Chapter 5: Serial Communications

Chapter 5

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Serial RS-485 Communication Features

This chapter details how to control an ACG series drive with a PLC or a computer using the RS-485 serial communication features. The ACG series drive terminals S+, S- will accommodate an RS-485 connection, through which the drive can be controlled by a remote master device on an RS-485 network. RS-232 signals can be converted to RS-485 by using a separate converter.

Following the RS-485 communication standards, ACG products exchange data with a PLC and computer. The RS-485 communication standards support the Multi-drop Link System and offer an interface that is strongly resistant to noise. Please refer to the following table for details about the communication standards.

NOTE: Ethernet connectivity for EtherNet/IP and Modbus TCP communication is possible with an optional communication card (ACG-ET2). Refer to Appendix B: Ethernet Module ACG-ET2 for details

Communication Standards

Following the RS-485 communication standards, ACG series products exchange data with a PLC and computer. The RS-485 communication standards support the Multi-drop Link System and offer an interface that is strongly resistant to noise. Please refer to the following table for details about the communication standards.

Communication Standards	
Item	**Standard**
Communication method/ Transmission type	RS-485/Bus type, Multi-drop Link System
Drive type name	ACG Series
Number of connected drives/ Transmission distance	Maximum of 16 drives / Maximum1,200m (recommended distance: within 700m)
Recommended cable size	0.75mm^2, (18AWG), shielded type twisted-pair (STP) wire
Installation type	Dedicated terminals (S+/S-) on the control terminal block connected to the RJ-45 connector (no 1-pin S+, no 8-pin S-)
Power supply	Supplied by the drive - insulated power source from the drive's internal circuit
Communication speed	1,200/2,400/9,600/19,200/38,400/57,600/115,200 bps
Control procedure	Asynchronous communications system
Communication system	Half duplex system
Character system	Modbus-RTU: Binary
Stop bit length	1-bit/2-bit
Frame error check	2 bytes
Parity check	None/Even/Odd

Common Third-Party Modbus RTU Masters

- *Modbus Poll from www.modbustools.com*

AutomationDirect PLCs as Modbus Master

Serial Modbus-capable AutomationDirect PLCs can communicate with the ACG drive. Serial Modbus control is easier to accomplish from a PLC that has a built-in RS-485 port and supports dedicated Modbus messaging. [RS-232-only PLCs will require an RS-232/RS-485 converter (FA-ISOCON); and older PLCs may require programming to construct the Modbus strings.] We recommend PLCs with built-in RS-485 ports and dedicated Modbus serial commands: CLICK (with RS-485 ports), P1000, P2000, P3000, BRX/Do-more, DirectLogic (DL06, D2-260, or D2-262). Other PLC-Drive connectivity is possible: Please refer to the chart below

Typical ADC PLC to ACG Serial Communications Connectivity

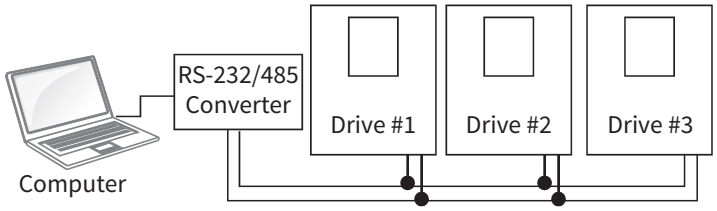
Typical ADC PLC to ACG Serial Communications Connectivity Matrix*					
Recommended PLC Connectivity			Communication	Direct Cable	ACG
PLC	Port #	Port Type			Terminals
CLICK	3	3 screw terminals	RS-485	Q8304-1 cable	S+ S-
D2-262	2	HD15	RS-485	D2-DSCBL-2	
DL06	2	HD15	RS-485	D2-DSCBL-2	
BRX/Do-more	RS-485	3 screw terminals	RS-485	Q8304-1 cable	
LS XEM-DN32HP, XEM-DP32HP, XEM-DN32H2, and XEM-DP32H2	RS-485	3 push-in terminals	RS-485	Q8304-1 cable	
P1-540 and P1-550	RS-485	4 screw terminals	RS-485	Q8304-1 cable	
P2-550 and P2-622	RS-485	3 screw terminals	RS-485	Q8304-1 cable	
P3-530	RS-485	3 screw terminals	RS-485	Q8304-1 cable	
P3-550E	RS-485	3 screw terminals	RS-485	Q8304-1 cable	
Other PLC Connectivity			**Communication**	**Direct Cable**	
D4-454	1	DB25	RS-232 to RS-485	FA-ISOCON with L19954 cable	
DL05	2	RJ12	RS-232 to RS-485	FA-ISOCON with L19954 cable	
DL06 + DCM	2	HD15	RS-485	D2-DSCBL-2	
Do-more H2-DM1 + H2-SERIO-4	3	5 screw terminals	RS-485	Q304-1 cable	
Do-more T1H-DM1	RS-232	RJ12	RS-232 to RS-485	FA-ISOCON with L19954 cable	
P2-SCM	4	4 screw terminals	RS-485	Q304-1 cable	
P3-SCM	4	4 screw terminals	RS-485	Q304-1 cable	

**Ethernet connectivity for EtherNet/IP or Modbus TCP communication is possible with an optional communication card ACG-ET2. Refer to Appendix B: Ethernet Module ACG-ET2 for details*

RS-232C to RS-485 Conversion

In an RS-485 communication system, the PLC or computer is the master device and the drive is the slave device. When using a computer as the master, the RS-232 converter must be integrated with the computer, so that it can communicate with the drive through the RS-232/RS-485 converter. Specifications and performance of converters may vary depending on the manufacturer, but the basic functions are identical. Please refer to the converter manufacturer's user manual for details about features and specifications. RS-232 signals can be converted to RS-485 by using a separate converter (see the following FA-ISOCON drawings).

Connect the wires and configure the communication parameters on the drive by referring to the following illustration of the communication system configuration.



RS-232C to RS-485 Conversion

Many AutomationDirect PLCs have only RS-232C communication ports, and require an FA-ISOCON (RS-232C to RS-422/485 network adapter) in order to make an RS-485 connection.

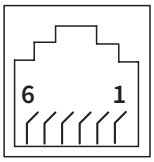
NOTE: If an FA-ISOCON module is used, set the module dipswitches as required. Refer to the FA-ISOCON manual for more detailed information.

FA-ISOCON Switch Settings:

- *S21–S23: OFF, ON, ON (19200 baud)*
- *S24–S27: OFF (Automatic Network Transmit Enable)*
- *Terminate: ON (end of run term resistors)*
- *Bias (2): ON (end of run bias resistors)*
- *1/2 DPX (2): ON (RS-485 TXD/RXD jumpers)*

Helpful Hint: Some applications require that the FA-ISOCON baud rate is set faster than the drive/network baud rate.

