

All dimensions are in mm; Drawing not to scale.

Motor – sensor configurations						
Motor Sensor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)	
Incr. Encoder	3		$\overline{\mathbf{v}}$	$\overline{\mathbf{T}}$		
Incr. Encoder + Dig. Hall	9	3				
Digital halls only	3					
Tacho			3			
Open-loop (no sensor)				3	$\overline{\mathbf{U}}$	
Open-loop (with step loss detection using incr. enc.)				6	5	
Open-loop (with enc. on load)				5	5	
 Features 						

Motion controller and drive in a single compact unit

- Universal solution for control of rotary and linear brushless, brushed and 2 or 3-phase step motors
- CANopen communication protocol (CiA 301v4.2, CiA 305v2.213 and 402v3.0)
- Various modes of operating supported: Position or Speed Profile, interpolated Cyclic Synchronous Position (CSP) mode, external reference mode (Position, Speed, Torque), 35 homing modes
- Motor supply: 11-50V. Logic supply: 9-36V
- Output current: 4A cont. (BLDC mode); 10APEAK, up to 100KHz PWM
- 5 opto-isolated digital inputs, 12-36V, PNP/NPN compatible: 2 for limit switches, 3 general-purpose
- 5 digital outputs, 5-36V, 0.5A, NPN open-collector: Error, 1 Motor brake [2A], 3 general-purpose [0.5A]
- Mini USB¹ & CAN-bus 2.0B interfaces
- 127 h/w addresses selectable by h/w DIP switch
- NTC/PTC analogue Motor Temperature sensor input

- Protections: short-circuit between motor phases and from motor phases to GND, over/under-voltage, over-current, I²t, control error, over temperature, communication error
- Feedback Devices :

 1st feedback devices supported:

 Incremental encoder interface (differential)
 Digital Hall sensor interface (single-ended and open collector)
 2nd feedback devices supported:

 pulse & direction interface (differential) for external (master) digital
 - pulse & direction interface (differential) for external (master) digital reference
- 1 analogue input: 12-bit, 0-5V: Feedback
- 1 rotating potentiometer used as Reference
- 16k x16 SRAM memory for data acquisition
- 16k x16 E²ROM to store setup and other user data
- Operating ambient temperature: 0-40°C (over 40°C with derating)

Mating Connectors							
Producer	Part No.	Connector	Description	Image			
WAGO	734-104	J1	Pluggable terminal block 4- pole Pin spacing 3.5 mm	AWG 14-28			
WAGO	733-108	J2	Pluggable terminal block 8- pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-112	J3 & J5	Pluggable terminal block 12-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-106	J4	Pluggable terminal block 6-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	734-105	J6	Pluggable terminal block 5-pole Pin spacing 3.5 mm	AWG 14-28			

-		PRODUCT DATA SHEET		Page: 1 of 4
TECHNOSOFT		ECHNOSOFT Udrive200		
		Title of document	N° document	
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Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :

	onnect	ors Descriptio	on	
	Pin	Name	Туре	Description
	1	GND	-	Negative return (ground) of the power supply
5-	2	+V _{LOG}	I	Positive terminal of the logic supply input: 12 to $36V_{\text{DC}}$
,	3	+V _{MOT}	I	Positive terminal of the motor supply: 12 to $50V_{\text{DC.}}$
	4	Earth	-	Earth connection
	Pin	Name	Туре	Description
	1	OUT0/M.BRK	0	5-36V 2A, digital output used for an electro- mechanical brake, NPN open-collector/TTL pull-up
_	2	OUT5	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	3	OUT4	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
5	4	OUT1	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	5	OUT2/Error	0	12-36V 0.5A, drive Error output, active low, NPN open-collector/TTL pull-up. Also drives the red Error LED.
_	6	CAN Hi	I/O	CAN-Bus positive line(dominant high)
-	7	CAN Lo	I/O	CAN-Bus negative line (dominant low)
	8	GND	-	Return ground for I/O and CAN pins
	Pin	Name	Туре	Description
	1	IN2+/LSP+	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, positive input
	2	IN2-/LSP-	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, negative input
	3	IN3+/LSN+	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, positive input
	4	IN3-/LSN-	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, negative input
	5	IN0+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
_	6	IN0-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
٤	7	IN1+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
_	8	IN1-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
	9	Ena+/IN4+	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, positive input
_	10	Ena-/ IN4-	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, negative input
	11	FDBK	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position or speed feedback (as tacho), or used as general purpose analogue input.
-	12	GND	-	Negative return (ground) of the motor supply
	Pin	Name	Туре	Description
	1	GND	-	Return ground
-	2	Pulse+	1	Pulse+ differential input; has 120Ω resistor between pins 2 and 3
Ī	3	Pulse-	I	Pulse- differential input; has 120Ω resistor between pins 2 and 3
ب	4	Dir+	I	Direction+ differential input; has 120Ω resiston between pins 4 and 5
۔ -	5	Dir-	I	Direction- differential input; has 120Ω resiston between pins 4 and 5
				Detween Dins 4 and 5

	Pin	Name	Туре	Description
	1	GND	-	Return ground for sensors supply
	2	A1+	I	Incr. encoder1 A+ diff. input; has 120Ω resistor between pins 2 and 3
	3	A1-	Т	Incr. encoder1 A- diff. input; has 120Ω resistor between pins 2 and 3
	4	B1+	I	Incr. encoder1 B+ diff. input; has 120 Ω resistor between pins 4 and 5
	5	B1-	I	Incr. encoder1 B- diff. input; has 120Ω resistor between pins 4 and 5
J5	6	Z1+	I	Incr. encoder1 Z+ diff. input; has 120Ω resistor between pins 6 and 7
	7	Z1-	I	Incr. encoder1 Z- diff. input; has 120Ω resistor between pins 6 and 7
	8	+5V _{ουτ}	0	5V output supply for I/O usage
	9	Hall 1	I	Digital input Hall 1 sensor
	10	Hall 2	I	Digital input Hall 2 sensor
	11	Hall 3	I	Digital input Hall 3 sensor
	12	GND	-	Return ground for sensors supply
-				0
	Pin	Name	Туре	Description
	Pin 1	Name A/A+	Туре О	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
				Phase A for 3-ph motors, A+ for 2-ph steppers,
Je	1	A/A+	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers,
J6	1	A/A+ B/A-	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
J6	1 2 3	A/A+ B/A- C/B+	0 0 0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step
ЭС	1 2 3 4	A/A+ B/A- C/B+ CR/B-	0 0 0	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors
9	1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth	0 0 0 0 -	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
9 	1 2 3 4 5 Pin 1 2	A/A+ B/A- C/B+ CR/B- Earth Name	0 0 0 0 -	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
9°	1 2 3 4 5 Pin 1	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0	0 0 0 0 -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
SW1 J6 J6	1 2 3 4 5 Pin 1 2 3	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth D-Bit0 ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified): • VLOG = 24 VDC; VMOT = 48VDC

Supplies start-up / shutdown sequence: -any-

 Load current (si 	JOUS BLL	C, DC, SI	epper) =	4A	
Operating Conditions			Тур.	Max.	Units
Ambient temperature		0		40 ^{1, 3}	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	2	Km
Allitude / pressure	Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Conditions		Min.	Тур.	Max.	Units
Ambient temperature		-40		105	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part			±0.5	kV
(Fruman body model)	Original packaging			±15	kV
Mechanical Mountin	g	Min.	Тур.	Max.	Units
Airflow		natura	al convecti	on³, close	ed box

¹Operating temperature at higher temperatures is possible with reduced current and power ratings ² Udrive can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :
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	-	Title of document N° document		
TECHNOSOFT		Udrive200	P030.400.E101.DSH.10A	
		OUTVEZOU		

