

# HGV 1 High-Resolution Encoder Junction

Project Planning Manual

DOK-ENCODR-HGV\*1\*\*\*\*\*-PRJ1-EN-P

*Titel* HGV 1 High-Resolution Encoder Junction

*Type of documentation:* Project Planning Manual

*Documenttype* DOK-ENCODR-HGV\*1\*\*\*\*\*-PRJ1-EN-E1,44

*Internal file reference* • 9.568.010.4-01

*Reference* This electronic document is based on the hardcopy document with document desig.: 9.568.010.4-01 EN/02.95

*This documentation is used:* This document serves to

- define the range of application
- assist in the constructional and functional integration of the HGV into the control cabinet

The document "Electrical Connections of Main Spindle Drives; Project Planning Manual" (doc. no. 209-0042-4111) is also needed to develop the switching diagram of the machine.

*Change procedures*

Designation of documentation up to present edition	Release-date	Coments
9.568.010.4-01 EN/02.95	Feb/95	First Edition
DOK-ENCODR-HGV*1*****-PRJ1-EN-E1,44	Jul./97	First E-Dok

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*Publisher* INDRAMAT GmbH • Bgm.-Dr.-Nebel-Straße 2 • D-97816 Lohr  
 Telefon 0 93 52 / 40-0 • Tx 689421 • Fax 0 93 52 / 40-48 85

Dept ENA (MR, FS)

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# 1. Applications and features

Main spindle drive controllers KDA, TDA and RAC and the digital drive controllers DDS, DKS and DKR use the high-resolution main spindle position encoder to calibrate the position of the spindle. The drive controllers can then, in turn, transmit this calibrated spindle position to the CNC control unit with the use of either the SERCOS interface module or the additional interface "incremental encoder output".

The CNC requires this data for the following functions:

- C-axis operation,
- thread cutting without compensating chuck,
- thread cutting, or,
- "setting the spindle" to some position.

## Field of application

Up until now, it has been necessary, there where the CNC simultaneously required high and normal resolution incremental encoder signals, to mount an additional incremental encoder (e.g., with 1024 cycles per revolution) to the spindle or the spindle motor, and couple it into the CNC.

The additional incremental encoder is no longer needed at the spindle or spindle motor if "High-Resolution Encoder Junction" (HGV 1) is used. Now, the HGV 1 is looped into the motor or spindle feedback cable to the drive controller and connected to the CNC the same as an incremental encoder.

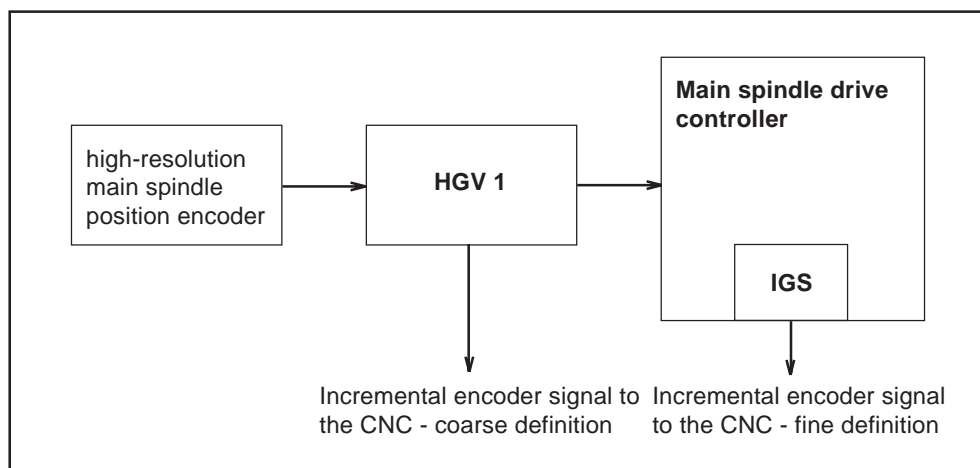


Figure 1.1: HGV 1 - principle of application

## Pre-requisites

An HGV 1 can only be used in conjunction with

- high-resolution motor feedback in 2AD motors or
- high-resolution main spindle position encoder in 1MB motors

For the HGV 1 to function properly, it is necessary

- to completely connect both the drive and the HGV 1,
- to supply the drive controller with control voltage, and,
- for the CNC to supply DC +5V to the output of the HGV 1.

