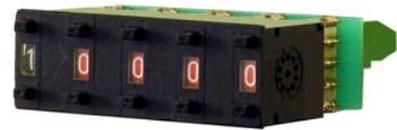**control – motion – interface**

Hints for Replacement of Obsolete Controller Models BY240 with New Models BY340

Previous Configuration:

BY240 Synchronous Controller

Option: Parallel interface PS240
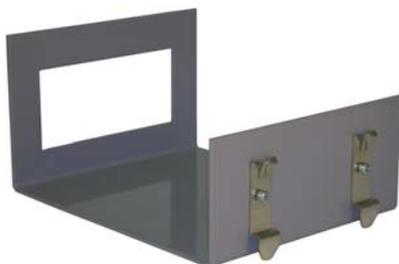and BCD thumbwheel switch set BY106-5

New Configuration:

BY 340 Synchronous Controller

Option: Parallel-to-serial converter PR210

Option: SM300 mounting frame for DIN rail mounting

BCD thumbwheel switch set BY106-5

Table of Contents

1.   Preliminary Note and Selection of Components

These instructions are intended to provide assistance for modification of machinery using the obsolete controller model BY 240 (no more available) with the new controller model BY 340. The new model is able to take all functions of old BY240 installations, however some differences with mechanical construction, wiring and parameter settings must be observed,

> For best understanding of the subsequent indications and hints it is necessary to be familiar with the basic contents of the BY340 / BY641 manual

Due to the difference of mechanical constructions, with most applications it will be desirable to mount the new BY340 controller (originally designed for front panel mounting) to a DIN rail inside the cabinet. For this the optional mounting frame SM 300 is available (not included in delivery).

The following considerations are important for selection of the necessary components to replace an existing BY240 installation:

1.1.   Power supply of the controller

Controller models BY 240 could be supplied directly from the mains with a 115 / 230 VAC supply. Unlike the new BY340 or BY641 controller requires a 24 V power supply (DC or AC alternatively) Where a suitable power unit is not available, it has to be refitted (e.g. power unit model NT 215)

1.2.   The BY240 unit to replace does not feature any interfaces

With applications where the speed ratio between the drives is constant and must not be changed during operation, no communication interface is necessary and the BY340 unit can directly replace the old model.

1.3.   The BY240 unit to replace uses a Serial Communication Interface *)

With applications where the speed ratio has been changed via serial interface, the old BY240 controller was equipped with an additional interface board type PS 240
(see remark "Option PS 240" on the type label of the unit).
Since also the new BY 340 controllers provide a serial interface as a standard, no further precautions are necessary, except proper setting of the serial access codes of the parameters to change.

*)   Whilst BY240 offered a RS232 and a RS485 interface at the same time, the new BY340 controller provides RS232 communication only

1.4. The BY240 unit to replace uses a Parallel Interface

With applications where the speed ratio has been changed via a remote thumbwheel switch type **BY106-5** or vial parallel port of a PLC, the old BY240 controller was likewise equipped with an additional interface board type **PS 240** (see remark "Option PS 240" on the type label of the unit).

If your application solely needs setting of the speed ratio via a simple thumbwheel switches, you should check for possible use of model BY641 as a replacement. This model already provides a corresponding thumbwheel switch on the front side. However the setting then has to occur on the controller directly and a real remote control of the ratio over a distance is not possible.

As soon as you need to set the speed ratio remotely from another location (via thumbwheels or by means of parallel PLC data), it is mandatory to apply an additional **PR210** converter.

