HEINZMANN®
Engine & Turbine Management

Digital Control System

HELENOS III

DG 162 - 02
DG 302 - 02
DG 402 - 02

Technical description

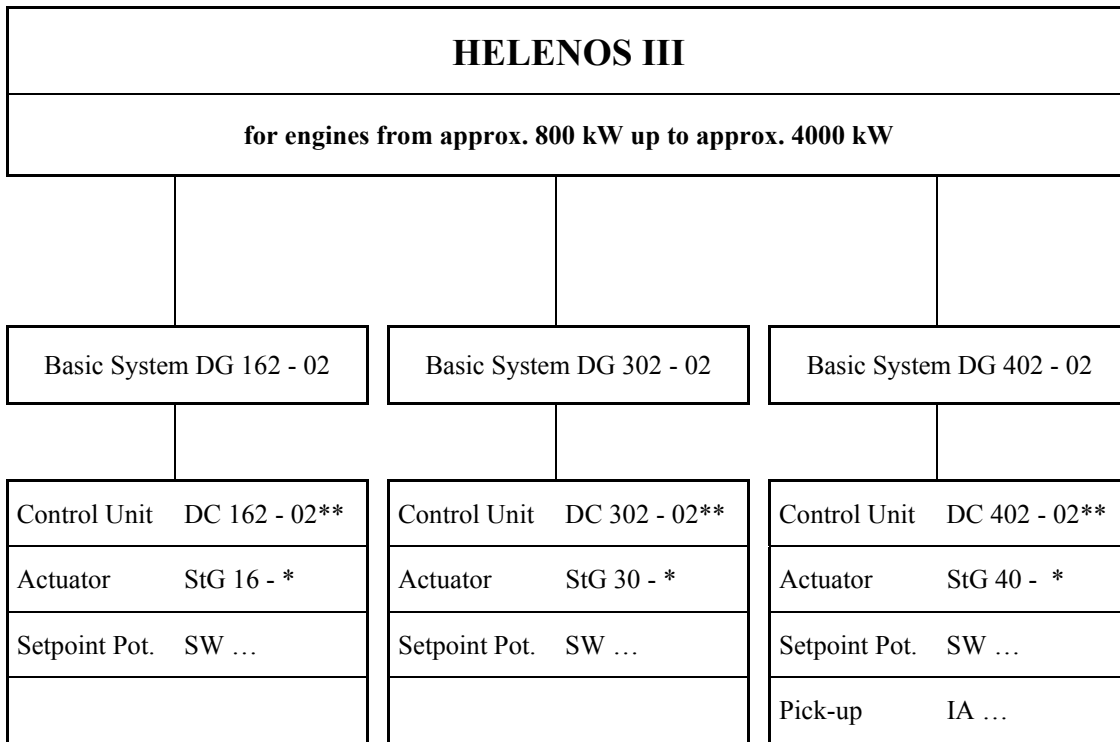|	
Warning	Read this entire manual and all other publications appertaining to the work to be performed before installing, operating or servicing your equipment. Practice all plant and safety instructions and precautions.
Danger	Failure to follow instructions may result in personal injury and/or damage to property. HEINZMANN will refuse all liability for injury or damage which results from not following instructions
Danger! High Voltage **Danger**	**Please note before commissioning the installation:** Before starting to install any equipment, the installation must have been switched dead! Be sure to use cable shieldings and power supply connections meeting the requirements of the *European Directive concerning EMI*. Check the functionality of the existing protection and monitoring systems.
Danger	**To prevent damages to the equipment and personal injuries, it is imperative that the following monitoring and protection systems have been installed:** Overspeed protection acting independently of the actuator Overtemperature protection HEINZMANN will refuse all liability for damage which results from missing or insufficiently working overspeed protection **Generator installation will in addition require:** Overcurrent protection Protection against faulty synchronization due to excessive frequency, voltage or phase differences Reverse power protection
	Overspeeding can be caused by: Failure of the voltage supply Failure of the actuator, the control unit or of any accessory device Sluggish and blocking linkage

Warning	The examples, data and any other information in this manual are intended exclusively as instruction aids and should not be used in any particular application without independent testing and verification by the person making the application.
Danger	Independent testing and verification are especially important in any application in which malfunction might result in personal injury or damage to property.
	HEINZMANN make no warranties, express or implied, that the examples, data, or other information in this volume are free of error, that they are consistent with industry standards, or that they will meet the requirements for any particular application.
	HEINZMANN expressly disclaim the implied warranties of merchantability and of fitness for any particular purpose, even if **HEINZMANN** have been advised of a particular purpose and even if a particular purpose is indicated in the manual.
	HEINZMANN also disclaim all liability for direct, indirect, incidental or consequential damages that result from any use of the examples, data, or other information contained in this manual.
	HEINZMANN make no warranties for the conception and engineering of the technical installation as a whole. This is the responsibility of the user and of his planning staff and specialists. It is also their responsibility to verify whether the performance features of our devices will meet the intended purposes. The user is also responsible for correct commissioning of the total installation.

> **NOTICE**
>
> The engine, turbine or any other type of power plant must be equipped with separate overspeed-, overtemperature- resp. overpressure shutdown devices operating independently of the electronic speed governor. Such devices are absolutely indispensable in order to protect operating personnel against injuries and the engine against damages that may occur in case of a runaway or of a failure of the electronic speed control.

HEINZMANN retains the right to introduce technical changes!

Chart of system HELENOS III

HELENOS III
for engines from approx. 800 kW up to approx. 4000 kW

Basic System DG 162 - 02	Basic System DG 302 - 02	Basic System DG 402 - 02

Control Unit DC 162 - 02**	Control Unit DC 302 - 02**	Control Unit DC 402 - 02**
Actuator StG 16 - *	Actuator StG 30 - *	Actuator StG 40 - *
Setpoint Pot. SW …	Setpoint Pot. SW …	Setpoint Pot. SW …
		Pick-up IA …

D	:	Digital
DG	:	Digital Governor (Basic System)
DC	:	Digital Control Unit
StG	:	Actuator
SW	:	Setpoint Potentiometer
IA	:	Pick-up

C o n t e n t s

1. General Remarks

Heinzmann digital governors with control unit DC 162 - 02, DC 302 - 02 and DC 402 - 02 constitute speed governors offering a medium range of functions.

In addition to speed regulation, the following functions are available:

a) Starting Fuel Flow Adjustment
When setting starting fuel flow, starting minimum fuel flow or starting maximum fuel flow are available as alternatives. Furthermore, variable starting fuel flow can be provided, by which starting fuel flow is increased automatically during start-up.

b) Speed Ramp
For applications in which speed is not supposed to respond as fast as possible to changes of setpoint values (e.g., locomotive operation), a speed ramp is available which according to requirements may be programmed separately for increasing or decreasing speed.

c) Fixed Fuel Limitation
For the stop-position and the maximum fuelling position "electric catches" can be provided. This will prevent the governor's thrust from affecting the terminal stops of the injection pump, etc.

d) Speed Dependent Fuel Limitation
For variable speed governors, there is provided an option of programming speed dependent limit curves. Thus, for any speed, torque can be reduced as is permissible for the engine or desired by the user.

e) Boost Pressure Dependent Fuel Limitation
For turbocharged engines, fuelling can be reduced to achieve smokeless operation in case of missing boost pressure (e.g., starting or load change). The respective limit curves can be programmed accordingly.

f) Idling and Maximum Speed Control
For vehicle application, the governor can be made to operate as an idling and maximum speed controller. In addition, one fixed intermediate speed is available, e.g., for an application combining driving and stationary mode (e.g., generator at power take-off). If necessary, a change-over switching of the droop can be provided, i.e., during stationary operation also droop zero is possible.

g) Temperature Dependent Idling Speed

For low temperatures, the engine can be run at some higher idling speed. With the engine warming up, idling speed is reduced to its normal value.

h) Velocity Limitation

For vehicles velocity limitations may be provided.

i) Velocity Regulation

For vehicles velocity regulation can be provided, by which the vehicle is made to maintain some preset velocity.

j) Oil Pressure Monitoring

For the purpose of oil pressure monitoring, speed/pressure dependent limit curves can be provided. If oil pressure is too low, an alarm is given; if oil pressure continues to drop, the engine is shut down.

k) Load Regulation System

For diesel-electric locomotive operation, a load regulation system can be provided, by which generator output is regulated in dependence on speed resp. load.

l) Anti Stick Slip Device

For locomotive operation, an anti stick slip device can be provided.

m) Accessories

Accessories such as synchronizing units, load measuring units, disturbance variable compensation units can be connected via a CAN-Bus within the control unit. The CAN-Bus may also be used to implement load distribution by equal fuelling (e.g., two engines on one gear).

n) Output Signals

For speed and actuator travel, proportional signals are available in the range of
4–20 mA. They can be used for purposes of display or for further processing (e.g., switches).
Furthermore, if errors occur at the sensors or within the control system, an alarm is given.

o) Operating Data Storage

On request, operating data storage can be provided, by which in cases of disturbances and failures the causes may be traced back even at some later time.

When selecting and determining the functions, it has to be ascertained whether the hardware equipment suffices with respect to the total range of functions.

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2. Mode of Operation

The actual speed of the engine is read by a pulse pick-up from a cog wheel, preferably from the starter gear. The microprocessor (CPU) of the control unit compares the actual speed with the preset value. If differences are stated, the new actuator signal is calculated by the CPU and transmitted to the actuator via the output stage. Feedback from the actuator indicates the current position of the output shaft thus allowing optimum signal adjustment by the CPU.

As the governor comprises an I-fraction and as for any load level the speed is permanently compared with a fixed preset value, speed can be kept constant also in steady state, i.e., droop is zero.

For applications requiring droop, the speed related to the respective fuelling is calculated by the CPU and entered as correction of the setpoint value.

During standstill, a particular circuit ensures that only the current of the control unit is received by the governor, but no current flows to the actuator motor.

3. Block Diagram of the Digital Governor DG 162 - up to DG 402 -
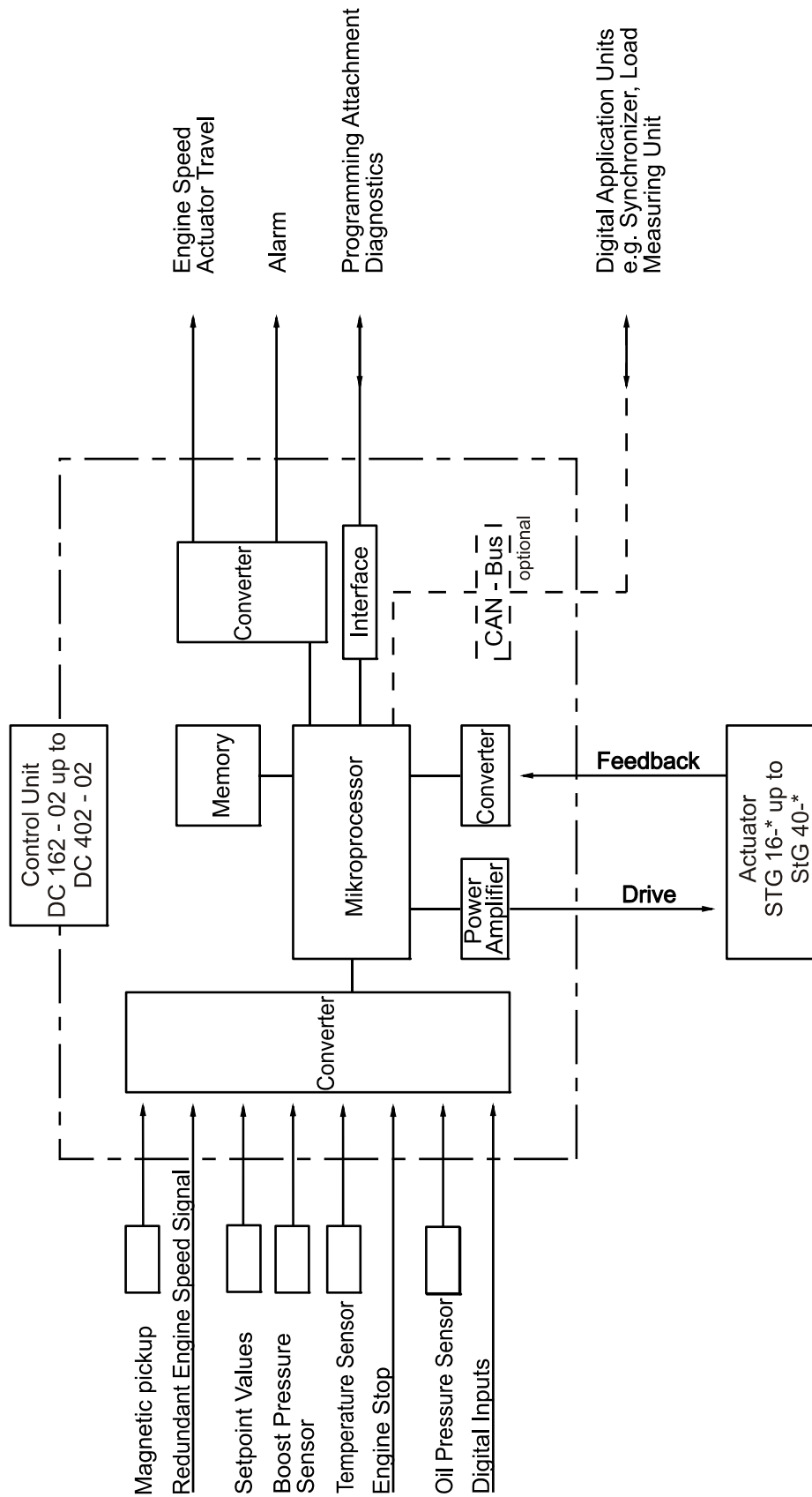
Fig. 1: Blockdiagram DG 162 - up to DG 402 -

4. Pick-up IA ...

4.1. Specification

IA 02 - 76 to IA 12 - 102
-55 °C to +120 °C
0,5 to 10 Volt ~ (AC)
approx. 52 Ohm
0,5 to 0,8 mm
IP 54

Temperatur Range
Output Voltage
Resistance
Distance from Pick-up Wheel
Protection grade

4.2. Installation

The installation of the pick-up has to be arranged in such a way as to obtain a frequency as high as possible. Normally, the **HEINZMANN** governors DG 162 - 02, DG 302 - 02 and DG 402 - 02 are designed for a maximum frequency of 12000 Hz. Frequency (by Hz) is calculated according to the formula

$$f_{(Hz)} = \frac{n(1/\min)*z}{60}$$

z = number of teeth on the pick-up wheel

Example:

n = 1.500
z = 160

$$f = \frac{1500*160}{60} = 4.000 \text{ Hz}$$

NB: It should be taken care that the speed can be measured by the pulse pick-up without any bias. For best results therefore, the speed pick-up should take the engine speed from the crankshaft. A suitable position for this is, e.g., the starter gear (but not the injection pump wheel).

The pick-up gear must consist of magnetic material (e.g., steel, cast iron).

4.3. Tooth profile

Any tooth profile is admissible. The top width of the tooth should be 2.5 mm minimum, the gap and the depth of the gap at least 4 mm. For index plates the same dimensions are valid.

Due to tolerances, a radial arrangement of the magnetic pick-up is preferable..