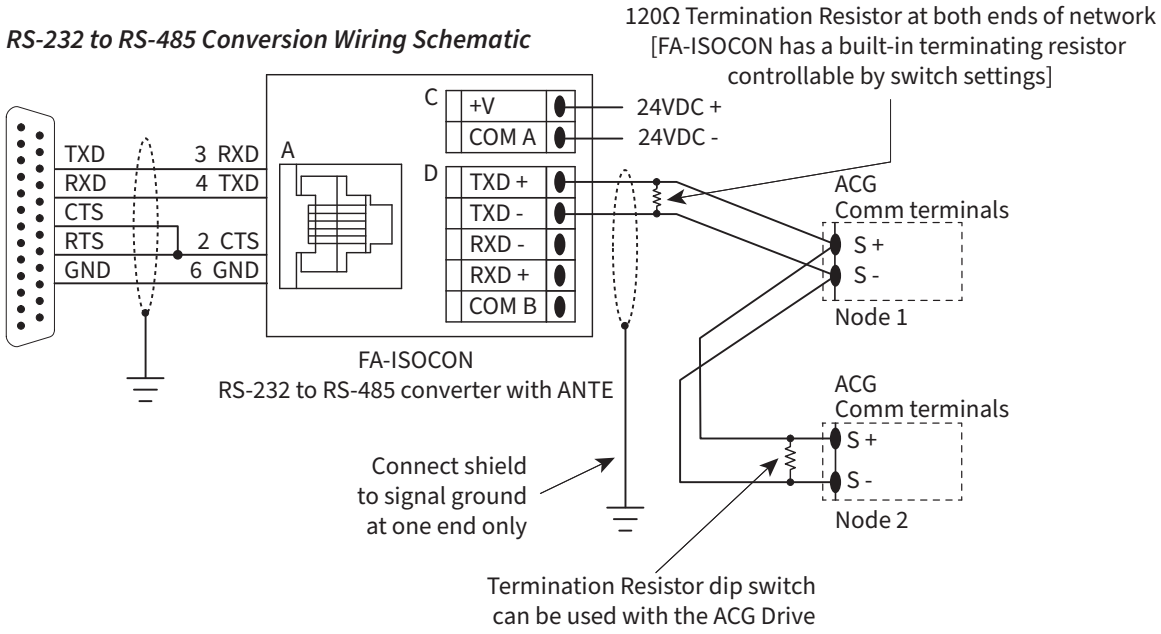
FA-ISOCON RJ-12 Serial Comm Port A
RS-232 Input Port



1: Signal Ground
2: CTS (input)
3: RXD (input)
4: TXD (output)
5: +5VDC in
6: Signal Ground

FA-ISOCON Wiring

RS-232 to RS-485 Conversion Wiring Schematic



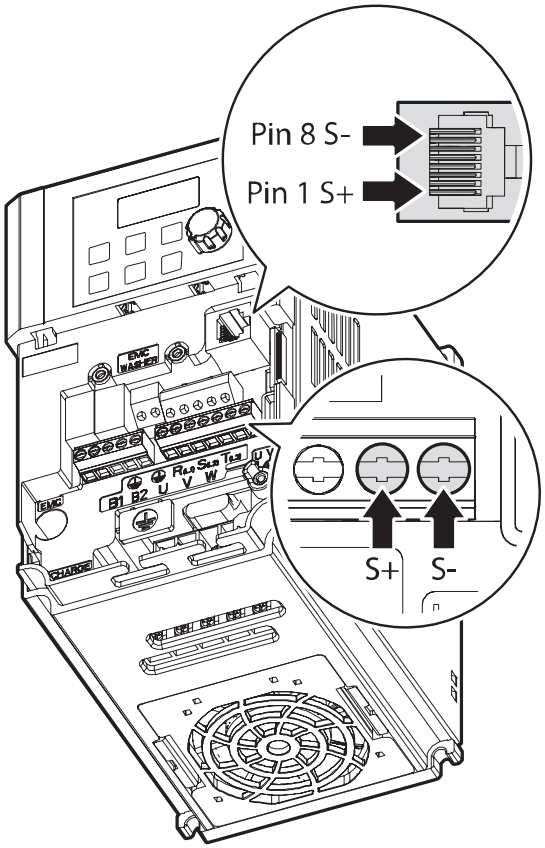
NOTE: For information regarding configuration of AutomationDirect PLCs or other PLCs, please refer to the applicable PLC user manual for your application.

Communication Cable Connection

After checking that the drive power is fully blocked, connect the RS-485 communication line to S+ or S-terminal of the control terminal or RJ45 connector (no.1 pin S+, no.8 pin S-) of the I/O board. The maximum number of inverters you can connect is 16. For communication lines, use shielded twisted pair (STP) cables.

The maximum length of the communication line is 1,200 meters, but it is recommended to use no more than 700 meters of communication line to ensure stable communication. Please use a repeater to enhance the communication speed when using a communication line longer than 1,200 meters or when using a large number of devices. A repeater is effective when smooth communication is not available due to noise interference.

NOTE: Recommended RS-485 cable: Belden 9842, AutomationDirect Q8304-1 series, or equivalent.



Serial Communication to VFD Suite Software

For instruction on serial communication to VFD Suite, see VFD Suite on page A–22.

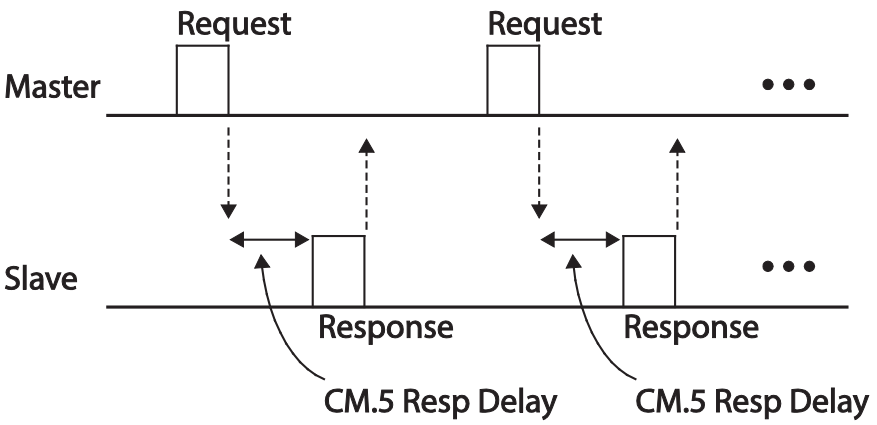
Setting Communication Parameters

Before proceeding with setting communication configurations, make sure that the communication cables are connected properly. Turn on the drive and set the communication parameters.

Setting Communication Parameters						
Parameter Group	**Parameter Number**	**Name**	**Parameter Setting**		**Setting Range**	**Unit**
CM	CM.1	Built-in communication drive ID	1		1-250	-
	CM.2	Built-in communication protocol	0	Modbus RTU	0, 2	-
	CM.3	Built-in communication speed	3	9600 bps	0-7	-
	CM.4	Built-in communication frame setting	0	D8/PN/S1	0-3	-
	CM.5	Transmission delay after reception	5		0-1000	ms

Communication Parameters Setting Details

Communication Parameters Setting Details			
Parameter	**Description**		
CM.1 Int485 St ID	Set the drive station ID between 1 and 250.		
CM.2 Int485 Proto	***Select one of the two built-in protocols: Modbus-RTU***		
	Setting		***Function***
	0	Modbus-RTU	Modbus-RTU compatible protocol
	2	Not supported	–

Communication Parameters Setting Details			
Parameter	**Description**		
CM.3 Int485 Baudrate	***Set a communication setting speed up to 115,200 bps.***		
	Setting		***Function***
	0		1,200 bps
	1		2,400 bps
	2		4,800 bps
	3		9,600 bps
	4		19,200 bps
	5		38,400 bps
	6		56 Kbps
	7		115 Kbps
CM.4 Int485 Mode	***Set a communication configuration. Set the data length, parity check method, and the number of stop bits.***		
	Setting		***Function***
	0	D8/PN/S1	8-bit data / no parity check / 1 stop bit
	1	D8/PN/S2	8-bit data / no parity check / 2 stop bits
	2	D8/PE/S1	8-bit data / even parity / 1 stop bit
	3	D8/PO/S1	8-bit data / odd parity / 1 stop bit
CM.5 Resp Delay	Set the response time for the slave (drive) to react to the request from the master. Response time is used in a system where the slave device response is too fast for the master device to process. Set this code to an appropriate value for smooth master-slave communication. 		

