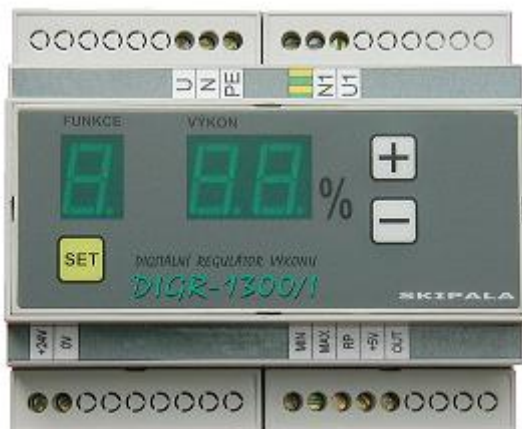Karel Skipala
Automating manufacturing processes, modernising machine control, producing industrial electronics
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USER MANUAL FOR DIGR-1300/I CONTROLLER

CONTENTS

1. Technical data

```
Supply voltage              18-24V DC
Switching voltage           max 230V/50Hz
Maximal output current      3A
Coverage                    IP20
Working temperature         10-55°C (50-130°F)
Power dissipation           7W
Suppression of interference EN 55011/B
Short circuit proof         1.5kA
Dimensions                  106x90x58 (WxHxD)
Weight                      0.4kg
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2. Description

Regulator DIGR-1300/I is intended to power regulation of vibration feeders driven by electromagnetic coil. Regulator's main component is triac, which is switched with phase shift. Regulator enables step setting of frequency: 100Hz, 50Hz, 33Hz, 25Hz, and 20Hz. The intensity of oscillations can be set from range 20-99%. Function of regulator is programmed from control panel by user. Regulator can be controlled from control panel or by external analog or digital signals. If you need to switch bigger power than the regulator enables, you can connect an extern power module to it. The control and power part are safely separate.