4.4. Clearance of Magnetic Pick-up

The distance between the magnetic pulse pick-up and the tooth top should range from 0.5 and 0.8 mm. (It is possible to screw in the magnetic pick-up till it touches the tooth and then unscrew it for about half a turn.)
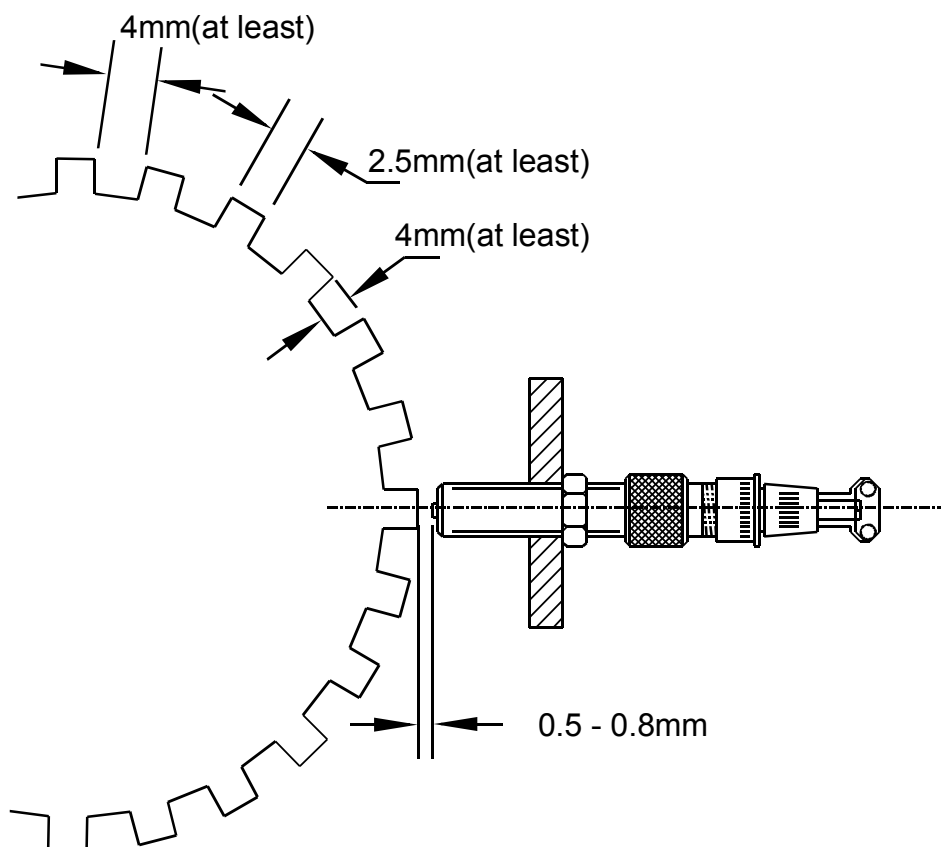
Fig. 2: Clerance of Pick-up

4.5. Mounting Measurements
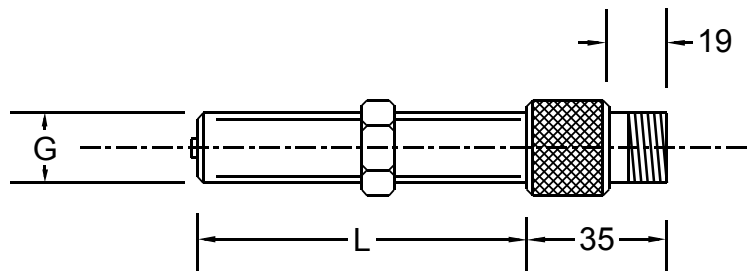
Fig. 3: Measurements of Pick-up

Measures Type	L (mm)	G	Remarks
01 - 38	38	M 16 x 1,5	
02 - 76	76	M 16 x 1,5	appropriate
03 - 102	102	M 16 x 1,5	plug
11 - 38	38	5/8"-18UNF-2A	SV6-IA-2K
12 - 76	76	5/8"-18UNF-2A	
13 - 102	102	5/8"-18UNF-2A	

Ordering specification, e.g. IA 02-76

4.6. Redundant Speed Signal

If precautions are to be taken with regard to failures of the pulse pick-up, a second pulse pick-up can be connected to the control unit. In case that an electric generator with terminal W is available, this signal may be used for emergency operation as well as any other signal of a tachogenerator.

In case of a failure on puls pick-up 1, the governor automatically switches over to the redundant speed signal and gives an alarm.

5. Speed Setpoint Adjusters and Sensors

Dependent on particular applications, a series of setpoint adjusters are available for the **HEINZMANN** Digital Controls.

5.1. Speed Setpoint Potentiometer SW 01-1-B

(1 turn with Limitation Resistors)
(EDV-No.: 600 00 041 01)

Displacement angle	approx. 312°
Potentiometer resistance	5 kOhm
Limitation resistance	2 x 470 Ohm
Temperature range	-55 °C to + 120 °C
Protection grade	IP 00
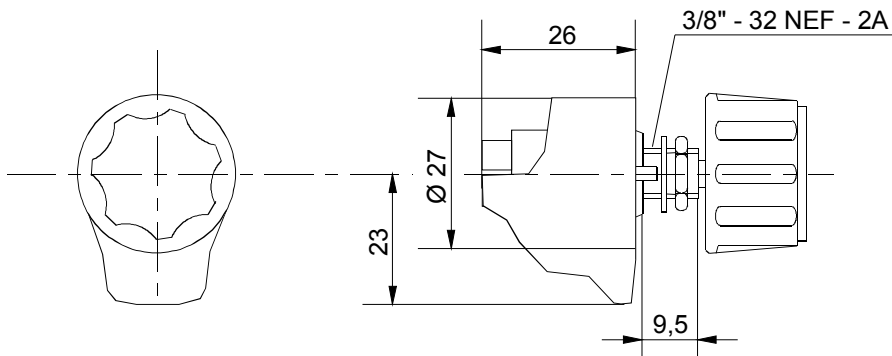
Fig. 4: Potentiometer SW 01 - 1

5.2. Speed Setpoint Potentiometer SW 02-10-B

(10 turns with Limitation Resistors)
(EDV-No.: 600 00 042 01)

Displacement angle	10 turns
Potentiometer resistance	5 kOhm
Limitation resistance	2 x 470 Ohm
Temperature range	-55 °C to + 105 °C
Protection grade	IP 00
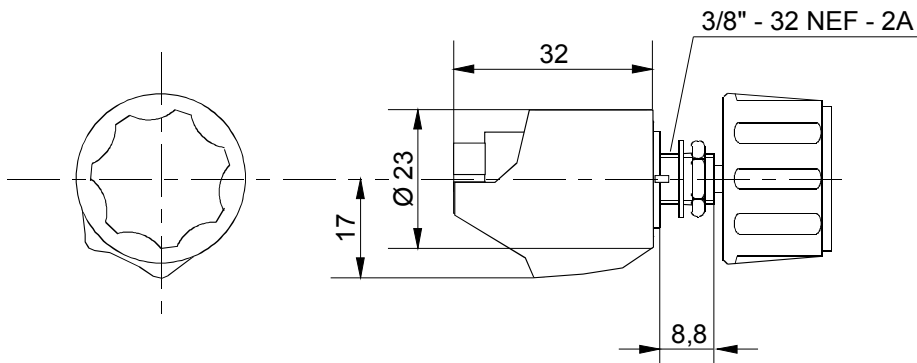
Fig. 5: Potentiometer SW 02 - 10

On request, the potentiometers, as specified under 5.1 and 5.2, can be supplied with analogue adjustment knob with lock in place of the standard rotating knob. In this case, ordering specification is SW..-..-m.

Equally, instead of the knob a clamping fixture can be installed. Ordering specification is to changed to SW ..-..-k.

5.3. Setpoint Value Adjustment by Current Signal

For the speed setpoint value a current signal of 4–20 mA can be directly connected to the control unit. If the signal fails, the governor will set the speed to a programmable substitute value.

5.4. Setpoint Value Adjustment by Pedal

This unit is basically an angular position transducer that translates a foot pedal into a proportional current or voltage for 0 - 45° rotation. The resulting output can be used for speed setting. For more information refer manual E 83 005 - e.

5.5. Pressure Sensors

For pneumatic setpoint adjustment are pressure sensors available as follows:

pressure range up to 10 bar DSG 01 (EDV- No.: 604 00 026 00)
       up to 5 bar   DSG 02 (EDV- No.: 604 00 026 01)

As boost pressure sensor for a range up to 2 bar the pressure sensor DSG 03
(EDV- No.: 604 00 024 02) is available.

5.6. Temperature Sensor TS - 2000 F for Measuring Fluid Temperatures
(EDV- No.: 600 00 034 00)

Measuring range	-20°C to +130°C
Accuracy	± 1.5°C
Resistance at 25°C (R25)	2,000 Ohm ±0.5%
Maximum operating voltage	10 V
Maximum operating current	5 mA
Recommended operating current	approx. 1 mA
Time constant in fluids	approx. 13 s
Admissible socket temperature range	-40°C to +105°C
Protection type	IP 65
Vibration	<10 g. 10 – 100 Hz
Shock	<50 g. 11 ms half-sine wave
Tightening moment	100 Nm ±15 %
Corresponding connector	SVM - TS - 2K (EDV- No.: 010 02 170 00)

Seal Ring DIN 7603-14x18 (Cu)

Pin Configuration:
A = +
B = -
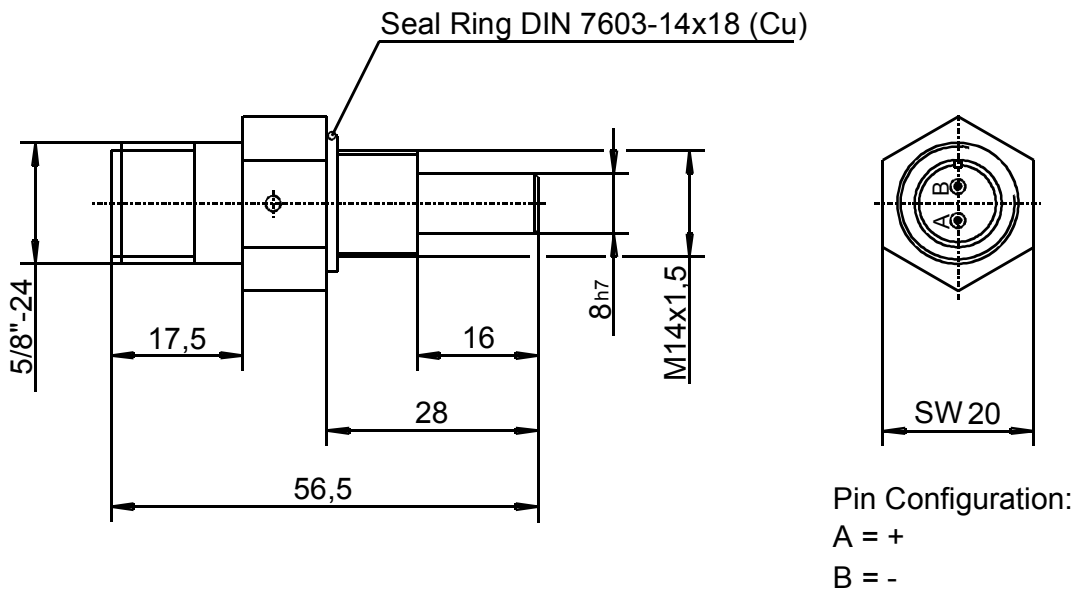
Fig. 6: Temperature Sensor TS - 2000 F

PT 1000- types can be used alternatively.

For measuring gas temperatures PT 1000- types must be used.

6. Control Unit DC 162 - 02, DC 302 - 02 and DC 402 - 02

6.1. Specification

Operating Voltage	24 V DC	(12 … 32 V DC)
Maximum Voltage	36 V DC	absolute
Minimum Voltage	9 V DC	absolute, short term

Maximum Ripple Voltage   maximum 10 % with 100 Hz

Permissible Voltage Drop at
Maximum Voltage of Actuator   maximum 10 % in control device

Fuse Protection of Governor   16 A, slow

Current Consumption   approx. 0.2 A + current of actuator
at 24 V DC

Operating Ambient Temperature   -40 °C to +70°C

Storing Temperature   -55 °C to +85 °C

Humidity   up to 100 %

Control Frequency   200 to 12.000 Hz

Steady State Variation ± 0.25 % of rated speed

Protection grade	
DC ... 2 - 02 - 00	IP 00
DC ... 2 - 02 - 55	IP 55

Weight	
DC ... 2 - 02 - 00	approx. 1.2 kg
DC ... 2 - 02 - 55	approx. 3 kg

Remark

The control unit is available with terminal strip (DC ... 2 - 02 - 00) or with plug-in connectors (DC ... 2 - 02 - 55) alternatively. At delivery of the control unit the exact governor type together with identification of housing, software version and serial number is printed on the type plate. For example: DC 162 - 02 - 55 - 12700

6.2. Measurements

Control Unit with plug-in connectors (DC ... 2 - 02 - 55)
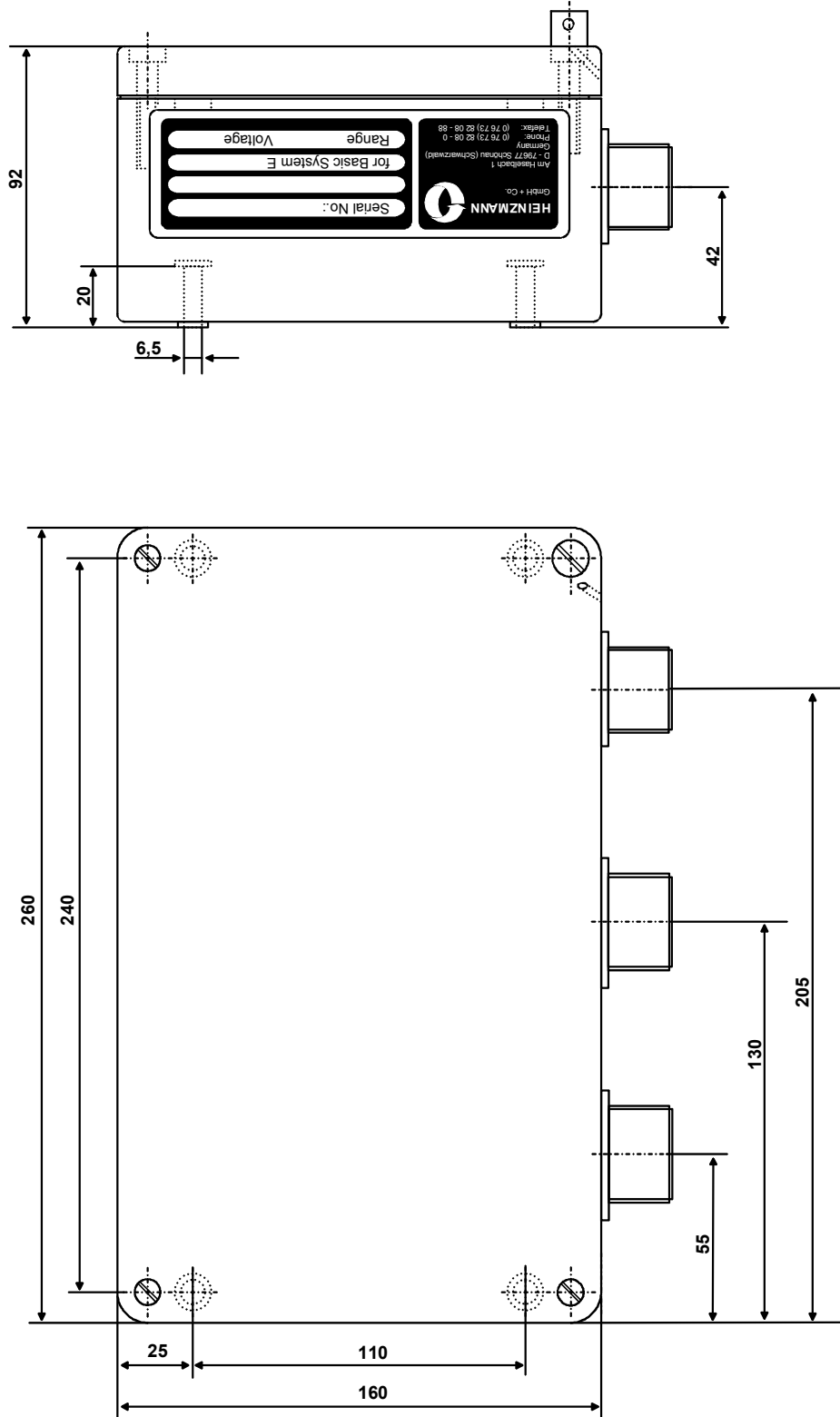
Fig. 7: Housing of DC 162 - 02 - 55 up to DC 402 - 02 - 55

