



# NGRM... - Modbus

Modbus registers NGRM5... and NGRM7...





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# 1. Modbus: registers and communication

This annex provides a complete description of the Modbus registers (protocol version 6.0) to facilitate access to information.

The NGRM7... supports the following Modbus functions:

1. Holding register for reading values  
(Read Holding Register; function code 0x03)
2. Register for device programming  
(Preset Multiple Registers; function code 0x10)

For a complete Modbus protocol specification, visit <http://www.modbus.org>.

## 2. Abbreviations

Term	Represents	Register size	Explanation
<b>RO</b>	Read only	-	Register can only be read
<b>RW</b>	Read write	-	Register can be written
<b>UINT16</b>	Unsigned integer 16 bits	16 bits = 2 bytes	Unsigned integer (High byte, low byte)
<b>u16Alarm</b>	Unsigned integer (alarm)	16 bits = 2 bytes	Unsigned integer representing the alarm 0: no alarm; 1: prewarning; 2: fault
<b>UINT32</b>	Unsigned integer 32 bits	32 bits = 4 bytes	Unsigned integer (HiWord, LoWord)
<b>Float</b>		4 bytes	Float
<b>String, xx</b>		xx+1 bytes	String with xx characters

### 3. Measured values

Register	Property	Description	Format	Description/Unit	NGRM500	NGRM700	NGRM550	NGRM750
8192	RO	Status	Float	0: Trip relay not tripped 1: Trip relay tripped 2: Initial measurement 3: Field calibration is started 4: Restart 5: Test is started 6: Prewarning	X	X	X	X
8194	RO	$R_{NGR}$	Float	$\Omega$	X	X	—	—
				0: open 1: OK	—	—	X	X
8196	RO	$R_{NGR\ rel}^{1)}$	Float	%	X	X	X	X
8198	RO	$I_{RMS}$	Float	A	X	X	X	X
8200	RO	$I_{RMS\ rel}^{1)}$	Float	%	X	X	X	X
8202	RO	$I_{fund}$	Float	A	X	X	X	X
8204	RO	$I_{fund\ rel}^{1)}$	Float	%	X	X	X	X
8206	RO	$I_{harm}$	Float	A	X	X	X	X
8208	RO	$I_{harm\ rel}^{1)}$	Float	%	X	X	X	X
8210	RO	$U_{RMS}$	Float	V	X	X	X	X
8212	RO	$U_{RMS\ rel}^{1)}$	Float	%	X	X	X	X
8214	RO	$U_{fund}$	Float	V	X	X	X	X
8216	RO	$U_{fund\ rel}^{1)}$	Float	%	X	X	X	X
8218	RO	$U_{harm}$	Float	V	X	X	X	X
8220	RO	$U_{harm\ rel}^{1)}$	Float	%	X	X	X	X
8222	RO	$U_{L1L2}$	Float	V	—	X	—	X
8224	RO	$U_{L2L3}$	Float	V	—	X	—	X

Register	Property	Description	Format	Description/Unit	NGRM500	NGRM700	NGRM550	NGRM750
8226	RO	$U_{L3L1}$	Float	V	—	X	—	X
8228	RO	$U_{L1E\ rms}$	Float	V	—	X	—	X
8230	RO	$U_{L2E\ rms}$	Float	V	—	X	—	X
8232	RO	$U_{L3E\ rms}$	Float	V	—	X	—	X
8234	RO	Frequency	Float	Hz	—	X	—	X
8236	RO	Temperature	Float	°C	X	X	X	X
8238	RO	Method	Float	0: passive 1: active	X	X	X	X
8240	RO	$R_{Sense}$	Float	20,000 100,000	X	X	X	X
8242...8446		Reserved			—	—	—	—
8448	RO	DC component $U_{NGR}$	UINT16	%	X	X	X	X
8449	RO	H1 $U_{NGR}$	UINT16	%	X	X	X	X
8450...8511	RO	H... $U_{NGR}$	UINT16	%	X	X	X	X
8512	RO	H64 $U_{NGR}$	UINT16	%	X	X	X	X
8513...8703		Reserved			—	—	—	—
8704	RO	DC component $I_{NGR}$	UINT16	%	X	X	X	X
8705	RO	H1 $I_{NGR}$	UINT16	%	X	X	X	X
8706...8767	RO	H... $I_{NGR}$	UINT16	%	X	X	X	X
8768	RO	H64 $I_{NGR}$	UINT16	%	X	X	X	X

Tab. 3.1: Measured values

- 1) The relative measured values always indicate the ratio of the measured value to the desired value. Example:

