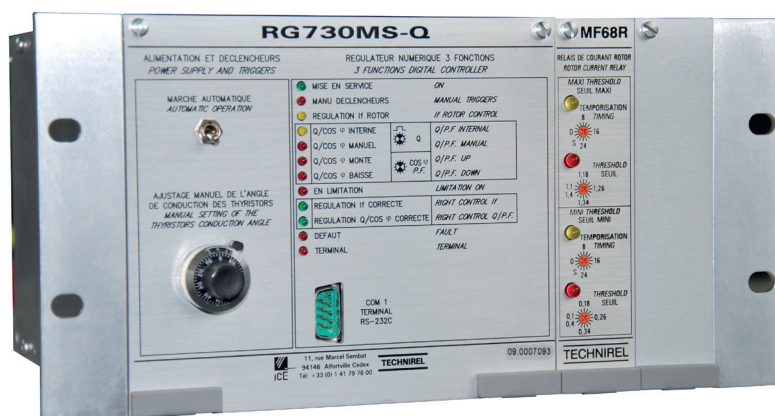
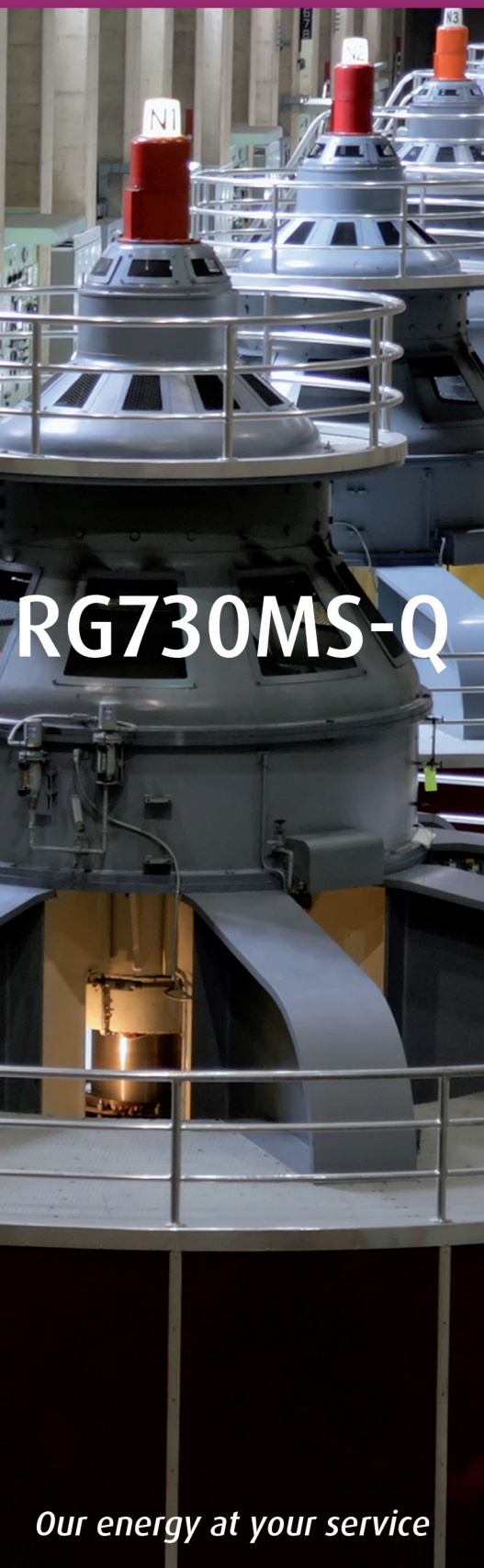


# REGULATION

## Digital Controller for Synchronous Motors



The digital Automatic Voltage Regulator **RG730MS-Q** is a numerical PID regulator designed to control the excitation of large & medium size synchronous motors.

The digital AVR **RG730MS-Q** belongs to the RG700 series of ICE digital controllers dedicated to the control of synchronous machines.

*Our energy at your service*

## Regulation purposes

The digital controller RG730MS-Q performs 3 regulation functions and control the bridge rectifier of the synchronous motor in order to:

- maintain the rotor current on its set point during the starting phase,
- maintain the value of the motor power factor on its set point regardless of the load conditions,
- maintain the value of the reactive power on its set point.

## Limitation purposes

### Rotor current limitation:

Thanks to this function the RG730MS-Q controller allows the motor to sustain a sudden & short overload, while minimizing the rotor heating.

