignored.
Pr->Fl.	Pressure for flow calculation. The flow is calculated according to constant 1 * root(input 1) * 10 ^ constant 2. E.g. Constant 1 is flow at 1 bar, input 1 is pressure drop in bar. Constant 2 can be used to correct the 10s, otherwise you must not forget to set it to 0.
Filter	A filter for very long filter times. Input 1 is filtered with a time constant calculated as follows: Constant 4 days + constant 3 hours + constant 2 minutes + constant 1 seconds. Filter times up to several years are possible. You can manually set the filter's output value, and filtration then continues from the set value.
COP	Coefficient of Performance, for example for heat pumps. The ratio between the useful power and the supplied (electrical) power is calculated. The result is calculated as the sum of input 1 and 2 divided by input 3: (v1+v2)/v3. The result can be limited to a reasonable range, with factor 4 as maximum and factor 5 as minimum. If input 4 is zero, the output value (enable condition) is frozen.
Deg*min	The difference between inputs 1 and 2 is accumulated. The result can be limited with factor 3 as maximum and factor 4 as minimum. Input 3 can be used as enable condition (when the value is 0, accumulation is stopped). Input 4 can be used for restart. If this value is zero, the output value is reset and accumulation must start again from zero.

LR Linear calculations

Linear regulation LR creates an analog value that follows a linear function. The function is created with one input signal and two input value/output value pairs. Both the input and output values can be selected as value references. In other words, you can allow a digital input signal to determine which of two analog signals should be the output value, or create an average value between two analog signals, with variable weighting etc.

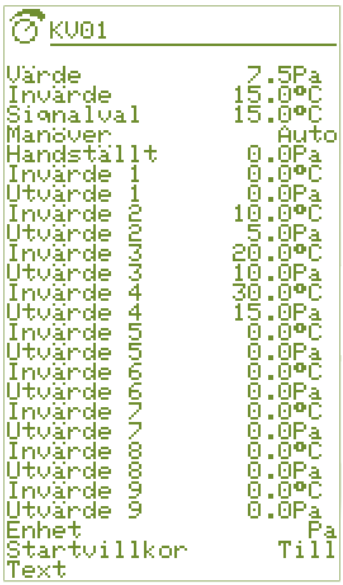
LR01	Linear regulator 1
Value	Actual output value
Selected input	Input value for the function. If the input value is digital, On is counted as One and Off as Zero.
Input value	Current input value
Unit	Selectable unit for output value.
Enable condition	Fixed or value reference. If *Off*, the output value is 0.
Input values 1 and 2/ Output 1 and 2	Two pairs of values. All values can be set values or references to other values. There is no requirement for ranking between the values. If both input values are equal, the output value is set as output 1
Text	Frame text, displayed at the top of the menu page, on the row after LR01.

E.g.: External temperature compensation for a fan pressure. -20°C gives -30Pa, 15°C gives 0Pa pressure.



KV Curves

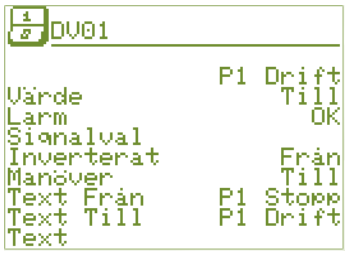
The curve function is used, for example, to create an external temperature dependent setpoint curve which is common when controlling radiator groups. Up to nine value pairs can be stated.
The created control curve consists of linear segments. The output value is limited to between the first and last output values. The units for output value can be set. The units for input value is taken from the referenced value.
At sensor error, the output value is set to the manually selected value.
NB! The coordinate pair must be stated either with increasing or decreasing input signal values.



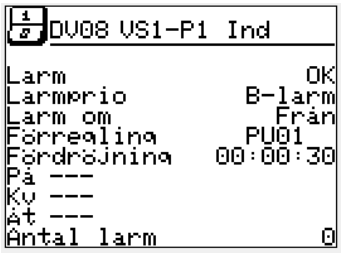
KV01	Curve 1
Value	Actual output value
Input value	Current input value
Selected input	Selected input signal for the function
Mode	Auto/Manual
Manual	Output value for *Mode* in *Manual*.
Inputs 1-9, Outputs 1-9	Pairs of input and output values can be set. Value pairs at the end with input values that are equal, or which break the size ranking from the two first pairs, are ignored.
Unit	The unit for the output value can be selected.
Enable condition	Fixed or value reference. If *Off* the output value is 0.
Text	Frame text, displayed at the top of the menu page, on the row after KV01.

DV Digital values

DV is a general internal digital value. Even if the selected input value is analog (e.g. an AI used digitally), the output value is always digital.
DV can also be allocated texts that correspond to the status On and Off, available as the value DVnnvt.
Digital alarms are also programmed here.



DV01	Digital value 1 (Own status text is written for *Text On* and *Text Off*.)
Value	Current status of the output signal.
Alarm	Indication of alarm status.
Selected input	Selected input signal for the function
Inventory	Possibility to inventory digital level.
Mode	Auto, On, Off
Text Off	Own status text for value *Off*
Text On	Own status text for value *On*
Text	Frame text, displayed at the top of the menu page, on the row after DV01.

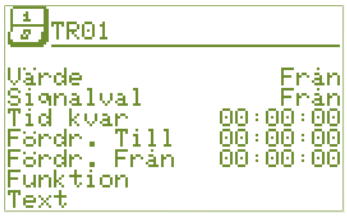


Alarm settings:

DV08	Digital value 8
Alarm	Alarm status. Also indicates that it is a digital alarm, and status for alarm sending.
Type	Alarm priority: Off, C, B or A
Alarm if	If the alarm should be activated when the value is On or Off.
Interlock	Digital signal that must be On for the alarm to be taken into account. Invalid values are considered to be On.
Delay	Time with all conditions fulfilled before the alarm is tripped.
On	Time at which the alarm went from OK to active.
Ack	Time at which the alarm was first acknowledged.
Ret	Time at which the alarm first returned to normal.
Counter	Number of times the alarm has been active since it was OK.

TR Time Relays

TR is controlled by a selected digital signal. Time relays are used to obtain delays on digital signals. Both switch on and switch off delays can be selected. The time relay will only switch if the input signal is unchanged on expiry of the delay time. You can also set set edge control to positive or negative edge. In the case of edge control, switch on delay is not activated. TR can be used as an input signal in the case of digital conditional control, for interlocking and as an input signal to LR block.



TR01	Time relay 1
Value	Current status of output, *On/Off*.
Selected input	The input value can be selected from all of the system's digital signals, or set to *On* or *Off*.
Time left	Time left to status change.
Delay On	In the case of level control, switch on is delayed by the set value.
Delay Off	In the case of level control, switch off is delayed by the set value. In the case of edge control, the pulse length is the set value.
Function	Set control type: *Level*, *positive edge* or *negative edge*.
Text	Frame text, displayed at the top of the menu page, on the row after TR01.

DQ Bool expr.

DQ Fictitious digital inputs have no external, physical inputs but are only used internally in the KTC unit. They are primarily used to be able to create complex control conditions by using one or more DQ blocks as input signals to other DQ or DU blocks.

DQ01	Boolean expression 1
Value	Current status of output, *On/Off*.
Mode	Auto, On, Off, Set/Reset.
Text	Frame text, displayed at the top of the menu page, on the row after DQ01.

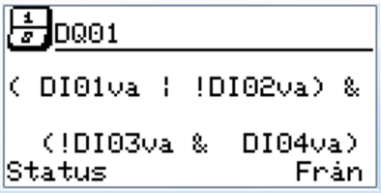
Boolean programming

By pressing the menu key and marking the row *Formulae*, you can access the page to enter a Boolean expression. This is a formula containing up to four digital signals. Every signal can be inverted.
The signals are grouped into two groups. First the values for group one and group two are calculated. Then both groups' values are combined to produce a final value. The result can be 1.0 = True/On or 0.0 = False/Off.
Any operation required can be set between values and between groups. *See table Boolean expression.*

If control mode is *Set/Reset* the first bracket is used for *Set*; in other words conditions to go On. The second bracket is used for *Reset*, conditions to go Off. Status is only changed in the case of positive edge for each condition. For example, if you have the same conditions for On and Off, the condition must be Off before the next switch can take place.

Example 1:

In DQ, you should use four DIs to change the level for DQ Status. All four inputs are now = *Off*. Boolean programming has been carried out as follows:

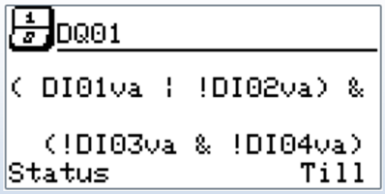


Calculation:
The result in the first set of brackets is calculated first: `( DI01va | !DI02va)` => (0 +!0) => (0 + 1)=1
Then the result in the second set of brackets is calculated: `(!DI03va & DI04va)` => (!0 * 0) => (1* 0)=0

The calculation is as follows:
1 * 0 = 0 Status of DQ is From.

Example 2:

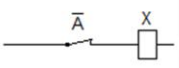
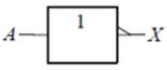
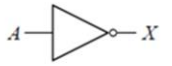
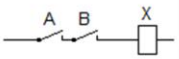
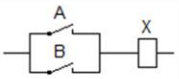
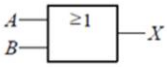
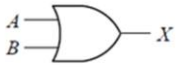
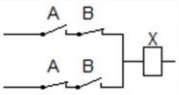
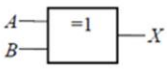
Below we have altered it to (! DI04va), i.e. Not DI04va. This means the status of DQ is On.



Calculation:
The result in the first set of brackets is calculated first: `( DI01va | !DI02va)` => (0 +!0) => (0 + 1)=**1**
Then the result in the second set of brackets is calculated: `(!DI03va & !DI04va)` => (!0 * !0) => (1* 1)=1

The calculation is as follows:
1 * **1** = **1** The status of DQ is *On*.

Boolean expression

Grind	Funktion	Elektrisk funktion	IEC–symbol	Amerikansk symbol	KTC-Symbol
Inverterare	$X = \overline{A}$				!
OCH	$X = A \cdot B$				&
ELLER	$X = A + B$				|
XOR	$X = A \oplus B$				∧

AZ Inc/Dec output

An analog value, normally an output signal from a regulator, can be translated into increase/decrease signals, for example to control such an actuator. Intended to be selected from digital outputs.

AZ01	Inc/Dec output 1
Value	Actual output value. Calculated position of actuator.
Selected input	Selected input signal for the function
Out increase	Increase signal On/Off
Out reduce	Reduce signal On/Off
Run time increase	Actuator run time from fully closed to fully open.
Run time reduce	Actuator run time from fully open to fully closed.
Min pulse time	Shortest permitted pulse. Shortest time an output can be on at a time.

Smooth mode

- *Off*: When the input value reaches an end position, 0 or 100%, the output is continuously activated in that direction. Appropriate for sequence regulation.
- *On*: As the input value approaches its end position, the regulators adjusted so that regulation carries on continuously. AZ will display a value calculated on the basis of the outputs' active time in the different directions, but the connected regulator is adjusted to maintain its control space. The position for AZ in this mode can therefore differ from the regulator's output signal.

Exercise Int.	If 0h, no exercise. Otherwise the smallest number of hours during which the actuator should have been considered to be fully closed before exercise takes place. Exercise means that at 11:02 the actuator opens fully and then closes again.
Text	Frame text, displayed at the top of the menu page, on the row after AZ01.