- Features*
- the HGV 1 is looped into the feedback cable (motor or spindle feedback)
  - signals that are incremental encoder compatible are coupled out of the feedback signal
  - incremental encoder outputs (X3 and X4) are potential free
  - the CNC supplies power to the incremental encoder outputs

Connection and frequency	Motor feedback or high-resolution main spindle position encoder used		
	MH2-128-.. +SH-128-..	2AD...-...-...3-.. MH2-256-.. +SH-256-..	MH2-512-.. +SH-512-..
HGV X1/X2 $f \sim [\frac{\text{cycles}}{\text{rev.}}]$	128	256	512
HGV1 X3 $f_{\square\square} = 2 \times f \sim$	256	512	1024
HGV1 X4 $f_{\square\square} = 4 \times f \sim$	512	1024	2048

TBHGV1Proj

Figure 1.2: Connection between the motor feedback or high-resolution spindle position encoder used and the resulting output frequency at X3 and X4 of the HGV 1

## 2. Planning the control cabinet

The information on structurally integrating the HGV 1 is broken down into

- mechanical data
- electrical data
- technical data
- type codes

### 2.1. Mechanical data

The HGV 1 must be mounted into the control cabinet as close as possible to the drive controller.

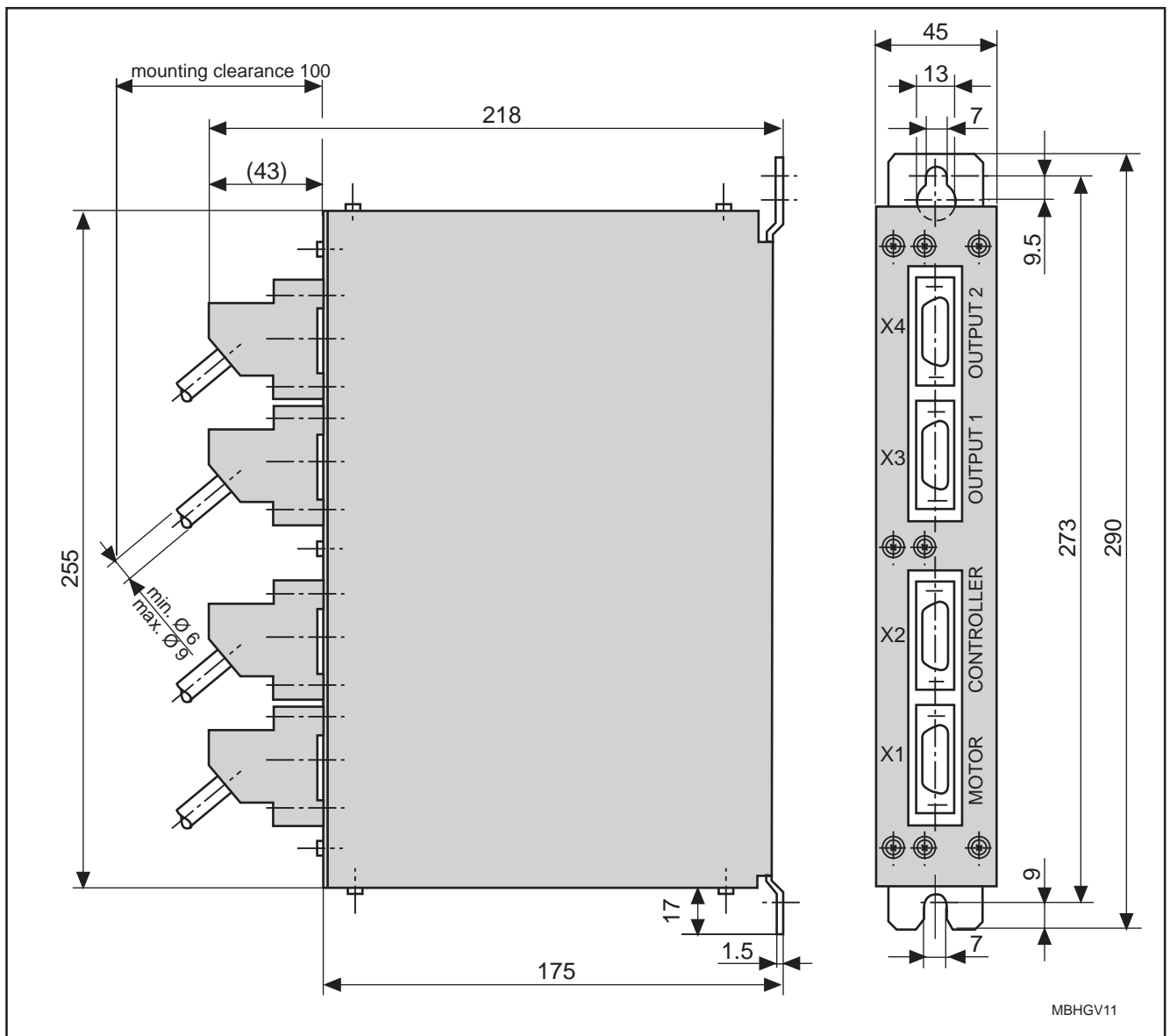


Figure 2.1: HGV 1 - dimensional data

## 2.2. Electrical data

The following terminal diagrams are schematic. They represent a checklist for all those electrical connections needed to operate the HGV 1.

*Additional documentation*

The comprehensive terminal diagrams, which include all pin assignments, can be found in the document "Electrical connections of main spindle drives; project planning manual" (doc. no. 209-0042-4111). It comprehensively summarizes all main spindle drive terminal diagrams. It is, therefore, absolutely necessary when developing the circuit diagrams of the machine. (Look up the index code "HG V" in the index of the aforementioned document to rapidly locate any information you may need.)

*Potentials*

In comparison to the feedback signals, the incremental encoder outputs X3 and X4 are isolated. X3 and X4 are not, however, isolated between each other.

