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HEINZMANN®
Engine & Turbine Management






Digital Basic System



HELENOS II

DG 20102-02

DG 20402-02

DG 20802-02

 <p>Warning</p>	<p>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.</p>
 <p>Danger</p>	<p>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</p>
 <p>Danger! High Voltage</p>  <p>Danger</p>	<p>Please note before commissioning the installation:</p> <p>Before starting to install any equipment, the installation must have been switched dead!</p> <p>Be sure to use cable shieldings and power supply connections meeting the requirements of the <i>European Directive concerning EMI</i>.</p> <p>Check the functionality of the existing protection and monitoring systems.</p>
 <p>Danger</p>	<p>To prevent damages to the equipment and personal injuries, it is imperative that the following monitoring and protection systems have been installed:</p> <p>Overspeed protection acting independently of the actuator Overtemperature protection</p> <p>HEINZMANN will refuse all liability for damage which results from missing or insufficiently working overspeed protection</p> <p>Generator installation will in addition require:</p> <p>Overcurrent protection Protection against faulty synchronization due to excessive frequency, voltage or phase differences Reverse power protection</p>
	<p>Overspeeding can be caused by:</p> <p>Failure of the voltage supply Failure of the actuator, the control unit or of any accessory device Sluggish and blocking linkage</p>

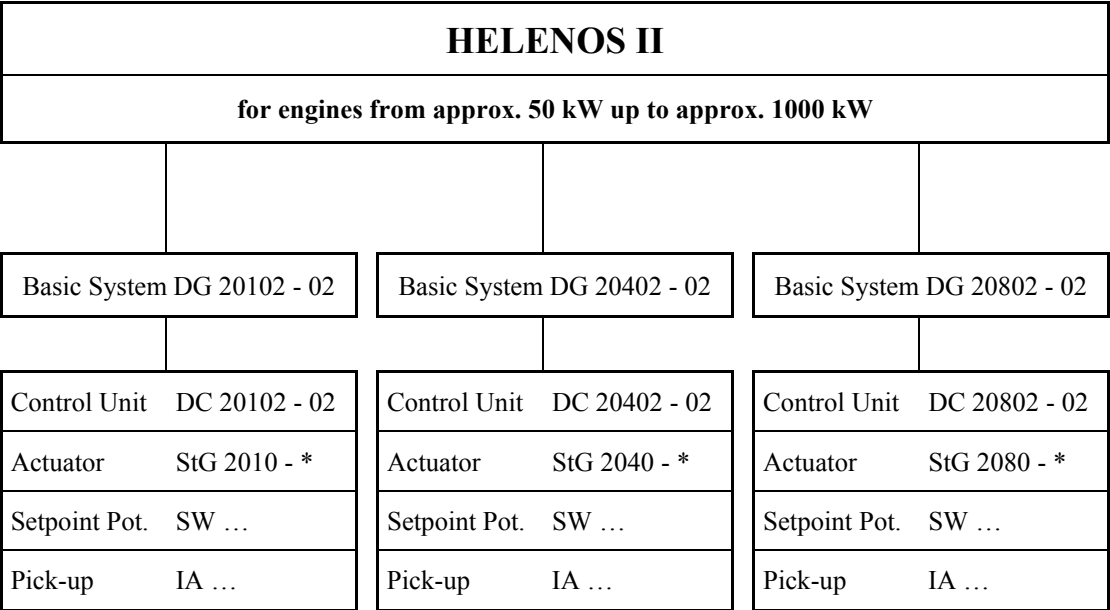
 Warning	<p>The examples, data and any other information in this manual are intended exclusively as instruction aids and should not be used in any particular application without independent testing and verification by the person making the application.</p>
 Danger	<p>Independent testing and verification are especially important in any application in which malfunction might result in personal injury or damage to property.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>

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 II



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

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1. General Remarks

Heinzmann digital governors with control unit DC ... 2 - 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.

1. General Remarks

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.

k) 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.

l) 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.

m) Anti Stick Slip Device

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

n) 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).

o) 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.

p) 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.

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 with Control Unit DC ... 2 - 02

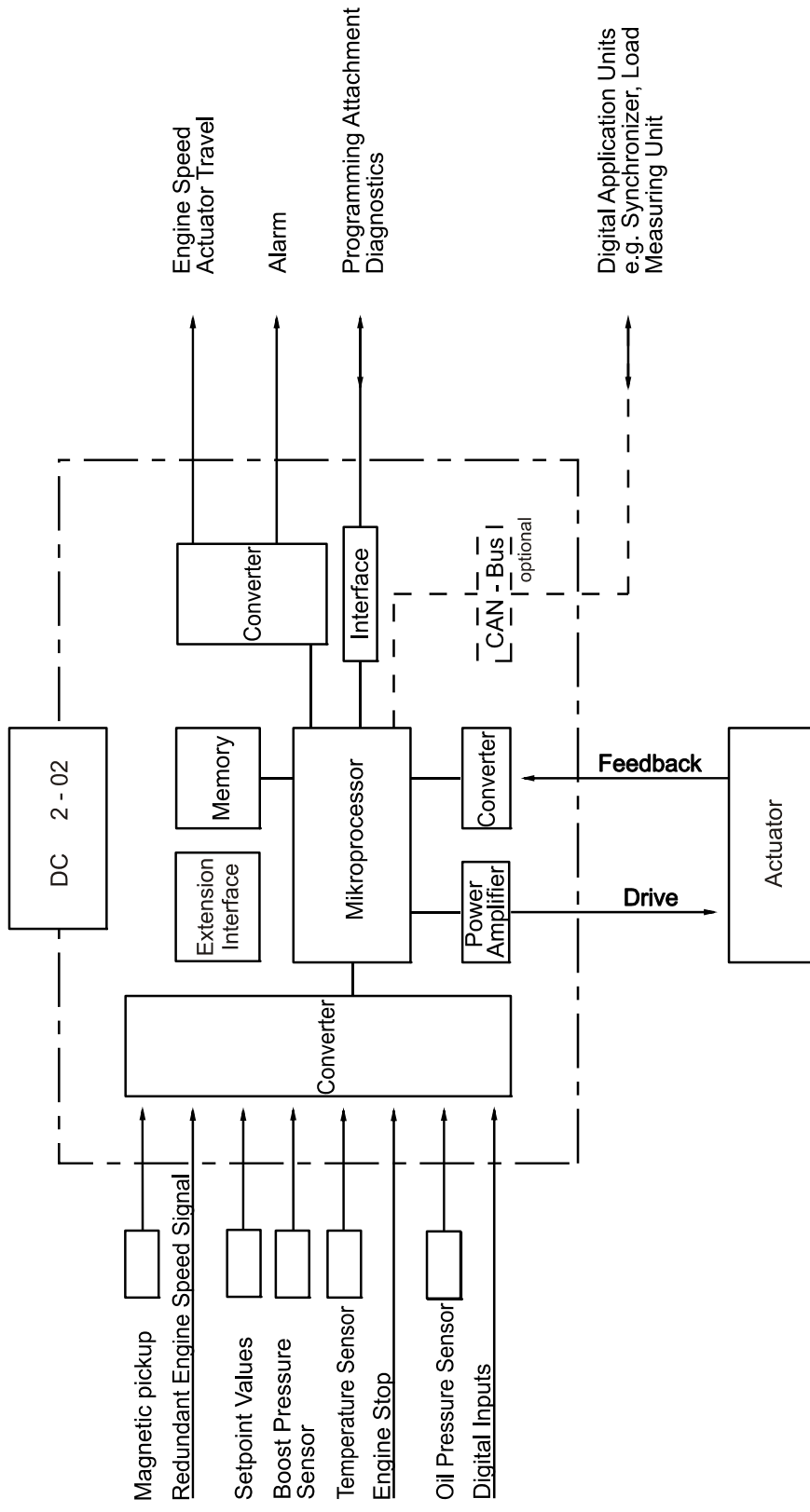


Figure 1: Blockdiagram DC ... 2 - 02

4. Pick-up IA ...

4.1. Specification

	IA 02 - 76 to IA 12 - 102	IA 22 - 76 , IA 23 - 102
Temperatur Range	-55 °C to +120 °C	-55 °C to +120 °C
Output Voltage	0,5 to 10 Volt ~ (AC)	0,5 to 10 Volt ~ (AC)
Resistance	approx. 52 Ohm	approx. 130 Ohm
Distance from Pick-up Wheel	0,5 to 0,8 mm	2,5 to 3 mm
Protection grade	IP 54	IP 54

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 are designed for a maximum frequency of 12000 Hz. Frequency (by Hz) is calculated according to the formula

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

$$z = \text{number of teeth on the pick-up wheel}$$

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.)

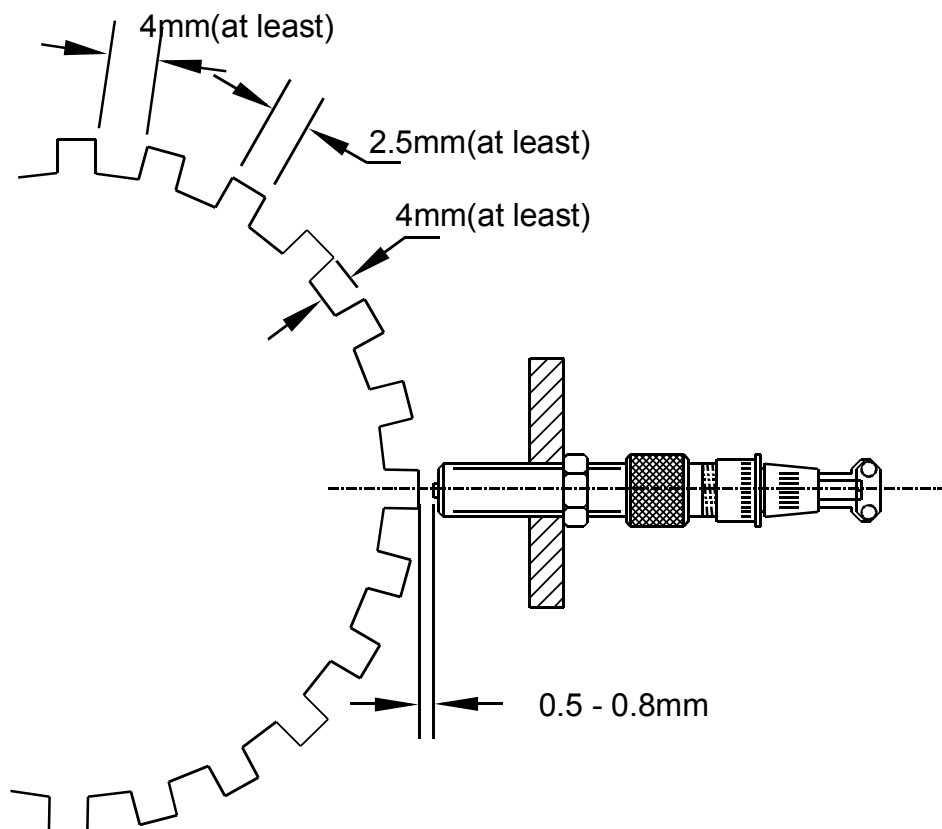


Figure 2: Clearance of pick-up

4.5. Mounting Measurements

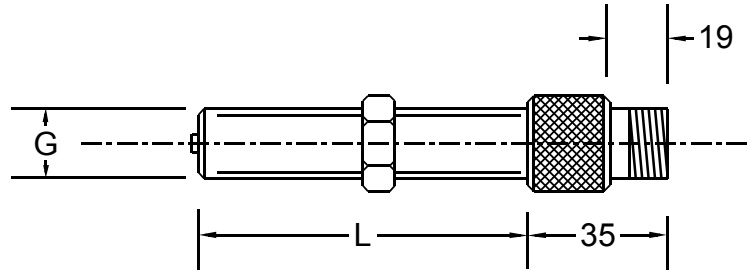


Figure 3: Measurements of pick-up

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

Failure of the pulse pick-up is signalled by an alarm.

5. Speed Setpoint Adjusters and Sensors

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

5.1. Speed Setpoint Potentiometer SW 01 - 1 - o (one turn)

Displacement Angle	approx. 312°
Resistance	5 kOhm
Temperature Range	-55 °C to + 120 °C
Protection	IP 00

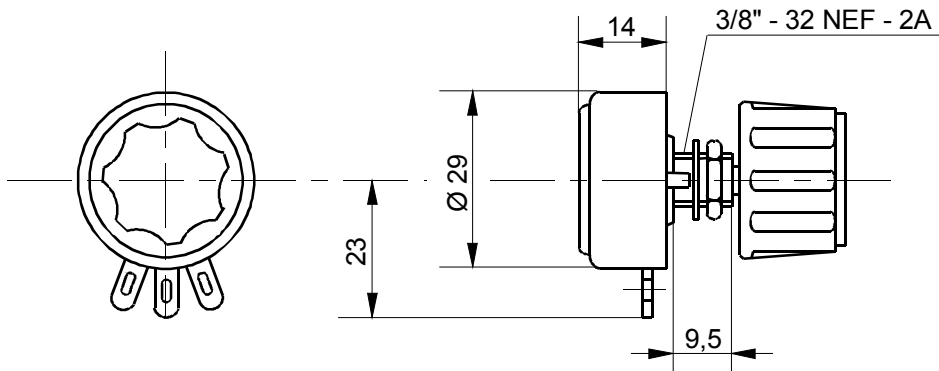


Figure 4: Potentiometer SW 01 - 1

5.2. Speed Setpoint Potentiometer SW 02 - 10 - o (10 turns)

Displacement Angle	10 turns
Resistance	5 kOhm
Temperature Range	-55 °C to + 105 °C
Protection	IP 00

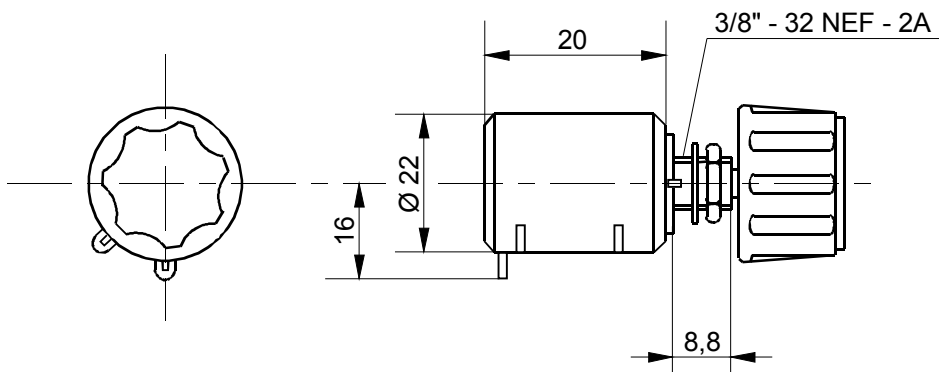


Figure 5: Potentiometer SW 02 - 10

5. Speed Setpoint Adjusters and Sensors

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 be 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 minimum speed according to the 4 mA value.