	naracteristics		Min.	Тур.	Max.	Units
Size (Length x	Without mating co	nnectors		10 x 90 x 1		mm
Width x Height)				3 x 3.54 x		inch
<i>,</i>	With recommende connectors.	u mating) <u>x 110 x 1</u> 3 x 4.33 x		mm inch
Weight	Without mating con	nnectors	~4.0	<u>3 x 4.33 x</u> 130	0.10	g
Efficiency	Without mating col	THECTORS		98		%
	Dry cleaning is		0.1.1		A.L L L L.	
Cleaning agents	recommended		Only	Water- or	Alconol- D	ased
Protection degree	According to IEC6	0529,		IP20		_
	UL508			-		
Logic Supply Inpu	Jt (+V∟og)		Min.	Тур.	Max.	Units
	Nominal values		9		36	V _{DC}
	Absolute maximun		•		40	
	drive operating but guaranteed param		8		40	VDC
Supply voltage	Absolute maximun					
	continuous	n valuoo,	-0.6		42	V _{DC}
	Absolute maximun	n values,				
	surge (duration ≤ 1	10ms) [†]	-1		+45	V
	$+V_{LOG} = 12V$	i onnoj		120		
Supply current	$+V_{LOG} = 24V$			70		mA
	$+V_{LOG} = 40V$			50		1
Motor Supply Inp	ut (+V _{MOT})		Min.	Тур.	Max.	Units
	Nominal values		11	48	52	V _{DC}
	Absolute maximun	n values,				1
Supply voltage	drive operating but		9		55	V _{DC}
Supply voltage	guaranteed param					
	Absolute maximun	+	-1		63	v
	surge (duration ≤ 1	I0ms) ˈ				
	Idle			1	5	mA
	Operating		-10	±4	+10	A
Supply current	Absolute maximun short-circuit condit					Ι.
					18	A
	(duration ≤ 10ms)			_		
Motor Outputs (A	/A+, B/A-, C/B+, BR	-	Min.	Тур.	Max.	Units
	for DC brushed, st					
	and BLDC motors with Hall- based trapezoidal control for PMSM motors with FOC sinusoidal control (sinusoidal				4	_
Nominal output						
current,					4	А
continuous ¹	amplitude value)	`				
	for PMSM motors					
	sinusoidal control	(sinusoidal			2.83	
	<i></i>	`			2.00	
Motor cutout	effective value)				2.00	
Motor output	effective value) maximum 2.5s		-10.2		+10.2	A
current, peak	í í		-10.2			A
	í í	`	-10.2 ±22	±26		A
current, peak Short-circuit protection	í í	、	-	±26	+10.2	
current, peak Short-circuit protection threshold Short-circuit	í í	`	±22		+10.2	A
current, peak Short-circuit protection threshold	maximum 2.5s	`	-	±26 10	+10.2	
current, peak Short-circuit protection threshold Short-circuit	maximum 2.5s	rrent;	±22	10	+10.2 ±30	A μs
current, peak Short-circuit protection threshold Short-circuit protection delay	maximum 2.5s Nominal output cu including typical m	rrent; ating	±22		+10.2	A
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop	maximum 2.5s	rrent; ating	±22	10 ±0.3	+10.2 ±30 ±0.5	Α μs V
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage	maximum 2.5s Nominal output cu including typical m	rrent; ating	±22	10	+10.2 ±30	A μs
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	Maximum 2.5s Nominal output cu including typical m connector contact	rrent; ating	±22	10 ±0.3	+10.2 ±30 ±0.5	Α μs V
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	Maximum 2.5s Nominal output cu including typical m connector contact Recommended	rrent; ating resistance	±22	10 ±0.3	+10.2 ±30 ±0.5	Α μs V
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current	rrent; ating resistance F _{PWM} 20 kHz 40 kHz	±22 5 330 150	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of	rrent; ating resistance 20 kHz 40 kHz 60 kHz	±22 5 330 150 120	10 ±0.3	+10.2 ±30 ±0.5	Α μs V
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current	rrent; ating resistance 20 kHz 40 kHz 60 kHz 80 kHz	±22 5 330 150 120 80	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range;	rrent; ating resistance 20 kHz 40 kHz 60 kHz 80 kHz 100 kHz	±22 5 330 150 120 80 60	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value,	rrent; ating resistance 20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz	±22 5 330 150 120 80 60 120	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short-	rrent; ating resistance 20 kHz 40 kHz 40 kHz 80 kHz 100 kHz 20 kHz 60 kHz	±22 5 330 150 120 80 60 120 40	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	rrent; ating resistance 20 kHz 40 kHz 60 kHz 100 kHz 100 kHz 20 kHz 60 kHz 40 kHz	±22 5 330 150 120 80 60 120 40 30	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection;	rrent; ating resistance 20 kHz 40 kHz 60 kHz 20 kHz 20 kHz 20 kHz 40 kHz 80 kHz 80 kHz	+22 5 330 150 120 80 60 120 80 60 120 40 30 15	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	rrent; ating resistance 20 kHz 20 kHz 60 kHz 100 kHz 20 kHz 20 kHz 40 kHz 40 kHz 40 kHz 100 kHz	±22 5 330 150 120 80 60 120 40 30	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection;	rrrent; ating resistance 20 kHz 20 kHz 60 kHz 60 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 100 kHz 20 kHz	+22 5 330 150 120 80 60 120 80 60 120 40 30 15	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase)	Maximum 2.5s Nominal output cu including typical m connector contact ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V	rrent; ating resistance 20 kHz 20 kHz 60 kHz 100 kHz 20 kHz 20 kHz 40 kHz 40 kHz 40 kHz 100 kHz	+22 5 3300 150 120 80 60 120 80 60 120 40 30 15 8	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase)	maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, protection; +V _{MOT} = 36 V Recommended value for ±5% current	rrrent; ating resistance 20 kHz 20 kHz 60 kHz 60 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 100 kHz 20 kHz	+22 5 3300 150 120 80 60 120 80 60 120 300 15 8 8 250	10 ±0.3	+10.2 ±30 ±0.5	A μs V mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase)	Maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for ±5% current measure-ment	rrent; ating resistance 20 kHz 20 kHz 60 kHz 100 kHz 20 kHz 40 kHz 80 kHz 100 kHz 20 kHz 40 kHz 20 kHz	+22 5 330 150 120 80 60 120 80 60 120 30 120 30 15 8 250 125	10 ±0.3	+10.2 ±30 ±0.5	Α μs ν mA μH
current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase)	maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, Imited by short- circuit protection; +V _{MOT} = 36 V Recommended value for ±5% current	rrent; ating resistance 20 kHz 40 kHz 60 kHz 20 kHz 20 kHz 20 kHz 80 kHz 100 kHz 80 kHz 100 kHz 20 kHz 40 kHz 60 kHz 20 kHz	+22 5 5 330 150 120 80 60 120 40 30 120 40 30 5 8 8 250 125 100	10 ±0.3	+10.2 ±30 ±0.5	Α μs ν mA μH

(INO, IN1, IN2/LS	pto-isolated- P, IN3/LSN, IN4) ²	2	Min.	Тур.	Max.	Units		
Mode	PNP		Connect negative pin to GND and positive pin to signal					
compliance	NPN		Connect positive pin to supply and connect negative pin to signal					
Default state		Input floating (wiring disconnected)			Logic LOW			
	Logic LOW		0		36	V		
Input voltage	Logic HIGH		5		36			
	Absolute maxi	mum	-7		50			
	Logic LOW		0		50	mA		
Input current	Logic HIGH	0		10	12			
	Absolute maxi	mum	8 -20		20			
Input frequency		inani	20	2	20	kHz		
Minimum pulse				500		μs		
ESD protection	Human body m	odel	±15			kV		
Digital Outputs			Min	True	Mari	11		
(OUT0, OUT1, O	UT2/Error, OUT4	, OUT5)	Min.	Тур.	Max.	Units		
Mode	All outputs (OU	T0, 1, 4, 5		NP	N 24V			
compliance	OUT2/Error)				11210			
	Not supplied (+ to GND)	VLOG floating or		High-Z	(floating)			
		OUT0. OUT1		Logic	"HIGH"			
Default state	after nower-	OUT2/Error						
	up			Logic	"LOW"			
		OUT0, OUT1, OUT2/Error		Logic	"HIGH"			
	Logic "LOW"; o			0.3	0.65			
	0.5A Logic "HIGH";		3.6					
	output current = 0, no load				-			
Output voltage	Logic "HIGH", e	external load to	V _{LOG}		5	V		
	+V _{LOG}	+V _{LOG} Absolute maximum, continuous			V _{LOG} +0.5 V _{LOG} +1			
	Absolute maximum, surge		-1		V LOG T I			
	$(duration \le 1s)^{\dagger}$	t	-1		V _{LOG} +1			
	(uuration ≤ 15)							
	Logic "LOW",	OUT2/Error,			0.5	Α		
	sink current,	OUT1,4,5						
	continuous	OUT0			2	Α		
Output current	Logic "HIGH", source current; external load to GND; V _{OUT} >= 2.0V				3	mA		
	Logic "HIGH", current; extern +V _{LOG} ; V _{OUT} = 40V	al load to		0.1		mA		
Minimum pulse width			2					
ESD protection	Human body m	odel	±15			kV		
Digital Hall Input	ts (Hall1, Hall2, H	lall3)	Min.	Тур.	Max.	Units		
Mode compliance			TTL		/ Open-coll	ector		
Default state	Input floating			Loci				
	(wiring disconne	ected)	ļ,	-	HIGH	1		
	Logic "LOW"		_	0	0.8			
	Logic "HIGH" Floating voltage	2	2	5	 			
Input voltage	(not connected)			4.4		V		
-	Absolute maxin				1	1		
	(duration \leq 1s)		-10		+15			
	Logic "LOW"; P	ull to GND			1.2			
Input current	Logic "HIGH"; I			0		mA		
Minimum pulse	pull-up to +5		0	0	0			
width			2			μs		
ESD protection	Human body m	a	±5		1	kV		

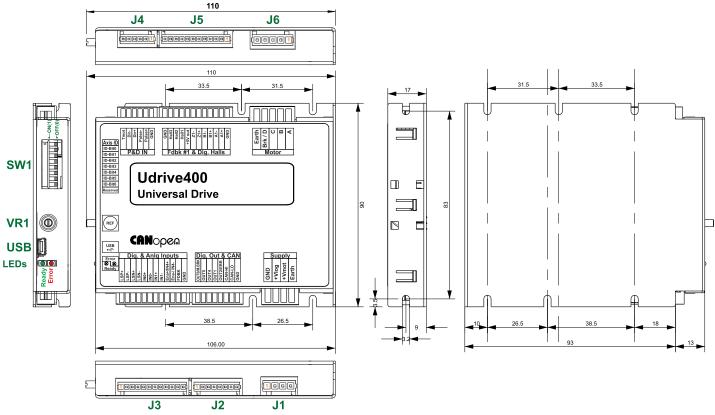
¹ @20Khz F _F	² The digital inputs are software selectable as PNP or NPN					
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Feedback 1 &2 inputs (A1+, A1-, B1+, B1-, Z1+, Z1-, P+, P-, D+, D-) ¹			Тур.	Max.	Units
Differential mode compliance	For full RS422 compliance, see ²		TIA/EIA	-422-A	
	Hysteresis	±0.06	6 ±0.1	±0.2	
Input voltage	Differential mode	-14		+14	v
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential			120		Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns
Analog 05V Inp	uts (REF, FDBK)	Min.	Тур.	Max.	Units
	Operational range	0		5	
Input voltage	Absolute maximum values, continuous	-16		+23	v
1	Absolute maximum, surge				
	$(duration \le 1s)^{\dagger}$			±36	
Input impedance	To GND		15		kΩ
Resolution			12		bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	$\% FS^2$
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	±2			kV

CAN-Bus		Min.	Тур.	Max.	Units
Compliance		ISO11898, CiA-301v4.2 & 402v3.			
Bit rate	Software selectable	125		1000	Kbps
	1Mbps			25	
Bus length	500Kbps			100	m
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo	none on-board			
	by hardware through SW1	1 ÷ 127 ; 255 (all bits 0)			
Nada addaaaiyaa		1- 255 (numbers above 127 will			
Node addressing	by software using EasySetup	be co configu	nsidered red)	as LSS	non-
ESD protection	Human body model	±15			kV
Supply Output (+	5V)	Min.	Тур.	Max.	Units
Output voltage	Current sourced = 250mA	4.8	5	5.2	V
Output current				500	mA
Short-circuit		Protected			
Over-voltage		Protected			
ESD protection	Human body model	±15			kV

 $^{^{1}}$ All differential input pins have internal 120 $\!\Omega$ termination resistors connected across

² "FS" stands for "Full Scale" Document template: P099.TQT.564.0001 Name First edition Last edition Visa : EΡ January 16, 2018 January 16, 2018 Title of document N° document **TECHNOSOFT** 5 Udrive200 P030.400.E101.DSH.10A Page: 4 of 4 **PRODUCT DATA SHEET**



All dimensions are in mm; Drawing not to scale.