SK Step Coupler

SK is an Analog/Digital converter that can be used, for example, as an output for the *RC*. *SK* converts an analog signal into a num of digital signals. *SK* can have up to ten steps which can be controlled in linear sequence or in a binary pattern. In the case of a linear sequence, the outputs are activated in sequence and the change points are distributed across the available input signal.
In the case of binary regulation, the outputs are activated according to a binary pattern. The first step is assumed to be the one with the smallest power. Each subsequent step should have a larger power than all the previous ones have had.
In the case of linear regulation, it is also possible to rotate the outputs so that the same output is not always switched on first. This is used, for example, to avoid uneven up time distributions between pumps.
If the outputs from *SK* are to be used as inputs for other function blocks, it is the individual output steps that must be called. The output steps are called s1, s2....s9. The designation for an *SK* output therefore looks like this: SK01s2 (Output 2 on SK01)
SK also has an analog output value, which shows where *SK* is in the interval between two steps. This value is called v1, e.g. SK01v1

SK01	Step Coupler 1
Value	Actual output value
Part of step	Shows % of signal for current step.
Selected input	Input value. Reference, for example to an RC or a fixed value.
Mode	*Manual/Auto*.
Manual	Value that applies when manually set.
Steps	Number of output steps used.
Rotate steps	
- None	Never rotate steps.
- Day	Rotate steps every day at 11:00
- Week	Rotate steps every Monday at 11:00
- Monthly	Rotate steps the first Monday of the month at 11:00.
- StartMin	The lowest value at start and the highest at stop.
- StartMax	The highest value at start and the lowest at stop.
Type	*Linear* or *Binary* function.
Delay On	Switch on delay for each step.
Delay Off	Switch off delay for each step.
Output 1-10	Shows which steps in *SK* are *On* and *Off* respectively.
Cmp Val 1-10	A comparison value linked to the relevant output step. Used if Rotate is first set to *StartMin* or *StartMax*.
Text	Frame text, displayed at the top of the menu page, on the row after SK01.

PU Pump Output

PU is intended to control a circulation pump for a heating or cooling system. When *Limit Off* is more than or equal to *Limit On*, PU is pump control for a heating system.
When *Limit Off* is less than *Limit On*, PU is pump control for a cooling system. Delays for off and on can be set.

Delay periods can be counted in two different ways:

- **Straight**: The time count begins when the value passes the limit, and is reset to the entire delay if it returns before the time has elapsed.
- **Degree minutes**: The time is counted quicker the further from the limit the input signal is.
    - **At on limit:** The time counter is set to the off limit delay and stops there until the input signal passes the off limit. Then it starts to count down, quicker if the input signal is more than one degree past the limit.
    - **At off limit:** The time counter is set to 1 hour. The time counter then increases as long as the input signal does not pass the on limit, quicker if it is further away. The time counter is **never** greater than the delay set for on limit. This also applies if it is set to less than 1 hour. When the input signal passes the limits, the time starts to count down in the same way as after on limit. This means, for example, that you can achieve a much longer on limit delay for a heating system after a hot summer's day than after the external temperature sensor has been heated up for a shorter period in the spring or autumn. PU creates a simple image of how heat is stored in a building.

Digital signals can be used to prevent or force switch on.
On start, or after a sensor error, a quicker decision about status is made, where the set delays have no effect.

Degree minutes

When degree minutes are used, there are two factors that can affect the counter for switch on of PU, *Degree minutes* and *Delay On*.
Degree minutes always start at 60 degree minutes. These degree minutes are not configurable. The counter can never be greater than what *Delay On* is set to. The factory setting is 120 minutes.

Explanation, Degree minutes.
How quickly the counter counts down the degree minutes depends on how many degrees the temperature is below *Limit On*. This means that the counter can count down more than 1 degree minute per minute.

Conditions:
PU has been switched off for 60 minutes and has just passed *On Limit*. For 30 of these minutes, the temperature was 2 °C above *Limit Off* and for 30 minutes the temperature was 1 °C above *Limit Off*.

This gives us 150 degree minutes. (60 + 2*30 + 1*30 =150 degree minutes).

These 150 degree minutes should now be used before the PU switches on again.

- If the temperature is 1 degree below *Limit On*, the PU switches on after 150/1 = 150 degree minutes. Countdown 1 degree minute/minute.
- If the temperature is 2 degrees below *Limit On*, the PU switches on after 150/2 = 75 degree minutes. Countdown 2 degree minutes/minute.
- If the temperature is 3 degrees below *Limit On*, the PU switches on after 150/3 = 50 degree minutes. Countdown 3 degree minutes/minute.

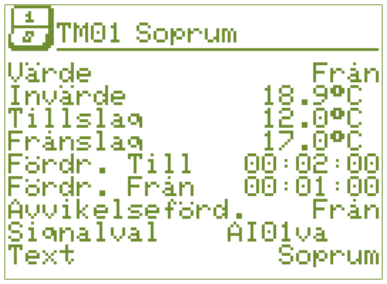
Explanation Delay On
This is a time counter that indicates how long it takes at most before the PU switches on after the temperature has passed *Limit On*. This means that Degree minutes can never accumulate more degree minutes than what *Delay On* is set to. If *Delay On* is set to 120 minutes, no more than 120 degree minutes can be accumulated.

Degree minutes and Delay On
The *Time Left* parameter shows the maximum time remaining before the PU starts. You need to remember that in the case of Degree minutes, the counter counts down the number of degrees by which the temperature is below Limit On per minute. This means that if the temperature is 2 °C below *Limit On*, the counter counts down by 2 degree minutes/minute.

PU01	Pump Output 1
Value	Current status of output, *On/Off*.
Input value	Input value from *Selected input.*
Time Left	Remaining time to change
Mode	PU can be set to Auto, On or Off. Even if PU is manually set, the time count continues according to the set limits. For exercise of PU to apply, Mode *Auto* must be selected.
Limit Off	PU goes Off when the limit is passed. Time to switch off is counted depending on whether the input signal is above or below this limit.
Limit On	PU goes On when the limit is passed. If Limit On is above Limit Off, this is regarded as a cooling system, and is On for a higher input signal.
Delay Off	Time delay for switch off.
Delay On	Time delay for switch on.
Time Count	You can choose between Straight time count or Degree minutes. See explanation on the previous page.
Selected input	Selected input signal (AV) or fixed temperature.
Restart Condit.	A digital signal can be selected. If this is *Off*, the PU is *Off*, regardless of the set limits and delays.
Force On	A digital signal can be selected. If this is *On*, the PU is On, regardless of the set limits and delays.
Exercise Block	To avoid clogging of pumps etc., the pump is exercised according to the settings in the selected exercise block. The factory setting is MT01 which in turn has the factory setting of every day, 11:00-11:02. The exercise block is handled as a digital signal, and the output value from the PU is the exercise block OR other conditions. *Mode* must be *Auto*.
Text	Frame text, displayed at the top of the menu page, on the row after PU01.

TM Thermostat Function

A digital signal the value of which depends on whether a selected analog input signal is above or below its limit. If the limit for On is lower than the limit for Off, TM is On for low input values, and vice versa. Limits and delays can be fixed or variable.

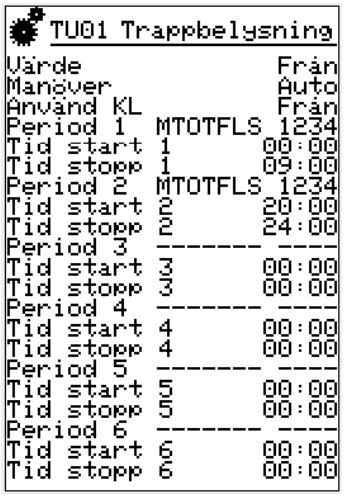


In the explanation, °C is used as a reference.
Of course, this can also be a flow,

TM01	Thermostat Function 1
Value	Current status of output signal, *On/Off*.
Input Value	Value for selected *Input Signal*.
Switch On	Input value for switch on
Switch Off	Input value for switch off
Delay On	Status is On when the input value is less than the Curr. Ref for longer than Delay On
Delay Off	Status is Off when the input value is more than Return for longer than *Delay Off*.
Delay Diff	If delay difference is activated, the delays will be shorter in the case of larger differences. Instead of simply calculating the time when a change awaits, time is multiplied by difference in whole degrees. For example, at 2 degrees past the limit, the change delay is half of the set delay. The delay is never longer than the set delay.
Selected input	The input signal is selected from a list of the analog signals available in the system.
Text	Frame text, displayed at the top of the menu page, on the row after TM01.

TU Time Channels

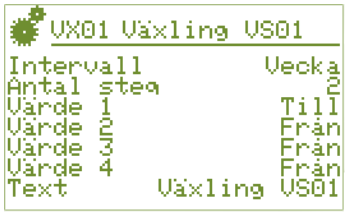
The KTC unit has weekly time channels *TU* which can be programmed for switch on and switch off at set times and on set days of the week. Each time channel can store 6 operating periods. It is also possible to programme operating periods for four different public holidays. Inserting the public holidays in the year is carried out in the one year calendar *KL*.



TU01	Time Channel 1.
Value	Current status of output signal, *On/Off*.
Mode	TU can be set manually, *On* or *Off*, or left in *Auto*. If the setting is not Auto, the TUnnvf signal is On.
Use KL	If *On*, TU imports user holidays 1-4 from KL (if there is a user holiday on a particular day, it is NOT Mon-Sun). If *Off*, it is always Mon-Sun.
Period 1-6	Active days for each time period. One or more days of the week, together with four special/public holidays according to *KL*. The selected day is shown as the day's initial letter or the figures 1-4. See the description under One year calendar KL.
Time on 1-6	Time for switch on, hours and minutes.
Time off 1-6	Time for switch off, hours and minutes.
Text	Frame text, displayed at the top of the menu page, on the row after TU01

VX Switching Function

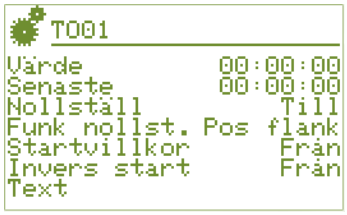
To ensure, for example, that a number of pumps have a similar running time, there is a switching function. Each such function has up to 4 output signals, accessible using the suffix v1, v2 etc., which are cyclically true one at a time, at a particular time with adjustable intervals.



VX01	Switching Function 1.
Interval	
- *Hour*:	Switching every even hour.
- *Day*:	Switching every day at 11:00
- *Week*:	Switching every Monday at 11:00.
- *Month*:	Switching the first Monday of every month at 11:00.
Steps	Number of output signals used. To obtain a signal which is true half of the time, set to 2. To obtain one which is true one third of the time, or to switch between three, set to 3 etc.
Value 1-4	Indicates the status of the selected steps in the switching function.
Text	Frame text, displayed at the top of the menu page, on the row after VX01.

TO Time Object

A time counter with enable conditions that can be reset on adjustable conditions. In other words, it is possible to both stop and reset the counter, with adjustable conditions for both. Used for example for ramp functions or up time alarm.



TO01	Time Object 1.
Value	Counter's value since it was last reset.
Previous	Value at latest reset.
Reset	Signal to control the reset conditions.
Reset Func.	Function for resetting value: Positive edge, Negative edge, Optional edge, On or Off.
Enable	Signal that starts/stops the counter.
Enable inv.	If *On*: *Enable* applies in reverse.
Text	Frame text, displayed at the top of the menu page, on the row after TO01.

HR Event Counter

A counter with enable conditions that can be reset on adjustable conditions. In other words, it is possible to both stop and reset the counter, with adjustable conditions for both. Changes in a digital signal are counted. Useful, for example, for counting the number of starts for a pump in the last 24 hours.
If the input signal is not a digital signal, the change since the previous reset is counted. This can be used, for example, to see consumption during a particular time interval.

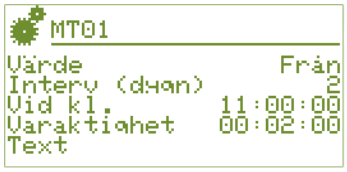
HR1	Event Counter 1.
Value	Counter's value since it was last reset.
Previous	Value at latest reset.
Selected input	The signal whose change is to be calculated.
Event	Function for counting: *Positive edge*, *Negative edge* and *Optional edge*.
Reset	Signal to control the reset conditions.
Reset Func.	Reset function: *Positive edge*, *Negative edge*, *Optional edge* and *On* or *Off*.
Enable	Signal that can start/stop the counter.
Enable inv.	If *On*: *Enable* applies in reverse.
Text	Frame text, displayed at the top of the menu page, on the row after HR01.

MT Exercise Block

To exercise the pumps, digital signals are active at pre-determined times.

There are four exercise blocks. The factory settings for these are:

- MT01va: On 11:00-11:02 every day.
- MT02va: On 11:00-11:02 every Monday.
- MT03va: On 11:00-11:02 the first Monday of every month.
- MT04va: On 11:00-11:02 every other day.