Setting Operation Command and Frequency

Set the drv code of the operation group to 3 (Int 485) and the Frq code of the operation group to 6 (Int 485) in order to set the operation command and frequency of the common area parameters via communication.

Setting Operation Command and Frequency						
Parameter Group	**Parameter Number**	**Name**	**Parameter Setting**		**Setting Range**	**Unit**
Operation	drv	Command source	3	Int485	0-4	-
	Frq	Frequency setting method	6	Int485	0-8	-

Command Loss Protective Operation

Set the following parameters to determine the drive action in the event of a communication loss.

Command Loss Protective Operation			
Parameter Group	**Description**		
Pr.12 Lost Cmd Mode, Pr.13 Lost Cmd Time	Select the drive function that will occur after the communication loss time is expired (set in Pr.13).		
	Setting		Function
	0	None	The speed command immediately becomes the operation frequency without any protection function.
	1	Free-Run	The drive blocks output. The motor performs in free-run condition.
	2	Dec	The motor decelerates and then stops
	3	Hold Input	The drive continues using the speed command input before the loss of communication.
	4	Hold Output	The drive continues using the operation frequency before the loss of communication.
	5	Lost Preset	The drive operates at the frequency set at Pr. 14 (Lost Preset F).

Setting Virtual Multi-Function Input

Multi-function input can be controlled using a communication address (0h0385). Set codes CM.70–CM.77 to the functions to operate, and then set the BIT relevant to the function to 1 at 0h0322 to operate it. Virtual multi-function operates independently from In.65–In.69 analog multi-function inputs and cannot be set redundantly. Virtual multi-function input can be monitored using CM.86 (Virt Dl Status). Before you configure the virtual multi-function inputs, set the parameter code drv (operation group) according to the command source.

Setting Virtual Multi-Function Input						
Parameter Group	**Parameter Number**	**Name**	**Parameter Setting**		**Setting Range**	**Unit**
CM	CM.70-CM.77	Communication multi-function input x	0	None	0-49	-
	CM.86	Communication multi-function input monitoring	-	-	-	-

Example: When sending an FX command by controlling virtual multi-function input in the common area via Int485, set CM.70 to FX. Then, assign a 0h0001 value to the communication address 0h0322 to operate the forward direction operation (FX) feature.

NOTE: The following are values and functions that are applied to address 0h0322

Values and functions that are applied to address 0h0385	
Setting	**Function**
0h0001	Forward operation (Fx)
0h0003	Reverse operation (Rx)
0h0000	Stop

Saving Parameters Defined by Communication

If you turn off the drive after setting the common area parameters or keypad parameters via communication and operate the inverter, the changes are lost and the values changed via communication revert to the previous setting values when you turn on the inverter.

Setting address 0h03E0 to 0 and then setting it again to 1 via communication allows the existing parameter settings to be saved. However, setting address 0h03E0 to 1 and then setting it to 0 does not carry out the same function.

Total Memory Map for Communication

Total Memory Map for Communication		
Item	**Memory Map**	**Details**
Parameter registration type area	0h0100-0h01FF	Areas registered at CM.31–CM.38 and CM.51–CM.58
Drive communication common area	0h0300-0h037F	Drive monitoring area
	0h0380-0h03DF	Drive control area
	0h03E0-0h03FF	Drive memory control area
	0h0400-0h0FFF	Reserved
	0h1100	dr Group
	0h1200	bA Group
	0h1300	Ad Group
	0h1400	Cn Group
	0h1500	In Group
	0h1600	OU Group
	0h1700	CM Group
	0h1800	AP Group
	0h1B00	Pr Group
	0h1C00	M2 Group

Parameter Group for Data Transmission

By defining a parameter group for data transmission, the communication addresses registered in the communication function group (CM) can be used in communication. Parameter group for data transmission may be defined to transmit multiple parameters at once, into the communication frame.

Parameter Group for Data Transmission						
Parameter Group	**Parameter Number**	**Name**	**Parameter Setting**		**Setting Range**	**Unit**
CM	CM.31-CM.38	Output communication address x	-	-	0000-FFFF	Hex
	CM.51-CM.58	Input communication address x	-	-	0000-FFFF	Hex

Currently Registered CM Group Parameter

Currently Registered CM Group Parameter		
Address	**Parameter**	**Assigned content by bit**
0h0100-0h0107	Status Parameter-1-Status Parameter-8	Parameter communication code value registered at CM.31-CM.38 (Read-only)

Currently Registered CM Group Parameter		
Address	**Parameter**	**Assigned content by bit**
0h0110-0h0117	Control Parameter-1- Control Parameter-8	Parameter communication code value registered at CM.51-CM.58 (Read/Write access)

NOTE: When registering control parameters, register the operation speed (0h0005, 0h0380, 0h0381) and operation command (0h0006, 0h0382) parameters at the end of a parameter control frame. For example, when the parameter control frame has 5 parameter control items (Para Control - x), register the operation speed at Para Control-4 and the operation command to Para Control-5.

Modbus-RTU Protocol

Function Code and Protocol (unit: byte)

In the following section, station ID is the value set at CM.01 (Int485 St ID), and starting address is the communication address. (starting address size is in bytes).

Function Code #03: Read Holding Register

Query Field Name
Station ID
Function(0x03)
Starting Address Hi
Starting Address Lo
Number of Points Hi
Number of Points Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function(0x03)
Byte Count
Data Hi
Data Lo
…
…
Data Hi
Data Lo
CRC Lo
CRC Hi

Number of Points

Function Code #04: Read Input Register

Query Field Name
Station ID
Function(0x04)
Starting Address Hi
Starting Address Lo
Number of Points Hi
Number of Points Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function(0x04)
Byte Count
Data Hi
Data Lo
…
…
Data Hi
Data Lo
CRC Lo
CRC Hi

Number of Points

Function Code #06: Preset Single Register

Query Field Name
Station ID
Function(0x06)
Starting Address Hi
Starting Address Lo
Preset Data Hi
Preset Data Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function(0x06)
Register Address Hi
Register Address Lo
Preset Data Hi
Preset Data Lo
CRC Lo
CRC Hi

Function Code #16 (hex 0h10): Preset Multiple Register

Query Field Name
Station ID
Function(0x06)
Starting Address Hi
Starting Address Lo
Number of Register Hi
Number of Register Lo
Byte Count
Data Hi
Data Lo
...
...
Data Hi
Data Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function(0x06)
Register Address Hi
Register Address Lo
Preset Data Hi
Preset Data Lo
CRC Lo
CRC Hi

Number of Points

Exception Code

Code
01: ILLEGAL FUNCTION
02: ILLEGAL DATA ADRESS
03: ILLEAL DATA VALUE
06: SLAVE DEVICE BUSY

Response

Field Name
Station ID
Function (The function value uses the top level bit for all query values.)
Exception Code
CRC Lo
CRC Hi

Example of Modbus-RTU Communication in Use

When the muti-step acceleration time1 (Communication address 0x1246) is changed to 5.0 sec and the Multi-step deceleration time1 (Communication address 0x1247) is changed to 10.0 sec.

