

• 16B0301B3•  
**DCREG**

# OPERATION MANUAL

## - DCREG INTERFACE VIA MODBUS-RTU -

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R. 00  
Version 3.09

**English**

- This manual is integrant and essential to the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This device is to be used only for the purposes it has been designed to. Other uses should be considered improper and dangerous. The manufacturer is not responsible for possible damages caused by improper, erroneous and irrational uses.
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## 1 COMMUNICATION SPECIFICATIONS

Baud rate:	configurable between 1200 and 128000 bps via parameter <b>C161</b> (default: 9600 bps)
Datum format:	8 bits
Start bit:	1
Parity:	configurable between None, Even and Odd through parameter <b>C162</b> (default: None)
Stop bit:	2 if <b>C162</b> =None, 1 if <b>C162</b> =Even or Odd
Electric standard:	RS232 or RS485 half duplex or RS485 full duplex configurable via jumper on optional board ES733
Protocol:	MODBUS RTU
DCREG address :	configurable between 1 and 247 through parameter <b>C160</b> (default 1)
Initial address of data area:	configurable between 0 and 32767 through parameter <b>C163</b> (default 0)
Time out for end of message:	configurable between 0 and 2000 ms through parameter <b>C164</b> (default 300 ms)
Response delay:	configurable between 0 and 2000 ms through parameter <b>C165</b> (default 0 ms)

This manual describes how to interface a DCREG (slave) converter to an intelligent outside control unit (master) via MODBUS-RTU. **In order to perform this interface, an optional board ES733 must be installed on the DCREG (see paragraph 4).**

Via MODBUS-RTU

it is possible to:

read every parameter of the converter

modify and save on EEPROM the parameters marked **R/W** in the following paragraph 2;

it is not possible to:

perform converter auto-tuning;

manage the EEPROM in the same manner as the remotable keyboard (Default Restore, WorkArea Backup, Backup Restore).

The following table shows the MODBUS addresses allowing to access DCREG internal parameters via serial communication. The table shows:

- 1) the parameter name and number,
- 2) its configuration,
- 3) its MODBUS address,
- 4) the extremes which do not include 03 ILLEGAL DATA VALUE exception (see p.14/15),
- 5) its unit of measure (displayed),
- 6) the ratio between the DCREG internal value (sent via serial communication) and the physical value mentioned (displayed),
- 7) the access type (RO reading only or R/W reading and writing),
- 8) the logical blocks allowing it to be modified (writing).

N.B.: unless otherwise specified, each parameter is exchanged as integer with sign at 16 bit (between -32768 and +32767).

For further details on the parameter configuration (in particular for the alphanumeric parameters, pointed out as AlfaNum in column 5) and the logical blocks refer to "**OPERATION MANUAL 15P0059A3 DCREG2 DCREG4**" R.01 Software Vers. D3.09.

1) Name	2) Configuration	3) MODBUS Address	4) Range	5) Unit of measure	6) Ratio	7) RO R/W	8)
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## 2.1 MEASURE PARAMETERS

M000 Vref	Speed / voltage reference applied to ramps	10	-100 ÷ +100	%	100 / 3FFFh	RO	-
M001 nFdbk	Speed / voltage feedback	11	-100 ÷ +100	%	-100 / 3FFFh	RO	-
M002 NSetPoint	Speed / voltage error	12	-200 ÷ +200	%	100 / 3FFFh	RO	-
M003 Iref	Armature Current Reference	13	-150 ÷ +150	%	100 / 1FFh	RO	-
M004 Iarm	Armature current	14	-1.5 ÷ +1.5	A	DriveSize / 2400	RO	-
M005 Alfa	Thyristor Firing Delay Angle	15	P230 ÷ P231	°	100	RO	-
M006 Varm	Armature voltage	16	-1000 ÷ +1000	V	1	RO	-
M007 BackEMF	Back-Electromotive force	17	-1000 ÷ +1000	V	1	RO	-
M008 Mfreq	Mains frequency	18	40 ÷ 70	Hz	10	RO	-
M009 Vmains	Mains voltage	19	0 ÷ 1000	V	1	RO	-
M010 AnIn1	Auxiliary analog input 1 to terminals 11 and 13	20	-100 ÷ +100	%	100 / 3FFFh	RO	-
M011 AnIn2	Auxiliary analog input 2 to terminal 17	21	-100 ÷ +100	%	100 / 3FFFh	RO	-
M012 AnIn3	Auxiliary analog input 3 to terminal 19	22	-100 ÷ +100	%	100 / 3FFFh	RO	-
M013 UpDnRef	Internal UP/DOWN speed / voltage reference	23	-100 ÷ +100	%	100 / 3FFFh	RO	-
M014 TermRef	Speed / voltage reference to terminals 5 and 7	24	-100 ÷ +100	%	100 / 3FFFh	RO	-
M015 SLRef	Speed / voltage reference from MODBUS	25	-100 ÷ +100	%	100 / 3FFFh	R/W	97
M016 FBRef	Speed / voltage reference from PROFIBUS	26	-100 ÷ +100	%	100 / 3FFFh	RO	-
M017 RefFld	Field Current Reference	27	0 ÷ 100	%	100 / FFFh	RO	-
M018 Ifld	Field current	28	0 ÷ 40	A	40 / 3FFh	RO	-
M019 AnOut1	Analog output 1 on terminal 8	29	-10 ÷ +10	V	10 / FFFh	RO	-
M020 AnOut2	Analog output 2 on terminal 10	30	-10 ÷ +10	V	10 / FFFh	RO	-
M021 DigIn	Digital input state after the OR	31	00000000b ÷ 11111111b	Note A)		RO	-
M022 MDO	Digital output state	32	00000xxx b ÷ 11111xxx b	Note B)		RO	-
M023 FldReg	State Of Field Regulator Internal Digital Inputs	33	xx00xxxx b ÷ xx11xxxx b	Note C)		RO	-
M024 Pout	Electrical output power	34	0 ÷ 5250	kW	1 / 10	RO	-
M025 Torque	Motor torque	35	0 ÷ 180	%	100 / 2AAAh	RO	-
M026 EFreq	Encoder frequency	36	-102.4 ÷ +102.4	kHz	10 / 3FFFh	RO	-
M027 DriveLife	Drive life	468	0 ÷ 235926000	s	1	RO	-