Control Unit with terminal strip (DC ... 2 - 02 - 00)
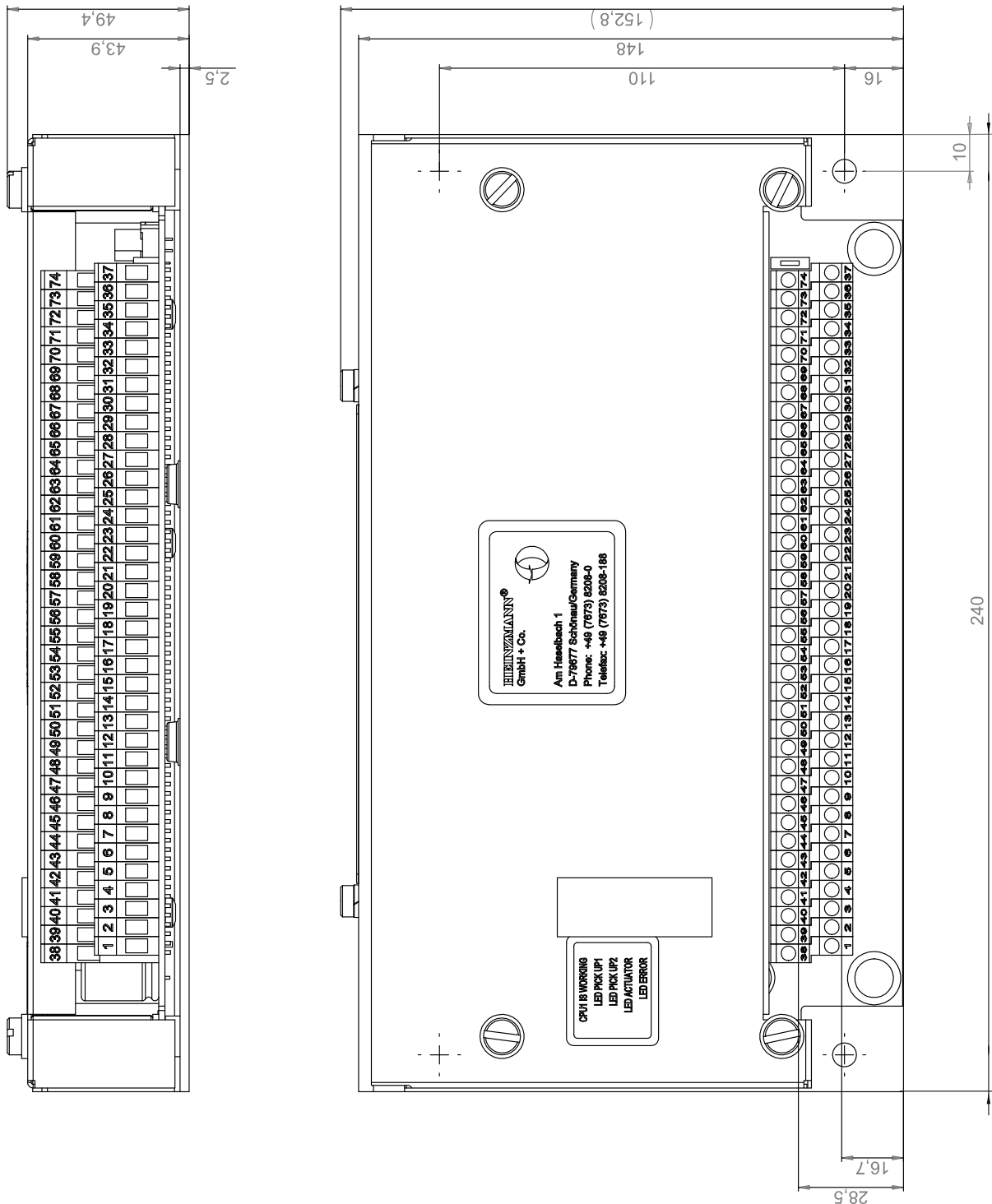
Fig. 8: Housing of DC 162 - 02 - 00 up to DC 402 - 02 - 00

7. Actuators

7.1. Design and Mode of Operation

governor output shaft

feedback probe

feedback cam

gearbox

dc disk armature motor
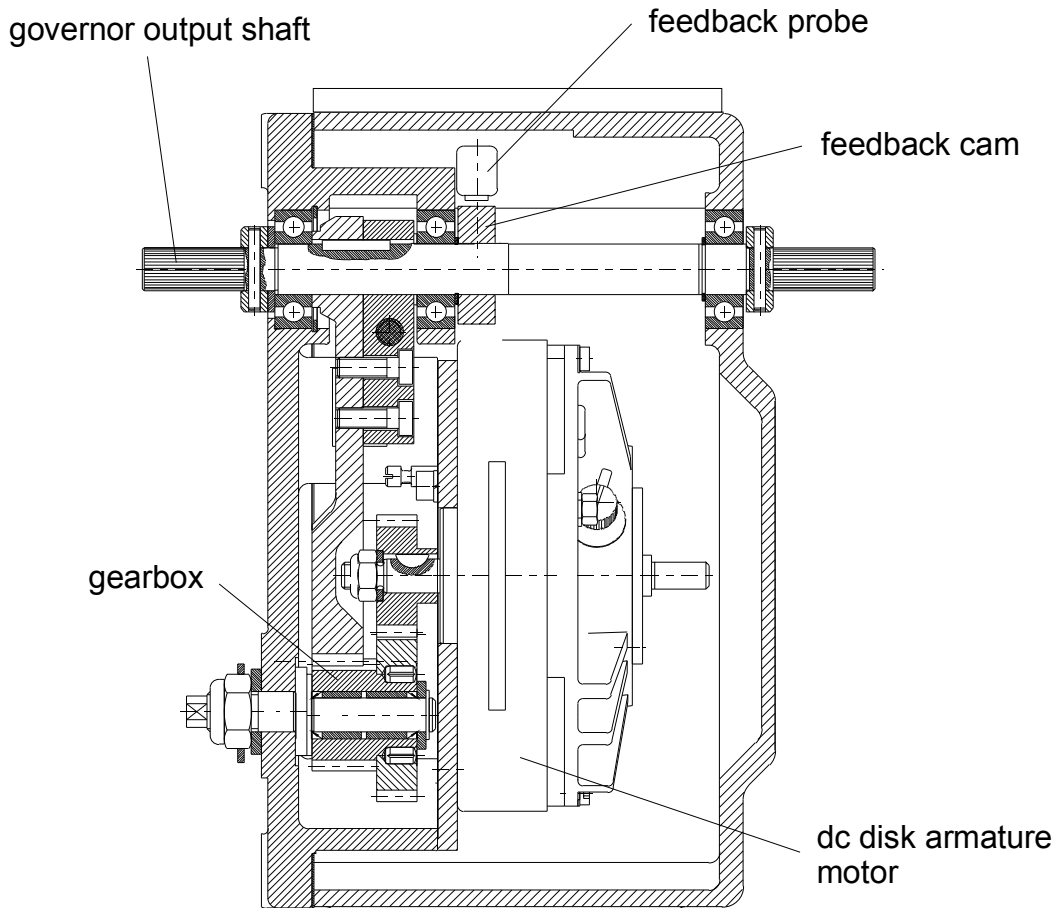
Fig. 9: Sectional Drawing of Actuator

The actuator torque is generated by a DC disk armature motor and transmitted to the governor output shaft by way of a gearbox.

The use of special materials and long-time lubricants assures maintenance-free operation and long working life of the actuators.

A feedback cam is mounted on the governor output shaft which is scanned contactlessly by a probe, thus transmitting the precise position of the output shaft to the control unit.

If the actuator strikes against a stop, as may occur, e.g., under parallel mains operation or may be caused by engine overload or cylinder failure, the current limitation will take effect after approx. 20 seconds; by this the current to the actuator is reduced to a value that cannot harm the motor.

HELENOS III

Altogether, this type of actuator provides the following advantages:

- High regulation power working in both directions.

- Extremely low current consumption during steady state and relatively low current consumption on change of load.

- Indifference to slow voltage changes of the supply; abrupt voltage changes cause governor disturbances.

7.2. Installation

The actuator must be mounted firmly on the engine by means of reinforced brackets. Unstable arrangements, as caused by weak bracket material or missing stiffenings, have to be avoided by all means; they are bound to intensify vibrations, which will lead to premature wear of the actuator and the connecting linkage!

7.3. Specification

	StG 16 - *	StG 30 - *	StG 40 - *
Effective rotation at the output shaft	42 °	42 °	42 °
Max. torque at the governor output shaft (direction stop)	approx. 15 Nm	approx. 28 Nm	approx. 44 Nm
Holding moment in current limitation	approx. 7.5 Nm	approx. 14 Nm	approx. 22 Nm
Response time 0-100 % without load	approx. 120 ms	approx. 170 ms	approx. 190 ms
Current consumption of whole governor:			
in steady state condition	approx. 1 A	approx. 1 A	approx. 1.5 A
on change of load	approx. 3 - 4 A	approx. 3 - 4 A	approx. 4 - 5 A
max. current	approx. 4.5 A	approx. 4.5 A	approx. 6 A
in current limitation	approx. 2.5 A	approx. 2.5 A	approx. 3 A
Storage temperature	-55°C to +110°C	- 55°C to +110°C	-55°C to +110°C
Ambient temperature in operation	-25°C to +90°C	-25°C to +90°C	-25°C to +90°C
Ambient temperature special version	-40°C to +90°C	-40°C to +90°C	-40°C to +90°C
Humitity	up to 100 %	up to 100 %	up to 100 %
Protection grade:	IP 44	IP 44	IP 44
Weight without base	approx. 12.3 kg	approx. 12.3 kg	approx. 12.3 kg
Weight of base	approx. 1.3 kg	approx. 1.3 kg	approx. 1.3 kg

7.4. Measurements

section A-B

actuator without base
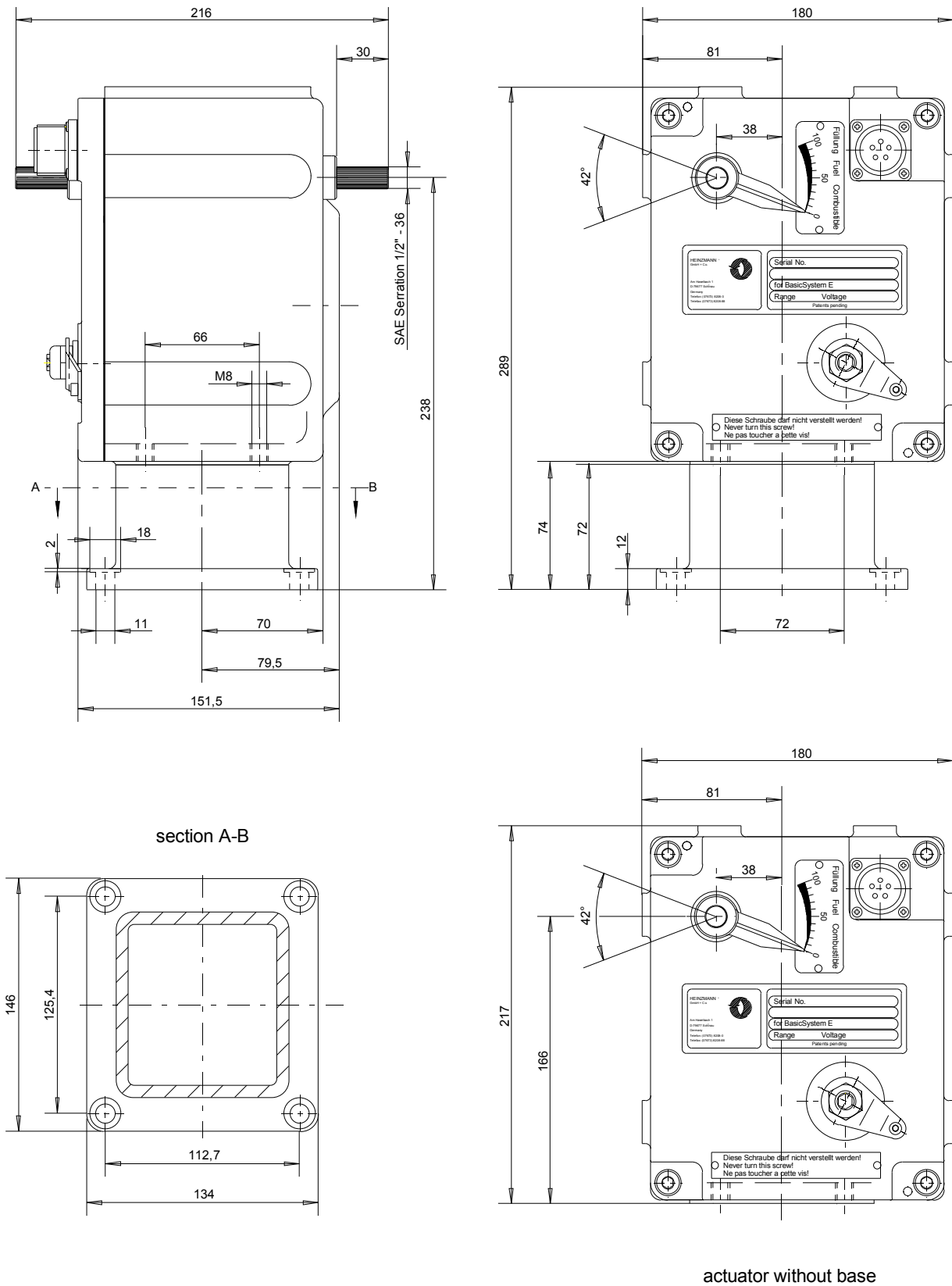
Fig. 10: Actuators StG 16, StG 30 and StG 40

8. Regulating Linkage

8.1. Length of Regulating Rack

The length of the regulating rack is determined in such a way that approx. 90 % of the governor output shaft adjustment angle can be used. Based on this, the rack length L of governors with 42° adjustment angle is calculated as L = 1.5 a, "a" being the travel distance of the injection pump or the carburettor.

8.2. Connecting Linkage

The connecting linkage from the governor to the injection pump or the carburettor should be length-adjustable and have a (pressure or tension) elastic link. If possible, joint rod heads in accordance with DIN 648 should be used as connecting links. The linkage must operate easily and without clearance.

In case of friction or backlash in the linkage connecting actuator and injection pump resp. throttle valve no optimal control is possible.

