



# METER OF NETWORK PARAMETERS ND30 TYPE

## MQTT PROTOCOL (supplement to the ND30 meter user manual)

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## 1 ENABLING MQTT EXTENDED FUNCTION

To enable additional functionality in the ND30 meter, enter the appropriate code received from the manufacturer from the meter menu (Information → Service code). The code is assigned to the serial number of the meter and cannot be used in another meter.

However, before the functionality of MQTT protocol is purchased, it is possible to check / test its operation in the form of temporary full-functional access for the period of 48 hours (the meter's working time with the power on is counted). This is done from the menu level of the meter (Information → Service code) by entering the code "002". This code can be entered only once, and after 48 hours the functionality of MQTT protocol is disabled. It is only possible to re-enable MQTT protocol after purchasing and entering the appropriate code received from the manufacturer.

## 2 OPERATING MODES

(supplement to item 7 of the ND30 meter user manual)

<b>Ethernet</b>	<b>Addresses</b>	DHCP	Mode	IP Address	Subnet mask	Gateway address	DNS Address	MAC Address			
		<input type="radio"/> Deact. <input checked="" type="radio"/> Act.	<input checked="" type="radio"/> Auto <input type="radio"/> 10Mb/s <input type="radio"/> 100Mb/s	000.000.000. 00 <u>0</u>	255.255.255.00 <u>0</u>	000.000.000.00 <u>0</u>	008.008.008.00 <u>8</u>	aa.bb.cc.00.21.01	Acquired from DHCP or entered manually when DHCP is deactivated.		
	<b>Modbus TCP</b>	Address	Port	Max. connection limit	Waiting time [s]						
		00 <u>1</u>	0050 <u>2</u>	1	00 <u>1</u>						
	<b>FTP</b>	Command port	Data port								
<b>WWW</b>	Port										
<b>MQTT</b>	Connection status	IP Address	Port no.	Publish time [s]	Client name	Topic Name	Parameters	MQTT On / Off	Save to FRAM		
	- Disconnected - Connecting - Connected	000.000.000. 000 <u>0</u>	0188 <u>3</u>	000 <u>5</u>	NR30-MQTT-CLIENT	ND30 -MEAS-TOPIC	<input checked="" type="radio"/> standard <input type="radio"/> Voltages <input type="radio"/> Currents <input type="radio"/> Energies <input type="radio"/> Powers <input type="radio"/> others <input type="radio"/> Harmonics U1 <input type="radio"/> Harmonics U2 <input type="radio"/> Harmonics U3 <input type="radio"/> Harmonics I1 <input type="radio"/> Harmonics I2 <input type="radio"/> Harmonics I3 <input type="radio"/> Minimums <input type="radio"/> Maximums	<input type="radio"/> Off <input checked="" type="radio"/> On	<input type="radio"/> No <input checked="" type="radio"/> Yes		

Fig.1. Programming matrix (supplement to Fig. 12d of the ND30 meter user manual)

### 2.1 Ethernet mode

Supplement to item 7.7 of the ND30 meter user manual.

Select the **Ethernet** mode in options and approve the choice by the Select push-button.

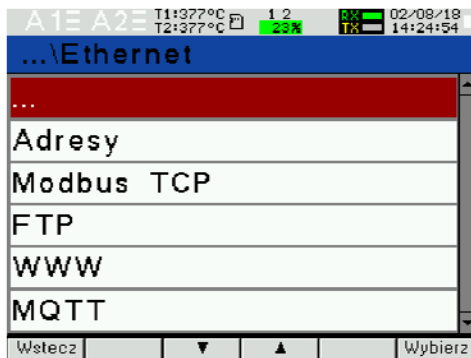


Fig.22. Ethernet mode screen

(supplement to Table 9 of the ND30 meter user manual)