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M028 PhaseSeq	Phase Sequence	38	0 ÷ 1	AlphaN u Note E)	RO	-
M029 TermDigIn	Digital input state to terminals 24, 26, 28, 30, 32, 34, 36 and 38	39	00000000b ÷ 11111111b	Note A)	RO	-
M030 SLDigIn	Digital input state from MODBUS	40	00000000b ÷ 11111111b	Note A)	R/W	98
M031 FBDigIn	Digital input state from PROFIBUS	41	00000000b ÷ 11111111b	Note A)	RO	-

## 2.2 PROGRAMMING PARAMETERS

P000 Key	Programming code	50	0 ÷ 2	AlphaN	R/W	10
P001 AutoTune	Auto Tune Command	51	0 ÷ 3	AlphaN	R/W	-
P002 ParmsCopy	Copy parameters command	52	0 ÷ 3	AlphaN	R/W	-
P003 ProgLevel	Programming level	53	0 ÷ 1	AlphaN	R/W	-
P004 FirstPage	Page displayed at power on	54	0 ÷ 1	AlphaN	R/W	-
P005 FirstParm	Measure parameter display on KEYPAD page	55	1 ÷ 33	Note H)	R/W	-
P006 MeasureSel	Selection of measure parameters in page KEYPAD	463 ÷ 466		Nota J)	R/W	-
P010 nFdbkMax	Max speed	60	300 ÷ 6000	RPM	1	R/W -
P011 VarmMax	Max armature voltage	61	50 ÷ 2000	V	1	R/W 19
P012 SpdDmndPol	Speed / Voltage Reference Polarity	62	0 ÷ 2	AlphaN	R/W	113
P013 nMaxPos	Speed / Voltage Max. Positive Reference	63	0 ÷ 100	%	1	R/W 40
P014 nMinPos	Speed/ Voltage Min. Positive Reference	64	0 ÷ 100	%	1	R/W 111
P015 nMaxNeg	Speed / Voltage Max. Negative Reference	65	-100 ÷ 0	%	1	R/W 41
P016 nMinNeg	Speed / Voltage Min. Negative Reference	66	-100 ÷ 0	%	1	R/W 112
P030 RampUpPos	Positive Reference Ramp Up	75	0 ÷ 300	S	100	R/W 87
P031 RampDnPos	Positive Reference Ramp Down	76	0 ÷ 300	S	100	R/W 87
P032 RampUpNeg	Negative Reference Ramp Up	77	0 ÷ 300	S	100	R/W 87
P033 RampDnNeg	Negative Reference Ramp Down	78	0 ÷ 300	s	100	R/W 87
P034 RampStopPos	Positive Reference Stop Ramp	79	0 ÷ 300	s	100	R/W -
P035 RampStopNeg	Negative Reference Stop Ramp	80	0 ÷ 300	s	100	R/W -
P036 RampUpJog	Jog Reference Ramp Up	81	0 ÷ 300	s	100	R/W -
P037 RampDnJog	Jog Reference Ramp Down	82	0 ÷ 300	s	100	R/W -
P038 InitialRndg	Ramp initial rounding	83	0 ÷ 10	s	100	R/W 87
P039 FinalRndg	Ramp final rounding	84	0 ÷ 10	s	100	R/W 87
P040 RamplncDec	UP/DOWN internal reference ramp	85	0.1 ÷ 100	s	100	R/W -
P050 Ilim1A	Bridge A First Current Limit	90	0 ÷ 300	%	1	R/W -
P051 Ilim1B	Bridge B First Current Limit	91	0 ÷ 300	%	1	R/W 101
P052 Ilim2A	Bridge A Second Current Limit	92	0 ÷ 300	%	1	R/W -
P053 Ilim2B	Bridge B Second Current Limit	93	0 ÷ 300	%	1	R/W 101
P054 Speed 1→2	1→2 Current Limit Speed Rate	94	0 ÷ 100	%	1	R/W -
P055 IlimHyper	Current Limit For Hyperbola End	95	0 ÷ 300	%	1	R/W -
P056 SpeedHyper1	Hyperbolic Limit Start Speed	96	0 ÷ 100	%	1	R/W 50
P057 SpeedHyper2	Hyperbolic Limit End Speed	97	0 ÷ 100	%	1	R/W 51
P058 Clim	Current Limit Decrease Per Cent	98	0 ÷ 100	%	1	R/W -

