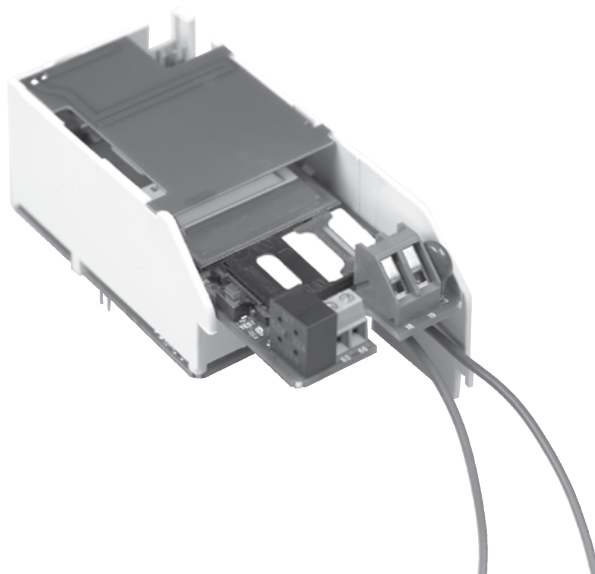


Installation and User Guide for GSM6i



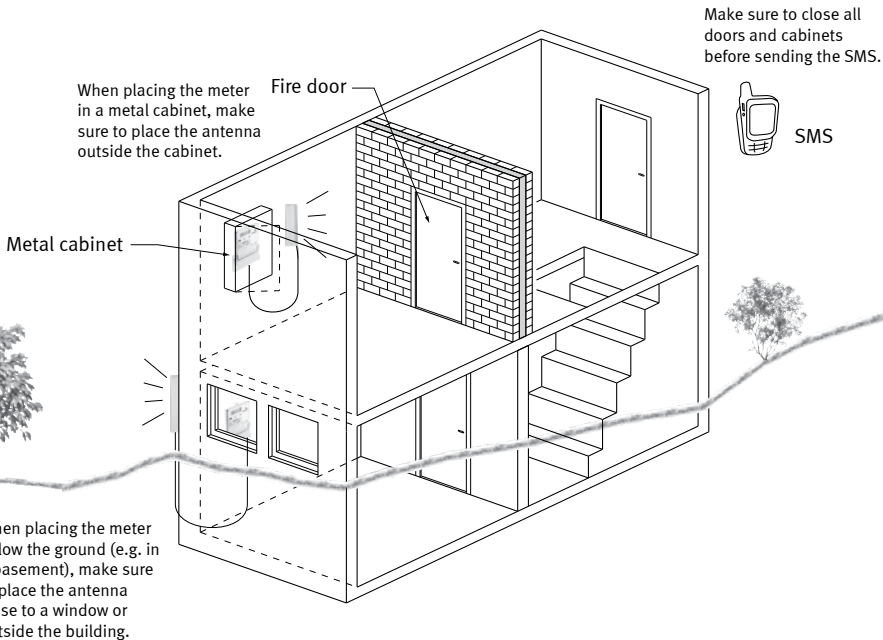
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Quick Guide

1. Perform a signal test by using the test button on the modem.
2. If the signal strength is below 12, an external antenna must be installed.
3. The external antenna must be placed in a position that improves the signal reception. Move the antenna around until the optimal position is located. Perform several signal tests while finding the best position.
4. Use Netmonitor or equivalent tools to help find the best position for the external antenna, if necessary.
5. Before leaving the installation, test the signal strength by sending an SMS. Make sure all cabinets and doors are closed before sending the SMS.

Hints

- Always install an external antenna when installing in a metal cabinet. The antenna must be placed outside the cabinet.
- Use dual band GSM antennas for optimal performance.
- Be aware that fire doors, concrete and metal plates disturb and attenuate the GSM signals.
- Special directional antennas can be ordered for areas with very poor signal conditions (contact Kamstrup for details).



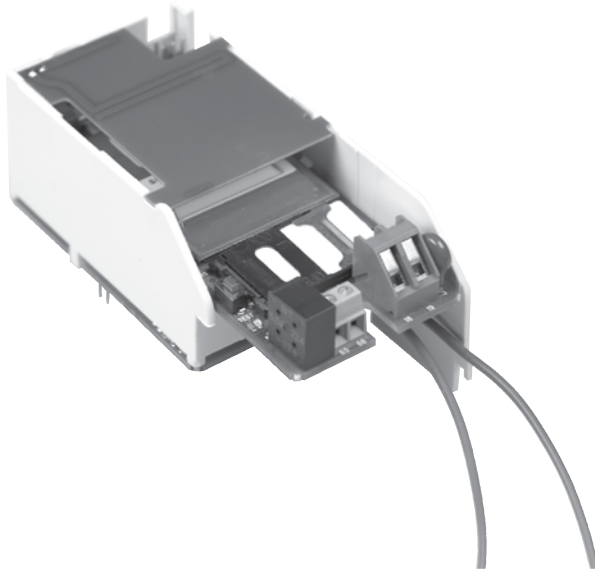
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1. Description

1.1. Description of GSM6i

GSM6i, article number 6814-xxxxx, is a GSM/GPRS modem module specially designed for mounting in Kamstrup electricity meters and in PLC Concentrators. It is possible to configure the module as a data logger, including daily values, load profile, and event log.