## Functional description

Basically the RG730MS-Q performs the following control functions:

### Regulation functions

- Automatic regulation of the rotor current after detecting the end of the start of the motor in the asynchronous mode and the closing of the excitation contactor.
- Automatic regulation of the power factor in all four quadrants after the start of the motor.
- Direct regulation of the reactive power.
- Manual control with «go up» and «go down» buttons after selecting the manual mode.
- Smooth switching between the automatic and the manual regulation.

### Limitation

- Limitation of If Rotor.

### Activation of the regulation and limitation functions

Regulation & limitation modes are activated by switching on external contacts.

## Displays

Regulation & limitation modes are displayed by LEDs on the front face of the RG730MS-Q.

- Yellow LEDs for regulation modes.
- Red LEDs for alarms and manual mode.
- Green LEDs for stabilized regulation conditions.

## Settings

The settings of internal set points, limitation parameters, communication parameters and the PID parameters are performed through the communication port located on the front face by using the PC software.

## Measurements

All the measurements are filtered:

- 2 voltages through PT's with 100V or 110V secondary:
  - 1 stator voltage (U12)
  - 1 voltage for thyristors synchronisation (U12)
- 1 current through CT's with 5 Amps secondary:
  - 1 stator current sensing (I3)
- 1 excitation current through an Hall effect sensor.

## Regulation & limitation functions activation

Regulation & limitation modes are activated by switching ON external contacts galvanically isolated by the means of optic couplers.

## Description

The digital controller RG730MS-Q uses 1 microprocessor.

This microprocessor is in charge of:

- Communication management: serial ports 1 & 2.
- Binary data input & output management.
- Regulation & limitation functions as well as the control of thyristors priming.

The RG730MS-Q hardware is made of 3 PCB's fitted in a 9.5" wide and 3 units high rack suitable for flush mounting.

## Safety

The microprocessor has a watchdog equipped with an alarm signalling contact hardwired on terminal.

All parameters used by the regulation are safeguarded in SRAM Memory backed up by a 3V lithium battery having a 1 year autonomy duration when out of supply.

## Communication

The RG730MS-Q controller is devoted to control & communication. Communication function uses 2 serial dedicated ports:

- Port n° 1 characteristics:
  - *Dedicated to the man/machine dialogue needed for the commissioning operation.*
  - *Link type: RS 232.*
  - *Speed: 9600 Bauds.*
  - *Protocol: private TECHNIREL ICE property.*
  - *Plug in connexion: on the front panel. DB9 plug in type.*
  - *Terminal suitable: PC / Windows (32 / 64 bits).*
- Port n° 2 characteristics:
  - *Dedicated to communication with the SCADA.*
  - *Link type: Current loop.*
  - *Speed: 300 to 4800 Bauds.*
  - *Protocol: Modbus / Jbus slave.*
  - *Connection: on rear terminal (screw connection).*

## HMI - RG730MS-Q configurator

Software functions:

- Display of measurements, set point & parameters adjustments.
- Real time motor diagram capability display.
- Set points & parameters protected by password.
- Status & alarms display.

## Displays of measurements, set points, & PID gains

RG750 & RG730-MSQ settings software

File Operation ?

**RG730 status: Reading measurements**

Status (I/O)

|                  |                        |
|------------------|------------------------|
| POWER ON         | RIGHT CONTROL If       |
| MANUAL TRIGGERS  | RIGHT CONTROL Q / P.F. |
| If ROTOR CONTROL | ERROR                  |
| Q CONTROL        | TERMINAL               |
| Q MANUAL         |                        |
| Q / P.F. UP      |                        |
| Q / P.F. DOWN    |                        |
| LIMITATION ON    |                        |

P.F. regulation

Settings

|                     |        |    |
|---------------------|--------|----|
| Int. P.F.           | 1      | AV |
| PG5                 | 0      |    |
| IT5                 | 0 s    |    |
| DT5                 | 0 s    |    |
| INT P.F. ramp       | 0 °/s  |    |
| Ramp. P.F. MAN      | 0 °/s  |    |
| <b>Q regulation</b> |        |    |
| Internal. Qo        | 0.1 Sn |    |
| PG6                 | 0.4    |    |