8.3. Linkage Adjustment for Diesel Engines

The length of the connecting linkage is adjusted in such a way that with the governor in
<u>stop</u> position the injection pump is set to 0 - 2 fuel marks. (Travel of the injection pump
control rack is limited by the governor.)
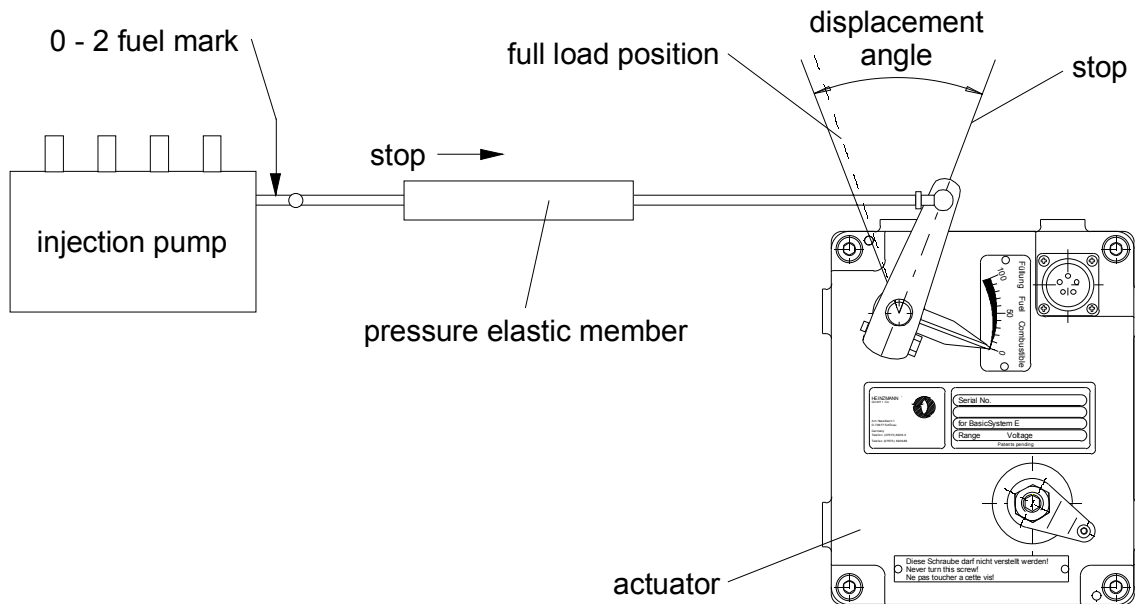
Fig. 11: Linkage for Diesel Engines

The resistance of the pressure elastic link is overcome when the control rack has reached
the full load stop and the speed continues to decrease (overload). Furthermore, the elastic
link is overcome when stopping via the emergency switch.

8.4. Linkage Adjustment for Carburettor Engines

For carburettor or gas engines, the length of the connecting linkage is adjusted in such a way that with the governor in <u>full load</u> position the throttle valve is completely open. In idling speed position, the elastic link must be slightly overcome. This allows adjustment of the idle screw without changing the governor adjustment.
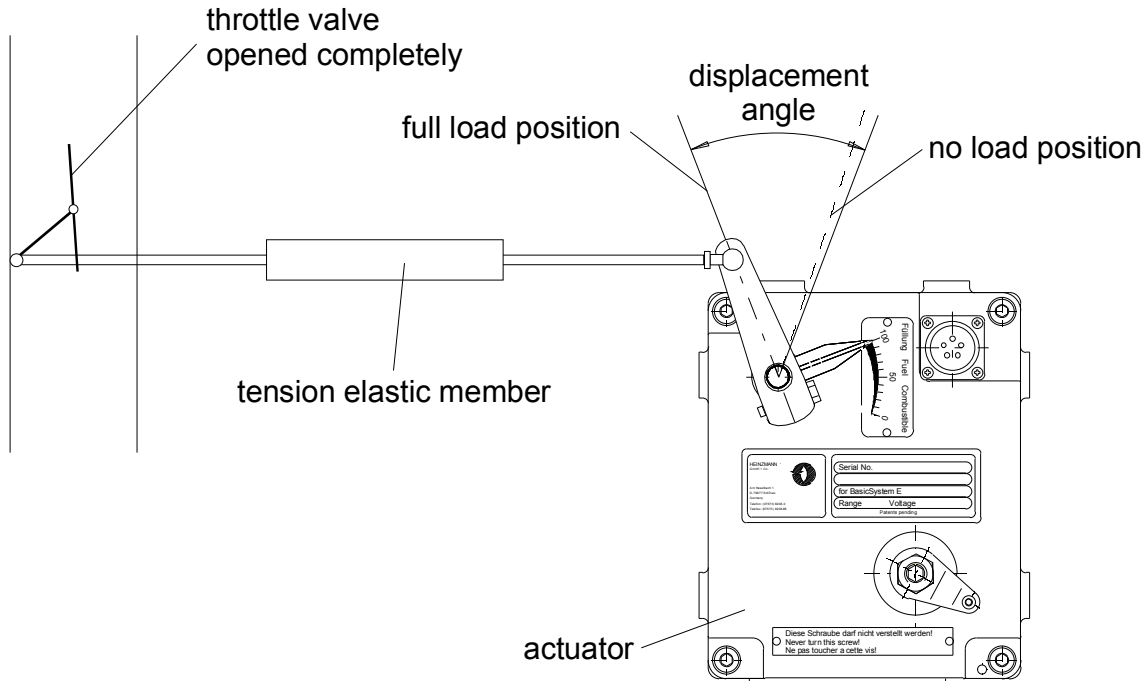
Fig. 12: Linkage for Gas Engines

If carburettor or injektion pump are to the right of the governor as opposed to their position on the drawings, then the direction of motion of the elastic link must also be reversed.

9. Electric Connection

9.1. Connection of Shielding

To avoid elektromagnetic influences it is necessary to connect cable shields at both ends. This includes shielding from control housing to sensors, from control housing to potentiometers, from control housing to actuator and from control housing to accessory units. If there is a potential difference between the control housing and any of these other componets, to avoid currents via the shielding it is necessary to run a separate wire from the control housing to each of these components.
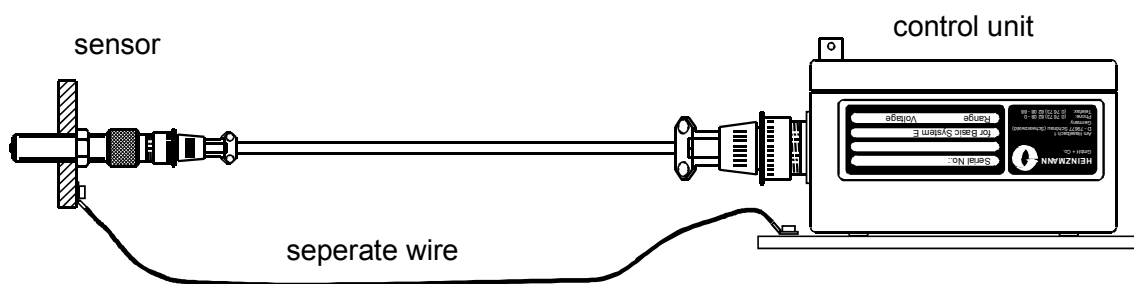
Fig. 13: Connection of Seperat Wire

At cable ends without plugs (e.g. terminal strip or pins) the shielding must be connected at the housing near the contacts.
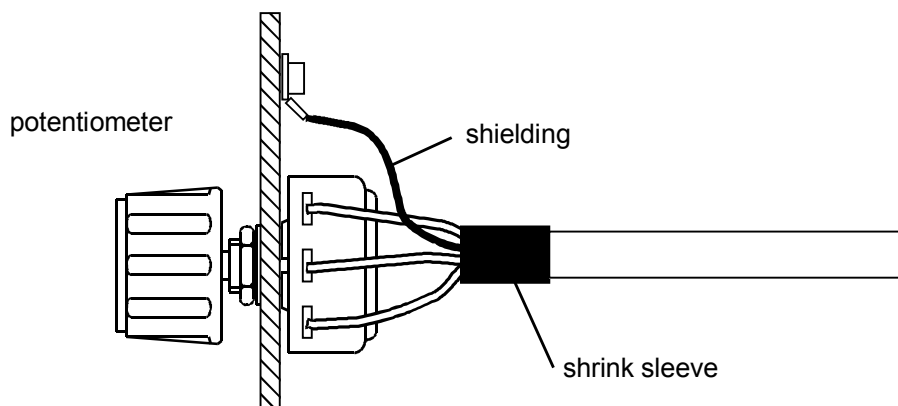
Fig. 14: Shield Connection without Plug

In case of a plug connection the shielding is jamed in the strain relief of the plug.
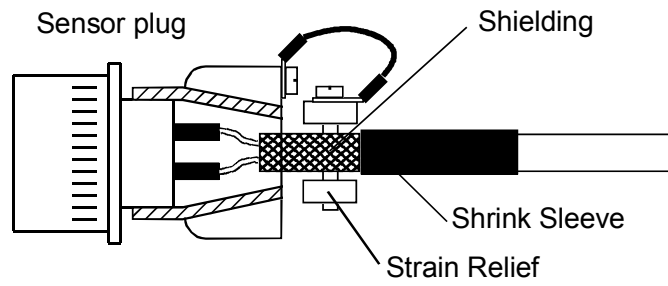
Fig. 15: Shield Connection in the Plug

9.2. Connection for Generator Set with digital Accessories

Example for parallel- and mains operation
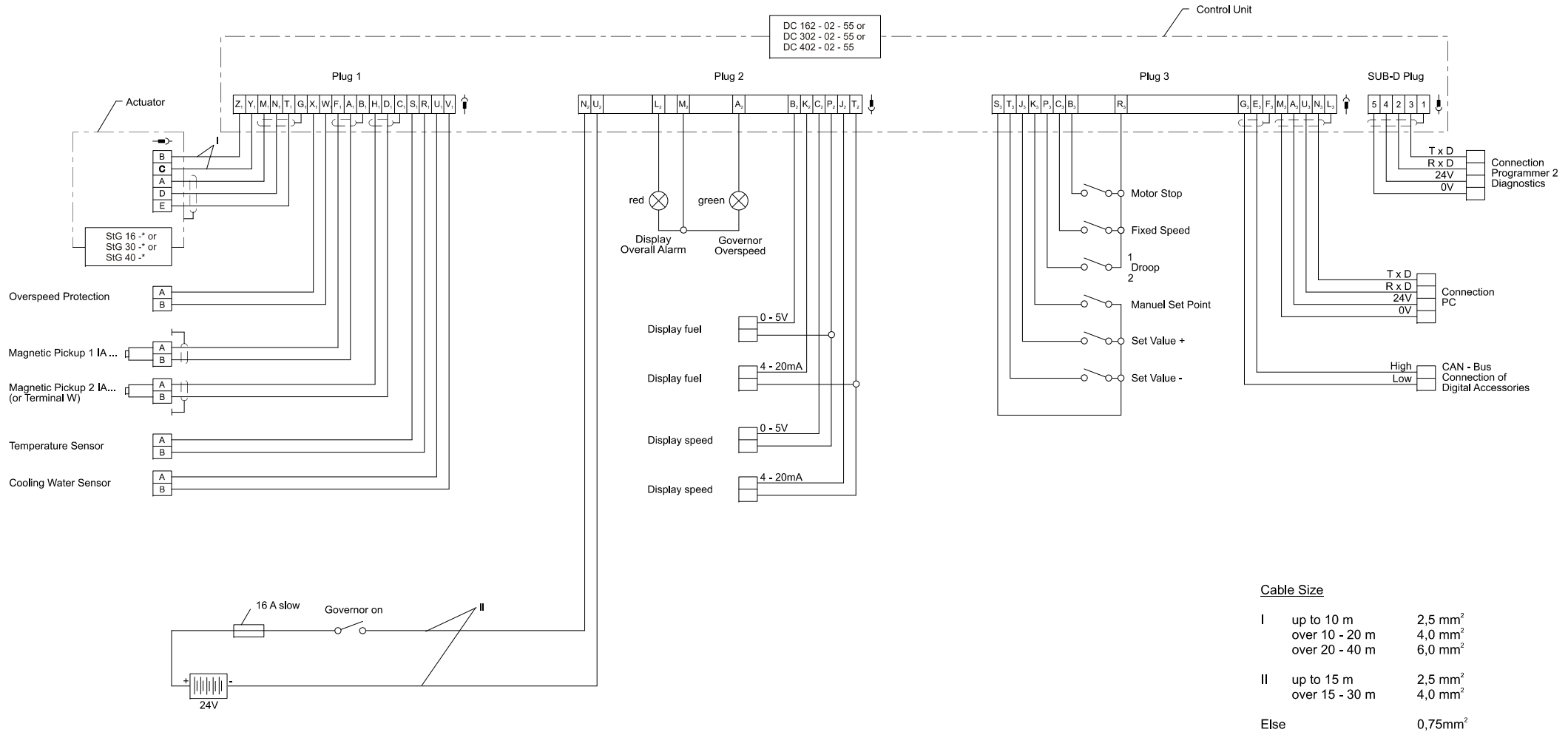
Fig. 16: Connections with Plugs (IP 55) for Genset with Digital Accessories
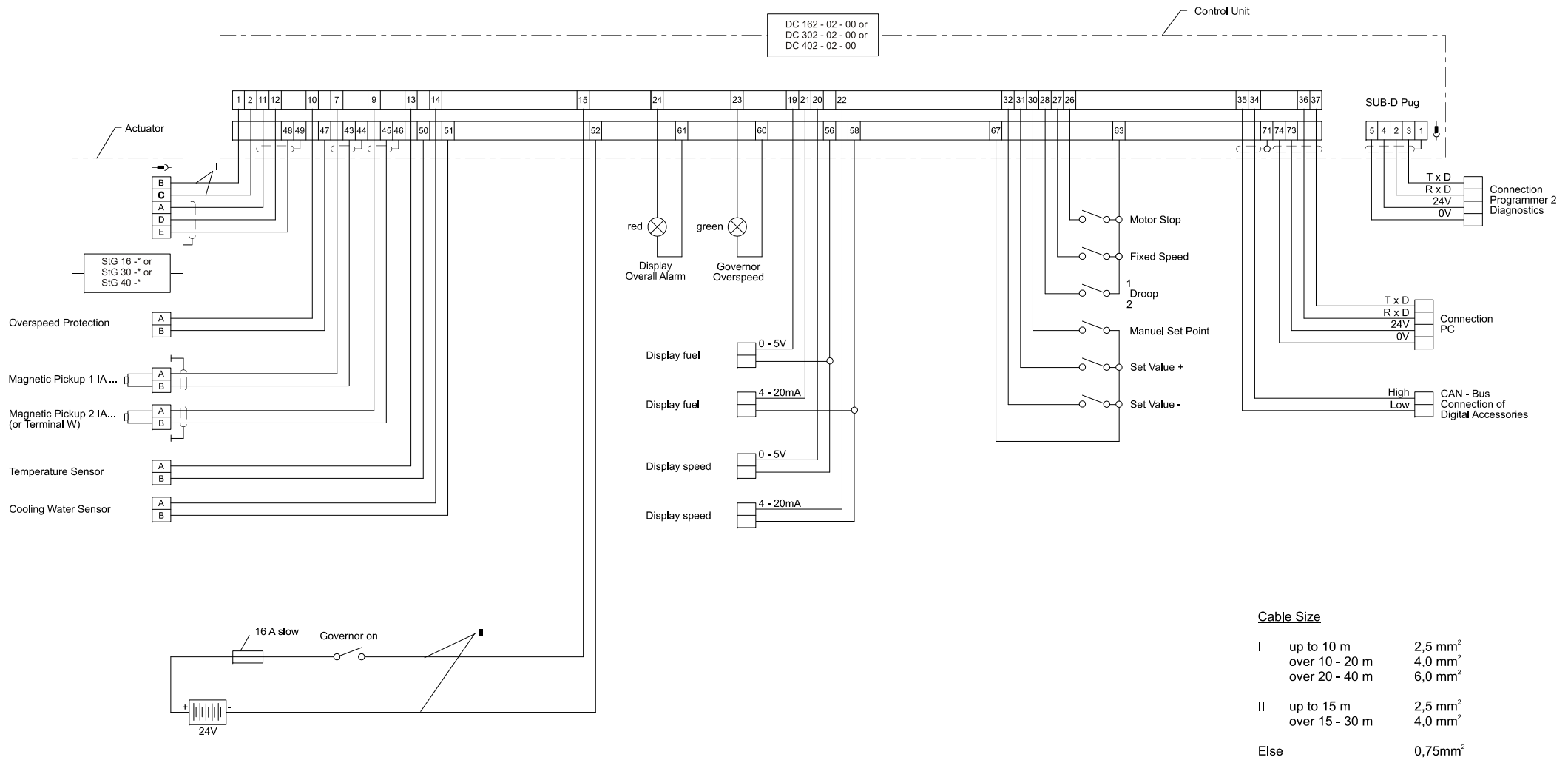
Fig. 17: Connections with Terminal Strip (IP 00) for Genset with Digital Accessories