5.4. Digital Presetting of setpoint values

A 4 bit binary coded digital input for 16 speed levels from n_{\min} to n_{\max} can be directly connected to the control unit.

5.5. 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 brochure E 83 005 - e.

5.6. Pressure Sensors

For pneumatic setpoint adjustment are pressure sensors available as follows:

pressure range	up to 10 bar	DSG 01
	up to 5 bar	DSG 02

As boost pressure sensor for a range up to 2 bar the pressure sensor DSG 03 is available.

5.7. Temperature Sensors

As temperature sensors several types are to be utilized:

- NTC ($R_{25} = 2000 \Omega$)
- Ni1000
- Pt1000
- Pt200

6. Control Unit DC ... 2 - 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.

Example: DC 20402 - 02 - 55 - 12700

6.2. Measurements

Control Unit with plug-in connectors (DC ... 2 - 02 - 55)

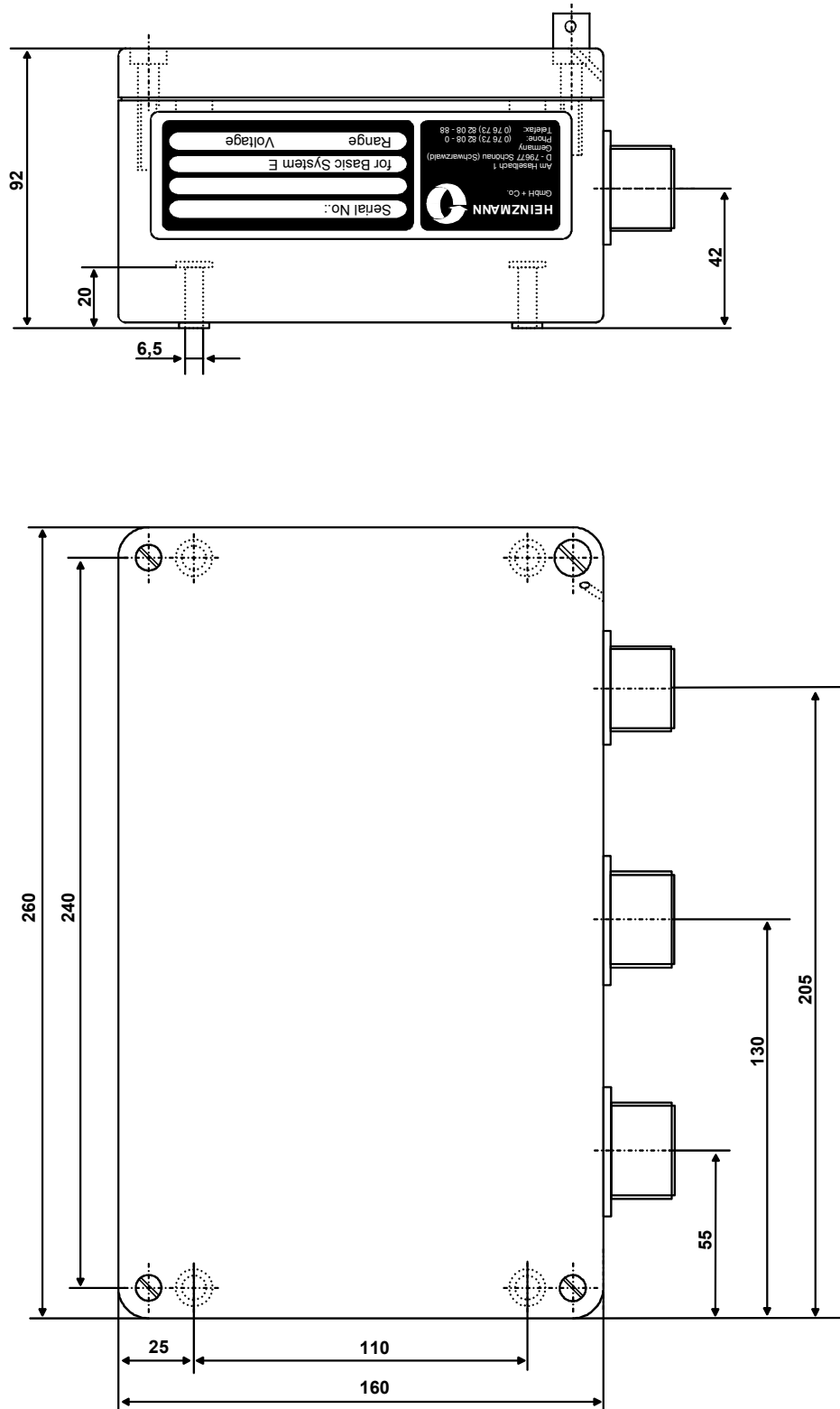


Figure 6: Housing of DC ... 2 - 02 – 55

Control Unit with terminal strip (DC ... 2 - 02 - 00)

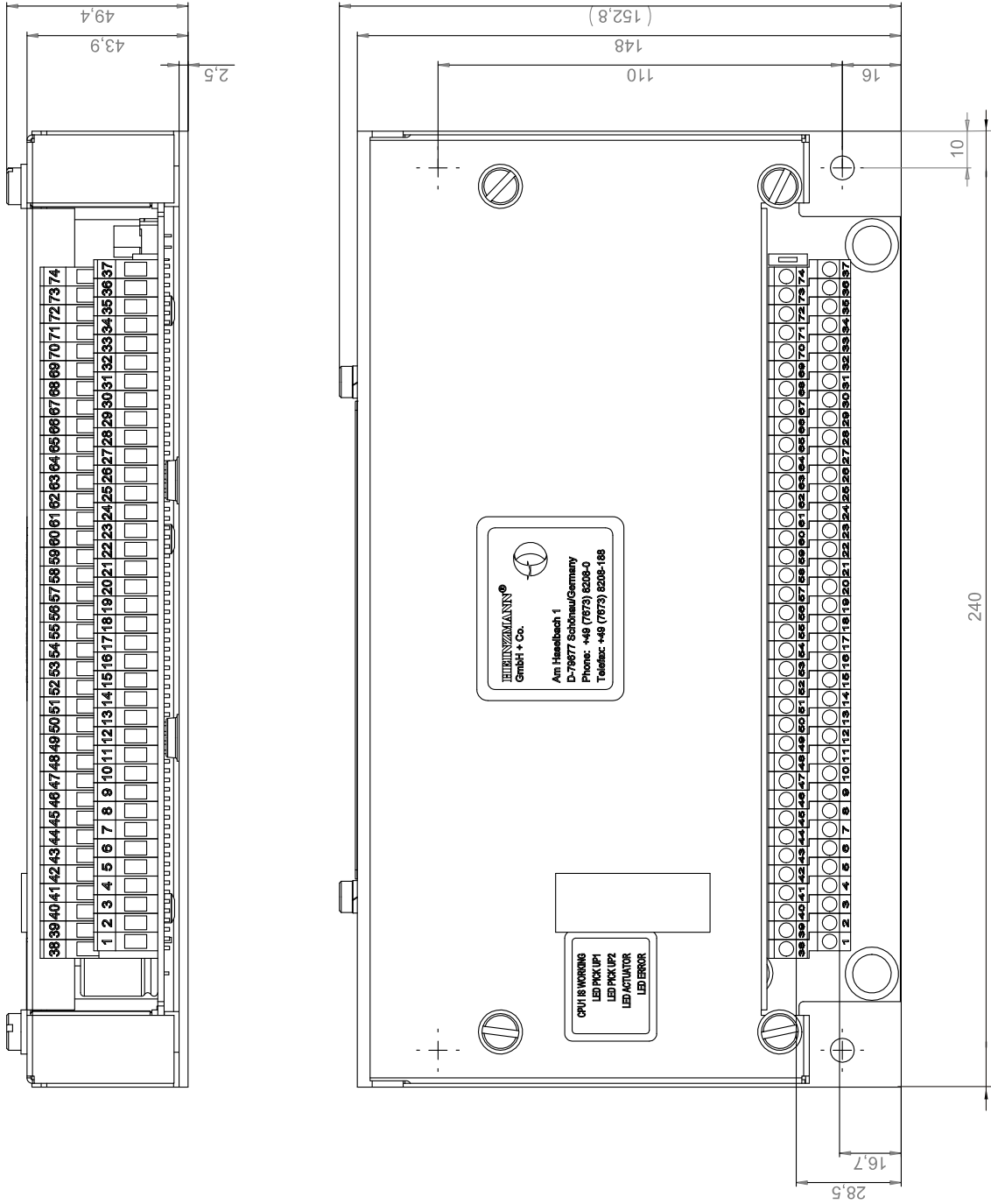


Figure 7: Housing of DC ... 2 - 02 - 00

7. Actuators

7.1. Design and Mode of Operation

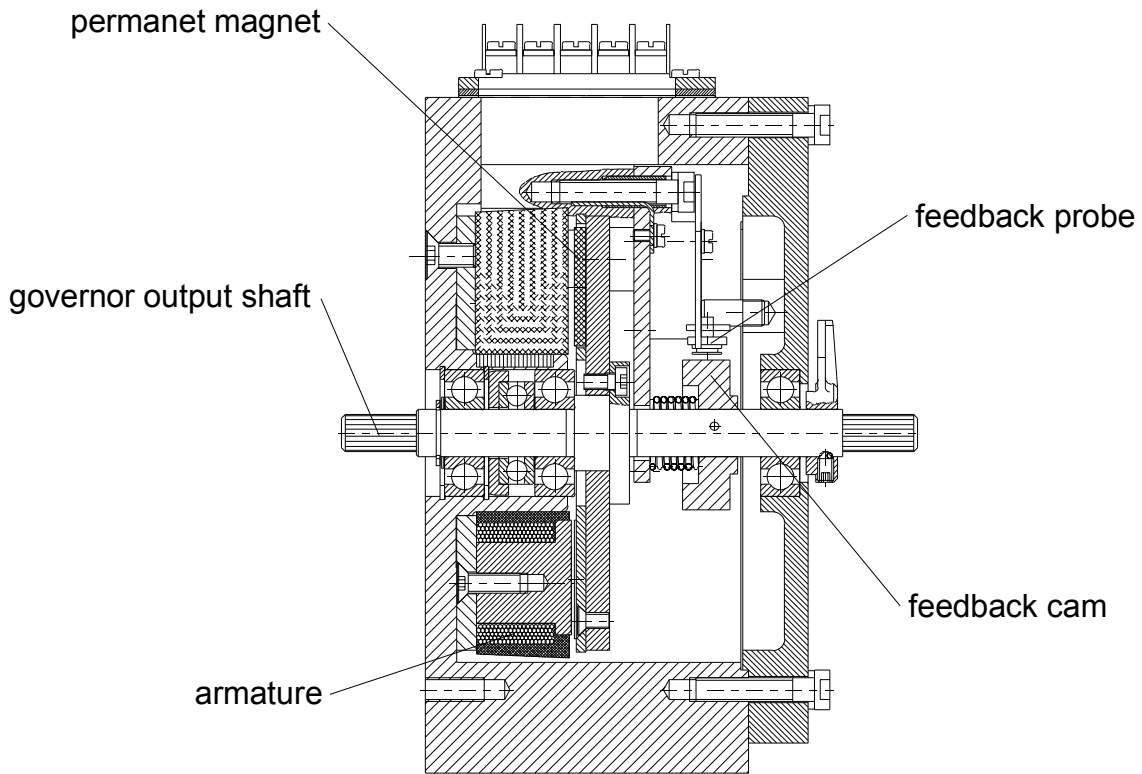


Figure 8: Sectional drawing of actuator

A multi-polar magnetised permanent magnet is mounted on the actuator shaft. Opposite the permanent magnet an armature is fixed. When current is given to the armature, a torque in one direction is obtained. Changing the polarity of the current results in direction changes.

The feedback of the governor is fixed on the shaft and the actuator has a non-contact feedback system that informs the governor of the fuel position. Therefore, when the speed changes, the control unit is able to transmit the current and the required angular position.

7. Actuators

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.

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!

Remark

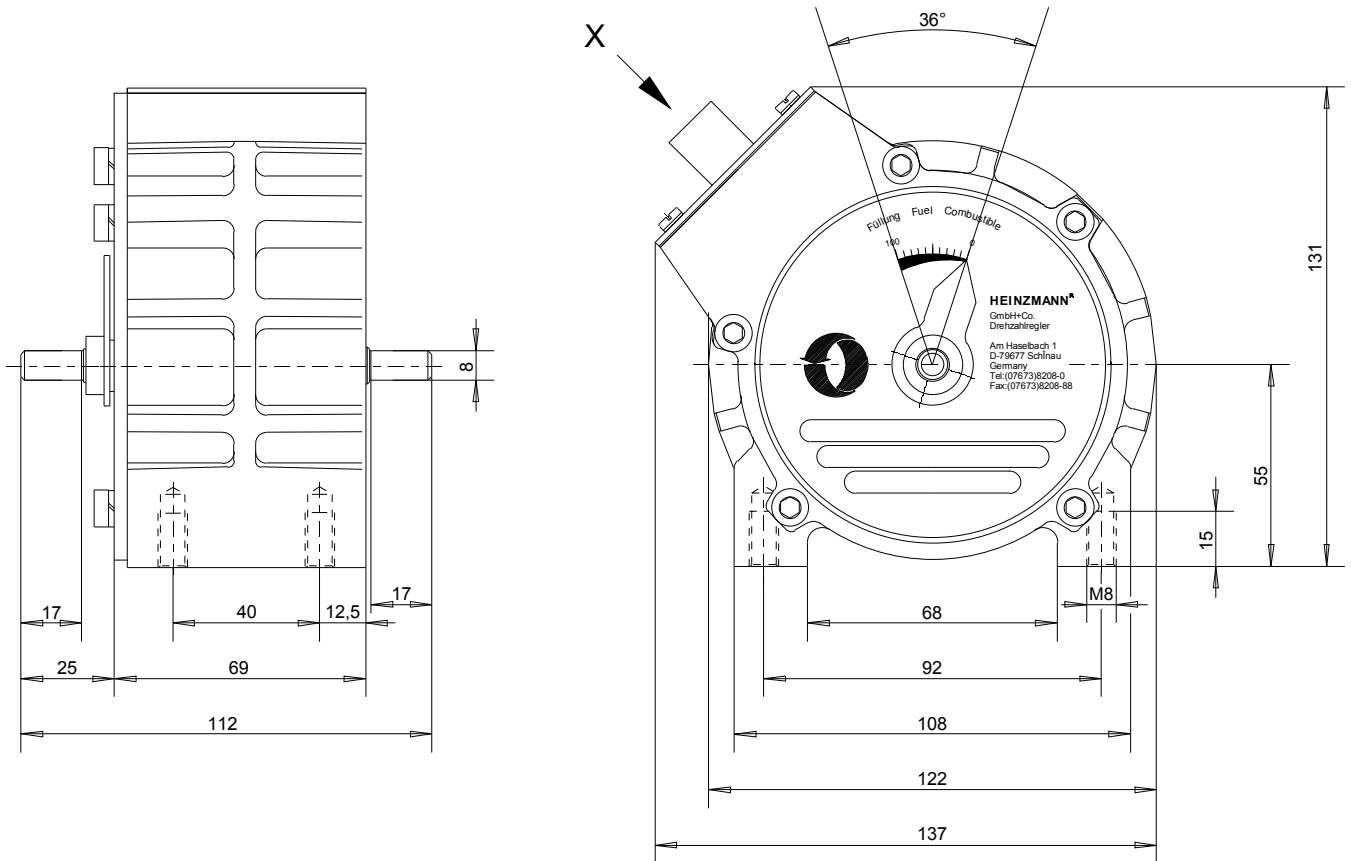
The actuator is available with terminal strip or with plug-in connectors.

