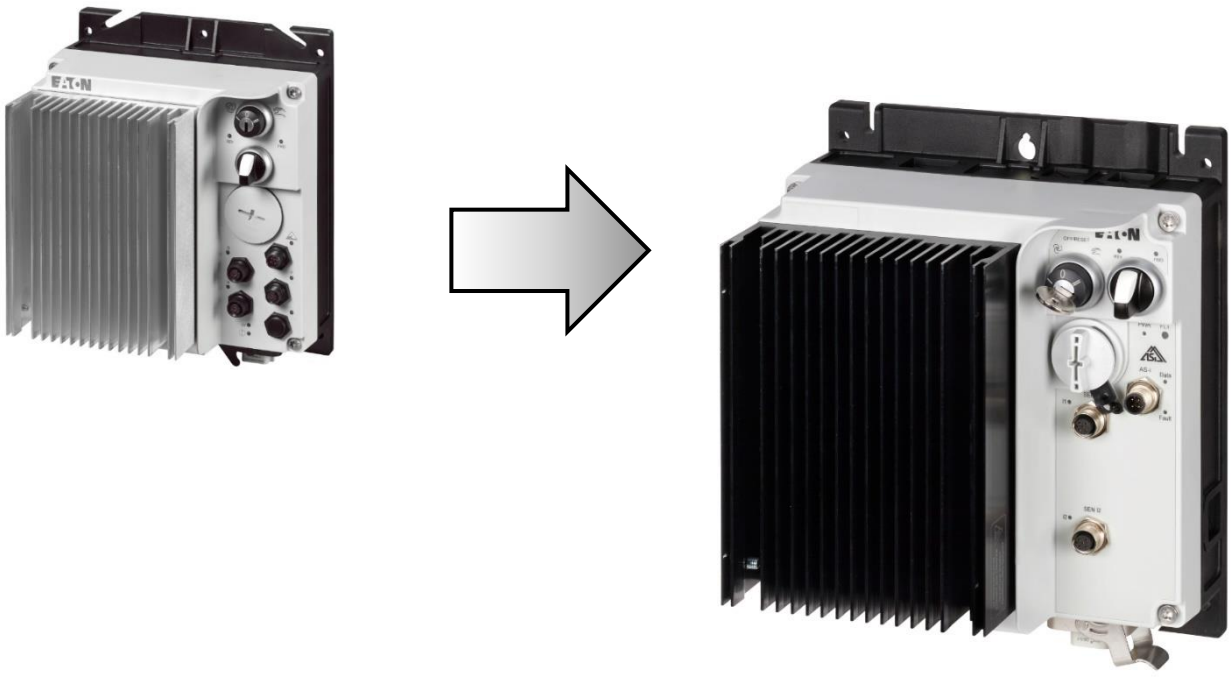
Rapid Link 5

RASP5

Generation change of Rapid Link - RASP 4.0 to RASP5



Level 3	1 – Fundamental – No previous experience necessary 2 – Basic – Basic knowledge recommended 3 – Advanced – Reasonable knowledge required 4 – Expert – Good experience recommended

Powering Business Worldwide

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Original Application Note is the English version of this document.

All non-English language versions of this document are translations of the original application note.

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Content

Danger! - Dangerous electrical voltage!

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automatic control functions.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specification, otherwise this may cause malfunction and/or dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes. Unlatching of the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been properly installed and with the housing closed.
- Wherever faults may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (e.g. by means of separate limit switches, mechanical interlocks etc.).
- Frequency inverters may have hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or frequency inverter may destroy the device and may lead to serious injury or damage.
- The applicable national safety regulations and accident prevention recommendations must be applied to all work carried on live frequency inverters.
- The electrical installation must be carried out in accordance with the relevant electrical regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing frequency inverters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the frequency inverters using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the frequency inverter (increased motor speed or sudden standstill of motor). These measures include: – Other independent devices for monitoring safety related variables (speed, travel, end positions etc.).
  – Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
  – Never touch live parts or cable connections of the frequency inverter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be alive after disconnection. Consider appropriate warning signs.

Disclaimer

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Figures Content

1 General

The following information indicates the differences that must be considered when expanding systems or creating new projects with RASP5 units, as well as when using them to replace RASP 4.0 devices.

The generation change has the following major differences:

- Parameter software, parameters, keypad and app functionality
- DIP-Switches to parameter software - sensors and thermistor settings
- Motor plug
- No AS-i connection required for RASP5 in manual mode

The controls' handling remains the same.

2 Dimensions

There is no difference between RASP 4.0 and RASP5 regarding dimensions. The mechanical system setup doesn't need to be changed respectively dimensions.

3 AS-i Profile

RASP 4.0 units have the same AS-i profile as RASP5 (AS-i profile S-7.4). The master (gateway) doesn't need to carry out a new initialization.

4 Replacement Sequence

Proceed following steps for a proper replacement.

1. Turn key and selector switch (FWD/REV) to '0' position (RASP 4.0 and RASP5)
2. Read the parameter from RASP 4.0 (MaxConnect)
3. Read the address from RASP 4.0 (with addressing device)
4. Note the DIP-positions of the RASP 4.0
5. Label and disconnect motor-, energy-, AS-i, sensor connectors from RASP 4.0
6. Set parameters of the RASP5 accordingly (with keypad, app or drivesConnect)
7. Settings for the DIP switches must be transferred to RASP5 (see table in chapter special settings below)
8. Give the address of RASP 4.0 to the RASP5
9. Replace motor cable, if necessary (see chapter motor plug below)
10. Connect all cables, line 400 V AC, AS-i, motor and sensors.
11. Ready to start.

Notice!
Before power on it must be ensured that the motor and the motor cable is properly connected.

5 Parameterization Software, Keypad and App

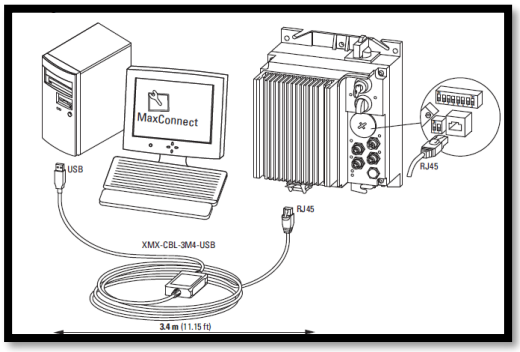


Figure 1: PC connection to RASP 4.0

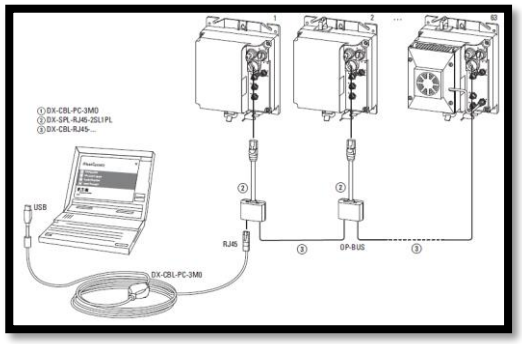


Figure 2: PC connection to RASP 5

The table below shows the difference between RASP 4.0 and RASP5 regarding PC software, PC cable, keypad and smartphone app.

	RASP 4.0	RASP5
Parameterization PC Software	MaxConnect Eaton MaxConnect	drivesConnect drivesConnect
Remote Keypad	RASP-KEY-10 	DX-KEY-OLED 
PC - Connection	XMX-CBL-3M4-USB	DX-CBL-PC-3M0 DX-COM-STICK-KIT (Bluetooth Stick)
Parameterization App	Not supported	Bluetooth Stick DX-COM-STICK3-KIT is required EATON drivesConnect mobile

NOTICE: Connection cable, Keypad or Bluetooth Stick are not supplied with the RASP5 or RASP 4.0. Those are optional articles.