9.3. Connection for Generator Set with analoque Accessories

Example for parallel- and mains operation
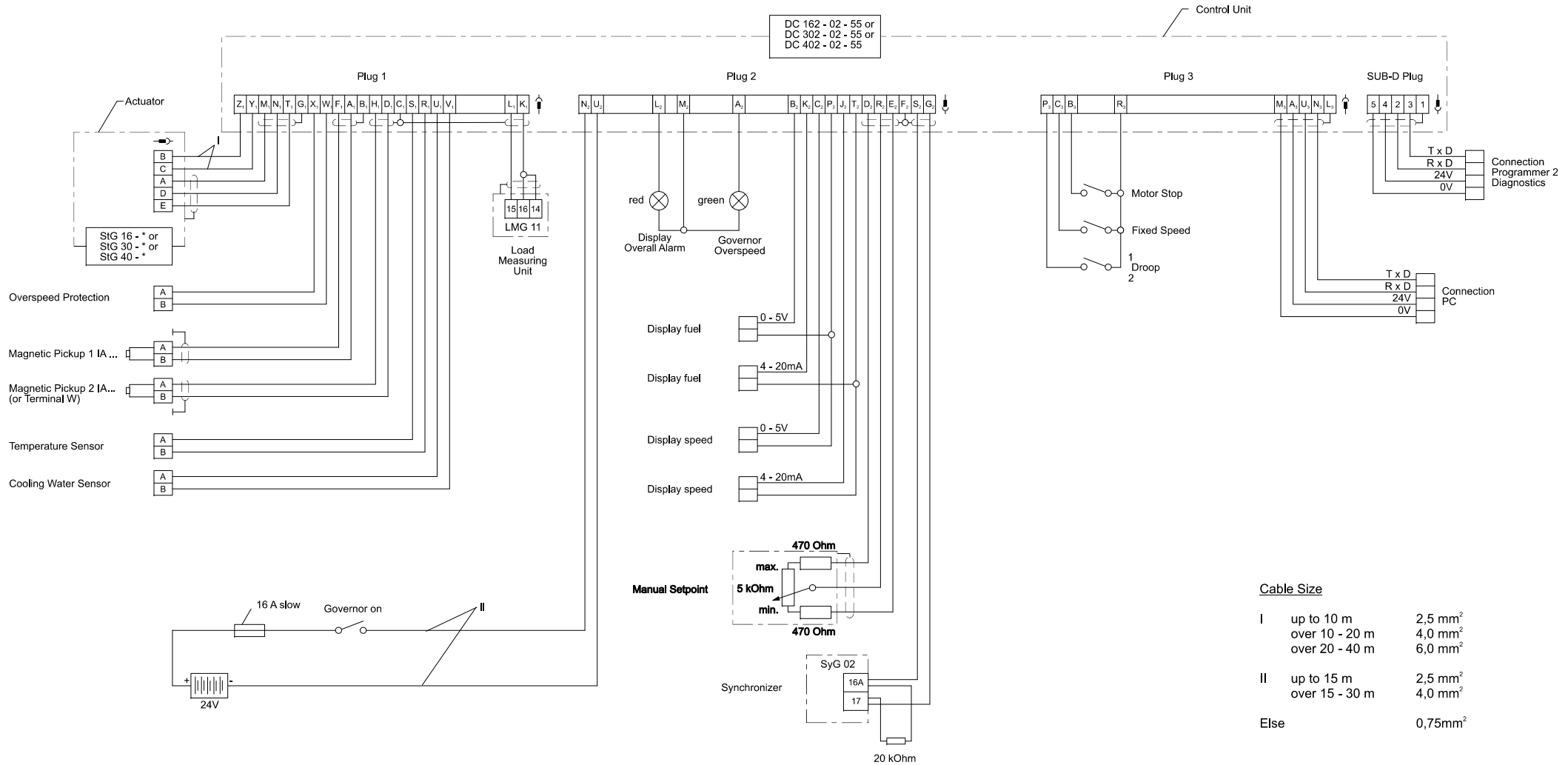
Fig. 18: Connections with Plugs (IP 55) for Genset with Analogue Accessories
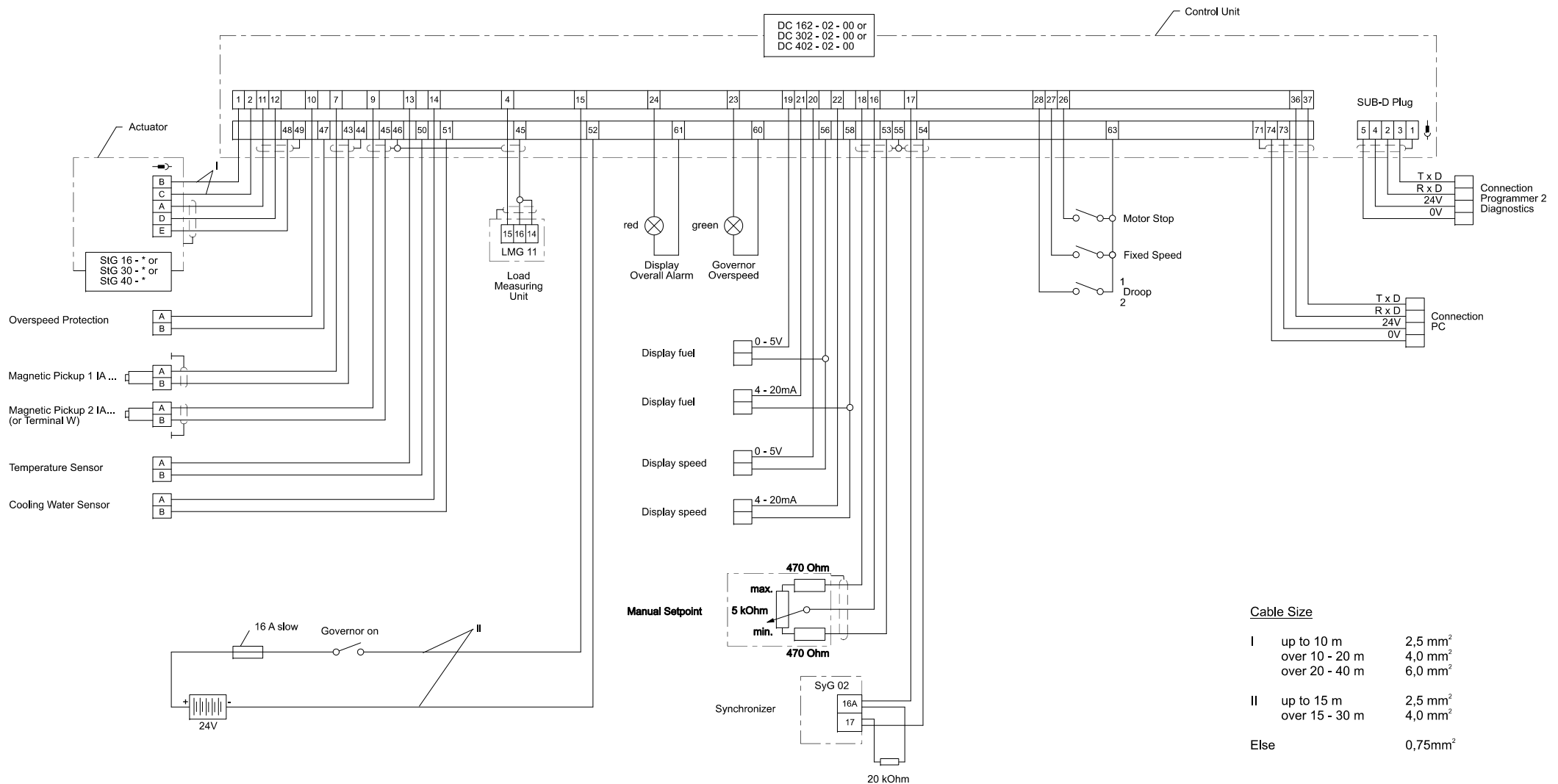
Fig. 19: Connections with Terminal Strip (IP 00) for Genset with Analogue Accessories

9.4. Connection for Vehicle Operation

Example
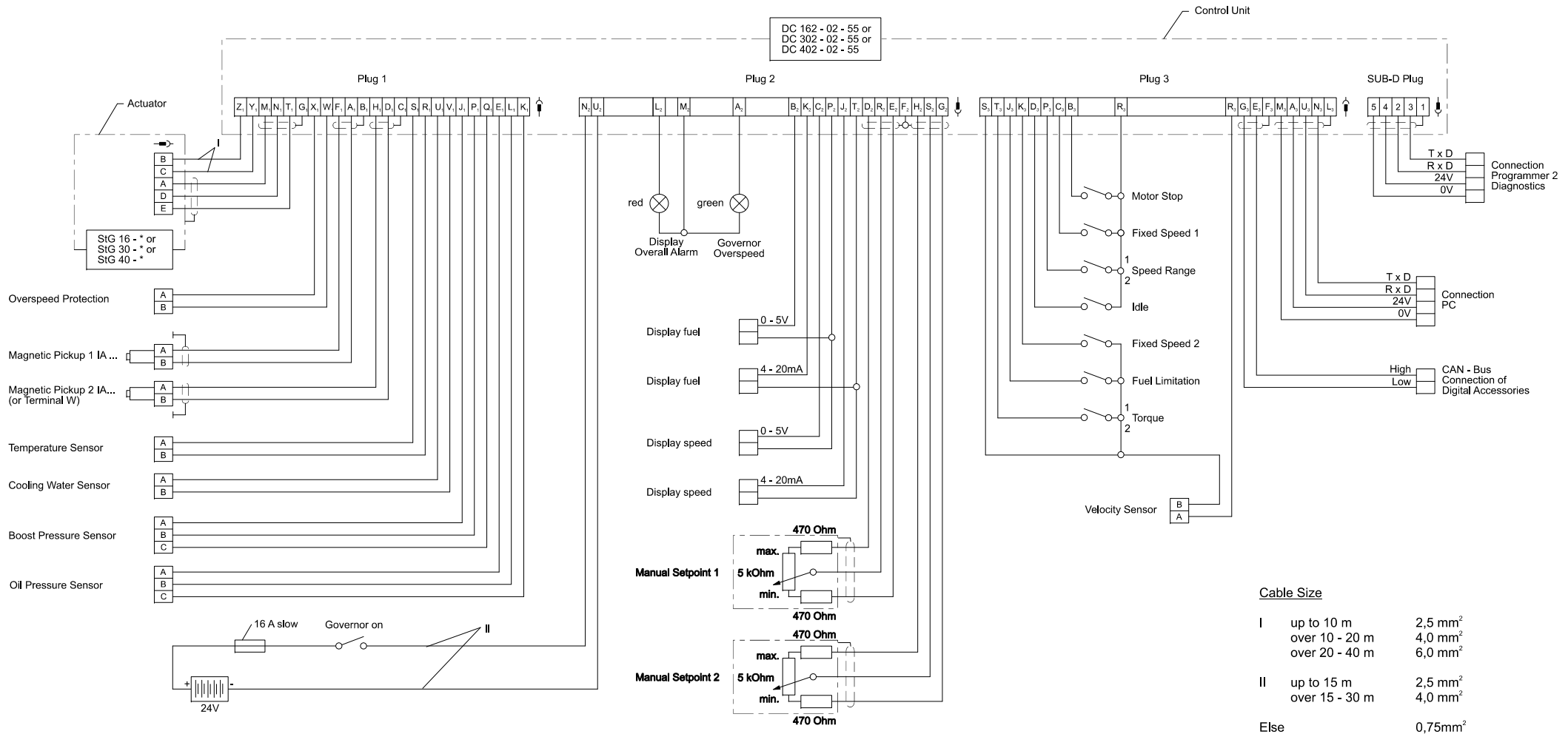
Fig. 20: Connections with Plugs (IP 55) for Vehicle Operation
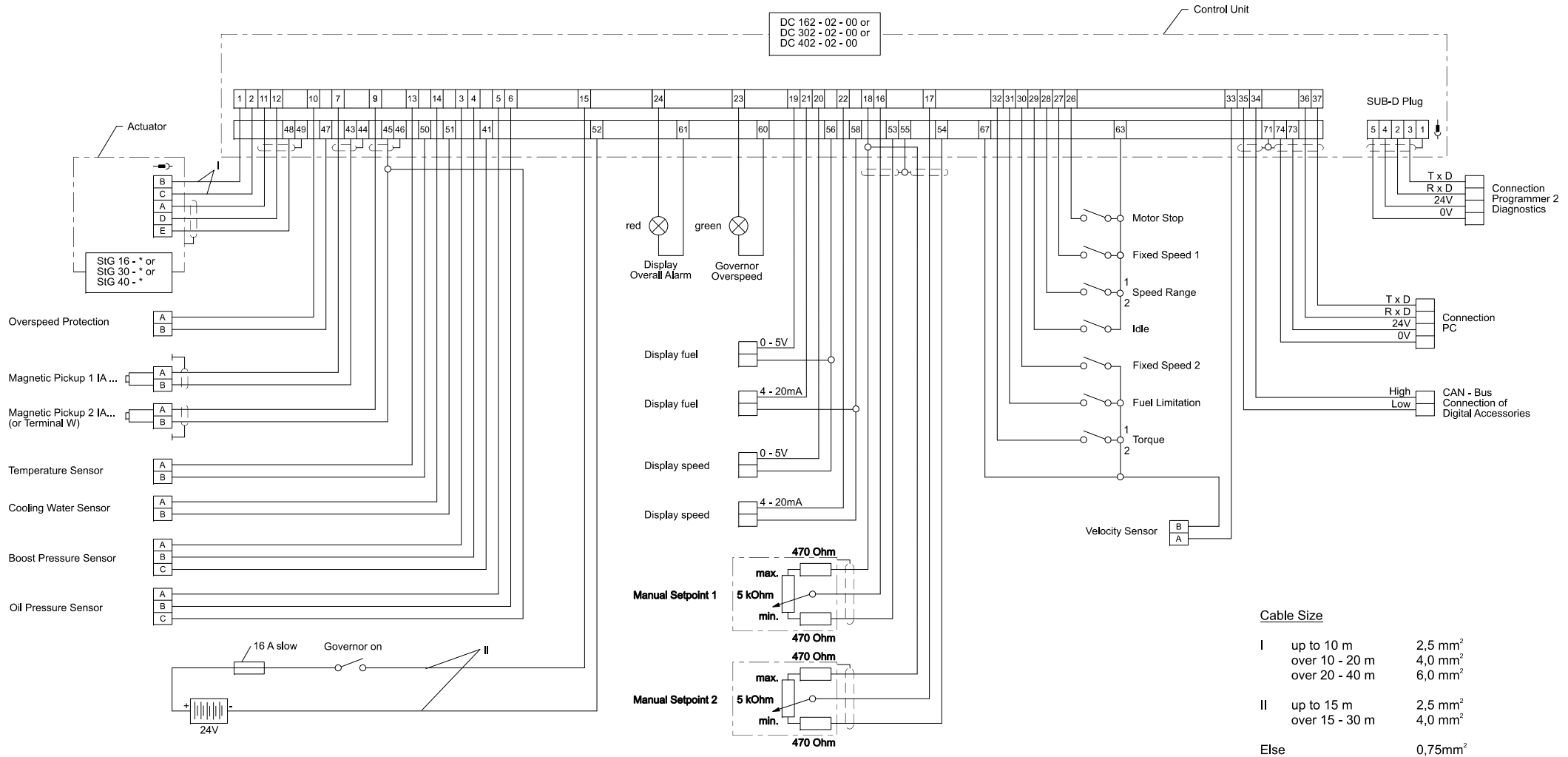
Fig. 21: Connections with Terminal Strip (IP 00) for Vehicle Operation