Setting of the speed ratio by means of the front thumbwheel switch on the BY641 model
(only applicable if setting can occur on the unit directly)

Thumbwheel switches or PLC   (parallel)   PR 210   (serial)   BY 340
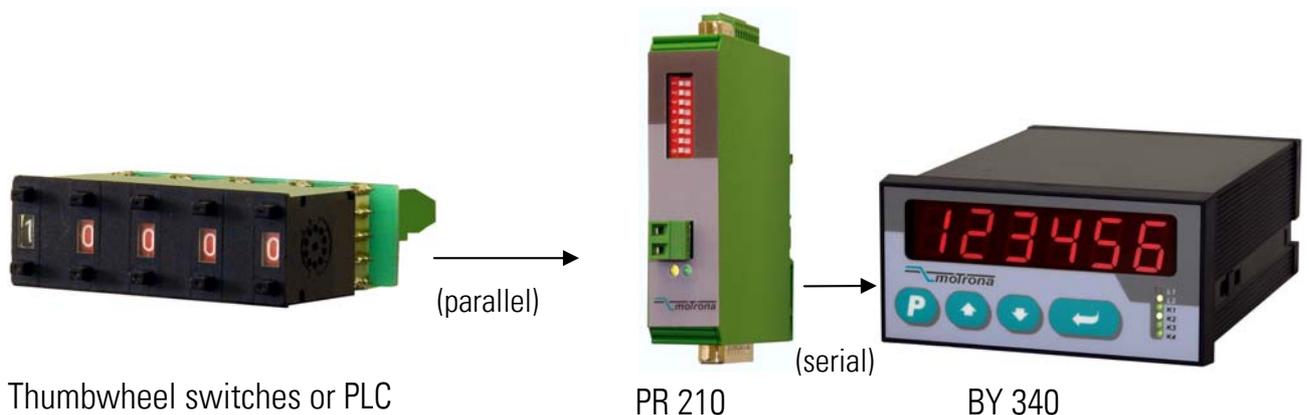
Remote setting of the speed ratio by means of an external thumbwheel switch or via parallel output of a PLC (needs the PR 210 converter)

1.5. The BY240 unit to replace uses a Multiplex Interface

For the very few and rare applications where remote ratio setting uses an <u>external switch type</u> <u>BY206</u> and a Multiplex Interface (Option FE), no more direct solution for replacement exists. Where remote setting via thumbwheel switches must be maintained, the system must be changed over to parallel interface as described under 1.4.

1.6. The Alarm Relays of the BY240 have been used

When the alarm relays of the old BY240 unit have been wired for signaling of bad synchronization, please observe that the standard model BY340 only offers corresponding transistor outputs for this. If relay contacts are required stringently, the following two options exist:

- Use of model BY641. This model provides 4 programmable relay outputs
- Use of model BY340 and the separate relay board type RL203 (see 2.5)

External relay board type RL203

2. Electrical Connections (Comparison)

2.1. Power supply of the controller (see also chapter 1.1)

BY 240 (230 VAC)		BY 340 / BY 641 (24 VAC or 24 VDC)
X16 (N)		X1/ 1 (0V)
X17 (L)		X2/17 (24 VDC or 24 VAC)

2.2. Wiring of incremental encoders

BY 240 Terminal	Assignment/Function	BY 340 / BY 641 Terminal
X11	GND Master	X2/20
X12 (+12 V)	+Power Master	X2/19 (+ 24 V)
X10	Master channel A	X2/24
X 9	Master channel B	X2/23
X 7	GND Slave	X1/ 4
X 8 (+12 V)	+Power Slave	X1/ 3 (+ 24 V)
X 6	Slave channel A	X2/22
X 5	Slave channel B	X2/21

2.3. Analogue Signals

BY 240 Terminal	Assignment/Function	BY 340 / BY 641 Terminal
X 4 and Z16	Analogue Input 10 V (feed-forward)	(not available)
Z13	Analogue Output 0 V	X2/32
Z17	Analogue Output 10 V (speed signal Slave)	X1/16
Z15	Analogue Output 10 V (= Z17-inverted)	(not available)
X 3	Analogue Correction Signal +/-10V	(not available) see *)
Z14	Analogue Correction Signal (= X3inverted)	(not available)

> *)   A pure correction signal +/-10V proportional to the actual following error of the Slave can be easily obtained on terminal X1/16 of the BY340 controllers by setting parameter "Gain-Total" to zero

