

Datasheet micromax-f

Precise measurement of the power supply mainsfrequency



1 General description

The measurement device micromax-f determines the frequency of the supply voltage by the time between the zero crossings of the sine wave of the supply voltage. The timebase is calibrated at regular intervals with a temperature compensated crystal, whereby a high accuracy is achieved. The model -fgps can calibrate the timebase via the signal of the GPS satellites (Global Positioning System).

The measured values are averaged over a second and are then available for further processing or output. For this purpose the system has a web client to actively send the measurement data to a server (UDP and Modbus/TCP), and a web server to enable a query for the data and the device settings. The model -f485 has a built in Modbus/RTU server, which provides the data to a Modbus client.

Following models of the meter are available:

	Basic	GPS	RS485
Standard case and power supply	-f	-fgps	-f485
Case and power supply for DIN rail mounting	-fh	-fhgps	-fh485

A data export via different interfaces (e.g. via RS232, RS485, SPI, CAN, LIN) and a data logger function are optional available.

The model -fgps requires GPS reception in order to obtain the current time and to carry out time-synchronized measurement. It has an external, weatherproof Garmin GPS receiver, connected with a 5 m cable for flexible mounting.

2 Content of delivery

The delivery should include:

- Measurement device micromax-f / -fgps
- 6 V AC Power Supply (220-240 V, optional 120 V)
- Network cable for ethernet
- Version -fgps: Garmin GPS receiver
- Infosheet (MAC-adress, serial number)

3 Technical data

Measurement device	
Case size	120 * 105 * 45 mm
(-fh with DIN rail mounting)	120 * 105 * 57 mm
Weight	ca. 350 g
Operating temperature	-25 °C bis +85 °C
Storage temperature	-40 °C bis +85 °C
GPS-receiver (only -fgps)	
Case size	61 * 61 * 19,5 mm
Weight	ca. 160 g
Cable Length	5 m
Operating temperature	-30 °C bis +80 °C
Storage temperature	-40 °C bis +90 °C
Case IP Code	IPX7 (waterproof IEC 60529)
Railmount power supply (only -fh)	
Case size	54 * 90 * 63 mm
Power supply	6 V AC
Operating current	< 450 mA
Operating power	< 4,5 VA
Measurement Specifications	
Range	45 Hz bis 65 Hz
Resolution	0.1 mHz
Accuracy (1 second period)	+/- 1 mHz
Accuracy (<250 ms period)	+/- 5 mHz

The accuracy can decrease with time due to aging of electronic components. Therefore, it is recommended that the unit is checked every four years. For this the submission of a recorded 10-minute period to the manufacturer is sufficient to possibly identify deviations.

The following measured values are made available by the system:

- Netzfrequenz (mainsfrequency): At the end of every second calculated average of the measurements over the period of a second. The version -fgps provides calculation synchronous with the GPS time.
- Phasenwinkel (phase angle): Angle of the current voltage vector relative to an imaginary machine which rotates at 50 Hz or 3000 revolutions per minute. The version -fgps provides calculation synchronous with the GPS time.
- Netzfrequenz_100ms (150ms, 200ms, 1000ms): Moving average of the measurements of the last 100 ms (150 ms, 200 ms, 1000 ms). The value is calculated after each single measurement and thus represents the most recent result. The 200 ms value is considering a time interval of 10 cycles (average of 10 cycles, performed with a moving window).

Moving average is not suitable for calculating minute values.

4 Commissioning

- The device is connected to the grid (230 V) using the 6V AC power supply. This will start the measurement.
- The network cable is connected to the network. The network must have a DHCP server that assigns an IP to the device. A working network connection is evident from the yellow LED on the Ethernet connector. Communication with the network is recognized by the illumination of the green LED on the Ethernet connector.
- The device communicates its host name to the network using NetBIOS. This allows a direct request in the browser (e.G. http://NETZFRQ_15/ for the device with the serial number 15).
- If the network does not support this service, then the device's IP address could be found with its MAC address (see supplied Infosheet). This can be done with the free tool *Network Scanner* from SoftPerfect, or in the windows command prompt („cmd.exe“) with the command „arp -a“.
- Version -fgps: The startup of the GPS-receiver may take up to 5 minutes (GPS cold start) if the receiver has been switched off for some days or if the location changed over wide distances. To get a good reception of the gps-signal, the receiver should be placed near a window.