7.3. Specification

	StG 2010 -*	StG 2040 -*	StG 2080 -*
Effective rotation at the output shaft	36 °	36 °	36 °
Max. torque at the governor output shaft (direction stop)	approx. 1.4 Nm	approx. 6.5m Nm	approx. 11 Nm
Holding moment in current limitation	approx. 0.7 Nm	approx. 3.2 Nm	approx. 5.5 Nm
Response time 0-100 % without load	approx. 45 ms	approx. 50 ms	approx. 60 ms
Current consumption of the whole governor:			
in steady state condition	approx. 1 A	approx. 1 A	approx. 1 A
on change of load	approx. 3 - 4 A	approx. 3 - 4 A	approx. 3-4 A
max. current	approx. 4.5 A	approx. 4.5 A	approx. 4.5 A
in current limitation	approx. 2.5 A	approx. 2.5 A	approx. 2.5 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
Humidity	up to 100 %	up to 100 %	up to 100 %
Protection grade:			
housing	IP 65	IP 65	IP 65
connections	IP 00	IP 00	IP 00
Weight	approx. 2.2 kg	approx. 4.6 kg	approx. 7.7 kg

7. Actuators

7.4. Measurements



view X with terminal strip
(shown without output shaft and pointer)

view X with plug-in connector
(shown without output shaft and pointer)

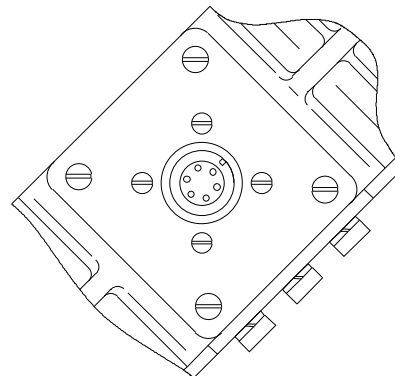
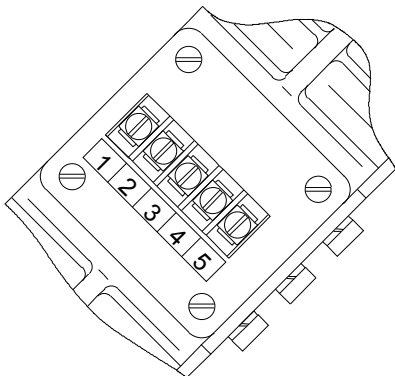
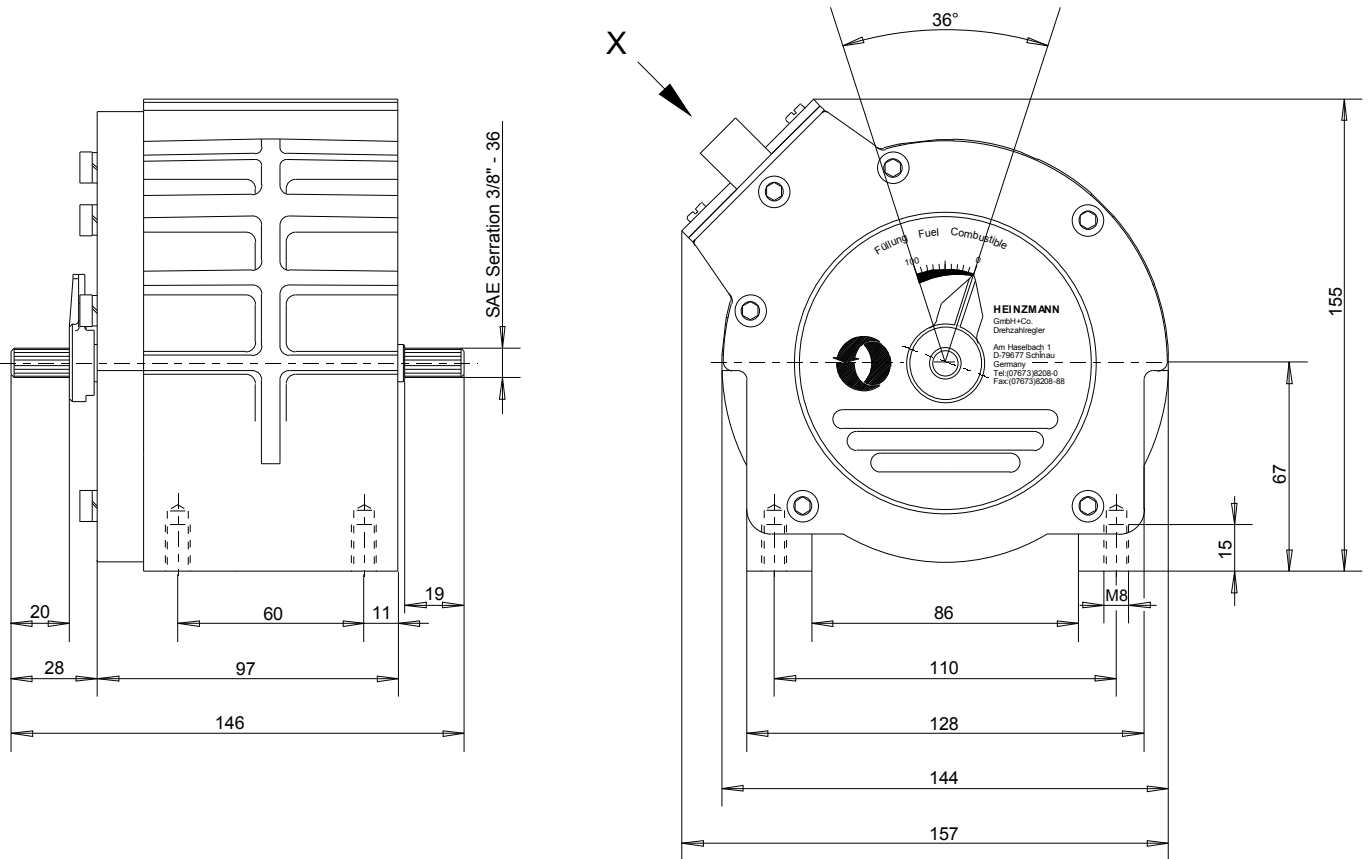
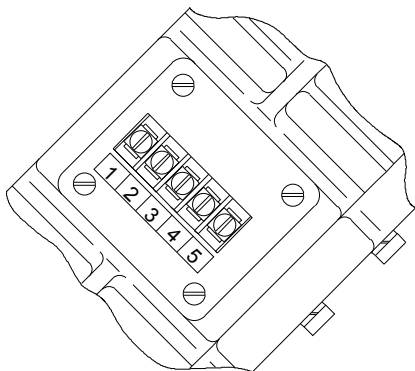


Figure 9: Actuator StG 2010 - 01



view X with terminal strip
(shown without output shaft and pointer)



view X with plug-in connector
(shown without output shaft and pointer)

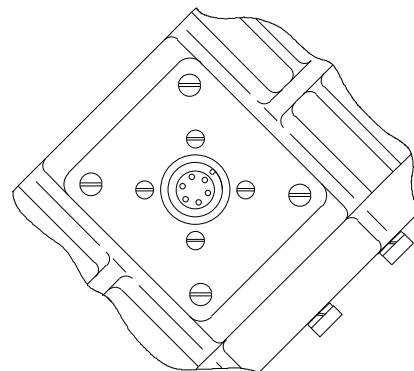
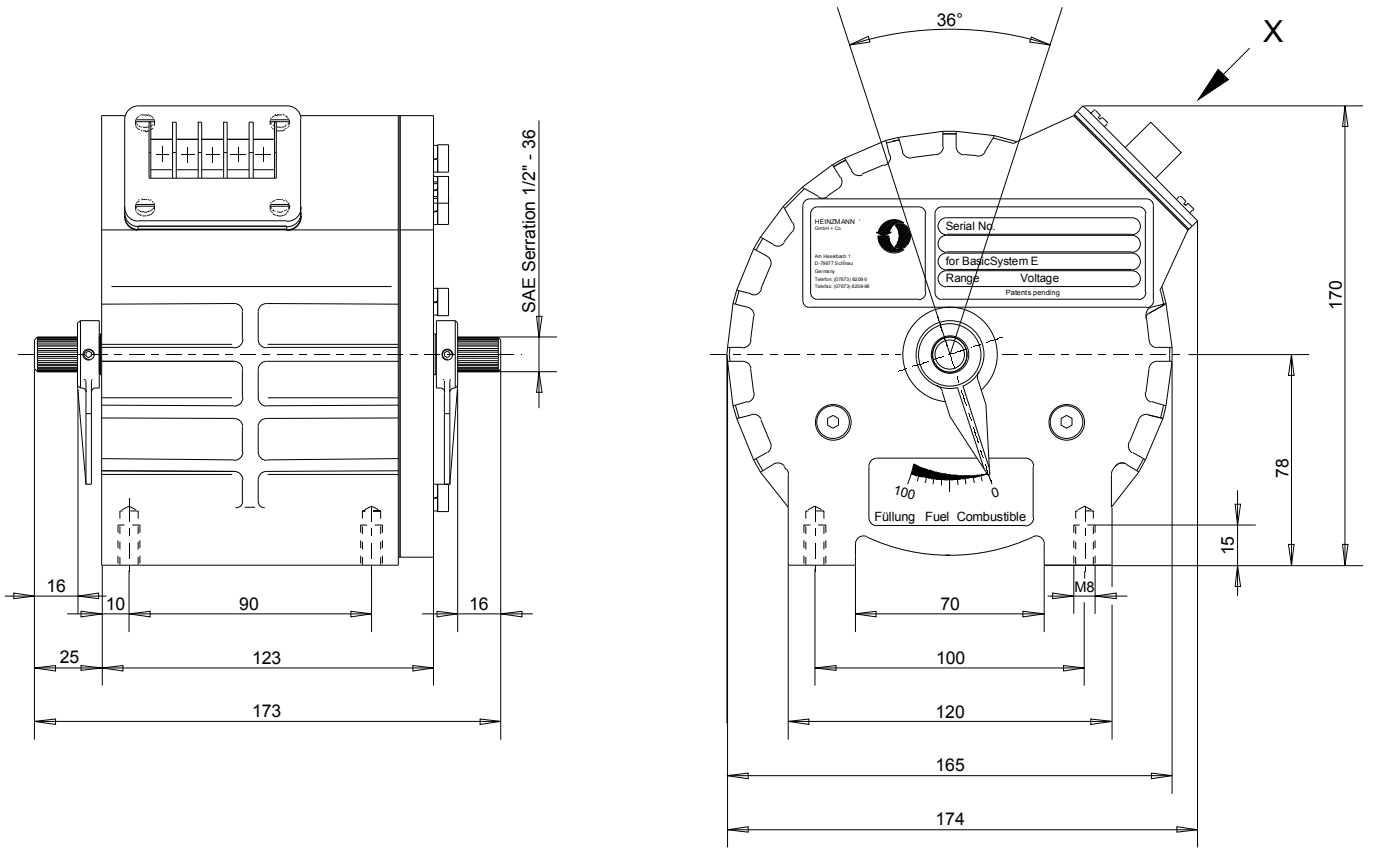
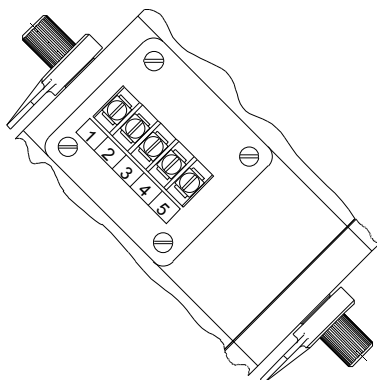


Figure 10: Actuator StG 2040 - 01



view X with terminal strip



view X with plug-in connector

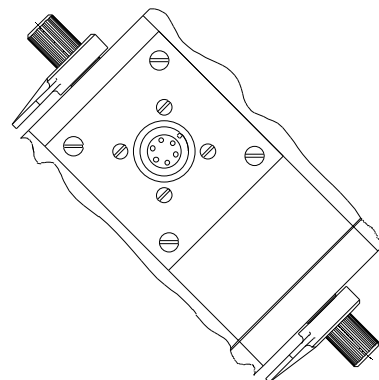


Figure 11: Actuator StG 2080 - 01

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 36° adjustment angle is calculated as $L = 1.8 a$, "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 the actuators torque is less than 10 Nm, the elastic link is not needed. If possible, joint rod heads in accordance with DIN 648 should be used as connecting links. The linkage must operate easily and without play.

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

8. Regulating Linkage

8.3. Linkage Adjustment for Diesel Engines

The length of the connecting linkage is adjusted in such a way that with the governor in stop position the injection pump is set to 0 - 2 fuel marks. (Travel of the injection pump control rack is limited by the governor.)

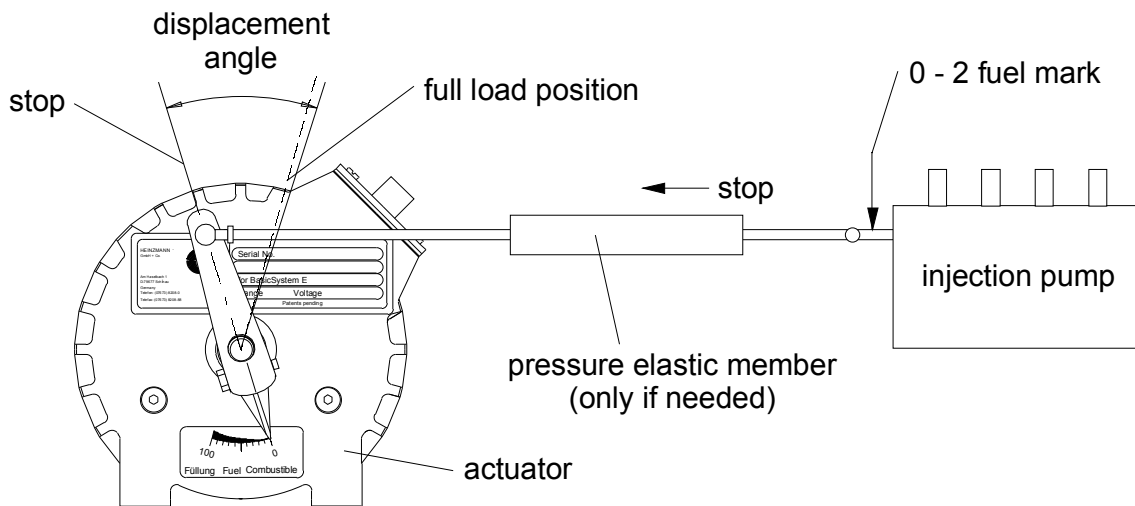


Figure 12: Linkage for diesel engines

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 full load 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.