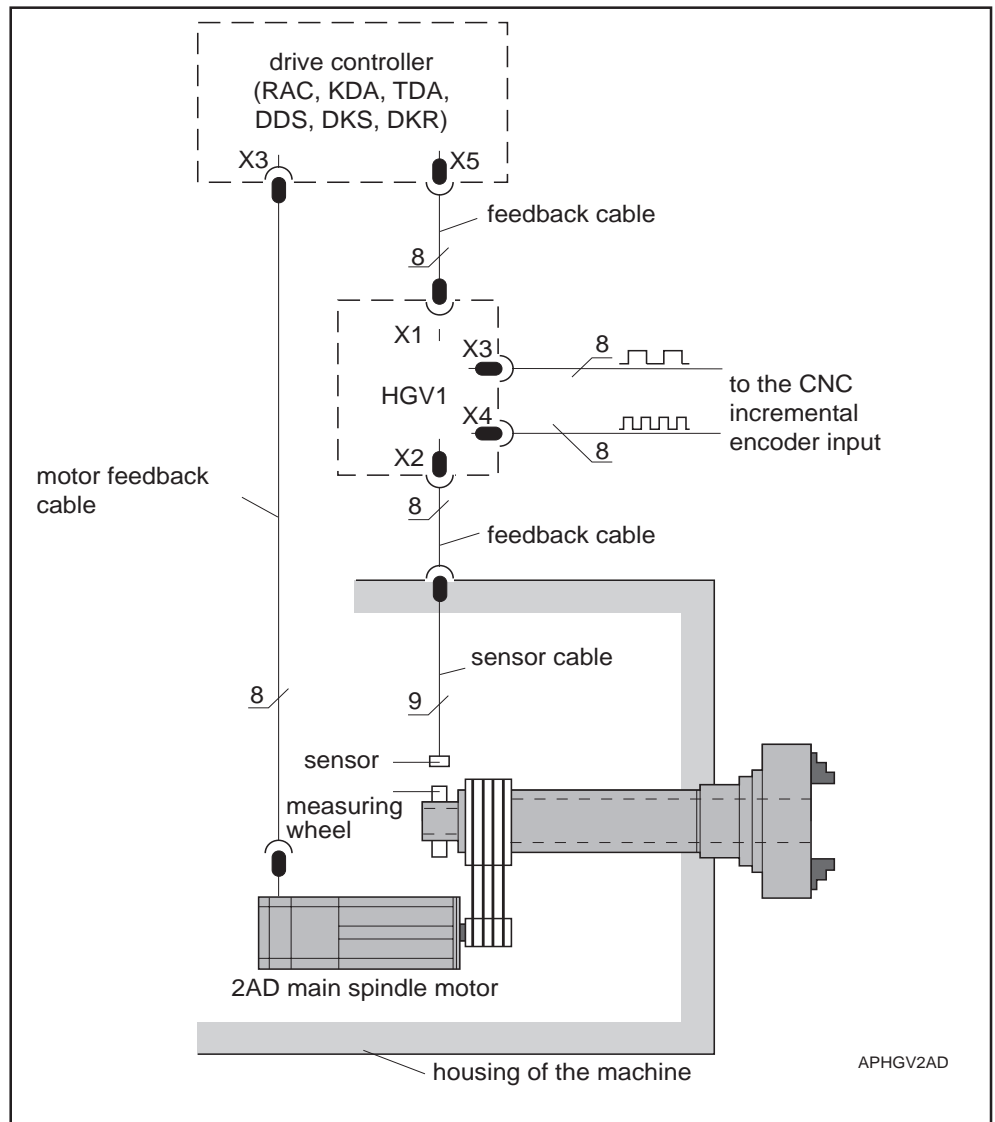


Figure 2.2: Schematic terminal diagram of an HG V1 with 2AD main spindle motor



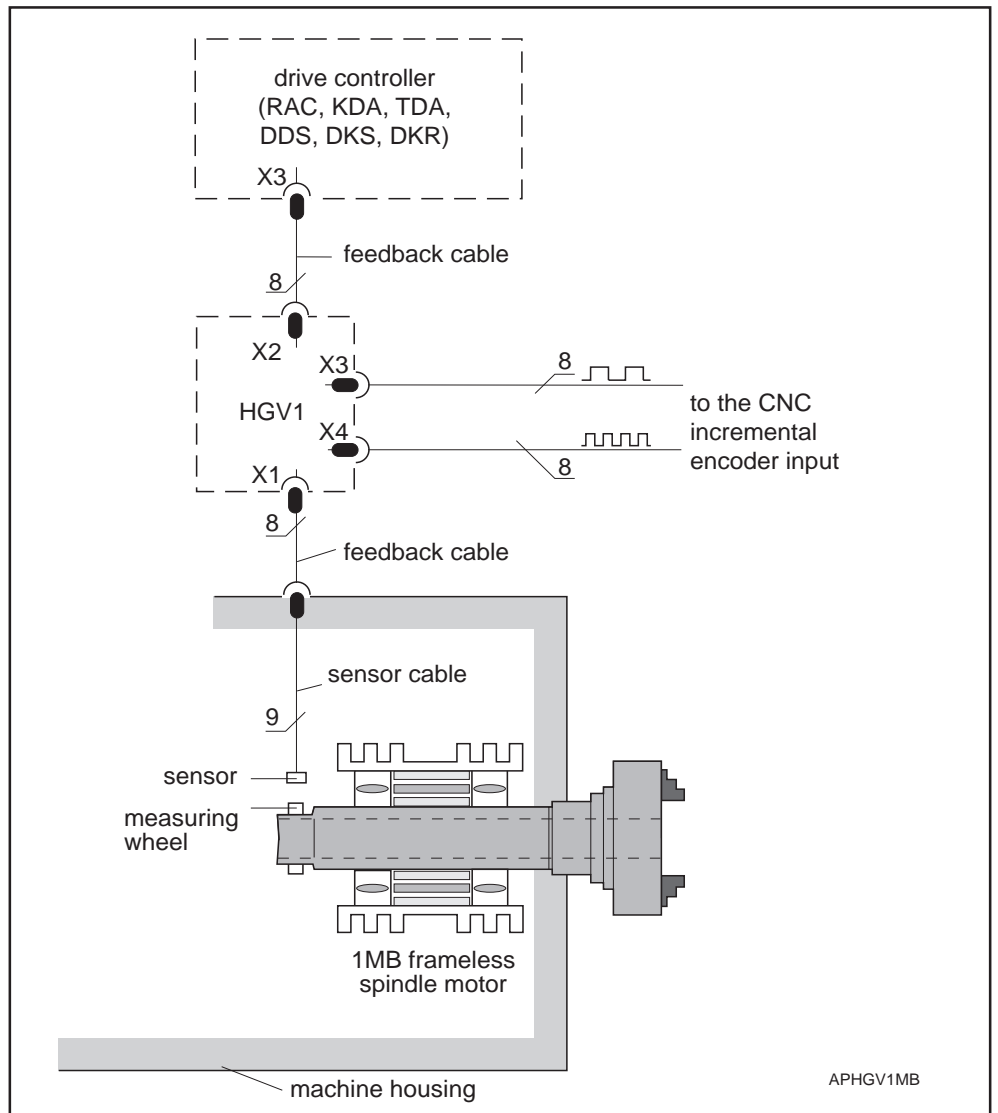


Figure 2.3: Schematic terminal diagram of an HG V1 with 1MB frameless spindle motor

### 2.3. Technical data

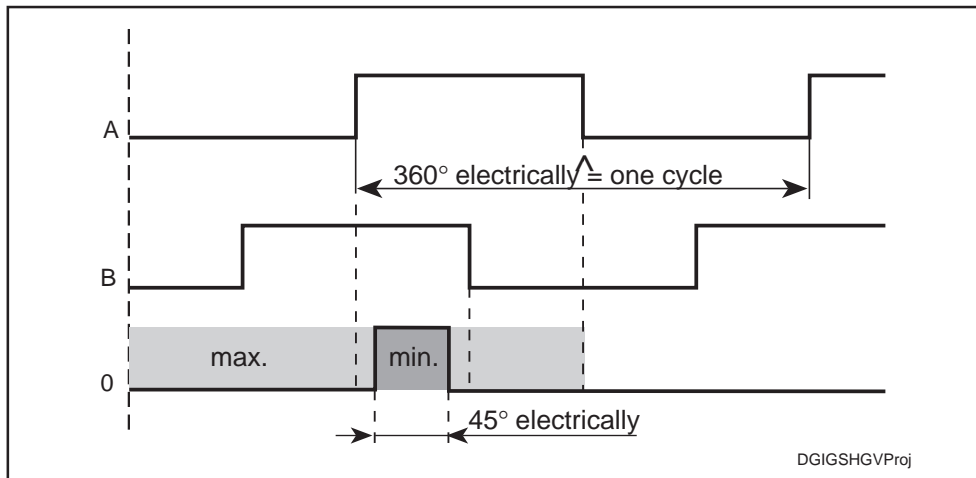


Figure 2.4: Timing diagram of the incremental encoder output signals

power source of the incremental encoder outputs X3 and X4	DC 5 V ± 5% (must be supplied by the CNC ) current consumption 200 mA per output
incremental encoder outputs (X3, X4)	signals A, $\bar{A}$ , B, $\bar{B}$ , 0, $\bar{0}$ (TTL-level; 1 zero impulse/rev.) galvanically isolated via optocoupler from X1 and X2
maximum output frequency	230 kHz
signal level at 40 mA	$U_{HIGH}$ 1.8 V $U_{LOW}$ 0.5 V
maximum output current	40 mA
perm. ambient temperature	+5° C to +55° C
permissible humidity of the air	humidity class F, as per DIN 40 040; do not permit condensation
protection category	IP 10, as per EN 60 529
mounting	in control cabinet with prot. cat. IP 54
mounting orientation	vertical
storage	dry and dust-free, protected against shocks and vibrations
storage temperature range	-30° C to +85° C
weight	approximately 1.5 kg