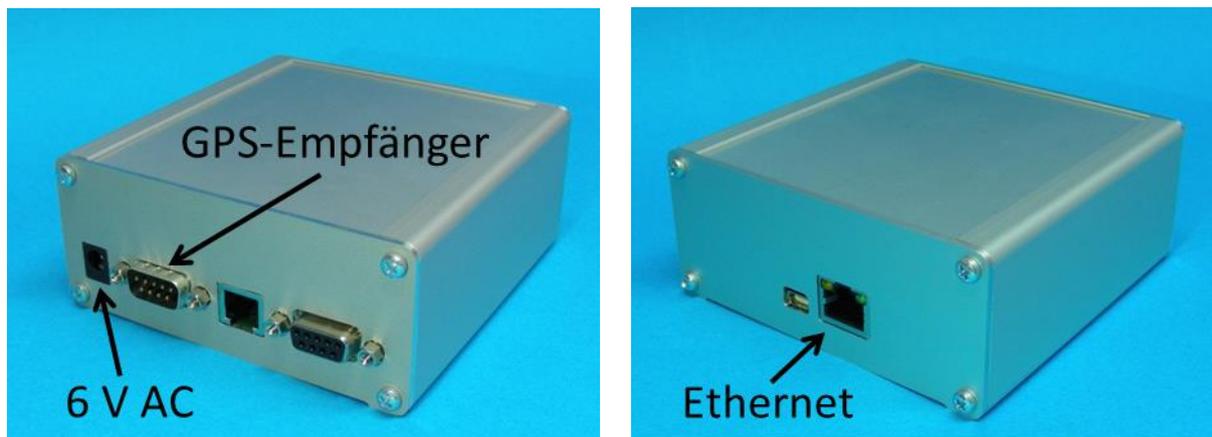


Figure 1: *Front side of the device with power supply (left figure) and back side with Ethernet (right figure)*

5 Meter with DIN rail mounting

The models micromax-fh and micromax-fhgps are equipped for DIN rail mounting. On the rail a width of at least 165 mm is required for the meter and the power supply.

- Power supply of the meter: The supplied cable (black/red, 2 m) is connected through the hollow plug with the meter. The other end of the cable is connected to terminals 6 and 7 of the power supply (6 V AC).
- For connection to 230 V mains voltage the terminals 1 and 4 are connected via a fuse to 230V.



Figure 2: *Measuring device with DIN rail mounting, terminals marked*

6 Interfaces

The measurement device automatically connects to the network (Ethernet) through the built-in DHCP client. For the transfer of data multiple paths are provided:

- Retrieval of the data from the website of the embedded webserver
- Active transmission of measurement data to a server via UDP
- Retrieving a xml file from the embedded webserver
- Retrieval of the frequency trend (seconds values) from the embedded webserver
- Retrieving the moving average from the embedded webserver
- Modbus/TCP Server (slave), Modbus/RTU (optional)

Retrieval of the data from the website of the integrated webserver

The embedded webserver provides a web site on which the actual measurements are available, updated every second. On this site, the IP address for sending UDP data packets and the system time can be set.

Example: Calling `http://netzfrq_35 /` returns the following website:

Figure 3: *Summary page of the integrated webserver*

Static IP address or dynamic IP address with DHCP

The meter has a DHCP client which gets automatically an IP address assigned in many networks (by a DHCP server). In this case, the field for the static IP address („Statische IP Adresse“) must contain the entry 0.0.0.0. Should the device get a static IP, then the address can be set in this input field. After pressing the button, „IP Adresse setzen“ the meter is restarted with the new IP.

Caution: If an incorrect IP is specified, the device may be unreachable from your network. Please contact the manufacturer for resetting.

MONITOR	VERLAUF	FREQUENZ	EINSTELLUNGEN	ANLEITUNG
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Netzfrequenz: 50.0148 Hz

Datum System: 31.03.2014 00:09:22
 Zeitgeber: ok Netzqualität: ok
 Empfangsindikator: ←
 Uptime: Laufzeit seit Start: 000 Tage, 00 h, 09 min, 22 s

Parametrierung

Ethernet (IP Adresse, Subnetz und UDP)

Statische IP Adresse (DHCP bei IP: 0.0.0.0)
 . . .