Set  $R_{NGR\ nom} = 470\ \Omega$

Measured value  $R_{NGR} = 480\ \Omega$

$R_{NGR\ rel} = 480\ \Omega / 470\ \Omega = 1.0213 = 102.13\ \%$

## 4. Alarms

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
9216	RO	Status	u16Alarm	0: no alarm 1: prewarning <sup>1)</sup> 2: fault <sup>2)</sup> 3: reserved 4: alarm	X	X	X	X
9217	RO	$R_{NGR}$	u16Alarm		X	X	X	X
9218	RO	$I_{RMS}$	u16Alarm		X	X	X	X
9219	RO	$I_{fund}$	u16Alarm		X	X	X	X
9220	RO	$I_{harm}$	u16Alarm		X	X	X	X
9221	RO	$U_{RMS}$	u16Alarm		X	X	X	X
9222	RO	$U_{fund}$	u16Alarm		X	X	X	X
9223	RO	$U_{harm}$	u16Alarm		X	X	X	X
9224	RO	$U_{L1L2}$	u16Alarm		—	X	—	X
9225	RO	$U_{L2L3}$	u16Alarm		—	X	—	X
9226	RO	$U_{L3L1}$	u16Alarm		—	X	—	X
9227	RO	$U_{L1E\ rms}$	u16Alarm		—	X	—	X
9228	RO	$U_{L2E\ rms}$	u16Alarm		—	X	—	X
9229	RO	$U_{L3E\ rms}$	u16Alarm		—	X	—	X
9230	RO	Frequency	u16Alarm		—	X	—	X
9231	RO	Temperature	u16Alarm		X	X	X	X
9232	RO	Method	u16Alarm		X	X	X	X
9233	RO	$R_{Sense}$	u16Alarm		X	X	X	X

Tab. 4.1: Alarms

Description of alarms:

- |    |            |                                                                                |
|----|------------|--------------------------------------------------------------------------------|
| 1) | Prewarning | Response value violation and $t_{trip}$ elapses.                               |
| 2) | Fault      | Indicates an internal self-test error.                                         |
| 3) | Alarm      | After $t_{Trip}$ has elapsed, the triggering response value is still violated. |



## 5. Device parameters

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12286	RO	Current IP address	UINT32	When DHCP = off, same as the IP address	X	X	X	X
12288	RW	DHCP on/off	UINT16	1: on 2: off	X	X	X	X
12289	RW	IP address	UINT32		X	X	X	X
12291	RW	IP address standard gateway	UINT32		X	X	X	X
12293	RW	Subnet mask	UINT16		X	X	X	X
12294	RW	Modbus TCP (port 502) on/off	UINT16	1: on 2: off	X	X	X	X
12295	RW	Write access via communication	UINT16	1: allow 2: deny	X	X	X	X
12298	RW	BCOM system name	String, 16		X	X	X	X
12306	RW	BCOM subsystem address	UINT16		X	X	X	X
12307	RW	BCOM device address	UINT16		X	X	X	X
12308	RW	BCOM messages timeout	Float		X	X	X	X
12310	RW	BCOM TTL for subscription	UINT16		X	X	X	X
12311	RW	BCOM for subscription percentage alteration	UINT32		X	X	X	X
12313	RW	IP address DNS server	UINT32		X	X	X	X

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12315	RW	DNS domain name	String, 125		X	X	X	X
12440	RW	Time (UTC)	UINT32		X	X	X	X
12442	RW	UTC offset	Float		X	X	X	X
12444	RW	Synchronisation via NTP server	UINT16	1: on 2: off	X	X	X	X
12445	RW	IP address NTP server	UINT32		X	X	X	X
12447	RW	Format (date)	UINT16	1: dd.mm.yy 2: mm-dd-yy	X	X	X	X
12448	RW	Summertime	UINT16	1: off 2: DST 3: CEST	X	X	X	X
12449	RW	Format (time)	UINT16	1: 12 h 2: 24 h	X	X	X	X
12450	RW	Device display language	UINT16	0: German 1: English GB 2: French 4: Spanish 30: English US	X	X	X	X
12451	RW	Decimal separator	UINT16	0: Comma 1: Point	X	X	X	X
12452	RW	Modbus RTU (address)	UINT16	1...247	X	X	X	X
12453	RW	Modbus RTU (baud rate)	UINT16	1: 9600 baud 2: 19200 baud 3: 38400 baud 4: 57600 baud	X	X	X	X
12454	RW	Modbus RTU (parity)	UINT16	1: even 2: uneven 3: none	X	X	X	X
12455	RW	Modbus RTU (number of stop bits)	UINT16	1: 1 stop bit 2: 2 stop bits 3: automatic <sup>2)</sup>	X	X	X	X

Tab. 5.1: Device parameters

### Notes

- 1) "Allow" can only be set on the device.  
If set to "Deny", no RW Modbus register can be written.
- 2) Number of stop bits is set by means of the parity so that a data frame consists of 11 bits.