Frame Transmission from Master to Slave (Request)								
Item	**Station ID**	**Function**	**Staring Address**	**Number of Register**	**Byte Count**	**Data 1**	**Data 2**	**CRC**
Hex	0x01	0x10	0x1245	0x0002	0x04	0x0032	0x0064	0x4324
Description	CM.01 Int485 St ID	Preset Multiple Register	Starting Address -1 (0x1246-1)	-	-	50 (ACC time 5.0sec)	100 (DEC time 10.0sec)	-

Frame Transmission from Slave to Master (Response)					
Item	**Station ID**	**Function**	**Staring Address**	**Number of Register**	**CRC**
Hex	0x01	0x10	0x1245	0x0002	0x5565
Description	CM.01 Int485 St ID	Preset Multiple Register	Starting Address -1 (0x1246-1)	-	-

Compatible Common Area Parameter

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
0h0000	Drive Model	–	–	R	16: ACG	
0h0001	Drive capacity	–	–	R	0	0.75 kW (1 hp)
					1	1.5 kW (2 hp)
					2	2.2 kW (3 hp)
					4	5.5 kW (7.5 hp)
					5	7.5 kW (10 hp)
					6	11 kW (15 hp)
					7	15 kW (20 hp)
					8	18.5 kW (25 hp)
					9	22 kW (30 hp)
					256	0.4 kW (1/2 hp)
					259	4.0 kW (5 hp)
0h0002	Drive input voltage	–	–	R	0	230V level
					1	460V level
0h0003	Version	–	–	R	0h0100	Version 1.00
					0h0101	Version 1.01 (etc.)
0h0004	Reserved	–	–	R/W	–	
0h0005	Target frequency	0.01	Hz	R/W	–	

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
0h0006	Operation command (option)	–	–	R	B15	Reserved
					B14	0: Keypad Freq 1: Keypad Torq limit 2-16 Terminal block multi-step speed 17: Up, 18: Down 19: STEADY 22: V1, 24: V0, 25: I2 26: Reserved 27: Built-in 485 28: Communication option 30: JOG, 31: PID
					B13	
					B12	
					B11	
					B10	
					B9	
					B8	0: Keypad 1: FX/RX-1 2: FX/RX-2 3: Built-in 485 4: Communication option
					B7	
					B6	
				R/W	B5	Reserved
					B4	Emergency stop
					B3	W: Trip (0→1)
					B2	Reverse operation (R)
					B1	Forward operation (F)
					B0	Stop (S)
0h0007	Acceleration time	0.1	sec	R/W	–	
0h0008	Deceleration time	0.1	sec	R/W	–	
0h0009	Output current	0.1	A	R	–	
0h000A	Output frequency	0.01	Hz	R	–	
0h000B	Output voltage	1	V	R	–	
0h000C	DC link voltage	1	V	R	–	
0h000D	Outputpower	0.1	kW	R	–	
0h000E	Operation status	–	–	–	B15	Reserved
					B14	1: Frequency command source by communication (built-in, option)
					B13	1: Operation command source by communication (built-in, option)
					B12	Reverse operation command
					B11	Forward operation command
					B10	Brake release signal
					B9	Jog mode
					B8	Drive stopping
					B7	DC braking
					B6	Speed reached
					B5	Decelerating
					B4	Accelerating
					B3	Fault Trip - operates according to OU.30 setting
					B2	Operating in reverse direction
					B1	Operating in forward direction
					B0	Stopped

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
0h000F	Fault trip information	–	–	R	B15–B11	Reserved
					B10	H/W-Diag
					B9–B4	Reserved
					B3	Level type trip
					B2–B1	Reserved
					B0	Latch type trip
0h0010	Input terminal information	–	–	R	B15–B5	Reserved
					B4	P5
					B3	P4
					B2	P3
					B1	P2
					B0	P1
0h0011	Output relay information	–	–	R	B15–B2	Reserved
					B1	Relay2
					B0	Relay1
0h0012	V1	0.01	%	R	V1 voltage input	
0h0013	V0	0.01	%	R	Potentiometer voltage input	
0h0014	I2	0.01	%	R	I2 current input	
0h0015	Motor rotation speed	1	Rpm	R	Displays existing motor rotation speed	
0h0016–0h0019	Reserved	–	–	–	–	
0h001A	Select Hz/rpm	–	–	R	0: Hz, 1: Rpm	
0h001B	Display the number of poles for the selected motor	–	–	R	Display the number of poles for the selected motor	

Drive Expansion Common Area Parameter

Monitoring Area Parameter (Read Only)

Monitoring Area Parameter (Read Only)						
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit
Hex	Modbus RTU	Modbus TCP				
0h0300	***40768***	***40769***	Drive model	-	-	ACG: 0010h
0h0301	***40769***	***40770***	Drive capacity	-	-	0.4 kW: 1900h
						0.75 kW: 3200h
						1.5 kW: 4015h
						2.2 kW: 4022h
						3.0 kW: 4030h
						4.0 kW: 4040h
						5.5 kW: 4055h
						7.5 kW: 4075h
						11kW: 40B0h
						15kW: 40F0h
						18.5 kW: 4125h
						22kW: 4160h
0h0302	***40770***	***40771***	Drive input voltage/power (Single phase, 3-phase)/cooling method	-	-	230V 3-phase forced cooling: 0231h
						460V single phase self cooling: 0420h
						230V single phase self cooling: 0220h
						460V 3-phase self cooling: 0430h
						230V 3-phase self cooling: 0230h
						460V single phase forced cooling: 0421h
						230V single phase forced cooling: 0221h
						460V 3-phase forced cooling: 0431h
0h0303	***40771***	***40772***	Drive S/W version	-	-	(Ex) 0h0100: Version 1.00
						(Ex) 0h0101: Version 1.01
0h0304	***40772***	***40773***	Reserved	-	-	-

Monitoring Area Parameter (Read Only)							
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit	
Hex	Modbus RTU	Modbus TCP					
0h0305	***40773***	***40774***	Drive operation state	-	-	B12–B15	0 Normal state
							4 Warning occurred
							8 Fault occurred [operates according to Pr. 30 (Trip Out Mode) setting.]
						B8–B11	-
						B4–B7	1 Speed searching
							2 Accelerating
							3 Operating at constant rate
							4 Decelerating
							5 Decelerating to stop
							6 H/W OCS
							7 S/W OCS
							8 Dwell operating
						B0–B3	0 Stopped
							1 Operating in forward direction
							2 Operating in reverse direction
							3 DC operating (0 speed control)
0h0306	***40774***	***40775***	Drive operation frequency command source	-	-	B8–B15	Operation command source
							0 Keypad
							1 Communication option
							3 Built-in RS 485
							4 Terminal block
						B0–B7	Frequency command source
							0 Keypad speed
							1 Keypad torque limit
							2–4 Up/Down operation speed
							5 V1
							7 V0
							8 I2
							10 Built-in RS 485
							11 Communication option
							13 Jog
							14 PID
							25-39 Multi-step speed frequency
0h0307–0h030F	***40775–40783***	***40776–40784***	Reserved	-	-	–	
0h0310	***40784***	***40785***	Output current	0.1	A	-	
0h0311	***40785***	***40786***	Output frequency	0.01	Hz	-	
0h0312	***40786***	***40787***	Output rpm	0	rpm	-	
0h0313	***40787***	***40788***	Motor feedback speed	0	rpm	-32768 rpm-32767 rpm (directional)	
0h0314	***40788***	***40789***	Output voltage	1	V	-	
0h0315	***40789***	***40790***	DC Link voltage	1	V	-	