1.2. GSM6i Application

The GSM6i module is used in the following meters:

Article no.	Function	Meter types
6814-Txxxx	Transparent reading of meter or Concentrator	Kamstrup 162 Kamstrup 382 Kamstrup 351 Combi PLC Concentrator
6814-Dxxxx	Communication with GSM6i data logger (Data logger mode)	Kamstrup 162 Kamstrup 382 Kamstrup 351 Combi

1.3. Technical data

1.3.1. GSM6i, article no. 6814-xxxxx

- Dual band GSM/GPRS module
- To be mounted as a module in the electricity meter or Concentrator
- Data logger for load profile (5, 15, 30, 60 mins.), daily/weekly/monthly logger and event logger
- Tariff and load control
- Central upload of new features, e.g. new tariff switch times
- Built-in real time clock (RTC) with minimum backup for 10 days
- Reading of electricity meters and signal strength via SMS
- Status LED's for GSM/GPRS network and antenna signal
- GSM/GPRS signal indicator
- Control output for load control (230 VAC, max 100mA)

NOTE: Installation to be carried out by authorized personnel only as it can be highly dangerous to touch connections and internal parts.

2. Mounting

GSM6i, article number 6814-xxxxx, is 230 VAC supplied and prepared for mounting of an external antenna. Please also see “GSM6i Variant Structure” on page 26

2.1. Mounting order

1. Disconnect the voltage supply to the electricity meter.
2. Dismount the top cover of the meter.
3. Place the GSM6i module in the meter (please check that the six module pins are all plugged in).
4. Insert SIM card (see paragraph 2.6 on page 10).
5. Mount the 230VAC supply mains as shown in paragraph 2.7 to 2.10 - please note the meter type. Be careful to lead the wires as shown on the drawings).
6. Connect the meter.
7. When the diodes on the GSM6i module stop flashing, the signal strength is read on the indicator (see paragraph 2.3 on page 8).
8. If the signal strength is acceptable, mount the top cover of the meter and make sure that the wires are not jammed.
9. Before leaving the installation, check the signal strength by sending an SMS (see paragraph 6 on page 24).

If the module does not indicate normal operation conditions (such as sufficient signal strength), see chapter 5 on page 23 for error detection help.

NOTE: In meters delivered before 2004 it may be necessary to make room for the module by removing a bit of edge from the module with a knife. Be careful not to leave sharp edges, which can damage the wires.

2.2. Start-up sequence

1. Immediately after start-up, all the Signal indicator diodes and the test diode switch on briefly (see fig. 1 on page 7).
2. The two *Signal indicator* diodes at the bottom flash until the module has been initialised correctly (approx. 5 secs.) When the diode at the bottom stops flashing, the module has been connected to the network (approx. 5-10 secs.).
3. Now, the signal indicator will show the current signal level.
4. If the module is configured for communication via GPRS, the GPRS diode switches on as soon as the module is connected to the GPRS network (approx. 20 secs. after start-up).
5. All diodes will turn off after 10 mins.

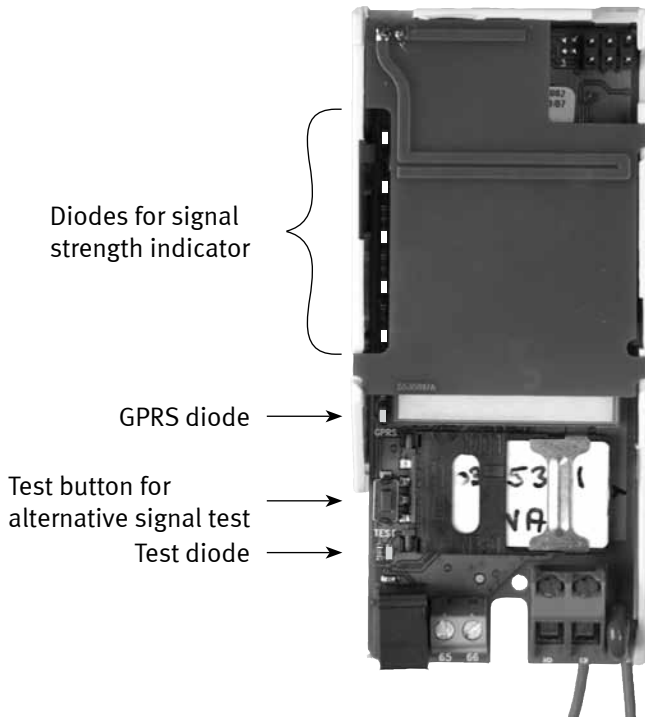


Figure 1

2.3. Signal test

Five LED's have been mounted on the GSM6i module to indicate the current GSM signal strength.