No.		Parameter name	range	Notes / description	Default value	
1	Address es	DHCP	Off/On	Enabling/disabling DHCP client (the service of automatic acquiring the parameters of Ethernet interface IP protocol of the meter from external DHCP servers located within the same LAN network).	Off	
2		Mode	Auto, 10Mb/s, 100Mb/s		Auto	
3		IP Address	0.0.0.0255.255.255.255	10.0.1.161	Acquired from DHCP or entered manually when DHCP is deactivated.	-
4		Subnet mask	0.0.0.0255.255.255.255	255.0.0.1		-
5		Default gateway	0.0.0.0255.255.255.255	0.0.0.0		-
6		DNS Address	0.0.0.0255.255.255.255	10.0.0.44		-
7		MAC Address		Aa:bb:cc:00:21:01		-
8	Modbus TCP	Address	1 ... 247		1	
9		Port	80 ... 32000		1	
10		Max. number of connections	1 ... 4		1	
11		Waiting time	10 .. 360		60s	
12	FTP	Command port	20 ... 32000		21	
13		Data port	20 ... 32000		1025	

14	WWW	Port	80 ... 32000		80
15	MQTT	Connection status	Readout only	Connection status with the MQTT server: (register value) 0xFFFF – Disconnected (register value) 0x0 – Connecting (register value) 0x1 – Connected	Disconnected
16		IP Address	0.0.0.0255.255.255.255	IP address of MQTT broker	37.187.106.16
17		Port number	1 ... 65534	Port number of MQTT broker	1883
18		Publication time	1 ... 3600	Period after which data are published (in seconds).	5
19		Client name		MQTT Client name	ND30-MQTT-CLIENT
20		Publication name		MQTT topic name	ND30-MEAS-TOPIC
21		Parameters	<input checked="" type="radio"/> standard <input type="radio"/> Voltages <input type="radio"/> Currents <input type="radio"/> Powers <input type="radio"/> Energies <input type="radio"/> others <input type="radio"/> Harmonics U1 <input type="radio"/> Harmonics U2 <input type="radio"/> Harmonics U3 <input type="radio"/> Harmonics I1 <input type="radio"/> Harmonics I2 <input type="radio"/> Harmonics I3 <input type="radio"/> Minimums <input type="radio"/> Maximums		standard
22					
23		MQTT On / Off	0.1	Enabling or disabling data publishing for the MQTT server: 0 - data not published, 1 - publishing data to the server.	0
24		Write to FRAM	0.1	Saving configuration to non-volatile memory: 0 – no changes, 1 – save changes.	0

### 3 SERIAL INTERFACES

(supplement to item 10 of the ND30 meter user manual)

#### 3.1 MQTT PROTOCOL

MQTT is an uncomplicated protocol used in the Internet of Things (IoT). It is based on a publication/subscription pattern. ND30, using this protocol, publishes various important control and measurement information on an external server. If the server is located in the Internet network, it is possible to read the parameters of the ND30 meter from any place in the world that has access to this network.

The MQTT protocol is configured in ND30 from the menu level (chapter 7.7 of the ND30 meter user's manual) or by using the Modbus RTU protocol via the RS-485 interface and Modbus TCP via the Ethernet interface. The parameters to be set are the IP address and the broker port, that is the MQTT server receiving the publications from the ND30 meter. The period between consecutive publications can be set in the limit (1-3600) s. Data are sent to the server in the form of text (ASCII). It is not required that the data be formatted in any special way. Nevertheless, ND30 uses the JSON format to send variable names and their associated values. The format of data sent by ND30 is as follows:

```
{"meter":"Unique ID","slot":"Date Time+TimeZone","ParameterIndex":"Value",...}
```

where:

Unique ID - is the name of the MQTT client entered in the ND30 meter,

Date Time - is the current date and time separated by a space,

Time Zone - is the time zone for Poland, that is +1:00,

Parameter Index - is a number that specifies the measured quantity according to the table 1,

Value - is the number corresponding to the value of the measured quantity.

The number of parameters sent and the corresponding values is always the same and equals to 36, that is the number of quantities presented in the table 1.