2.4. Control Inputs **)

BY 240 Terminal	Assignment/Function	BY 340 / BY 641 Terminal
X15, Y14 and Y15	GND (Common switching potential)	X1/4 and X2/20
X13	Reset	X1/12 (Cont.3)
Y16	Integrator Stop	X1/11 (Cont.4)
Y17	Trim+ / Index Master	X2/28 (Cont.1)
Y13	Trim- / Index Slave	X2/27 (Cont.2)
X14	Inhibit	(not available)

	**) Functions of the BY340 / BY641 control inputs are freely programmable. There are totally 4 control inputs available. The input assignment Cont.1 to Cont.4 as shown in the table above corresponds to the parameter settings used in chapter 3.2
	The very rarely used function "Inhibit" is no more available with the new BY340 controllers. In practically all cases this Inhibit function can be replaced by "Reset"

2.5. Relay Outputs (see also chapter1.5)

Where you have decided to use a **BY641** unit for replacement, the following correspondence is valid for the relay contacts:

BY 240 Terminal	Assignment/Function	BY 641 Terminal
Y4	Relay 1 [C]	X3/1
Y5	Relay 1 [NO] (open when unenergized)	X3/2
Y6	Relay 1 [NC] (closed when unenegized)	X3/3
Y1	Relay 2 [C]	X4/1
Y2	Relay 2 [NO] (open when unenergized)	X4/2
Y3	Relay 2 [NC] (closed when unenegized)	X4/3

When the solution with **BY340** and an external relay board **RL203** has been chosen, the new connecting situation is like shown below:
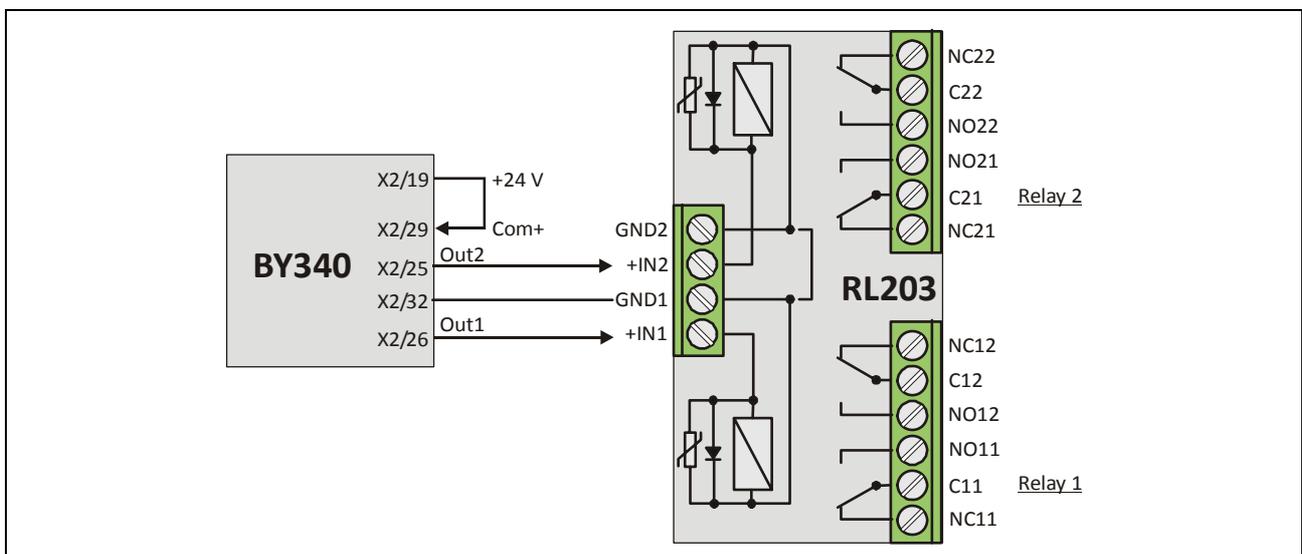
2.6. Serial Interface

Where the BY240 unit was equipped with a serial interface, the connection used a female Sub-D-9 connector on the controller side. The new BY340 and BY641 units use screw terminal connection instead.