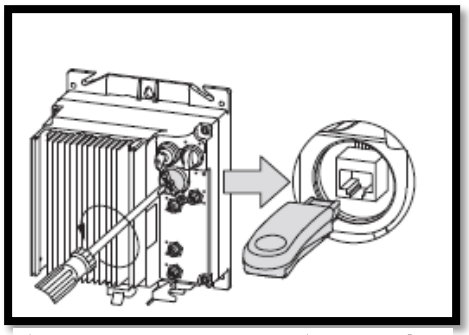


Figure 3: Bluetooth connection to RASP5

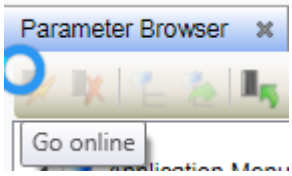
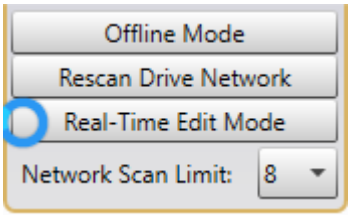
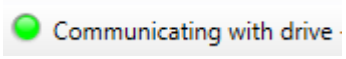
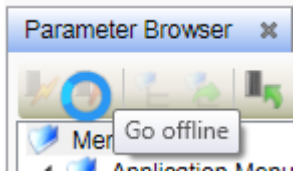
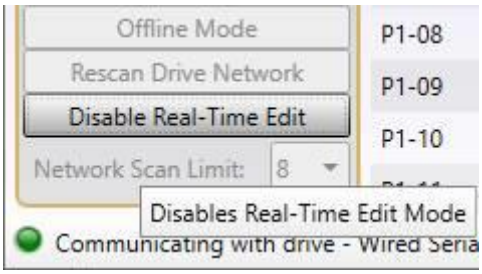
The drivesConnect mobile App helps to connect smartphone to the RASP5. The parametrization and monitor information can be done by using the App (Android or IOS based). For detailed information refer to Appnote: **AP040189EN** in the Overview Drives Appnotes.

5.1 Software file

	RASP 4.0	RASP5
Parameterization PC Software	MaxConnect	drivesConnect
File extension	*.dpd (parameter file of one drive)	*.ptb (parameter file of one drive) *.pprj (complete project with several drives)
Hidden parameters	P1.1 = 1 (default) Only visible parameters are saved. To get all parameters saved set P1.1 = 0 during upload and keep this setting. Changing P1.1 from "1" to "0" in an offline file does not reveal the hidden parameters! Reconfiguration could be necessary in case of using P1.1 = 1 for a saved offline file!	P1-14 = 0 (default) All parameters are saved, independent from the setting of P1-14

5.2 Software comparison

	RASP 4.0	RASP5
Parameterization PC Software	MaxConnect	drivesConnect
Offline Mode	No default parameter files of the different drive sizes are available	Whole PowerXL family (including Rapid Link 5) is available in offline mode
Connection to drive	After selection of the right communication channel whole menu structure including the parameters based on P1.1 are uploaded. Parameters can be changed directly.	Selection of the right communication channel must be done. Press button "Scan Drive Network" to find connected drives. Upload or download of parameters is possible with the icons  (green for Upload, red for Download)

Real-Time Edit Mode	After connection directly software is running in Real-Time Edit Mode. If "Offline" is active, press button "Go Online" 	Press button "Real-Time Edit mode" to edit parameters directly.  Status is shown with flashing green LED 
Go Offline in connected condition	Press button "Go offline" 	Press button "Disable Real-Time Edit"  **Note:** Pressing "Offline Mode" will disconnected the drive. For reconnection press button "Rescan Drive Network"

6 DIP Switch Settings

The functionality of RASP 4.0 and RASP5 is the same. RASP 4.0 is generally set via parameters, but some special functions of RASP 4.0 are set via DIP switches. At RASP5 these settings are also made via parameters.

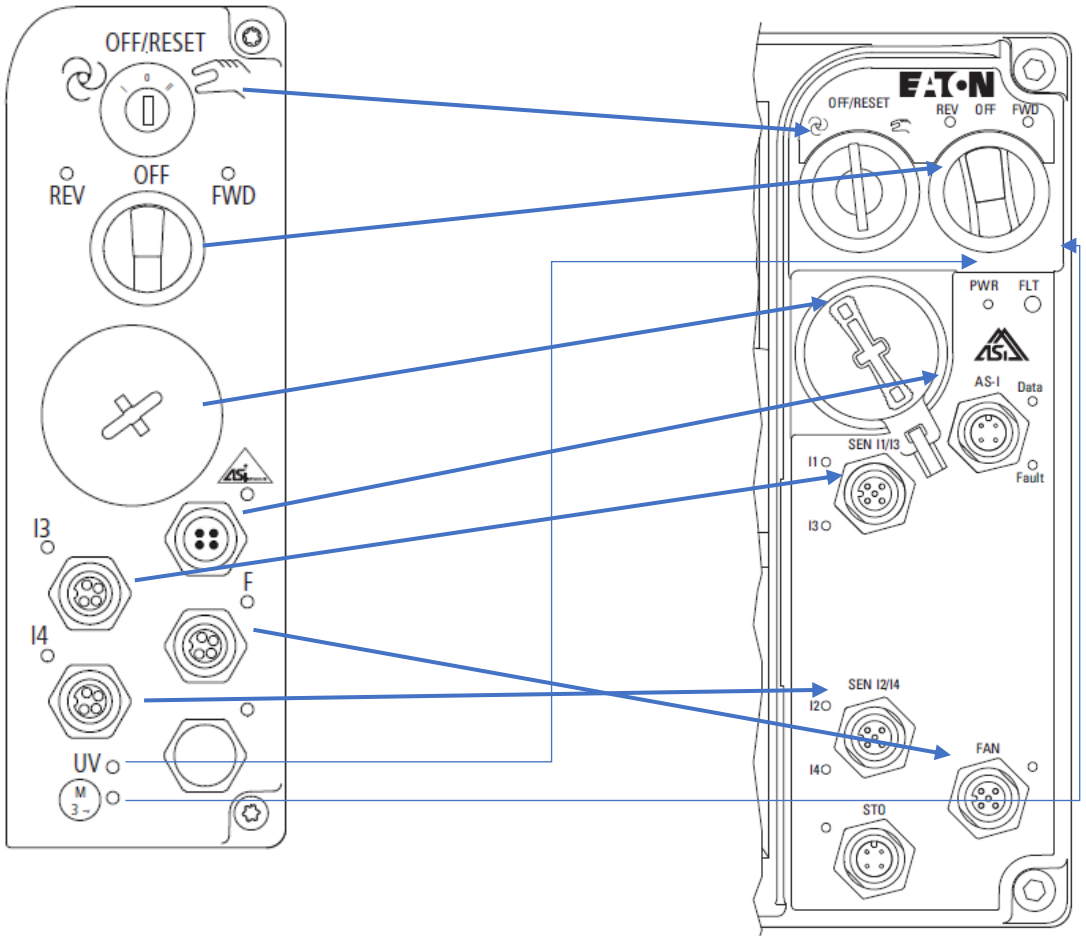
See details in chapter ***10 DIP Switch Setting vs. Parameter Settings.***

Functions	RASP 4.0 - DIP Switches	RASP5 – Parameters
Motor cable monitoring	DIP 1 	P2-27
AS-interface diagnostics	DIP 2 	-
Sensor inputs I3 and I4	DIP 3 	P3-06 to P3-09
Quick stop and interlocked manual: **For more details see chapter: *10.3 DIP 4, 5, 6 vs P1-13 (Quick stop and interlocked manual operation)***	 DIP 4 DIP 5 DIP 6 - - - OFF OFF OFF -> 0 OFF OFF ON -> 1 OFF ON OFF -> 2 OFF ON ON -> 3 4	 P1-13 0 1 2 3 4

	ON OFF OFF -> ON OFF ON -> ON ON OFF -> ON ON ON ->	5 6 7 8
Phase reversal	DIP 7 	P6-08
Stop behavior	DIP 8 	P6-11

7 Sensor Inputs and general comparison

The new generation RASP5 has the same functionality of the sensors and switches. The illustration below shows the positions of the elements.



RASP 4.0 **RASP5**

The LED status signals are sligt different e.g. on AS-i connection. Refer to device manual for the detailed information.

8 Motor Plug and Motor Cable

RASP 4.0 and RASP5 have motor plug type HAN Q8. The only difference is the housing material. This has no effect to the installation of the system. The pinout is the same for RASP 4.0 and RASP5.

For motor cable length less than 10 m, the motor cable with the plastic plug can also be used with RASP5. Longer motor cables need the metal plug due to EMC reasons.

The motor cable for RASP5– metal housing – must be ordered separately.