Table 1

Index Index	Basic measurement	Unit of the quantity	Unit name	Parameter description
1	Voltage	V	Volts	Phase 1 voltage
2	Voltage	V	Volts	Phase 2 voltage
3	Voltage	V	Volts	Phase 3 voltage
4	Current	A	Amperes	Phase 1 current
5	Current	A	Amperes	Phase 2 current
6	Current	A	Amperes	Phase 3 current
7	Active power	kW	Kilowatts	Active power of phase 1
8	Active power	kW	Kilowatts	Active power of phase 2
9	Active power	kW	Kilowatts	Active power of phase 3
10	Apparent power	kVA	Kilo-volt-amperes	Apparent power of phase 1
11	Apparent power	kVA	Kilo-volt-amperes	Apparent power of phase 2
12	Apparent power	kVA	Kilo-volt-amperes	Apparent power of phase 3
13	Reactive power	kVAR	Kilovars	Reactive power of phase 1
14	Reactive power	kVAR	Kilovars	Reactive power of phase 2
15	Reactive power	kVAR	Kilovars	Reactive power of phase 3
16	Power factor	none	none	Power factor of phase 1
17	Power factor	none	none	Power factor of phase 2
18	Power factor	none	none	Power factor of phase 3
19	Phase angle	°	Angular degrees	Phase angle of phase 1
20	Phase angle	°	Angular degrees	Phase angle of phase 2
21	Phase angle	°	Angular degrees	Phase angle of phase 3
22	Voltage	V	Volts	The average of three phase voltages
23	Voltage	V	Volts	The sum of three phase voltages
24	Current	A	Amperes	The average of three phase currents
25	Current	A	Amperes	The sum of three phase currents
26	Active power	kW	Kilowatts	The average of three active powers
27	Active power	kW	Kilowatts	The sum of three active powers
28	Apparent power	kVA	Kilo-volt-amperes	The average of three apparent powers
29	Apparent power	kVA	Kilo-volt-amperes	The sum of three apparent powers
30	Reactive power	kVAR	Kilo-volt-amperes	The average of three reactive powers

31	Reactive power	kVAR	Kilo-volt-amperes	The sum of three reactive powers
32	Power factor	none	none	The average of three power factors
33	Power factor	none	none	The sum of three power factors
34	Phase angle	°	Angular degrees	The average of three phase angles
35	Phase angle	°	Angular degrees	The sum of three phase angles
36	Periods per second	Hz	Frequency	Network frequency

Table 1a

<b>Voltages</b>				
Index	Basic measurement	Unit	Quantity name	Description
1	Voltage	V	Volts	Voltage of phase L1
2	Voltage	V	Volts	Voltage of phase L2
3	Voltage	V	Volts	Voltage of phase L3
22	Voltage	V	Volts	Average of three phase voltages
23	Voltage	V	Volts	Sum of three phase voltages
48	Voltage	V	Volts	Phase-to-phase voltageL1-2
49	Voltage	V	Volts	Phase-to-phase voltageL2-3
50	Voltage	V	Volts	Phase-to-phase voltageL3-1
113	Voltage	V	Volts	mean phase-to-phase voltage

Table 1b

<b>Currents</b>				
Index	Basic measurement	Unit	Quantity name	Description
4	Current	A	Amperes	Current of phase L1
5	Current	A	Amperes	Current of phase L2
6	Current	A	Amperes	Current of phase L3
24	Current	A	Amperes	Average of three phase currents
25	Current	A	Amperes	Sum of three phase currents
120	Current	A	Amperes	average current (I Demand)
59	Current	A	Amperes	Current in neutral wire In