Motor – sensor configurations							
PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)			
5		$\overline{\mathbf{v}}$	J				
9	T						
6							
		3					
			6	3			
			3	9			
			5	3			
	PMSM	PMSM BLDC	PMSM BLDC DC BRUSH Image: State of the	PMSM BLDC DC BRUSH STEP (2-ph) Image:			

Motion controller and drive in a single compact unit

- Universal solution for control of rotary and linear brushless, brushed and 2 or 3-phase step motors
- CANopen communication protocol (CiA 301v4.2, CiA 305v2.213 and 402v3.0)
- Various modes of operating supported: Position or Speed Profile, interpolated Cyclic Synchronous Position (CSP) mode, external reference mode (Position, Speed, Torque), 35 homing modes
- Motor supply: 11-50V. Logic supply: 9-36V
- Output current: 8A cont. (BLDC mode); 21APEAK, up to 100KHz PWM
- 5 opto-isolated digital inputs, 12-36V, PNP/NPN compatible: 2 for limit switches, 3 general-purpose
- 5 digital outputs, 5-36V, 0.5A, NPN open-collector: Error, 1 Motor brake [2A], 3 general-purpose [0.5A]
- Mini USB¹ & CAN-bus 2.0B interfaces
- 127 h/w addresses selectable by h/w DIP switch
- NTC/PTC analogue Motor Temperature sensor input

- Protections: short-circuit between motor phases and from motor phases to GND, over/under-voltage, over-current, I²t, control error, over temperature, communication error
- Feedback Devices :

 1st feedback devices supported:

 Incremental encoder interface (differential)
 Digital Hall sensor interface (single-ended and open collector)
 2nd feedback devices supported:

 pulse & direction interface (differential) for external (master) digital
 - pulse & direction interface (differential) for external (master) digital reference
- 1 analogue input: 12-bit, 0-5V: Feedback
- 1 rotating potentiometer used as Reference
- 16k x16 SRAM memory for data acquisition
- 16k x16 E²ROM to store setup and other user data
- Operating ambient temperature: 0-40°C (over 40°C with derating)

Mating Connectors							
Producer	Part No.	Connector	Description	Image			
WAGO	734-104	J1	Pluggable terminal block 4- pole Pin spacing 3.5 mm	AWG 14-28			
WAGO	733-108	J2	Pluggable terminal block 8- pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-112	J3 & J5	Pluggable terminal block 12-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-106	J4	Pluggable terminal block 6-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	734-105	J6	Pluggable terminal block 5-pole Pin spacing 3.5 mm	AWG 14-28			

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	Pin	Name	Туре	Description
-	1	GND	-	Negative return (ground) of the power supply
_ '	2	+V _{LOG}	I	Positive terminal of the logic supply input: 1° to $36V_{DC}$
5	3	+V _{MOT}	I	Positive terminal of the motor supply: 11 to $50V_{\text{DC.}}$
	4	Earth	-	Earth connection
	Pin	Name	Туре	Description
	1	OUT0/M.BRK	0	5-36V 2A, digital output used for an electro- mechanical brake, NPN open-collector/TTL pull-up
_	2	OUT5	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	3	OUT4	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
5	4	OUT1	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	5	OUT2/Error	0	12-36V 0.5A, drive Error output, active low, NPN open-collector/TTL pull-up. Also drives the red Error LED.
-	6	CAN Hi	I/O	CAN-Bus positive line(dominant high)
	7	CAN Lo	I/O	CAN-Bus negative line (dominant low)
	8	GND	-	Return ground for I/O and CAN pins
	Pin	Name	Туре	Description
	1	IN2+/LSP+	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, positive input
	2	IN2-/LSP-	Ι	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, negative input
	3	IN3+/LSN+	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, positive input
	4	IN3-/LSN-	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, negative input
	5	IN0+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
	6	IN0-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
ß	7	IN1+	Т	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
_	8	IN1-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
_	9	Ena+/IN4+	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, positive input
_	10	Ena-/ IN4-	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, negative input
	11	FDBK	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position or speed feedback (as tacho), or used as general purpose analogue input.
-	12	GND	-	Negative return (ground) of the motor supply
	Pin	Name	Туре	Description
	1	GND	-	Return ground
-	2	Pulse+	I	Pulse+ differential input; has 120Ω resistoned between pins 2 and 3
Ī	3	Pulse-	Т	Pulse- differential input; has 120Ω resisto between pins 2 and 3
ک	4	Dir+	I	Direction+ differential input; has 120Ω resiston between pins 4 and 5
Ī	5	Dir-	I	Direction- differential input; has 120Ω resistone between pins 4 and 5
				· · · · · · · · · · · · · · · · · · ·

	Pin	Name	Туре	Description
	1	GND	-	Return ground for sensors supply
	2	A1+	I	Incr. encoder1 A+ diff. input; has 120Ω resistor between pins 2 and 3
	3	A1-	Т	Incr. encoder1 A- diff. input; has 120Ω resistor between pins 2 and 3
	4	B1+	I	Incr. encoder1 B+ diff. input; has 120Ω resistor between pins 4 and 5
	5	B1-	I	Incr. encoder1 B- diff. input; has 120Ω resistor between pins 4 and 5
J5	6	Z1+	I	Incr. encoder1 Z+ diff. input; has 120Ω resistor between pins 6 and 7
	7	Z1-	I	Incr. encoder1 Z- diff. input; has 120Ω resistor between pins 6 and 7
	8	+5V _{OUT}	0	5V output supply for I/O usage
	9	Hall 1	I	Digital input Hall 1 sensor
	10	Hall 2	I	Digital input Hall 2 sensor
	11	Hall 3	I	Digital input Hall 3 sensor
	12 GND -		-	Return ground for sensors supply
		-		······································
	Pin	Name	Туре	Description
	Pin 1	Name A/A+	Type O	
				Description Phase A for 3-ph motors, A+ for 2-ph steppers,
JG	1	A/A+	0	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers,
J6	1	A/A+ B/A-	0	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
JG	1 2 3	A/A+ B/A- C/B+	0 0 0	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step
 ЭС	1 2 3 4	A/A+ B/A- C/B+ CR/B-	0 0 0	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors
9	1 2 3 4 5 Pin 1	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0	0 0 0 0 -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
9°	1 2 3 4 5 Pin 1 2	A/A+ B/A- C/B+ CR/B- Earth Name	0 0 0 0 -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
	1 2 3 4 5 Pin 1 2 3	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2	0 0 0 0 -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 - Type -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph steppers Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
SW1 J6	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth D-Bit0 ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 - Type - -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 - Type - -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph steppers Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth D-Bit0 ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 - Type - -	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified): • VLOG = 24 VDC; VMOT = 48VDC

Supplies start-up / shutdown sequence: -any-BLDC DC stapper) - 44

 Load current (si 	JOUS BLD	C, DC, st	epper) =	4A	
Operating Condition	Min.	Тур.	Max.	Units	
Ambient temperature		0		40 ^{1, 3}	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	2	Km
Allitude / pressure	Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Conditions		Min.	Тур.	Max.	Units
Ambient temperature		-40		105	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part			±0.5	kV
(numan body model)	Original packaging			±15	kV
Mechanical Mountin	Ig	Min.	Тур.	Max.	Units
Airflow		natura	al convecti	on³, close	ed box

¹Operating temperature at higher temperatures is possible with reduced current and power ratings ² Udrive can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