Small dimensions and effective user functions create preconditions for using these regulators (working alone or with superior system PLC) in most applications of vibration feeders.

Fig. 1 - description of the controls

Number of function (shown only in setting mode)

Required power, value of function in setting mode

Value increasing

Signalling of STOP status

Value decreasing

SET – entry to the setting mode

0.5%
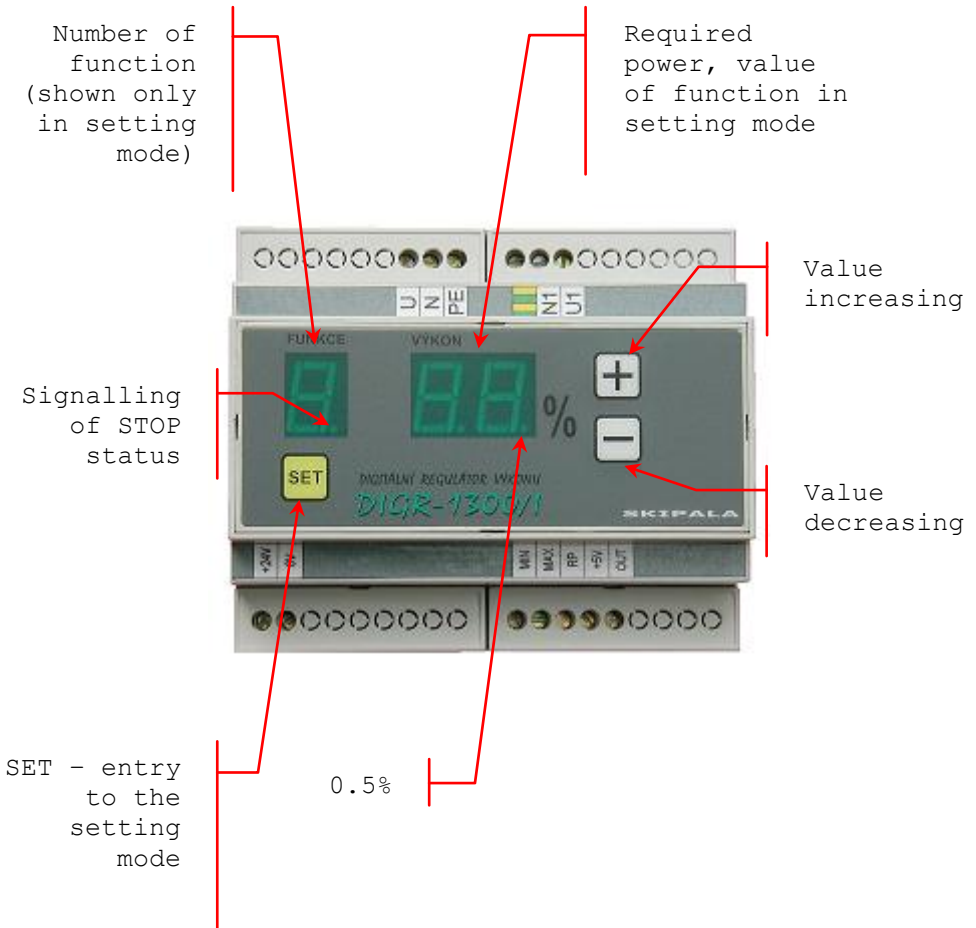
Fig. 2 – connecting the external part of the controller

FU1 3,15A

supply
230V AC

L
N
PE

U
N
PE

U1
N1

vibration feeder

supply
24V DC

+
-

+24V
0V

SQ2
min store

MIN

SQ1
max. store

MAX

power
regulation

5k/N

AIN
+5V

OUT

0-10V

+
-

AIN

560

0-20mA

+
-

AIN
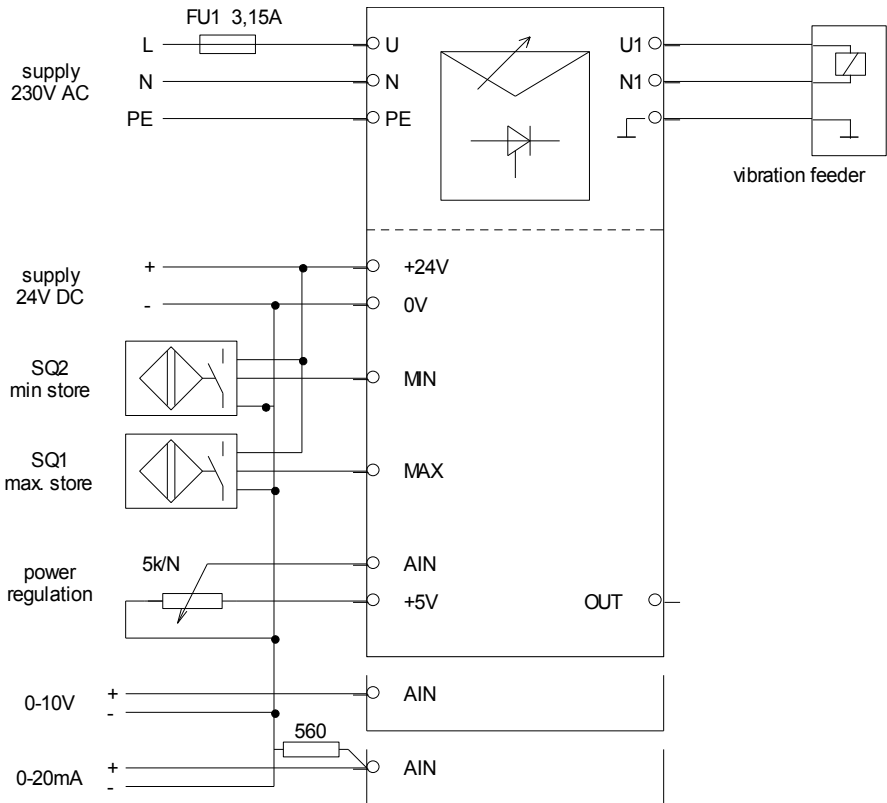
Fig. 3 – connection of extern power module
switching voltage 230V

| | | | | | | EMI FILTER | | | | | |
| | | | | | 1 | | 2 | 1 | | 2 | |

FU1   FU2 63mA

L   U

supply 230V AC   N   N

PE   PE

A1   A2

vibration feeder

U1

N1

supply 24V DC   +   +24V

−   0V

SQ2 min store   MIN

SQ1 max. store   MAX

power regulation   5k/N   AIN

+5V   OUT

0-10V   + −   AIN
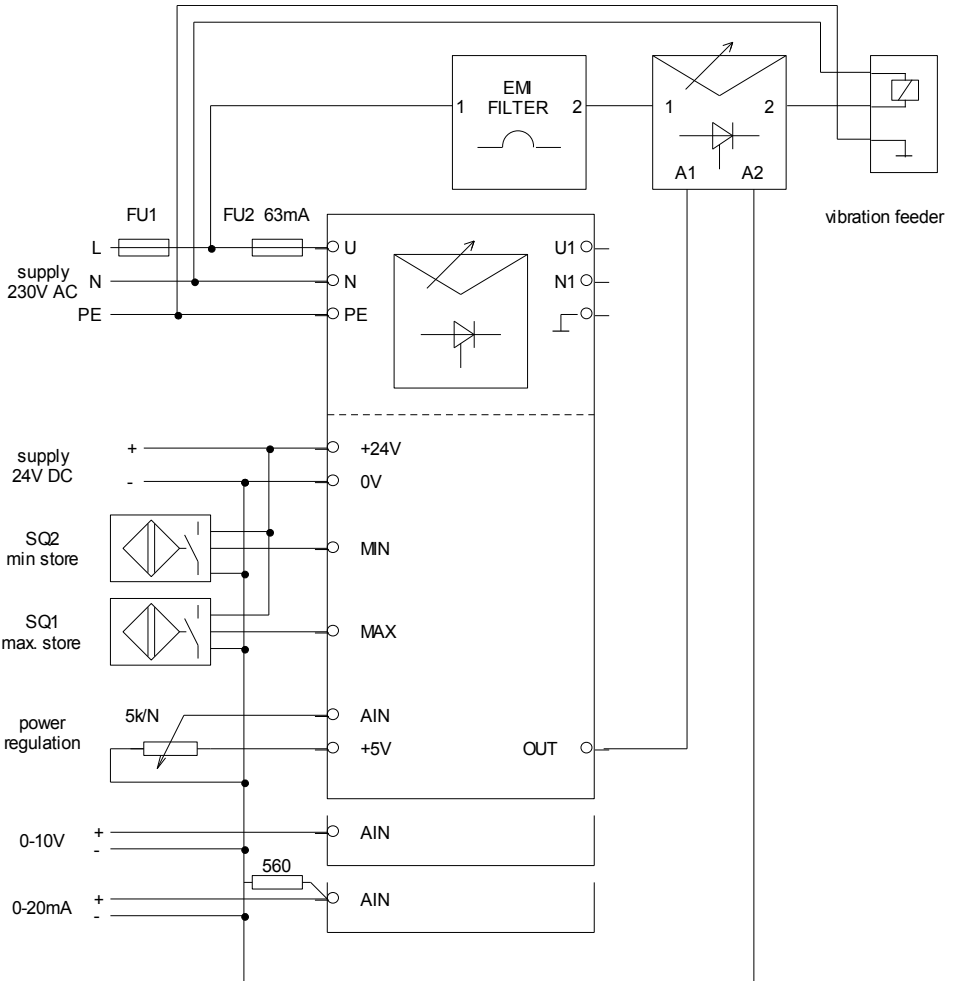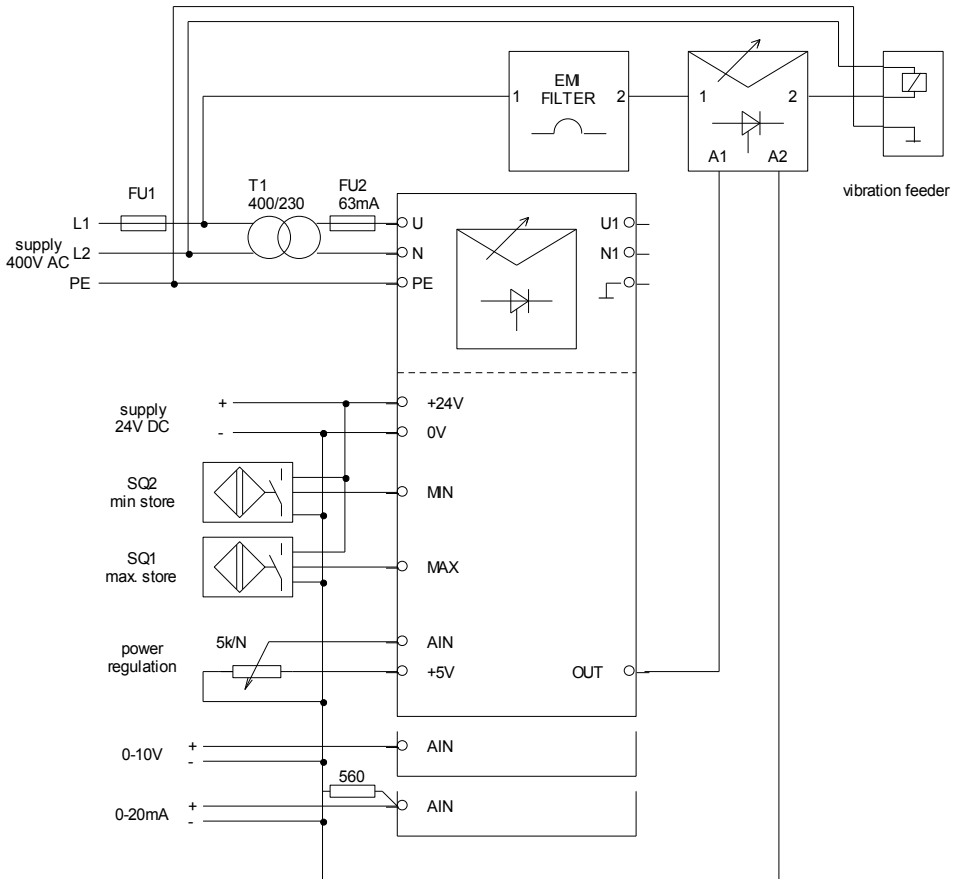
560

0-20mA   + −   AIN