Subnetzmaske (autom. bei 0.0.0.0)
 . . .

Default Gateway (autom. bei 0.0.0.0)
 . . .

IP-Adresse für UDP-Versand (deaktiviert bei IP: 0.0.0.0)
 . . .

Modbus/TCP und Modbus/RTU

Betriebsart und Geschwindigkeit (bei RS485 Parity even, 1 Stoppbit):

Aus
 TCP (Ethernet)
 RTU (9.600 bps) RTU (19.200 bps)

Modbus Unit identifier (1 bis 247):

Modbus/TCP Port (Standard Port 502):

Datum und Uhrzeit

Datum in der Form dd.mm.jj
 . .

Zeit in der Form hh:mm:ss
 : :

Phasenwinkel (nur Versionen mit GPS-Empfänger)

Auswahl der Phase für Phasenwinkel:

0° +120° +240°

GPS Empfang (nur Versionen mit GPS-Empfänger)

GPS Status: kein Empfang
 GPS Qualität: GPS Fix not available
 Anzahl Satelliten sichtbar/genutzt: 0 / 0
 Koordinaten: 0.0000, 0.0000, Höhe: 0.0 m

Informationen:

Messgerät: C_35
 Software: V02.18
 Build Date: Mar 17 2016 10:49:25

Dr.-Ing. Thomas Göbmler Feldmochinger Str. 210 b 80995 München info@netzfrequenzmessung.de

Figure 4: *Settings of the device*

Active transmission of measurement data to a server via UDP

The integrated UDP client sends every second a UDP packet with the measured data (frequency and time stamp) to a pre-programmed IP address. The ip-address can be set on the integrated web server. For UDP the device needs a dynamic IP via DHCP.

Example: Setting the field „IP-Adresse für den UDP-Versand“ will result in sending UDP packets to the IP each second (frequency 50.0273 Hz, Date/Time 14.05.2014 08:46:04, device number C_15):

```
f=50.0273&n=C_15 &z=14.05.2014 08:46:04
```

Retrieving the xml file from the embedded webserver

Each second a xml file with the current measurement data is generated. This file can be downloaded with a server that calls via http cyclically the file "frequenz.xml".

Example: Access the <http://192.168.4.14/frequenz.xml> to get a xml-file with the content:

```
<response>
  <frequenz>50.0273</frequenz>
  <datumzeit_utc>14.05.2014 08:46:04</datumzeit_utc>
  <controller>C_15</controller>
</response>
```

Retrieval of the frequency trend (second values) from the embedded webserver

The meter provides an xml file (frequenz_export.xml) which includes an adjustable number of measurements. With the parameter „d“ up to 3,600 second values can be queried. The last value is the current measured value. To simplify further processing, the values are transferred in mHz and separated by semicolons.

Example: Access http://netzfrq_15/frequenz_export.xml?d=5 to get a xml file with the measured values of the last 5 seconds:

```
<result>
  <data>50019;50019;50020;50020;50020;</data>
</result>
```

Retrieving the moving average from the embedded webserver

The measurement device continuously calculates a moving average over the last 100 ms, 150 ms, 200 ms and 1000 ms. These values can be retrieved via the file "frequenz_ms.xml". The frequency measurement <frequenz> is synchronized to the second change, the moving averages shows the current average of the last measurements (e.g. <frequenz_100ms> shows the average of the last 100 ms period).

Example: Access http://192.168.4.14/frequenz_ms.xml to get a xml-file with the content:

```
<response>
  <frequenz>49.9667</frequenz>
  <frequenz1000ms>49.9664</frequenz1000ms>
  <frequenz100ms>49.9643</frequenz100ms>
  <frequenz150ms>49.9646</frequenz150ms>
  <datumzeit_utc>31.03.2014 00:08:07</datumzeit_utc>
  <zeit_ms>560</zeit_ms>
  <controller>C_15</controller>
</response>
```

Modbus/TCP Server (slave)

The device has a built in Modbus/TCP Server (slave). On request of a Modbus Client (master) the server answers with the requested register.