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Environmental C	naracteristics		Min.	Тур.	Max.	Units
Size (Length x	Without mating co	nnectors		<u>10 x 90 x 1</u>		mm
Width x Height)				$3 \times 3.54 \times 110 \times 1$		inch
<i>c</i> ,	With recommende connectors.	a mating) <u>x 110 x 1</u> 3 x 4.33 x		mm inch
Weight	Without mating co	nnectors		130	0.75	g
Efficiency				98		%
	Dry cleaning is		Only	Water- or	Alcohol h	acad
Cleaning agents	recommended		Only	water- or	AICONOI- L	aseu
Protection degree	According to IEC6	0529,		IP20		-
	UL508			-		
Logic Supply Inp			Min.	Тур.	Max.	Units
	Nominal values		9		36	V _{DC}
	Absolute maximum drive operating but		8		40	V _{DC}
	guaranteed param		0		40	V DC
Supply voltage	Absolute maximun		0.0		42	V
	continuous		-0.6		42	V _{DC}
	Absolute maximum		-1		+45	v
	surge (duration ≤ 1	10ms) [†]	-1		+45	v
	$+V_{LOG} = 12V$			120		
Supply current	$+V_{LOG} = 24V$			70		mA
	$+V_{LOG} = 40V$			50		
Motor Supply Inp			Min.	Тур.	Max.	Units
	Nominal values		11	48	52	V _{DC}
	Absolute maximum	,	<u> </u>			
Supply voltage	drive operating bu guaranteed param		9		55	V _{DC}
	Absolute maximum					1
		surge (duration ≤ 10 ms) [†]			63	V
	Idle	101115)		1	5	mA
	Operating		-22	±8	+22	A
Supply current	Absolute maximun	n value,		0		
eappi) canon	short-circuit condit	ion			37	А
	(duration \leq 10ms)	t			-	
Motor Outputs (A	/A+, B/A-, C/B+, BF		Min.	Тур.	Max.	Units
	for DC brushed, st	-				
		and BLDC motors with Hall-			8	
Nominal output	based trapezoidal control for PMSM motors with FOC sinusoidal control (sinusoidal amplitude value) for PMSM motors with FOC					
current,					_	
continuous ¹					8	A
	sinusoidal control				5.67	
	effective value)	(
Motor output	maximum 2.5s		-21.4		+21.4	А
current, peak			21.7		121.4	~
Short-circuit protection			100	106	120	^
threshold			±22	±26	±30	A
Short-circuit	+					+
protection delay			5	10		μs
On-state voltage	Nominal output cu					
drop	including typical m			±0.3	±0.5	V
	connector contact	resistance				
Off-state leakage				±0.5	±1	mA
current	+	FPWM				+
	Recommended	20 kHz	330			1
	value, for current	40 kHz	150			1
						μН
	ripple max. ±5% of	60 kHz	120			- ''
	ripple max. ±5% of full range;		120 80			
	ripple max. ±5% of	60 kHz				
	ripple max. ±5% of full range; +V _{MOT} = 36 V	60 kHz 80 kHz	80			
	ripple max. ±5% of full range;	60 kHz 80 kHz 100 kHz	80 60			
	ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value,	60 kHz 80 kHz 100 kHz 20 kHz	80 60 120			 μH
Motor inductance (phase-to-phase)	ripple max. $\pm 5\%$ of full range; $+V_{MOT} = 36$ V Minimum value, limited by short- circuit protection;	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz	80 60 120 40			μH
	ripple max. \pm 5% of full range; $+V_{MOT} = 36 V$ Minimum value, limited by short- circuit	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz	80 60 120 40 30			μΗ
	ripple max. $\pm 5\%$ of full range; $+V_{MOT} = 36$ V Minimum value, limited by short- circuit protection; $+V_{MOT} = 36$ V	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz	80 60 120 40 30 15			μΗ
(phase-to-phase)	$\begin{array}{l} \mbox{ripple max. } \pm 5\% \mbox{ of full range;} \\ + V_{MOT} = 36 \mbox{ V} \\ \mbox{Minimum value,} \\ \mbox{limited by short-circuit} \\ \mbox{protection;} \\ + V_{MOT} = 36 \mbox{ V} \\ \mbox{Recommended} \end{array}$	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz	80 60 120 40 30 15 8			μΗ
	ripple max. $\pm 5\%$ of full range; $+V_{MOT} = 36$ V Minimum value, limited by short- circuit protection; $+V_{MOT} = 36$ V	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz	80 60 120 40 30 15 8 250 125			μΗ
(phase-to-phase) Motor electrical	$ ripple max. \pm 5\% of full range; \\ +V_{MOT} = 36 V \\ Minimum value, limited by short-circuit protection; \\ +V_{MOT} = 36 V \\ Recommended value for \pm 5\% $	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz 40 kHz 60 kHz	80 60 120 40 30 15 8 250 125 100			
(phase-to-phase) Motor electrical time-constant		60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz 40 kHz 60 kHz 80 kHz	80 60 120 40 30 15 8 250 125 100 63			
(phase-to-phase) Motor electrical time-constant	ripple max. $\pm 5\%$ of full range; $+V_{MOT} = 36$ V Minimum value, limited by short- circuit protection; $+V_{MOT} = 36$ V Recommended value for $\pm 5\%$ current measure-ment	60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 100 kHz 20 kHz 40 kHz 60 kHz 60 kHz 80 kHz 100 kHz	80 60 120 40 30 15 8 250 125 100	±4	±8	

(IN0, IN1, IN2/LS	pto-isolated- P, IN3/LSN, IN4) ²	2	Min.	Тур.	Max.	Units		
Mode	PNP	PNP NPN			Connect negative pin to GND and positive pin to signal			
compliance	NPN				Connect positive pin to supply and connect negative pin to signal			
Default state	Input floating (v disconnected)	Input floating (wiring disconnected)			c LOW			
	Logic LOW		0		36	V		
Input voltage	Logic HIGH		5		36			
	Absolute maxi	mum	-7		50			
	Logic LOW		0		50	mA		
Input current	Logic HIGH		8	10	12			
	Absolute maxi	Absolute maximum			20			
Input frequency				2		kHz		
Minimum pulse				500		μs		
ESD protection Digital Outputs	Human body m	odel	±15			kV		
(OUT0, OUT1, OI	JT2/Error. OUT4	. OUT5)	Min.	Тур.	Max.	Units		
Mode	All outputs (OU			ND	N 24V			
compliance	OUT2/Error)			INP	IN 24 V			
	Not supplied (+ to GND)	VLOG floating or		High-Z	(floating)			
	Immediately	OUT0, OUT1		Logic	"HIGH"			
Default state	after power- up	OUT2/Error		Logic	Logic "LOW"			
	Normal operation	OUT0, OUT1, OUT2/Error		Logic	"HIGH"			
	Logic "LOW"; o 0.5A	utput current =		0.3	0.65			
	Logic "HIGH";		3.6					
Output voltage	output current = 0, no load		V _{LOG}		5	v		
	Logic "HIGH", e	external load to	-0.5		VLOG+0.5			
		num, continuous	-1		V _{LOG} +1			
	Absolute maximum, surge		-1					
	$(duration \le 1s)^{\dagger}$		-1		V _{LOG} +1			
	Logic "LOW",	OUT2/Error, OUT1,4,5			0.5	А		
	sink current, continuous	OUT0			2	A		
Output current	Logic "HIGH", source current; external load to GND; V _{OUT} >= 2.0V				3	mA		
	current; extern	Logic "HIGH", leakage current; external load to +V _{LOG} ; V _{OUT} = V _{LOG} max = 40V		0.1		mA		
Minimum pulse width			2					
ESD protection	Human body m	odel	±15		1	kV		
Digital Hall Input	s (Hall1, Hall2, H	lall3)	Min.	Тур.	Max.	Units		
Mode compliance			TTL	/ CMOS	/ Open-coll	ector		
Default state	Input floating (wiring disconn	ected)	1	Logi	HIGH			
	Logic "LOW"	00100/		0	0.8			
	Logic "HIGH"		2	5				
Input voltage	Floating voltage (not connected))		4.4		V		
	Absolute maxim (duration \leq 1s)		-10		+15			
	Logic "LOW"; P	ull to GND			1.2			
Input current	Logic "HIGH"; I pull-up to +5		0	0	0	mA		
Minimum pulse width			2			μs		
ESD protection	Human body m	adal	±5			kV		

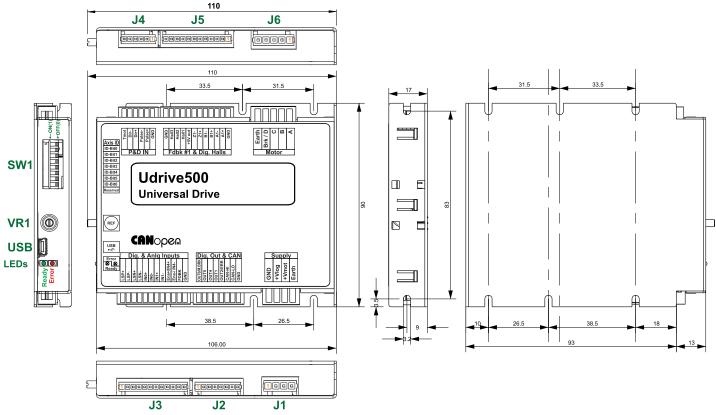
¹ @20Khz F _P	PWM	² The digital inputs are software selectable as PNP or NPN				
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :		
EP	January 16, 2018		January 16, 2018			
	· · · ·	Title of document	N° document			
	TECHNOSOFT	Udrive400	P030.400.E201.DSH.10A			
		PRODUCT DATA SHEET		Page: 3 of 4		

Feedback 1 &2 inputs (A1+, A1-, B1+, B1-, Z1+, Z1-, P+, P-, D+, D-) ¹			Тур.	Max.	Units
Differential mode For full RS422 compliance, see ²			TIA/EIA	-422-A	
	Hysteresis	±0.06	6 ±0.1	±0.2	
Input voltage	Differential mode	-14		+14	v
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential			120		Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns
Analog 05V Inp	uts (REF, FDBK)	Min.	Тур.	Max.	Units
	Operational range	0		5	
Input voltage	Absolute maximum values, continuous	-16		+23	v
1	Absolute maximum, surge			00	
	$(duration \le 1s)^{\dagger}$			±36	
Input impedance	To GND		15		kΩ
Resolution			12		bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	$\% FS^2$
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	±2			kV

CAN-Bus			Тур.	Max.	Units
Compliance		ISO118	398, CiA-30	01v4.2 & 4	02v3.0
Bit rate	Software selectable	125		1000	Kbps
	1Mbps			25	
Bus length	500Kbps			100	m
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo		none or	n-board	
	by hardware through SW1	1 ÷ 127 ; 255 (all bits 0)			
Nada addaaaiyaa		1- 255 (numbers above 127 with the second se			
Node addressing	by software using EasySetup	be co configu	nsidered red)	as LSS	non-
ESD protection	Human body model	±15			kV
Supply Output (+	5V)	Min.	Тур.	Max.	Units
Output voltage	Current sourced = 250mA	4.8	5	5.2	V
Output current				500	mA
Short-circuit			Prote	ected	
Over-voltage			Prote	ected	
ESD protection	Human body model	±15			kV

 $^{^{1}}$ All differential input pins have internal 120 $\!\Omega$ termination resistors connected across

² "FS" stands for "Full Scale" Name Document template: P099.TQT.564.0001 First edition Last edition Visa : EΡ January 16, 2018 January 16, 2018 Title of document N° document **TECHNOSOFT** 5 Udrive400 P030.400.E201.DSH.10A Page: 4 of 4 **PRODUCT DATA SHEET**



All dimensions are in mm; Drawing not to scale.