Before: serial wiring with BY240

After: serial wiring with BY340
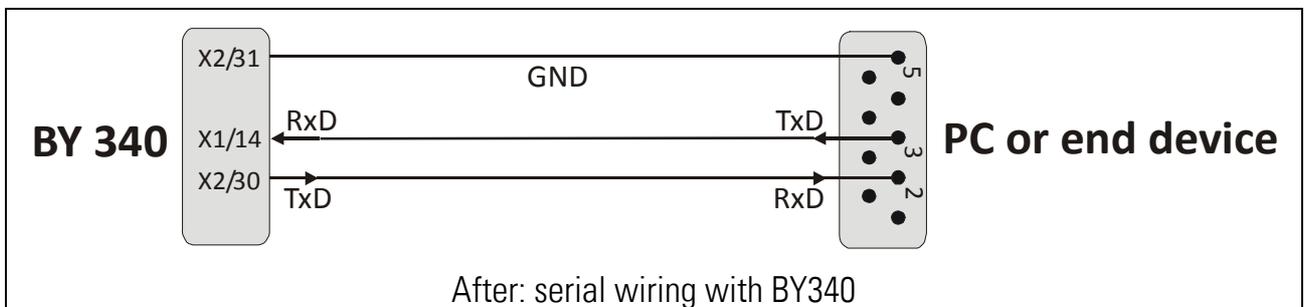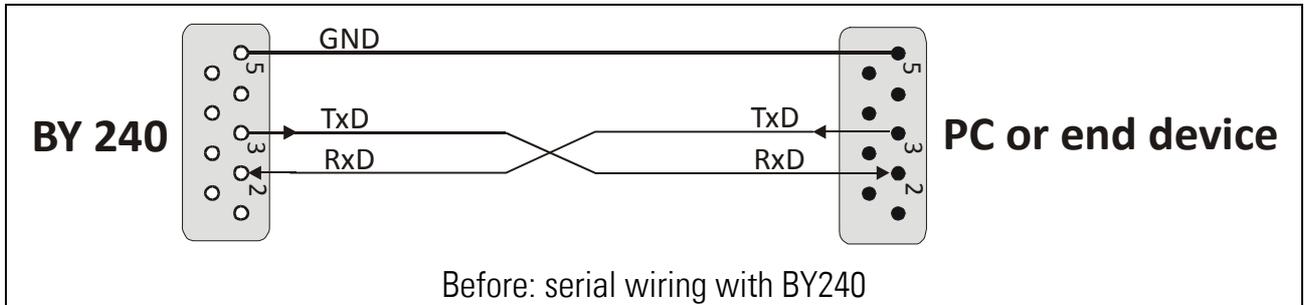
2.7. Parallel Interface and Parallel-to-Serial Converter PR210