Table 1c

<b>Powers</b>				
Index	Basic measurement	Unit	Quantity name	Description
7	Active power	kW	Kilowatts	Active power of phase L1
8	Active power	kW	Kilowatts	Active power of phase L2
9	Active power	kW	Kilowatts	Active power of phase L3
10	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L1
11	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L2
12	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L3
13	Reactive power	kVAR	Kilovars	Reactive power of phaseL1
14	Reactive power	kVAR	Kilovars	Reactive power of phaseL2
15	Reactive power	kVAR	Kilovars	Reactive power of phaseL3
26	Active power	kW	Kilowatts	Average of three active powers
27	Active power	kW	Kilowatts	Sum of three active powers
28	Apparent power	kVA	Kilo-volt-amperes	Average of three apparent powers
29	Apparent power	kVA	Kilo-volt-amperes	Sum of three apparent powers
30	Reactive power	kVAR	Kilo-volt-amperes	Average of three reactive powers
31	Reactive power	kVAR	Kilo-volt-amperes	Sum of three reactive powers
130	Active power	kW	Kilowatts	Active power averaged (P Demand)
45	Apparent power	kVA	Kilovolt-Ampere	Apparent power averaged (S Demand)

Table 1d

<b>Energies</b>				
Index	Basic measurement	Unit	Quantity name	Description
68	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy (Overflow counter for value 37)
37	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy

69	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy (Overflow counter for value 38)
38	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy
144	Reactive energy	MVARh	Megavar-hours 1 = 100MWh	Reactive inductive 3-phase energy (Overflow counter for value 145)
145	Reactive energy	kVARh	Kilovar-hours	Reactive inductive 3-phase energy
146	Reactive energy	MVARh	Megavar-hours 1 = 100MWh	Reactive capacitive 3-phase energy (Overflow counter for value 147)
147	Reactive energy	kVARh	Kilovar-hours	Reactive capacitive 3-phase energy
72	Apparent energy	MVAh	Megavoltampere-hour 1 = 100MWh	Apparent 3-phase energy (Overflow counter for value 41)
41	Apparent energy	kVAh	Kilovoltampere-hour	Apparent 3-phase energy
148	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy for the previous year (Overflow counter for value 149)
149	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy for the previous year
150	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy for the previous year (Overflow counter for value 151)
151	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy for the previous year
152	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase for the current year (Overflow counter for value 153)
153	Active energy	kWh	Kilowatt-hours	Active imported 3-phase for the current year
154	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase for the current year (Overflow counter for value 155)
155	Active energy	kWh	Kilowatt-hours	Active exported 3-phase for the current year
156	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy for the current month (Overflow counter for value 157)
157	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy for the current month
158	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy for the current month (Overflow counter for value 159)
159	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy for the current month



160	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy for the current week (Overflow counter for value 161)
161	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy for the current week
162	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy for the current week (Overflow counter for value 163)
163	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy for the current week
164	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy for the current 48 hours (Overflow counter for value 165)
165	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy for the current 48 hours
166	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy for the current 48 hours (Overflow counter for value 167)
167	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy for the current 48 hours
168	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active imported 3-phase energy for the current 24 hours (Overflow counter for value 169)
169	Active energy	kWh	Kilowatt-hours	Active imported 3-phase energy for the current 24 hours
170	Active energy	MWh	Megawatt-hours 1 = 100MWh	Active exported 3-phase energy for the current 24 hours (Overflow counter for value 171)
171	Active energy	kWh	Kilowatt-hours	Active exported 3-phase energy for the current 24 hours

Table 1e

<b>Others</b>				
Index	Basic measurement	Unit	Quantity name	Description
16	Power factor	lack	lack	Power factor of phase L1
17	Power factor	lack	lack	Power factor of phase L2
18	Power factor	lack	lack	Power factor of phase L3
19	Phase angle	°	Angular degrees	Phase angle of phase L1
20	Phase angle	°	Angular degrees	Phase angle of phase L2
21	Phase angle	°	Angular degrees	Phase angle of phase L3