Monitoring Area Parameter (Read Only)							
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit	
Hex	Modbus RTU	Modbus TCP					
0h0316	***40790***	***40791***	Output power	0.1	kW	-	
0h0317	***40791***	***40792***	Output torque	0.1	%	-	
0h0318	***40792***	***40793***	PID reference	0.1	%	-	
0h0319	***40793***	***40794***	PID feedback	0.1	%	-	
0h031A	***40794***	***40795***	Display the number of poles for the first motor	-	-	Displays the number of poles for the first motor	
0h031B	***40795***	***40796***	Display the number of poles for the second motor	-	-	Displays the number of poles for the second motor	
0h031C	***40796***	***40797***	Display the number of poles for the selected motor	-	-	Displays the number of poles for the selected motor	
0h031D	***40797***	***40798***	Select Hz/rpm	-	-	0	Hz
						1	RPM
0h031E - 0h031F	***40798 - 40799***	***40799 - 40800***	Reserved	-	-	-	
0h0320	***40800***	***40801***	Digital input information	-	-	B5–B15	Reserved
						B4	P5(I/O board)
						B3	P4(I/O board)
						B2	P3(I/O board)
						B1	P2(I/O board)
						B0	P1(I/O board)
0h0321	***40801***	***40802***	Digital output information	-	-	B2–BI5	Reserved
						B1	Relay2
						B0	Relay1
0h0322	***40802***	***40803***	Virtual digital input information	-	-	B8–B15	Reserved
						B7	Virtual DI 8(CM.77)
						B6	Virtual DI 7(CM.76)
						B5	Virtual DI 6(CM.75)
						B4	Virtual DI 5(CM.74)
						B3	Virtual DI 4(CM.73)
						B2	Virtual DI 3(CM.72)
						B1	Virtual DI 2(CM.71)
						B0	Virtual DI 1(CM.70)
0h0323	***40803***	***40804***	Display the selected motor	-	-	0	First Motor
						1	Second Motor
0h0324	***40804***	***40805***	V1	0.01	%	Analog input V1 (I/O board)	
0h0325	***40805***	***40806***	Reserved	0.01	%		
0h0326	***40806***	***40807***	V0	0.01	%	Potentiometer dial	
0h0327	***40807***	***40808***	I2	0.01	%	Analog input I2 (I/O board)	
0h0328	***40808***	***40809***	AO1	0.01	%	Analog output 1 (I/O board)	
0h0329	***40809***	***40810***	AO2	0.01	%	Analog output 2 (I/O board)	

Monitoring Area Parameter (Read Only)							
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit	
Hex	Modbus RTU	Modbus TCP					
0h032A	***40810***	***40811***	Reserved	0.01	%	Reserved	
0h032B	***40811***	***40812***	Reserved	0.01	%	Reserved	
0h032C	***40812***	***40813***	Reserved	-	-	-	
0h032D	***40813***	***40814***	Drive module temperature	1	°C	-	
0h032E	***40814***	***40815***	Drive power consumption	1	kWh	-	
0h032F	***40815***	***40816***	Drive power consumption		MWh	-	
0h0330	***40816***	***40817***	Latch type trip information - 1	-	-	BI5	Fuse Open Trip
						BI4	Over Heat Trip
						BI3	Arm Short
						BI2	External Trip
						BI1	Overvoltage Trip
						BI0	Overcurrent Trip
						B9	NTC Trip
						B8	Reserved
						B7	Reserved
						B6	Input open-phase trip
						B5	Output open-phase trip
						B4	Ground Fault Trip
						B3	E-Thermal Trip
						B2	Drive Overload Trip
						B1	Underload Trip
						B0	Overload Trip
0h0331	***40817***	***40818***	Latch type trip information - 2	-	-	BI5	Reserved
						BI4	Pre Over Heat Trip
						BI3	Reserved
						BI2	Reserved
						BI1	Reserved
						BI0	Bad option card
						B9	No motor trip
						B8	External brake trip
						B7	Bad contact at basic I/O board
						B6	Pre PID Fail
						B5	Reserved
						B4	Reserved
						B3	FAN Trip
						B2	Reserved
						B1	Reserved
						B0	Reserved

Monitoring Area Parameter (Read Only)							
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit	
Hex	Modbus RTU	Modbus TCP					
0h0332	***40818***	***40819***	Level type trip information	-	-	B4–B15	Reserved
						B3	Keypad Lost Command
						B2	Lost Command
						B1	Low Voltage Trip
						B0	BX
0h0333	***40819***	***40820***	H/W Diagnosis Trip information	-	-	B6–B15	Reserved
						B5	Queue Full
						B4	Reserved
						B3	Watchdog-2 error
						B2	Watchdog-1 error
						B1	EEPROM error
						B0	ADC error
0h0334	***40820***	***40821***	Warning information	-	-	B10–B15	Reserved
						B9	Auto Tuning failed
						B8	Keypad lost
						B7	Encoder disconnection
						B6	Wrong installation of encoder
						B5	DB
						B4	FAN running
						B3	Lost command
						B2	Drive Overload
						B1	Underload
						B0	Overload
0h0335	***40821***	***40822***	Latch type trip information – 3	–	–	B3	Under torque detection 2
						B2	Over torque detection
						B1	Under torque detection 1
						B0	Over torque detection 1
0h0336 - 0h033F	***40822 - 40831***	***40823 - 40832***	Reserved	-	-	-	
0h0340	***40832***	***40833***	On Time date	0	Day	Total number of days the drive has been powered on	
0h0341	***40833***	***40834***	On Time minute	0	Min	Total number of minutes excluding the total number of On Time days	
0h0342	***40834***	***40835***	Run Time date	0	Day	Total number of days the drive has driven the motor	
0h0343	***40835***	***40836***	Run Time minute	0	Min	Total number of minutes excluding the total number of Run Time days	
0h0344	***40836***	***40837***	Fan Time date	0	Day	Total number of days the heat sink fan has been running	
0h0345	***40837***	***40838***	Fan Time minute	0	Min	Total number of minutes excluding the total number of Fan Time days	
0h0346 - 0h0348	***40838 - 40840***	***40839 - 40841***	Reserved	-	-	-	
0h0349	***40841***	***40842***	Reserved	-	-	-	
0h034A	***40842***	***40843***	Option 1	-	-	0	None
						11	EtherNet/IP or Mod TCP

Monitoring Area Parameter (Read Only)						
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit
Hex	Modbus RTU	Modbus TCP				
0h034B	***40843***	***40844***	Reserved	-	-	-
0h034C	***40844***	***40845***	Reserved	-	-	-

Control Area Parameter (Read/ Write)

Control Area Parameter (Read/ Write)							
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit	
Hex	Modbus RTU	Modbus TCP					
0h0380	***40896***	***40897***	Frequency command	0.01	Hz	Command frequency setting	
0h0381	***40897***	***40898***	RPM command	1	rpm	Command rpm setting	
0h0382	***40898***	***40899***	Operation command	-	-	B7	Reserved
						B6	Reserved
						B5	Reserved
						B4	Reserved
						B3	0 → 1: Free-run stop
						B2	0 → 1: Trip initialization
						B1	0: Reverse command
							1: Forward command
						B0	0 Stop command
							1 Run command
						Example: Forward operation command 0003h, Reverse operation command 0001h.	
0h0383	***40899***	***40900***	Acceleration time	0.1	s	Acceleration time setting	
0h0384	***40900***	***40901***	Deceleration time	0.1	s	Deceleration time setting	
0h0385	***40901***	***40902***	Virtual digital input control (0: Off, 1:On)	-	-	B8–B15	Reserved
						B7	Virtual DI 8(CM.77)
						B6	Virtual DI 7(CM.76)
						B5	Virtual DI 6(CM.75)
						B4	Virtual DI 5(CM.74)
						B3	Virtual DI 4(CM.73)
						B2	Virtual DI 3(CM.72)
						B1	Virtual DI 2(CM.71)
						B0	Virtual DI 1(CM.70)
0h0386	***40902***	***40903***	Digital output control (0:Off, 1:On)	-	-	B5–B2	Reserved
						B1	Relay2
						B0	Relay1 (0.4~7.5kW, OU.31: None)
0h0387	***40903***	***40904***	Reserved	-	-	Reserved	
0h0388	***40904***	***40905***	PID reference	0.1	%	PID reference command	
0h0389	***40905***	***40906***	PID feedback value	0.1	%	PID feedback value	