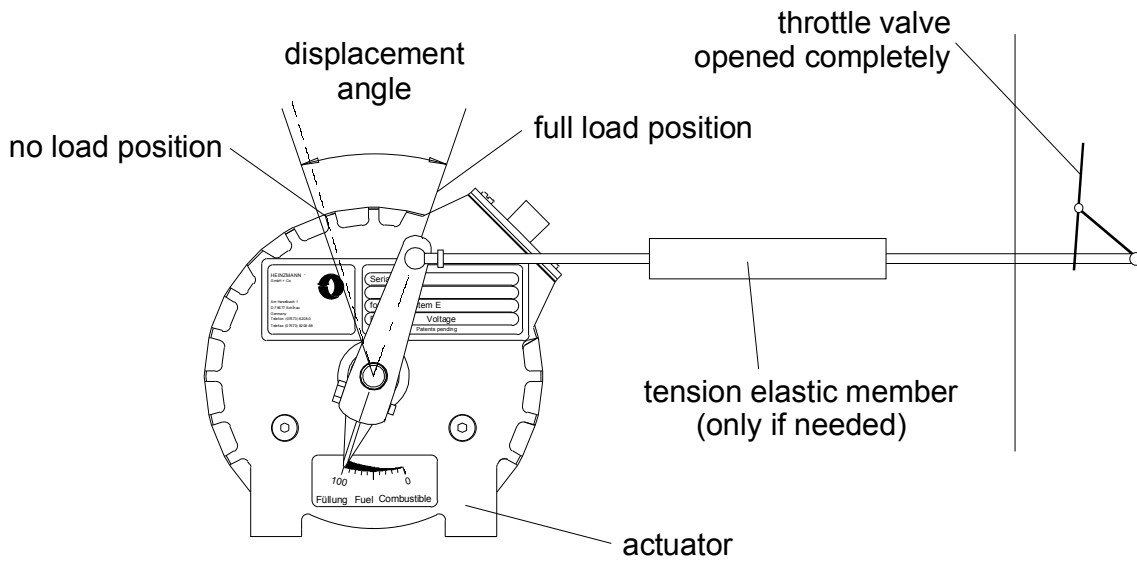


Figure 13: Linkage for gas engines

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 componets.

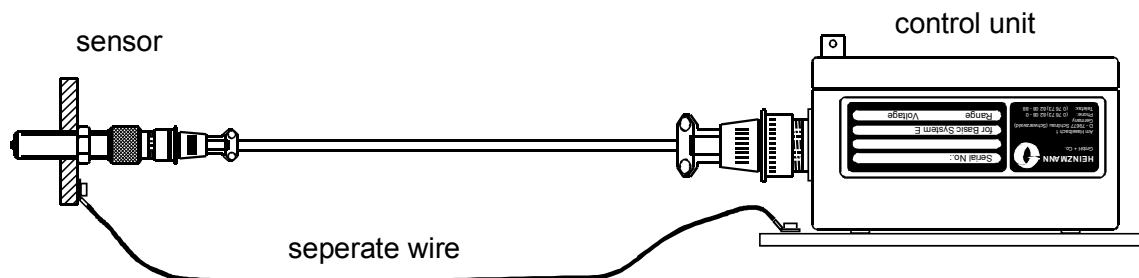


Figure 14: Connection of seperat wire

At cable ends without plugs (e.g. terminal strip or pins) the shielding must be connected at the housing near the contacts.

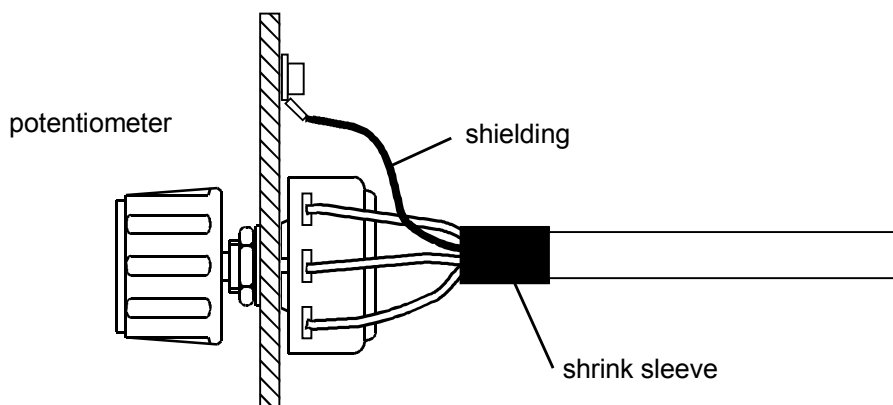


Figure 15: Shield connection without plug

9. Electric Connection

In case of a plug connection the shielding is jamed in the strain relief of the plug.

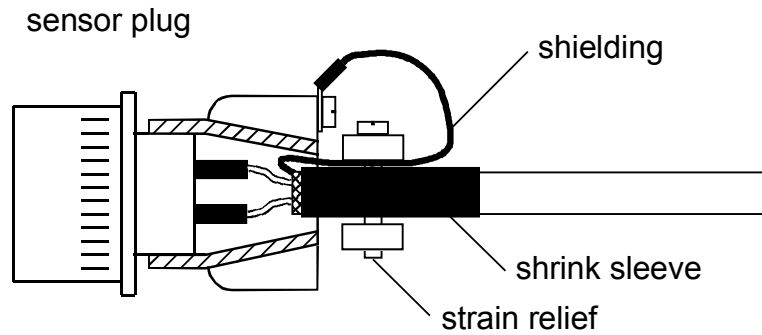


Figure 16: Shield connection in the plug

9.2. Connection for Generator Set with digital Accessories Example for parallel- and mains operation with digital accessories)

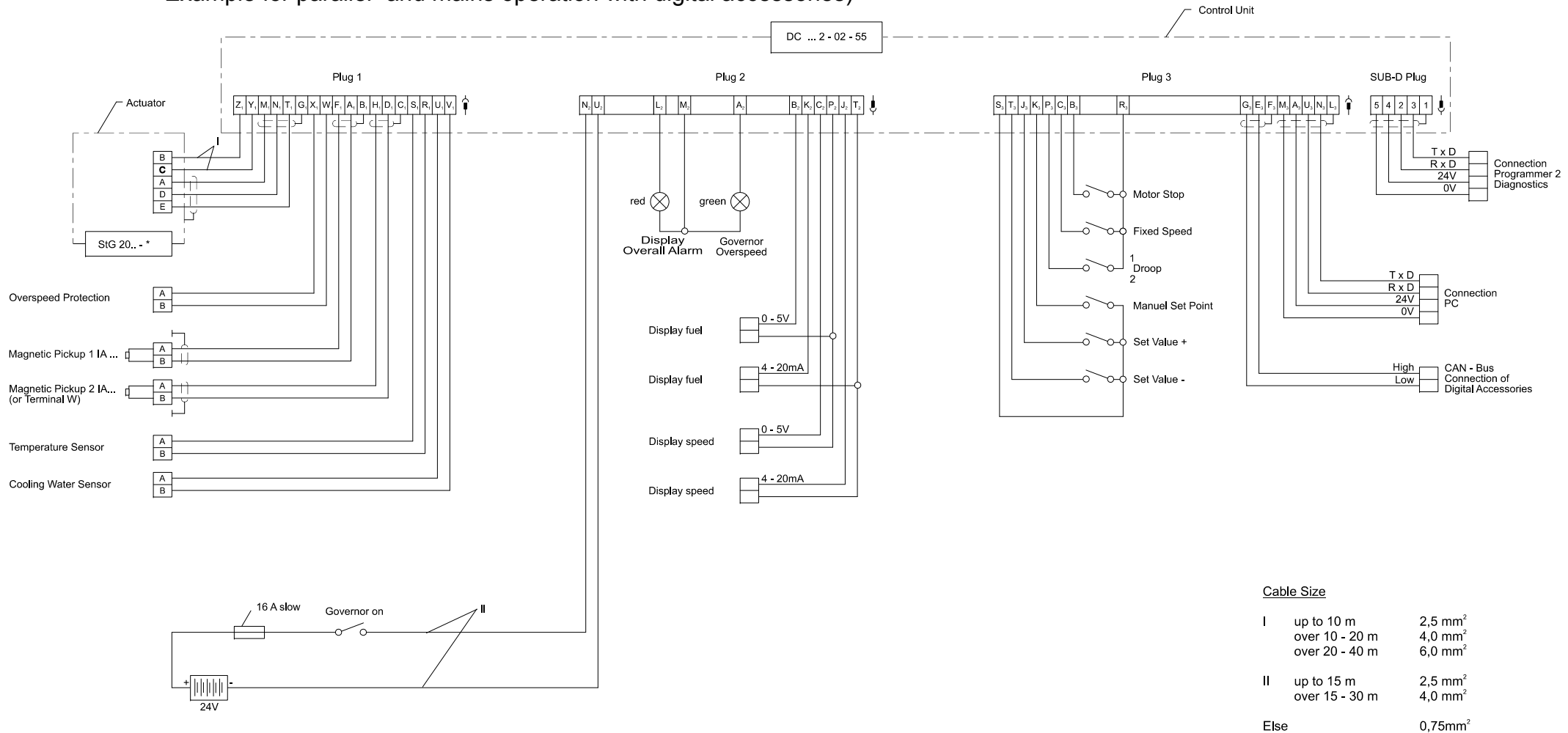
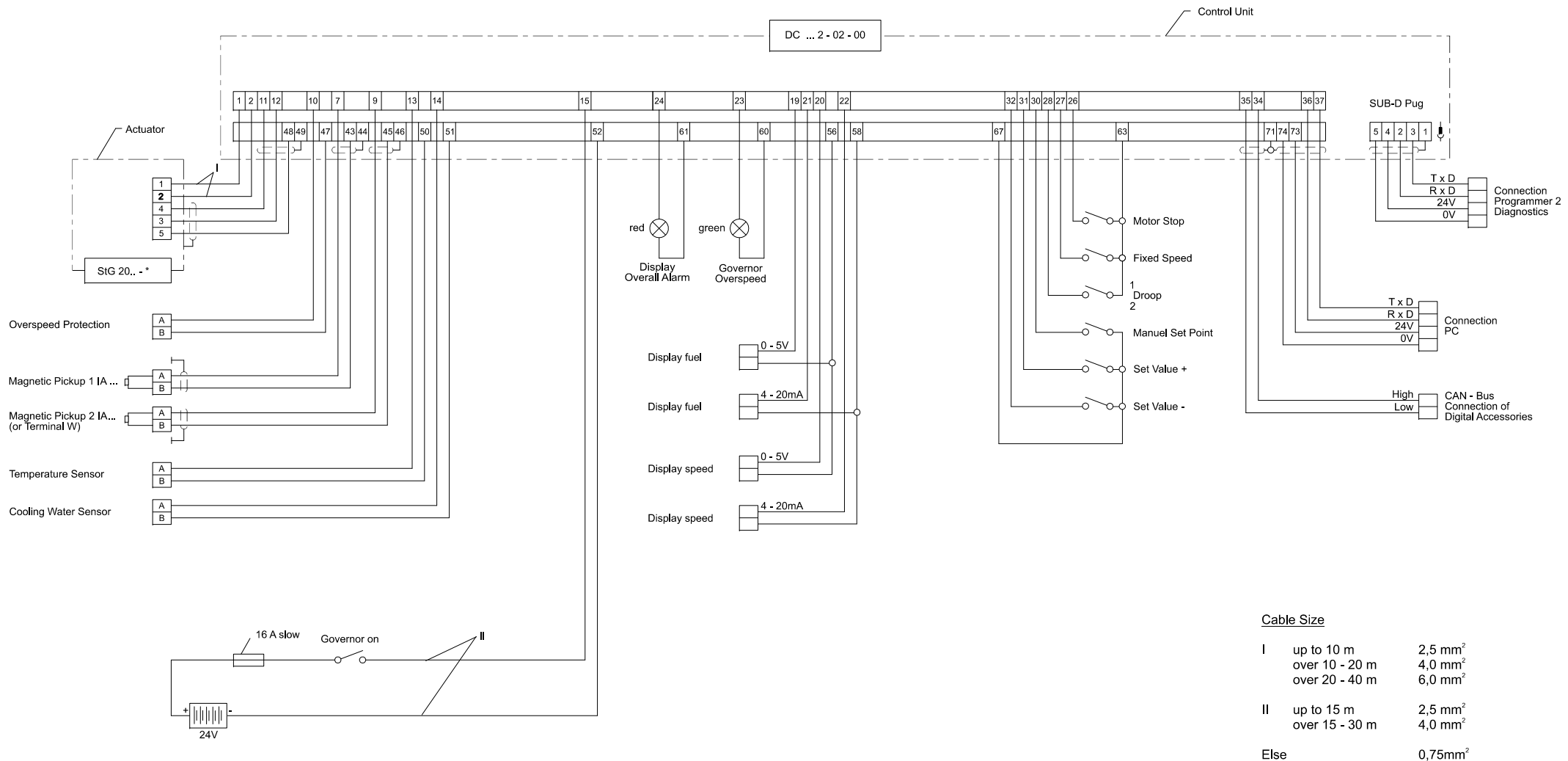