The table below shows the difference:

	RASP 4.0 (plastic plug)	**RASP5 (metal plug)**
Motor Cable 		
Type	HAN Q8	
Housing Material	Plastic	Metal
Cable Catalog name	RASP-CM1-2M (2 m)	RASP-CM2-2MO (2m)

9 Parameter Cross Reference

9.1 MaxConnect vs. drivesConnect

DIP switches			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
DIP 1	P2-27	Action@Thermistorfault Motor	Motor Thermistor Protection 0: Disabled 1: Enable (Trip level fixed by hardware) For more details see chapter: ***10.1DIP 1 vs P2-27***
DIP 3	P3-06	SEN I1 Logic	Sensor 1 Logic - normally open/closed For more details see chapter: ***10.2 DIP 3 vs P3-06...09***
DIP 3	P3-07	SEN I2 Logic	Sensor 2 Logic - normally open/closed

			For more details see chapter: ***10.2 DIP 3 vs P3-06...09***
DIP 3	P3-08	SEN I3 Logic	Sensor 3 Logic - normally open/closed For more details see chapter: ***10.2 DIP 3 vs P3-06...09***
DIP 3	P3-09	SEN I4 Logic	Sensor 4 Logic - normally open/closed For more details see chapter: ***10.2 DIP 3 vs P3-06...09***
DIP 4, 5, 6	P1-13	SEN Config Select	Sensor Input / Speed Configuration For more details see chapter: ***10.3 DIP 4, 5, 6 vs P1-13*** (Quick stop and interlocked manual operation)
DIP 7	P6-08	Change Phase sequence Motor	Output phase sequence: 0: U V W 1: U W V For more details see chapter: ***10.1.***
DIP 8	P3-11	t-dec Select B0	External stop function via AS-i For more details see chapter: ***10.5 DIP 8 vs P3 -11***

Monitoring Values			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
M 1.1	P0-07	Output Frequency	Motor output frequency
M 1.2	P0-04	f-PreRamp	Frequency set-point value
M 1.3	P0-08	Motor Speed	Motor shaft speed (Estimated)
M 1.4	P0-09	Motor Current	Motor current
M 1.5	P0-12	Motor Torque	Motor output torque
M 1.6	P0-10	Motor Power Rel	Motor output power
M 1.7	P0-11	Motor Voltage	Motor output voltage
M 1.8	P0-20	DC-Link Voltage	Intermediate DC bus voltage
M 1.9	P0-21	Heatsink Temperature	Unit temperature (Module)
M 1.10	P0-02	Thermistor Input1	Thermistor input 0: Motor temperature ok 1: Motor temperature too high
M 1.14	-	DI Status	Digital input DI1 ... DI3
M 1.15	-	-	Digital input DI4 ... DI6
M 1.16	P0-19	DO 1 to 3 Status	Digital output DO (Actuators)
M 1.22	P0-05	T-Controlboard	Board Temperature

Parameter Selection			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 1.1	P1-14	Access Key	Extended Menu Access Code. For more details see chapter: ***5.1 Software file***
P 1.2	P5-11	AS-i command config	Configuration of the 4 AS-Interface output DQ0 - DQ3 0: FWD, REV, f-Fix Bit 0, f-Fix Bit 1 1: FWD, f-Fix Bit 0, f-Fix Bit 1; f-Fix Bit 2 0: FWD, t-acc1/2, f-Fix Bit 0, f-Fix Bit 1
P 1.3	P2-31	Default Selection	Set Country Defaults: 0 = EU 1 = USA

Digital Input			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P3.17 (via digital input)	P2-33	Parameter Lock	Parameter access lock

Digital Output			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 5.3	P3-01	Brake Mode	Control of the mechanical brake 0: simple mode (P3-02, P3-03 1: extended mode (P3-02 - P3-05)

Drive Control			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 6.3	P1-02	f-min	Minimum Frequency / Speed Limit
P 6.4	P1-01	f-max	Maximum Frequency / Speed Limit
P 6.5 (based on P6.4)	P1-03 (based on P1-09)	t-acc	Acceleration Ramp Time For more details see chapter: ***14.3 Ramp Times***
P 6.6 (see above)	P1-04 (see above)	t-dec	Deceleration Ramp Time For more details see chapter: ***14.3 Ramp Times***
P 6.7	P2-37	Spin Start Enable	Start Function: 0: Ramp Start 1: Spin Start
P 6.8	P1-05	Stop Mode	Stop Mode 0: Free Coasting 1: Ramp Deceleration 2: Flux braking
P 6.9	P2-08	t-SRamp1	S-Ramp Control 0.0 = linear: 0.1 - 10.0s = S-Ramp
P 6.10	P2-26	Auto Reset Delay	Wait time before an automatic restart

Drive Control			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 6.12	P2-25	REAF Start Function	Restart function with automatic restart 0 = Ramp 1 = Flying restart circuit 2 = According to P2-37
P 6.13	P2-24	Start Mode	Start/restart mode selection 0: Edge-r, 1 = Auto-0 2…10: Auto-1 to Auto-9
P 6.19	P2-11	t-acc2	Acceleration Ramp 2
P 6.20	P2-13	t-dec2	Deceleration Ramp 2
P 6.21	P2-12	n-accMulti1	Speed Boundary for ACC Ramp 1 - Ramp 2
P 6.22	P2-14	n-decMulti1	Speed Boundary for DEC Ramp 2 - Ramp 1
P 6.23	P2-10	REV Enable	Block Reverse Motor Rotation 0 = deactivate 1 = activated
P 6.24	P2-15	f-Skip1	Skip Frequency 1 Centre Point
P 6.25	P2-16	f-SkipBand1	Skip Frequency 1 Band Width
P 6.26	P2-17	f-Skip2	Skip Frequency 2 Centre Point
P 6.27	P2-18	f-SkipBand2	Skip Frequency 2 Band Width
P 6.30	P2-24	Start Mode	Start/restart mode selection 1 = Auto-0 2…10: Auto-1 to Auto-9
P 6.34	P2-09	Overvoltage Control	Overvoltage Controller ON/OFF 0 = overvoltage controller on 1 = overvoltage controller off

Motor			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 7.1	P1-08	Motor Nom Current	Motor Rated Current
P 7.2 [A]	P6-04 [%]	M-Max Motoring	Maximum Current Limit For more details see chapter: 16.7 Motor Current Limitation
P 7.3	P1-10	Motor Nom Speed	Motor Rated Speed For more details see chapter: ***12 Formula for calculation of rpm (set the right f-fix)***
P 7.4	P7-02	Motor PF	Motor Power Factor Cos φ
P 7.5	P1-07	Motor Nom Voltage	Motor Rated Voltage
P 7.6	P1-09	Motor Nom Frequency	Motor Rated Frequency

Protective Function			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 8.5	P6-05	Action@Underload Motor	Underload Protection Setup P8.5 = 0 => P6-05 = 0 (ON) P8.5 = 2 => P6-05 = 1 (OFF) 0 = Disable 1 = Enable **Note:** P8.5 = 1 => no corresponding setting due to missing possibility to display this status via AS-i
P8.12	P6-06	M-Min (f-Ref > 5 Hz) Limit	Underload torque limit (> 5 Hz) in motor range
P8.13	P6-07	M-Min (f > P1-09) Limit	Underload torque limit above the field weakening point

Fixed Frequency			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 10.1	P1-12	f-Fix1	Fixed Frequency 1 For more details see chapter: ***14.1 Fixed frequency f-Fix1 / P1-12 (RASP5) vs f0 / P10.1 (RASP 4.0)***
P10.2	P2-01	f-Fix2	Fixed Frequency 2
P10.3	P2-02	f-Fix3	Fixed Frequency 3
P10.4	P2-03	f-Fix4	Fixed Frequency 4
P10.5	P2-04	f-Fix5	Fixed Frequency 5
P10.6	P2-05	f-Fix6	Fixed Frequency 6
P10.7	P2-06	f-Fix7	Fixed Frequency 7
P10.8	P2-07	f-Fix8	Fixed Frequency 8

V/Hz Characteristic			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 11.1	P2-19	V/f-Characteristic	V/Hz characteristic curve 0 = cTq, 1 = vTq, 2 = configurable
P 11.4 [Hz]	P2-20 [%]	f-MidV/f	V/Hz characteristic set-point Freq (% of P1-09)
P 11.5	P2-21	V-MidV/f	V/Hz characteristic set point voltage (% of P1-07) For more details see chapter: ***14.2 V/f curve***
P 11.6	P1-11	V-Boost	V/F Mode Voltage Boost
P11.8=1 + P11.7=1 P11.8 = 0	P6-01	Motor Control Mode	0: Smart vector speed control 6: V/F speed control