P059	dl/dtMax	Ramp over current reference	99	0.01 ÷ 1	%/μs	500	R/W	-
P060	OverLimA	Bridge A Current Overlimit	100	100 ÷ 300	%	1	R/W	-
P061	OverLimB	Bridge B Current Overlimit	101	100 ÷ 300	%	1	R/W	101
P062	TFullOvLim	Overlimit Digital Output Delay	102	0.2 ÷ 60	s	10	R/W	-
P070	KpSpeed	Speed loop proportional gain	110	0.1 ÷ 100		300	R/W	-
P071	TiSpeed	Speed loop integral time	111	0.01 ÷ 5	s	1000	R/W	-
P073	KpSpdAdapt	Speed loop adapted proportional gain	113	0.1 ÷ 100		300	R/W	-
P074	TiSpdAdapt	Speed loop adapted integral time	114	0.01 ÷ 5	s	1000	R/W	-
P076	KpSpeed2	Speed Loop Second Proportional Gain	116	0.1 ÷ 100		300	R/W	-
P077	TiSpeed2	Speed Loop Second Integral Time	117	0.01 ÷ 5	s	1000	R/W	-
P079	KpSpdAdapt2	Speed Loop Second Adapted Proportional Gain	119	0.1 ÷ 100		300	R/W	-
P080	TiSpdAdapt2	Speed Loop Second Adapted Integral Time	120	0.01 ÷ 5	s	1000	R/W	-
P082	AdaptCtrl	Speed Parameter Auto-Adaptation	122	0 ÷ 1	AlphaN u		R/W	-
P083	Verr1	First speed error for auto-adaptation	123	0 ÷ 100	%	10	R/W	30
P084	Verr2	Second speed error for auto-adaptation	124	0 ÷ 100	%	10	R/W	31
P085	TiRampScale	Ramp Speed Integral Time Increase	125	1 ÷ 1000		1	R/W	-
P086	ArmatureCmp	Armature compensation	126	0 ÷ 200	%	1	R/W	-
P087	VerrOffset	Speed / voltage error offset	127	-1 ÷ +1	%	100 / 3FFFh	R/W	-
P088	Rxl	Armature resistive drop	128	0 ÷ 100	V	1	R/W	18
P100	KpCurr	Current loop proportional gain	135	0 ÷ 1		2000 0	R/W	-
P101	TiCurrDisc	Current Loop Integral Time With Discontinuous Current Conduction	136	1 ÷ 100	ms	100	R/W	-
P102	TiCurrCont	Current loop integral time in With Continuous Current Conduction	137	1 ÷ 320	ms	100	R/W	-
P103	Rxl Pred	Armature equivalent resistive drop	138	0 ÷ 282.8	V	20 / 1.414	R/W	-
P104	Ldl/dt Pred	Armature equivalent inductive drop	139	0 ÷ 2.828	V	2000 / 1.414	R/W	-
P110	KpFld	Voltage Loop Proportional Gain For Field Regulator	145	0.005 ÷ 1.500		2	R/W	-
P111	TiFld	Voltage Loop Integral Time For Field Regulator	146	0.1 ÷ 1	s	100	R/W	-
P120	VrefPol	Speed / voltage Main Analog Input Polarity	150	0 ÷ 2	AlphaN u		R/W	-
P121	VrefBias	Speed/voltage Main Analog Input Bias	151	-400 ÷ +400	%	10	R/W	-
P122	VrefGain	Speed/voltage Main Analog Input Gain	152	-800 ÷ +800	%	10	R/W	-
P123	IrefPol	Current Main Analog Input Polarity	153	0 ÷ 2	AlphaN u		R/W	-
P124	IrefBias	Current Main Analog Input Bias	154	-400 ÷ +400	%	10	R/W	-

P125 IrefGain	Main Current Analog Input Gain	155	-800 +800	÷ %	10	R/W	-
P126 AnIn1Pol	Polarity for auxiliary analog input 1	156	0 ÷ 2	AlphaN u		R/W	-
P127 AnIn1Bias	Bias for auxiliary analog input 1	157	-400 +400	÷ %	10	R/W	-
P128 AnIn1Gain	Gain for auxiliary analog input 1	158	-800 +800	÷ %	10	R/W	-
P129 AnIn2Pol	Polarity for auxiliary analog input 2	159	0 ÷ 2	AlphaN u		R/W	-
P130 AnIn2Bias	Bias for auxiliary analog input 2	160	-400 +400	÷ %	10	R/W	-
P131 AnIn2Gain	Gain for auxiliary analog input 2	161	-800 +800	÷ %	10	R/W	-
P132 AnIn3Pol	Polarity for auxiliary analog input 4	162	0 ÷ 2	AlphaN u		R/W	-
P133 AnIn3Bias	Bias for auxiliary analog input 3	163	-400 +400	÷ %	10	R/W	-
P134 AnIn3Gain	Gain for auxiliary analog input 3	164	-800 +800	÷ %	10	R/W	-
P150 AnOut1Cfg	Analog Output Configuration	1 175	0 ÷ 13	AlphaN u		R/W	-
P151 AnOut1Bias	Analog output 1 bias	176	-400 +400	÷ %	10	R/W	-
P152 AnOut1Gain	Analog output 1 gain	177	-800 +800	÷ %	10	R/W	-
P153 AnOut2Cfg	Analog Output Configuration	2 178	0 ÷ 13	AlphaN u		R/W	-
P154 AnOut2Bias	Analog Output 2 Bias	179	-400 +400	÷ %	10	R/W	-
P155 AnOut2Gain	Analog Output 2 Gain	180	-800 +800	÷ %	10	R/W	-
P156 IOutPol	Analog Output IOut Polarity	181	0 ÷ 1	AlphaN u		R/W	101
P157 AnOut1Pol	Analog Output 1 Polarity	182	0 ÷ 1	AlphaN u		R/W	-
P158 AnOut2Pol	Analog Output 2 Polarity	183	0 ÷ 1	AlphaN u		R/W	-
P170 MDO1Cfg	Digital Output 1 Configuration	190	0 ÷ 13	AlphaN u		R/W	-
P171 MDO1OnDelay	Digital output 1 Enabling delay	191	0 ÷ 600	s	50	R/W	-
P172 MDO1OffDelay	Digital output 1 Disabling delay	192	0 ÷ 600	s	50	R/W	-
P173 MDO1Level	Digital output 1 switching level	193	0 ÷ 200	%	1	R/W	60
P174 MDO1Hyst	Digital output 1 switching hysteresis	194	0 ÷ 200	%	1	R/W	61
P175 MDO1Logic	Digital output 1 contact logic	195	0 ÷ 1	AlphaN u		R/W	-
P176 MDO2Cfg	Digital Output 2 Configuration	196	0 ÷ 13	AlphaN u		R/W	-
P177 MDO2OnDelay	Digital output 2 Enabling delay	197	0 ÷ 600	s	50	R/W	-
P178 MDO2OffDelay	Digital output 2 Disabling delay	198	0 ÷ 600	s	1	R/W	-
P179 MDO2Level	Digital output 2 switching level	199	0 ÷ 200	%	1	R/W	62