200	Tg factor of phase	lack	lack	Tg factor of phase L1
201	Tg factor of phase	lack	lack	Tg factor of phase L2
202	Tg factor of phase	lack	lack	Tg factor of phase L3
203	Power factor	lack	lack	3-phase active power factor
204	Tg factor of phase	lack	lack	Factor tg 3-phase average
51	THD U1	%	percentages	Harmonic contents for voltage, phase 1
54	THD I1	%	percentages	Harmonic contents for current, phase 1
52	THD U2	%	percentages	Harmonic contents for voltage, phase 2
55	THD I2	%	percentages	Harmonic contents for current, phase 2
53	THD U3	%	percentages	Harmonic contents for voltage, phase 3
56	THD I3	%	percentages	Harmonic contents for current, phase 3
57	THD U	%	percentages	Harmonic contents for 3-phase mean voltage
58	THD I	%	percentages	Harmonic contents for 3-phase mean current
32	Power factor	lack	lack	The average of three power factors
33	Power factor	lack	lack	The sum of three power factors
34	Phase angle	°	Angular degrees	The average of three phase angles
35	Phase angle	°	Angular degrees	The sum of three phase angles
36	Periods per second	Hz	frequency	Network frequency
214	Time	s	Seconds	RTC time - seconds
215	Time	lack	lack	RTC time – hours, minutes
216	Date	lack	lack	RTC date – month, day
217	Date	lack	lack	RTC date – year
221	Status 1	lack	lack	Status 1
222	Status 2	lack	lack	Status 2
223	Status 3	lack	lack	Status 3
224	Status 4	lack	lack	Status 4
225	Status 5	lack	lack	Status 5
226	Status 6	lack	lack	Status 6

Table 1f

<b>Harmonics U1</b>				
Index	Basic measurement	Unit	Quantity name	Description
300	HarU1[2]	%	percentages	2nd voltage harmonic of phase L1
301	HarU1[3]	%	percentages	third voltage harmonic of phase L1
	...			
	...			
348	HarU1[50]	%	percentages	50th voltage harmonic of phase L1
349	HarU1[51]	%	percentages	51st voltage harmonic of phase L1
900	HarU1[52]	%	percentages	52nd voltage harmonic of phase L1
901	HarU1[53]	%	percentages	53rd voltage harmonic of phase L1
	...			
	...			
911	HarU1[63]	%	percentages	63rd voltage harmonic of phase L1

Table 1g

<b>Harmonics U2</b>				
Index	Basic measurement	Unit	Quantity name	Description
350	HarU2[2]	%	percentages	2nd voltage harmonic of phase L2
351	HarU2[3]	%	percentages	third voltage harmonic of phase L2
	...			
	...			
398	HarU2[50]	%	percentages	50th voltage harmonic of phase L2
399	HarU2[51]	%	percentages	51st voltage harmonic of phase L2
920	HarU2[52]	%	percentages	52nd voltage harmonic of phase L2
921	HarU2[53]	%	percentages	53rd voltage harmonic of phase L2
	...			
	...			
931	HarU2[63]	%	percentages	63rd voltage harmonic of phase L2

Table 1h

<b>Harmonics U3</b>				
Index	Basic measurement	Unit	Quantity name	Description
400	HarU3[2]	%	percentages	2nd voltage harmonic of phase L3
401	HarU3[3]	%	percentages	third voltage harmonic of phase L3
	...			
	...			
448	HarU3[50]	%	percentages	50th voltage harmonic of phase L3
449	HarU3[51]	%	percentages	51st voltage harmonic of phase L3
940	HarU3[52]	%	percentages	52nd voltage harmonic of phase L3
941	HarU3[53]	%	percentages	53rd voltage harmonic of phase L3
	...			
	...			
951	HarU3[63]	%	percentages	63rd voltage harmonic of phase L3