Fig. 4 – connection of extern power module switching voltage 400V

3. Assembly

Mount the regulator to a terminal strip DIN TS35 in horizontal position. It is important to keep free space (20mm from upper and lower border) because of cooling.

4. Connection

Only persons with adequate electrotechnical qualification are allowed to connect the regulator.

Warning! Connect only when disconnected from power network.

Make connection according to Fig. 2, alternatively Fig. 3 or Fig. 4. It is necessary to make overload and short circuit protection. Choose current value and characteristics of protection element according to the inputting power of used vibration feeder. When using extern power module, it must contain accordant EMI filter.

Connect clamps +**24V** and **0V** with 24V for supplying the control part. If you use sensors, they are supplied from this source. If you supply them from other source, it's necessary to connect potentials 0V.

Connect sensors and digital or analog signals according to demands of current application (Fig. 2). For advanced explanation see chapter 7 – Functions description. Sensors are powered by safely separate voltage 24V DC, current drain of both sensors must not exceed 50mA. Prefer sensors of PNP type (output signal is attached to +24V). If you use sensors NPN, it's necessary to put a 3.3kΩ resistor between supply clamp +24V and signal.

5. Activation

Regulator will automatically switch on after connection of supply voltage 24V and at the same time or before connection of power voltage 230V. However this setting is not suitable as START - STOP of regulator because there is a min. 3s time-out between switching-off and switching-on. If this time-out is not kept the regulator may get blocked. In that case you must do restart (see chapter 7 – Functions description, Factory settings).

Do START-STOP by signal +24V connected to clamp MAX (see chapter 7 - Functions description, Function no.1).

6. Setting

Switch on the regulator and press button [SET] . The number of function no.0 and its value will be shown on the display. Set value of the function by buttons [+] [−]. Press the button [SET] again. The number of function will increase by 1. After setting all values press button [SET] that will save all set values into memory.

If you are not in setting mode you can set only value of function no.0. – required power. Regulator can't save the change of value when running. Save will be done after changing state to STOP. **Warning!** If the regulator is RUN mode and you switch it off by disconnecting it from power network, the value of function no.0 won't be saved into memory.