Figure 17: Connections with plugs (IP 55) for genset with digital accessories

9. Electric Connection

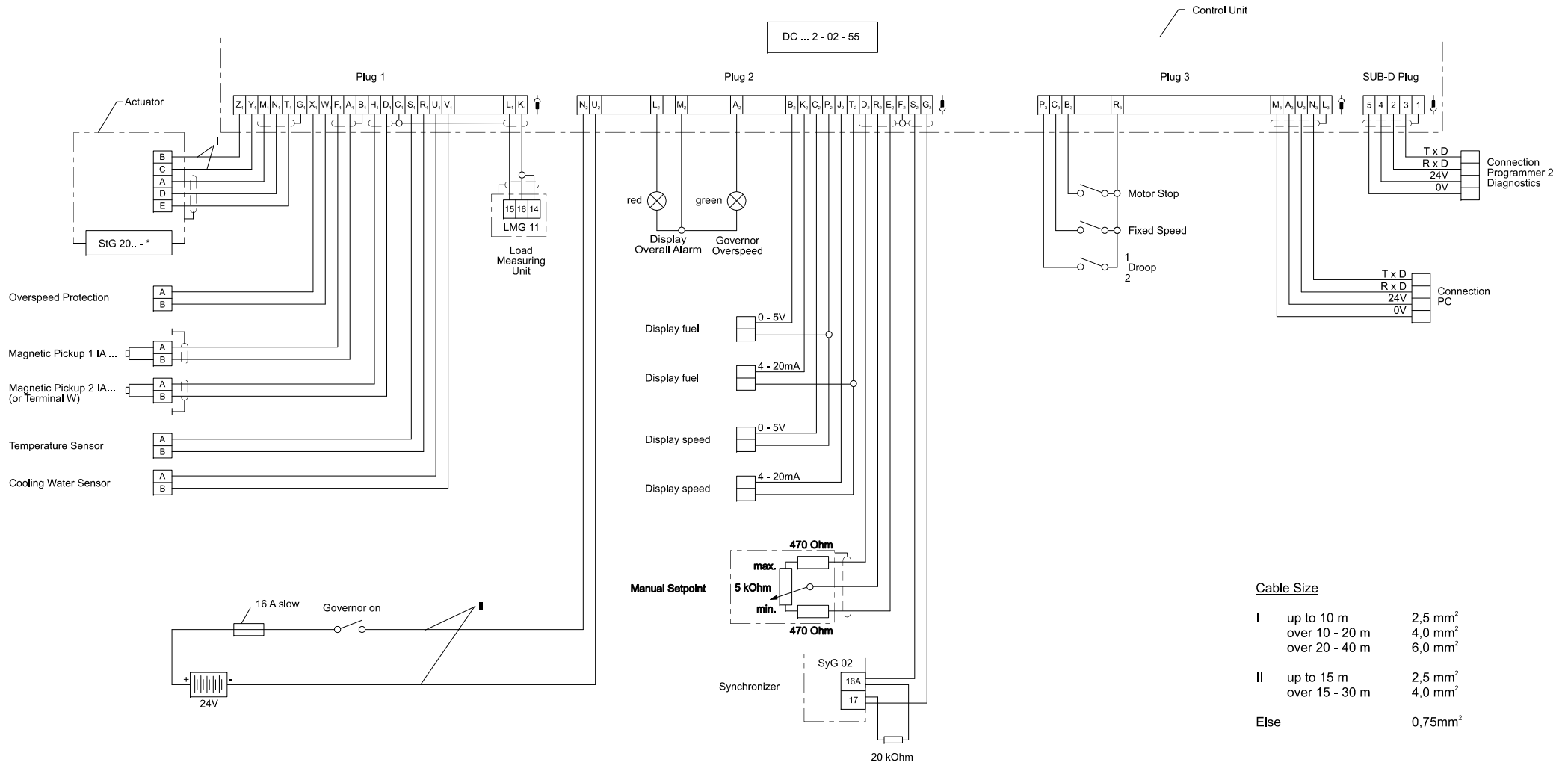


Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 18: Connections with terminal strip (IP 00) for genset with digital accessories

9.3. Connection for Generator Set with analogue accessories Example Parallel- and mains operation with analogue accessories)

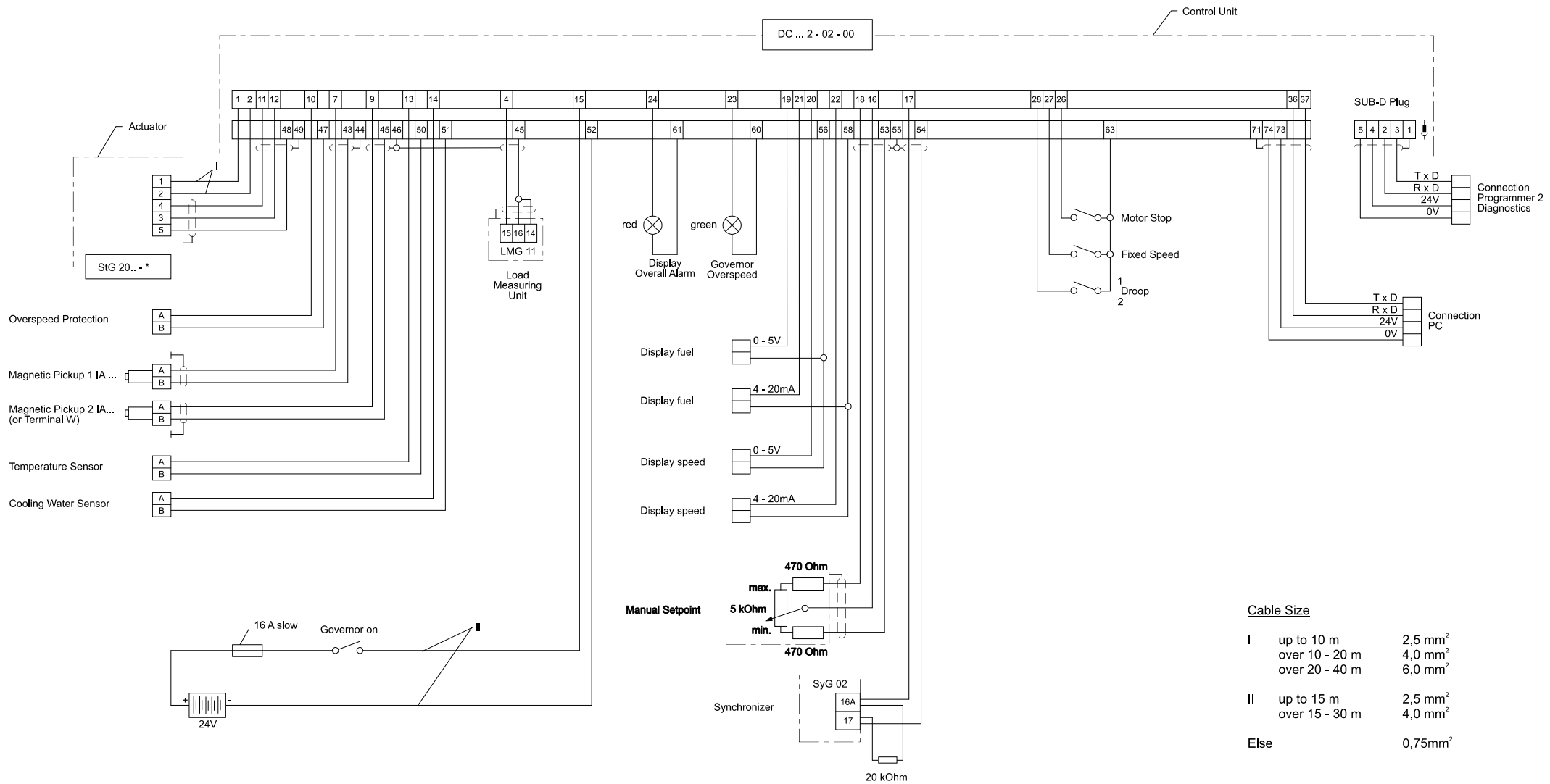


Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 19: Connections with plugs (IP 55) for genset with analogue accessories

9. Electric Connection



Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 20: Connections with terminal strip (IP 00) for genset with analogue accessories

9.4. Connection for Vehicle Operation

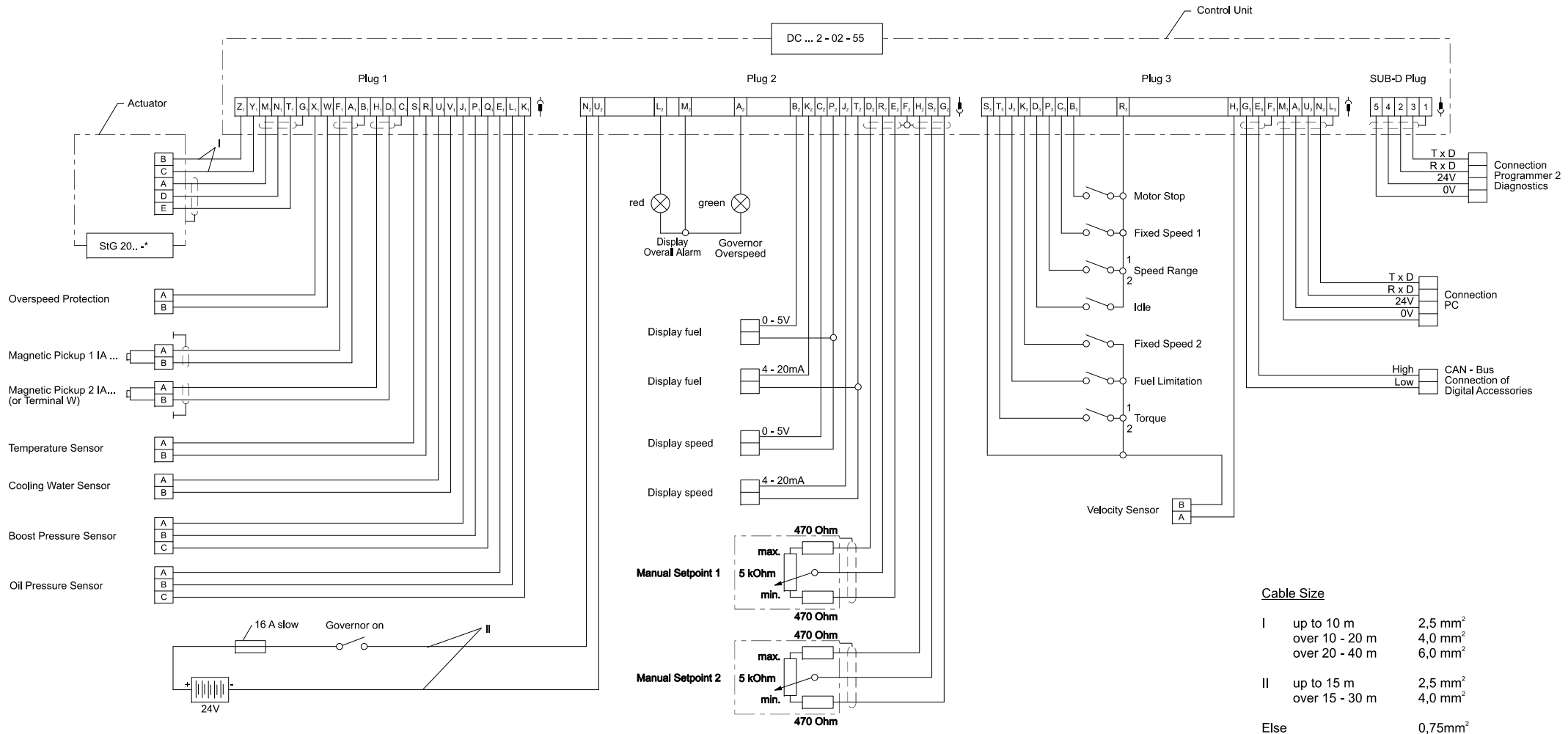
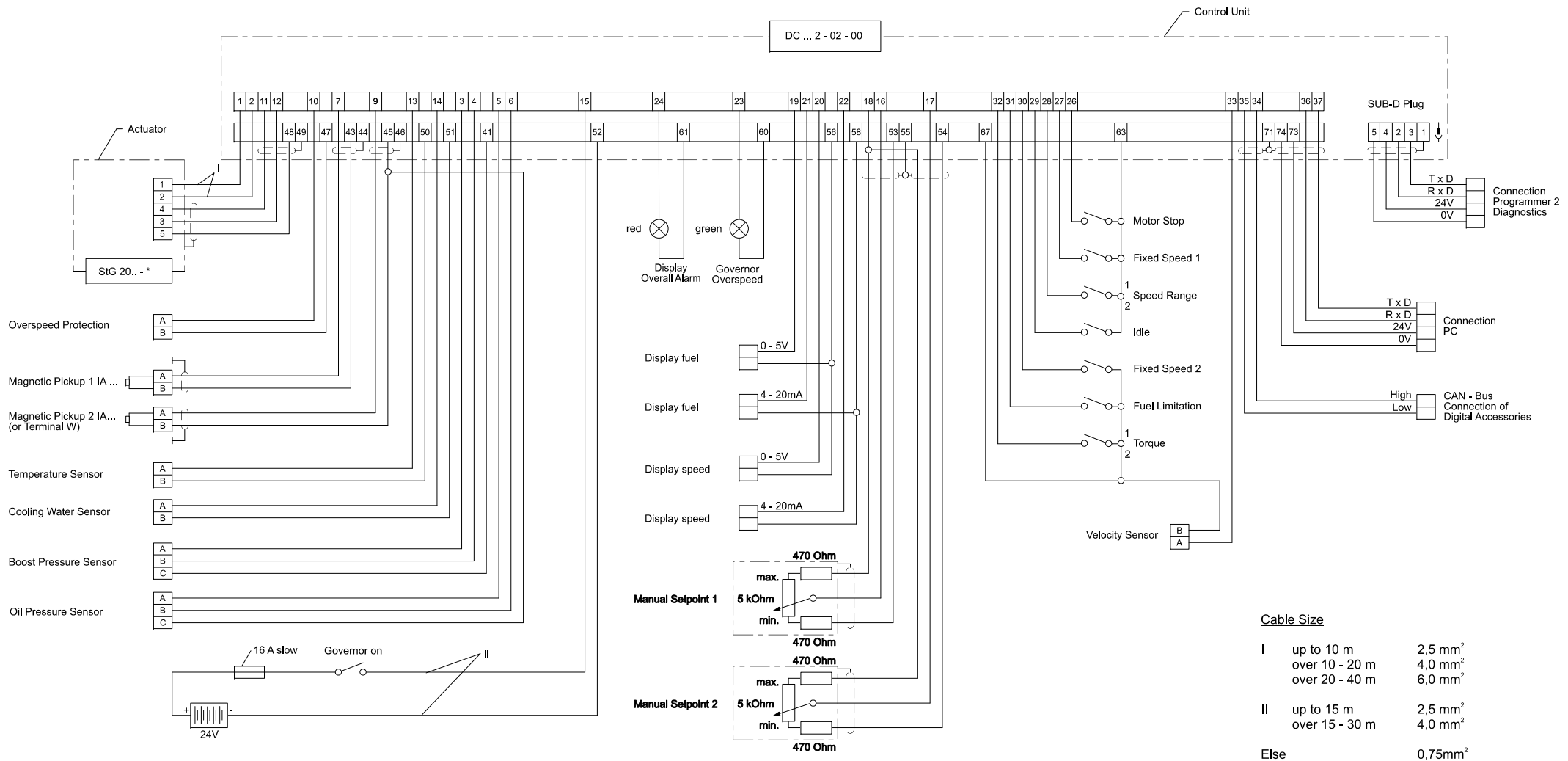


Figure 21: Connections with plugs (IP 55) for vehicle operation

9. Electric Connection



Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 22: Connections with terminal strip (IP 00) for vehicle operation