Immediately after starting up the module, it will try to connect to the GSM network, and the signal strength indicator will be activated (see paragraph 2.3 on page 8).

If a higher resolution of the signal strength is required, it is possible to make a signal test with the test button.

1. Press the button for 2 secs. after which the test diode turns on and lights for approx. 10 secs.
2. Now, the test diode will indicate the signal strength with flashes. One long flash equals 10 and a short flash equals 1,
3. i.e. two long flashes and three short flashes equal a signal strength of 23.

See paragraph 2.4 on page 9 for more details.

2.4. Diagram for signal conversion

Signal indicated in dBm	Signal with Button test	Signal Indicator	
-113	0	0	
-111	1	0	
-109	2	0	
-107	3	0	
-105	4	0	
-103	5	0	
-101	6	0	
-99	7	0	
-97	8	0	
-95	9	1	
-93	10	1	
-91	11	1	
-89	12	2	GSM minimum
-87	13	2	
-85	14	2	
-83	15	3	
-81	16	3	
-79	17	3	
-77	18	4	
-75	19	4	
-73	20	4	
-71	21	5	
-69	22	5	
-67	23	5	
-65	24	5	
-63	25	5	
-61	26	5	
-59	27	5	
-57	28	5	
-55	29	5	
-53	30	5	
-51	31	5	

2.5. Light-emitting diodes

Signal Indicator (Green)	Indicates the current GSM/GPRS signal strength
LED's 1+2 flash	The module is starting up
LED 1 flashes	Is connecting to the GSM network
LED's 1 to 5 emit light	Indicates the current signal level
No LED emits light	Poor GSM signal, mount an external antenna (note that all diodes turn off automatically after 10 mins.)

GPRS (Orange)	Indicates the current GPRS status
LED turned off	No GPRS connection

Test (Orange)	Is used for alternative signal test
LED emits light constantly	Emits light constantly for approx. 10 secs. during signal test
LED flashes constantly	The module cannot communicate with the electricity meter

**Note that all diodes will turn off after 10 mins.
They can be activated again by pressing the test button for 2 secs.**

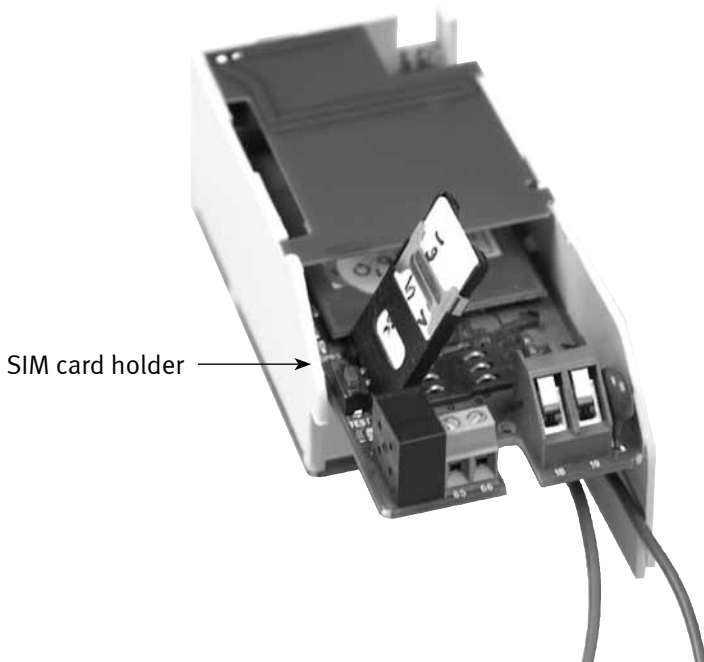
2.6. SIM card

2.6.1. Mounting the SIM card

The unit can be ordered with the SIM card mounted from the factory. Please check that the card has been inserted. The telephone number of the card appears from a label on the side of the GSM/GPRS module. The number can be read from the outside without dismounting the meter cover.

Kamstrup A/S cannot be held responsible for theft and misuse of SIM cards from GSM6i units.

**When the SIM card holder is opened, the connection to the SIM card is disrupted.
When the SIM card has been inserted correctly and the holder is closed, the module will restart automatically.**



If the unit is supplied without a SIM card, make sure that it is inserted before using the unit.

The SIM card holder is opened by pushing the bright holder towards the left and carefully tipping up the holder. Place the SIM card with the “cut-off” corner in the top right side and with the contacts facing the print. Please remember to write the telephone number on a label placed on the outside of the unit.