P180 MDO2Hyst	Digital output 2 switching hysteresis	200	0 ÷ 200	%	1	R/W	63
P181 MDO2Logic	Digital output 2 contact logic	201	0 ÷ 1	AlphaN		R/W	-
P182 MDO3Cfg	Digital Output 3 Configuration	202	0 ÷ 13	AlphaN		R/W	-
P183 MDO3OnDelay	Digital output 3 Enabling delay	203	0 ÷ 600	s	1	R/W	-
P184 MDO3OffDelay	Digital output 3 Disabling delay	204	0 ÷ 600	s	1	R/W	-
P185 MDO3Level	Digital output 3 switching level	205	0 ÷ 200	%	1	R/W	64
P186 MDO3Hyst	Digital output 3 switching hysteresis	206	0 ÷ 200	%	50	R/W	65
P187 MDO3Logic	Digital output 3 contact logic	207	0 ÷ 1	AlphaN		R/W	-
P188 MDO4Cfg	Digital Output 4 Configuration	208	0 ÷ 13	AlphaN		R/W	-
P189 MDO4OnDelay	Digital output 4 Enabling delay	209	0 ÷ 600	s	1	R/W	-
P190 MDO4OffDelay	Digital output 4 Disabling delay	210	0 ÷ 600	s	1	R/W	-
P191 MDO4Level	Digital output 4 switching level	211	0 ÷ 200	%	50	R/W	66
P192 MDO4Hyst	Digital output 4 switching hysteresis	212	0 ÷ 200	%	50	R/W	67
P193 MDO4Logic	Digital output 4 contact logic	213	0 ÷ 1	AlphaN		R/W	-
P194 MDO5Cfg	Digital Output 5 Configuration	214	0 ÷ 10	AlphaN		R/W	-
P195 MDO5OnDelay	Digital output 5 Enabling delay	215	0 ÷ 600	s	1	R/W	-
P196 MDO5OffDelay	Digital output 5 Disabling delay	216	0 ÷ 600	s	50	R/W	-
P197 MDO5Level	Digital output 5 switching level	217	0 ÷ 200	%	50	R/W	68
P198 MDO5Hyst	Digital output 5 switching hysteresis	218	0 ÷ 13	%	1	R/W	69
P199 MDO5Logic	Digital output 5 contact logic	219	0 ÷ 1	AlphaN		R/W	-
P211 PresetSpd1	Preset Speed/voltage Reference	1 226	-100 ÷ +100	%	10	R/W	-
P212 PresetSpd2	Preset speed/voltage reference	2 227	-100 ÷ +100	%	10	R/W	-
P213 PresetSpd3	Preset speed/voltage reference	3 228	-100 ÷ +100	%	10	R/W	-
P214 PresetSpd4	Preset speed/voltage reference	4 229	-100 ÷ +100	%	10	R/W	-
P215 PresetSpd5	Preset speed/voltage reference	5 230	-100 ÷ +100	%	10	R/W	-
P216 PresetSpd6	Preset speed/voltage reference	6 231	-100 ÷ +100	%	10	R/W	-
P217 PresetSpd7	Preset speed/voltage reference	7 232	-100 ÷ +100	%	10	R/W	-
P221 JogSelect	Jog ramp selection	236	0 ÷ 2	AlphaN		R/W	-
P222 Jog1	Jog 1 reference	237	-100 ÷ +100	%	10	R/W	-
P223 Jog2	Jog 2 reference	238	-100 ÷ +100	%	10	R/W	-

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P224 Jog3	Jog 3 reference	239	-100 +100	÷ %	10	R/W	-
P230 AlfaMin	Firing Min. Angle	245	0 ÷ 80	°	100	R/W	-
P231 AlfaMax	Firing Max. Angle	246	100 ÷ 180	°	100	R/W	-
P240 LowPassConst	Low Pass Filter Over The Voltage / Speed Error	250	0 ÷ 300	ms	100	R/W	-
P250 UpDnRefPol	UP/DOWN internal reference polarity	255	0 ÷ 2	AlphaN u		R/W	-
P251 UpDnRefMem	UP/DOWN internal reference reset at start-up	256	0 ÷ 1	AlphaN u		R/W	-

## 2.3 CONFIGURATION PARAMETERS

**NOTE**

R/W parameters may be changed only when drive DCREG is not in RUN mode.