9.5. Connection for Locomotive Operation, 16 Speed Levels

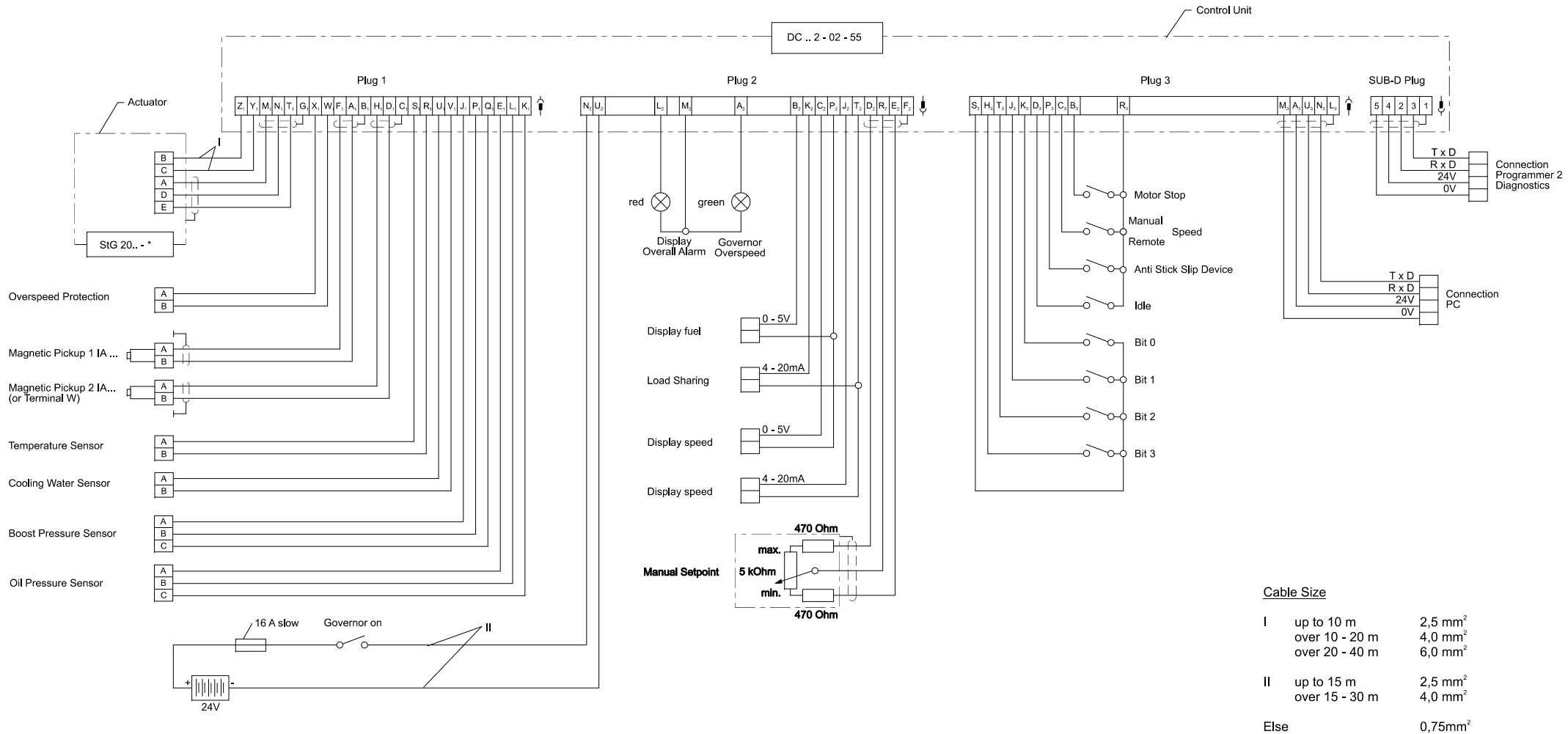


Figure 23: Connections with plugs (IP 55) for locomotive with speed steps

9. Electric Connection

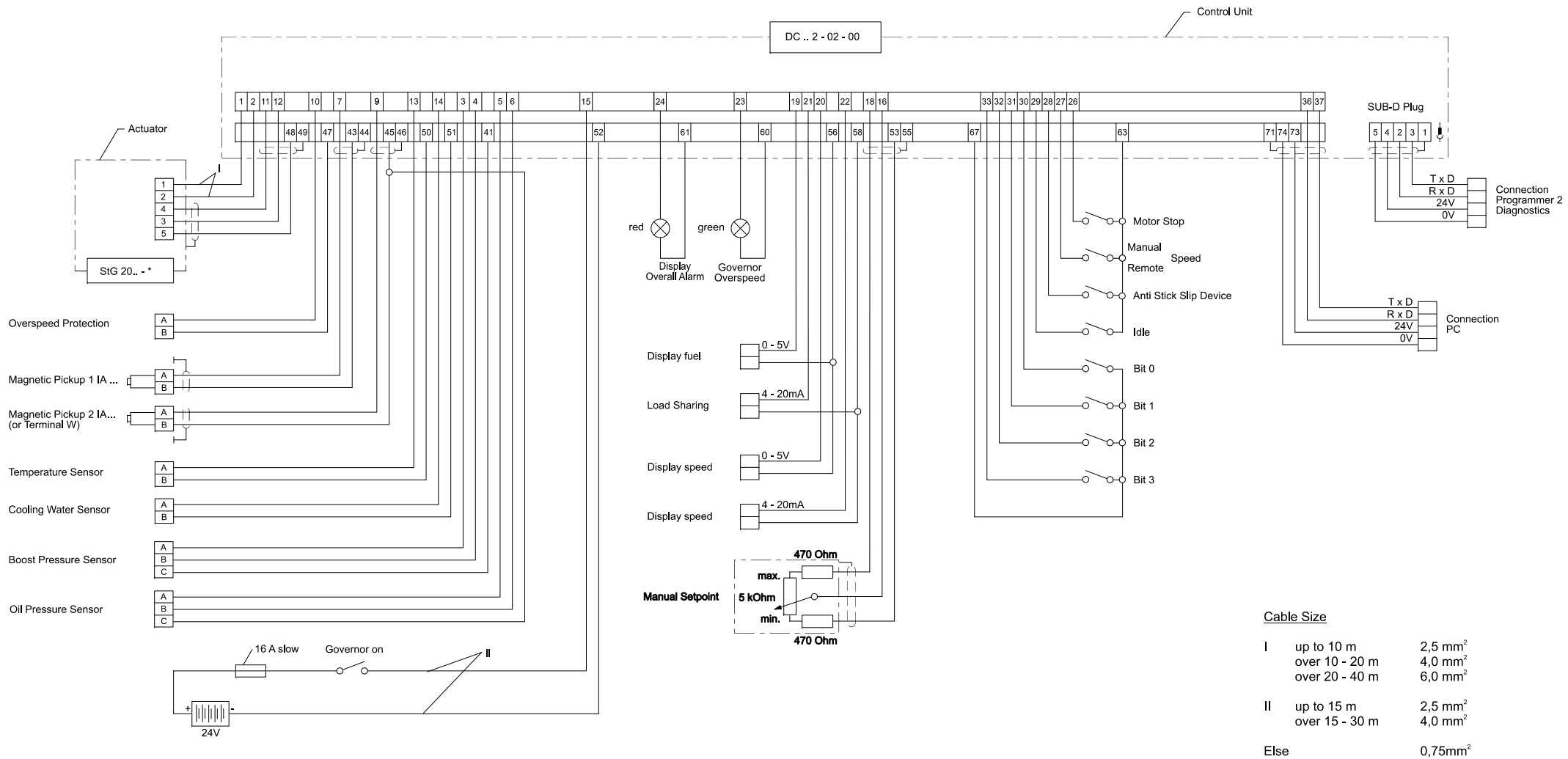


Figure 24: Connections with terminal strip (IP 00) for locomotive with speed steps

9.6. Connection for Locomotive Operation with Current Signal

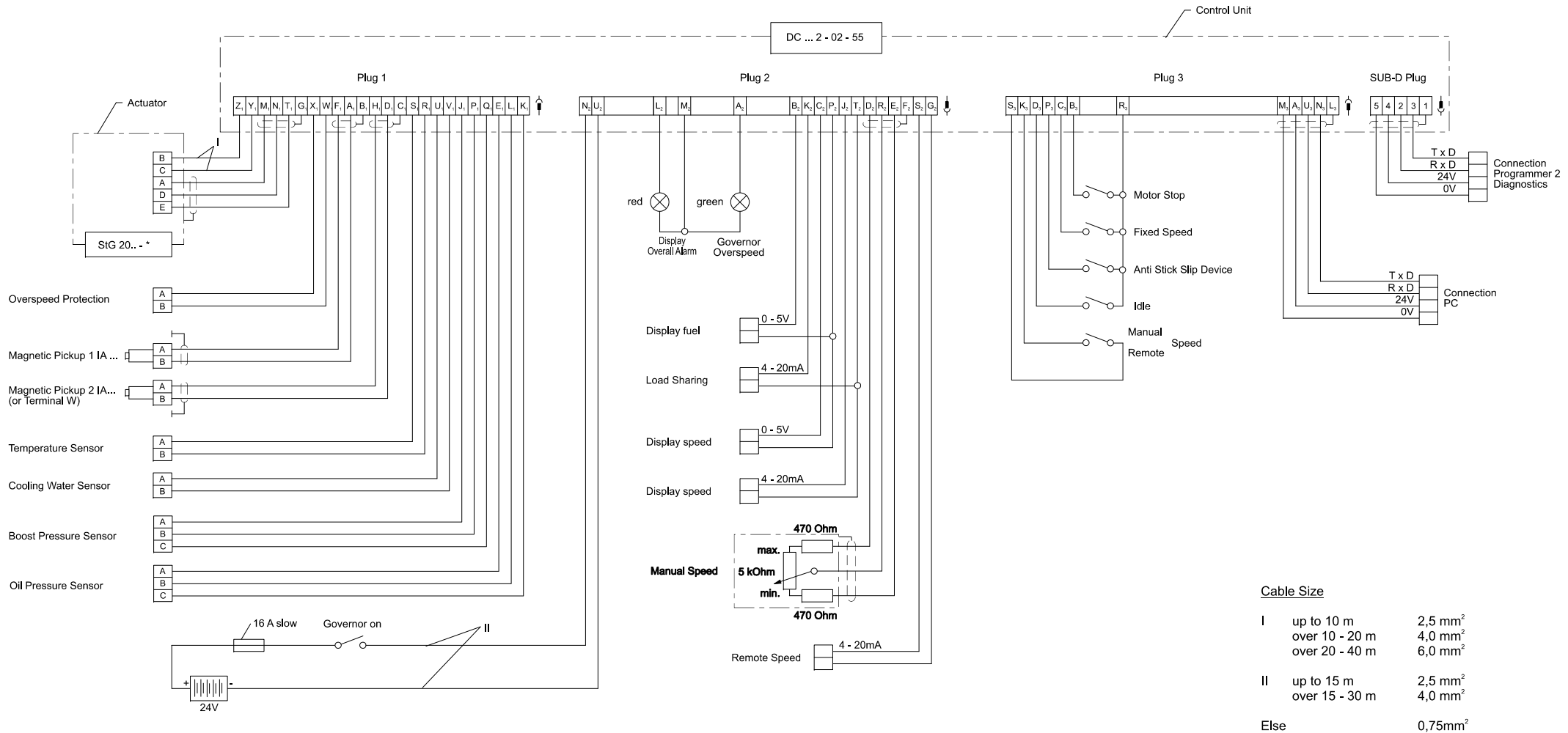
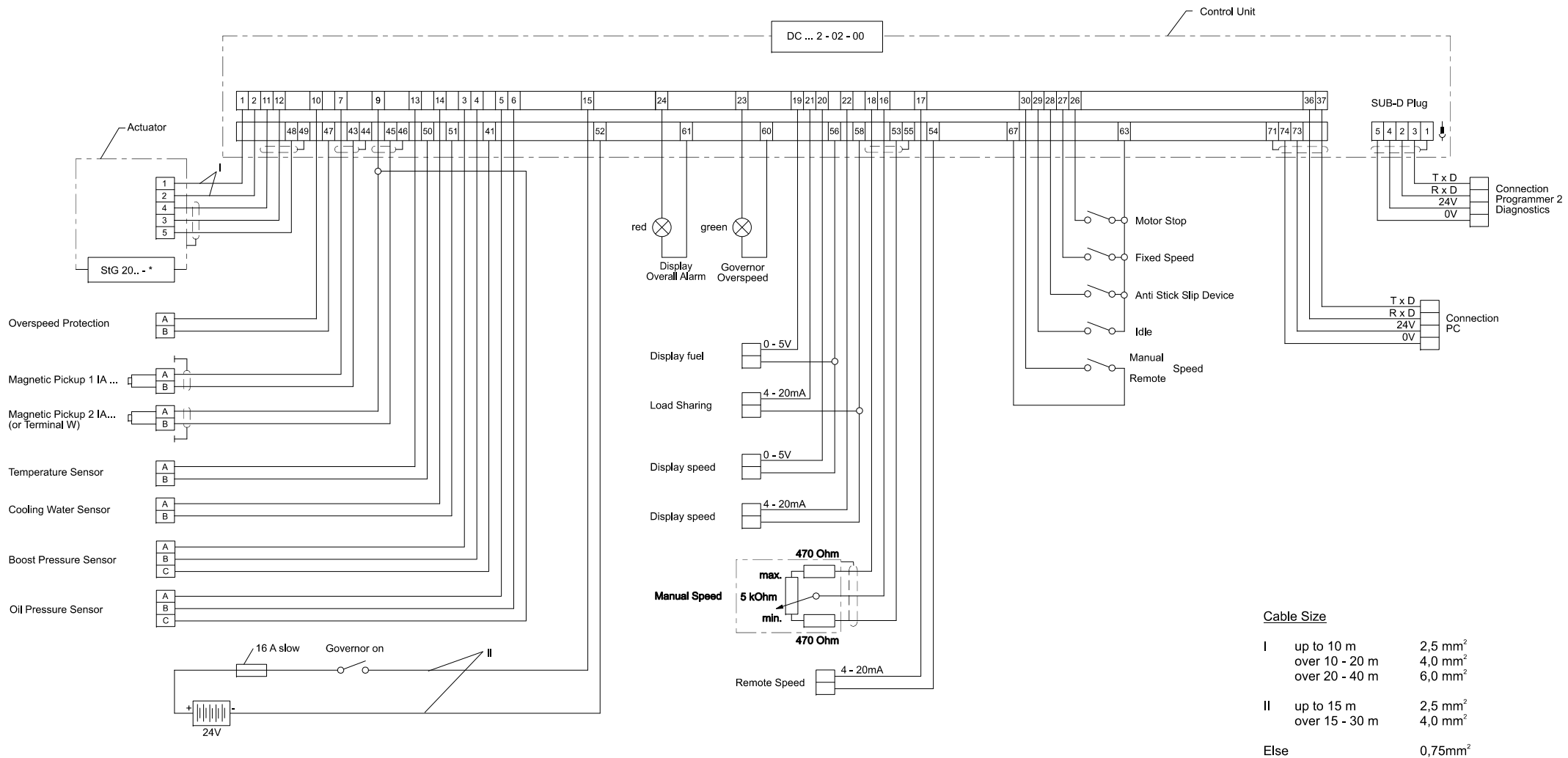