2.6.2. SIM card requirements

The SIM card must fulfil the following requirements:

GSM/GPRS, DATA/SMS-9.6kb V110, PIN code must be disabled, no voice and no pre-paid card can be used.

Mounting of external antenna (to be ordered separately)

Connect the external antenna to the connector on the module. Be careful to hear a “click” before the two connectors are connected correctly. Place the antenna cable inside the plastic frame of the module and lead it out, down through the cable channel at the bottom of the electricity meter. See picture below.

IMPORTANT

To ensure that the external antenna is mounted in a way that optimises the reception conditions, the signal indicator on the module must be followed (see paragraph 2.3 on page 8). Turn the external antenna around until the best position has been found.

If an external antenna is mounted, the internal antenna MUST be removed.

Removal of internal antenna

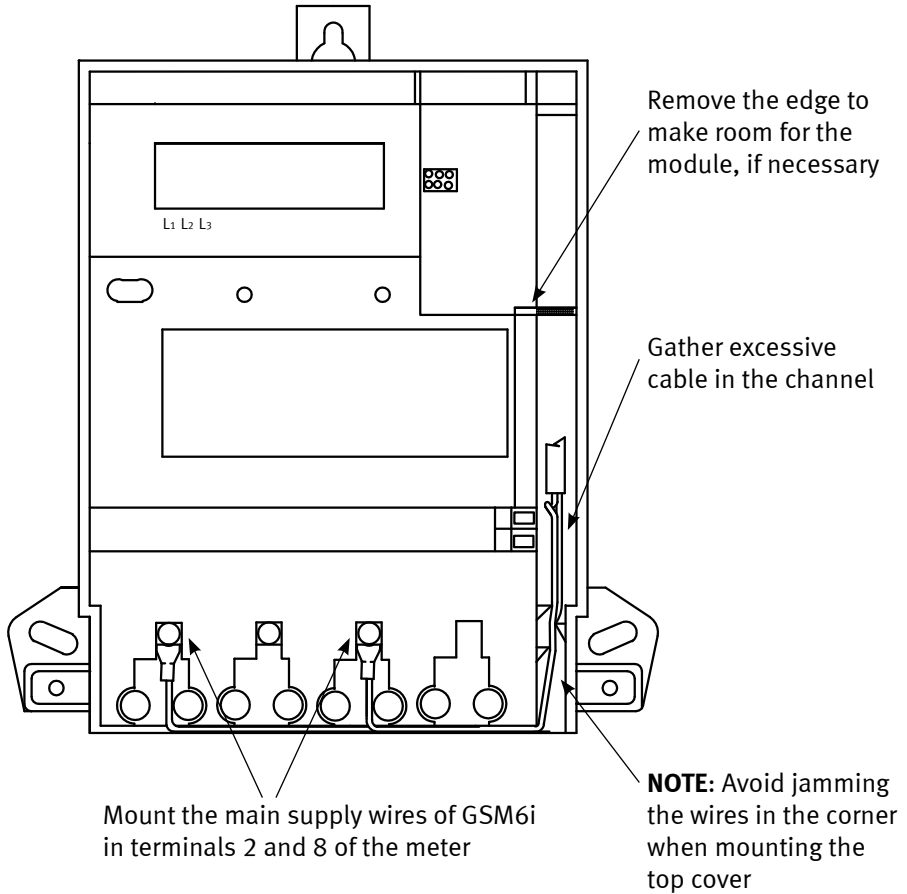


Mounting of external antenna



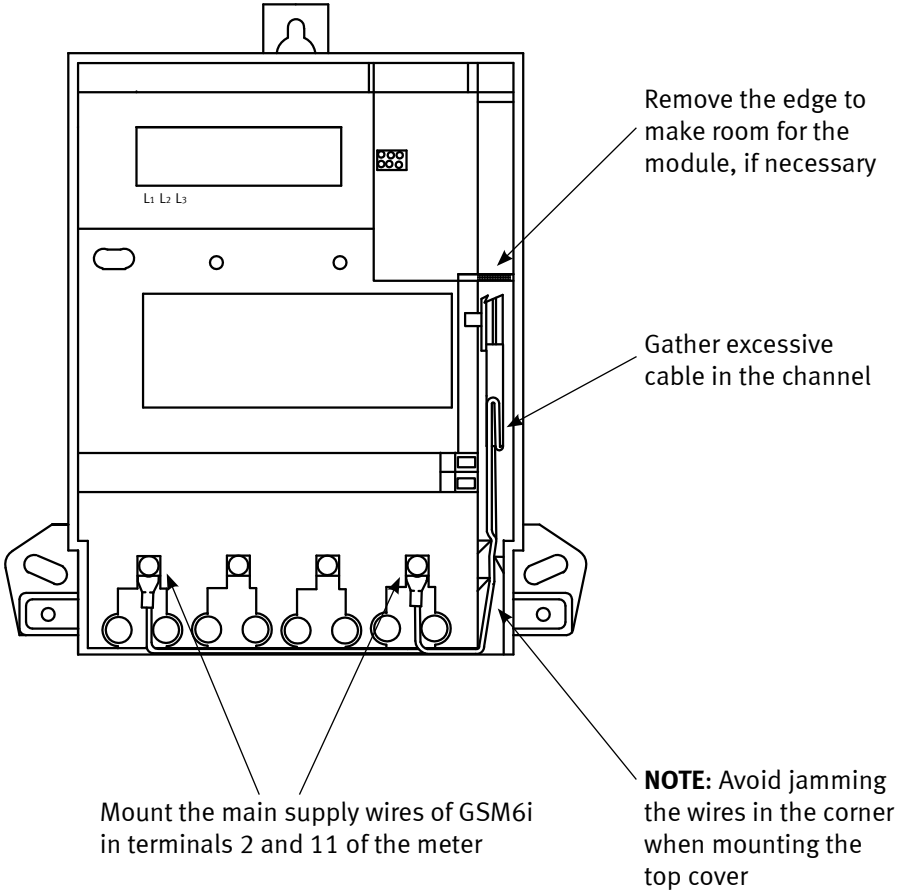
Do not mount the external antenna inside cabinets made of metal or other materials that disturb the signal

2.7. Kamstrup 382 - type 685-282-zz-zz



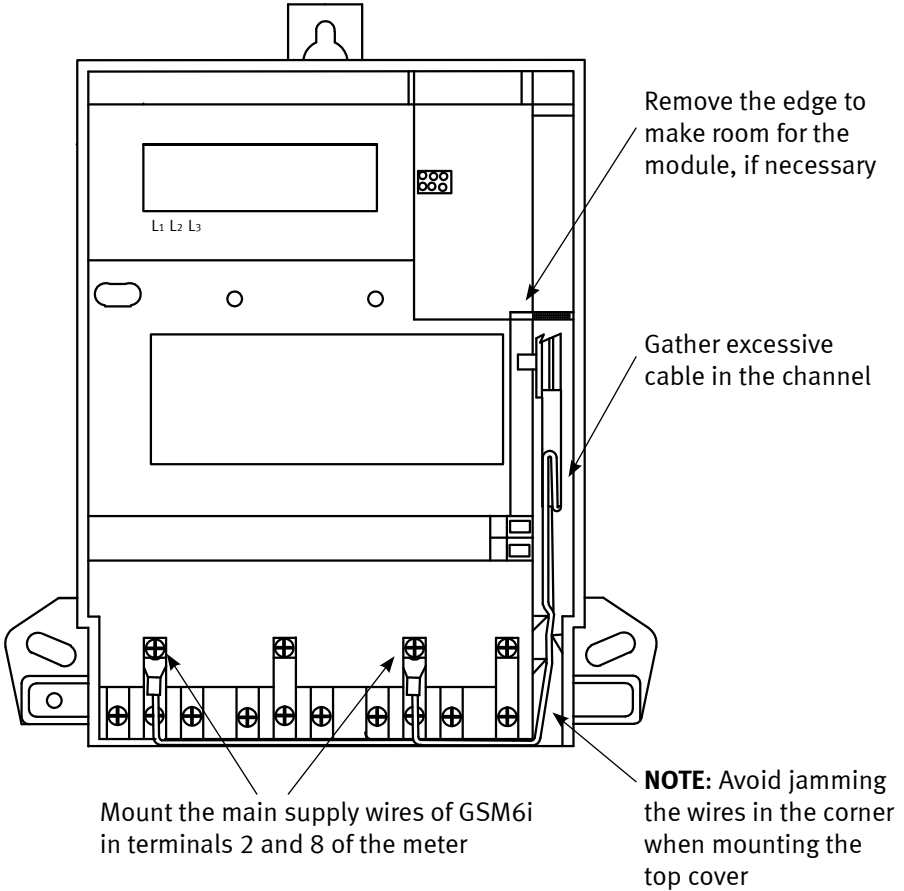
To gain access to the screw terminals, carefully tip up the main supply wires. After mounting, carefully put the supply wires back into the channel.