Where the existing BY240 unit used a parallel interface, this was connected via a SUB-D-25 cable connection (female connector on cable side). The same connector can be plugged directly to the PR210 converter which must be used now. No changes are needed on the parallel side since all signals are fully pin compatible. But an additional serial communication cable must be installed between the converter and the BY340 unit. All connection details are shown in the diagram below.
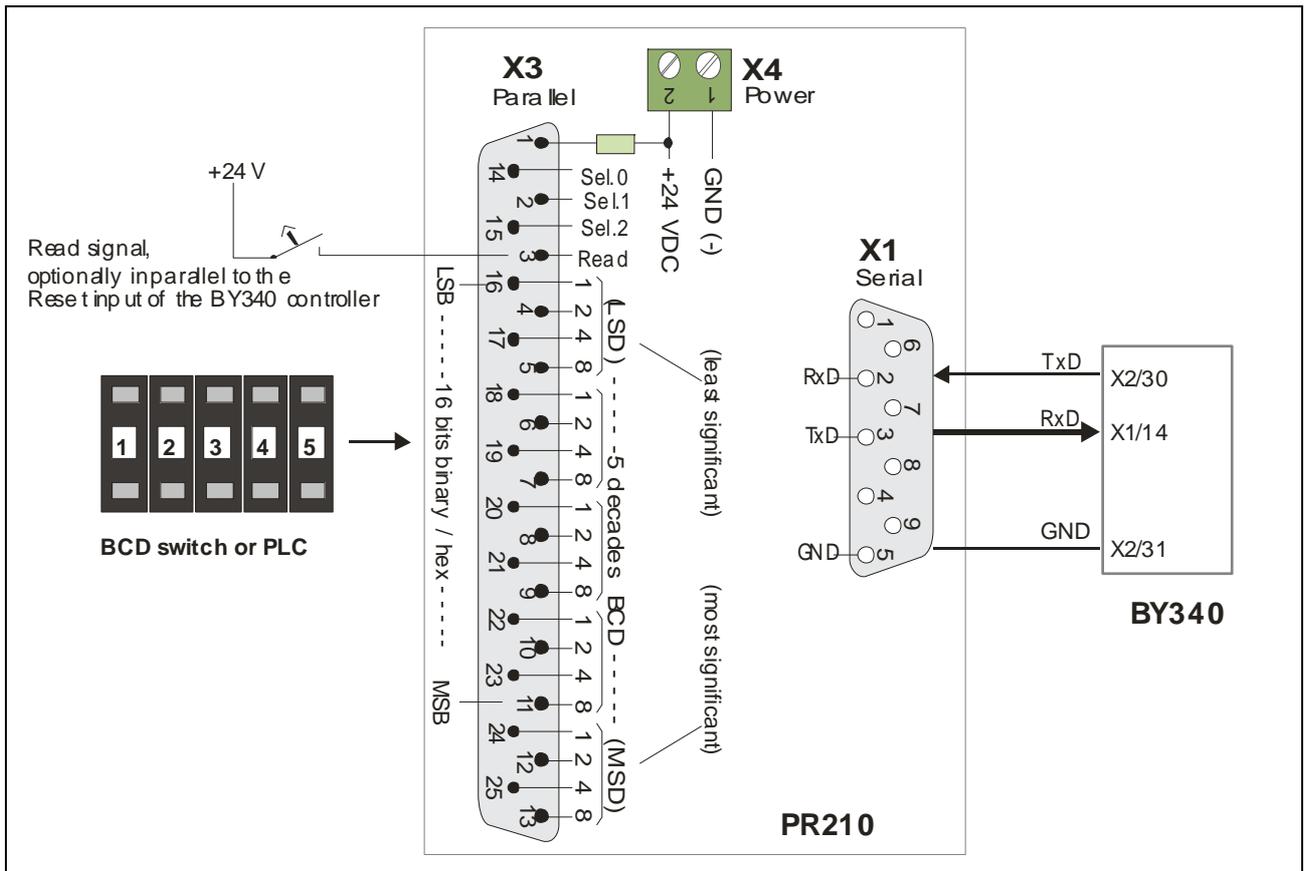
3. BY340 Parameter Settings

Subsequently you will find a complete listing of parameters (as far as possible) which must be set with the new BY340 / BY641 controller.

☞	• This chapter explains the correlation between the old parameters of the BY240 unit and the new parameters, in order to achieve the best possible pre-settings and a trouble-free commissioning procedure with the new controller
	• Where you find that the parameters of the old BY240 unit are unknown, please be prepared for completely new setup and commissioning (see BY340 operating instructions)
	• Even with well-known parameters you have at least to run the final tuning procedure by using the Adjust Menu of the PC operator software (see chapter 9 of the BY340 manual)