Figure 25: Connections with plugs (IP 55) for locomotive with current input

9. Electric Connection

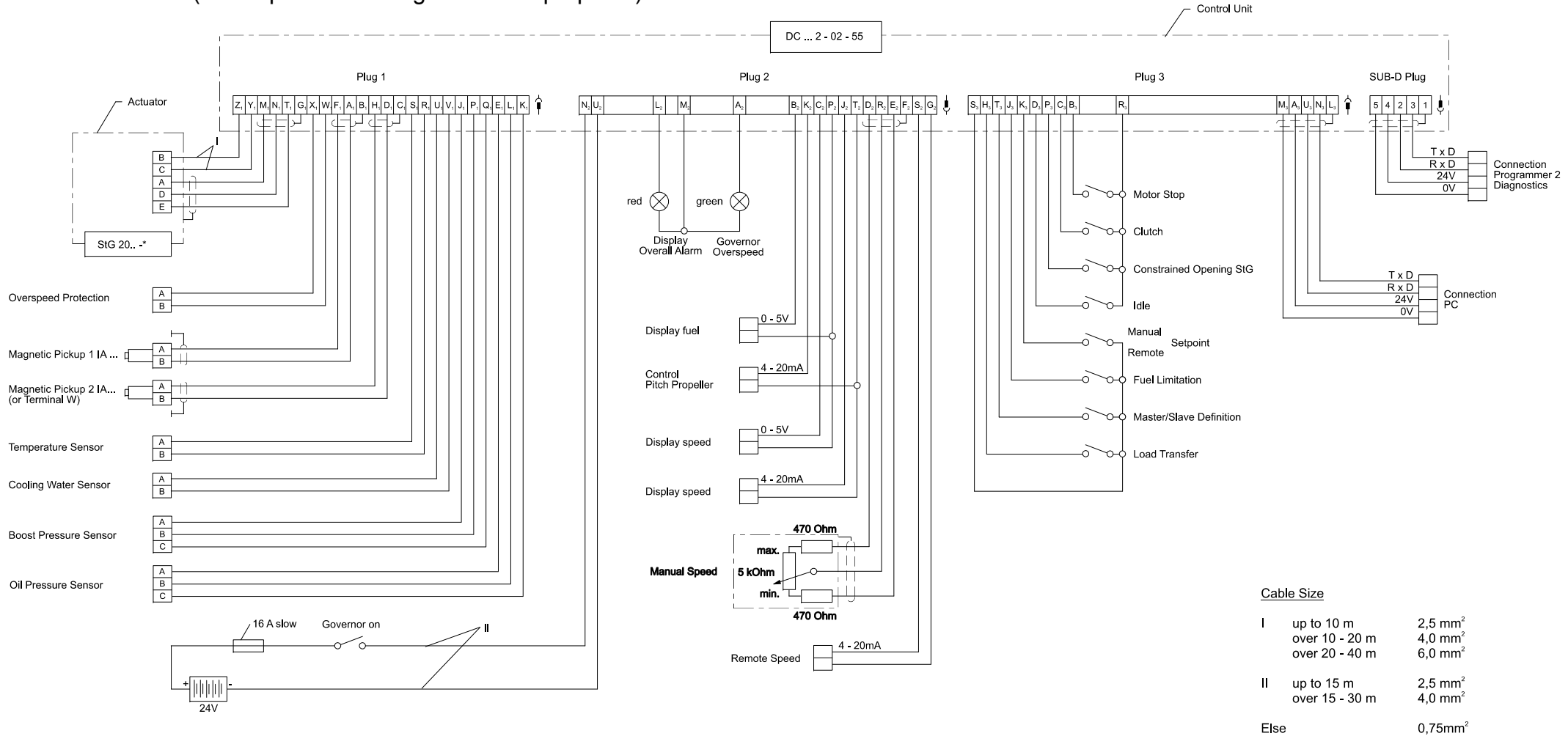


Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 26: Connections with terminal strip (IP 00) for locomotive with current input

9.7. Connection for Marine Operation, Twin operation (Twin operation: 2 engines with 1 propeller)

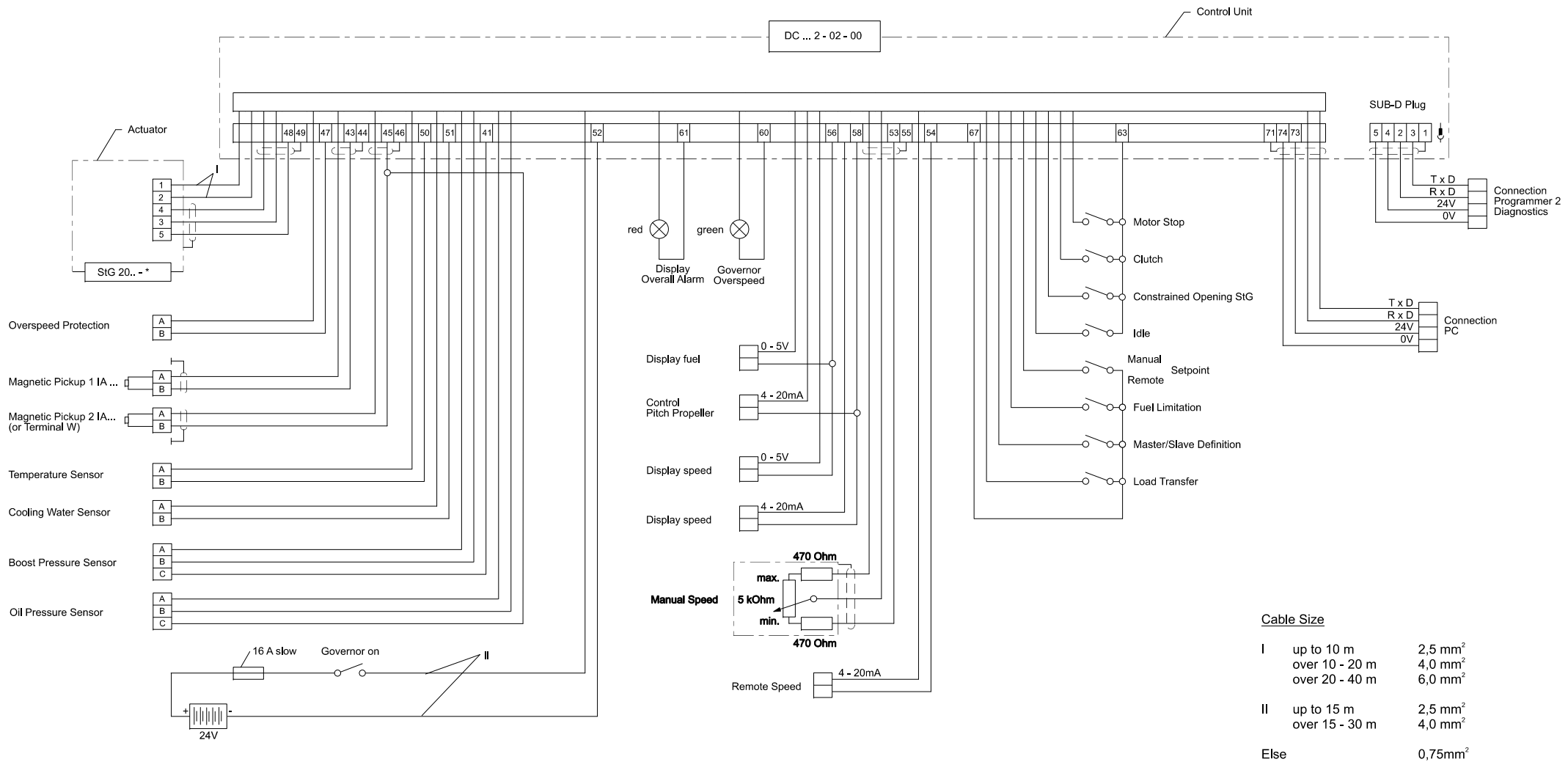


Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 27: Connections with plugs (IP 55) for marine twin operation

9. Electric Connection

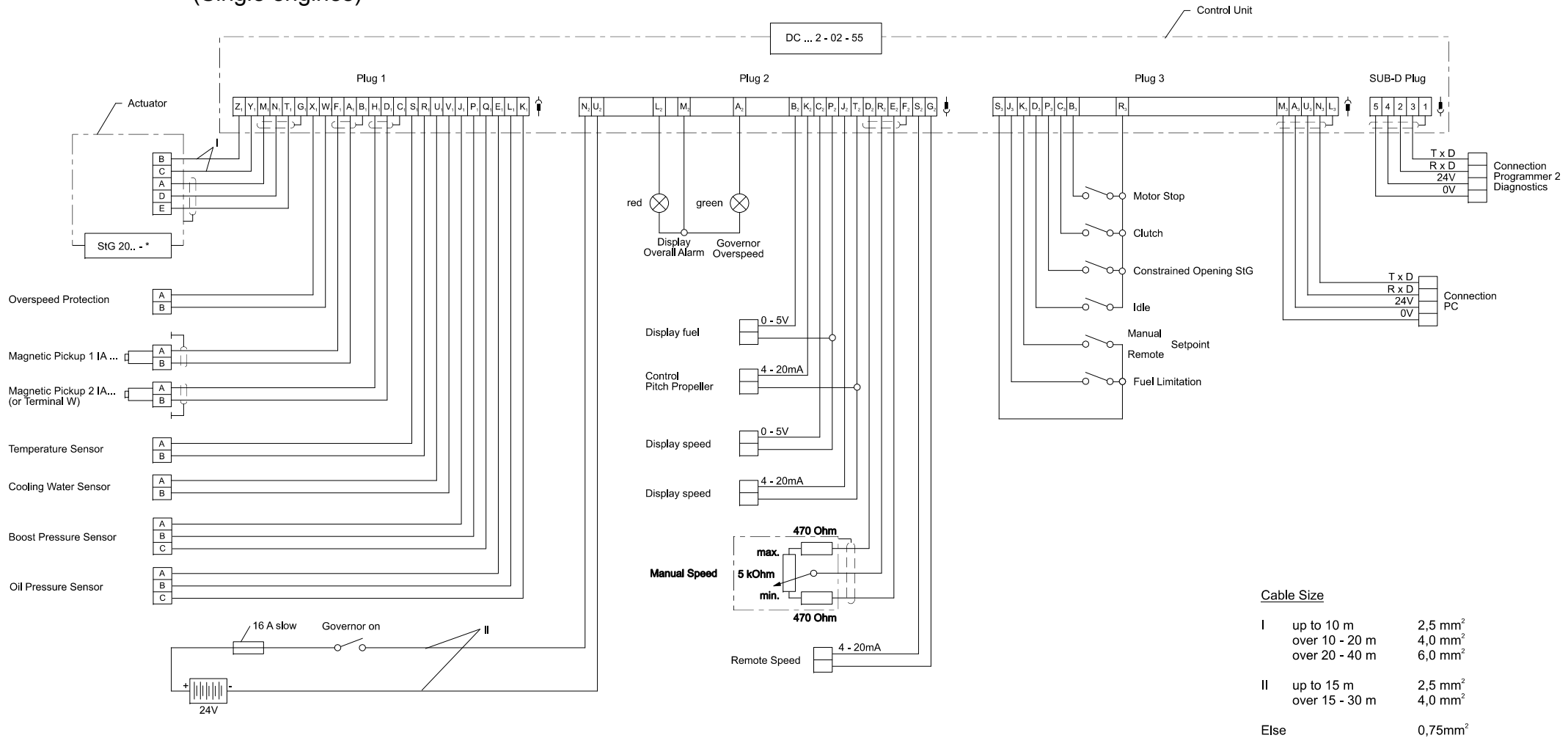


Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 28: Connections with terminal strip (IP 00) for marine twin operation

9.8. Connection for Marine Operation, Single engine (Single engines)



Cable Size

I	up to 10 m	2,5 mm ²
	over 10 - 20 m	4,0 mm ²
	over 20 - 40 m	6,0 mm ²
II	up to 15 m	2,5 mm ²
	over 15 - 30 m	4,0 mm ²
Else		0,75mm ²