2.8. Kamstrup 382 - type 685-382-zz-zz



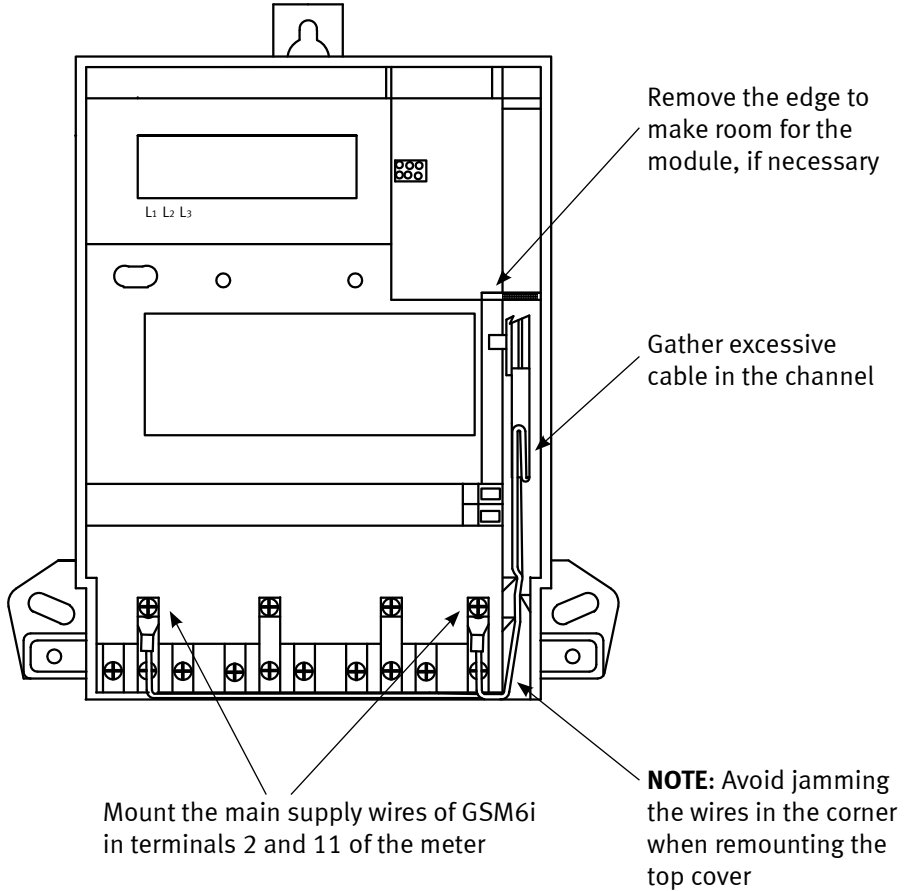
To gain access to the screw terminals, carefully tip up the main supply wires. After mounting, carefully put the supply wires back into the channel.

2.9. Kamstrup 351 Combi - type 685-251-xx-xx-xxx



To gain access to the screw terminals, carefully tip up the main supply wires.
After mounting, carefully put the supply wires back into the channel.

2.10. Kamstrup 351 Combi - type 685-351-xx-xx-xxx

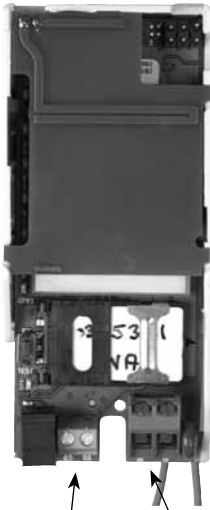


To gain access to the screw terminals, carefully tip up the main supply wires.
After mounting, carefully put the supply wires back into the channel.

2.11. Mounting of load control and Status/Pulse input

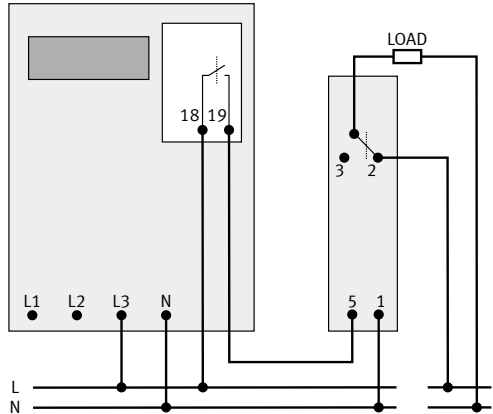
The control output is connected in series with the load. The control output must be charged with a maximum of 230 VAC, 100 mA. An example of a connection between electricity meter and recommended relay (type G2RS, OMRON) is shown below.

The status/pulse input can be used to read the status of a potential-free contact or as pulse input from e.g. a water meter. If it is used as pulse input, the pulses will be counted in the pulse register of the electricity meter.



Load control output
(max 230VAC, 100mA)

Status/Pulse input
(potential-free contact)



Example of a connection between electricity meter and relay, OMRON type G2RS switch relay

3. Data in the GSM6i Module, Article no. 6814-xxxxx

3.1. Data logger

The data logger stores daily/weekly/monthly values, load profiles, and events.

All registers and data are reset when the module detects a new electricity meter (e.g. in connection with a new installation or replacement of the meter).