Figure 2.5: HG1 - technical data

## 2.4. Type codes

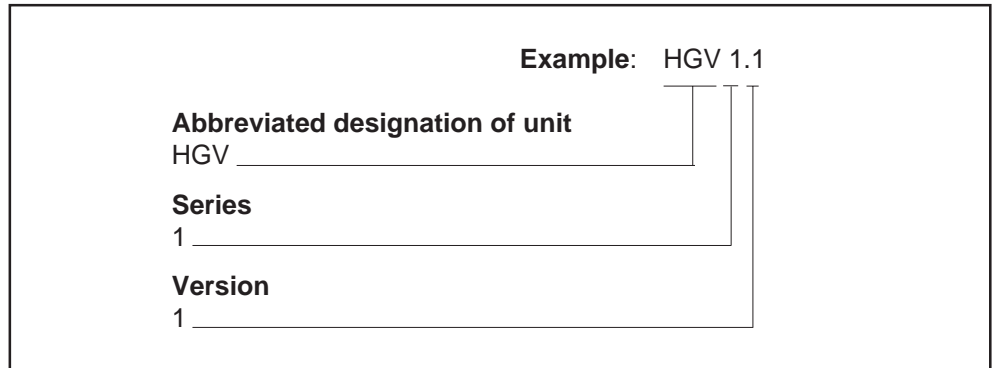
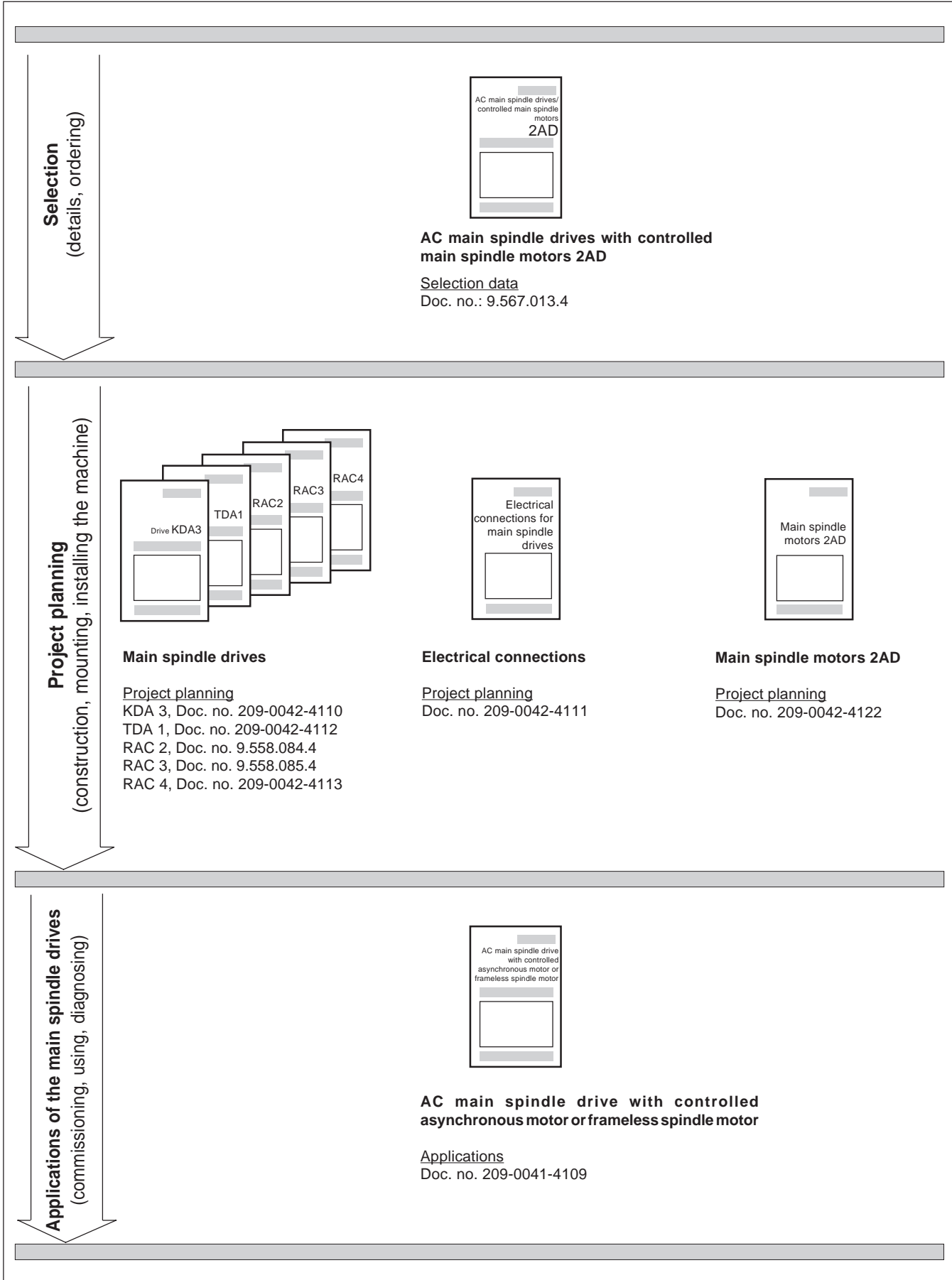