C000 Inom	Motor nominal current	<b>310</b>	1 ÷ 100	%	1	R/W	-
C001 MotThrshold	Current For Motor I <sup>2</sup> t Protection	<b>311</b>	1 ÷ 120	%	1	R/W	-
C002 MotThConst	Time Constant For Motor I <sup>2</sup> t Protection	<b>312</b>	0 ÷ 10800	s	1	R/W	-
C010 IfldNom	Motor field nominal current	<b>320</b>	3 ÷ 100	%	10	R/W	-
C011 BaseSpeed	Field Regulation Start Nominal Speed	<b>321</b>	5 ÷ 100	%	1	R/W	-
C012 VarmNom	Nominal Armature Voltage at field regulation start	<b>322</b>	50 ÷ 1000	V	1	R/W	-
C014 FldEcoLevel	Standstill Field Current	<b>324</b>	0 ÷ 100	%	1	R/W	-
C015 FldEcoDelay	Standstill Field Current Decrease Delay	<b>325</b>	0 ÷ 300	s	50	R/W	-
C016 IfldMin	Min. Field Current In Field Regulation Mode	<b>326</b>	5 ÷ 100	%	1	R/W	-
C017 FldFrcLevel	Field Current Boost	<b>327</b>	100 ÷ 120	%	1	R/W	-
C018 FldFrcTime	Field Current Boost Time	<b>328</b>	0 ÷ 60	s	50	R/W	-
C030 VmainsNom	Power Supply Nominal Voltage	<b>330</b>	10 ÷	V	1	R/W	20
C050 SpdLoopSel	Speed Loop Operation	<b>335</b>	1 ÷ 3	AlphaNu		R/W	86
C051 CurrLoopSel	Current Loop Operation	<b>336</b>	0 ÷ 1	AlphaNu		R/W	-
C052 FldLoopSel	Field Regulator Voltage Loop Operation	<b>337</b>	0 ÷ 1	AlphaNu		R/W	-
C060 1stQ- FwdMot	First Quadrant Selection	<b>340</b>	0 ÷ 1	AlphaNu		R/W	-
C061 2ndQ- RevReg	Second Quadrant Selection	<b>341</b>	0 ÷ 1	AlphaNu		R/W	-
C062 3rdQ- RevMot	Third Quadrant Selection	<b>342</b>	0 ÷ 1	AlphaNu		R/W	101
C063 4thQ- FwdReg	Fourth Quadrant Selection	<b>343</b>	0 ÷ 1	AlphaNu		R/W	101
C070 nFdbkSelect	Speed feedback selection	<b>345</b>	0 ÷ 4	AlphaNu		R/W	-
C072 EncoderPls	Encoder pulses / rev	<b>347</b>	100 ÷ 10000	Pulses	1	R/W	-
C074 Tach Volts	Tacho transduction ratio	<b>349</b>	5 ÷ 120	V / 1000 RPM	1	R/W	-
C075 nFdbkSwitch	Feedback autoswitch	<b>350</b>	0 ÷ 1	AlphaNu		R/W	-
C090 AutoReset	Alarm autoreset number	<b>355</b>	0 ÷ 10	AlphaNu		R/W	-
C091 AutoResTime	Autoreset Number Time	<b>356</b>	1 ÷ 999	s	1	R/W	-
C092 PwrOnReset	Power-On Autoreset	<b>357</b>	0 ÷ 1	AlphaNu		R/W	-
C093 MainsReset	Autoreset after mains Cut Out	<b>358</b>	0 ÷ 1	AlphaNu		R/W	-
C094 StartSafety	Restart Safety	<b>359</b>	0 ÷ 1	AlphaNu		R/W	-
C100 LocRemSel	LOCAL / REMOTE Selection Enabling	<b>365</b>	0 ÷ 1	AlphaNu		R/W	-
C101 PwrOnDelay	Waiting time for starting	<b>366</b>	0 ÷ 10	s	1000	R/W	-
C102 ZeroingTime	Current zeroing time	<b>367</b>	30 ÷ 3000	ms	10	R/W	-
C103 EmergStop	Emergency stop	<b>368</b>	0 ÷ 1	AlphaNu		R/W	-