MT01	Exercise Block 1.
Value	Current status for selected exercise block
Interv (day)	Days between exercises. For some intervals, this is synchronised with the calendar:

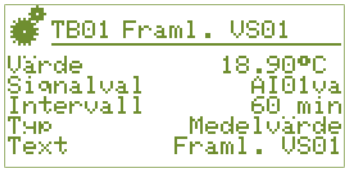
- 2 days: Monday, Wednesday and Friday
- 3 days: Monday and Thursday
- 7 days: Monday.
- 30 days: The first Monday of every month.

Otherwise MT is activated the first time the time agrees, and then with the set interval on a rolling basis.

At Time	Time for start of exercise.
Duration	How long the exercise should last each time.
Text	Frame text, displayed at the top of the menu page, on the row after MT01.

TB Trend Buffer

In addition to the values logged automatically in the KTC unit, the user can define values to be logged.



TB01	Trend Buffer 1.
Value	Current value/meter value/digital signal for selected logging signal.
Selected input	Selected signal to be logged.
Interval	Logging interval: 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 60 minutes.
Type	

- *Average value:* Average value is logged for each interval.
- *Meter value:* The value is logged in each interval (the value at that time).
- *Digital:* The value is logged for each change. At most one pulse during the set time period is logged

Text	Frame text, displayed at the top of the menu page, on the row after TB01.

KL One year calendar

The system can keep track of special days during the year when the normal weekly rhythm is interrupted. This makes it possible to programme the four different user holidays H1-H4 in TU. If a user holiday is active, the day of the week has no significance.

The calendar is actually two calendars.

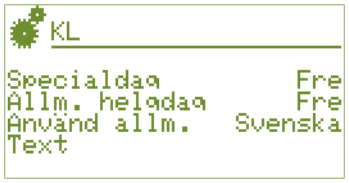
One calendar contains Swedish public holidays. Red (public holiday) days are H4, the day before red days are H3. You can choose whether or not this calendar will apply.

The other calendar is user configurable. Configuration is carried out via the parent system and cannot be done via the local user interface, display/keyboard.

The current status for both calendars is displayed on the calendar page. If no user holiday is active, the current weekday is displayed. If the different calendars give different public holidays at the same time, the user configured calendar applies.

Days included in the Swedish calendar:

H4 (public holidays): New Year's Day (1/1), Epiphany (6/1), Good Friday, Easter Day, Easter Monday, 1 May (1/5), Ascension Day, National Day (6/6), Midsummer Day, Christmas Day (25/12), Boxing Day (26/12)
H3 (days before public holidays): Easter Saturday, Midsummer Eve, Christmas Eve (24/12), New Year's Eve (31/12)



User Holiday Status for user configured public holiday calendar.

Auto Holiday Status for the built-in calendar.

Use Auto

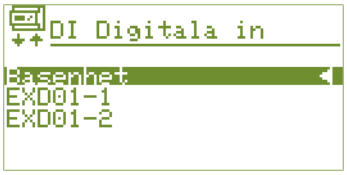
- Swedish: Swedish public holidays apply. *Factory setting.*
- None: No preprogrammed public holidays are used.

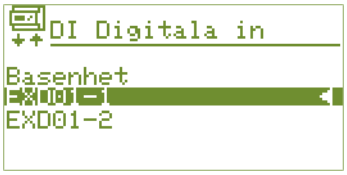
Text: Frame text, displayed at the top of the menu page, on the row after KL.

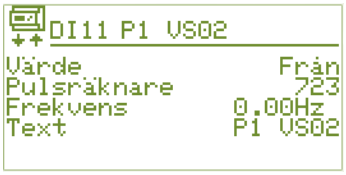
DI Digital inputs

For each digital input, you can see the current status and switch on frequency. The number of switch ons and accumulated time are also actively displayed. These two parameters can be edited if necessary.
To expand access for digital inputs on the SRD5000 you can use the expansion unit EXD01, which has eight extra digital inputs. Two EXD01 units can be connected to each SRD5000. The EXD01-1 has designations DI11-DI18 and the EXD01-2 has designations DI21-DI28.
To access DI settings, you must mark Base Unit or EXD01-1 or EXD01-2, which are connected expansion units below. Mark the unit. then choose OK.

DI01/DI11	Digital input 1/11.
Value	Status of input. On/Off.
Pulses	Number of on and off operations. Can be set.
Frequency	Frequency of on/off operations.
Text	Frame text, displayed at the top of the menu page, on the row after DI01.





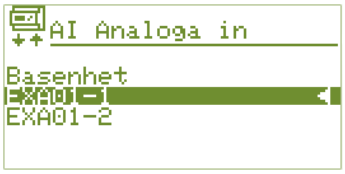


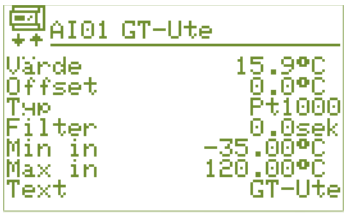
AI Analog inputs

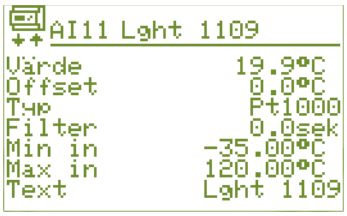
Passive temperature sensors of type PT1000 or NI1000 are connected to the analog inputs. To expand access for analog inputs on the SRD5000 you can use the expansion unit EXA01, which has four extra analog inputs. Two EXA01 units can be connected to each SRD5000. The EXA01-1 has designations AI11-AI14 and the EXA01-2 has designations AI21-AI24. To access AI settings, you must mark Base Unit or EXA01-1 or EXA01-2, which are connected expansion units below. Mark the unit, then choose OK.

*The EXA01 also has four extra universal inputs, UI, which can be used for inputs including passive temperature sensors. See explanation of UI.

AI01/AI11	Analog input 1/11.
Value	Actual temperature.
Offset	If the current temperature shows too high/low a value, you can use the offset function to calibrate the temperature so that the right value is displayed.
Type	Type of sensor, Pt1000 or Ni1000
Filter	The unit reads off the inputs with very high accuracy.. The input signal normally contains a certain amount of noise, generated by external sources of interference. To minimise the impact of such interference, the input signals can be filtered. The filter factor should be tested individually for each application so that optimal function is obtained. Filtering is carried out using a time constant.
Min Limit	Lower temperature limit for what the connected sensor can measure.
Max Limit	Upper temperature limit for what the connected sensor can measure.
Text	Frame text, displayed at the top of the menu page, on the row after AI01.







Example filter time:

An external temperature sensor is not normally exposed to rapid temperature changes, so it can be allocated a high filter factor.

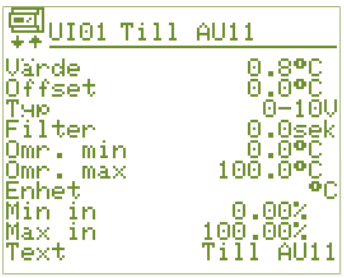
The regulating sensor on a domestic hot water regulator is exposed to rapid temperature changes but should still supply the correct water temperature and should then be allocated a short/no filter time.

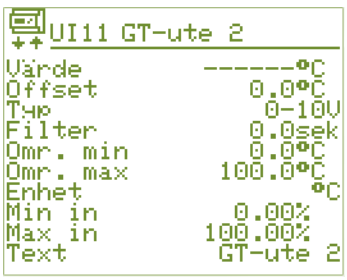
UI Universal inputs

The universal inputs are flexible inputs that can be connected to a passive temperature sensor (type PT1000 or NI1000) or active sensor 0-10 V but can also act as a digital input.
To expand access for analog inputs on the **SRD5000** you can use the expansion unit EXA01, which has four extra universal inputs. Two EXA01 units can be connected to each SRD5000. The EXA01-1 has designations UI11-UI14 and the EXA01-2 has designations UI21-UI24.
To access UI settings, you must mark Base Unit or EXA01-1 or EXA01-2, which are connected expansion units below. Mark the unit, then choose *OK*.

*The EXA01 also has four extra analog inputs, AI, which can be used for passive temperature sensors. See explanation of AI.

UI01/UI11	Universal input 1/11.
Value	Current value
Offset	Calibration of current value. If the current value displayed is too high/low, you can use the offset function to calibrate so that the right value is displayed.
Type	Choice of signal: Pt1000, Ni1000, 0-10 V, Digital in.
Filter	The unit reads off the inputs with very high accuracy.. The input signal normally contains a certain amount of noise, generated by external sources of interference. To minimise the impact of such interference, the input signals can be filtered. The filter factor should be tested individually for each application so that optimal function is obtained. Filtering is carried out using a time constant. See example on the previous page.
Sens Min	Corresponds to 0% of the signal.
Sens Max	Corresponds to 100% of the signal.
Unit	Unit for recalculated value.
Min Limit	Minimum permitted input signal, lower value on input signal produces sensor error. For passive sensors (Pt1000, Ni1000) in °C, active sensors in Volts. For 0-10V, the input signal on this level gives an output value corresponding to *Sens Min*.
Max Limit	Highest permitted input signal, higher value on input signal produces sensor error. For passive sensors (Pt1000, Ni1000) in °C, active sensors in Volts. For 0-10V, the input signal on this level gives an output value corresponding to *Sens Max*.





DU Digital outputs

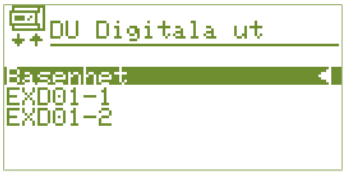
The digital outputs are intended for 24 VAC, max. 0.5A. To expand access for digital outputs on the SRD5000 you can use the expansion unit EXD01, which has four extra digital outputs. These outputs are intended for 230 VAC, max. 10A. Two EXD01 units can be connected to each SRD5000. The EXD01-1 has designations DU11-DU14 and the EXD01-2 has designations DU21-DU24. To control higher voltages and/or currents from the SRD5000's digital outputs, you can use the relay unit RE4i, which has inputs intended for 230 VAC, 10A. To access DU settings, you must mark Base Unit or EXD01-1 or EXD01-2, which are connected expansion units below. Mark the unit, then choose OK.

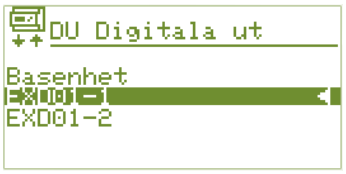
Parameters for SRD5000:

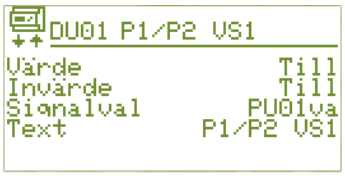
DU01	Digital Output 1.
Value	Current status of the output. *On/Off*.
In value	Status of *Input signal*.
Selected input	Selected input for *Input value.*
Text	Frame text, displayed at the top of the menu page, on the row after DU01.

Parameters for EXD01:

DU011	Digital Output 11.
Value	Current status of the output. *On/Off*.
In value	Status of *Input signal*.
Mode Switch	Position of mode switch on enclosure.
Selected input	Selected input for *Input value.*
Red LED	Signal that should illuminate red LED on the EXD01's enclosure.
Yellow LED	Signal that should illuminate yellow LED on the EXD01's enclosure.
Text	Frame text, displayed at the top of the menu page, on the row after DU01.



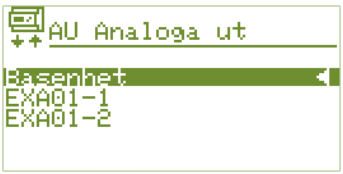


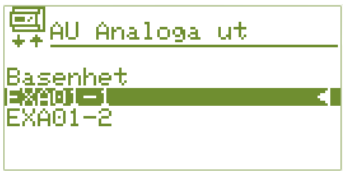


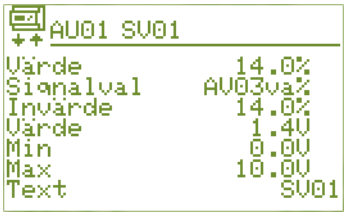
AU Analog outputs

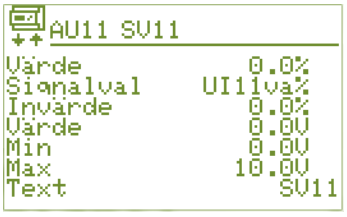
The analog outputs are intended for control of 0-10V equipment. To expand access for analog outputs on the SRD5000 you can use the expansion unit EXA01, which has four extra analog outputs. Two EXA01 units can be connected to each SRD5000. The EXA01-1 has designations AU11-AU14 and the EXA01-2 has designations AU21-AU24. To access AU settings, you must mark Base Unit or EXA01-1 or EXA01-2, which are connected expansion units below. Mark the unit, then choose OK.