Motor – sensor configurations							
PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)			
5		$\overline{\mathbf{v}}$	J				
9	3						
6							
		3					
			6	3			
			3	9			
			5	3			
	PMSM	PMSM BLDC	PMSM BLDC DC BRUSH Image: State of the	PMSM BLDC DC BRUSH STEP (2-ph) Image:			

Motion controller and drive in a single compact unit

- Universal solution for control of rotary and linear brushless, brushed and 2 or 3-phase step motors
- CANopen communication protocol (CiA 301v4.2, CiA 305v2.213 and 402v3.0)
- Various modes of operating supported: Position or Speed Profile, interpolated Cyclic Synchronous Position (CSP) mode, external reference mode (Position, Speed, Torque), 35 homing modes
- Motor supply: 11-90V. Logic supply: 9-36V
- Output current: 6A cont. (BLDC mode); 21APEAK, up to 100KHz PWM
- 5 opto-isolated digital inputs, 12-36V, PNP/NPN compatible: 2 for limit switches, 3 general-purpose
- 5 digital outputs, 5-36V, 0.5A, NPN open-collector: Error, 1 Motor brake [2A], 3 general-purpose [0.5A]
- Mini USB¹ & CAN-bus 2.0B interfaces
- 127 h/w addresses selectable by h/w DIP switch
- NTC/PTC analogue Motor Temperature sensor input

- Protections: short-circuit between motor phases and from motor phases to GND, over/under-voltage, over-current, I²t, control error, over temperature, communication error
- Feedback Devices :
 1st feedback devices supported:
 Incremental encoder interface (differential)
 Digital Hall sensor interface (single-ended and open collector)
 2nd feedback devices supported:
 oulse & direction interface (differential) for external (master) digital
 - pulse & direction interface (differential) for external (master) digital reference
- 1 analogue input: 12-bit, 0-5V: Feedback
- 1 rotating potentiometer used as Reference
- 16k x16 SRAM memory for data acquisition
- 16k x16 E²ROM to store setup and other user data
- Operating ambient temperature: 0-40°C (over 40°C with derating)

Mating Connectors							
Producer	Part No.	Connector	Description	Image			
WAGO	734-104	J1	Pluggable terminal block 4- pole Pin spacing 3.5 mm	AWG 14-28			
WAGO	733-108	J2	Pluggable terminal block 8- pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-112	J3 & J5	Pluggable terminal block 12-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-106	J4	Pluggable terminal block 6-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	734-105	J6	Pluggable terminal block 5-pole Pin spacing 3.5 mm	AWG 14-28			

-		PRODUCT DATA SHEET		Page: 1 of 4
(() [⊺]	TECHNOSOFT Udrive500		P030.400.E301.DSH.10	Α
		Title of document	N° document	·
EP	January 16, 2018		January 16, 2018	
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :

		ors Descriptio	Л	
	Pin	Name	Туре	Description
_	1	GND	-	Negative return (ground) of the power supply
5-	2	+V _{LOG}	I	Positive terminal of the logic supply input: 11 to $36V_{\text{DC}}$
	3	+V _{MOT}	Т	Positive terminal of the motor supply: 11 to $90V_{DC.}$
	4	Earth	-	Earth connection
	Pin	Name	Туре	Description
	1	OUT0/M.BRK	0	5-36V 2A, digital output used for an electro- mechanical brake, NPN open-collector/TTL pull-up
_	2	OUT5	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	3	OUT4	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
5	4	OUT1	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	5	OUT2/Error	0	12-36V 0.5A, drive Error output, active low, NPN open-collector/TTL pull-up. Also drives the red Error LED.
_	6	CAN Hi	I/O	CAN-Bus positive line(dominant high)
	7	CAN Lo	I/O	CAN-Bus negative line (dominant low)
	8	GND	-	Return ground for I/O and CAN pins
	Pin	Name	Туре	Description
	1	IN2+/LSP+	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, positive input
	2	IN2-/LSP-	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, negative input
	3	IN3+/LSN+	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, positive input
	4	IN3-/LSN-	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, negative input
	5	IN0+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
_	6	IN0-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
۳	7	IN1+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
_	8	IN1-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
	9	Ena+/IN4+	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, positive input
_	10	Ena-/ IN4-	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, negative input
	11	FDBK	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position or speed feedback (as tacho), or used as general purpose analogue input.
-	12	GND	-	Negative return (ground) of the motor supply
	Pin	Name	Туре	Description
	1	GND	-	Return ground
-	2	Pulse+	1	Pulse+ differential input; has 120Ω resisto between pins 2 and 3
Ī	3	Pulse-	I	Pulse- differential input; has 120Ω resisto between pins 2 and 3
4	4	Dir+	ı	Direction+ differential input; has 120Ω resisto between pins 4 and 5
Ī	5	Dir-	I	Direction- differential input; has 120Ω resisto between pins 4 and 5

	Pin	Name	Туре	Description	
	1	GND	-	Return ground for sensors supply	
	2	A1+	I	Incr. encoder1 A+ diff. input; has 120Ω resistor between pins 2 and 3	
	3	A1-	I	Incr. encoder1 A- diff. input; has 120Ω resistor between pins 2 and 3	
	4	B1+	I	Incr. encoder1 B+ diff. input; has 120Ω resistor between pins 4 and 5	
	5	B1-	I	Incr. encoder1 B- diff. input; has 120Ω resistor between pins 4 and 5	
J5	6	Z1+	I	Incr. encoder1 Z+ diff. input; has 120Ω resistor between pins 6 and 7	
	7	Z1-	I	Incr. encoder1 Z- diff. input; has 120Ω resistor between pins 6 and 7	
	8	+5V _{OUT}	0	5V output supply for I/O usage	
	9	Hall 1	I	Digital input Hall 1 sensor	
	10	Hall 2	I	Digital input Hall 2 sensor	
	11	Hall 3	I	Digital input Hall 3 sensor	
	12	GND	-	Return ground for sensors supply	
	Pin	Name	Туре	Description	
	Pin 1	Name A/A+	Туре О	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors	
				Phase A for 3-ph motors, A+ for 2-ph steppers,	
JG	1	A/A+	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers,	
Je	1	A/A+ B/A-	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors	
Je	1 2 3	A/A+ B/A- C/B+	0 0 0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step	
J6	1 2 3 4	A/A+ B/A- C/B+ CR/B-	0 0 0	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors 	
9	1 2 3 4 5 Pin 1	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0	0 0 0 0 -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection	
9 	1 2 3 4 5 Pin 1 2	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1	0 0 0 0 -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection	
9	1 2 3 4 5 Pin 1 2 3	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2	0 0 0 0 -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit	
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.	
SW1 J6 J6	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth D-Bit0 ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1	
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.	
	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth D-Bit0 ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1	

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified): • VLOG = 24 VDC; VMOT = 48VDC

Supplies start-up / shutdown sequence: -any-BLDC DC stapper) - 44

 Load current (si 	JOUS BLL	C, DC, St	epper) =	4A	
Operating Condition	Min.	Тур.	Max.	Units	
Ambient temperature		0		40 ^{1, 3}	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	2	Km
Allitude / pressure	Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Conditions	Storage Conditions			Max.	Units
Ambient temperature		-40		105	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part			±0.5	kV
(numan body model)	Original packaging			±15	kV
Mechanical Mountin	ıg	Min.	Тур.	Max.	Units
Airflow		natura	al convecti	on³, close	ed box

¹Operating temperature at higher temperatures is possible with reduced current and power ratings ² Udrive can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

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TECHNOSOFT		TECHNOSOFT Udrive500		
(5)	ECHNOSOFI	Udrive500	P030.400.E301.DSH.10A	