C105 RefSelect1	Speed / voltage reference	370	0 ÷ 4	AlphaNu	R/W	122
C106 RefSelect2	Speed / voltage reference	371	0 ÷ 4	AlphaNu	R/W	122
C107 RefSelect3	Speed / voltage reference	372	0 ÷ 4	AlphaNu	R/W	122
C108 RefSelect4	Speed / voltage reference	373	0 ÷ 4	AlphaNu	R/W	122
C110 CommandSel1	Command source 1	375	0 ÷ 4	AlphaNu	R/W	122
C111 CommandSel2	Command source 2	376	0 ÷ 4	AlphaNu	R/W	122
C112 CommandSel3	Command source 3	377	0 ÷ 4	AlphaNu	R/W	122
C120 AnIn1Cfg	Analog Input 1 Configuration	385	0 ÷ 10	AlphaNu	R/W	-
C121 AnIn2Cfg	Analog Input 2 Configuration	386	0 ÷ 10	AlphaNu	R/W	-
C122 AnIn3Cfg	Analog Input 3 Configuration	387	0 ÷ 10	AlphaNu	R/W	-
C123 ExtLimPol	External Limit Polarity	388	0 ÷ 1	AlphaNu	R/W	-
C130 MDI1Cfg	Digital Input 1 Configuration	395	0 ÷ 20	AlphaNu	R/W	-
C131 MDI2Cfg	Digital Input 2 Configuration	396	0 ÷ 20	AlphaNu	R/W	-
C132 MDI3Cfg	Digital Input 3 Configuration	397	0 ÷ 20	AlphaNu	R/W	-
C133 MDI4Cfg	Digital Input 4 Configuration	398	0 ÷ 20	AlphaNu	R/W	-
C134 MDI5Cfg	Digital Input 5 Configuration	399	0 ÷ 20	AlphaNu	R/W	-
C135 MDI6Cfg	Digital Input 6 Configuration	400	0 ÷ 20	AlphaNu	R/W	-
C141 A016/7 (VAC)	Alarm A016/17 Trip Delay	406	0 ÷ 2000	ms	2	R/W -
C142 A027	Alarm A027 Trip Delay	407	1 ÷ 100	s	50	R/W -
C143 A028	Alarm A028 Trip Delay	408	1 ÷ 100	s	50	R/W -
C150 A001 (Fld)	Alarm A001 disabling	410	0 ÷ 1	AlphaNu	R/W	-
C151 A004 (Load)	Alarm A004 disabling	411	0 ÷ 1	AlphaNu	R/W	-
C153 A006 (fUnst)	Alarm A006 disabling	413	0 ÷ 1	AlphaNu	R/W	-
C154 A007 (Mains)	Alarm A007 disabling	414	0 ÷ 1	AlphaNu	R/W	-
C155 A008 (nFdbk)	Alarm A008 disabling	415	0 ÷ 1	AlphaNu	R/W	-
C156 A010 (ArmOV)	Alarm A010 disabling	416	0 ÷ 1	AlphaNu	R/W	-
C157 A016/7 (VAC)	Alarm A016/17 disabling	417	0 ÷ 1	AlphaNu	R/W	-
C158 A027	Alarm A027 disabling	418	0 ÷ 1	AlphaNu	R/W	-
C159 A028	Alarm A028 disabling	419	0 ÷ 1	AlphaNu	R/W	-
C160 DeviceID	Converter address in serial connection	420	1 ÷ 247	AlphaNu	R/W	-
C161 BaudRate	Serial Connection Baud Rate	421	0 ÷ 7	AlphaNu	R/W	-
C162 Parity	Serial Connection Parity Control	422	0 ÷ 2	AlphaNu	R/W	-
C163 BaseAddress	Master Data Area Starting Address	423	0 ÷ 32767	AlphaNu	R/W	-
C164 RTUTimeOut	Serial time out	424	0 ÷ 2000	ms	2	R/W -
C165 Rx→TxDelay	Serial Response Delay	425	0 ÷ 2000	ms	2	R/W -
C170 LoadType	Load type	430	0 ÷ 1	AlfaNum	R/W	-

## 2.4 SPECIAL PARAMETERS

**NOTE**

R/W parameters may be modified only when drive DCREG is not in RUN mode.

<b>AlarmNumber</b>	Alarm or warning code	<b>8</b>	0 ÷ 36	AlphaNum <b>Note K)</b>	1	RO	-
<b>Imax</b>	Posizione trimmer T2	<b>467</b>	0 ÷ 3FFh		1	RO	-
<b>LED</b>	LED state on remotable keyboard	<b>471</b>	00000000b ÷ 11111111b	<b>Note L)</b>		RO	-
<b>SaveAddress</b>	EEPROM Save Address	<b>472</b>	0 ÷ 511	<b>Note M)</b>	1	RO	-
<b>SWVersion</b>	SW Version (e.g. D3.09)	<b>475</b>		<b>Note N)</b>	100	RO	-
<b>DriveType</b>	Uni / Bidirectional DCREG	<b>480</b>	0 ÷ 2	AlphaNu <b>Note O)</b>		RO	-
<b>DriveSize</b>	DCREG Size	<b>481</b>	10 ÷ 3500	A	1	RO	-
<b>VmainsMax</b>	Mains Max. Voltage To Be Applied To The Power Section	<b>482</b>	0 ÷ 3	AlphaNu <b>Note P)</b>		RO	-
<b>VarmOffset</b>	Offset over the armature voltage reading	<b>483</b>	-500 ÷ +500	V	1	R/W	-
<b>FieldSize</b>	DCREG field circuit size	<b>484</b>	0 ÷ 3	AlphaNu <b>Note Q)</b>		RO	-

**Note A)**

Bit 0 ENABLE  
 Bit 1 START  
 Bit 2 MDI1  
 Bit 3 MDI2  
 Bit 4 MDI3  
 Bit 5 MDI4  
 Bit 6 MDI5  
 Bit 7 MDI6

**Note B)**

Bit 3 MDO5  
 Bit 4 MDO1  
 Bit 5 MDO2  
 Bit 6 MDO3  
 Bit 7 MDO4

**Note C)**

Bit 4 → /60HZ  
 5 → /RUN

**Note E)**

= 0: RST; = 1: TSR.

**Note F)**

It is possible to read and write the values of parameter **P002** at any time ,but it is not possible to interact completely with the auto-tuning (it is necessary to press keys on the remotable keyboard and close the ENABLE contact) except directly on the converter.

**Note G)**

It is possible to read and write the values of parameter **P003** at any time, but it is not possible to manage the EEPROM completely (it is necessary to press keys on the remotable keyboard) except directly on the converter.