AU01	Analog Output 1.
Value	Current percentage signal of the output
Selected input	Choice of input value for the signal. Can be selected from among all analog values in the system.
Input value	Current value of input signal.
Value	Voltage of output signal.
Min	Output value that corresponds to 0% of the input signal.
Max	Output value that corresponds to 100% of the input signal.
Text	Frame text, displayed at the top of the menu page, on the row after AU01.







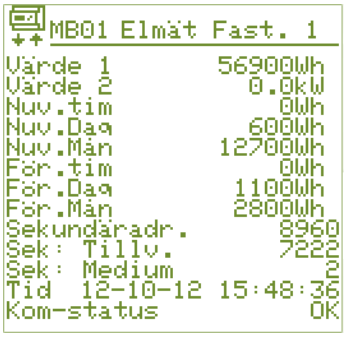


M-Bus

Measurement data is collected from connected measurement nodes via M-Bus. These measurement nodes can be everything from a simple temperature sensor to more advanced collection of different types of consumption, such as water meters, electricity meters and energy meters for district heating.

Menu MB M-Bus data

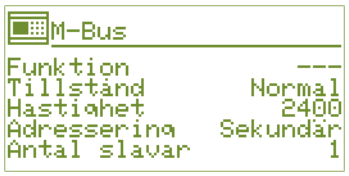
The data presented depends on the type of meter node connected. In the example below we have connected an electricity meter via M-Bus to the KTC unit.



MB01	M-Bus Object 1.
El. meter. Prop. 1	Frame text. The name of the meter connected to MB01 Written in parameter *Text*, menu *MB Object.*
Value 1-6	Displays the meter value and information supplied by the M-Bus object. Up to six different values from M-Bus objects can be displayed. Only primary values are displayed. If more VIFs are displayed, these are activated under MB object.
Curr. hr	Consumption current hours. E.g.: if the time is 13.25, => consum. **13.00–14.00**
Curr. Day	Consumption current day. E.g.: if the time is 13.25 on 22/8 => consum. **22/8, 00.00–24.00**
Curr. Month	Consumption current month. E.g.: if 22 August => consum. **1/8–31/8**
Cons. Hr	Consumption previous whole hour. E.g.: if the time is 13.25 => consum.
12:00-13:00	
Cons. Day	Consumption previous 24-hour period. E.g.: if the time is 13.25 on 22/8 => consum. **21/8, 00.00–**
24.00	
Cons. Month	Consumption previous month. E.g.: if 22 August, => consum. **July, 1/7–31/7**
Sec. Id.	Unit's secondary address.
Sec: Man.	The manufacturer of the connected M-Bus node.
Sec: Medium	Figure that translates into the medium measured, translated by the software.
Time	Current time and date.
Com state	Shows if the meter is correctly connected and working. *OK/Time Out/Collision*.

Menu M-Bus

In the M-Bus menu, you can search for connected M-Bus nodes both via the primary and secondary address.



Function.

- --- Normal mode
- Search Searches for all meters connected to M-Bus
- Abort Cancels ongoing search
- Clear all Delete all meters connected to M-Bus
- Save Rx Saves latest incoming data in a file. *MBusRx.txt*

State	Indicates *Searching* when searching for meters on M-bus. Returns to *Normal* when searching for meters is finished. When the M-Bus Hardware indicates an overload (e.g. when a node has short circuited) the state *overload* is displayed.
Baud rate	Choose from baud rates 300 and 2400 baud. Factory setting 2400 baud.
Addr type	Choice of the type of address to be used when searching after connected M-Bus objects. Primary/secondary.
Number of slaves	Shows the number of found/connected M-Bus objects.

Menu M-Bus Object Secondary Address.

MB02	M-Bus Object 2.
Fast-Lgh-VV01-	Frame text. Name of the meter connected to MB2. Written in parameter *Text.*
Addr type	The example uses secondary addressing
Sec. Id.	Secondary address
Sec: Man.	Figure indicating the manufacturer of the connected node.
Sec: Medium	Measured medium according to M-Bus standard.
Text	Frame text, displayed at the top of the menu page, on the row after MB02.
Category	States what is measured, translated from medium. If the category is changed, the figure in *Medium* does not change.
Meter ID	The node's ID number:
Sync. Meter ID	Reads off the nodes' ID/serial number
Tag	Can be used, for example, for information about the meter's position.
Interval	How often the nodes are requested, in seconds.
Pages	How many pages are required to get the information sought. For additional information, see the relevant meter's manual.
Baud rate	300 or 2400 baud.
VIF 1-6	Up to 6 different values can be presented from each connected M-Bus node.

Menu M-Bus Object: Primary addressing.

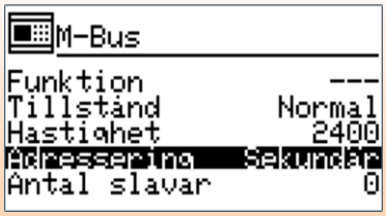
MB02	M-Bus Object 2.
Addr type	The example uses primary addressing
PrimAddress	Connected M-Bus node's primary address
Text	Frame text, displayed at the top of the menu page.
El. meter. Prop. 2	on row after MB02. Written in parameter *Text*.
Category	States what is measured.
Meter ID	The node's ID number:
Sync. Meter ID	Reads off the nodes' ID/serial number
Tag	Tag text. Can be used, for example, for information about the meter's position.
Interval	How often the nodes are requested, in seconds.
Pages	How many pages are required to get the information sought. For additional information, see the relevant meter's manual.
Baud rate	300 or 2400 baud.
VIF 1-6	Up to 6 different values can be presented from each connected

Search for measurement nodes connected to M-Bus.

You can search for both *primary* and *secondary* connected M-Bus nodes. The unit searches the entire bus and adds nodes found in number order for selected *Addressing and speed*. If you want a particular M-Bus node for a special *MB Object*, follow the instruction “Contact M-Bus meter via known Primary/Secondary Address” on the following pages in the manual. To see which nodes are connected, see the section M-Bus data.

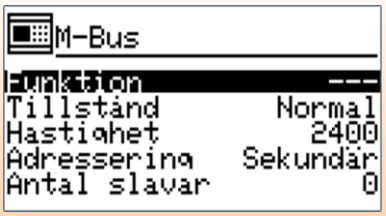
1.

First mark Addressing, choose if you want to search on *Primary* or *Secondary* address.



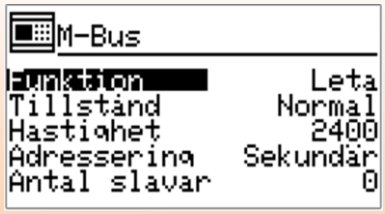
2.

Mark - - - against Function



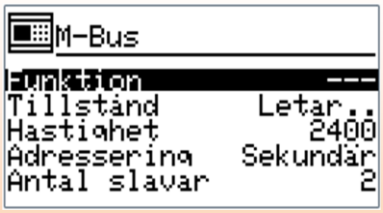
3.

Press and scroll until you reach *Search* with and , .



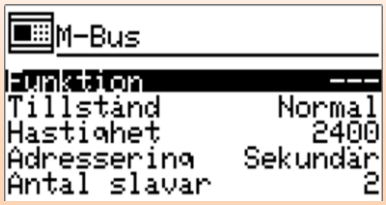
4.

The display shows:



5.

When the text *Searching* on the *State* row changes to *Normal*, the search is finished and the number of measurement nodes found is displayed at the bottom right on the display *Number of slaves*. In our example, two measurement nodes were found.



Contact M-Bus meter via known secondary address.

If the M-Bus node's secondary address is known, you can enter the address directly for the M-Bus object you want the node on. When the information for searching the node has been entered, after a few minutes you can see in the M-Bus data menu whether the connection has worked.

Procedure:

Mark M-Bus and press *OK*. Press the menu key on the unit and select *MB object*.

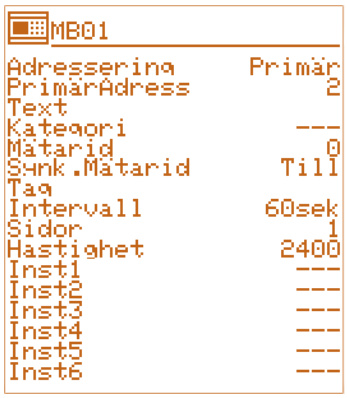
- Move to *Addressing*, choose *Secondary*, *OK*.
- Move the cursor with the arrow keys and mark *Secondary addr*. Press the edit key and use the arrow keys to write in the secondary address of the meter to be connected (e.g.: 1981104), then press *OK*.
- Now move the cursor and mark the row *Baud rate*. Use the edit key and choose the baud rate the meter communicates with in the M-Bus network. See the meter manual and then press *OK*.

Example:

In the example on the left, we are searching for a meter with a secondary address of 400 and which communicates at a baud rate of 2400 baud.
If the meter is correctly connected, it will soon be found by the unit and its values entered on the rows it has data for. When the information has been logged by the unit, the Frame Text needs to be edited. Mark the Text row and use the arrow keys to enter the Frame Text. If you have several meters to be connected, you move to the next free M-Bus object and repeat the stages above. The M-Bus data menu now contains meter values and other information for this object.

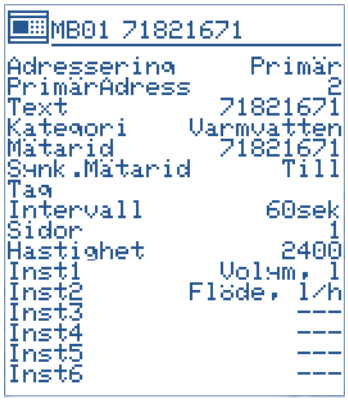
Contact M-Bus meter via known primary address.

If the M-Bus node's primary address is known, you can enter the address directly for the M-Bus object you want the node on. When the information for searching the node has been entered, after a few minutes you can see in the M-Bus data menu whether the connection has worked.



Procedure:

- Mark M-Bus and press OK. Press the menu key on the unit and choose M-Bus object.
- Move to Addressing, choose Primary, OK.
- Move the cursor with the arrow keys and mark PrimAddress. Press the edit key and use the arrow keys to write in the primary address of the meter to be connected (e.g. 2), then press OK.
- Now move the cursor and mark the row Baud rate. Use the edit key and choose the baud rate the meter communicates with in the M-Bus network, then press OK.



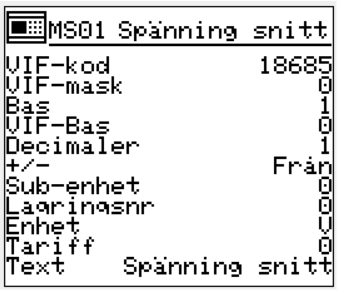
Example:

In the example on the left, we are searching for a primary connected meter with a primary address of 2 and which communicates at a baud rate of 2400 baud.
If the meter is correctly connected, it will soon be found by the unit and its values entered on the rows it has data for. When the information has been logged by the unit, the Frame Text needs to be edited. Mark the Text row and use the arrow keys to enter the Frame Text. If you have several meters to be connected, you move to the next free M-Bus object and repeat the stages above. The M-Bus data menu now contains meter values and other information for this object.