9.5. Connection for Locomotive Operation, 16 Speed Levels

Example for 16 speed levels
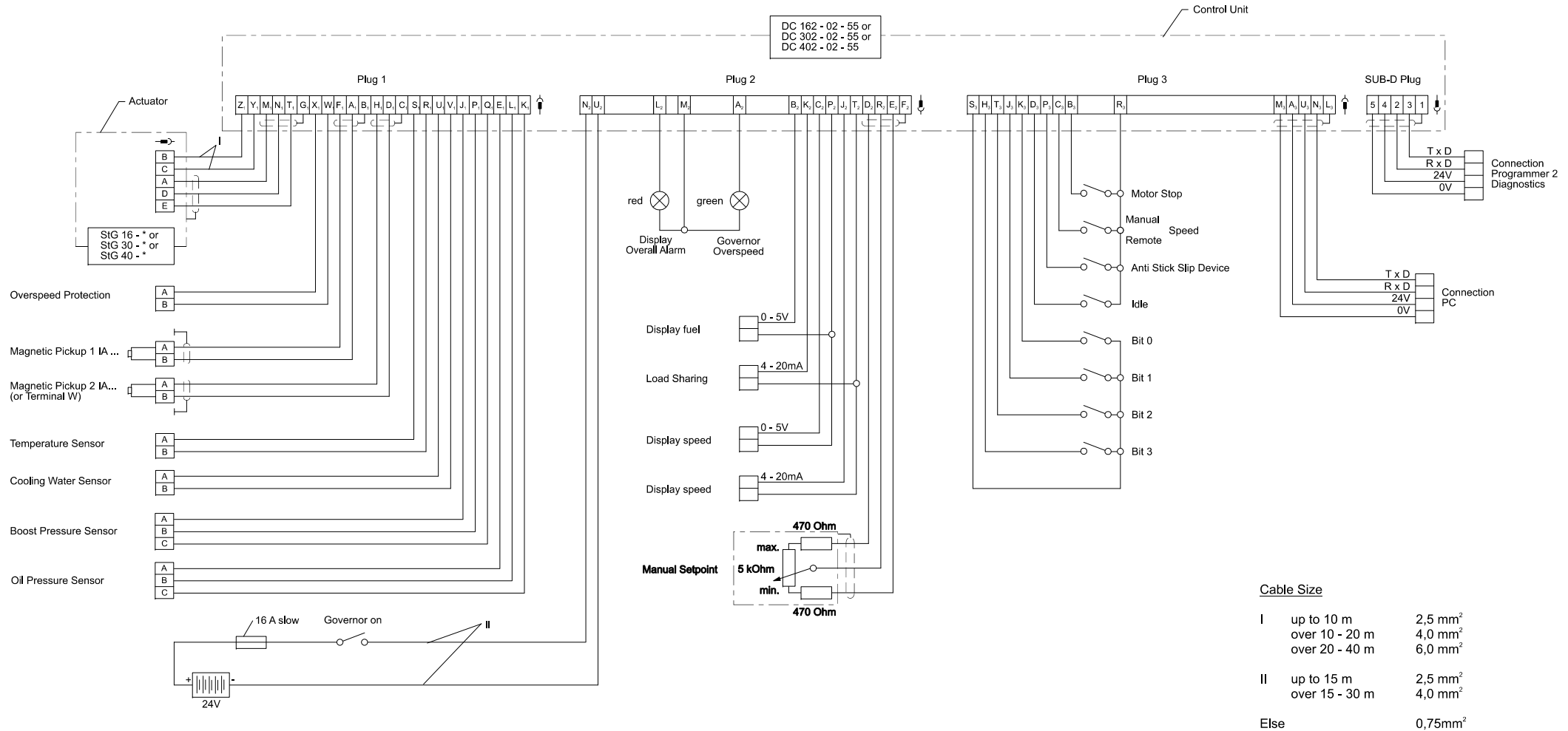
Fig. 22: Connections with Plugs (IP 55) for Locomotive with Speed Steps
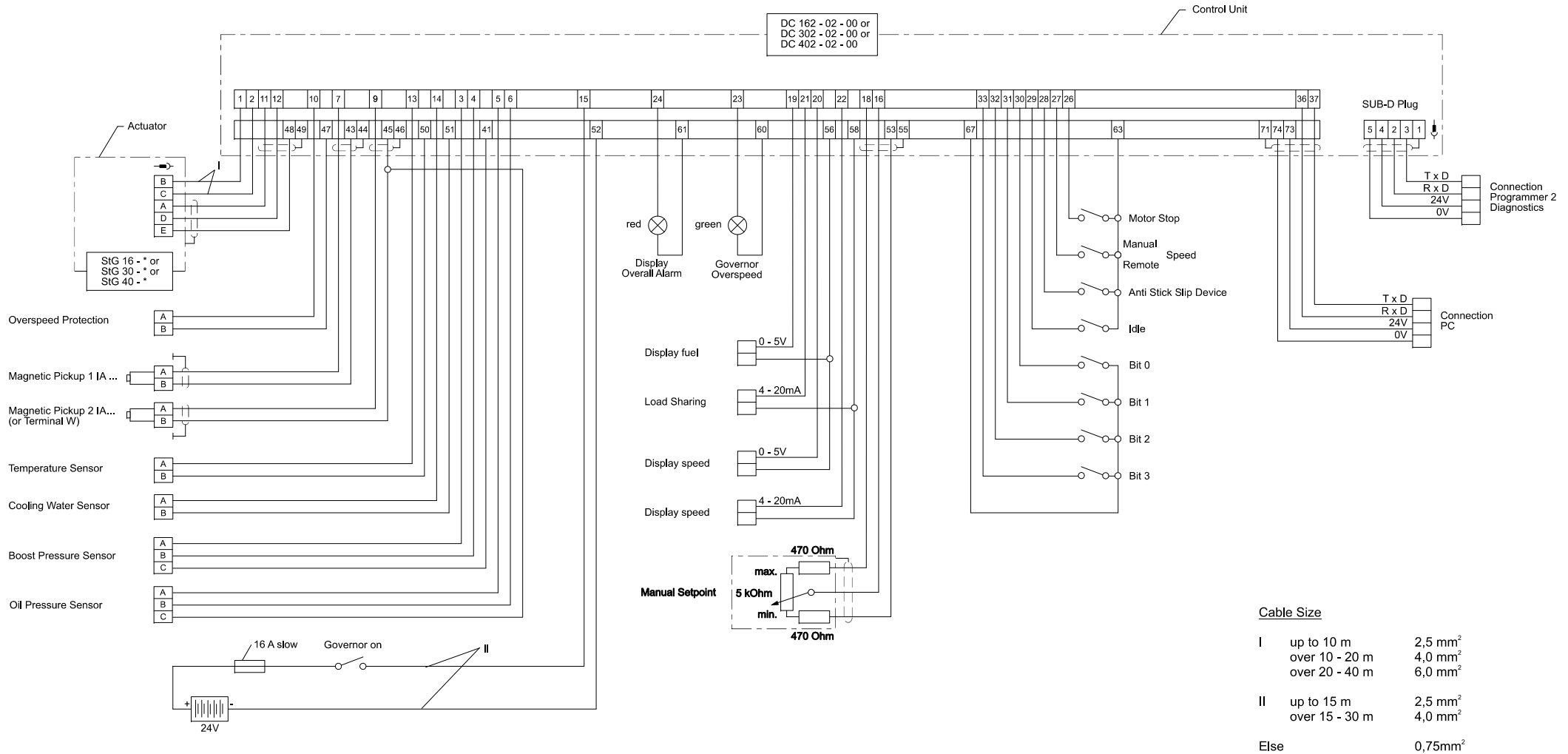
Fig. 23: Connections with Terminal Strip (IP 00) for Locomotive with Speed Steps

9.6. Connection for Locomotive Operation with Current Signal

Example for speed adjustment by current signal
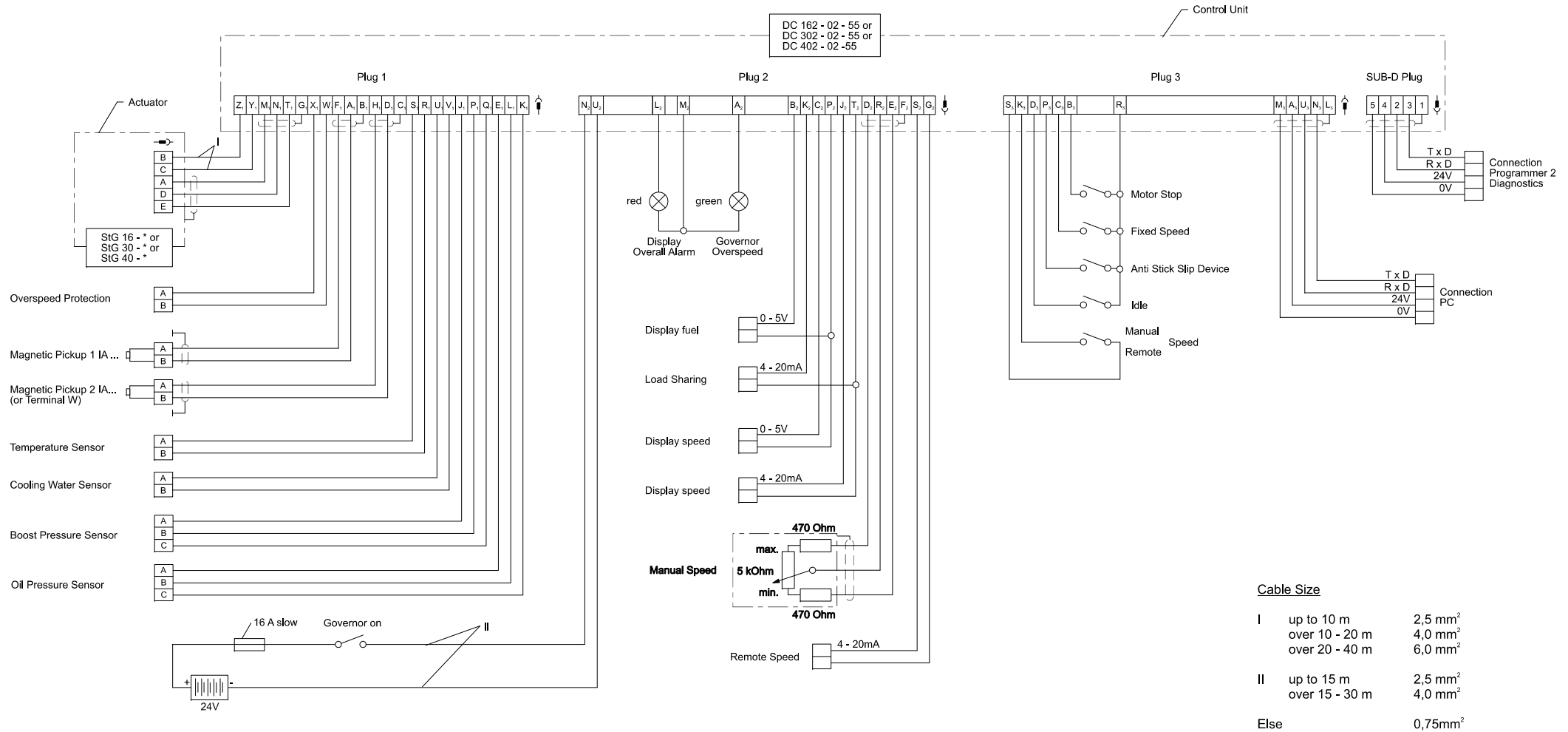
Fig. 24: Connections with Plugs (IP 55) for Locomotive with Current Input
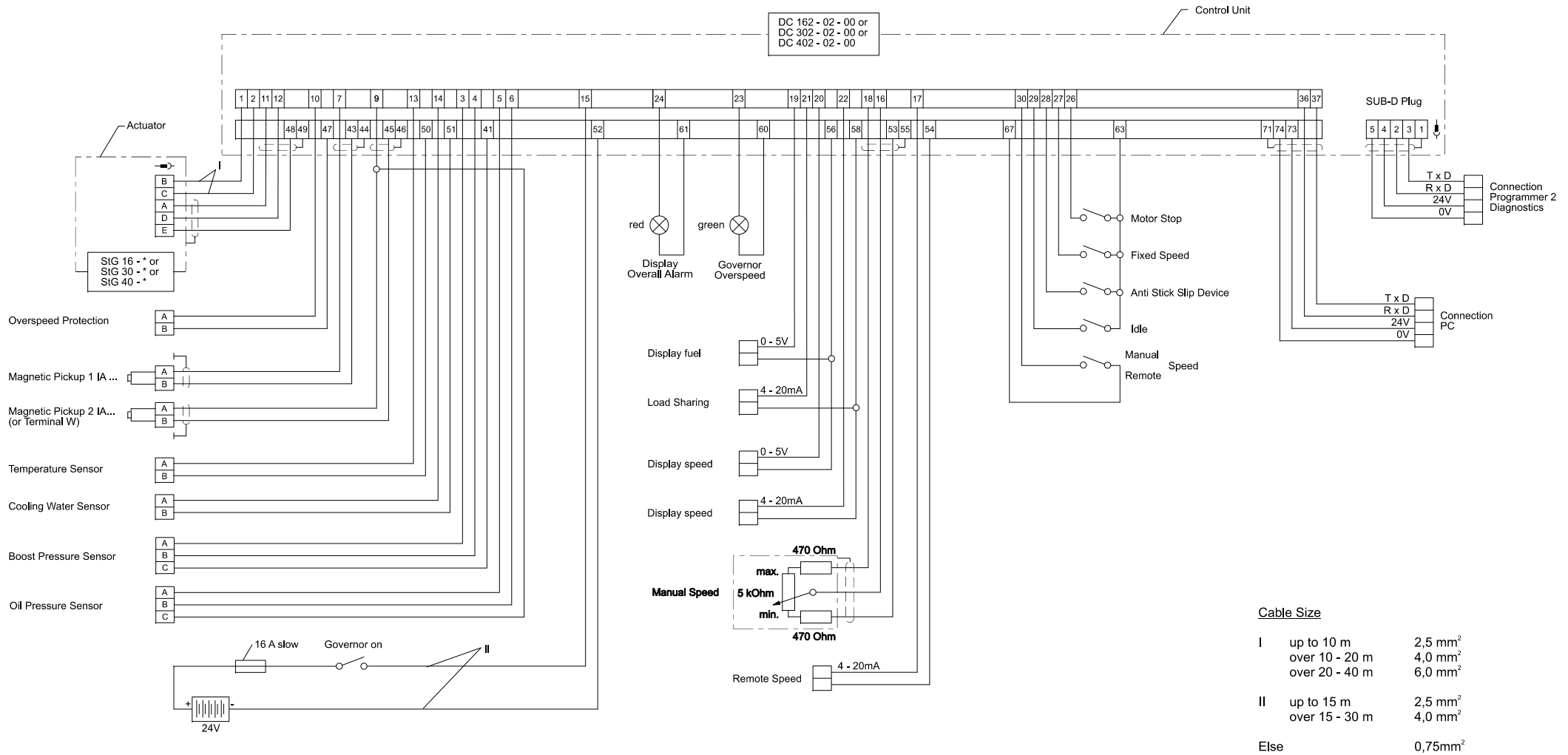
Fig. 25: Connections with Terminal Strip (IP 00) for Locomotive with Current Input