P 11.9	P2-22	Switching Frequency	Output PWM frequency 4kHz, 8kHz, 12kHz, 16kHz, 24kHz, 32kHz For more details see chapter: ***14.4 Switching Frequency P2-22*** (double modulation on RASP5)
P 11.10	P2-23	Auto Thermal Management	Sine wave filter Mode 0 = deactivated, 1 = activated

Braking			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
P 12.1 [A]	P4-01 [%]	DC-Brake Current	DC brake current For more details see chapter: ***14.8 DC Brake Current P4-01***
P 12.2	P4-02	t-DCBrake@Start	DC braking, braking time at start
P 12.3	P4-03	f-DCBrake@Stop	DC braking, start frequency
P 12.4	P4-04	t-DCBrake@Stop	DC braking, braking time at STOP
P 12.5	P4-05	Brake Chopper Mode	Parameter function only for devices with internal brake resistor 0 = deactivated 1 = active in RUN 2 = active in RUN and STOP
P 12.7	P3-05	Brake Release Delay	External brake, delay time opening
P 12.8	P3-02	Brake f-open	External brake, frequency threshold opening
P 12.9	P3-03	Brake f-close	External brake, frequency threshold closing
P 12.11	P3-04	Brake M-Level Release	External brake, current limit opening

System Menu			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
S 1.3~ S 1.6	P0-28	Application Version	IO SW version/Checksum, Power SW Version/Checksum
S 2.1	P0-50	FaultCounter Communication Loss	Fieldbus Fault/Error Counter: In xx.yyy format xx = Number of error messages (0 – 64) yyy = Number of correct messages (0 – 999)
S 2.3	P5-01	RS485-0 Address	Drive Fieldbus Address
S 3.1	P0-27	MWh Meter	MWh meter
S 3.2~ S 3.3	P0-56	t-PowerOn	Drive life time (operating time)
S 3.4 ~ S 3.5	P0-31	t-Run	RUN time since manufacture
S 4.2	P2-30	Parameter Set	Restore Default parameter values to drive 0: No Function, 1: Default
S 4.3	P2-32	Access Key Level2	Password setting

9.2 drivesConnect vs. MaxConnect

Monitoring Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P0-02	M 1.10	Thermistor Input1	Thermistor input 0: Motor temperature ok 1: Motor temperature too high
P0-03	No Corresponding Parameter	Input Sensor Status	Digital sensor input SEN I1..4
-	M 1.14	DI Status	Digital input DI1 … DI3
-	M 1.15	-	Digital input DI4 … DI6
P0-04	M 1.2	f-PreRamp	Frequency set-point value
P0-05	M 1.22	T-Controlboard	Board Temperature
P0-06	No Corresponding Parameter	Overload	Overload Level
P0-07	M 1.1	Output Frequency	Motor output frequency
P0-08	M 1.3	Motor Speed	Motor shaft speed (Estimated)
P0-09	M 1.4	Motor Current	Motor current
P0-10	M 1.6	Motor Power Rel	Motor output power
P0-11	M 1.7	Motor Voltage	Motor output voltage
P0-12	M 1.5	Motor Torque	Motor output torque
P0-13	No Corresponding Parameter	Trip Log	Fault Log (4 latest)
P0-14	No Corresponding Parameter	Magnetizing current Id	Motor Magnetising Current (Id)
P0-15	No Corresponding Parameter	Torque current Iq	Torque Current (Iq)
P0-16	No Corresponding Parameter	DC-Link Voltage Ripple	DC-Link Voltage Ripple
P0-17	No Corresponding Parameter	HOA Status	Selector status
P0-18	No Corresponding Parameter	FWD/REV Status	Key Switch Status
P0-19	M 1.16	DO 1 to 3 Status	Digital output DO (Actuators)
P0-20	M 1.8	DC-Link Voltage	Intermediate DC bus voltage
P0-21	M 1.9	Heatsink Temperature	Unit temperature (Module)
P0-22	No Corresponding Parameter	TimeToNextService	Service Interval Time to Service
P0-23	No Corresponding Parameter	t-Run IGBT in OT	Time Run with heatsink above 85 deg C
P0-24	No Corresponding Parameter	t-Run PCB in OT	Time Run with internal ambient above 80 deg C
P0-25	No Corresponding Parameter	f-PostRamp	Post ramp speed reference

Monitoring Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P0-26	No Corresponding Parameter	kWh Meter	kWh meter
P0-27	S 3.1	MWh Meter	MWh meter
P0-28	S 1.3~ S 1.6	Application Version	IO SW version/Checksum, Power SW Version/Checksum
P0-29	No Corresponding Parameter	Device Type	Drive type ID For more information see manual.
P0-30	No Corresponding Parameter	Serial Number	Serial Number
P0-31	S 3.4 ~ S 3.5	t-Run	RUN time since manufacture
P0-32	No Corresponding Parameter	t-Run since Restart	Time Run since last Trip or power down
P0-33	No Corresponding Parameter	t-Run since Trip	Time Run since last Trip
P0-34	No Corresponding Parameter	t-HoursRun Enable	Time Run since Last Enable
P0-35	No Corresponding Parameter	Fan Runtime	Heat Sink Fan Run Time
P0-36	No Corresponding Parameter	DC-Link Log	DC Link Voltage Log (last 8 samples)
P0-37	No Corresponding Parameter	DC-Link V-Ripple Log	DC Link Ripple Log (last 8 samples)
P0-38	No Corresponding Parameter	Heatsink Log	Heat Sink Temperature Log (last 8 samples)
P0-39	No Corresponding Parameter	AmbientTemp Log	Ambient Temperature Log (last 8 samples)
P0-40	No Corresponding Parameter	MotorCurrent Log	Motor Current Log (last 8 samples)
P0-41	No Corresponding Parameter	FaultCounter Overcurrent	Over Current Fault Counter
P0-42	No Corresponding Parameter	FaultCounter DC-Overvoltage	DC Over Voltage Fault Counter
P0-43	No Corresponding Parameter	FaultCounter DC-Undervoltage	DC Under Voltage Fault Counter
P0-44	No Corresponding Parameter	FaultCounter Overtemperature Heatsink	Heat sink Over Temperature Fault Counter
P0-45	No Corresponding Parameter	FaultCounter Overcurrent Brake Chopper	Brake Chopper Over Current Fault Counter
P0-46	No Corresponding Parameter	FaultCounter Overtemperature Ambient	Ambient Over Temperature Fault Counter
P0-47	No Corresponding Parameter	FaultCounter Internal Fault (IO)	Internal Value – Fault counter IO Processor
P0-48	No Corresponding Parameter	FaultCounter Internal Fault (DSP)	Internal Value – Fault Counter MC Processor

Monitoring Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P0-49	No Corresponding Parameter	FaultCounter Local COM Loss	Internal Value – Fault Counter Inner bus link
P0-50	S 2.1	FaultCounter Communication Loss	Fieldbus Fault/Error Counter: In xx.yyy format xx = Number of error messages (0 – 64) yyy = Number of correct messages (0 – 999)
P0-51	No Corresponding Parameter	Input Data Value	Fieldbus Input data value e.g. with 000F all AS-i-Bits are high
P0-52	No Corresponding Parameter	Output Data Value	Fieldbus Output data value
P0-53	No Corresponding Parameter	Phase U Current Offset Ref	U Phase current sensing/reference
P0-54	No Corresponding Parameter	Phase V Current Offset Ref	V phase current sensing/reference
P0-55	No Corresponding Parameter	Phase W Current Offset Ref	W phase current sensing/reference
P0-56	S 3.2~ S 3.3	t-PowerOn	Drive life time (operating time)
P0-57	No Corresponding Parameter	V d-Axis / V q-Axis	Stator Voltage (Ud) and Rotor voltage (Uq)
P0-62	No Corresponding Parameter	t-accNET	Fieldbus Ramp Time
P0-63	No Corresponding Parameter	f-Ref Interface0	Fieldbus Speed Reference
P0-64	No Corresponding Parameter	Actual Switching Frequency	Actual (Current) switching Frequency
P0-65	No Corresponding Parameter	System Software Version	Motor control lib version