Environmental C	naracteristics		Min.	Тур.	Max.	Units
Size (Length x	Without mating co	nnectors		10 x 90 x 1		mm
Width x Height)				3 x 3.54 x		inch
σ,	With recommende connectors.	a mating) <u>x 110 x 1</u> 3 x 4.33 x		mm inch
Weight	Without mating co	nnectors	~4.0	<u>3 x 4.33 x</u> 130	0.10	g
Efficiency	Without mating co	TITICOLOTS		98		9 %
	Dry cleaning is	0.1.1				
Cleaning agents	recommended		Only	Water- or	Alconol- D	ased
Protection degree	According to IEC6	0529,		IP20		_
•	UL508			-		
Logic Supply Inp	ut (+V _{LOG})		Min.	Тур.	Max.	Units
	Nominal values		9		36	V _{DC}
	Absolute maximum		•		40	
	drive operating bu guaranteed param		8		40	VDC
Supply voltage	Absolute maximun					
	continuous	n valaoo,	-0.6		42	VDC
	Absolute maximun	n values,				
	surge (duration \leq 1	10ms) [†]	-1		+45	V
	$+V_{LOG} = 12V$			120		
Supply current	$+V_{LOG} = 24V$			70		mA
	$+V_{LOG} = 40V$			50		
Motor Supply Inp	ut (+V _{мот})		Min.	Тур.	Max.	Units
	Nominal values		11	90	92	V _{DC}
	Absolute maximum	n values,				
Supply voltage	drive operating but		9		95	V _{DC}
Supply voltage	guaranteed param					-
	Absolute maximum values,		-1		102	v
	surge (duration ≤ 1	10ms) [`]		L		-
	Idle			1	5	mA
	Operating		-22	±10	+22	A
Supply current	Absolute maximun short-circuit condit				07	
					37	A
Marian Ostanta (A	(duration ≤ 10ms)			T		11
Motor Outputs (A	/A+, B/A-, C/B+, BF	-	Min.	Тур.	Max.	Units
	for DC brushed, st				6	
	and BLDC motors with Hall- based trapezoidal control for PMSM motors with FOC sinusoidal control (sinusoidal				0	
Nominal output						
current,						
	sinusoidal control	(sinusoidal			6	А
continuous ¹	amplitude value)	,			6	А
	amplitude value) for PMSM motors	with FOC				A
	amplitude value) for PMSM motors sinusoidal control	with FOC			6 4.26	A
continuous ¹	amplitude value) for PMSM motors sinusoidal control effective value)	with FOC			4.26	
	amplitude value) for PMSM motors sinusoidal control	with FOC	-21.4			A
continuous ¹ Motor output	amplitude value) for PMSM motors sinusoidal control effective value)	with FOC	-21.4		4.26	
Motor output current, peak Short-circuit protection	amplitude value) for PMSM motors sinusoidal control effective value)	with FOC	-21.4 ±22	±26	4.26	_
Motor output current, peak Short-circuit protection threshold	amplitude value) for PMSM motors sinusoidal control effective value)	with FOC		±26	4.26 +21.4	A
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit	amplitude value) for PMSM motors sinusoidal control effective value)	with FOC		±26	4.26 +21.4	A
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s	with FOC (sinusoidal	±22		4.26 +21.4	A
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s	with FOC (sinusoidal	±22	10	4.26 +21.4 ±30	A A µs
Motor output current, peak Short-circuit protection threshold Short-circuit protection delay	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m	with FOC (sinusoidal	±22		4.26 +21.4	A
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s	with FOC (sinusoidal	±22	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m	with FOC (sinusoidal	±22	10	4.26 +21.4 ±30	A A µs
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact	with FOC (sinusoidal rrrent; hating resistance	±22 5	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended	with FOC (sinusoidal rrrent; iating resistance FPWM 20 kHz	±22 5 330	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V
Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact	with FOC (sinusoidal rrrent; hating resistance FPWM 20 kHz 40 kHz	+22 5 330 150	10 ±0.3	4.26 +21.4 ±30 ±0.5	A μs V mA
Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range;	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz	±22 5 330 150 120	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V
Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of	with FOC (sinusoidal rrrent; hating resistance FPWM 20 kHz 40 kHz 60 kHz 80 kHz	±22 5 330 150 120 80	10 ±0.3	4.26 +21.4 ±30 ±0.5	A μs V mA
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 80 kHz 100 kHz	±22 5 330 150 120 80 60	10 ±0.3	4.26 +21.4 ±30 ±0.5	A μs V mA
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value,	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz	±22 5 330 150 120 80 60 120	10 ±0.3	4.26 +21.4 ±30 ±0.5	A μs V mA
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short-	with FOC (sinusoidal rrrent; iating resistance 20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 100 kHz 60 kHz	±22 5 330 150 120 80 60 120 40	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V mA μH
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	with FOC (sinusoidal rrrent; lating resistance 20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 100 kHz 40 kHz 40 kHz	±22 5 330 150 120 80 60 120 40 30	10 ±0.3	4.26 +21.4 ±30 ±0.5	A A μs V mA
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection;	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 20 kHz 20 kHz 20 kHz 40 kHz 80 kHz 40 kHz 80 kHz	+22 5 330 150 120 80 60 120 80 60 120 40 30 15	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V mA μH
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 20 kHz 100 kHz 40 kHz 80 kHz 100 kHz 40 kHz 100 kHz	+22 5 3300 150 120 80 60 120 80 60 120 40 30 15 8	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V mA μH
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection protection delay On-state voltage drop Off-state leakage <u>current</u> Motor inductance (phase-to-phase)	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended	rrent; lating resistance FPWM 20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 100 kHz 20 kHz 100 kHz 20 kHz 100 kHz	+22 5 3300 150 120 80 60 120 80 60 120 300 15 8 8 250	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V mA μH
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase) Motor electrical	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for ±5%	rrent; lating resistance FPWM 20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 40 kHz 100 kHz 20 kHz 40 kHz 20 kHz 40 kHz 100 kHz 20 kHz 40 kHz	+22 5 330 150 120 80 60 120 80 60 120 30 120 30 15 8 250 125	10 ±0.3	4.26 +21.4 ±30 ±0.5	A A μs ν mA μH
continuous ¹ Motor output current, peak Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase) Motor electrical time-constant	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for ±5% current	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 20 kHz 100 kHz 80 kHz	+22 5 330 150 120 80 60 120 40 30 120 40 30 5 8 8 250 125 100	10 ±0.3	4.26 +21.4 ±30 ±0.5	Α Α μs V mA μH
continuous ¹ Motor output current, peak Short-circuit protection Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase) Motor electrical	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for \pm 5% current measure-ment	with FOC (sinusoidal rrent; hating resistance 20 kHz 40 kHz 20 kHz 40 kHz 20 kHz 40 kHz 40 kHz 40 kHz 100 kHz 20 kHz 40 kHz 40 kHz 100 kHz 40	+22 5 330 150 120 80 60 120 80 60 120 30 120 30 15 8 250 125	10 ±0.3	4.26 +21.4 ±30 ±0.5	A A μs V mA μH
Continuous ¹ Motor output <u>current, peak</u> Short-circuit protection threshold Short-circuit protection delay On-state voltage drop Off-state leakage current Motor inductance (phase-to-phase) Motor electrical time-constant	amplitude value) for PMSM motors sinusoidal control effective value) maximum 2.5s Nominal output cu including typical m connector contact Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for ±5% current	with FOC (sinusoidal rrrent; hating resistance 20 kHz 40 kHz 60 kHz 20 kHz 100 kHz 80 kHz	+22 5 330 150 120 80 60 120 40 30 120 40 30 5 8 8 250 125 100	10 ±0.3	4.26 +21.4 ±30 ±0.5	A A μs V mA μH

Digital Inputs – c (IN0, IN1, IN2/LS		2	Min.	Тур.	Max.	Units		
Mode	PNP		Connect negative pin to GND and positive pin to signal					
compliance	NPN				Connect positive pin to supply and connect negative pin to signal			
Default state	Input floating (v disconnected)			c LOW				
	Logic LOW				36	V		
Input voltage	Logic HIGH		5		36			
	Absolute maxi	mum	-7		50			
	Logic LOW				50	mA		
Input current	Logic HIGH	Logic HIGH		10	12			
	Absolute maxi	mum	-20		20			
Input frequency				2		kHz		
Minimum pulse				500		μs		
ESD protection	Human body m	odel	±15			kV		
Digital Outputs (OUT0, OUT1, OI	IT2/Error OUT4		Min.	Тур.	Max.	Units		
Mode	All outputs (OU							
compliance	OUT2/Error)	10, 1, 1, 0		NP	N 24V			
•		VLOG floating or		High-Z	(floating)			
	Immediately	OUT0, OUT1		Logic	"HIGH"			
Default state	after power-	OUT2/Error		Logic	"LOW"			
	Normal	OUT0, OUT1,		Logic	"HIGH"			
	Logic "LOW"; o	OUT2/Error output current =		0.3	0.65			
	0.5A			0.0	0.00			
	Logic "HIGH"; output current		3.6					
Output voltage	= 0, no load Logic "HIGH", e	external load to	V _{LOG}		5	V		
	+V _{LOG}	+V _{LOG}			V _{LOG} +0.5			
	Absolute maximum, continuous Absolute maximum, surge		-1		V _{LOG} +1			
			-1		V _{LOG} +1			
	(duration \leq 1s)	1						
	Logic "LOW",	OUT2/Error,			0.5	А		
	sink current,	OUT1,4,5						
	continuous	OUT0			2	Α		
Output current	Logic "HIGH", source current; external load to GND; V _{OUT} >= 2.0V				3	mA		
	Logic "HIGH", current; exterr +V _{LOG} ; V _{OUT} = 40V	nal load to		0.1		mA		
Minimum pulse width			2					
ESD protection	Human body m	odel	±15		ſ	kV		
Digital Hall Input	s (Hall1, Hall2, F	lall3)	Min.	Тур.	Max.	Units		
Mode compliance			TTL		/ Open-coll	ector		
Default state	Input floating (wiring disconn	ected)	1	Logi	HIGH			
	Logic "LOW"			0	0.8			
	Logic "HIGH"		2	5				
Input voltage	Floating voltage			4.4		v		
Input voltage	(not connected)					v		
	Absolute maxim (duration \leq 1s)		-10		+15			
	Logic "LOW"; P	Pull to GND			1.2			
Input current	Logic "HIGH"; I		0	0	0	mA		
Minimum pulse width	pull-up to +5		2			μs		

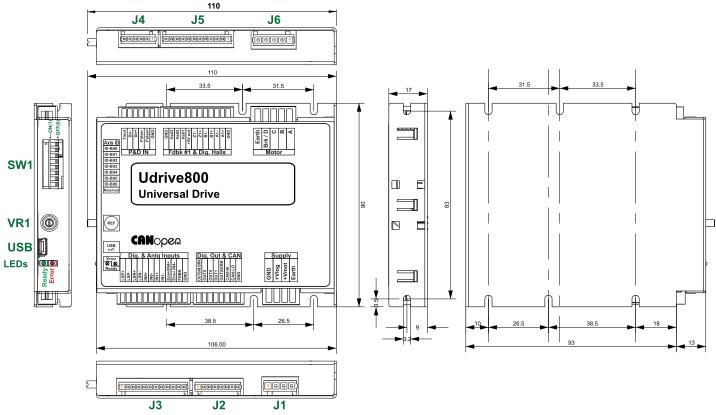
¹ @20Khz F _F	PWM	² The digital inputs are software selectable as PNP or NPN				
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :		
EP	January 16, 2018		January 16, 2018			
	·	Title of document	N° document			
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Feedback 1 &2 inputs (A1+, A1-, B1+, B1-, Z1+, Z1-, P+, P-, D+, D-) ¹			Тур.	Max.	Units
Differential mode For full RS422 compliance, see ²			TIA/EIA	-422-A	
	Hysteresis	±0.06	6 ±0.1	±0.2	
Input voltage	Differential mode	-14		+14	v
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential			120		Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns
Analog 05V Inp	uts (REF, FDBK)	Min.	Тур.	Max.	Units
	Operational range	0		5	
Input voltage	Absolute maximum values, continuous	-16		+23	v
1	Absolute maximum, surge			±36	
	$(duration \le 1s)^{\dagger}$				
Input impedance	To GND		15		kΩ
Resolution			12		bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	$\% FS^2$
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	±2			kV

CAN-Bus		Min.	Тур.	Max.	Units
Compliance		ISO118	398, CiA-30	01v4.2 & 4	02v3.0
Bit rate	Software selectable	125		1000	Kbps
	1Mbps			25	
Bus length	500Kbps			100	m
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo		none or	n-board	
	by hardware through SW1	1 ÷ 127 ; 255 (all bits 0)			
Nada addaaaiyaa		1- 255 (numbers above 127 w			
Node addressing	by software using EasySetup	be co configu	nsidered red)	as LSS	non-
ESD protection	Human body model	±15			kV
Supply Output (+	5V)	Min.	Тур.	Max.	Units
Output voltage	Current sourced = 250mA	4.8	5	5.2	V
Output current				500	mA
Short-circuit		Protected			
Over-voltage			Prote	ected	
ESD protection	Human body model	±15			kV

 $^{^{1}}$ All differential input pins have internal 120 $\!\Omega$ termination resistors connected across

² "FS" stands for "Full Scale" Document template: P099.TQT.564.0001 Name First edition Last edition Visa : EΡ January 16, 2018 January 16, 2018 Title of document N° document **TECHNOSOFT** 5 Udrive500 P030.400.E301.DSH.10A Page: 4 of 4 **PRODUCT DATA SHEET**



All dimensions are in mm; Drawing not to scale.