Special settings

When a meter connected via M-Bus, the KTC unit reads the medium it is working with, and automatically sets number of settings, which generally suit meters for this medium. User can also choose additional values to read off from a list. “MS01”-“MS04” come last in the list. This is an opportunity to exploit more of the M-Bus protocol, and to read out additional values from a meter, by creating detailed settings for up to four different values

NB!
To make configurations in this menu, you need detailed knowledge of the M-Bus protocol. Please see M-Bus documentation, version 4.8.
http://www.m-bus.com/files/MBDOC48.PDF



VIF Code	Desired VIF Code (other than scaling) according to the M-Bus protocol. Entered in decimals.
VIF Mask	A bit pattern, up to 7, with the bits in the VIF code that provide the scale factor. Entered in decimals, 0, 1, 3 or 7.
Base	10 exponent for scaling start value, according to the definition in the M-Bus protocol.
VIF Base	The same function as “Base”
Decimals	Resolution of result, number of decimals.
+/-	Not used.
Sub Unit	Unit or sub unit according to M Bus documentation. Picked from DIF.
Storage no	Searched storage number. Setting -1 gives the first value found regardless of storage number.
Unit	Unit for the locked value.
Tariff	Searched tariff according to the M-Bus protocol. If Tariff is set to -1 the first value found is obtained regardless of tariff
Text	A text that describes the object. Shown at the top of the page.

Modbus

Via Modbus, you can read and write data commands in connected units. The Modbus protocol is very flexible, which requires a number of settings to adapt to different manufacturers and products.

Menu MV Modbus Value

An MV object provides the opportunity to read and write a value via Modbus. A number of settings make it possible to handle many different types of values, with different scaling and resolution. The value is made available with the right scale and unit for the system and, via SRDLink, for other KTC units. An optional value in the system can be connected to MV, to be written via Modbus as soon as it changes more than the set resolution.
A visible, writable time count facilitates the service.

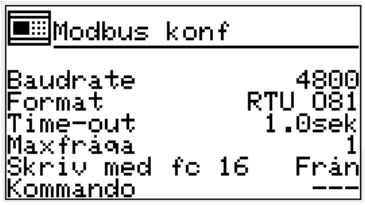
Value	Latest value read from or written to the connected unit.
Status	Current status for the value: Off, OK or any error text.
Time	Time for latest reading from unit.
Time left	Time count till next reading of data. Can also be written, e.g. to speed up reading during service.
Type	Choose if MV should handle individual bits, 16-bit, 32-bit, 64-bit values, or floating integers (real). You can also choose whether it should be possible for the value to be negative, and for 32-bit values you can set if the most significant word comes at a lower or higher (reverse) reference number.
Register	Register number for value according to slave specification
Address	Modbus address for unit on Modbus loop.
Function	Which Modbus function code should be used to read the value
Interval	How often the value should be read
Signal	Value in the system which, after recalculation, should be written to the Modbus unit. Unless otherwise stated, writing only take place when the primary value is changed.
Resolution	Accuracy of writing. Writing is carried out when the selected signal changes more than the resolution states.
Factor	For scaling. The incoming value is multiplied by this factor.
Dividend	For scaling. The incoming value is divided by this figure.
Offset	For scaling. This value is added to the incoming value after it has been scaled.
Unit	Unit for primary value and offset.
First mask bit	If parts of a 16 or 32-bit value should be used, the first valid bit is stated here. Numbered from 0, most significant bit is 0.
Last mask bit	If parts of a 16 or 32-bit value should be used, the last valid bit is stated here. Numbered from 0, most significant bit is 15 for 16-bit values, 31 for 32-bit values.
Category	A way of grouping data.

Writing the Modbus values

When a value should be written to a Modbus slave, the system selects a function code depending on the setting function for reading, and the set value type.
Function 1 and 2 gives writing with function 5 (“Write Single Coil”), 3 and 4 with function 6 (“Write Single Register”). If the value type is 32-bit, writing always takes place with code 16 (Write Multiple Registers”).

Menu Modbus Conf

A menu for settings for the actual Modbus loop



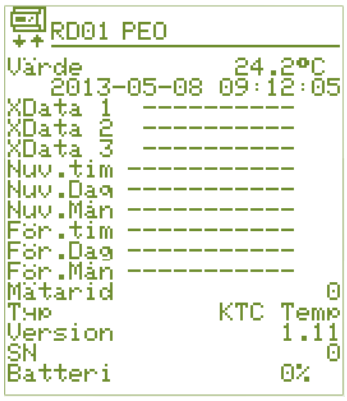
Baud rate	9600, 19200 or 38400 baud. The bit baud rate for communication on the Modbus loop.
Format	Byte format on the Modbus loop. Parity check (N: none, E: even, O: odd), number of bits data (8 for Modbus RTU, 7 for Modbus ASCII), number of stop bits (1 if parity, 2 if no parity check).
TimeOut	Max time for full response to a request.
Max Req Size (only Modbus master)	Maximum number of registers that can be queried at one time. COM1112 tries to include several values in a request if it is possible without the number of registers in the request being larger than the set maximum.
Write using fc 16	Some slaves only accept commands for writing several values (fc 16), even if only one value should be written. This parameter On gives such writing for all slaves.
Command	Command to the Modbus function. E.g. Save communication log.

Z-Wave Radio

KTC radio transmitter is based on Z-Wave, which is an international standard for wireless communication in smarta homes.

Menu RD Radio data

The data presented depends on the type of meter node connected. In the example below we have connected a room temperature sensor via radio to the KTC unit.



Value	Latest value delivered by the connected radio node.
2013-01-08 09:05:05	Date and time when the latest value was delivered to RD from the connected radio node.
XData1-3	Value 1-3 from node*
Curr. hr	Consumption current hours. E.g.: if the time is 13.25, => consum. 13.00–14.00
Curr. Day	Consumption current day. E.g.: if the time is 13.25 on 22/8, => consum. 00.00-24.00 22/8
Curr. Month	Consumption current month. E.g.: if 22 August, => consum. 1/8–31/8
Cons. Hr	Consumption previous whole hour E.g.: if the time is 13.25, => consum. 12.00–13.00)
Cons. Day	Consumption previous 24-hour period. E.g.: if the time is 13.25 on 22/8, => consum. 00.00-24.00 21/8
Cons. Month	Consumption previous month. E.g.: if 22 August, => consum. July, 1/7–31/7
Meter ID	ID number for sensor/node connected to RD01. Often sensor/node serial no./no.
Type	KTC internal, explains which type of node delivers the value.
Version	Version of the software in the radio node.
SN	Serial number of sensor/node connected to RD01 if this is configured.
Battery	Shows battery status in the connected sensor/node.

*One radio node can have up to 4 values. A temperature sensor has only one, while a KTC water meter

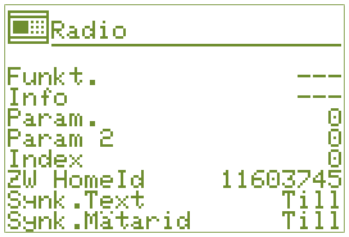
Menu Radio

Parameters common to the entire radio network are configured in the Radio menu.

Meny RD Radio, begin an installation

When you begin a new radio installation, it can be appropriate to clear the radio network before the radio nodes are connected to the radio master. Note that this is only a reset of the radio in the current KTC unit. Radio nodes can still consider themselves to be connected to the KTC unit and must then be deleted separately before they can be connected again.
If there are problems with connecting a new radio node, try deleting the radio node from the radio network and then connecting it again. This often resolves the connection problem.

Keep a radio node awake
A battery-supplied radio node is primarily in rest mode to save battery, and is therefore unable to respond to requests from RCU. To set different parameters it can be made to be awake for approx. one minute. If it is a KTC node, it is easiest to press the radio node's service button three times.



Funct. Parameters for reading off and configuring meter nodes.

- --- Normal mode
- *Delete* Delete/reset the radio node
- *Add cont.* Temporarily connect installation tool (X*)
- *Send NodeInfo* X*
- *Reset radio* Reset radio master
- *Move* Move a radio node from the RD object *Index* to *Folder*
- *Get HomeId* X*
- *Write HomeId* X*
- *Get Cap.* X*
- *Set Name* Write name to radio node *Index*, according to what is set under the RD object menu
- *Set Loc.* Write Loc. to radio node *Index*, according to what is set under the RD object menu
- *Radio Test* X*
- *Add* Add new node as RD *Index*. The same as under RD object.
- *Get Data* X*
- *Replace* Replace a node, RD *Index* if it no longer works. The same as under RD object
- *Remove failed* Delete node RD *Index*. Used when the node no longer works, and normal deletion is therefore not possible. The same as under RD object.
- *Range test* Test the radio contact with a node, by sending a number of messages with reduced power. The same as under RD object. Here the number of transmissions can be set, however, and power reduction in several steps. Result as number of successful attempts.
- *Get conf* Special settings in a node can be read. Node RD *Index*, configuration parameters number *Param 2*. The result comes in *Param*.
- *Set conf* Special settings in a node can be made. Node RD *Index*, configuration parameters number *Index*, new value in *Param*.

Funct. *CONTD.*	Parameters for reading off and configuring meter nodes.
Info	Shows action/result for one of the actions above.
Param	Figure to be sent to the measurement node. e.g. a meter value
Param 2	
Index	
ZW HomeId	Identity number of the radio network that the radio transmitter and all radio nodes connected to the transmitter belong to.
Sync. Text	Normally the *Frame Text* is set to the radio nodes' configured name and the *Location* text to the radio node's configured Location. The connection can be deleted for all radio nodes together by setting *Sync. Text* to Off.
Sync. ID	Normally the meter ID is set to the node's manufacturing number. This connection can be deleted by setting *Sync ID* to Off.

X* Advanced configuration parameters which are not used in a normal installation.

Menu Radio, configuration of measurement node.

Delete: Delete a radio node

1. Mark the *Funct* row, press the edit key and scroll to the parameter *Delete*.
2. Press the *OK* key.
3. *Info: Press*, press the radio node's service button. *Info* confirm with *OK* if the deletion is correct. If *Info: Time Out*, start again at step 1.

Add cont.: Activate remote connection tool.

1. Mark the Funct row, press the edit key and scroll to the parameter *Add cont.*
2. Press the *OK* key
3. *Info: Press*, press the remote connection tool's service button. *Info* confirm with *OK* if the activation is correct. If *Info: Time Out*, start again at step 1.
4. When the installation is finished, don't forget to delete the remote connection tool from the radio network. This is done in the same way that you delete a radio node. *See the section Delete a radio node.*

Reset radio: Clear the radio network.

1. Mark the *Funct* row, press the edit key and scroll to the parameter *Reset radio*.
2. Press the *OK* key.
3. *Info* confirm with *OK*. If *Info: Time Out*, start again at step 1.

Move: Move a radio node between RD objects.

1. Set *Index* to the index for the RD to be moved.
2. Set *Param* to the index to be moved.
3. Set function to "Move", press *OK*.

Set Name: Give the radio node a name.

1. Go to the RD object menu for the radio node to be named.
2. Scroll down to *Name*.
3. Press on the *pen key* and enter the name of the RD. Confirm with the *OK key*.
4. Scroll to *Toolbox*. Press the *pen key*, scroll to Set Name.
5. Press the meter node's service button 3 times.
6. Press the OK key. If everything has worked, Info shows OK. If *Info: Time Out* the configuration has failed. Start at point 4 above and try again.

Set Loc: Describe the location of a radio node

1. Go to the RD object menu for the radio node to be given a location.
2. Scroll down to *Name*.
3. Press on the *pen key* and enter the name of the RD. Confirm with the *OK key*.
4. Scroll to *Toolbox*. Press the *pen key*, scroll to *Set Loc*.
5. Press the meter node's service button 3 times.
6. Press the OK key. If everything has worked, Info shows OK. If *Info: Time Out* the configuration has failed. Start at point 4 above and try again.

Reading off the parameter settings in a node

1. Enter the node's index on *Index*.
2. Enter the parameter number under *Param 2*.
3. Go to function, press *pen* and *up arrow* until Read conf. is displayed.
4. Wake the node (press the button three times)
5. Press *OK*. The result comes as *Param*.

Menu RD object

In the RD object menu, you can add, remove failed and replace new and/or old measurement nodes.

Funct. Parameters for reading off and configuring radio nodes.