Control Area Parameter (Read/ Write)						
Comm. Address			Parameter	Scale	Unit	Assigned Content by Bit
Hex	Modbus RTU	Modbus TCP				
0h038A	***40906***	***40907***	Motor rated current	0.1	A	-
0h038B	***40907***	***40908***	Motor rated voltage	1	V	-
0h038C-0h038F	***40908 - 40911***	***40909 - 40912***	Reserved	-	-	-
0h0390	***40912***	***40913***	Torque Ref	0.1	%	Torque command
0h0391	***40913***	***40914***	Fwd Pos Torque Limit	0.1	%	Forward motoring torque limit
0h0392	***40914***	***40915***	Fwd Neg Torque Limit	0.1	%	Forward regenerative torque limit
0h0393	***40915***	***40916***	Rev Pos Torque Limit	0.1	%	Reverse motoring torque limit
0h0394	***40916***	***40917***	Rev Neg Torque Limit	0.1	%	Reverse regenerative torque limit
0h0395	***40917***	***40918***	Torque Bias	0.1	%	Torque bias

A frequency set via communication using the common area frequency address (0h0380) is not saved even when used with the parameter save function. To save a changed frequency to use after a power cycle, follow these steps:

1) *Set Frq to 0:Keypad-1 and select a random target frequency.*
2) *Set the frequency via communication into the parameter area frequency address (0h1D04).*
3) *Perform the parameter save (0h03E0: '1') before turning off the power. After the power cycle, the frequency set before turning off the power is displayed.*

Drive Memory Control Area Parameter (Read and Write)

- *♦R/W – Parameter Write–enabled during Operation (Run mode)*
- *R/W – Parameter Write–enabled when stopped*
- *Parameter Read Only*

Drive Memory Control Area Parameter (Read and Write)								
Comm. Address			Parameter	Scale	Unit	R/W	Function	
Hex	Modbus RTU	Modbus TCP						
0h03E0	***40992***	***40993***	Save parameters	-	-	R/W	0	No
							1	Yes
0h03E1	***40993***	***40994***	Monitor mode initialization	-	-	♦R/W	0	No
							1	Yes
0h03E2	***40994***	***40995***	Parameter initialization	-	-	R/W	0	No
							1	All Grp
							2	Drv Grp
							3	bA Grp
							4	Ad Grp
							5	Cn Grp
							6	In Grp
							7	OU Grp
							8	CM Grp
							9	AP Grp
							12	Pr Grp
							13	M2 Grp
							14	Operation Grp
							Setting is prohibited during fault trip interruptions.	
0h03E3	***40995***	***40996***	Display changed parameters	-	-	♦R/W	0	No
							1	Yes
0h03E4	***40996***	***40997***	Reserved	-	-	–	-	
0h03E5	***40997***	***40998***	Delete all fault history	-	-	♦R/W	0	No
							1	Yes
0h03E6	***40998***	***40999***	Delete user-registrated codes	-	-	♦R/W	0	No
							1	Yes
0h03E7	***40999***	***41000***	Hide parameter mode	0	Hex	♦R/W	Write: 0-9999	
							Read	
							0	Unlock
							1	Lock
0h03E8	***41000***	***41001***	Lock parameter mode	0	Hex	♦R/W	Write: 0-9999	
							Read	
							0	Unlock
							1	Lock
0h03E9	***41001***	***41002***	Reserved	–	–	–	–	–

Drive Memory Control Area Parameter (Read and Write)								
Comm. Address			Parameter	Scale	Unit	R/W	Function	
Hex	Modbus RTU	Modbus TCP						
0h03EA	***41002***	***41003***	Initializing power consumption	-	-	♦R/W	0	No
							1	Yes
0h03EB	***41003***	***41004***	Initialize drive operation accumulative time	-	-	♦R/W	0	No
							1	Yes
0h03EC	***41004***	***41005***	Initialize cooling fan accumulated operation time	-	-	♦R/W	0	No
							1	Yes

When setting parameters in the drive memory control area, the values are reflected to the drive operation and saved. Parameters set in other areas via communication are reflected to the drive operation, but are not saved. All set values are cleared following a drive power cycle and revert back to its previous values. When setting parameters via communication, ensure that a parameter save is completed prior to shutting the drive down.

Whereas the drive may respond and operate to new parameters written via communications, some parameters set via communications are not retentive upon a power cycle UNLESS the new parameter values have been SAVED prior to the power cycle.

- *Parameter SET via Communications + NOT Saved + Power Cycle = Parameters reverts back to previous setting.*
- *Parameter SET via Communications + SAVED + Power Cycle = Parameters holds saved value.*

The addresses 0h03E7 and 0h03E8 are parameters for entering the password. When the password is entered, the condition will change from Lock to Unlock, and vice versa. When the same parameter value is entered continuously, the parameter is executed just once. Therefore, if the same value is entered again, change it to another value first and then re-enter the previous value. For example, if you want to enter 244 twice, enter it in the following order: 244 → 0 → 244.

NOTE: It may take longer to set the parameter values in the drive memory control area because all data is saved to the drive. Be careful as communication may be lost during parameter setup if parameter setup is continues for an extended period of time.

Drive Parameter Modbus Communication Addresses

The following tables list the specific modbus addresses for all parameters in the ACN series drive. Please note, the Modbus RTU addresses for serial use are different than the Modbus TCP addresses for use with the ACN-ETH communications option card. Hex Address 0000 is unavailable with Modbus RTU.

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Drive Group							
dr.09	1109	44361	44362	***dr.27***	111B	44379	44380
dr.11	110B	44363	44364	***dr.28***	111C	44380	44381
dr.12	110C	44364	44365	***dr.80***	1150	44432	44433
dr.13	110D	44365	44366	***dr.81***	1151	44433	44434
dr.14	110E	44366	44367	***dr.89***	1159	40995	40996
dr.15	110F	44367	44368	***dr.91***	115B	44443	44444
dr.16	1110	44368	44369	***dr.93***	115D	44445	44446
dr.17	1111	44369	44370	***dr.94***	115E	44446	44447
dr.18	1112	44370	44371	***dr.95***	115F	44447	44448
dr.19	1113	44371	44372	***dr.97***	1161	44449	44450
dr.20	1114	44372	44373	***dr.98***	1162	44450	44451
dr.26	111A	44378	44379				