Basic Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P1-01	P 6.4	f-max	Maximum Frequency / Speed Limit
P1-02	P 6.3	f-min	Minimum Frequency / Speed Limit
P1-03 (based on P1-09)	P 6.5 (based on P6.4)	t-acc	Acceleration Ramp Time For more details see chapter: ***14.3 Ramp Times***
P1-04 (see above)	P 6.6	t-dec	Deceleration Ramp Time For more details see chapter: ***14.3 Ramp Times***
P1-05	P 6.8	Stop Mode	Stop Mode Stop Mode

Basic Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
			0: Free Coasting 1: Ramp Deceleration 2: Flux braking
P1-07	P 7.5	Motor Nom Voltage	Motor Rated Voltage
P1-08	P 7.1	Motor Nom Current	Motor Rated Current
P1-09	P 7.6	Motor Nom Frequency	Motor Rated Frequency
P1-10	P 7.3	Motor Nom Speed	Motor Rated Speed For more details see chapter: ***12 Formula for calculation of rpm (set the right f-fix)***
P1-11	P 11.6	V-Boost	V/F Mode Voltage Boost
P1-12	P 10.1	f-Fix1	Fixed Frequency 1 For more details see chapter: ***14.1 Fixed frequency f-Fix1 / P1-12 (RASP5) vs f0 / P10.1 (RASP 4.0)***
P1-13	DIP 4, 5, 6	SEN Config Select	Sensor Input / Speed Configuration For more details see chapter: ***10.3 DIP 4, 5, 6 vs P1-13 (Quick stop and interlocked manual operation)***
P1-14	P 1.1	Access Key	Extended Menu Access Code. For more details see chapter: ***5.1Software file***

Advanced Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P2-01	P10.2	f-Fix2	Fixed Frequency 2
P2-02	P10.3	f-Fix3	Fixed Frequency 3
P2-03	P10.4	f-Fix4	Fixed Frequency 4
P2-04	P10.5	f-Fix5	Fixed Frequency 5
P2-05	P10.6	f-Fix6	Fixed Frequency 6
P2-06	P10.7	f-Fix7	Fixed Frequency 7
P2-07	P10.8	f-Fix8	Fixed Frequency 8
P2-08	P 6.9	t-SRamp1	S-Ramp Control 0.0 = linear: 0.1 - 10.0s = S-Ramp
P2-09	P 6.34	Overvoltage Control	Overvoltage Controller ON/OFF 0 = overvoltage controller on 1 = overvoltage controller off
P2-10	P 6.23	REV Enable	Block Reverse Motor Rotation 0 = deactivate 1 = activated
P2-11	P 6.19	t-acc2	Acceleration Ramp 2
P2-12	P 6.21	n-accMulti1	Speed Boundary for ACC Ramp 1 - Ramp 2

Advanced Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P2-13	P 6.20	t-dec2	Deceleration Ramp 2
P2-14	P 6.22	n-decMulti1	Speed Boundary for DEC Ramp 2 - Ramp 1
P2-15	P 6.24	f-Skip1	Skip Frequency 1 Centre Point
P2-16	P 6.25	f-SkipBand1	Skip Frequency 1 Band Width
P2-17	P 6.26	f-Skip2	Skip Frequency 2 Centre Point
P2-18	P 6.27	f-SkipBand2	Skip Frequency 2 Band Width
P2-19	P 11.1	V/f-Characteristic	V/Hz characteristic curve 0 = cTq, 1 = vTq, 2 = configurable
P2-20 [%]	P 11.4 [Hz]	f-MidV/f	V/Hz characteristic set-point Freq (% of P1-09)
P2-21	P 11.5	V-MidV/f	V/Hz characteristic set point voltage (% of P1-07) For more details see chapter: ***14.2 V/f curve***
P2-22	P 11.9	Switching Frequency	Output PWM frequency 4kHz, 8kHz, 12kHz, 16kHz, 24kHz, 32kHz For more details see chapter: ***14.4 Switching Frequency P2-22 (double modulation on RASP5)***
P2-23	P 11.10	Auto Thermal Management	Sine wave filter Mode 0 = deactivated, 1 = activated
P2-24	P 6.13 P 6.30	Start Mode	Start/restart mode selection 0: Edge-r, 1 = Auto-0 2…10: Auto-1 to Auto-9
P2-25	P 6.12	REAF Start Function	Restart function with automatic restart 0 = Ramp 1 = Flying restart circuit 2 = According to P2-37
P2-26	P 6.10	Auto Reset Delay	Wait time before an automatic restart
P2-27	DIP 1	Action@Thermistorfault Motor	Motor Thermistor Protection 0: Disabled 1: Enable (Trip level fixed by hardware) For more details see chapter: ***10.1 DIP 1 vs P2-27***
P2-28	No Corresponding Parameter	Service Interval Time	Maintenance Time Interval
P2-29	No Corresponding Parameter	Reset ServiceIndicator	Reset Maintenance timer: 0: No function 1: Reset
P2-30	S 4.2	Parameter Set	Restore Default parameter values to drive 0: No Function, 1: Default
P2-31	P 1.3	Default Selection	Set Country Defaults: 0 = EU 1 = USA
P2-32	S 4.3	Access Key Level2	Password setting
P2-33	P3.17 (via digital input)	Parameter Lock	Parameter access lock

Advanced Parameter			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P2-34	No Corresponding Parameter	TCP Enable Service	Cyber Security, enable none primary communications interfaces 0: Disable 1: Enable
P2-36	No Corresponding Parameter	Save Parameters @24V-ext.	Save parameters @ external 24V mode 0: Disable 1: Enable
P2-37	P 6.7	Spin Start Enable	Start Function: 0: Ramp Start 1: Spin Start

Digital Input/Output			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P3-01	P 5.3	Brake Mode	Control of the mechanical brake 0: simple mode (P3-02, P3-03) 1: extended mode (P3-02 - P3-05)
P3-02	P 12.8	Brake f-open	External brake, frequency threshold opening
P3-03	P 12.9	Brake f-close	External brake, frequency threshold closing
P3-04	P 12.11	Brake M-Level Release	External brake, current limit opening
P3-05	P 12.7	Brake Release Delay	External brake, delay time opening
P3-06	DIP 3	SEN I1 Logic	Sensor 1 Logic - normally open/closed For more details see chapter ***10.2 DIP 3 vs P3-06...09***
P3-07	DIP 3	SEN I2 Logic	Sensor 2 Logic - normally open/closed For more details see chapter ***10.2 DIP 3 vs P3-06...09***
P3-08	DIP 3	SEN I3 Logic	Sensor 3 Logic - normally open/closed For more details see chapter ***10.2 DIP 3 vs P3-06...09***
P3-09	DIP 3	SEN I4 Logic	Sensor 4 Logic - normally open/closed For more details see chapter ***10.2 DIP 3 vs P3-06...09***
P3-11	DIP 8	t-dec Select B0	External stop function via AS-i For more details see chapter ***10.5 DIP 8 vs P3 -11***
Motor Brake			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P4-01 [%]	P 12.1 [A]	DC-Brake Current	DC brake current For more details see chapter: ***14.8 DC Brake Current P4-01***
P4-02	P 12.2	t-DCBrake@Start	DC braking, braking time at start
P4-03	P 12.3	f-DCBrake@Stop	DC braking, start frequency

P4-04	P 12.4	t-DCBrake@Stop	DC braking, braking time at STOP
P4-05	P 12.5	Brake Chopper Mode	Parameter function only for devices with internal brake resistor 0 = deactivated 1 = active in RUN 2 = active in RUN and STOP
P4-06	No Corresponding Parameter	Brake Resistor	Brake Resistor Resistance
P4-07	No Corresponding Parameter	P-Brake Resistor	Brake Resistor Power
P4-08	No Corresponding Parameter	Brake Chopper ED Heat-Up	Brake chopper Under Temperature Duty Cycle