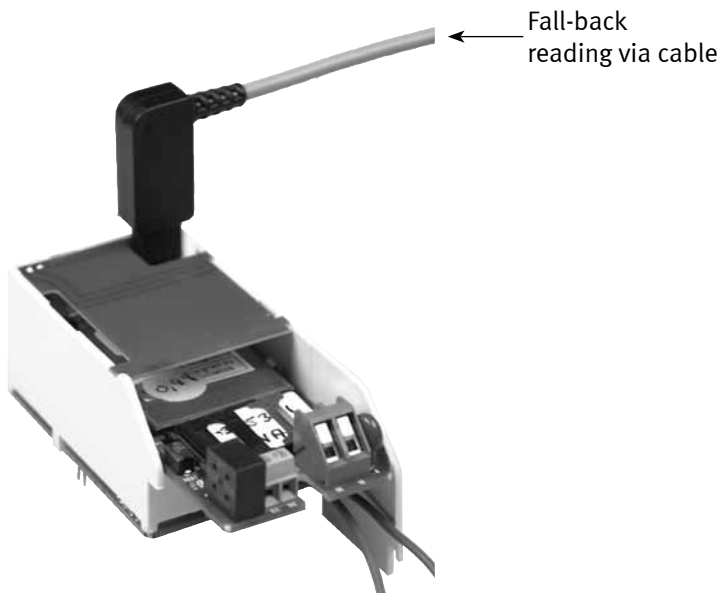
3.2. Backup

In case of power failure, the real time clock has a 10 days' backup, which means that the module is able to continue data logging once the power is reestablished.

Logged data are stored in the EEPROM of the module, and are therefore not lost in connection with power failure.

NOTE: As a precaution, logged data will be deleted if the module is moved from one meter to another.

On the GSM6i module itself a 6-pole plug can be used for fall-back reading of the module's data logger in case of errors on the GSM network. Please contact Kamstrup A/S for further details.



3.3. Daily/weekly/monthly logger

The daily/weekly/monthly logger consists of e.g. registers including tariffs and status information concerning the real time clock.

The daily logger stores values every day (at 00:00), on the night of Sunday and Monday (at 00:00) for the weekly logger, and for the monthly logger at the turn of the month (at 00:00).

The logging depth is 45 days, 45 weeks, and 45 months, respectively.

Please note that the daily, weekly, and monthly logger cannot be activated at the same time.

Register structure of the daily/weekly/monthly logger:

Time stamp	Register 1	Register 2	Register 3	Register 4	Control
------------	------------	------------	------------	------------	---------

Time stamp				
Year	Month	Day	Hour	Minute

	Register 1	Register 2	Register 3	Register 4
Kamstrup 162	Actual energy, kWh	0	Tariff 1, kWh	Tariff 2, kWh
Kamstrup 382	Actual energy, kWh	0	Tariff 1, kWh	Tariff 2, kWh
Kamstrup 351 Combi	Actual energy, kWh	Actual energy, kvarh	Tariff 1, kWh	Tariff 2, kWh

Control							
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Phase 1	Phase 2	Phase 3	Clock adjusted	Clock adj. 7-15 secs	Clock adj. 15-60secs.	Clock not valid	Periodic error

3.4. Load profile (minute logger)

The load profile is composed of 5, 15, 30, or 60 minutes' values and the logging depth is 1080.

The logging depth for 60 minutes' values is 45 days.

The register structure for the load profile:

Time stamp	Register 1	Register 2	Kontrol
------------	------------	------------	---------

Time stamp				
Year	Month	Day	Hour	Minute

	Register 1	Register 2
Kamstrup 162	Actual energy, kWh*	0
Kamstrup 382	Actual energy, kWh*	0
Kamstrup 351 Combi	Actual energy, kWh**	Actual energy, kvarh

Control							
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Phase 1	Phase 2	Phase 3	Clock adjusted	Clock adj. 7-15 secs	Clock adj. 15-60secs.	Clock not valid	Periodic error

*: The energy is registered with two decimals.

** : The energy is registered without decimals or as verified energy with two decimals.

3.5. Event logger

Among other things the event logger contains status information on the real time clock. The status information is stored with each change, e.g. time adjustment. The time adjustment is used for e.g. determining the duration of a voltage cut-off, two minutes being the minimum limit.

The logging depth is 64 events.

The register structure for the event logger:

Time stamp					Control
Year	Month	Day	Hour	Minute	

Control							
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Phase 1	Phase 2	Phase 3	Clock adjusted	Clock adj. 7-15 secs	Clock adj. 15-60secs.	Clock not valid	Periodic error

4. Tariff shifting Function

The tariff shifting function allows two tariff shiftings on weekdays and two tariff shiftings during weekends as illustrated in the table below.

Furthermore, low tariff can be active on 30 optional days.

	Shift into T1	Shift into T2
Monday – Friday	1 shift/day	1 shift/day
Saturday – Sunday	1 shift/day	1 shift/day

It is possible to have two shiftings within 60 mins.