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Basic Group							
bA.1	1201	44609	44610	***bA.43***	122B	44651	44652
bA.2	1202	44610	44611	***bA.44***	122C	44652	44653
bA.3	1203	44611	44612	***bA.45***	122D	44653	44654
bA.4	1204	44612	44613	***bA.46***	122E	44654	44655
bA.5	1205	44613	44614	***bA.47***	122F	44655	44656
bA.7	1207	44615	44616	***bA.48***	1230	44656	44657
bA.8	1208	44616	44617	***bA.53***	1235	44661	44662
bA.9	1209	44617	44618	***bA.54***	1236	44662	44663
bA.10	120A	44618	44619	***bA.55***	1237	44663	44664
bA.11	120B	44619	44620	***bA.56***	1238	44664	44665
bA.12	120C	44620	44621	***bA.70***	1246	44678	44679
bA.13	120D	44621	44622	***bA.71***	1247	44679	44680
bA.14	120E	44622	44623	***bA.72***	1248	44680	44681
bA.15	120F	44623	44624	***bA.73***	1249	44681	44682
bA.16	1210	44624	44625	***bA.74***	124A	44682	44683
bA.17	1211	44625	44626	***bA.75***	124B	44683	44684
bA.18	1212	44626	44627	***bA.76***	124C	44684	44685
bA.19	1213	44627	44628	***bA.77***	124D	44685	44686
bA.20	-	-	-	***bA.78***	124E	44686	44687
bA.21	-	-	-	***bA.79***	124F	44687	44688
bA.22	-	-	-	***bA.80***	1250	44688	44689
bA.23	-	-	-	***bA.81***	1251	44689	44690
bA.24	-	-	-	***bA.82***	1252	44690	44691
bA.41	1229	44649	44650	***bA.83***	1253	44691	44692
bA.42	122A	44650	44651				
Advanced Group							
Ad.1	1301	44865	44866	***Ad.42***	132A	44906	44907
Ad.2	1302	44866	44867	***Ad.44***	132C	44908	44909
Ad.3	1303	44867	44868	***Ad.45***	132D	44909	44910
Ad.4	1304	44868	44869	***Ad.46***	132E	44910	44911
Ad.5	1305	44869	44870	***Ad.47***	132F	44911	44912
Ad.6	1306	44870	44871	***Ad.50***	1332	44914	44915
Ad.7	1307	44871	44872	***Ad.51***	1333	44915	44916
Ad.8	1308	44872	44873	***Ad.60***	133C	44924	44925
Ad.9	1309	44873	44874	***Ad.61***	133D	44925	44926
Ad.10	130A	44874	44875	***Ad.62***	133E	44926	44927
Ad.12	130C	44876	44877	***Ad.63***	133F	44927	44928
Ad.13	130D	44877	44878	***Ad.64***	1340	44928	44929
Ad.14	130E	44878	44879	***Ad.65***	1341	44929	44930
Ad.15	130F	44879	44880	***Ad.66***	1342	44930	44931
Ad.16	1310	44880	44881	***Ad.67***	1343	44931	44932
Ad.17	1311	44881	44882	***Ad.68***	1344	44932	44933
Ad.20	1314	44884	44885	***Ad.70***	1346	44934	44935

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Ad.21	1315	44885	44886	***Ad.71***	1347	44935	44936
Ad.22	1316	44886	44887	***Ad.72***	1348	44936	44937
Ad.23	1317	44887	44888	***Ad.74***	134A	44938	44939
Ad.24	1318	44888	44889	***Ad.75***	134B	44939	44940
Ad.25	1319	44889	44890	***Ad.76***	134C	44940	44941
Ad.26	131A	44890	44891	***Ad.77***	134D	44941	44942
Ad.27	131B	44891	44892	***Ad.78***	134E	44942	44943
Ad.28	131C	44892	44893	***Ad.79***	134F	44943	44944
Ad.29	131D	44893	44894	***Ad.80***	1350	44944	44945
Ad.30	131E	44894	44895	***Ad.81***	1351	44945	44946
Ad.31	131F	44895	44896	***Ad.82***	1352	44946	44947
Ad.32	1320	44896	44897	***Ad.83***	-	-	-
Ad.33	1321	44897	44898	***Ad.85***	1355	44949	44950
Ad.41	1329	44905	44906	***Ad.86***	1356	44950	44951
Control Group							
Cn.4	1404	45124	45125	***Cn.57***	1439	45177	45178
Cn.5	1405	45125	45126	***Cn.70***	1446	45190	45191
Cn.9	1409	45129	45130	***Cn.71***	1447	45191	45192
Cn.10	140A	45130	45131	***Cn.72***	1448	45192	45193
Cn.11	140B	45131	45132	***Cn.73***	1449	45193	45194
Cn.21	1415	45141	45142	***Cn.74***	144A	45194	45195
Cn.22	1416	45142	45143	***Cn.75***	144B	45195	45196
Cn.23	1417	45143	45144	***Cn.76***	144C	45196	45197
Cn.24	1418	45144	45145	***Cn.77***	144D	45197	45198
Cn.29	141D	45149	45150	***Cn.78***	144E	45198	45199
Cn.30	141E	45150	45151	***Cn.79***	144F	45199	45200
Cn.53	1435	45173	45174	***Cn.80***	1450	45200	45201
Cn.54	1436	45174	45175	***Cn.81***	1451	45201	45202
Cn.55	1437	45175	45176	***Cn.82***	1452	45202	45203
Cn.56	1438	45176	45177	***Cn.83***	1453	45203	45204
Input Group							
In.1	1501	45377	45378	***In.47***	152F	45423	45424
In.2	1502	45378	45379	***In.50***	1532	45426	45427
In.5	1505	45381	45382	***In.52***	1534	45428	45429
In.6	1506	45382	45383	***In.53***	1535	45429	45430
In.7	1507	45383	45384	***In.54***	1536	45430	45431
In.8	1508	45384	45385	***In.55***	1537	45431	45432
In.9	1509	45385	45386	***In.56***	1538	45432	45433
In.10	150A	45386	45387	***In.61***	153D	45437	45438
In.11	150B	45387	45388	***In.62***	153E	45438	45439
In.12	150C	45388	45389	***In.65***	1541	45441	45442
In.13	150D	45389	45390	***In.66***	1542	45442	45443
In.14	150E	45390	45391	***In.67***	1543	45443	45444
In.15	150F	45391	45392	***In.68***	1544	45444	45445

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
In.16	1510	45392	45393	***In.69***	1545	45445	45446
In.17	1511	45393	45394	***In.84***	1554	45460	45461
In.35	1523	45411	45412	***In.85***	1555	45461	45462
In.37	1525	45413	45414	***In.86***	1556	45462	45463
In.38	1526	45414	45415	***In.87***	1557	45463	45464
In.39	1527	45415	45416	***In.88***	1558	45464	45465
In.40	1528	45416	45417	***In.89***	1559	45465	45466
In.41	1529	45417	45418	***In.90***	155A	45466	45467
In.46	152E	45422	45423	***In.99***	1563	45475	45476
Output Group							
OU.1	1601	45633	45634	***OU.53***	1635	45685	45686
OU.2	1602	45634	45635	***OU.54***	1636	45686	45687
OU.3	1603	45635	45636	***OU.55***	1637	45687	45688
OU.4	1604	45636	45637	***OU.56***	1638	45688	45689
OU.5	1605	45637	45638	***OU.57***	1639	45689	45690
OU.6	1606	45638	45639	***OU.58***	163A	45690	45691
OU.30	161E	45662	45663	***OU.67***	1643	45699	45700
OU.31	161F	45663	45664	***OU.68***	1644	45700	45701
OU.33	1621	45665	45666	***OU.69***	1645	45701	45702
OU.41	1629	45673	45674	***OU.70***	1646	45702	45703
OU.50	1632	45682	45683	***OU.71***	1647	45703	45704
OU.51	1633	45683	45684	***OU.72***	1648	45704	45705
OU.52	1634	45684	45685				