Communication			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P5-01	S 2.3	RS485-0 Address	Drive Fieldbus Address
P5-02	No Corresponding Parameter	COM Loss Timeout	Communications Loss Timeout
P5-03	No Corresponding Parameter	Action@Communication Loss	Communications Loss Action 0: Trip 1: Ramp to stop, then trip 2: Ramp to stop only (no trip) 3: Run at preset speed 2 (P2-01)
P5-04	No Corresponding Parameter	FieldbusRampControl	Fieldbus Ramp Control Enable
P5-05	No Corresponding Parameter	NETSendPZD3	Fieldbus Process Data Output Word 3 Select 0: Motor current 1: Motor power 2: Digital input status 3: Power stage temperature 4: User register 1 5: User register 2 6: PDO index register (P5-09)
P5-06	No Corresponding Parameter	NETSendPZD4	Fieldbus Process Data Output Word 4 Select As P5-05
P5-07	No Corresponding Parameter	NETReceivePZD3	Fieldbus Process Data Input Word 3 Select 0: Dummy 1: User ramp 2: User register 3 3: User register 4
P5-08	No Corresponding Parameter	NETReceivePZD4	Fieldbus Process Data Input Word 4 Select As P5-07
P5-09	No Corresponding Parameter	PointerToParameter	PDO Parameter pointer
P5-10	No Corresponding Parameter	Disable QuickStop	AS-i DQ3 Option

Communication			
Display Number		**Display Name**	**Definition**
RASP5	**RASP 4.0**		
P5-11	No Corresponding Parameter	AS-i command configuration	Configuration of the 4 AS-Interface output DQ0 - DQ3 0: FWD, REV, f-Fix Bit 0, f-Fix Bit 1 1: FWD, f-Fix Bit 0, f-Fix Bit 1; f-Fix Bit 2 0: FWD, t-acc1/2, f-Fix Bit 0, f-Fix Bit 1 For more details see chapter: ***14.5 AS-i command configuration P5-11***

Advanced Motor Control			
Display Number		**Display Name - RASP5**	**Definition RASP5**
RASP5	**RASP 4.0**		
P6-01	P11.8=1 + P11.7=1 P11.8 = 0	Motor Control Mode	Motor Control Mode 0: Smart vector speed control 1: Vector speed control 2: PM motor speed control 3: LSPM motor speed control 4: SYNCREL motor speed control 5: BLDC motor speed control 6: V/F speed control
P6-02	No Corresponding Parameter	MSC Kp	Vector Speed Controller Proportional Gain
P6-03	No Corresponding Parameter	MSC1 Ti	Vector Speed Controller Proportional Gain
P6-04 [%]	P 7.2 [A]	M-Max Motoring	Maximum Current Limit For more details see chapter: ***14.7 Motor Current Limitation***
P6-05	P 8.5	Action@Underload Motor	Underload Protection Setup P8.5 = 0 => P6-05 = 0 (ON) P8.5 = 2 => P6-05 = 1 (OFF) Note: P8.5 = 1 => no corresponding setting due to missing possibility to display this status in AS-i bits. 0 = Disable 1 = Enable
P6-06	P8.12	M-Min (f-Ref > 5 Hz) Limit	Underload torque limit (> 5 Hz) in motor range
P6-07	P8.13	M-Min (f > P1-09) Limit	Underload torque limit above the field weakening point
P6-08	DIP 7	Change Phase sequence Motor	Output phase sequence: 0: U V W 1: U W V For more details see chapter: ***10.4 DIP 7 vs P6-08 (Change phase sequence motor)***

Advanced Motor Control			
Display Number		**Display Name - RASP5**	**Definition RASP5**
RASP5	**RASP 4.0**		
P6-09	No Corresponding Parameter	T-Memory Enable	Thermal overload value retention 0: Disable 1: Enable
P6-10	No Corresponding Parameter Note: Always active	Action @I-CurrentLimit	Motor overload management 0: Disable 1: Enable
P6-11	No Corresponding Parameter	EnhancedGeneratorControl	Enhanced Generator Mode 0: Disable 1: Enable
P6-12	No Corresponding Parameter	Overvoltage Currentlimit	Over Voltage Current Limit
P6-13	No Corresponding Parameter	LoadInertiaFactor	System Inertia Constant
P6-14	No Corresponding Parameter	t-Excitation-V/f	Magnetising Period
P6-15 [%]	No Corresponding Parameter	Torque Boost	Low Frequency Torque Boost Current
P6-16	No Corresponding Parameter	f-Torque Boost Limit	Low Frequency Torque Boost Frequency Limit
P6-17	No Corresponding Parameter	PM-MotorSignalInLevel	PM Motor Signal Injection Control 0: Disable 1~200: No. of pulse during injection
P6-18	No Corresponding Parameter	Overmodulation	Over Modulation Enable: 0: Disable 1: Enable

Motor Parameters			
Display Number		**Display Name - RASP5**	**Definition RASP5**
RASP5	**RASP 4.0**		
P7-01	No Corresponding Parameter	Motor Identification	Motor Parameter Auto-tune Enable For more details see chapter: ***13 Motor Identification P7-01***
P7-02	P 7.4	Motor PF	Motor Power Factor Cos φ
P7-03	No Corresponding Parameter	Motor Stator Resistance R1	Motor stator resistance (Rs)
P7-04	No Corresponding Parameter	Motor Rotor Resistance R2	Motor Rotor Resistance (Rr)
P7-05	No Corresponding Parameter	Motor Stator Inductance d-Axis	Motor Stator Inductance (Lsd)
P7-06	No Corresponding Parameter	Motor Stator Inductance q-Axis	Motor Q Axis Inductance (Lsq)

10 DIP Switch Setting vs. Parameter Settings

10.1 DIP 1 vs P2-27 (Motor cable monitoring)

DIP switches			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
DIP 1 ON OFF	P2-27 1 0	Action@Thermistorfault Motor	Motor Thermistor Protection 0: Disabled 1: Enable (Trip level fixed by hardware)

10.2 DIP 3 vs P3-06...09 (Sensor input configuration)

DIP switches			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
DIP 3 OFF ON	P3-06 0 1	SEN I1 Logic	Sensor 1 Logic - normally open/closed
DIP 3 OFF ON	P3-07 0 1	SEN I2 Logic	Sensor 2 Logic - normally open/closed
DIP 3 OFF ON	P3-08 0 1	SEN I3 Logic	Sensor 3 Logic - normally open/closed
DIP 3 OFF ON	P3-09 0 1	SEN I4 Logic	Sensor 4 Logic - normally open/closed

Note: Each Sensor on RASP5 can be configured individually. DIP 3 on RASP 4.0 changes all sensors to falling edge (falling sense) if set to ON

10.3 DIP 4, 5, 6 vs P1-13 (Quick stop and interlocked manual operation)

DIP switches					
Display Number				**Display Name**	**Definition**
RASP 4.0			**RASP5**		
DIP4	DIP5	DIP6	P1-13	SEN Config Select	Sensor Input / Speed Configuration
-	-	-	0		Details see following table
OFF	OFF	OFF	1		
OFF	OFF	ON	2		
OFF	ON	OFF	3		
OFF	ON	ON	4		

ON	OFF	OFF	5		
ON	OFF	ON	6		
ON	ON	OFF	7		
ON	ON	ON	8		

P1-13	Description
0	reserved
1	No function (Default)
2	Quick stop: only Auto mode I1 and I2 enabled. I1 is assigned to the direction of rotation "right", I2 is assigned to the direction of rotation "left"; **Application example**: Vertical sorter < 360° eccentric
3	Quick stop: only Auto mode I1 is activated. I1 is assigned to both operating directions. I2 has no add-on function; **Application example**: Chain ejector
4	Quick stop and interlocked manual mode (edge- and signal-controlled): I1 and I2 enabled. I1 is assigned to operating direction "right", I2 is assigned to operating direction "left"; **Application example**: Vertical sorter < 360° eccentric Note: In automatic mode, only edge-controlled
5	Quick stop and interlocked manual mode (only edge controlled): I1 and I2 enabled. I1 and I2 are assigned to operating direction "right". The operating direction "left" is locked: **Application example**: Vertical sorter > 360° eccentric and > 360° turntable
6	Quick stop and creep speed: In automatic mode I1 to I4 are activated. I1, I3 are assigned to operating direction "right", I2 and I4 to operating direction "left". When I3/I4 is reached, RASP5… switches to creep speed FF1. When I1/I2 is reached, the drive switches off edge and signal controlled). **Application example**: Turntable Note: I3 and I4 require the RA-XM12-Y connector.
7	Quick stop and creep speed: In automatic mode I1 to I4 are activated. I1, I3 are assigned to operating direction "right", I2 and I4 to operating direction "left". When I3/I4 is reached, RASP5… switches to creep speed FF1. When I1/I2 is reached, the drive switches off. **Application example**: Turntable I1 and I2: Edge-controlled I3 and I4: edge and signal controlled Note: I3 and I4 require the RA-XM12-Y connector.
8	Quick stop and interlocked manual mode (edge- and signal-controlled) and creep speed: I1 to I4 are activated. I1, I3 are assigned to operating direction "right", I2 and I4 to operating direction "left". When I3/I4 is reached, RASP5… switches to creep speed FF1. When SI1/SI2 is reached, the drive switches off. **Application example**: Turntable Note: I3 and I4 require the RA-XM12-Y connector.