- `- - -` Normal mode
- *Add* Install new radio node.
- *Set Meter Val* Send meter value to radio node.
- *Set Condit.* Set conditional meter value in a KTC Pulse sensor (XData 1).
- *Get Meter Val.* Reads the meter value in the radio node.
- *Get Condit.* Reads conditional meter value in a KTC Pulse sensor (XData 1).
- *Replace* Replace a faulty radio node with a new one.
- *Remove failed* Delete a faulty radio node.
- *Test 50%* Do range test with approx. half power.
- *Test 10%* Do range test with approx. 10% of power
- *Get SDiff* Temperature change/number of pulses which should update the RCU. *See Appendix 2*
- *Get Min* Reads the lowest temperature.
- *Get Max* Reads the highest temperature.
- *Get CWTemp* X*
- *Get HWLim* X*
- *Get Energy* X*
- *Get MsgCnt* *See Appendix 2*
- *Get Status* Troubleshooting, shows node status.
- *Reset MM* Resets highest/lowest temperature
- *Set SDiff* X*
- *Set CW Temp* X* Set estimated incoming cold water temperature for energy calculation.
- *HW limit* X* Set temperature limit for conditional flow and energy calculation.
- *Set Energy* X*
- *Get Data* X*
- *Set Name* Gives the radio node a name
- *Set Loc.* Enter where the radio node is located

Param. Figure to be sent to the radio node. e.g. a meter value

Info Instruction about/response to configuration carried out.

Category Type of medium being measured

Meter ID The radio node's ID number

Tag Possibility to technically describe an RD object.

Type Type of radio node.

Version Version of the software in the radio node.

SN Radio node's serial number

Name Configured name of radio node

Loc. Configured location of a sensor.

Interval For mains powered, listening nodes: how often data is updated.

Node Id Node's technical address in the ZW network (this is useful if you use advanced tools).

Text Frame text, displayed at the top of the menu page, on the row after RD01.

X* Advanced configuration parameters not used in a normal installation. Explained in appendix.

Menu RD object, configuration of measurement node.

Add: Add radio node.

1. Scroll with the *arrow key* to the RD object the radio node should be added to.
2. Scroll and mark *Toolbox.* Press the *pen key*, scroll to *Add*.
3. Press the *OK* key, *Info: Press*. Press the radio node's service button.
4. If everything has worked, *info* should display *OK*. If *Info: Time Out* the installation has failed. Start at point 2 above and try again.

Set Meter Val: Configure meter value in measurement node.

1. Scroll with the *arrow key* to the RD object where the meter value should be configured.
2. Scroll down and mark *Param*.
3. Press the *pen key* and enter the meter value with the *arrow key*, confirm with the *OK key*
4. Scroll to *Toolbox*. Press the *pen key*, scroll to *Set meter value*.
5. Wake the radio node (press the button three times).
6. Press the *OK* key, *Info: Press*. Press the radio node's service button.
7. If everything has worked, info should display *OK*. If *Info: Time Out* the installation has failed. Start at point 2 above and try again.

Replace: Replace a faulty radio node with a new one.

1. Scroll with the *arrow key* to the RD object where the faulty radio node is configured.
2. Scroll and mark *Toolbox.* Press the *pen key*, scroll to *Replace*.
3. Press the *OK* key, *Info: Press*. Press the new radio node's service button.
4. If everything has worked, *info* should display *OK*. If *Info: Time Out* the installation has failed. Start at point 2 above and try again. If this does not help, check that the old node really doesn't respond to a call

Remove failed: Delete a faulty radio node.

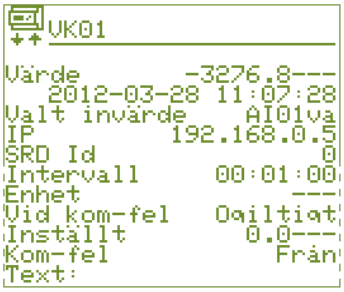
1. Scroll with the *arrow key* to the RD object where the faulty radio node is configured.
2. Scroll and mark *Toolbox.* Press the *pen key*, scroll to *Remove failed*.
3. Press the *OK* key.
4. If everything has worked, *info* should display *OK*. If *Info: Error* the installation has failed. Start at point 2 above and try again. If this does not help, check that the old node really doesn't respond to a call

Range test

1. Scroll with the *arrow key* to the right RD object.
2. Mark *Toolbox*, press *Pen* and choose "Test 50%" or "Test 10%".
3. Wake the radio node (press the button three times).
4. Press *OK*. *Param* shows how many out of 10 attempts worked.

VK Value from communication

Imports the desired value, e.g. from an external temperature sensor connected to another DDC. This DDC should be accessible via IP, XMPP or RS485, directly or via COM1025 (IP modem).



Value	Value which has been imported.
Date and time	Time for latest import.
Selected input	Value to be imported. Entered as text for greatest flexibility. Requires the user to right the right OOnnvv, object type, index and value, two characters for each.
IP	IP number where the other DDC can be accessed. If this is accessed via RS485, this field is left blank.
SRD address	SRD ID number/SRDLink2 address on DDC which should deliver the desired value, either via RS485 or via IP.
Interval	Time interval for importing value.
Unit	Unit for imported value.
At Com Fault	How *VK* should react to communication error: • Use latest imported • Use the pre-defined value • Display error value.
Set	Value to use in the case of communication error if *At Com Fault* has been set to *pre-def*.
Com Fault	Current communication status. *On* indicates Fault. *Three imports in a row have failed*.
Text	Frame text, displayed at the top of the menu page, on the row after VK01.

IP address, XMPP and IP Port

To import data via XMPP, enter the address (JID) as an IP address, including domain (e.g. "subcontroller@xmpp.ktc.se"). The system considers it to be XMPP if the address contains '@'.

Otherwise the system uses UDP, with the port set for DDC to DDC in the RT object.
If you want to import via another port, add ':' after the IP address, followed by the desired port.
e.g. "10.34.2.120:10102" (in version 4.7.xx this doesn't work!)

System

LS Alarm sending

Here you configure alarm sending to the parent system, Scada, OPC server etc. You can chose which type of alarms should be sent and status changes for these alarms. Alarm sending can also be interlocked with any signal in the system.

Each LS can have different current status:

- **Inactive:** Nothing to send just now.
- **Sending:** Flashes briefly when an alarm message is added to the sending queue.
- **Waiting:** Alarm message has been sent. Waits for reception confirmation, or until it is time for the next attempt.

In the case of status Sending or Waiting, it also shows which alarm object should be sent.

LS 01	Alarm transmitter 1.
Status	Active/Inactive. If alarm sending takes place or not.
Curr. AL obj.	Alarm which is being processed. When the alarm is sent the next alarm in the sending queue is processed.
Types	Which types of alarm should be sent. - None – alarm transmitter is disconnected - Only A alarms. - Only B alarms. - A and B alarms. - All, including C alarms.
Events	The status changes to be sent. • New: Only when the alarm goes from OK or Active. • New + OK: Includes when alarm returns to OK, both returned and acknowledged. • New + Ack + OK: Including when alarm is acknowledged. • All: Returned are also sent.
Attempts	How many sending attempts should be made per day. The clock is reset at 08:00 every day. 0 (zero) means unlimited number of sending attempts
Delay	Delay between new sending attempts.
Attempts made	Number of sending attempts thus far. Can be altered manually to force the system to make additional attempts.
Time left	Time left to next sending attempt.
IP	IP address for recipient. Can be of different types, for example: • **172.10.234.54:** Fixed IP address. Alarm is sent via IP to the set address and port. • **larm.minserver.se** Domain name. The system looks up the IP address via DNS, and sends via IP to the set port. Requires DNS to be available with the current network settings. • **minopc@xmpp02:** The @ symbol in the text indicates that it is interpreted as a client in XMPP. Requires the system to be connected via XMPP. • **Empty row with name *localhost* or with IP number 127.0.0.1:** Sending takes place via RS485.
IP Port	IP port if sending takes place via IP.
SRD address	SRD ID for recipient. Applies to all types of sending.
Interlock	Digital signal that must be true for sending to take place. Invalid setting means that sending takes place.
Text	Frame text, displayed at the top of the menu page, on the row after LS01

Alarm list

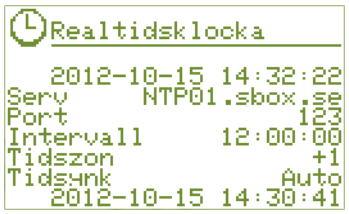
Via the menu on the home page, alarm page or alarm sending page, you can access the list of active alarms. This shows both all LS that are active and the alarms they are currently sending together with all active alarms. For each alarm the following is displayed:

- Alarm Text
- Alarm object, Alarm type, Alarm status
- Time when the alarm was activated
- Time when the alarm returned/was acknowledged.

The alarm is acknowledged by marking *Ack* and pressing the *OK key*. By marking the alarm object and pressing the *OK key*, you access the page for the relevant alarm.

RT Real time

Here you configure the unit, with set intervals, to contact an NTP server and set its real time clock accordingly. The KTC unit can also receive synchronisation messages via RS485.



Serv	Address for server that the time is imported from (NTP)
Port	The port via which the time is imported. (NTP)
Interval	How often the unit requests the right time (NTP)
Time Zone	Relative to GMT
Time Sync	How the clock should be synchronised.
- Off or RS485	No active synchronisation. The clock must be set manually or via write command.
- Auto or NTP	Use NTP if there is an IP network. In other cases, the clock must be set manually or by writing via RS485.
- Server	Synchronises itself via NTP, and forwards this via write command over RS485 to other KTC units on the same RS485 network.
Time	Shows the latest time set, via NTP or by another means.

The clock

To carry out data logging, the system must know the date and time. Normally the date is kept automatically updated via the network, but it can also be set manually. The system's built-in time channels can be set under *System/Real Time Clock*.

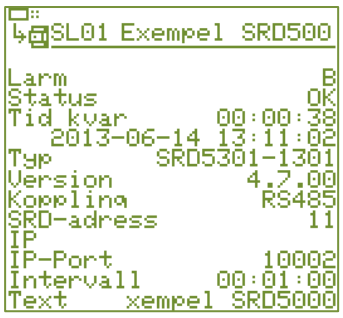
- Mark the date/time text by pressing an arrow key.
- Press the Edit key.
- Move the cursor with *Arrow Left/Right.*
- Change with Arrow Up/Down.
- Confirm with *OK.*

- You need not set the weekday. The system works this out itself.
- The clock resets itself to summer time automatically.

During summer time, it is used for times on the display, e.g. current time, time for latest incoming value etc. In the data logs, normal time is always used.

SL Slave DDC SL

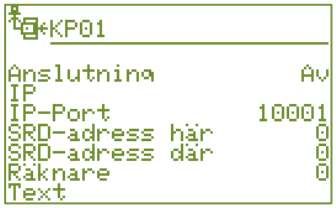
A Slave DDC means a possibility to remotely control another DDC, in other words to show its display image on your own display unit, and to affect the other DDC with the keypad. Alarm status is read in continuously and affects the alarm LED.
If the slave belongs to the MMC family, the display is created locally with knowledge of the slave's display tree and continuously topped up with data in the same way as during data collection (via SRDLink). For slaves from earlier KTC product series, a copy of the display content is made.



Connection	Choose the communication path to the slave: RS485, XMPP or IP. Off means that the SL object is not active.
SRD address	SRD address for the slave (0-249)
IP	IP or XMPP address for the slave. For RS485, the field can be left empty.
IP Port	For communication via IP, the port is set to the slave. The port must be the same port set for "DDC to DDC" on the slave.
Interval	Interval for updating slave status (alarm status, RAM text, version etc.)
Text	Copied from the slave's RAM text. Need not be entered

KP Connection

A connection is a path from a DDC connected via RS485 out to the internet, to send an alarm or import data. Each connection corresponds to an SRD address on the RS485 network, and connects it to an IP address or an XMPP identity, together with an SRD address which applies "there", on the other side of the internet.

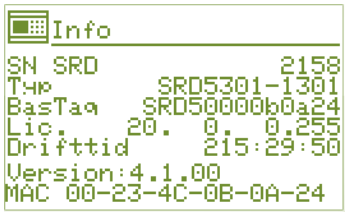


Connection	States if the connection is to a DDC, to SCADA, or via XMPP (DDC or SCADA). If the connection is AV, this is considered to be unused.
IP	Address on the internet. IP address (e.g. 192.168.0.4), host computer name (e.g. nissestyr.se) or an XMPP name (e.g. haga_vader@xmpp02).
IP Port	For connecting DDC or SCADA, the port to send to is entered. For SCADA normally 10001, for DDC 10002.