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Communication Group							
CM.1	1701	45889	45890	***CM.43***	172B	45931	45932
CM.2	1702	45890	45891	***CM.44***	172C	45932	45933
CM.3	1703	45891	45892	***CM.45***	172D	45933	45934
CM.4	1704	45892	45893	***CM.46***	172E	45934	45935
CM.5	1705	45893	45894	***CM.50***	1732	45938	45939
CM.6	1706	45894	45895	***CM.51***	1733	45939	45940
CM.7	1707	45895	45896	***CM.52***	1734	45940	45941
CM.8	1708	45896	45897	***CM.53***	1735	45941	45942
CM.9	1709	45897	45898	***CM.54***	1736	45942	45943
CM.10	170A	45898	45899	***CM.55***	1737	45943	45944
CM.11	170B	45899	45900	***CM.56***	1738	45944	45945
CM.12	170C	45900	45901	***CM.57***	1739	45945	45946
CM.13	170D	45901	45902	***CM.58***	173A	45946	45947
CM.14	170E	45902	45903	***CM.59***	173B	45947	45948
CM.15	170F	45903	45904	***CM.60***	173C	45948	45949
CM.16	1710	45904	45905	***CM.61***	173D	45949	45950
CM.17	1711	45905	45906	***CM.62***	173E	45950	45951
CM.18	1712	45906	45907	***CM.63***	173F	45951	45952
CM.19	1713	45907	45908	***CM.64***	1740	45952	45953
CM.20	1714	45908	45909	***CM.65***	1741	45953	45954
CM.21	1715	45909	45910	***CM.66***	1742	45954	45955
CM.22	1716	45910	45911	***CM.68***	1744	45956	45957
CM.23	1717	45911	45912	***CM.70***	1746	45958	45959
CM.24	1718	45912	45913	***CM.71***	1747	45959	45960
CM.30	171E	45918	45919	***CM.72***	1748	45960	45961
CM.31	171F	45919	45920	***CM.73***	1749	45961	45962
CM.32	1720	45920	45921	***CM.74***	174A	45962	45963
CM.33	1721	45921	45922	***CM.75***	174B	45963	45964
CM.34	1722	45922	45923	***CM.76***	174C	45964	45965
CM.35	1723	45923	45924	***CM.77***	174D	45965	45966
CM.36	1724	45924	45925	***CM.86***	1756	45974	45975
CM.37	1725	45925	45926	***CM.90***	175A	45978	45979
CM.38	1726	45926	45927	***CM.91***	175B	45979	45980
CM.39	1727	45927	45928	***CM.92***	175C	45980	45981
CM.40	1728	45928	45929	***CM.93***	175D	45981	45982
CM.41	1729	45929	45930	***CM.94***	-	-	-
CM.42	172A	45930	45931				

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Application Group							
AP.1	1801	46145	46146	***AP.29***	181D	46173	46174
AP.16	1810	46160	46161	***AP.30***	181E	46174	46175
AP.17	1811	46161	46162	***AP.31***	181F	46175	46176
AP.18	1812	46162	46163	***AP.32***	1820	46176	46177
AP.19	1813	46163	46164	***AP.34***	1822	46178	46179
AP.20	1814	46164	46165	***AP.35***	1823	46179	46180
AP.21	1815	46165	46166	***AP.36***	1824	46180	46181
AP.22	1816	46166	46167	***AP.37***	1825	46181	46182
AP.23	1817	46167	46168	***AP.38***	1826	46182	46183
AP.24	1818	46168	46169	***AP.39***	1827	46183	46184
AP.25	1819	46169	46170	***AP.40***	1828	46184	46185
AP.26	181A	46170	46171	***AP.43***	182B	46187	46188
AP.27	181B	46171	46172	***AP.44***	182C	46188	46189
AP.28	181C	46172	46173	***AP.45***	182D	46189	46190
Protection Group							
Pr.4	1B04	46916	46917	***Pr.43***	1B2B	46955	46956
Pr.5	1B05	46917	46918	***Pr.45***	1B2D	46957	46958
Pr.6	1B06	46918	46919	***Pr.50***	1B32	46962	46963
Pr.7	1B07	46919	46920	***Pr.51***	1B33	46963	46964
Pr.8	1B08	46920	46921	***Pr.52***	1B34	46964	46965
Pr.9	1B09	46921	46922	***Pr.53***	1B35	46965	46966
Pr.10	1B0A	46922	46923	***Pr.54***	1B36	46966	46967
Pr.12	1B0C	46924	46925	***Pr.55***	1B37	46967	46968
Pr.13	1B0D	46925	46926	***Pr.56***	1B38	46968	46969
Pr.14	1B0E	46926	46927	***Pr.57***	1B39	46969	46970
Pr.15	1B0F	46927	46928	***Pr.58***	1B3A	46970	46971
Pr.17	1B11	46929	46930	***Pr.59***	1B3B	46971	46972
Pr.18	1B12	46930	46931	***Pr.66***	1B42	46978	46979
Pr.19	1B13	46931	46932	***Pr.77***	1B4D	46989	46990
Pr.20	1B14	46932	46933	***Pr.78***	1B4E	46990	46991
Pr.21	1B15	46933	46934	***Pr.79***	1B4F	46991	46992
Pr.22	1B16	46934	46935	***Pr.80***	1B50	46992	46993
Pr.25	1B19	46937	46938	***Pr.81***	1B51	46993	46994
Pr.26	1B1A	46938	46939	***Pr.82***	1B52	46994	46995
Pr.27	1B1B	46939	46940	***Pr.86***	1B56	46998	46999
Pr.28	1B1C	46940	46941	***Pr.87***	1B57	46999	47000
Pr.29	1B1D	46941	46942	***Pr.88***	1B58	47000	47001
Pr.30	1B1E	46942	46943	***Pr.89***	1B59	47001	47002
Pr.31	1B1F	46943	46944	***Pr.91***	1B5B	47003	47004
Pr.32	1B20	46944	46945	***Pr.92***	1B5C	47004	47005
Pr.33	1B21	46945	46946	***Pr.93***	1B5D	47005	47006
Pr.40	1B28	46952	46953	***Pr.94***	1B5E	47006	47007
Pr.41	1B29	46953	46954	***Pr.95***	1B5F	47007	47008

Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal	Parameter	HEX	ModbusRTU Decimal	ModbusTCP Decimal
Pr.42	1B2A	46954	46955	***Pr.96***	1B60	47008	47009
2nd Motor Group							
M2.4	1C04	47172	47173	***M2.20***	-	-	-
M2.5	1C05	47173	47174	***M2.25***	1C19	47193	47194
M2.6	1C06	47174	47175	***M2.26***	1C1A	47194	47195
M2.7	1C07	47175	47176	***M2.27***	1C1B	47195	47196
M2.8	1C08	47176	47177	***M2.28***	1C1C	47196	47197
M2.10	1C0A	47178	47179	***M2.29***	1C1D	47197	47198
M2.11	1C0B	47179	47180	***M2.30***	1C1E	47198	47199
M2.12	1C0C	47180	47181	***M2.31***	1C1F	47199	47200
M2.13	1C0D	47181	47182	***M2.32***	1C20	47200	47201
M2.14	1C0E	47182	47183	***M2.33***	1C21	47201	47202
M2.15	1C0F	47183	47184	***M2.34***	1C12	47186	47187
M2.16	1C10	47184	47185	***M2.40***	1C28	47208	47209
M2.17	-	-	-	***M2.41***	1C29	47209	47210
M2.18	-	-	-	***M2.42***	1C2A	47210	47211
M2.19	-	-	-				
Operation Group							
0.00	1F00	47936	47937	***St3***	1F07	47943	47944
ACC	1F01	47937	47938	***Cur***	1F08	47944	47945
dEC	1F02	47938	47939	***RPM***	1F09	47945	47946
drv	1F03	47939	47940	***dCL***	1F0A	47946	47947
Fr9	1F04	47940	47941	***vOL***	1F0B	47947	47948
St1	1F05	47941	47942	***nOn***	1F0C	47948	47949
St2	1F06	47942	47943	***drC***	1F0D	47949	47950