The meaning of functions and their values is described in chapter 7 and in table Fig. 5.

7. Functions description

Function no.0 – required power

The regulator regulates power in maximal range 20-99% with step 0.5%. Value 0.5% is expressed by turning on the decimal point. The range of required power is limited by values of function no.6 – minimal power and no.7 – maximal power.

Function no.1 – sensors

Regulator can work according to the needs of concrete application without sensors, with one sensor or with two sensors. Signals from sensors set the regulator to STOP or RUN mode. Status STOP is signalised by turning on the decimal point at number showing the number of function. The influence of sensors depends on value of function no.1:

00- Sensors are not connected. The feeder is constantly in RUN mode after switching-on.

01- One sensor is connected: SQ1 - maximal store. If the sensor is active (there's +24V on clamp MAX) the feeder is in STOP mode. In other case the feeder is in RUN mode. The change from STOP to RUN mode and otherwise is done with a time-out set by value of function no.2 and no.3 (see down).

02- Two sensors are connected: SQ1 and SQ2. If sensor SQ2 is not active (there's 0V on clamp MIN) regulator is in RUN mode. If both sensor SQ1 and SQ2 are active (there's +24V on clamps MIN and MAX) regulator is in STOP mode. The change from STOP to RUN mode and otherwise is done with a time-out set by value of function no.2 and no.3 (see down).

03- One sensor is connected: SQ1 - maximal store. Its behaviour is inverse to value 01. If the sensor is not active (there's 0V on clamp MAX) the feeder is in STOP mode. In other case the feeder is in RUN mode. The change from STOP to RUN mode and otherwise is done with a time-out set by value of function no.2 and no.3 (see down). If you start the regulator by superior controlling system PLC, use this setting. Connect the START signal with clamp MAX.

04- Two sensors are connected: SQ1 and SQ2. Their behaviour is inverse to value 02. If sensor SQ2 is active (there's +24V on clamp MIN) regulator is in RUN mode. If both sensors (SQ1 and SQ2) are not active (there's 0V on clamps MIN and MAX) regulator is in STOP mode. The change from STOP to RUN mode and otherwise is done with a time-out set by value of Function no.2 and no.3 (see down).

Function no.2 – time-out when changing to RUN mode
Regulator is in STOP or RUN mode according to the information from sensors. The change from STOP to RUN mode is done with a time-out. This time-out is expressed by value 0 – 99 which means 0 – 9.9s.

Function no.3 – time-out when changing to STOP mode
    Regulator is in STOP or RUN mode according to the
    information from sensors. The change from RUN to STOP
    mode is done with a time-out. This time-out is
    expressed by value 0 – 99 which means 0 – 9.9s.

Function no.4 – regulation method
    The value of function no.4 determines the way how the
    required power is set:
    00- Power is set by buttons ⊞ ⊟.
    01- Power is set by voltage signal 0-5V on clamp
        no.11. This setting is suitable for using the
        potentiometer. Value of the potentiometer must be
        from range 1-10kΩ.
    02- Power is set by voltage signal 0-10V or by
        current signal 0-20mA on clamp no.11. If you use
        current signal it's necessary to put a 560Ω
        resistor between clamp no.11 and clamp no.12.

Function no.5 – automatic switching-on
    00- Automatic switching-on is blocked
    01- The regulator will be automatically switched on
        after connection of supply voltage.

Function no.6 – minimal power
    Low limit of regulation is set by value of this
    function. Minimal value is 20, maximal value is 10
    units lower than the value of maximal power (Function
    no.7).

Function no.7 – maximal power
    High limit of regulation is set by value of this
    function. Minimal value is 10 units higher than the
    value of minimal power (Function no.6), maximal value
    is 99.

Function no.8 – oscillations frequency

The range for frequency of oscillations is 20-100Hz.
The gist of frequency change consists in skipping
a certain count of sinusoid half-waves of regulated
voltage. Its result is a discontinuous "jump" change.