3.1. General Parameters

Parameter BY340 (new)		Parameter BY240 (old)	Correspondence (old setting <--> new setting)
F01.000	Factor 1	FACT 1	Use the same setting as before (0,0001 - 9,9999)
F01.001	Factor 2	FACT 2	Use the same setting as before (0,0001 - 9,9999)
F02.004	Operation mode	MODE	Use the same setting as before (1 - 8)
F02.005	Trim Time	TRIMM	[New setting] = [old setting] x 0,6 (100 with BY240 equals to 60 with BY340)
F02.006	Integration Time	INT.TIME	[New setting] = [old setting] x 0,6 (100 with BY240 equals to 60 with BY340)
F02.007	Correction Divider	COR.DIVI	Use the same setting as before (0 - 9)
F02.008	Factor 1 Scaling	F1-SCAL	Use the same setting as before (old setting 10000 equals to new 1,0000)
F02.009 F02.010	Factor 1 Minimum Factor 1 Maximum	F1 MIN F1 MAX	Use the same setting as before (0,0001 - 9,9999)
F02.011	Sampling Time	- not available -	Recommended setting: 10 msec.
F02.013	Max. Master Frequency	- not available -	Mandatory setting: enter the expected maximum frequency (Hz) of the Master encoder. It is recommended to have a reserve of about 10% by setting a higher frequency. The BY340 unit will only operate fine up to the max. frequency entered here (0,1 Hz - 300 000,0 Hz)

Parameter BY340 (new)		Parameter BY240 (old)	Correspondence (old setting <--> new setting)
F02.014	Ramp Time	RAMP	Use the same setting as before (0 - 999 sec.)
F02.015	Stop Ramp Time	STOP-RMP	Use the same setting as before (0 - 999 sec.)
F02.016	Alert 1	- not available -	- not used -
F02.017	Alert 2	ALERT	Use the same setting as before (5 - 9999 increments)
F02.018	Phase Offset	OFFSET	Use the same setting as before (-199 999 to +199 999 increments)
F02.019	Slave Pulses Index	IMP. IND.	Use the same setting as before (1 to 999 999 increments)
F02.020	Phase Adjust	PHAS.ADJ.	Use the same setting as before (1 to 9)
F02.021	Master Index Divider	IND.DIVI.	Use the same setting as before (1 to 99)
F02.022	Index Window	IND.WIND.	Use the same setting as before (1 to 9999)
F02.023	Max. Index Correction	- not available -	Use the default setting of the BY340 unit (= 32 000)
F03.026	Encoder Properties (Master)	- not available -	Use the default setting of the BY340 unit (= 1)
F03.027	Edge Counting (Master)	- not available -	Use the default setting of the BY340 unit (= 0)
F03.028	Counting direction (Master)	MAST.DIR.	If setting was "0", then set to "1" If setting was "1", then set to "0" If setting unknown: see chapter 9.2 of the BY340 manual
F04.032	Encoder Properties (Slave)	- not available -	Use the default setting of the BY340 unit (= 1)
F04.033	Edge Counting (Slave)	- not available -	Use the default setting of the BY340 unit (= 0)
F04.034	Counting direction (Slave)	SLAV.DIR.	Use the same setting as before (0 or 1) If setting unknown: see chapter 9.2 of the BY340 manual

Parameter BY340 (new)		Parameter BY240 (old)	Correspondence (old setting <--> new setting)	
F05.038	Control characteristics and analogue format	LVCALC	**BY240 (old)**	**BY340 (new)**
			1 or 5	0
			2 or 6	1
			others	not applicable
F05.039	Offset Correction	OFFS.COR	**Standard setting is always 0,000 V**	
F05.040	Gain Correction		**[New setting] = [old setting] x 20** **(100 with BY240 equals to 2,000 with BY340)**	
F05.041	Max. Correction:	- not available -	**Recommended setting: 10,000 V**	
F05.042	Offset Total	- not available -	**Standard setting is always 0,000 V**	
F05.043	Gain Total	GAIN TOT.	**[New setting] =** **[old setting] x** **[max. Master Frequency kHz] : [1000]** When e.g. the max. master frequency is 20 kHz and the BY240 setting was "500" the new setting must be [500 x 20] : [1000] = **10,000** (3 decimal positions)	

3.2. Parameters for the Serial Communication
(only applicable when a Parallel Interface must be connected via PR210 converter)

We recommend to use the serial communication parameters according to the default settings of motrona units (indicated below for BY340 controllers):

Nr.	Parameter	Setting
F07.058	Serial device address (Unit Address)	11
F07.059	Serial baud rate (9600 Bauds)	0
F07.060	Serial data format (7 Data bits, Parity even, 1 Stop bit)	0

3.3. Parameters for Configuration of the Control Inputs

Please observe the new assignment of the control signals according to chapter 2.4.