9.7. Connection for Marine Operation, Twin Operation

Example for twin operation: 2 engines with 1 propeller)
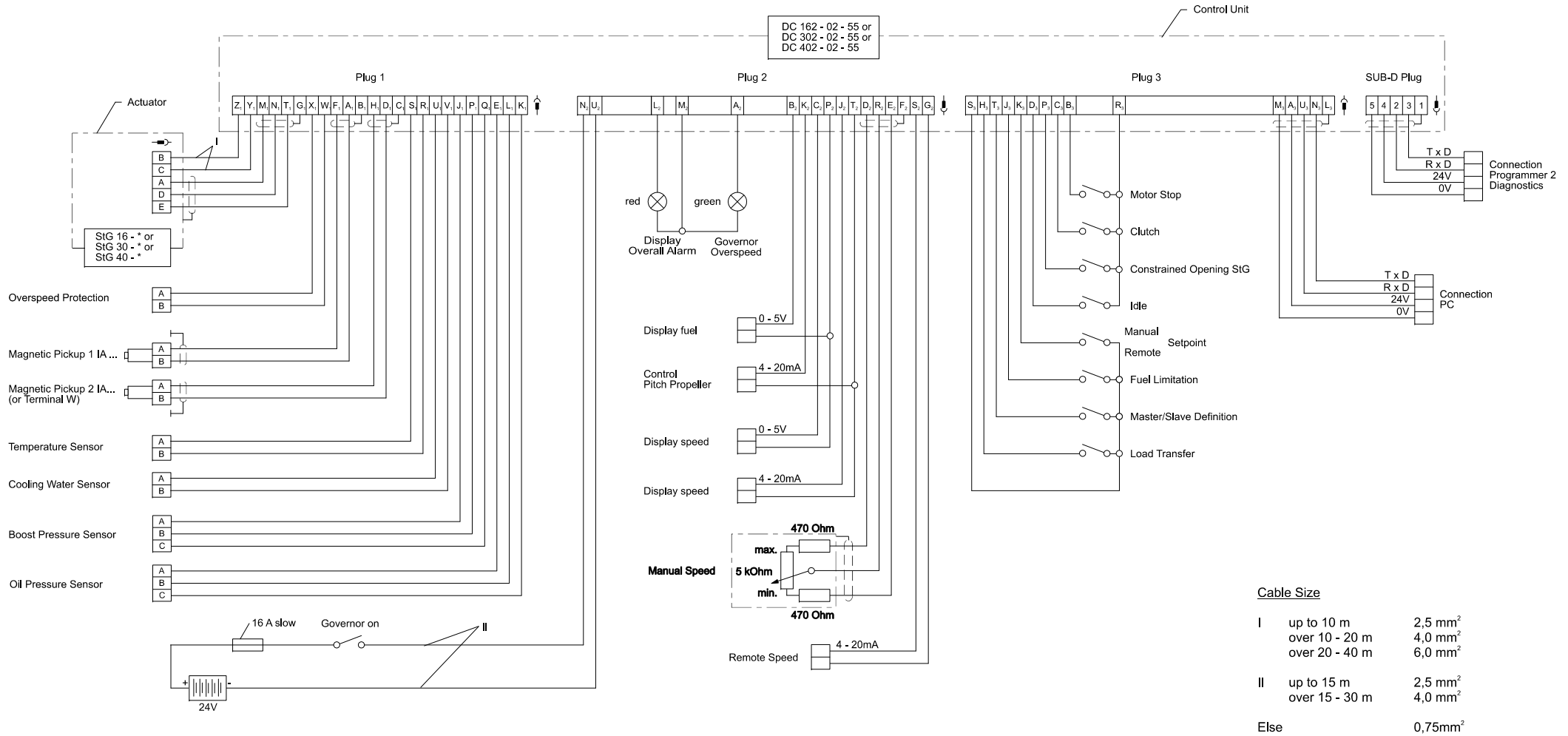
Fig. 26: Connections with Plugs (IP 55) for Marine Twin Operation
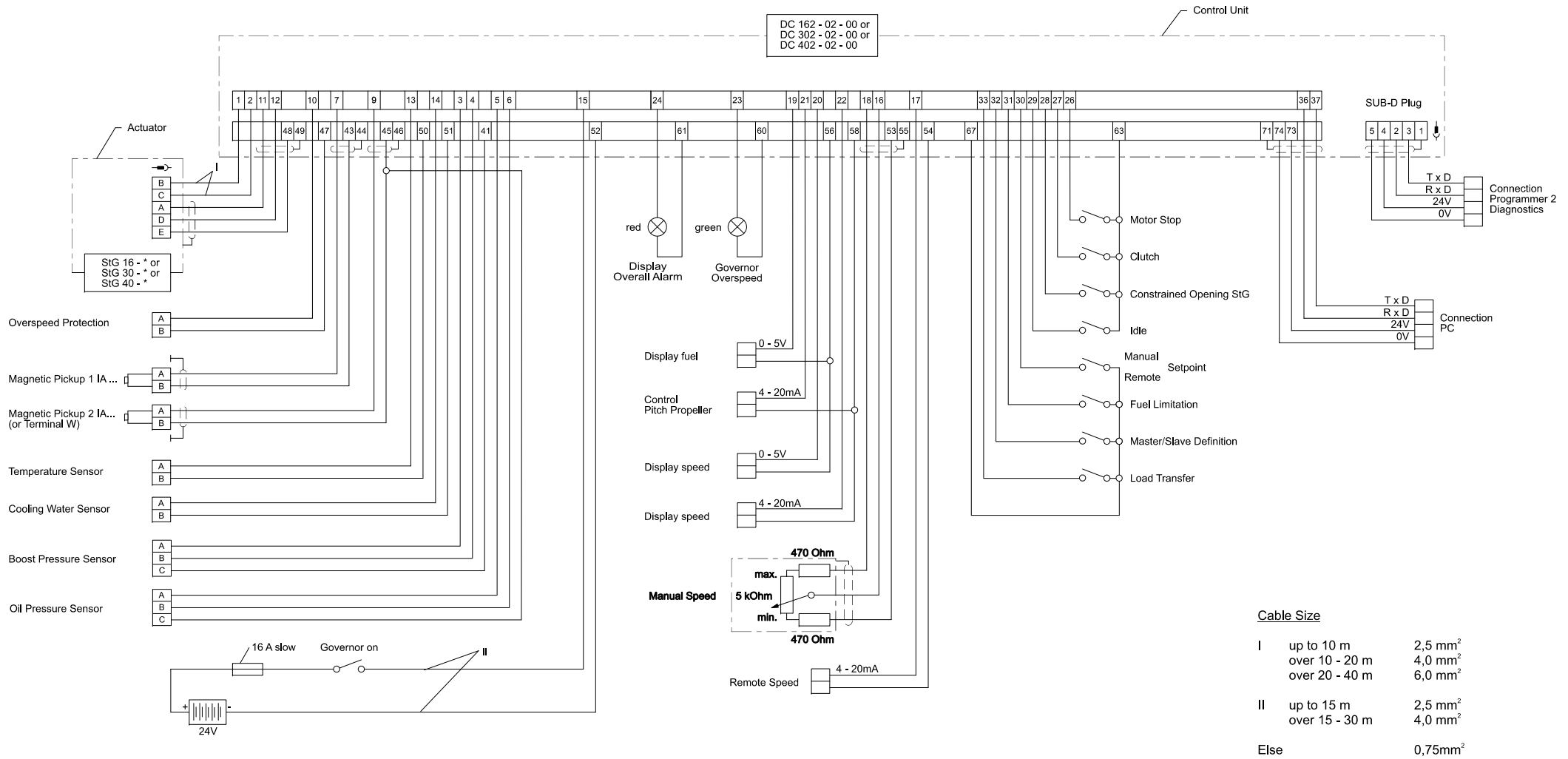
Fig. 27: Connections with Terminal Strip (IP 00) for Marine Twin Operation

9.8. Connection for Marine Operation, Single Engine

Example for single engines
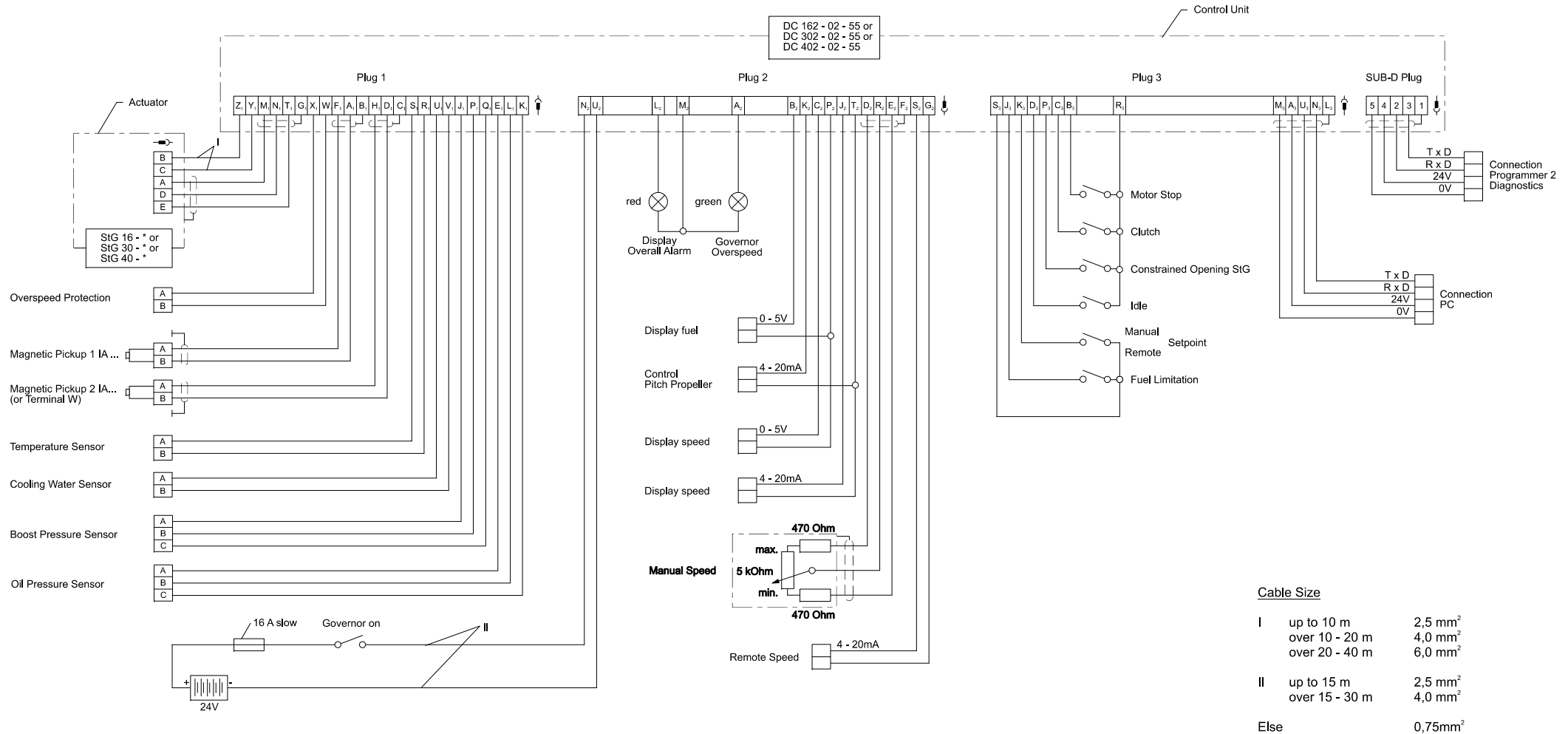
Fig. 28: Connections with Plugs (IP 55) for Marine Single Operation

DC 162 - 02 - 00 or
DC 302 - 02 - 00 or
DC 402 - 02 - 00

Control Unit

SUB-D Plug

| 1 | 2 | 11 | 12 | | 10 | 7 | | 9 | | 13 | 14 | 3 | 4 | | 5 | 6 | | 15 | | 24 | | 23 | | 19 | 21 | 20 | | 22 | | 18 | 16 | | 17 | | 31 | 30 | 29 | 28 | 27 | 26 | | 36 | 37 |

| 48 | 49 | | 47 | | 43 | 44 | | 45 | 46 | | 50 | | 51 | | 41 | | 52 | | 61 | | 60 | | 56 | | 58 | | 53 | 55 | | 54 | | 67 | | 63 | | 71 | 74 | 73 | | 5 | 4 | 2 | 3 | 1 |

Actuator

B
C
A
D
E

I

T x D
R x D
24V
0V

Connection
Programmer 2
Diagnostics

StG 16 - * or
StG 30 - * or
StG 40 - *

Overspeed Protection
A
B

Magnetic Pickup 1 IA ...
A
B

Magnetic Pickup 2 IA ...
(or Terminal W)
A
B

Temperature Sensor
A
B

Cooling Water Sensor
A
B

Boost Pressure Sensor
A
B
C

Oil Pressure Sensor
A
B
C

red ⊗   green ⊗

Display
Overall Alarm

Governor
Overspeed

Display fuel   0 - 5V

Control
Pitch Propeller   4 - 20mA

Display speed   0 - 5V

Display speed   4 - 20mA

470 Ohm
max.
Manual Speed   5 kOhm
min.
470 Ohm

Remote Speed   4 - 20mA

Motor Stop

Clutch

Constrained Opening StG

Idle

Manual
Remote   Setpoint

Fuel Limitation

T x D
R x D
24V
0V

Connection
PC

16 A slow   Governor on

II

+ | | | | | -
24V

Cable Size

I   up to 10 m   2,5 mm²
     over 10 - 20 m   4,0 mm²
     over 20 - 40 m   6,0 mm²

II   up to 15 m   2,5 mm²
     over 15 - 30 m   4,0 mm²

Else   0,75mm²

Fig. 29: Connections with Terminal Strip (IP 00) for Marine Single Operation

10. Programming Possibilities

Programming the Heinzmann Digital Governor can be performed according to the possibilities described below:

10.1. Programming by the Manufacturer

During final inspection by the manufacturer, the functionability of the governor is checked by means of a test program. If the operational data for the governor are available, the test program is executed using those data. On the engine, only the dynamic values and, if necessary, the actuator position limits and sensors have to be adjusted.

10.2. Programming with the Hand- Held Programmer 2

The entire programming can be performed using the Hand-Held Programmer 2. This handy device may be conveniently used for development and for serial adjustment as well as for service purposes.

10.3. Programming by PC

Programming can also be performed using the PC. In comparison with the hand-held programmer, this method offers advantages with respect to the possibilities of having characteristic curves readily displayed on the screen and easily varied; the same holds for the time diagrams when putting the governor into operation on the engine. Furthermore, the PC offers a better overview, as the PC program presents a menu structure and is able to continuously display several parameters at a time.