The data transmission via Modbus/TCP can be activated by setting a unit identifier. A unit identifier of 0 disables the server. The server supports only holding registers (function-code 3 respectively starting with the address 0x40000). The register contents are shown in the following table.

Adressierung	Daten	Datenformat
0x00 01	Messwert der Netzfrequenz in mHz	unsigned int 16 bit
0x00 02	Status	unsigned int 16 bit
0x00 03	Tag	unsigned int 16 bit
0x00 04	Monat	unsigned int 16 bit
0x00 05	Jahr	unsigned int 16 bit
0x00 06	Stunde (UTC)	unsigned int 16 bit
0x00 07	Minute	unsigned int 16 bit
0x00 08	Sekunde	unsigned int 16 bit
0x00 09	ProgrammNr.	unsigned int 16 bit
0x00 0A	VersionsNr.	unsigned int 16 bit
0x00 0B	leer	unsigned int 16 bit
0x00 0C	leer	unsigned int 16 bit
0x00 0D	leer	unsigned int 16 bit
0x00 0E	Netzfrequenz (gleitender Mittelwert 1000 ms)	unsigned int 16 bit
0x00 0F	Netzfrequenz (gleitender Mittelwert 200 ms)	unsigned int 16 bit
0x00 10	Netzfrequenz (gleitender Mittelwert 150 ms)	unsigned int 16 bit
0x00 11	Netzfrequenz (gleitender Mittelwert 100 ms)	unsigned int 16 bit

Table 1: Registers of Modbus (TCP & RTU)

In Modbus/RTU (optional) data is transmitted via RS485 using the standard MODBUS-2W (RS232 is available as an option). RS485 is a serial transmission using two differentially driven lines (A/B), which allows multiple subscribers, and is robust against interference.

Parameter: 19,200 bps, even parity, 1 stop bit

The interface speed can also be reduced to 9,200 bps in the settings. The connector is a female 9-pol. D-Sub.

EG-Konformitätserklärung



Allgemein

Hiermit erklären wir, dass die nachstehend bezeichnete Maschine in Ihrer Konzeption und Bauart sowie der von uns in Verkehr gebrachten Ausführung der grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 2006/42/EG entspricht. Bei einer mit uns nicht abgestimmten Änderung des Messgerätes verliert die Erklärung ihre Gültigkeit.

Hersteller/Bevollmächtigter:

micma GmbH
 Glonner Straße 19
 85667 Oberpfammern
 Tel: 08093 / 905940

Beschreibung der Maschine:

Funktion:	Messgerät für Netzfrequenzmessung micromax-f
Typ/Model:	Netzfrequenzmessung
Seriennummer:	
Baujahr:	2016

Es wird die Übereinstimmung mit weiteren, ebenfalls für das Produkt geltenden Richtlinien/Bestimmungen erklärt:

Niederspannungsrichtlinie 2014/35/EU

den Bestimmungen der oben gekennzeichneten Richtlinien – einschließlich deren zum Zeitpunkt der Erklärung geltenden Änderungen – entspricht.

Angaben zur Person des Unterzeichners:

Siegfried Zeller, Geschäftsführer

Oberpfammern, den 14.03.2016

Unterschrift:

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7 Information

- Use only the supplied accessories (e.g. power supply, GPS receiver)
- Do not use the meter on mains with higher voltage or frequencies as specified
- Do not use the device if it appears damaged, incomplete or not properly closed
- Only use the factory supplied power adapter
- Repairs and checks must be performed by accredited experts.
- If there is doubt about the proper function of the device, the frequency-value of the integrated web interface can be compared with the value shown under www.netzfrequenzmessung.de. For a detailed review the values of a 10-minute period can be logged and sent to the manufacturer, so we can compare it to its reference measurement.



The CE mark confirms the compliance with European Directives, notably the Low Voltage Directive and the EMC Directive.



The crossed out dustbin means that the product must be supplied in the European Union in accordance with the WEEE Directive 2012/19/EG a separate e-waste recycling. The product may not be treated as household waste.

8 Contact

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