The range of this function is 0 – 4 that means
frequency 100-20Hz (see table Fig. 5). When setting
the frequency to 100 Hz, the amplitude limited only
to 50%.

Function no.9 – run-up, run-out

In some cases it is desirable to run-up and run-out
the feeder continuously. You can set the speed of
run-up and run-out ramp by setting this value from
range 0-5. Value 5 means time 5s for run-up
from 0% to 100%.

Factory settings

If there are complications with controller, RESTART
it to reset the factory settings of all parameters.
RESTART as follows:

- Disconnect the controller from the supply network
  and wait at least 10 seconds to discharge
  condensers.
- press the SET button and hold it down
- connect the controller to the supply network
- release the SET button

The parameter values of the factory settings are given
in the table (*Fig. 5*).

Fig. 5 – *Functions table*

function no.	value	description
0 power	20-99	required power (20-99%)
1 sensors	00	no sensors
	01	one sensor, log.1 switches off
	02	two sensors, log.1 switches off
	03	one sensor, log.0 switches off
	04	two sensors, log.0 switches off
2 RUN time-out	00-99	time-out when switching from status STOP to RUN (0 – 9.9s)
3 STOP time-out	00-99	time-out when switching from status RUN to STOP (0 – 9.9s)
4 control	00	power is set by control panel
	01	power is set by potentiometer RP1
	02	power is set by signal 0-10V or 0-20mA
5 switching-on	00	automatic switching-on blocked
	01	automatic switching-on allowed
6 min. power	20-89	minimal power limitation (20-89%)
7 max. power	30-99	maximal power limitation (30-99%)
8 oscillations frequency	00	100 Hz *
	01	50 Hz
	02	33 Hz
	03	25 Hz
	04	20 Hz
9 run-up	0-5	time of run-up and run-out ramp (0–5s from 0% to 100%)

* When setting the frequency to 100 Hz, the amplitude
  limited only to 50%.

8. Maintenance

The controller does not require any special maintenance. Carry out Pergorm only regular inspection in accordance with ČSN 33 2000-1, ČSN 34 3100 and Regulation No. 50/78 Sb. In the case of failure do not repair - send the controller to the manufacturer for repair.

In the case of complications with the operation of the controller, reset the factory setting of the parameters (Chapter 7).

9. Disposal

At the end of its service life the controller must be handed over for professional disposal to a specialized firm or the manufacturer.

10. Guarantee

The guarantee for the product is 12 months from the day of sale.

Serial number:

Seller: Date of sale:

11. ES DECLARATION OF CONFORMITY

In accordance with Act No. 22/97 Coll. on the technical requirements for products, as effective amended by act.

Manufacturer: Karel Skipala
Rybník 162, 560 02 Česká Třebová
Czech Republic
Reg. No.: 48608017
http://www.skipala.cz

Identification of the product:
Name: Digital power controller
Model: **DIGR-1300/I**

We declare that the above-mentioned product fulfils the respective provisions of the following EU regulations:
Government Directive No. 17/2003 Coll. (Directive of the European Parliament and the Council 2006/95/EC)
Government Directive No. 616/2006 Sb. (Directive of the European Parliament and the Council 2004/108/EC)

Description of the product: The product is designed for regulating vibration feeders driven by an electromagnetic coil.

List of technical and harmonized standards used:
ČSN EN 61010-1 ed.2:11, Article 5, 5.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5.2, 5.1.7, 5.3, 5.4, 6, 6.1, 6.2.2, 6.4, 6.5.2, 6.5.2.3, 6.5.2.5, 6.5.3, 6.7, 6.9.2, 6.7.1.2, 6.7.1.3, 6.8.2, 6.8.3.1, 8.2, 8.2.1, 8.2.2, 8.3, 8.3.1, 10.5.2, 10.5.3;
ČSN EN 60695-2-11:01; ČSN EN 61326-1 ed.2:13

Source materials for issuing the EC Declaration of Conformity: **Certificate No. 1150486** issued on 02.07.2015 by the Electro-technical testing institute, certified body No. 3018.

The two last digits of the year in which the CE indication was attached to the product: 15

In Rybník dated 02.07.2015   Karel Skipala
                               Company owner