Figure 29: Connections with plugs (IP 55) for marine single operation

9. Electric Connection

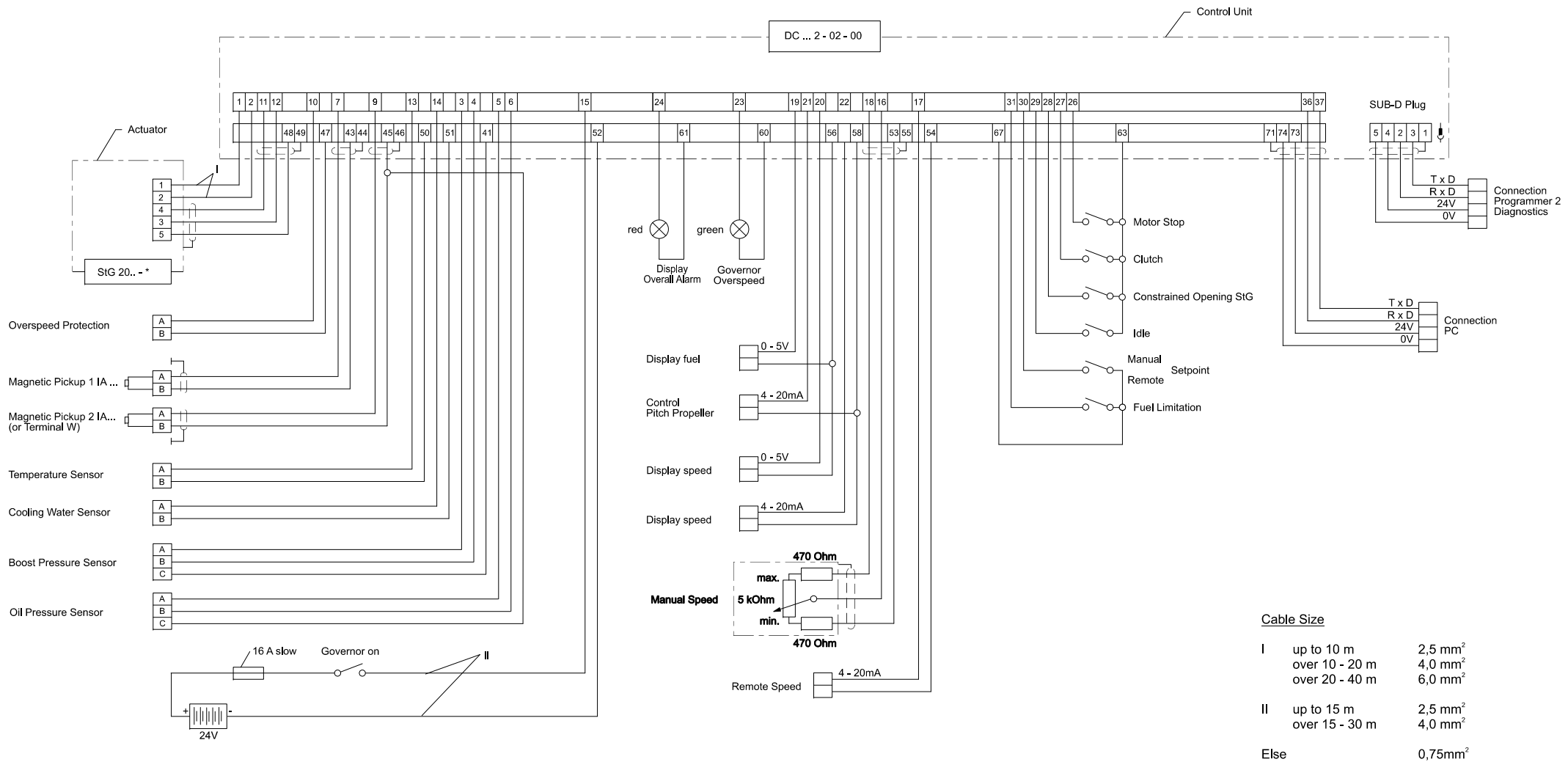
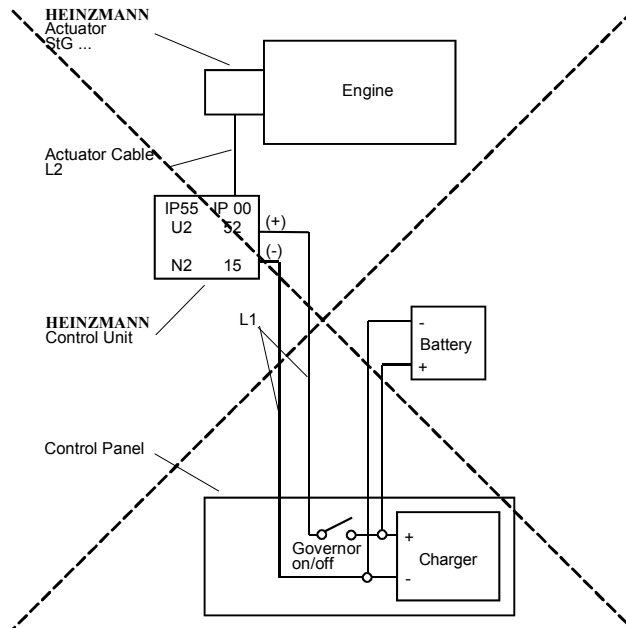


Figure 30: Connections with terminal strip (IP 00) for marine single operation

9.9. Connection of Power Supply

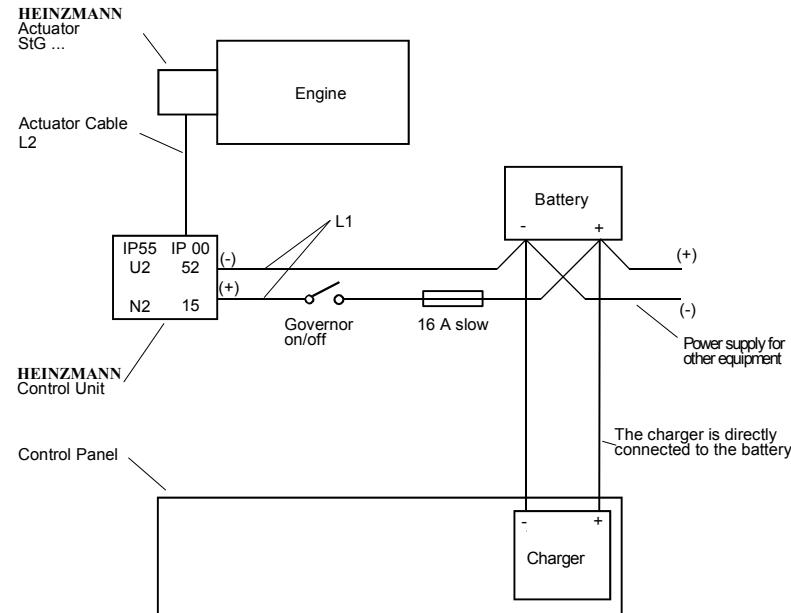


Power Supply has to be supplied via two separate leads directly from the battery. This leads must not be connected to any other equipment.



WRONG, because the ripple voltage of the charger is fed directly into the electronic governor!
This will damage the actuator

Please note! Coils (e.g. stopping solenoid, gas valve) must be equipped with a protective circuit to eliminate high inductance voltages. Diode type e.g. 1N4002



CORRECT, because the control unit is connected **directly to the battery**, so that the battery buffers the ripple voltage of the charger.

Figure 31: Connection of Power Supply

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 functionality 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 external storage media.

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.

Increase 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 up to 11.8 and any further options of adjustment see manual DG 07 001-e / 05-08 "Control devices for conventional injection with actuators".

12. Plug Connections

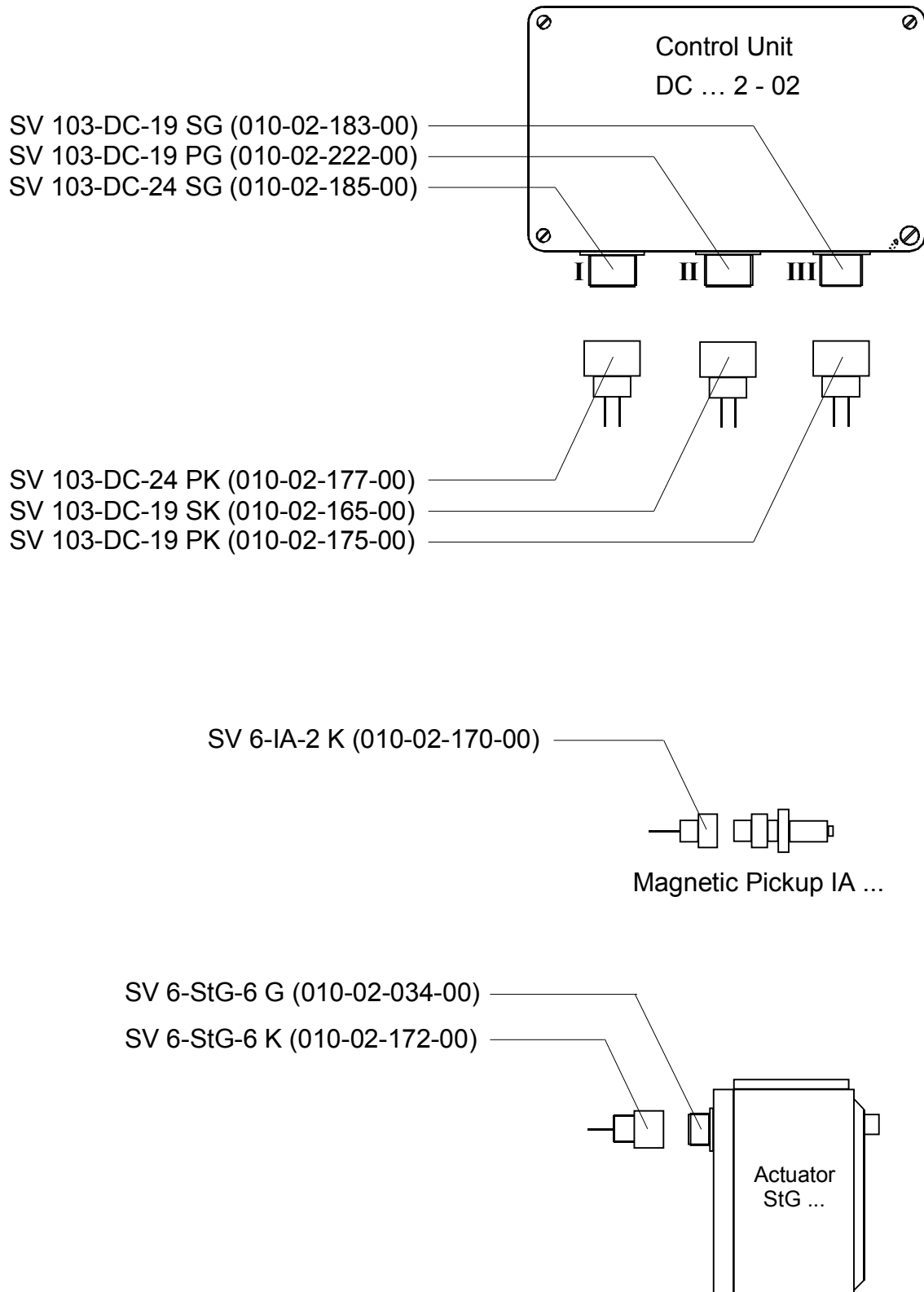


Figure 32: Plugs with desination

13. Ordering Specifications

13.1. 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 brochure "**Order Information Digital Speed Governors**"
Nr. DG 96 012-e and shoud be transferred to HEINZMANN.

13.2. Cable Harness

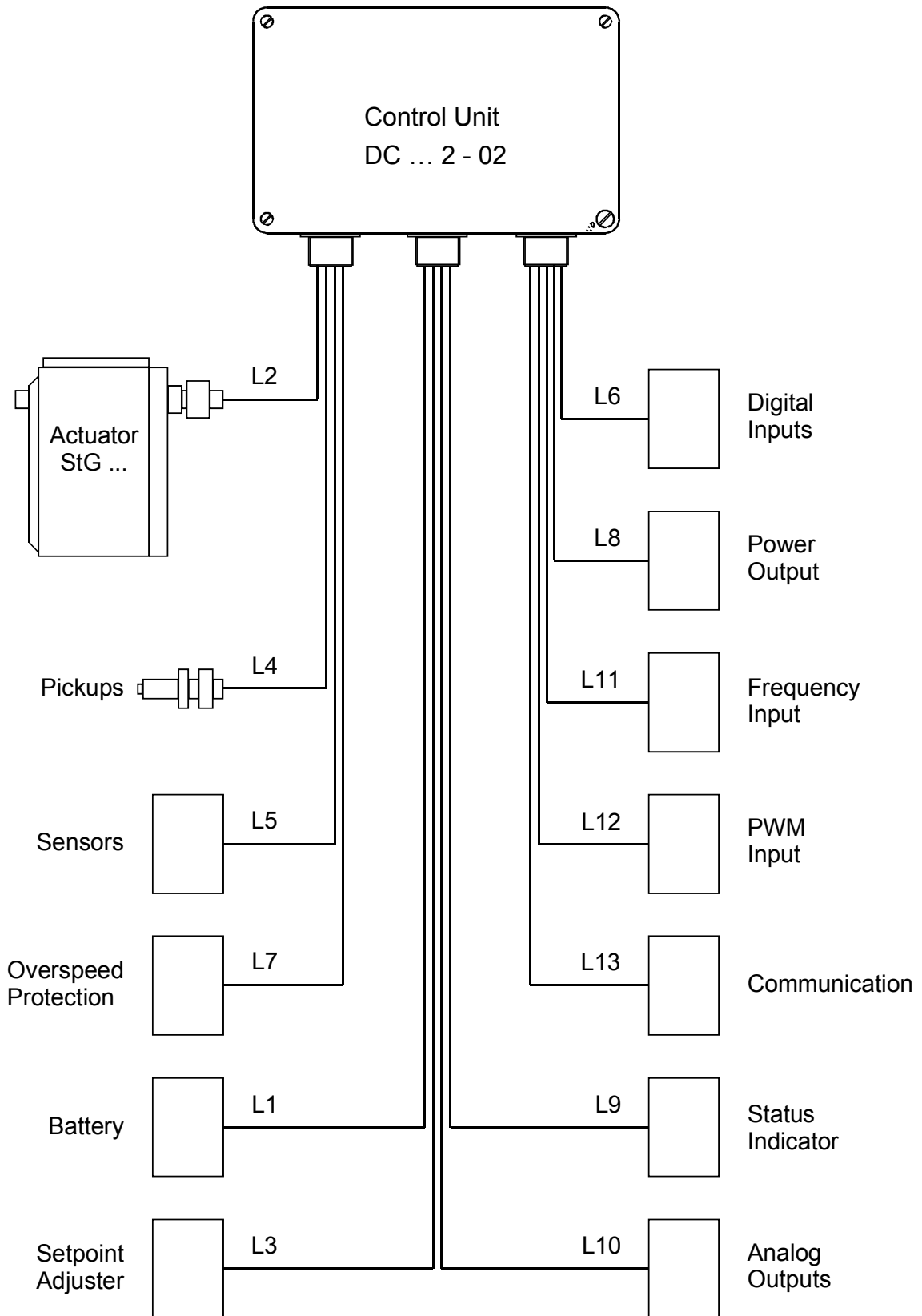


Figure 33: Harness with cable numbers

13.3. Cable Lengths

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

The necessary cable lengths and versions of units have to be registered here and transferred 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 mm ²
		over 15 - 30 m	2 x 4.00 mm ²

b) L2 = Control unit - actuator

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

c) L3 = Control unit - setpoint adjusting unit

L 3.1	Control unit - setpoint poti 1	..... cm	3 x 0.75 mm ² shielded
L 3.2	Control unit - setpoint poti 2	..... cm	3 x 0.75 mm ² shielded

13. Ordering Specifications

L 3.3	Control unit - 4-20 mA input	..... cm	2 x 0.75 mm ²
L 3.4	Control unit - synchronizer	..... cm	2 x 0.75 mm ² shielded
L 3.5	Control unit - load measuring unit	..... cm	2 x 0.75 mm ² shielded

d) L4 = Control unit - pick-up

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

e) L5 = Control unit - sensor inputs

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

f) L6 = Control unit - digital inputs

L 6.1	Control unit - switch 1 - 4	..... cm	5 x 0.75 mm ²
L 6.2	Control unit - switch 5 - 8	..... cm	5 x 0.75 mm ²

g) L7 = Control unit - overspeed protection

L 7	Control unit - overspeed protection cm	2 x 1.50 mm ²
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h) L8 = Control unit - controlled current output

L 8	Control unit - contr. current output cm	2 x 1.50 mm ²
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i) L9 = Control unit - status indicator

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

j) L10 = Control unit - analogue outputs

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

k) L11 = Control unit - frequency input

L 11	Control unit - tacho cm	2 x 0.75 mm ²
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l) L12 = Control unit - PWM input

L 12	Control unit - PWM-in cm	2 x 0.75 mm ²
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m) L13 = Communication

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

14. 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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- 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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