Table 1i

<b>Harmonics I1</b>				
Index	Basic measurement	Unit	Quantity name	Description
450	HarI1[2]	%	percentages	2nd current harmonic of phase L1
451	HarI1[3]	%	percentages	third current harmonic of phase L1
	...			
	...			
498	HarI1[50]	%	percentages	50th current harmonic of phase L1
499	HarI1[51]	%	percentages	51st current harmonic of phase L1
960	HarI1[52]	%	percentages	52nd current harmonic of phase L1
961	HarI1[53]	%	percentages	53rd current harmonic of phase L1
	...			
	...			
971	HarI1[63]	%	percentages	63rd current harmonic of phase L1

Table 1j

<b>Harmonics I2</b>				
Index	Basic measurement	Unit	Quantity name	Description
500	HarI2[2]	%	percentages	2nd current harmonic of phase L2
501	HarI2[3]	%	percentages	third current harmonic of phase L2

	...			
	...			
548	HarI2[50]	%	percentages	50th current harmonic of phase L2
549	HarI2[51]	%	percentages	51st current harmonic of phase L2
980	HarI2[52]	%	percentages	52nd current harmonic of phase L2
981	HarI2[53]	%	percentages	53rd current harmonic of phase L2
	...			
	...			
991	HarI2[63]	%	percentages	63rd current harmonic of phase L2

Table 1k

<b>Harmonics I3</b>				
Index	Basic measurement	Unit	Quantity name	Description
550	HarI3[2]	%	percentages	2nd current harmonic of phase L3
551	HarI3[3]	%	percentages	third current harmonic of phase L3
	...			
	...			
598	HarI3[50]	%	percentages	50th current harmonic of phase L3
599	HarI3[51]	%	percentages	51st current harmonic of phase L3
1000	HarI3[52]	%	percentages	52nd current harmonic of phase L3
1001	HarI3[53]	%	percentages	53rd current harmonic of phase L3
	...			
	...			
1011	HarI3[63]	%	percentages	63rd current harmonic of phase L3

Table 1l

<b>Minimums</b>				
Index	Basic measurement	Unit	Quantity name	Description
700	Voltage	V	Volts	Voltage of phase L1
701	Voltage	V	Volts	Voltage of phase L2
702	Voltage	V	Volts	Voltage of phase L3
703	Current	A	Ampere	Current of phase L1
704	Current	A	Ampere	Current of phase L2
705	Current	A	Ampere	Current of phase L3

706	Active power	kW	Kilowatt	Active power of phase L1
707	Active power	kW	Kilowatt	Active power of phase L2
708	Active power	kW	Kilowatt	Active power of phase L3
709	Reactive power	kVAR	Kilovar	Reactive power of phase L1
710	Reactive power	kVAR	Kilovar	Reactive power of phase L2
711	Reactive power	kVAR	Kilovar	Reactive power of phase L3
712	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L1
713	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L2
714	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L3
715	Power factor	lack	lack	Power factor (PF) of phase L1
716	Power factor	lack	lack	Power factor (PF) of phase L2
717	Power factor	lack	lack	Power factor (PF) of phase L3
718	Tg factor of phase	lack	lack	Ratio of reactive to active power L1
719	Tg factor of phase	lack	lack	Ratio of reactive to active power L2
720	Tg factor of phase	lack	lack	Ratio of reactive to active power L3
721	Voltage	V	Volts	Phase-to-phase voltage L1-2
722	Voltage	V	Volts	Phase-to-phase voltage L2-3
723	Voltage	V	Volts	Phase-to-phase voltage L3-1
724	Voltage	V	Volts	Average 3-phase voltage
725	Current	A	Ampere	Average 3-phase current
726	Active power	kW	Kilowatt	3-phase active power
727	Reactive power	kVAR	Kilovolt-Ampere	3-phase reactive power
728	Apparent power	kVA	Kilovolt-Ampere	3-phase apparent power
729	Power factor	lack	lack	Power factor (PF)
730	Factor tg	lack	lack	3-phase reactive to active power ratio
731	Periods per second	Hz	Frequency	Network frequency
732	Voltage	V	Volts	Mean phase-to-phase voltage
733	Active power	kW	Kilowatt	Active power averaged(P Demand)
734	Apparent power	kVA	Kilovolt-Ampere	Apparent power averaged (S Demand)
735	Current	A	Ampere	Current averaged (I Demand)