**Note H)**

KEYPAD if **FirstParm** = 1;  
Mxxx = **FirstParm**-2 if **FirstParm** > 1;

**Nota J)**

The 8 measures parameter chosen from P006 are settled as byte (8 bit) in the following way, setting in parameter 1 the first parameter displayed in KEYPAD, with parameter 2 the second and so on:

<b>466</b> hight side parameter 8	<b>466</b> bottom side parameter 7	<b>465</b> hight side parameter 6	<b>465</b> bottom side parameter 5	<b>464</b> hight side parameter 4	<b>464</b> bottom side parameter 3	<b>463</b> hight side parameter 2	<b>463</b> bottom side parameter 1
---	--	---	--	---	--	---	--

• **Nota K) !!!**

Drive OK if **Allarm number** (Special parameter) = 0;  
Allarm = **Allarm number** if **Allarm number** ≤ 33;  
Warning = **Allarm number** -33 if **Allarm number** > 33.

**Note L)**

Bit 0 RUN  
Bit 1 FORWARD  
Bit 2 LOC SEQ  
Bit 3 BRAKE  
Bit 4 REF  
Bit 5 REVERSE  
Bit 6 LOC REM  
Bit 7 I LIMIT

**Note M)**

If a parameter value is to be saved on EEPROM, set **SaveAddress** (SPECIAL PARAMETER) = MODBUS address of the parameter to be saved. Once saved, such address will be automatically reset to 0.

**Note N)**

**SWVersion** (SPECIAL PARAMETER) = 309 (for example) means D3.09

**Note O)**

= 0: DCREG4;  
= 1: DCREG2;  
= 2: DCREG2F.

**Note P)**

= 0: 440V;  
= 1: 500V;  
= 2: 600V;  
= 3: 690V.

**Note Q)**

= 0: Standard;  
= 1: 5A  
= 2: 15A;  
= 3: 35A.

**Note 10**

Greater limit = 1 if ENABLE is closed.

**Note 18**

Is to be less than **P011 VarmMax**.

**Note 19**

Is to be greater than **P088 Rxl**.

**Note 20**

Is to be less than **VmainsMax** (SPECIAL PARAMETER).

**Note 30**

Is to be less than **P084 Verr2**.

**Note 31**

Is to be greater than **P083 Verr1**.

**Note 40**

Is to be greater than **P014 nMinPos**.

**Note 41**

Is to be less than **P016 nMinNeg**.

**Note 50**

Is to be less than **P057 SpeedHyper2**.

**Note 51**

Is to be greater than **P056 SpeedHyper1**.

**Note 60**

Is to be greater than **P174 MDO1Hyst**.

**Note 61**

Is to be less than **P173 MDO1Level**.

**Note 62**

Is to be greater than **P180 MDO2Hyst**.

**Note 63**

Is to be less than **P179 MDO2Level**.

**Note 64**

Is to be greater than **P186 MDO3Hyst**.

**Note 65**

Is to be less than **P185 MDO3Level**.

**Note 66**

Is to be greater than **P192 MDO4Hyst**.

**Note 67**

Is to be less than **P191 MDO4Level**.

**Note 68**

Is to be greater than **P198 MDO5Hyst**.

**Note 69**

Is to be less than **P197 MDO1Level**.

**Note 86**

May be changed only if any MDI configured as MASTER/SLAVE is disabled (see DCREG2(F) DCREG4 OPERATION MANUAL).

**Note 87**

May be changed only if any MDI configured as RAMP RESET is disabled (see DCREG2(F) DCREG4 OPERATION MANUAL).

**Note 97**

May be changed only if at least one out of C105 RefSelect1, C106 RefSelect2, C107 RefSelect3, C108 RefSelect4=3.

**Note 98**

May be changed only if at least one out of C110 CommandSelect1, C111 CommandSelect2, C112 CommandSelect3=3.

**Note 101**

May be changed only if **DriveType** (SPECIAL PARAMETER) = 0.

**Note 111**

May be changed only if **P012 SpdDmndPolarity** = 1. Is to be less than **P013 nMaxPos**.

**Note 112**

May be changed only if **P012 SpdDmndPolarity** = 2. Is to be greater than **P015 nMaxNeg**.

**Note 113**

May be changed only if **P015 nMinPos** = **P016 nMinNeg** = 0.

**Note 122**

May be changed only if the keys LOC/REM on the remotable keyboard have not been pressed.



### 3 MESSAGE FORMAT

The messages and data are sent through standard MODBUS protocol in RTU mode. Said protocol has control procedures using an 8-bit binary system.

In standard RTU mode, the message sending is determined by a standstill interval equal to 3.5 times the transmission time of a character (marked with T1-T2-T3-T4 in the table below). If the communication is cut out for a time longer than 3.5 times the transmission time of a character, this will be considered as the message end by DCREG drive. Similarly, if a message starts with a lower standstill interval, it will be considered as the continuation of the previous message.

Message sending	Address	Function	Data	Error control	Message end
T1-T2-T3-T4	8 bit	8 bit	n x 8 bit	16 bit	T1-T2-T3-T4

In order not to have any problem with those systems that do not comply with said standard timing, parameter **C164 RTUTimeOut** allows to extend such time interval up to 2000ms.

#### Address

The values acknowledged by the Address field range from 0 to 247 as the slave peripheral address. The master queries the peripheral pointed out in said field, which responds with a message containing its address. The master may then acknowledge the responding slave. A master query characterised by address 0 will concern every slave – in this case, any slave will respond (BROADCAST mode).

#### Function

The message function may be chosen among 0 to 255. If the slave response is correct (i.e. no error occurs) the function code is just sent to the master again; on the other hand, if an error takes place, the most significant bit in this field will be set at 1.