Example:

Definition tariff 2: 1 January - 31 December, Monday – Friday 08:00-16:00

	Shift into T1	Shift into T2
Monday – Friday	16.00	8.00
Saturday – Sunday	T1 (no shift)	T1 (no shift)

5. Error Detection Help

NOTE: SMS commands must be sent in either capital letter or small letter.

Check that 230VAC is available.	
The test diode flashes constantly.	The module has no contact with the meter. Check that it has been mounted correctly.
LED1 + LED2 on the Signal Level Indicator flash.	The module does not connect to the GSM network. Check that the SIM card has been inserted correctly. Can also be caused by no GSM coverage.
The GPRS diode does not emit light after start-up.	Check that the IP address has been registered in M2M Gateway. Check that there is a GPRS subscription for the SIM card.
Has the SIM card been inserted correctly?	See paragraph 2.6 on page 10
Is it the correct SIM card?	Check the telephone number and make sure that it is data subscription, see paragraph 2.6.2 on page 11.
Weak GSM signal.	Mount an external antenna and try to improve the signal by placing the antenna in different places.
Try to call the unit.	Check if there is contact to the module.
Send an SMS to the modem, e.g. =SIGNAL#	The unit must respond with the signal strength of the module.
Always make a final control reading from the main station.	Call the station and make sure that meter data have been received.
Defective modem.	Enclose a precise description of the error and return to Kamstrup.

6. SMS commands

NOTE: SMS must be sent in either capital letters or small letters. Capital letters and small letters must not be mixed in the same SMS command.

READ_RTC - for reading the clock

Syntax	=READ_RTC#
Example	=READ_RTC#
Return reply, correct. The clock will be read on Wednesday, 17 June 2007 at 13:11	13:11:27 17/06/07 3#
Return reply, error	NO ANSWER

READ_METER - for reading a direct meter (e.g. Kamstrup 382 or 162)

Syntax	=READ_METER#
Example	=READ_METER#
Return reply, correct. Meter no. 10101010 is read, the register is 32432 kWh, the power is 343 W, and the meter has operated for 2452 hours.	32432 kWh, 343 W, 2452 Hours, Meter no: 10101010
Return reply, error	NO ANSWER

READ_CT_METER - for reading a transformer meter (e.g. Kamstrup 351)

Syntax	=READ_CT_METER#
Example	=READ_CT_METER#
Return reply, correct. Meter no. 10101010 is read, the register is 32432 kWh, the reactive power is 343 kvarh, and the meter has operated for 2452 hours.	32432 kWh, 343 kvarh, 2452 Hours, Meter no: 10101010
Return reply, error	NO ANSWER

SIGNAL - for reading the signal strength

Syntax, command	=SIGNAL#
Example	=SIGNAL#
Return reply, correct. Displays the current signal strength of the modem on a scale of 0 to 31 where 31 is best. The signal strength must be minimum 12	Signal: 16(0-31)
Return reply, error	NO ANSWER

CONTROL OUTPUT – for control of relay output

Syntax:	=CONTROL_OUTPUT <out1> <out2># (Note that there is only one relay output on this module <out1>)
Example Switch on relay 1 immediately	=CONTROL_OUTPUT 1 0#
Example Switch off relay 1 immediately	=CONTROL_OUTPUT 0 0#
Return reply, error	NO ANSWER

IOSTATUS for reading of status of relay output and status/Pulse input

Syntax	=IOSTATUS# (Note that there is only one relay output <relay1> and one input <input1> on this module)
Example	=IOSTATUS#
Return reply, correct	Relay1: 1 Relay2: 0 Input1: 1 Input2: 0
Return reply, error	No answer

7. GSM6i Variant Structure

681 -

□ - □ - □ - □

GSM6i

4

GSM Module SW

Transparent

T

Data logger

D

Data logger verified

V

Features

No options

0

Earth fault

A

Feature 2

B

Feature 3

C

Country

Denmark

DK

Norway

NO

Sweden

SE

Others

00

Additional options:

SIM card

None _____ 0

BillingCom SIM card - Danish _____ 1

BillingCom SIM card - Swedish _____ 2

SIM card supplied by the customer _____ 3

Antenna

Without external antenna _____ 0

External antenna, (6699407) _____ 1

External antenna, (6699408) _____ 2

Cable RG174 300 mm FME (M)/MCX (M) _____ 3

Cable RG174 300 mm SMA (F)/MCX (M) _____ 4

External antenna 1 mtrs. RG174 + MCX (M) _____ 5

Delivery

Module _____ 1

Kit - Kamstrup 162 (module and top cover) _____ 2

Kit - Kamstrup 382 (module and top cover 2002) _____ 3

Kit - Kamstrup 351 Combi (module and top cover 2002) _____ 4

Kit - Kamstrup 382 (module and top cover 2004) _____ 5