736	Current	A	Ampere	Current in neutral wireIn
739	THD U1	%	percentages	Harmonic contents for voltage, phaseL1
740	THD U2	%	percentages	Harmonic contents for voltage, phaseL2
741	THD U3	%	percentages	Harmonic contents for voltage, phaseL3
742	THD U	%	percentages	Harmonic contents for 3-phase mean voltage
743	THD I1	%	percentages	Harmonic contents for current, phaseL1
744	THD I2	%	percentages	Harmonic contents for current, phaseL2
745	THD I3	%	percentages	Harmonic contents for current, phaseL3
746	THD I	%	percentages	Harmonic contents for 3-phase mean current

Table 1m

<b>Maximums</b>				
Index	Basic measurement	Unit	Quantity name	Description
800	Voltage	V	Volts	Voltage of phase L1
801	Voltage	V	Volts	Voltage of phase L2
802	Voltage	V	Volts	Voltage of phase L3
803	Current	A	Ampere	Current of phase L1
804	Current	A	Ampere	Current of phase L2
805	Current	A	Ampere	Current of phase L3
806	Active power	kW	Kilowatt	Active power of phase L1
807	Active power	kW	Kilowatt	Active power of phase L2
808	Active power	kW	Kilowatt	Active power of phase L3
809	Reactive power	kVAR	Kilovar	Reactive power of phase L1
810	Reactive power	kVAR	Kilovar	Reactive power of phase L2
811	Reactive power	kVAR	Kilovar	Reactive power of phase L3
812	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L1
813	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L2
814	Apparent power	kVA	Kilovolt-Ampere	Apparent power of phase L3
815	Power factor	lack	lack	Power factor (PF) of phase L1
816	Power factor	lack	lack	Power factor (PF) of phase L2

817	Power factor	lack	lack	Power factor (PF) of phase L3
818	Tg factor of phase	lack	lack	Ratio of reactive to active power L1
819	Tg factor of phase	lack	lack	Ratio of reactive to active power L2
820	Tg factor of phase	lack	lack	Ratio of reactive to active power L3
821	Voltage	V	Volts	Phase-to-phase voltage L1-2
822	Voltage	V	Volts	Phase-to-phase voltage L2-3
823	Voltage	V	Volts	Phase-to-phase voltage L3-1
824	Voltage	V	Volts	Average 3-phase voltage
825	Current	A	Ampere	Average 3-phase current
826	Active power	kW	Kilowatt	3-phase active power
827	Reactive power	kVAR	Kilovolt-Ampere	3-phase reactive power
828	Apparent power	kVA	Kilovolt-Ampere	3-phase apparent power
829	Power factor	lack	lack	Power factor (PF)
830	Factor tg	lack	lack	3-phase reactive to active power ratio
831	Periods per second	Hz	frequency	Network frequency
832	Voltage	V	Volts	Mean phase-to-phase voltage
833	Active power	kW	Kilowatt	Active power averaged(P Demand)
834	Apparent power	kVA	Kilovolt-Ampere	Apparent power averaged (S Demand)
835	Current	A	Ampere	Average Current (I Demand)
836	Current	A	Ampere	Current in neutral wireIn
839	THD U1	%	percentages	Harmonic contents for voltage, phaseL1
840	THD U2	%	percentages	Harmonic contents for voltage, phaseL2
841	THD U3	%	percentages	Harmonic contents for voltage, phaseL3
842	THD U	%	percentages	Harmonic contents for 3-phase mean voltage
843	THD I1	%	percentages	Harmonic contents for current, phaseL1
844	THD I2	%	percentages	Harmonic contents for current, phaseL2
845	THD I3	%	percentages	Harmonic contents for current, phaseL3
846	THD I	%	percentages	Harmonic contents for 3-phase mean current

To read data from the ND30 meter, connect to the server on which ND30 publishes information and subscribe to the topic (topic), which was entered in the meter during the configuration of the MQTT protocol.