Internal P.F. regulation Set point, ex.= 0.8 for Cos  $\Phi = 0.8$

From 0 to 1

Qc

Q

Measures

|            |        |     |
|------------|--------|-----|
| V          | 1.009  | Un  |
| I          | 0.991  | In  |
| S          | 1.000  | Sn  |
| P          | -0.992 | Sn  |
| Q          | 0.113  | Sn  |
| If         | 1.002  | IfN |
| $\alpha$   | 0.0    | °   |
| Psi        | 180.0  | °   |
| $\Phi$     | 173.6  | °   |
| P.F        | -0.994 |     |
| Sin $\Phi$ | 0.115  |     |
| If max     | 1.200  | IfN |
| F          | 50.0   | Hz  |
| Fsyn       | 50.0   | Hz  |

RG730 : 1

V3.03      01/05/2003

(F12) Disconnection

(F6) Receive all

(F5) Send all

(F4) Receive

(F3) Send

(F9) Stop scanning

(F11) Bar Chart

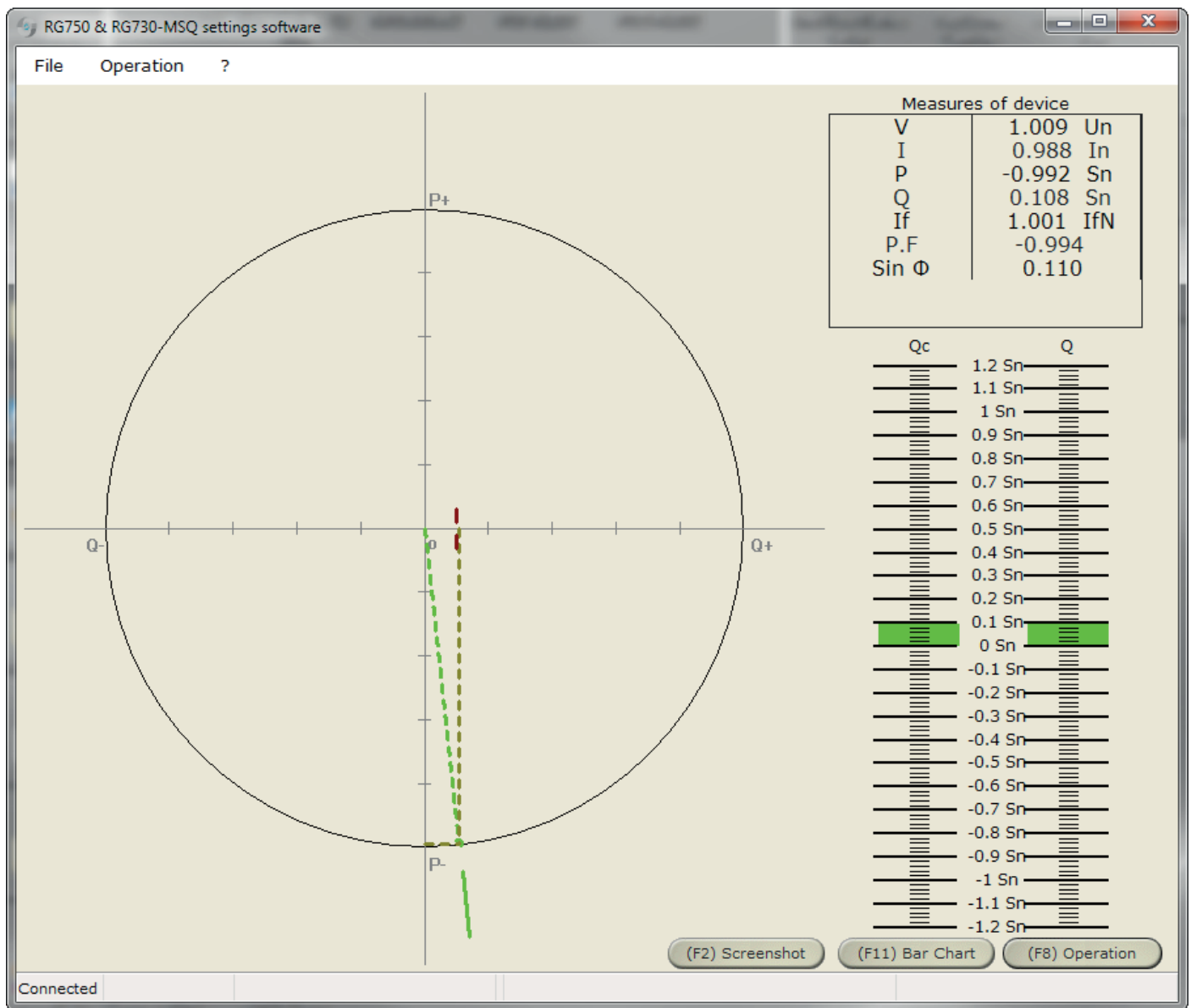
(sh.F10) Act. COM2

(F2) Screenshot

(F8) PQ diagram

Connected

## Machine capability diagram



## Characteristics

### Auxiliary supply:

- Galvanically insulated.
- 24 Vdc.
- Power burden: 10 W maxi.