10.4 DIP 7 vs P6-08 (Change phase sequence motor)

DIP switches			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
DIP 7 OFF ON	P6-08 0 1	Change Phase sequence Motor	Output phase sequence: 0: U V W 1: U W V

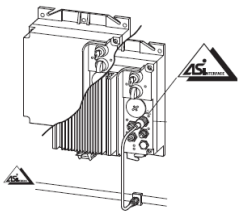
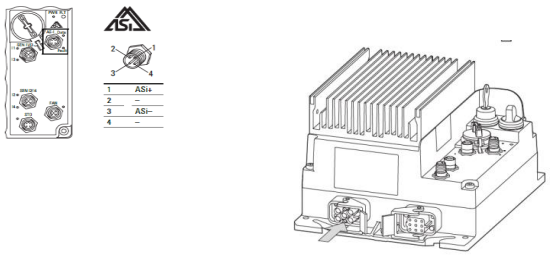
10.5 DIP 8 vs P3 -11 (Stop behavior, t-dec Select B0)

DIP switches			
Display Number		**Display Name**	**Definition**
RASP 4.0	**RASP5**		
DIP 8 OFF ON	P3-11 0 1	t-dec Select B0	External stop function via AS-i 0: Deactivated 1: Activated

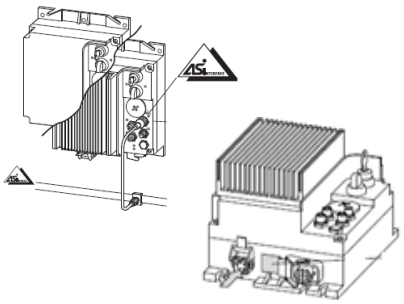
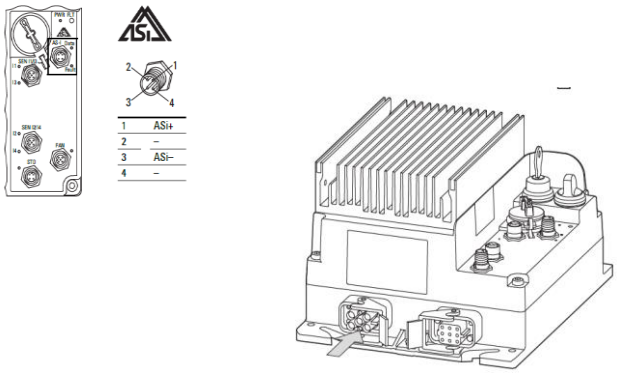
11 Requirements for Parametrization and PLC Communication

The following tables show the differences in the power supply for PLC communication and the parameterization via PC.

11.1 PLC Communication

PLC Communication	
RASP 4.0	**RASP5**
AS-i Supply is required	AS-i Supply **or** Power Supply (mains) required
	

11.2 Parametrization

Parametrization	
RASP 4.0	**RASP5**
AS-i Supply **and** power supply (mains) required	AS-i Supply or power supply (mains) required RASP5 parameter save via P2-36 is required when the unit is operating on AS-i supply **only**.
	

Note: If RASP5 supplied with AS-i connection only, the parameter settings must be saved with P2-36!

12 Formula for calculation of rpm (set the right f-fix)

When P1-10 is set to 0, the motor speed is displayed in Hz. When P1-10 is set to a value greater than 0, the speed-related parameters (f-max, f-min, f-fix etc.) are displayed in rpm. Slip compensation is also activated, whereby the motor speed is maintained under different load conditions by compensating the load-dependent motor slip.

For a convenient parameter setting, first set all speed related parameters in Hz then set P1-10. The parameter software will then convert all values to rpm.

rpm = f / p * 60 (with f = wanted frequency, p = pole pair; e.g. (30 Hz / 2 * 60 = 900 rpm)

13 Motor Identification P7-01

Motor Identification is possible via keypad (DX-KEY-OLED) or via drivesConnect.

With drivesConnect Motor Identification runs only in Real-Time Edit Mode!

After Motor Identification is finished following values in P7-03 … P7-06 are going to be updated under following condition:

- If P6-01 set to 0 (Smart Vector Speed Control) or P6-01 = 1 (Vector Speed Control)
- When P6-01 set to 6 (V/f Speed Control) then only the value of P7-03 will be updated.

Note: Motor identification is not absolutely necessary in Smart Vector Mode (P6-01 = 0), but it does improve the performance of the drive.

14 Further application specific information

14.1 Fixed frequency f-Fix1 / P1-12 (RASP5) vs f0 / P10.1 (RASP 4.0)

RASP 4.0

Preset speed FF0 / P10.1 is the preset speed for the manual mode (hand mode) and first fixed speed (FF0) in automatic mode. See table "Actuation of speed control unit RASP" on the MN03406003Z-EN.

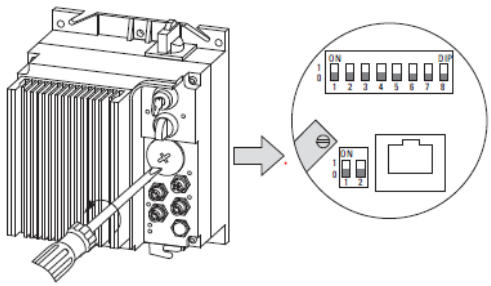
Table 12: Actuation of speed control unit RASP

Function	Signal to RASP Outputs			
	DQ0	DQ1	DQ2	DQ3
No controller enable	0	0		
Anticlockwise rotating field (REV)	0	1		
Clockwise rotating field (FWD)	1	0		
No controller enable	1	1		
f_0 = Analog value via potentiometer or FF0 (P10.1), if P6.2 = 0			0	0
FF1 (P10.2) = 30 Hz			1	0
FF2 (P10.3) = 40 Hz			0	1
FF3 (P10.4) = 50 Hz			1	1

The preset speed FF0 can be set per potentiometer or per parameter P10.1.

Parameter P6.2 defines the selection between setpoint sources.
See on the MN03406003Z-EN.

PNU	ID	Access right RUN	Access right rw/ro	Value	Description	DS (P1.1 = 1)
P6.2	117	✓	rw		Setpoint input	3
				0	FF0 (Fixed frequency) The value can be set in parameter P10.1.	
				1	REF (external keypad RASP-KEY-S1) This setting causes the setpoint value defined at REF to be read. It can be set via the keypad with the arrow keys.	
				2	Deactivated	
				3	Potentiometer n_0 (→ Figure 102, internal input AI1 of the variable frequency drive)	



If P6.1 is set to 0 then the P10.1 is active as set point value. If P6.1 is set to 3 then potentiometer setting is active. In default potentiometer is adjusted to 10 Hz.

RASP5

Preset speed f-Fix1 / P1-12 (RASP5) is the preset speed for the manual mode (hand mode) and first fixed speed in automatic mode. See table 45 on the MN034004EN.

Table 45: Control RASP5

Function	Signal to RASP Outputs			
	DQ0	DQ1	DQ2	DQ3
No controller enable	0	0		
Anticlockwise rotating field (REV)	0	1		
Clockwise rotating field (FWD)	1	0		
No controller enable	1	1		
FF0 (P1-12 = 10 Hz)			0	0
FF1 (P2-01 = 30 Hz			1	0
FF2 (P2-02 = 40 Hz			0	1
FF3 (P2-03 = 50 Hz			1	1

14.2 V/f curve

V/f characteristic P2-19 (RASP5) vs V/f-characteristic P11.1 (RASP 4.0)

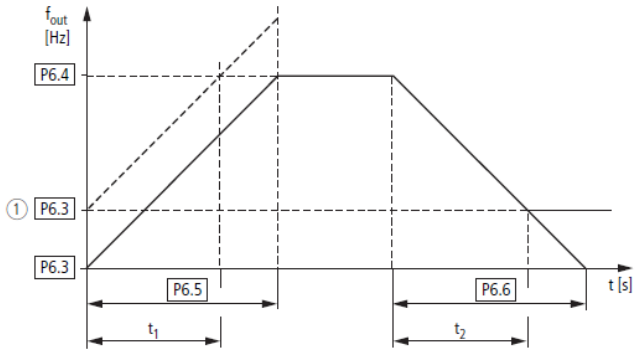
RASP 4.0: P11.4 and P11.5 can be modified if P11.1 set to 2.