SRD address here The SRD address to be used by DDCs on the RS485 network.
SRD address there The SRD address contacted via the internet.

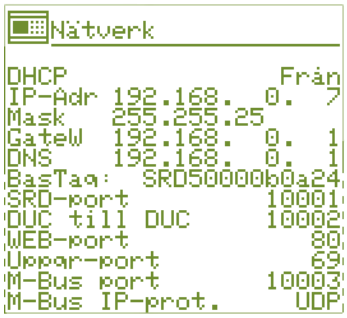
Info

The Info menu contains information about the unit's hardware and software. The information on this page is useful when you need support for the unit.



SN SRD	The unit's serial number/manufacturing number.
Type	The unit's model designation.
BaseTag	Tag text/Hostname. Here you name the unit. The text is displayed on the home page.
Lic	Licence code for the unit's software.
Up time	Time elapsed since last restart of the unit.
Version	The unit's software version.
MAC	The unit's MAC address.

Network



DHCP	*ON*: Network settings are obtained automatically. This requires you to be connected in a network with a router. *AV*:(Factory setting), you enter the IP address to be used.
IP-Adr	IP address. Factory setting: 192.168.0.5
Mask	The network mask indicates which IP numbers belong to the network to which the unit is connected. Factory setting: 255.255.255.0
GateW	Default Gateway, IP address for the path out to the internet. Factory sett: 192.168.0.1
DNS	IP address for the DNS server. Factory setting: 0.0.0.0 (invalid).
BaseTag	Hostname, name used by DHCP to identify the unit. Also included in the *Info* menu.
SRD port	Port for communication with parent system via TCP/IP. Factory setting: 10001
DDC to DDC	Port used for communication with other units in the same network via UDP/IP. Factory setting: 10002.
WEB port	On products with home pages Factory setting: 80
Modbus port	Port Modbus gateway function/slave function. TCP. Factory setting: Port 502.
Modbus active	Must be On for the system to be able to respond to requests via Modbus. Factory setting: Off.
Upgr port	Port for upgrading software via tftp. Factory setting: Port 69.
M-Bus port	On products with M-Bus Factory setting: 10003
M-Bus IP port	On products with M-Bus UDP/TCP. Factory setting: UDP

Temporary connection between the KTC unit and a PC

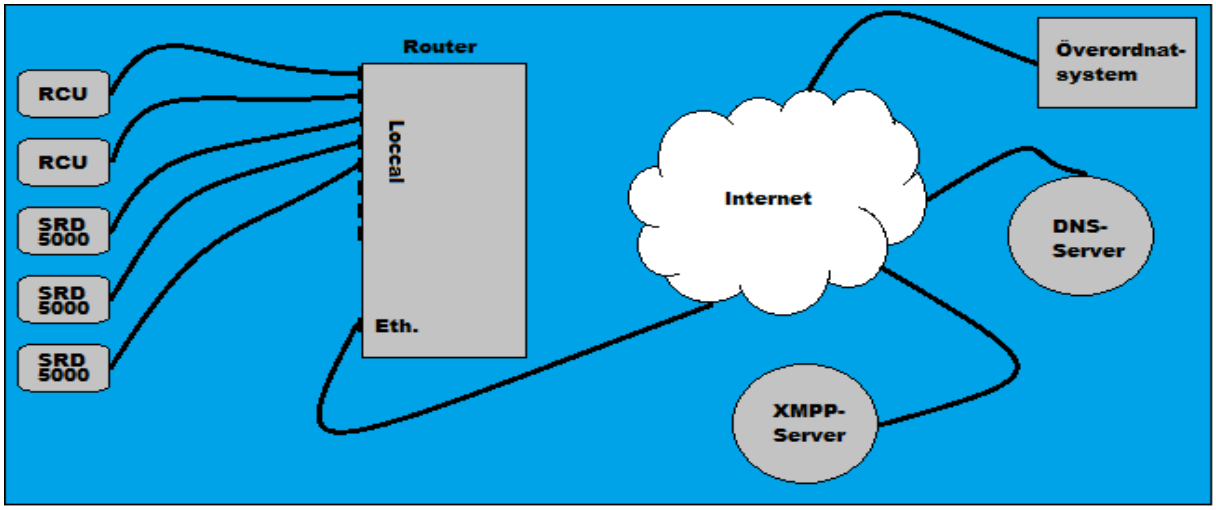
To be able to temporarily connect with a KTC unit (SRD DDC, COM, RCU), if there is no usable network outlet, or if the unit has no display and the current IP address is therefore unknown, you can do as follows:

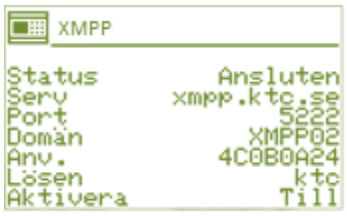
- Connect a standard IP cable between the PC's network outlet and the DDC's
- After between 30 and 60 seconds, the current address is changed to 192.168.0.5 on the unit and this is now accessed on this temporary IP address, regardless of which settings it has normally.
  Settings can now be made for the product. Even network settings can be changed in this mode without losing contact between the PC and the unit.
- As soon as the cable is removed from the PC or the unit, IP function on both is reset to normal

This assumes that the PC is set on automatic network settings, DHCP active. Otherwise nothing happens.

XMPP

XMPP is an alternative connection method for communication carried out via an XMPP server. Unlike normal IP based communication, XMPP makes constant connection possible. The advantage of this technique is that when the unit is commissioned it connects itself via the XMPP server with a username. A known network address is therefore not required. Instead the parent system communicates with the unit via a known username and password.





Status	Disconnected/Connecting/Connected (Indication).
Serv	Network address for XMPP server.
Port	Port for server
Domain	Domain for the account
User	Username for the account. Often the last eight characters in the unit's MAC address. Do not use hyphens.
Passwd	Password for the account.
Activate	Setting to connect XMPP. *On/Off*

When XMPP is set and activated, the unit will connect with the XMPP server on start. This is shown by Status changing between Disconnected and Connecting. When the unit has made contact with the XMPP server, the status changes to Connected. During commissioning, XMPP is configured even if the property network is not complete. The unit then connects itself when the network is commissioned.

RS485

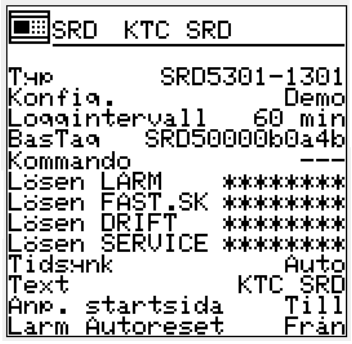
To communicate with equipment including other KTC units, the product is equipped with RS485 bus. Via RS485, connected KTC units can borrow values and parameters from each other. This means, for example, that if there is an external temperature sensor connected to another KTC unit, you can borrow this temperature when programming other KTC units. In other words you do not need to install and connect an additional external temperature sensor.

SRD address	The unit's address on RS485-Bus.
Baud rate	Communication speed on RS485-Bus. For communication via RS485 to work, it is important that all connected units have the same communication speed set.
Test 1	For testing communication with other units on RS485-Bus. One, the address to the right of the symbol *Test* is changed to the address of the unit to which communication is being tested.
---	Indicates OK if communication with the selected unit on RS485-Bus succeeds, otherwise Time Out.

Communication test on RS485

Communication on the RS485 bus can be tested. To the right of the symbol *Test*, you set the ID (address) for another connected unit on RS485. The baud rate for the communication is set. Mark the symbol *Test* and press *OK* on the unit's keypad. The three dashes at the bottom disappear and are replaced with OK if it worked, TIMEOUT if no response was received.

SRD/RCU/COM



Type The unit's type designation

Log interval: How often measurement values and other data are logged. 10/15/20/30/60 minutes.

BaseTag The unit's name/Hostname

Command

- *Restart SRD/RCU/COM* The KTC unit restarts.
- *RS485 test:* *No function. The test is carried out in the RS485 menu.*
- *Set in auto:* Set all manually set objects to auto.
- *Clear memory:* Clears the whole parameter memory.
- *Alarm dupl:* Only use after contacting KTC support.
- *Fix MAC:* Only use after contacting KTC support.

Pass ALARM Login password for alarm acknowledgement. See below.

Pass OPER Login password for property manager. See below.

Pass MAINT Login password for technician. See below.

Pass SERVICE Login password for service technician. See below.

Time Sync Described under Real Time Clock.

Text Frame text, displayed at the top of the menu page after SRD/RCU/COM, and at the top of the home page.

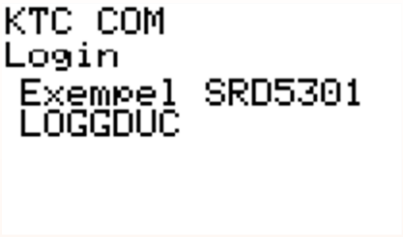
Custom start p If On, the system searches for a file named “dsppages.xml”. This makes it possible to define what should be displayed on the first page for this particular DDC.

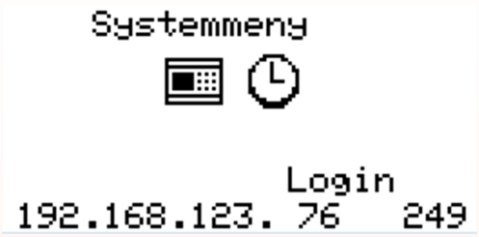
Auto Reset Alarms If On, all alarms will act as C-alarms, and automatically acknowledge themselves when they return. This means that the alarm flags are also reset, **which can affect the programming**. The function is available because it can work well together with certain SCADA systems, which want to handle acknowledgement themselves.

Login/Password

To configure the unit, you must be logged in with the right permission level. The pre-set level in the unit is *User* and requires no password. On this level, you cannot make any changes, but only read off certain values and parameters.

Logging in can be done at the following locations in the unit:





Mark ***login*** with the arrow keys. Press the Edit key , to enter edit mode. Choose the password for the level you want to log in as. If you have changed password, enter the new password. e.g. for service,

You use to get the first 9, copy 9 into the second place, copy the 9 to the third place change the 9 to a 6 and move with the 6 to the fourth place, .

You are now logged in at the highest level and have access to all parameters which are editable in the service menu.

Depending on the KTC unit being used, in the menu *System/Installation/SRD/RCU* or *COM* you can easily reset the password up to the permission level granted by your logged in password. If a password is set to 0, the unit will be logged in on this level until a new password that begins with one of the figures 1-9 is entered.

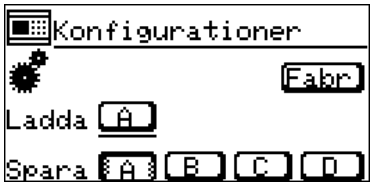
If you have changed password and lost it, you can get a temporary password from your supplier and use this to log in and reset the password. Before contacting your supplier, note the date on the KTC unit to get the right temporary password.

If you change the password in the unit, make sure you carefully document the new one.
The password is a number with up to 8 digits.
From the factory, the following passwords are set:

Alarm	**ALARM**	: **111**	Acknowledge alarm
Property manager	**PROP MAN**	: **123**	Acknowledge alarm, change set point (not change offsets and connections) and change TU
Maint	**MAINT**	: **2222**	Acknowledge alarm, change set point (not change connections) and change TU
Service technician	**SRV**	: **9966**	Acknowledge alarm, change set point and change TU (Does not apply to EC2)

Configurations SRD, COM and RCU

You can manage all settings in the system as one configuration. On the Configurations page are buttons to create and activate configurations. There is also a button for importing factory settings.
The configurations are called A, B, C or D. They can also be pre-installed from KTC.
When a configuration is imported, the communication settings are not affected.
The configurations are stored in the unit's file system, as a dat file. These files are compatible with Automate. In other words, you can create configurations in Automate, upload them to the unit's file system (PLCFileTransfer) and then choose to activate them at a later date, for example if the unit will have alternative uses that will be selected in the field. You can also download configuration files and use them as a starting point for your work in Automate.