## 4 MAP OF REGISTERS OF ND30 METER

### Supplement to item 11 of the ND30 meter user manual.

In ND30 meter the data is placed in 16- and 32-bit registers. Process variables and parameters of the meter are located in the address space of registers in a manner dependent on the type of the variable. Bits in 16-bit register are numbered from the youngest to the oldest (b0-b15). 32-bit registers contain floating point numbers in IEEE-754 standard. Byte order 3210 – the oldest is sent first.

#### Supplement to Table 15 of the ND30 meter user manual

Address range	Value type	Description
4400- 4440	Integer (16 bits)	Value placed in one 16-bit register. Registers of statuses, energy values, the meter MAC address, configuration data. Description of registers can be found in table 20. Read-only registers.
4500-4529	Integer (16 bits)	Value placed in one 16-bit register. Configuration registers of the MQTT protocol.

#### Supplement to Table 20 of the ND30 meter user manual

Register address	Operations	Range	Description	Default
4424	R	0...65535	Status register 7– description below	0

**Status register 7 (address 4424, R)**

Bit 15 – “1” – presence of binary inputs  
 Bit 14 – reserved  
 Bit 13 – reserved  
 Bit 12 – reserved  
 Bit 11 – reserved  
 Bit 10 – reserved  
 Bit 9 – reserved  
 Bit 8 – reserved

Bit 7 – reserved  
 Bit 6 – reserved  
 Bit 5 – reserved  
 Bit 4 – reserved  
 Bit 3 – reserved  
 Bit 2 – reserved  
 Bit 1 – “1” – functions of MQTT protocol enabled  
 Bit 0 – “1” – functions of monitoring relay enabled

Table 2

Register address	Operations	Range	Description	Default
4500	R	0xFFFF, 0x0, 0x1	Connection status with the MQTT server: 0xFFFF - no connection, 0x0 - attempt to establish a connection, 0x1 - connection has been established.	0xFFFF
4501	RW	0x0000-0xFEFE	The first and second byte of the IP address of the MQTT broker (B1:B2).	0x25BB
4502	RW	0x0000-0xFEFE	The third and fourth byte of the IP address of the MQTT broker (B3:B4).	0x6A10
4503	RW	0x0001-0xFFFFE	Port number of MQTT broker	1883
4504	RW	1 .. 3600	Period after which data are published (in seconds).	5
4505	RW	0..1	Saving configuration to non-volatile memory: 0 – no changes, 1 – save changes.	0
4506	RW	0..1	Enabling or disabling data publishing for the MQTT server: 0 - data not published, 1 - publishing data to the server.	0
4507-4517	RW	0x2D, 0x20, 0x2E, 0x30-0x39 (digits), 0x41-0x5A (uppercase letters), 0x61-0x7A (lowercase letters)	The MQTT client name written with two characters for each register. For example, the client's name in the form 12345 will be saved in the registers as follows: 4507: 3132, 4508: 3334, 4509: 3500.	
4518-4528	RW	0x2D, 0x20, 0x2E, 0x30-0x39 (digits), 0x41-0x5A (uppercase letters), 0x61-0x7A (lowercase letters)	The MQTT topic name written with two characters for each register. For example, the topic name in the form 23456 will be saved in the registers as follows: 4518: 3233, 4519: 3435, 4520: 3600.	
4529	RW	0x0000-0x3FFF	Parameters sent by MQTT bit0 - Standard bit1 - Voltages bit2 - Currents bit3 - Powers bit4 - Energies bit5 - others bit6 - Harmonics U1 bit7 - Harmonics U2 bit8 - Harmonics U3 bit9 - Harmonics I1 bit10 - Harmonics I2 bit11 - Harmonics I3 bit12 - Minimums bit13 - Maximums	0x0001