Motor – sensor configurations							
PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)			
5		$\overline{\mathbf{v}}$	J				
9	3						
6							
		3					
			6	3			
			3	9			
			5	3			
	PMSM	PMSM BLDC	PMSM BLDC DC BRUSH Image: State of the	PMSM BLDC DC BRUSH STEP (2-ph) Image:			

- Teatures

- Motion controller and drive in a single compact unit
 Universal solution for control of rotary and linear brushless, brushed and 2 or 3-phase step motors
- CANopen communication protocol (CiA 301v4.2, CiA 305v2.213 and 402v3.0)
- Various modes of operating supported: Position or Speed Profile, interpolated Cyclic Synchronous Position (CSP) mode, external reference mode (Position, Speed, Torque), 35 homing modes
- Motor supply: 11-90V. Logic supply: 9-36V
- Output current: 10A cont. (BLDC mode); 21APEAK , up to 100KHz PWM
- 5 opto-isolated digital inputs, 12-36V, PNP/NPN compatible: 2 for limit switches, 3 general-purpose
- 5 digital outputs, 5-36V, 0.5A, NPN open-collector: Error, 1 Motor brake [2A], 3 general-purpose [0.5A]
- Mini USB¹ & CAN-bus 2.0B interfaces
- 127 h/w addresses selectable by h/w DIP switch
- NTC/PTC analogue Motor Temperature sensor input

- Protections: short-circuit between motor phases and from motor phases to GND, over/under-voltage, over-current, I²t, control error, over temperature, communication error
- Feedback Devices :
 1st feedback devices supported:
 Incremental encoder interface (differential)
 Digital Hall sensor interface (single-ended and open collector)
 2nd feedback devices supported:
 oulse & direction interface (differential) for external (master) digital
 - pulse & direction interface (differential) for external (master) digital reference
- 1 analogue input: 12-bit, 0-5V: Feedback
- 1 rotating potentiometer used as Reference
- 16k x16 SRAM memory for data acquisition
- 16k x16 E²ROM to store setup and other user data
- Operating ambient temperature: 0-40°C (over 40°C with derating)

Mating Connectors							
Producer	Producer Part No. Connector Description		Image				
WAGO	734-104	J1	Pluggable terminal block 4- pole Pin spacing 3.5 mm	AWG 14-28			
WAGO	733-108	J2	Pluggable terminal block 8- pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-112	J3 & J5	Pluggable terminal block 12-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	733-106	J4	Pluggable terminal block 6-pole Pin spacing 2.5 mm	AWG 20-28			
WAGO	734-105	J6	Pluggable terminal block 5-pole Pin spacing 3.5 mm	AWG 14-28			

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		Title of document	N° document	·
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Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :

	Pin	Name	Туре	Description
	1	GND	-	Negative return (ground) of the power supply
-	2	+V _{LOG}	I	Positive terminal of the logic supply input: 17 to $36V_{DC}$
5	3	+V _{MOT}	I	Positive terminal of the motor supply: 11 to $90V_{DC.}$
	4	Earth	-	Earth connection
	Pin	Name	Туре	Description
	1	OUT0/M.BRK	0	5-36V 2A, digital output used for an electro- mechanical brake, NPN open-collector/TTL pull-up
_	2	OUT5	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
2ſ	3	OUT4	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	4	OUT1	0	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
	5	OUT2/Error	0	12-36V 0.5A, drive Error output, active low, NPN open-collector/TTL pull-up. Also drives the red Error LED.
-	6	CAN Hi	I/O	CAN-Bus positive line(dominant high)
_	7	CAN Lo	I/O	CAN-Bus negative line (dominant low)
	8	GND	-	Return ground for I/O and CAN pins
	Pin	Name	Туре	Description
	1	IN2+/LSP+	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, positive input
	2	IN2-/LSP-	I	12-36V digital PNP/NPN opto-isolated input. Positive limit switch function, negative input
	3	IN3+/LSN+	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, positive input
	4	IN3-/LSN-	I	12-36V digital PNP/NPN opto-isolated input. Negative limit switch function, negative input
_	5	IN0+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
~ -	6	IN0-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
۲ ۲	7	IN1+	I	12-36V general-purpose digital PNP/NPN opto-isolated positive input.
-	8	IN1-	I	12-36V general-purpose digital PNP/NPN opto-isolated negative input.
	9	Ena+/IN4+	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, positive input
-	10	Ena-/ IN4-	I	12-36V digital PNP/NPN opto-isolated input. Drive enable function, negative input
	11	FDBK	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position or speed feedback (as tacho), or used as general purpose analogue input.
	12	GND	-	Negative return (ground) of the motor supply
	Pin	Name	Туре	Description
	1	GND	-	Return ground
-	2	Pulse+	I	Pulse+ differential input; has 120Ω resistoned between pins 2 and 3
	3	Pulse-	I	Pulse- differential input; has 120Ω resisto between pins 2 and 3
ک	4	Dir+	I	Direction+ differential input; has 120Ω resistoned between pins 4 and 5
Ī	5	Dir-	I	Direction- differential input; has 120Ω resists between pins 4 and 5

	Pin	Name	Туре	Description
	1	GND	-	Return ground for sensors supply
	2	A1+	I	Incr. encoder1 A+ diff. input; has 120Ω resistor between pins 2 and 3
	3	A1-	I	Incr. encoder1 A- diff. input; has 120Ω resistor between pins 2 and 3
	4	B1+	I	Incr. encoder1 B+ diff. input; has 120Ω resistor between pins 4 and 5
	5	B1-	I	Incr. encoder1 B- diff. input; has 120Ω resistor between pins 4 and 5
J5	6	Z1+	I	Incr. encoder1 Z+ diff. input; has 120Ω resistor between pins 6 and 7
	7	Z1-	I	Incr. encoder1 Z- diff. input; has 120Ω resistor between pins 6 and 7
	8	+5V _{ουτ}	0	5V output supply for I/O usage
	9	Hall 1	Ι	Digital input Hall 1 sensor
	10	Hall 2	I	Digital input Hall 2 sensor
	11	Hall 3	Ι	Digital input Hall 3 sensor
	12	GND	-	Return ground for sensors supply
	Pin	Name	Туре	Description
	Pin 1	Name A/A+	Туре О	Description Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
				Phase A for 3-ph motors, A+ for 2-ph steppers,
JG	1	A/A+	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers,
JG	1	A/A+ B/A-	0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
JG	1 2 3	A/A+ B/A- C/B+	0 0 0	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step
J6	1 2 3 4	A/A+ B/A- C/B+ CR/B-	0 0 0	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors
9°	1 2 3 4 5 Pin 1	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0	0 0 0 0 -	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
9	1 2 3 4 5 Pin 1 2	A/A+ B/A- C/B+ CR/B- Earth Name	0 0 0 0 -	 Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection
9	1 2 3 4 5 Pin 1 2 3	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2	0 0 0 0 -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
SW1 J6 J6	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1
	1 2 3 4 5 Pin 1 2 3 4	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit2 ID-Bit3	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number.
	1 2 3 4 5 Pin 1 2 3 4 5	A/A+ B/A- C/B+ CR/B- Earth Name ID-Bit0 ID-Bit1 ID-Bit1 ID-Bit2 ID-Bit3 ID-Bit4	0 0 0 - Type - -	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors Phase C for 3-ph motors, B+ for 2-ph steppers Chopping resistor / Phase B- for 2-ph step motors Earth connection Description Hardware AxisID selection switches They represent the first 7 LSB bits of an 8 bit binary Axis ID number. Switch = ON(down) -> ID bit = 1

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified): • VLOG = 24 VDC; VMOT = 48VDC

Supplies start-up / shutdown sequence: -any-BLDC DC stapper) - 44

 Load current (si 	JOUS BLL	C, DC, St	epper) =	4A	
Operating Condition	Min.	Тур.	Max.	Units	
Ambient temperature		0		40 ^{1, 3}	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	2	Km
Allitude / pressure	Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Conditions	Storage Conditions		Тур.	Max.	Units
Ambient temperature		-40		105	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part			±0.5	kV
(numan body model)	Original packaging			±15	kV
Mechanical Mountin	ıg	Min.	Тур.	Max.	Units
Airflow		natura	al convecti	on³, close	ed box

¹Operating temperature at higher temperatures is possible with reduced current and power ratings ² Udrive can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

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EP	January 17, 2018		January 17, 2018	
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa :