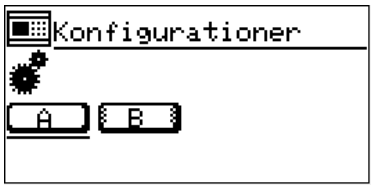


The gear symbol is displayed while the unit works to import or save a configuration.

Fact	Load factory settings
Load	The button is only visible if the configuration file exists. The latest imported or saved file is marked with a line under the Load button.
Save	Buttons to save a configuration under a given name (A-D).

Configurations EC2

You can manage all settings in the system as one configuration. On the Configurations page are buttons to activate configurations.
The configurations can be called A, B, C... up to H. They come preinstalled from KTC.
When a configuration is imported, the communication settings are not affected.



The gear symbol is displayed while the unit works to import or save a configuration.
Button is only visible if the configuration file exists. The latest imported or saved file is marked with a line under the Load button.

EXA & EXD

To the KTC unit SRD5000, there are two types of expansion units, EXA01 and EXD01. The units are connected via CAN bus. Two EXA01 and two EXD01, in total four expansion units, can be connected to the SRD5000.

EXA01, which is the expansion unit for the analog side, increases the analog inputs and outputs by four universal inputs, four analog inputs and four analog outputs. Two EXA01 units can be connected to each SRD5000. In total, an SRD5000's analog inputs and outputs can be increased to 12 universal inputs, 12 analog inputs and 12 analog outputs.

EXD01, which is the expansion unit for the digital side, increases the digital inputs and outputs by eight digital inputs and four digital outputs. Two EXD01 units can be connected to each SRD5000. In total, an SRD5000’s digital inputs and outputs can be expanded to: 20 digital inputs and 12 digital outputs.

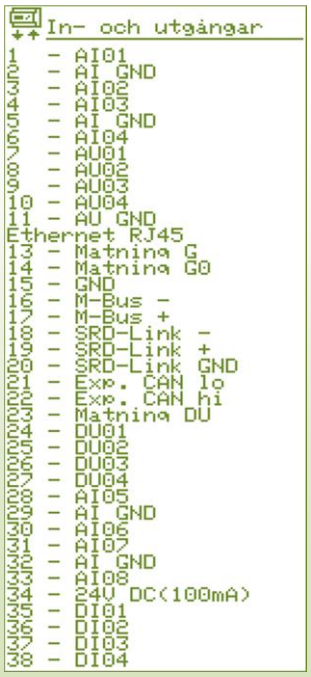
You should remember that the digital outputs on the SRD5000 are via TRIACS, 24 VAC 0.5A, which makes them suitable for use when rapid switching of the output status is required. The digital outputs on EXD01 are via relay 230 VAC.

See User Manual Part 2, KTC SRD5000

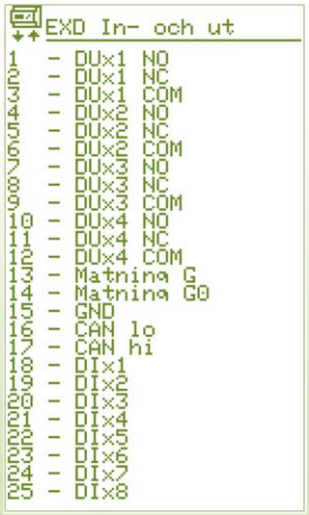
How to connect

To be easily able to see where/how an external unit, e.g. an analog sensor or actuator, should be connected to the KTC unit, an I/O list with terminal numbers is provided in the menu. You can bring up the I/O with the menu key if you are on the home page or in the In & Outputs menu.

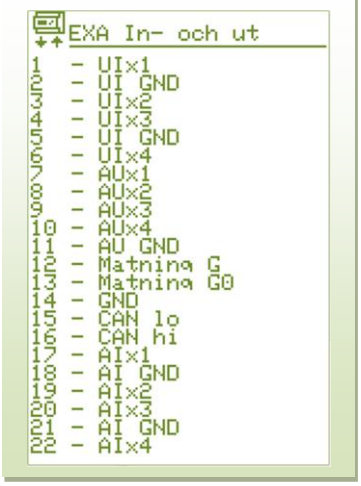
SRD5000 In and out



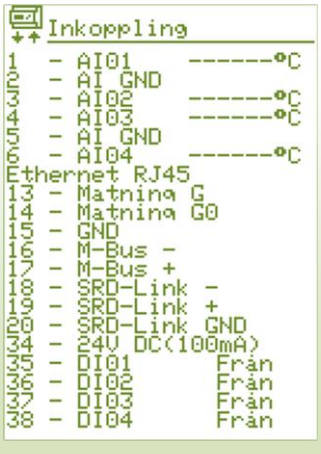
EXD In and out



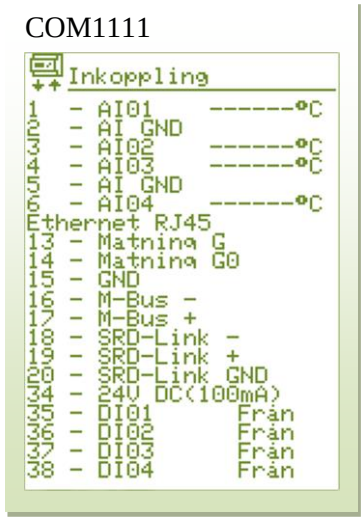
EXA In and out



RCU1111



COM1111



Appendices

Appendix 1 Value references.

AI01	Main value
AI01vu	Unit
AQ01	Main value
AQ01vf	Manually operated
AQ01gf	Sensor error Output
AU01	Main value
AU01v1	In Value
AU01vv	Output level
AV01	Main value
AV01ac	Counter
AV01al	State
AV01gf	Sensor error alarm
AV01hl	Limit Max
Av01ll	Limit Min
AV01s1	Output status
AV01v-	Min
AV01v+	Max
AV01vf	Manually operated
AZ01	Estimated Act. Position
AZ01d-	Output reduce
AZ01d+	Output increase
AZ01gf	Sensor error In Value
CS01tr	(Result of RS485 test)
CS01xm	XMPP Status
DI01	Main value
DI01vf	Frequency
DU01	Output status
DU01sw	Mode Switch
DU01v1	In Value
DV01	Main value
DV01ac	Counter
DV01al	State
DV01dl	Alarm active
DV01vf	Manually operated
DQ01	Main value
DQ01vf	Manually operated
FV01	On if status OK, Off if alarm active
FV01v0	Output
FV01v1	Output FG
FV01v2	Output KW
HR01	Counter value
HR01v1	Latest period
HR01vu	Unit
KL01	Weekday or user holiday according to set calendar
KL01v2	Calendar value
KV01	Main value
KV01ia	In Value
KV01vf	Manually operated
KV01gf	Sensor error In Value
LR01	Main value
LR01vi	In Value
LR01gf	Sensor error In Value
LS01	Status for alarm transmitter (0=inactive)
MB01	Value 1
MB01ci	Communication status, 1=OK
MB01dc	Current day
MB01dv	Previous day
MB01hc	Current hour
MB01hv	Previous hour
MB01mc	Current month
MB01mv	Previous month
MB01mi	Manufacturer
MB01nt	Medium
MB01gf	Sensor error
MB01sn	ID number
MB01u1	Unit 1
MB01u2	Unit 2
MB01u3	Unit 3
MB01u4	Unit 4
MB01u5	Unit 5
MB01u6	Unit 6
MB01v1	Value 1
MB01v2	Value 2
MB01v3	Value 3
MB01v4	Value 4
MB01v5	Value 5
MB01v6	Value 6
MB01ve	Energy (kWh)
MB01vv	Volume (m^3)
MM01ns	Installed slave count
MM01st	Status, 0 normal, 1 searching under way, 3 overload.
MV01	Value
MV01ci	Status
MV01ot	Time to next update (s)
MV01gf	Sensor error
MV01b0-bf	Bit 0 – 15 from an imported 16 bit value
PU01	Main value
PU01iv	In Value
PU01vf	Manually operated
PW01	Current login level remote
RC01	Curr. ref
RC01df	Regulator deviation
RC01f1	Feedback 1
RC01f2	Feedback 2
RC01f3	Feedback 3
RC01f4	Feedback 4
RC01gf	Sensor error regulating sensor
RC01ia	Curr. value
RC01la	Limit sensor value
RC01lu	Limit sensor unit
RC01on	Active
RC01r2	Value added ref. 1
RC01r3	Value added ref. 2

RC01s1	Output status 1
RC01s2	Output status 2
RC01s3	Output status 3
RC01s4	Output status 4
RC01st	State
RC01v1	Output 1
RC01v2	Output 2
RC01v3	Output 3
RC01v4	Output 4
RC01vu	Unit In Value
RD01	Value 1
RD01bl	Battery level
RD01bv	Battery warning
RD01dc	Current day
RD01dv	Previous day
RD01gf	Sensor error
RD01hc	Current hour
RD01hv	Previous hour
RD01mc	Current month
RD01mv	Previous month
RD01v1	Value 1
RD01v2	Value 2
RD01v3	Value 3
RD01v4	Value 4
RD01u1	Unit 1
RD01u2	Unit 2
RD01u3	Unit 3
RD01u4	Unit 4
RL01	Curr. ref
RL01ia	Curr. value
RL01on	Active
RL01rf	Regulator deviation
RL01s1	Output status
RL01v0	Output 0-100%
RL01v1	Output
RL01gf	Sensor error regulating sensor
RT01al	Common alarm A+B
RT01id	Serial number
RT01rt	Raw Time
RT01sa	Common alarm A
RT01sb	Common alarm B
RT01sc	Common alarm C
RT01sf	On if circ. EXD01 manual
RT01sm	M-bus serial number
RT01sr	RS485 Serial number
RT01zh	Z-Wave Home Id
RT01st	Start code
RT01up	Up time since last start
RT01vf	Value manual
RT01tl	Status time synchronisation
RT01ct	Temperature CPU

SK01	In Value
SK01s1	Output 1
SK01s2	Output 2
SK01s3	Output 3
SK01s4	Output 4
SK01s5	Output 5
SK01s6	Output 6
SK01s7	Output 7
SK01s8	Output 8
SK01s9	Output 9
SK01st	Output 10
SK01v1	Part of step
SK01vf	Manually operated
SK01gf	Sensor error In Value
TB01	In Value
TM01	Main value
TM01iv	In Value
TM01vu	Unit In Value
TO01	Current counter value
TO01v1	Latest period
TU01	Current output
TU01vf	Manually operated
UI01	Main value
VK01	Main value
VK01gf	Communication error
VX01	Value 1
VX01v1	Value 1
VX01v2	Value 2
VX01v3	Value 3
VX01v4	Value 4
XE01ac	Active
XE01cr	Revision
XE01id	Serial number
XE01in	Installed
XE01pc	Product Code
XE01vi	Vendor ID

Appendix 2 Parameters in a KTC radio node.

Parameter	Default	Unit	Radio node types	Comment
Send diff.	*Temp* 5 *Pulse* 10	0.1°C 1 litre	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature CPC200-RF Pulses	At 0.5 °C (5*0.1) temperature change or alternatively 10 litres (10*1) water consumption, the value is updated in RCU.
Msg count	-	1	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature CPC200-RF Pulses	Number of data messages sent between transmitter and receiver since last reading. (Reset when read).
Status	0	-	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature CPC200-RF Pulses	Bit pattern describing node status. For troubleshooting.
Min	-	0.1°C	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature	Lowest measured temperature.
Max	-	0.1°C	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature	Highest measured temperature.
Reset MM	-	-	RTS100-RF Room sensor OTS100-RF External temperature sensor CTS200-RF Contact sensor Temperature	Sending of (***Send conf***) 1 resets min and max temperature.
CW temp	10	1°C	CPC200-RF Pulses	Estimated incoming cold water temperature, for energy calculation.
HW limit	40	1°C	CPC200-RF Pulses	Temperature limit for conditional flow and energy calculation.
Total	-	L	CPC200-RF Pulses	Total consumption. (Physical meter value)
Cond. Val.	-	L	CPC200-RF Pulses	Consumption when temperature sensor measured more than “HW limit” at pulse.
Energy	-	Wh	CPC200-RF Pulses	A very rough energy calculation, carried out by using receptacle water temperature and measured hot water temperature at each pulse (litres). Only counts the temperature exceeding the HW limit.