Depending on the individual use of the inputs and on the settings of DIL switch S2 of the old BY240 board, the parameters "Switching Characteristics" and "Function Assignment" of the new BY340 unit require corresponding settings to obtain similar operation

3.3.1. Terminals Y17 and Y13 were used for phase trimming (Trim+, Trim-)

When the DIL switch has been set like this: S2/ 1 = ON, 2 = OFF, 3 = ON, 4 = OFF
(i.e. Master encoder and Slave encoder have both been set to PNP characteristics):
Parameter F06.049 (Switching Characteristics "Cont.1") = **4** (PNP, active Low)
Parameter F06.050 (Function Assignment "Cont.1")   = **3** (Function Trim+)
Parameter F06.051 (Switching Characteristics "Cont.2") = **4** (PNP, active Low)
Parameter F06.052 (Function Assignment "Cont.2")   = **2** (Function Trim-)

When the DIL switch has been set like this: S2/ 1 = OFF, 2 = ON, 3 = OFF, 4 = ON
(i.e. Master encoder and Slave encoder have both been set to NPN characteristics):
Parameter F06.049 (Switching Characteristics "Cont.1") = **0** (NPN, active Low)
Parameter F06.050 (Function Assignment "Cont.1")   = **3** (Function Trim+)
Parameter F06.051 (Switching Characteristics "Cont.2") = **0** (NPN, active Low)
Parameter F06.052 (Function Assignment "Cont.2")   = **2** (Function Trim-)

3.3.2. Terminals Y17 and Y13 were used as Index Inputs (Index M, Index S)

When the DIL switch has been set like this: S2/ 1 = ON, 2 = OFF, 3 = ON, 4 = OFF
(i.e. Master encoder and Slave encoder have both been set to PNP characteristics):
Parameter F06.049 (Switching Characteristics "Cont.1") = **7** (PNP, falling edge)
Parameter F06.050 (Function Assignment "Cont.1")   = **12** (Function: Index Master)
Parameter F06.051 (Switching Characteristics "Cont.2") = **7** (PNP, falling edge)
Parameter F06.052 (Function Assignment "Cont.2")   = **11** (Function: Index Slave)

When the DIL switch has been set like this: S2/ 1 = OFF, 2 = ON, 3 = OFF, 4 = ON
(i.e. Master encoder and Slave encoder have both been set to NPN characteristics):
Parameter F06.049 (Switching Characteristics "Cont.1") = **3** (NPN, falling edge)
Parameter F06.050 (Function Assignment "Cont.1")   = **12** (Function: Index Master)
Parameter F06.051 (Switching Characteristics "Cont.2") = **3** (NPN, falling edge)
Parameter F06.052 (Function Assignment "Cont.2")   = **11** (Function: Index Slave)

With BY240 controllers the input "Trim+ / Index Master" always uses the same input characteristics as set for the Master encoder, and the input "Trim-/Index Slave" the same input characteristics as set for the Slave encoder.

Therefore, if in very exceptional cases the two encoders should be set to different characteristics (i.e. one encoder to NPN and the other one to PNP), please modify the settings of F06.049 and F06.051 in accordance with above indications "PNP" and "NPN" respectively

3.3.3. Switching characteristics of the "Reset" input

When the DIL switch has been set like this: <u>S2/7 = ON und S2/8 = OFF   (PNP)</u>:
Parameter F06.053 (Switching Characteristics "Cont.3")   = **4** (PNP, active Low)
Parameter F06.054 (Function Assignment "Cont.3")   = **1** (Function: Reset)

When the DIL switch has been set like this: <u>S2/7 = OFF und S2/8 = ON   (NPN)</u>:
Parameter F06.053 (Switching Characteristics "Cont.3")   = **0** (NPN, active Low)
Parameter F06.054 (Function Assignment "Cont.3")   = **1** (Function: Reset)

3.3.4. Switching characteristics of the "Integrator Stop" input

Parameter F06.055 (Switching Characteristics "Cont.4")   = **0** (NPN, active Low)
Parameter F06.056 (Function Assignment "Cont.4")   = **6** (Function: Integrator off)

☞	• For all further parameters of the BY340 unit no correspondence to previous BY240 settings is available. Please observe the instructions given in the BY340 manual. • Please consider that BY340 also offers several additional functions which were not available with BY240 units, but might be appreciated to use after modification (e.g. Trim functions via unit keypad or "Stop Slave" function etc.)