Figure 2.6: HGV - type codes

### 3. Supplementary documentation



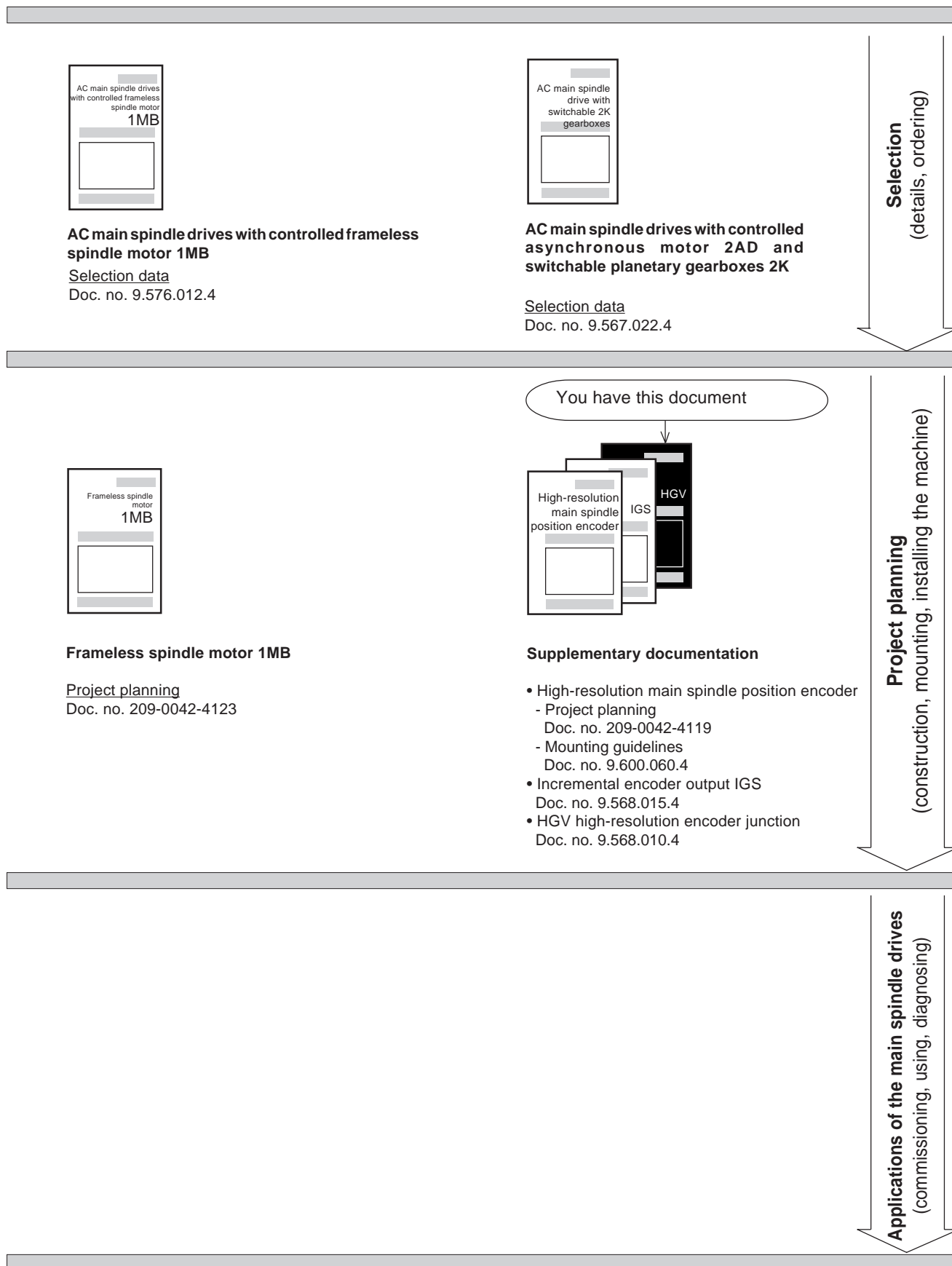


Figure 3.1: Supplementary documentation on "AC main spindle drives with 2AD main spindle motors and 1MB frameless spindle motors"

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