The PC program also permits to save and load governor data to and from diskettes.

10.4. Programming with User Masks

Principally, programming may be performed with the help of user masks that have been provided by Heinzmann or may conveniently be created by the user himself. Within a user mask, only those parameters are accessible that are actually needed.

10.5. Transferring Data Sets

Once programming with respect to a specific engine type and its application has been completed, the data set can be stored (in the hand-held programmer or on diskette). For future cases of similar applications, the data set may be downloaded into the new governors.

11. Starting the Engine - Brief Instructions

11.1   Adjust clearance of magnetic pulse pick-up.

11.2   Check program with respect to relevant parameters: number of teeth, speed, etc.

11.3   Set point potentiometer in mid-position:

P -	Gain	to	50
I -	Stability	to	0
D-	Derivative	to	0

If the dynamic values have already been determined for an installation, they can be programmed directly at this point.

> Attention: Overspeed protection must be guaranteed!

11.4   Start engine and run it up to nominal speed using the set point potentiometer.

11.5   Increase gain (P-fraction) up to instability and reduce until stability is attained.
Increase stability (I-fraction) up to instability and reduce until stability is attained.
Increse derivative (D-fraction) up to instability and reduce until stability is attained.

With these values set, engine speed is to be disturbed briefly (e.g., by shortly pressing the stop switch), and the transient oscillations are to be observed.

11.6   Check over the entire speed range.

If for maximum and minimum speed other values than the programmed ones should result, this will be due to tolerances of the set point potentiometer. If the speed derivation is not acceptable, it will be necessary to measure the setpoint source.

11.7   Gain-correction (P-correction) for gas engines resp. for variable speed governors with larger speed ranges; adjust map if necessary.

11.8   Checking the remaining program items, e.g., starting fuel injection, ramp time, etc.

> For detailed adjustment procedures as required for items 11.2 bis 11.8 and any further options of adjustment see manual DG 07 001-e / 05-08
> "Control devices for conventional injection with actuators".

12. Ordering Specifications

12.1. General Informations

Every data as

    supply voltage and kind of usage
    parameters, such as speeds and number of teeth on the flywheel
    sensors, such as speed probes, pressure and temperature sensors
    limitation curves
    additional functions
    monitoring funktions
    input / output configuration

are noted in the manual "**Order Information Digital Speed Governors**"
DG 96 012-e and shoud be transferred to HEINZMANN.

12.2. Harness

Control Unit
DC 162 - 02 or
DC 302 - 02 or
DC 402 - 02

Actuator
StG 16-*/
StG 30-*/
StG 40-*

L2

Pickups   L4

Sensors   L5

Overspeed   L7
Protection

Battery   L1

Setpoint   L3
Adjuster

L6   Digital
Inputs

L8   Power
Output

L11   Frequency
Input

L12   PWM
Input

L13   Communication

Status
Indicator

L10   Analog
Outputs
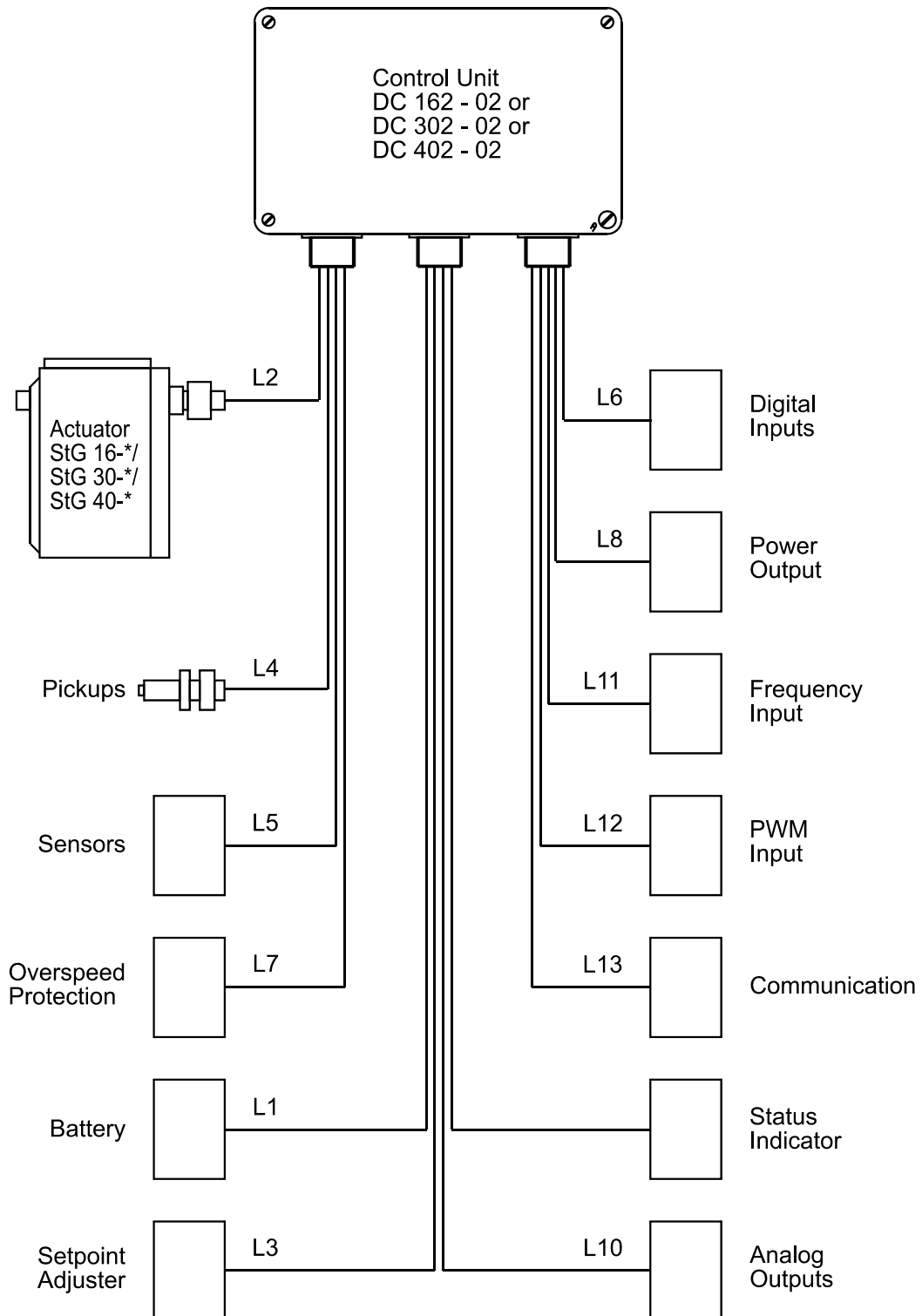
Fig. 30: Harness with Cable Numbers

12.3. Plug Connections

SV 103-DC-19 SG (010-02-183-00)
SV 103-DC-19 PG (010-02-222-00)
SV 103-DC-24 SG (010-02-185-00)

Control Unit DC 162 - 02
        or   DC 302 - 02
        or   DC 402 - 02

SV 103-DC-24 PK (010-02-177-00)
SV 103-DC-19 SK (010-02-165-00)
SV 103-DC-19 PK (010-02-175-00)

SV 6-IA-2 K (010-02-170-00)

Magnetic Pickup IA ...

SV 16-StG-5 G (010-02-039-00)

SV 16-StG-5 KW (010-02-179-00)

Actuator
StG 16-*/
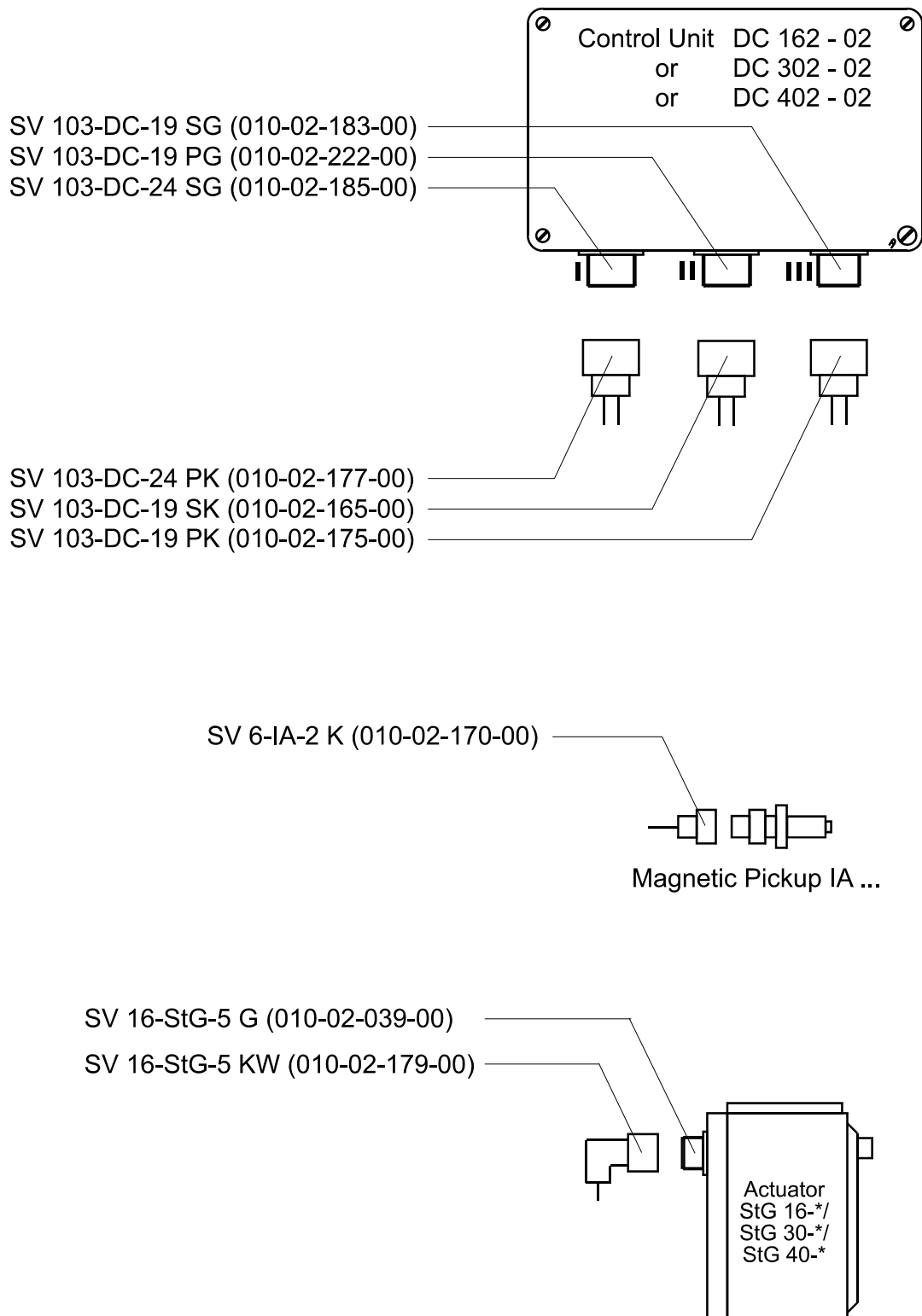StG 30-*/
StG 40-*

Fig. 31: Plugs with Designation

12.4. Cable lengths

It is of advantage to obtain the harness together with the governor.

The necessary cable lengths have to be registered here and transfered to HEINZMANN.

Please note: It is not possible to use all signals simultaneous because some inputs and
outputs of the governor have various options depending on the application.

Version of Control Unit:

with plugs (IP55)   ☐   with terminal strip (IP00)   ☐

Version of Actuator:

with plug (IP55)   ☐   with terminal strip (IP00)   ☐

a) L1 = Control unit - battery

L 1	Control unit - battery	.... cm	
	Cable size	up to 15 m	2 x 2.50 mm²
		over 15 - 30 m	2 x 4.00 mm²

b) L2 = Control unit - actuator

L 2.1	Control unit - actuator (feedback)	.... cm	3 x 0.75 mm² shielded
L 2.2	Control unit - actuator (power)	.... cm	
	Cable size	up to 10 m	2 x 2.50 mm²
		over 10 - 20 m	2 x 4.00 mm²
		over 20 - 40 m	2 x 6.00 mm²

c) L3 = Control unit - setpoint adjusting unit

L 3.1	Control unit - setpoint poti 1	.... cm	3 x 0.75 mm² shielded
L 3.2	Control unit - setpoint poti 2	.... cm	3 x 0.75 mm² shielded
L 3.3	Control unit - 4-20 mA input	.... cm	2 x 0.75 mm²
L 3.4	Control unit - synchronizer	.... cm	2 x 0.75 mm² shielded
L 3.5	Control unit - load measuring unit	.... cm	2 x 0.75 mm² shielded

d) L4 = Control unit - pick-up

L 4.1	Control unit - pick-up 1	.... cm	2 x 0.75 mm²	shielded
L 4.2	Control unit - pick-up 2	.... cm	2 x 0.75 mm²	shielded

e) L5 = Control unit - sensor inputs

L 5.1	Control unit - temperature 1	.... cm	2 x 0.75 mm²
L 5.2	Control unit - cooling water temperature	.... cm	2 x 0.75 mm²
L 5.3	Control unit - boost pressure	.... cm	3 x 0.75 mm²
L 5.4	Control unit - oil pressure	.... cm	3 x 0.75 mm²

f) L6 = Control unit - digital inputs

L 6.1	Control unit - switch 1 - 4	.... cm	5 x 0.75 mm²
L 6.2	Control unit - switch 5 - 8	.... cm	5 x 0.75 mm²

g) L7 = Control unit - overspeed protection

L 7	Control unit - overspeed protection	.... cm	2 x 1.50 mm²

h) L8 = Control unit - controlled current output

L 8	Control unit - contr. current output	.... cm	2 x 1.50 mm²

i) L9 = Control unit - status indicator

L 9.1	Control unit - "Overall alarm" ind.	.... cm	2 x 0.75 mm²
L 9.2	Control unit - "Overspeed" ind.	.... cm	2 x 0.75 mm²

j) L10 = Control unit - analogue outputs

L 10.1	Control unit - display fuel (V)	..................cm	2 x 0.75 mm²	
L 10.2	Control unit - display fuel (A)	..................cm	2 x 0.75 mm²	
L 10.3	Control unit - display speed (V)	..................cm	2 x 0.75 mm²	
L 10.4	Control unit - display speed (A)	..................cm	2 x 0.75 mm²	
L 10.5	Control unit - load sharing	..................cm	2 x 0.75 mm²	
L 10.6	Control unit - controll pitch propeller	..................cm	2 x 0.75 mm²	

k) L11 = Control unit - frequency input

L 11	Control unit - tacho	..................cm	2 x 0.75 mm²

l) L12 = Control unit - PWM input

L 12	Control unit - PWM-in	..................cm	2 x 0.75 mm²

m) L13 = Communication

L 13.1	Control unit - CAN - Bus	..................cm	2 x 0.14 mm²	shielded
L 13.2	Control unit - PC	..................cm	4 x 0.14 mm²	shielded

13. Download of Manuals

Technical manuals can be downloaded in pdf-format from our homepage:

www.heinzmann.com

If the desired manual should not be available there, send an e-mail to:

info@heinzmann.de

or write to:

HEINZMANN GmbH & Co. KG

Technische Redaktion

Am Haselbach 1

D-79677 Schönau/Germany

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  (if different from above)
- item code (as on front page, bottom right) and title of the desired manual
  or alternatively the technical data of your HEINZMANN equipment

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