4. Settings of the PR210 Converter
(only important if you intend to continue using an existing parallel interface)

When the old BY240 used a parallel interface (option PS240), all parallel data and transmission details can be maintained with use of the PR210 converter.

- All necessary electrical connections of the PR210 converter have already been described in chapter 2.7

- Generally the parallel interface is used for remote setting and changing of the speed ratio between Master and Slave (i.e. setting of "Factor 1"). The subsequent remarks therefore refer to exactly this application

- Subsequently, for all serial communication the usual standard settings will be used (motrona factory default values)

- All further details are clearly described in the PR210 Operating Instructions

4.1. Setting of the PR210 DIL Switch

As long as the converter is connected with a PC for setup and communication with the OS32 operator software, the front DIL switch must be set like shown below:

DIL1

```
1 2 3 4 5 6 7 8    ON
                    OFF
```
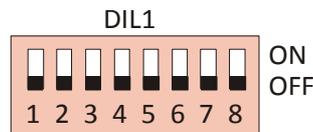
As soon as the converter has been set up and is ready to do its final job (serial transmission of parallel input data to the BY340 unit), the following switch setting is needed:

DIL1

```
1 2 3 4 5 6 7 8    ON
                    OFF
```
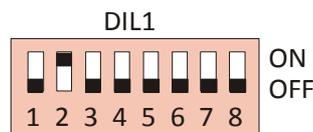
4.2. PR210 Parameters "Selection Settings"

Parameter (Select 0)	Setting
Unit Nr. Serial device address of the BY340 controller	11
Serial Code Serial access code of the location inside the target unit, to where the data should be sent (Code 00 corresponds to "Factor 1")	0
Serial Sub Code Always zero with units like BY340 that use standard addressing	0
Format BCD / Hex Code of the parallel input data: 0 = Data is BCD coded, 1 = data is binary or hexadecimal coded	0 or 1
Normal / Extend Addr. 0 = standard addressing (valid for BY340)	0
Sign 0 = no sign is available (Factor 1 is an unsigned parameter)	0
Store Value Parameter for automatic EEProm storage 1 = the command "Store EEProm" will be added automatically (recommended)	1

When "Factor 1" is the only parameter for remote setting, all PR210 settings of parameter groups "Select 1" to "Select 7" can be omitted.

4.3. PR210 Parameters "General Settings"

General Setting	Setting
Read In Config. Operation mode of the "Read" input (pin 3) 0 = data transfer upon positive (rising) edge of the signal 1 = data transfer upon negative (falling) edge of the signal	0 or 1
Output Polarity	0
Input Polarity *) Polarity of the parallel input data 0 = Input data are straight (Low = log.0 und High = log.1) 1 = Input data are inverted (High = log.0 und Low = Log.1)	0 (in general)
Unit Nr. Serial device address of the PR210 converter itself when communicating with a PC	11

General Setting	Setting
Serial Baud Rate Baud rate for direct communication between PC and PR210 converter	0 (= 9600 Bauds)
Serial Format Data format for direct communication between PC and PR210 converter	0 (= 7 Data, Parity even, 1 Stop)
Read-In Filter Minimum signal duration on the parallel input for proper evaluation	3 (= minimum signal duration 14,4 µsec.)
Serial Timer Programmable timer for automatic and cyclic transmission of parallel input data	0 (Timer not in use)

The information given in this manual is intended to facilitate the modification of existing BY240 systems into new BY340 system,
This is however not a replacement of the BY340 Operating Instructions!
It is therefore mandatory to observe all hints of the BY340 manual.