RASP5: P2-20 and P2-21 can be modified if P2-19 set to 2.

14.3 Ramp Times

RASP 4.0	RASP5	
P 6.5 (based on P6.4)	P1-03 The time interval set in "t-acc" represents the time taken to accelerate from zero to "Motor Nom Frequency" (P1-09).	Acceleration Ramp Time
P 6.6 (based on P6.4)	P1-04 The time interval set in" t-dec" represents the time taken to decelerate from "Motor Nom Frequency" (P1-09) to zero.	Deceleration Ramp Time

RASP 4.0:
Ramp time relationship is based on the maximum frequency (P6.4).



The values for the acceleration time t1 and the deceleration time t2 are calculated as follows:

$t_1 = f_{Setpoint} * P6.5$ (t-accl) / P6.4 (fmax)

$t_2 = f_{Setpoint} * P6.6$ (t-decl) / P6.4 (fmax)

Example:

Setpoint frequency 100 Hz; P6.5 = 5.0 s; P6.4 = 100 Hz,
P7.6 (Motor rated frequency) = 50 Hz => no influence on ramp times
Total acceleration time $t_1 = f_{SetPoint} * P6.5 / P6.4 = 100 Hz * 5 s / 100 Hz = 5 s$.

RASP5:

The ramp time ratio is based on the rated motor frequency.
The acceleration time is set in parameter P1-03.

$t_1 = f_{Setpoint} * P1\text{-}03$ (t-accl) / P1-09 ($f_{MotorRatedFrequency}$)

$t_2 = f_{Setpoint} * P1\text{-}04$ (t-decl) / P1-09 ($f_{MotorRatedFrequency}$)

Example:

Setpoint frequency 100 Hz; P1-03 = 5.0 s; P1-09 = 50 Hz
Total acceleration time $t_1 = f_{SetPoint} * P1\text{-}03 / P1\text{-}09 = 100 Hz * 5 s / 50 Hz = 10 s$.

14.4 Switching Frequency P2-22 (double modulation on RASP5)

Using the special feature Double Edge Modulation, the acoustic switching frequency (set with parameter P2-22) is double the real switching frequency. The range is: 4 - 32 (Acoustic switching frequency) / 2 - 16 (real switching frequency)

Example:

RASP 4.0 (P11.9) = 6 kHz ≙ RASP5 (P2-22) = 12 kHz

14.5 AS-i command configuration P5-11

Configuration of the 4 AS-Interface outputs DQ0 to DQ3 are done per P5-11. Default value is '0'. Following setting are possible.

P5-11	Functions of AS-i Signals				Notes
	DQ0	DQ1	DQ2	DQ3	
0	Clockwise rotation	anticlockwise rotation	FF1 - FF4 (binary coded via Select f-Fix Bit 0-1)		DQ0 + DQ1 = Reset
1	Clockwise rotation	FF1 - FF8 (binary coded via Select f-Fix Bit 0-2)			DQ0 + DQ1 = Reset
2	Clockwise rotation	selection between 1st and 2nd ramp time (0= P1-03, P1-04 / 1 = P2-11, P2-13)	FF1 - FF4 (binary coded via Select f-Fix Bit 0-1)		DQ0 + DQ1 = Reset

14.6 Handling of Reset

RASP 4.0 and RASP5

If an error is detected, the cause of the error must be eliminated. DQ0 or DQ1 must be set to LOW. Now a Reset can be performed with DQ0 and DQ1 set to HIGH. For a restart a new edge on DQ0 or DQ1 is necessary.

Other possibilities for Reset (after elimination of the error):
Set Key Switch to OFF/RESET or power down and power up again

14.7 Motor Current Limitation

RASP 4.0

P 7.2 [A] Current limitation is based on the device nominal current.
Range: 0,2 x $I_{RatedCurrent\_RASP4}$ – 2 x $I_{RatedCurrent\_RASP4}$
Default = 1,5 x $I_{RatedCurrent\_RASP4}$

RASP5

P6-04 [%] Current limitation is based on the device nominal current.
Range: 0 – 200 %
Default = 150 %

Example:

RASP5 with 2,2 kW => rated current (P1-08 in default): 5.6 A
Nominal current of the motor: 2.8 A
Requested overload capability has to be 300 % of the motor current: 8.4 A
RASP5:
Calculation of P6-04 (M-Max Motoring): Current limit
P6-04 [%] = $I_{DesiredCurrentLimit}$ [A] * 100 [%] / $I_{RatedCurrent\_RASP5}$ [A]
P6-04 [%] = 8.4 A * 100 % / 5.6 A = 150 %

14.8 DC Brake Current P4-01

Undesirable run-out distances and times can be shortened by the DC brake function.

RASP 4.0

P12.1 [A] DC brake current is based on the **device** rated current.
Range = 0.2..2 x $I_{RatedCurrent\_RASP4}$
Default = $I_{RatedCurrent\_RASP4}$

RASP5

P4-01 [%] DC brake current is based on the **motor** rated current (P1-08).
Range: 0 – 200 %
Default = 0 %

Example 1

Device rated current = 5.6 A (2,2 kW)
Motor rated current = 5.6 A
RASP 4.0: P12.1 setting = 5.6 A
RASP5: P1-08 setting = 5.6 A

RASP5 Calculation of P4-01
P4-01 [%] = P12.1 [A] * 100 [%] / P1-08 [A]
P4-01 [%] = 5.6 A * 100 % / 5.6 A = 100 %

Example 2

Device rated current = 5.6 A (2,2 kW)
Motor rated current = 3.0 A
RASP 4.0: P12.1 setting = 4.5 A
RASP5: P1-08 setting = 3.0 A

RASP5 Calculation of P4-01
P4-01 [%] = P12.1 [A] * 100 [%] / P1-08 [A]
P4-01 [%] = 4.5 A * 100 % / 3.0 A = 150 %

14.9 Power Consumption from AS-i power supply

Total power consumption from AS-Interface power supply (30 V DC) of RASP5 and RASP 4.0 is listed below:

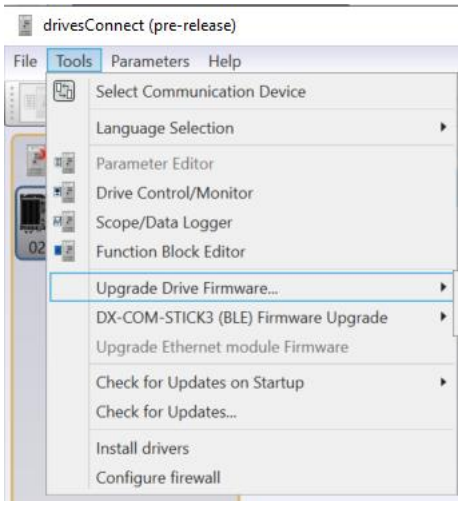
RASP 4.0: 30 mA + max. 160 mA for sensors

RASP5: 50 mA + max. 160 mA for sensors

15 Firmware update

The firmware of RASP5 can be updated by using drivesConnect software and serial cable DX-CBL-PC-3M0.

Warning: Copy Stick DX-COM-STICK3 is not allowed to use for update!



16 References

Documentation	RASP 4.0	RASP5	LINK
Manual RASP...	MN03406003Z-EN	MN034004EN	DownloadCenter
Instruction Leaflet RASP...	IL0306020Z	IL034085ZU	DownloadCenter
Application Note - Parametrization per Bluetooth	-	AP040189EN	Drives AP Note Overview Document http://www.eaton.com/ap/overview/drives
PowerXL Device Firmware Update	-	AP040214EN	Drives AP Note Overview Document http://www.eaton.com/ap/overview/drives

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