Environmental C	naracteristics		Min.	Тур.	Max.	Units
Size (Length x	Without mating co	nnectors		10 x 90 x 1		mm
Width x Height)				3 x 3.54 x		inch
<i>c</i> ,	With recommende connectors.	u mating) <u>x 110 x 1</u> 3 x 4.33 x		mm inch
Weight	Without mating co	nnectors	~4.3	<u>3 x 4.33 x</u> 130	0.10	q
Efficiency	Without mating co	INECIOIS		98		9 %
	Dry cleaning is					
Cleaning agents	recommended		Only	Water- or	Alcohol- b	ased
Protection degree	According to IEC6	0529,		IP20		
FIDIECIIDII degree	UL508			IF 20		-
Logic Supply Inp	ut (+V⊾og)		Min.	Тур.	Max.	Units
	Nominal values		9		36	V _{DC}
	Absolute maximum					
	drive operating but		8		40	VDC
Supply voltage	guaranteed param					
euppi) renage	Absolute maximun continuous	n values,	-0.6		42	V _{DC}
	Absolute maximun	n values				
		+	-1		+45	V
	surge (duration ≤ 1	iums)		400		
Supply current	$+V_{LOG} = 12V$ $+V_{LOG} = 24V$			120 70		mA
Supply current	$+V_{LOG} = 24V$ $+V_{LOG} = 40V$			50		IIIA
Motor Supply Inp			Min.	Тур.	Max.	Units
Motor Suppry htp	. ,					
	Nominal values Absolute maximum	n values	11	90	92	V _{DC}
	drive operating but		9		95	V _{DC}
Supply voltage	guaranteed param		5		50	• 00
	Absolute maximun					
	surge (duration \leq 1	10ms) [†]	-1		102	V
	Idle	i onnoj		1	5	mA
	Operating		-22	±10	+22	Α
Supply current	Absolute maximun	n value,				
	short-circuit condit	ion			37	А
	(duration ≤ 10 ms)	t				
Motor Outputs (A	/A+, B/A-, C/B+, BF	(/B-)	Min.	Тур.	Max.	Units
	for DC brushed, st	-				
	and BLDC motors with Hall- based trapezoidal control for PMSM motors with FOC sinusoidal control (sinusoidal				10	
Nominal output						
current.						
continuous ¹					10	Α
	amplitude value)	for PMSM motors with FOC				_
	sinusoidal control				7.09	
	effective value)	(ริกานรับในสา			7.05	
Motor output	·					
current, peak	maximum 2.5s		-21.4		+21.4	A
Short-circuit						
protection			±22	±26	±30	Α
threshold						
Short-circuit			5	10		μs
protection delay	Nominal output au	rrent:				+
On-state voltage	Nominal output cu			±0.3	±0.5	v
drop		including typical mating connector contact resistance		10.0	-0.0	v
Off-state leakage				10 F	. 4	٣A
current				±0.5	±1	mA
		FPWM				4
	Recommended					1
		20 kHz	330			1
	value, for current	20 kHz 40 kHz	150			μН
		20 kHz 40 kHz 60 kHz	150 120			μН
Motor industance	value, for current ripple max. ±5% of	20 kHz 40 kHz 60 kHz 80 kHz	150 120 80			μН
Motor inductance	value, for current ripple max. ±5% of full range;	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz	150 120 80 60			μH
Motor inductance (phase-to-phase)	value, for current ripple max. \pm 5% of full range; $+V_{MOT} = 36 V$ Minimum value,	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz	150 120 80 60 120			- μH
	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short-	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz 60 kHz	150 120 80 60 120 40			
	value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 40 kHz	150 120 80 60 120 40 30			μH μΗ
	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection;	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz	150 120 80 60 120 40			
	value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit	20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 40 kHz	150 120 80 60 120 40 30			
	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz	150 120 80 60 120 40 30 15			
(phase-to-phase)	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz	150 120 80 60 120 40 30 15 8			
	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V	20 kHz 40 kHz 60 kHz 80 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz	150 120 80 60 120 40 30 15 8 250			
(phase-to-phase) Motor electrical	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for \pm 5%	20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz 40 kHz 40 kHz 60 kHz	150 120 80 60 120 40 30 15 8 250 125 100			μΗ
(phase-to-phase) Motor electrical time-constant	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for \pm 5% current	20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 40 kHz 100 kHz 100 kHz 20 kHz 40 kHz 80 kHz 80 kHz	150 120 80 60 120 40 30 15 8 250 125 100 63			μΗ
(phase-to-phase) Motor electrical time-constant	value, for current ripple max. \pm 5% of full range; +V _{MOT} = 36 V Minimum value, limited by short- circuit protection; +V _{MOT} = 36 V Recommended value for \pm 5% current measure-ment	20 kHz 40 kHz 60 kHz 100 kHz 20 kHz 60 kHz 40 kHz 80 kHz 100 kHz 20 kHz 40 kHz 40 kHz 60 kHz 80 kHz 100 kHz	150 120 80 60 120 40 30 15 8 250 125 100	±4		μΗ

(INO, IN1, IN2/LS	pto-isolated- P, IN3/LSN, IN4) ²	2	Min.	Тур.	Max.	Units		
Mode	PNP	PNP NPN			Connect negative pin to GND and positive pin to signal			
compliance	NPN				Connect positive pin to supply and connect negative pin to signal			
Default state	Input floating (v disconnected)	Input floating (wiring disconnected)			c LOW			
	Logic LOW		0		36	V		
Input voltage	Logic HIGH		5		36			
	Absolute maxi	mum	-7		50			
	Logic LOW		0		50	mA		
Input current	Logic HIGH	0		10	12			
	Absolute maxi	mum	8 -20		20			
Input frequency		inani	20	2	20	kHz		
Minimum pulse				500		μs		
ESD protection	Human body m	odel	±15			kV		
Digital Outputs			Min	True	Mari	11		
(OUT0, OUT1, O	UT2/Error, OUT4	, OUT5)	Min.	Тур.	Max.	Units		
Mode	All outputs (OU	T0, 1, 4, 5		NP	N 24V			
compliance	OUT2/Error)				11210			
	Not supplied (+ to GND)	VLOG floating or		High-Z	(floating)			
		OUT0. OUT1		Logic	"HIGH"			
Default state	after nower-	OUT2/Error						
	up			Logic	"LOW"			
		OUT0, OUT1, OUT2/Error		Logic	"HIGH"			
	Logic "LOW"; o			0.3	0.65			
Output voltage	0.5A Logic "HIGH";		3.6					
	output current = 0, no load				-			
	Logic "HIGH", e	external load to	VLOG		5	V		
	+V _{LOG}	num, continuous	-0.5 -1		V _{LOG} +0.5 V _{LOG} +1			
	Absolute maximum, surge		- 1		V LOG T I			
	$(duration \le 1s)^{\dagger}$		-1		V _{LOG} +1			
	(uuration ≤ 15)							
	Logic "LOW",	OUT2/Error,			0.5	Α		
	sink current,	OUT1,4,5						
	continuous	OUT0			2	Α		
Output current	Logic "HIGH", source current; external load to GND; V _{OUT} >= 2.0V				3	mA		
	Logic "HIGH", leakage current; external load to +V _{LOG} ; V _{OUT} = V _{LOG} max = 40V			0.1		mA		
Minimum pulse width			2					
ESD protection	Human body m	odel	±15			kV		
Digital Hall Input	ts (Hall1, Hall2, H	lall3)	Min.	Тур.	Max.	Units		
Mode compliance			TTL		/ Open-coll	ector		
Default state	Input floating			Loci				
	(wiring disconne	ected)	ļ	-	HIGH	1		
	Logic "LOW"		_	0	0.8			
	Logic "HIGH" Floating voltage	2	2	5	 			
Input voltage	(not connected)			4.4		V		
-	Absolute maxin				1	1		
	(duration \leq 1s)		-10		+15			
	Logic "LOW"; P	ull to GND			1.2			
Input current	Logic "HIGH"; I			0		mA		
Minimum pulse	pull-up to +5		0	0	0			
width			2			μs		
ESD protection	Human body m	a	±5		1	kV		

¹ @20Khz F _P	² The digital inputs are software selectable as PNP or NPN					
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EP	January 17, 2018		January 17, 2018			
		Title of document	N° document			
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Feedback 1 &2 inputs (A1+, A1-, B1+, B1-, Z1+, Z1-, P+, P-, D+, D-) ¹			Тур.	Max.	Units
Differential mode compliance	For full RS422 compliance, see ²		TIA/EIA-422-A		
	Hysteresis	±0.06	6 ±0.1	±0.2	
Input voltage	Differential mode	-14		+14	v
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential			120		Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns
Analog 05V Inp	uts (REF, FDBK)	Min.	Тур.	Max.	Units
	Operational range	0		5	
Input voltage	Absolute maximum values, continuous	-16		+23	v
1	Absolute maximum, surge				
	$(duration \le 1s)^{\dagger}$			±36	
Input impedance	To GND		15		kΩ
Resolution			12		bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	% FS ²
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	±2			kV

CAN-Bus			Тур.	Max.	Units
Compliance		ISO118	398, CiA-30	01v4.2 & 4	02v3.0
Bit rate	Software selectable	125		1000	Kbps
	1Mbps			25	
Bus length	500Kbps			100	m
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo		none or	n-board	
	by hardware through SW1	1 ÷ 127 ; 255 (all bits 0)			
Nada addaaaiyaa		1- 255 (numbers above 127 w			
Node addressing	by software using EasySetup	be co configu	nsidered red)	as LSS	non-
ESD protection	Human body model	±15			kV
Supply Output (+	5V)	Min.	Тур.	Max.	Units
Output voltage	Current sourced = 500mA	4.8	5	5.2	V
Output current				500	mA
Short-circuit			Prote	ected	
Over-voltage			Prote	ected	
ESD protection	Human body model	±15			kV

 $^{^{1}}$ All differential input pins have internal 120 $\!\Omega$ termination resistors connected across

² "FS" stands for "Full Scale" Document template: P099.TQT.564.0001 Name First edition Last edition Visa : EΡ January 17, 2018 January 17, 2018 Title of document N° document **TECHNOSOFT** 5 Udrive800 P030.400.E401.DSH.10A Page: 4 of 4 **PRODUCT DATA SHEET**