## 6. Measurement parameters

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12544	RW	$U_{sys}$ (L-L)	UINT32	V	X	X	X	X
12546	RW	Frequency	UINT16	1: 50 Hz 2: 60 Hz	X	X	X	X
12547	RW	$I_{NGR}$	Float	A	X	X	—	—
12549	RW	$R_{NGR}$	UINT32	15...5000 $\Omega$	X	X	—	—
			Float	0,1...200 $\Omega$	—	—	X	X
12551	RW	CT primary	UINT32	1...10000 A	X	X	X	X
12553	RW	CT secondary	UINT32	1...10000 A	X	X	X	X
12555	RW	CT connection	UINT16	1: 5 A 2: 50 mA	X	X	X	X
12556	RW	Method	UINT16	1: auto 2: passive 3: external	X	X	X	X
12557...12559		Reserved			—	—	—	—
12561	RW	Phase monitor	UINT16	1: on 2: off	—	X	—	X
12562	RW	Phase monitor PT primary	UINT32	1...10000 V	—	X	—	X
12564	RW	Phase monitor PT secondary	UINT32	1...10000 V	—	X	—	X
12566	RW	$U_{NGR}$ trip	UINT32	10...90 %	X	X	X	X
12568	RW	$I_{NGR}$ trip	UINT32	10...90 %	X	X	X	X
12570	RW	$> R_{NGR}$	UINT32	110...200 %	X	X	—	—

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12572	RW	$< R_{NGR}$	UINT32	10...90 %	X	X	—	—
12574	RW	$t_{GF \text{ trip}}$	Float	0 s...48 h	X	X	X	X
12576	RW	Ground-fault trip	UINT16	1: on 2: off	X	X	X	X
12577	RW	$t_{\text{restart}}$	Float	0.1...86400 s	X	X	X	X
12579	RW	Alarm stored	UINT16	1: on 2: off	X	X	X	X
12580	RW	Restart count	UINT32	1...5	X	X	X	X
12582	RW	Trip signal	UINT16	1: RMS 2: Fundamental 3: Harmonics	X	X	X	X
12583	RW	Upper limit harmonic	UINT16	0...32	X	X	X	X
12584	RW	Lower limit harmonic	UINT16	0...32	X	X	X	X
12585	RW	Ground-fault relay: mode	UINT16	1: Fail-safe 2: Non-fail-safe	X	X	X	X
12586	RW	Ground-fault relay: relay test	UINT16	1: on 2: off	X	X	X	X
12587	RW	NGR relay: mode	UINT16	1: Fail-safe 2: Non-fail-safe	X	X	X	X
12588	RW	NGR relay: relay test	UINT16	1: on 2: off	X	X	X	X
12589	RW	Trip relay: mode	UINT16	1: Fail-safe 2: Non-fail-safe	X	X	X	X
12590	RW	Trip relay: relay test	UINT16	1: on 2: off	X	X	X	X

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12591	RW	Analogue mode	UINT16	1: 0...20 mA 2: 4...20 mA 3: 0...400 $\mu$ A 4: 0...10 V 5: 2...10 V	X	X	X	X
12592	RW	Analogue function	UINT16	1: $I_{NGR}$ 2: $R_{NGR}$ <sup>1)</sup>	X X	X X	X —	X —
12593	RW	Device OUT	UINT16	1: Fail-safe	X	X	X	X
12594	RW	Pulser OUT	UINT16	2: Non-fail-safe	X	X	X	X
12595	RW	Digital 1	UINT16	1: Active high 2: Active low	X	X	X	X
12596	RW	RESET IN	UINT16		X	X	X	X
12597	RW	TEST IN	UINT16		X	X	X	X
12598	RW	Buzzer alarm	UINT16	1: on 2: off	X	X	X	X
12599	RW	Buzzer test	UINT16	1: on 2: off	X	X	X	X
12600	RW	Pulser	UINT16	1: active 2: external 3: auto 4: inactive	X	X	X	X
12601	RW	$t_{pulse}$	Float	1...10 s	X	X	X	X
12603	RW	Display $R_{NGR}$	UINT16	1: Display in $\Omega$ 2: Display in %	X	X	—	—
12604	RW	Display $I_{NGR}$	UINT16	1: Display in A 2: Display in %	X	X	X	X
12605	RW	$t_{NGR}$ trip	Float	0 s...48 h	X	X	X	X
12607	RW	CD-NGRM	UINT16	1: CD1000 2: CD5000 3: CD14400 4: CD25000 5: Sonstiger	X	X	X	X

Register	Property	Description	Format	Description/ Unit	NGRM500	NGRM700	NGRM550	NGRM750
12608	RW	$> R_{\text{NGR}}$	Float	200...500 $\Omega$	—	—	X	X
12610	RW	$I_{\text{NGR}}$	Float	10...2000 A	—	—	X	X
12612	RW	Function Digital 1	UINT16	1: method 2: pulser	X	X	X	X

Tab. 6.1: Measurement parameters

#### Notes

- 1) Selection 2:  $R_{\text{NGR}}$  is only available for HRG.





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