### Measurement input characteristics:

Current input: 5 A - 50 / 60 Hz.

- Burden per input: 10 VA.
- Insulated.

Voltage input: 100Vac or 110Vac - 50 / 60 Hz

- Burden per input: 10 VA.
- Insulated.

### Contacts input characteristics:

- Dry contacts, galvanically isolated.

### Contacts output characteristics:

- Dry contacts.

Breaking rate dc currents:

30 V / 8 A - 100 V / 0.5 A - 300 V / 0.3 A.

Breaking rate ac currents:

2000 VA / 220 V.

### Performances:

- Regulation accuracy: ±1%.

### Environmental conditions:

- Operating temperature: 0° C to + 50° C.
- Storage temperature: - 20° C to + 70° C.
- Relative humidity: 0 to 92 % without condensation.

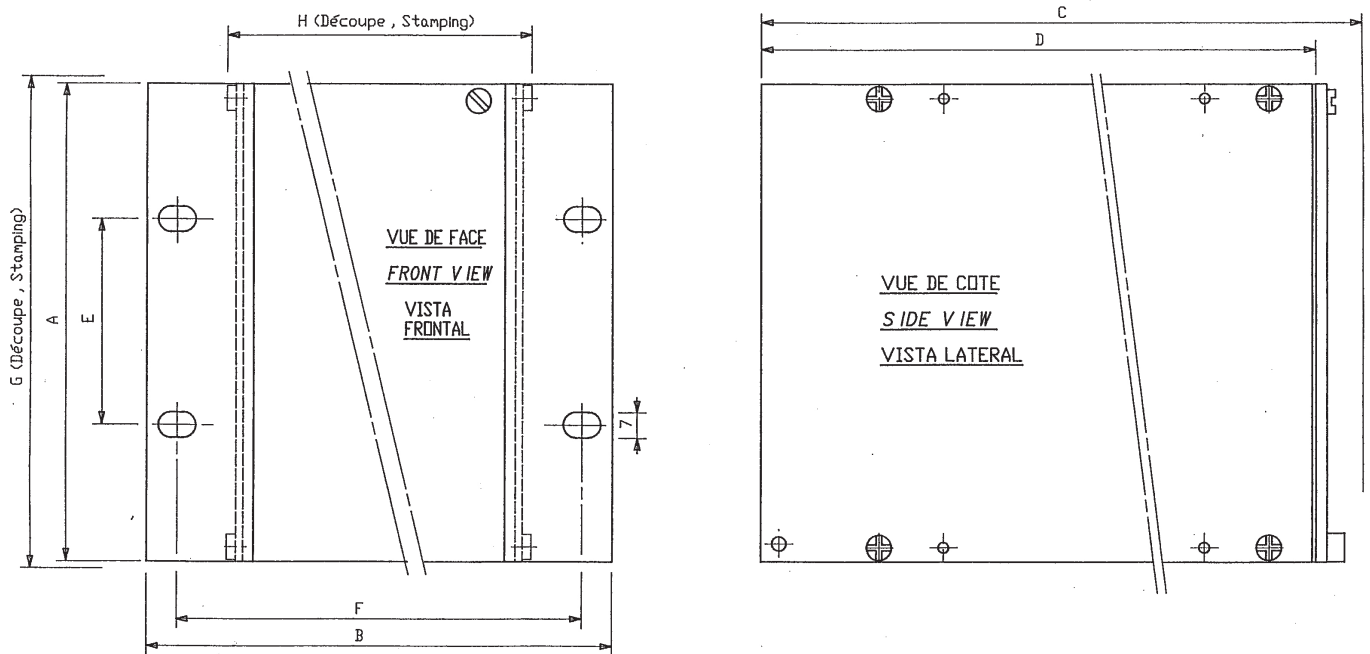
# Dimensions

## 30 T Cases

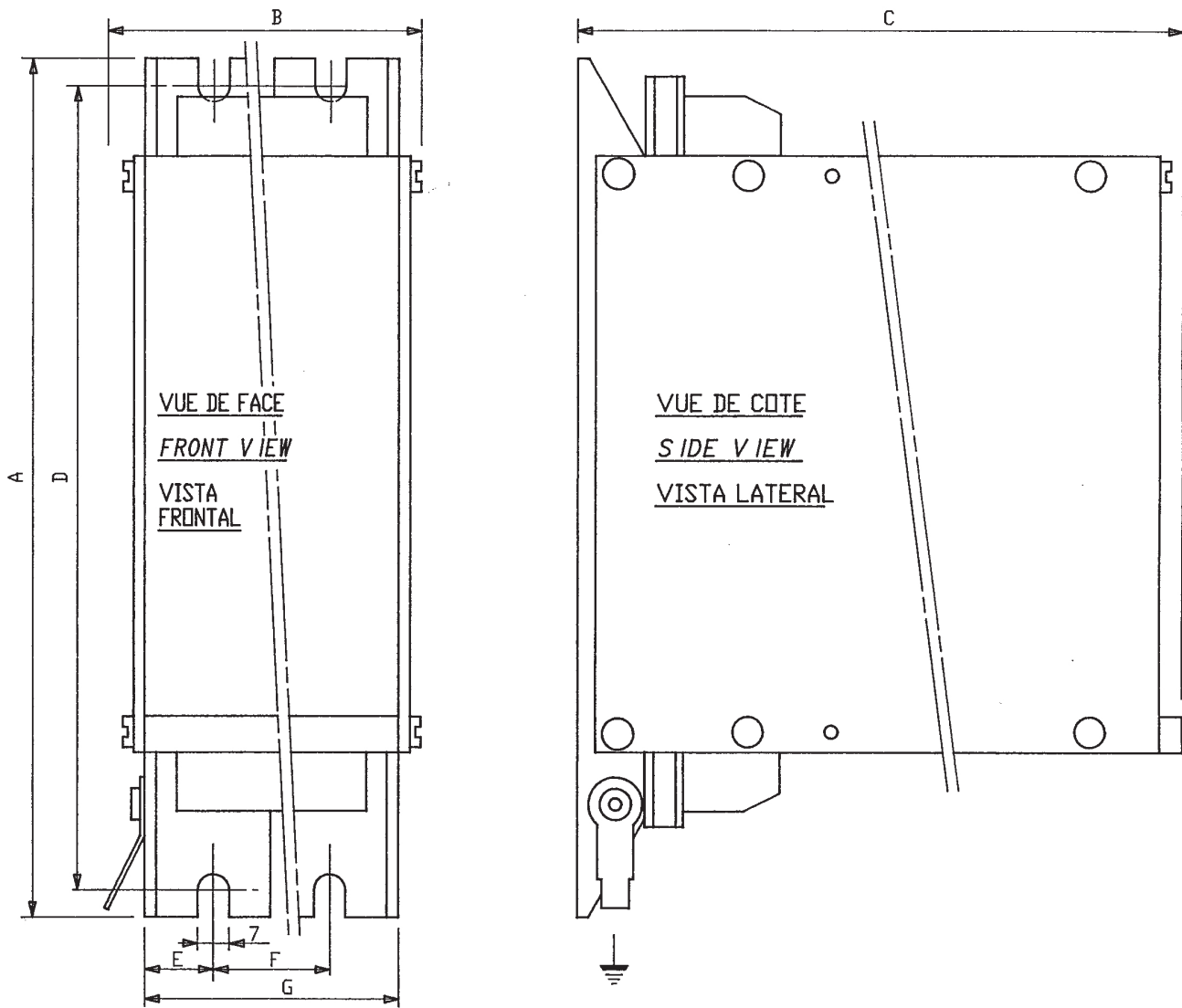
| Size | Surface mounting ( mm ) | Flush mounting ( mm ) |
|------|-------------------------|-----------------------|
| A    | 190                     | 132.5                 |
| B    | 166                     | 208.5                 |
| C    | 238                     | 255.0                 |
| D    | 178                     | 225.5                 |
| E    | 16.5                    | 57.1                  |
| F    | 119                     | 191.5                 |
| G    | 152                     | 133.0                 |
| H    | -                       | 169.0                 |

- Weight : 3.5 Kg
- Connections: Screws terminal with 51 positions

## Flush mounting housing



## Surface mounting housing



The specifications and drawings given are subject to change and are not binding unless confirmed by our specialists.