**However, the only two functions allowed are 03h and 10h (see below).**

#### Data

The data field contains any further information required for the function being used.

#### Error control

Any error is controlled via CRC (Cyclical Redundancy Check) method: the 16-bit value of the relevant field is computed when the transmitter sends the message, then it will be computed and checked by the receiver again.

Register CRC is computed as follows:

At the beginning, register CRC is set at FFFFh

Exclusive OR operation is performed between CRC and the first 8 bits in the message; the result is stored in a 16-bit register.

Said register is shifted to the right by one step.

If the bit on the right is 1, exclusive OR will be performed between the 16-bit register and value 1010000000000001b.

Steps 3 and 4 are repeated up to 8 shiftings.

Exclusive OR is now performed between 16-bit register and the following 8 bits in the message.

Repeat steps 3 to 6 until any message byte has been processed.

The result is a CRC which will be annexed to the message by sending the less significant byte as the first byte

## 3.1 FUNCTIONS SUPPORTED

### 3.1.1 03h: READ HOLDING REGISTERS

Allows to read the state of one or more slave device registers. The broadcast mode is inhibited (address 0). The additional parameters are the basic digital register address to be read and the output number to be read.

Query	Response
Slave address	Slave address
<b>03h function</b>	<b>03h function</b>
Register address (High)	Byte number
Register address (Low)	Data
Register number (High)	...
Register number (Low)	Data
CRC (Low)	CRC (Low)
CRC (High)	CRC (High)

### 3.1.2 10h: Preset Multiple Registers

Allows to set the state of one or more slave device registers. The broadcast mode (address 0) is enabled: in that case, the function sets the state of the same register in any slave that is connected.

The additional parameters are the basic register address, the register number to be set, their value and the byte number used for the data.

Query	Response
Slave address	Slave address
<b>10h function</b>	<b>10h function</b>
Register address (High)	Register address (High)
Register address (Low)	Register address (Low)
Register number (High)	Register number (High)
Register number (Low)	Register number (Low)
Byte number	CRC (Low)
Register value (High)	CRC (High)
Register value (Low)	
...	
Register value (High)	
Register value (Low)	
CRC (Low)	
CRC (High)	

In both functions, the register address is the number displayed in column 3) MODBUS address in the table on page 3/15 and following. To said address, the master may sum up a basic value which is the same for any parameter: such value is to match with C163 BaseAddress and will be automatically subtracted by DCREG while receiving.

---

## Exceptions

If DCREG detects a message error, the master will be sent a message like the one below:

Slave address
Function (MSB = 1)
Error code
CRC (Low)
CRC (High)

The code meaning is the following:

Code	Name	Meaning
<b>01h</b>	<b>ILLEGAL FUNCTION</b>	This function is not implemented in DCREG drive
<b>02h</b>	<b>ILLEGAL DATA ADDRESS</b>	The address pointed out in the relevant field is not correct for DCREG drive
<b>03h</b>	<b>ILLEGAL DATA VALUE</b>	The value is not allowable for the address pointed out

---

## 4 DESCRIPTION OF BOARD es733



### NOTE

This optional board is to be used for the serial connection. The board is to be fit in connector CN7 in board ES800 (DCREG control) and fastened with the three nylon clamps. It does not require any further setting – except for the jumper setting below.

#### **CN1: RS485**

CN1: 1 GND

CN1: 2 n.c

CN1: 3 RX+

CN1: 4 TX+

CN1: 5 GND

CN1: 6+5v.

CN1: 7 n.c.

CN1: 8 RX-

CN1: 9 TX-

#### **CN2: RS232**

CN2: 1 DCD

CN2: 2 RXD

CN2: 3 TXD

CN2: 4 DTR

CN2: 5 GND

CN2: 6 DSR

CN2: 7 RTS

CN2: 8 CTS

CN2: 9 RI

**JP1:** 1-2 = RS485 2 FILI (HALF DUPLEX)

**JP1:** 2-3 = RS485 4 FILI (FULL DUPLEX)

**JP2:** 1-2 = SWAP TX/RX

**JP2:** 2-3 = ECHO ON

**JP3:** 1-2 = RS232

**JP3:** 2-3 = RS485

**JP4:** 1-2 = BIAS ON

**JP4:** 2-3 = BIAS OFF

**JP5:** 1-2 = TERMINATION ON

**JP5:** 2-3 = TERMINATION OFF

**JP6:** 1-2 = BIAS ON

**JP6:** 2-3 = BIAS OFF

**L1:** TX

**L2:** RX

---

## 5 HALF DUPLEX CONTROL FOR LINE RS485

When managing bus RS485, the master must be in reception mode and the bus is to be left free: keep signal DTR equal to 0 (its driver RS485 output is high impedance). Only during transmission the bus is to be engaged by setting DTR at 1. Instead of using DTR signal, a different signal might be used (e.g. RTS), depending on the converter RS232-RS485 being used.

DCREG drive will start controlling the serial line as soon as it acknowledges the message sent, i.e. in the first 20ms cycle soon after the master transmission is over. Said transmission may start from 0 to 20 ms after the master message is over.

By that time, if the master does not release the serial line, a clash will take place. To avoid any trouble with the systems which slowly release the serial line, parameter **C165 Rx→TxDelay** allows a DCREG response delay up to max. 2000 ms.

## 6 ALARM A027 – SERIAL COMMUNICATION FAILURE

This alarm trips if the DCREG does not receive any valid message through serial communication within a timeout which can be set using parameter **C142 A027Delay**. This alarm can be inhibited by the parameter **C158 A027Inhibit**.