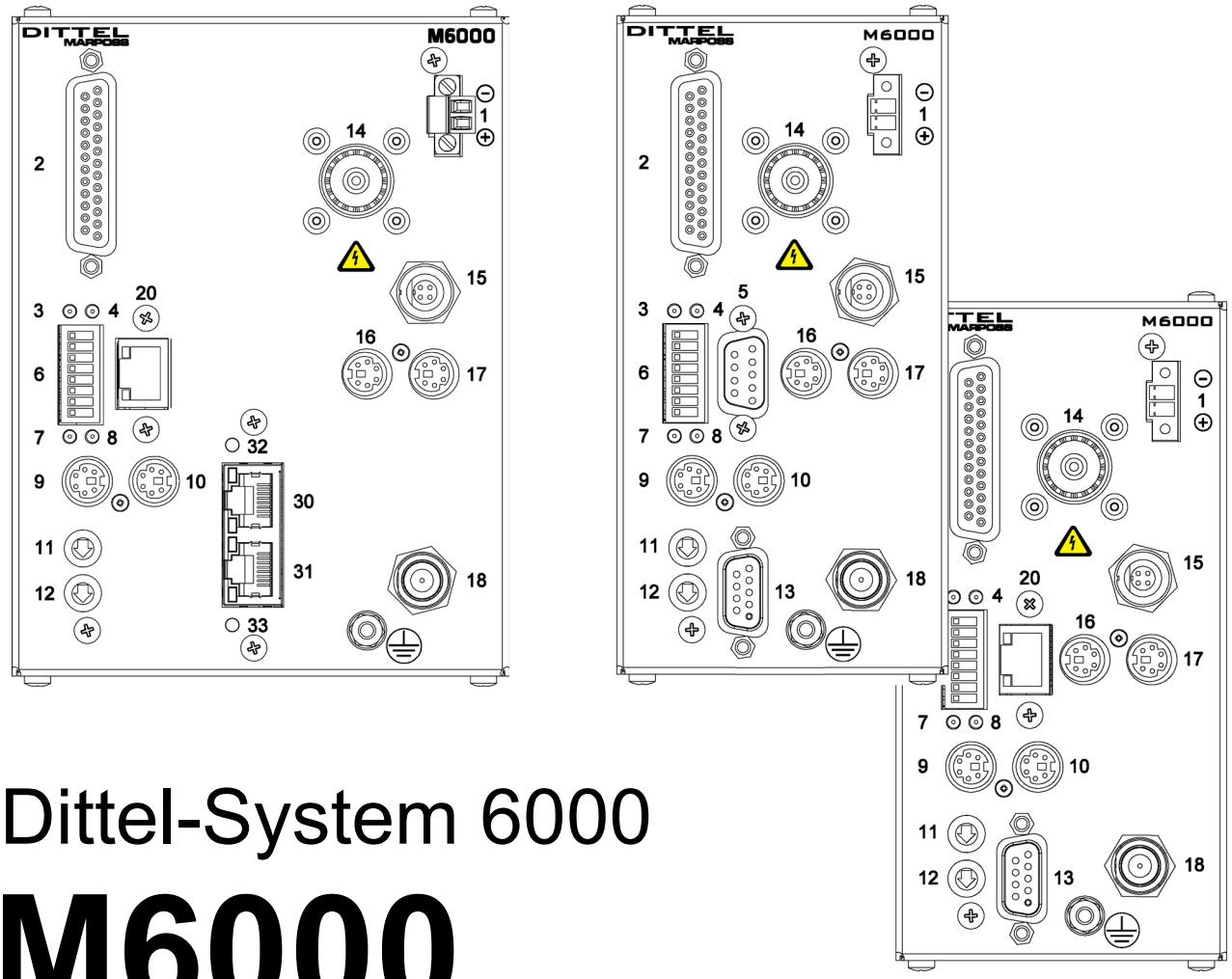


Dittel-System 6000

M6000

Balancing Module - electromechanical

Installation and Operation Manual

Covers **M6000** A/N O830L634001 (A/N F61001)
M6000 Ethernet A/N O830L634002 (A/N F61003)
M6000 PROFINET A/N O830L634006 (A/N F61017)

Date of Issue: May 2019
Issue: 15
Article No.: ODNFL63EN01 (D61020)

Solution Partner Automation SIEMENS

CE

Installation- and Operation Manual (D61020): ODNFL63EN01

M6000	A/N O830L634001 (A/N F61001)
M6000 Ethernet	A/N O830L634002 (A/N F61003)
M6000 PROFINET	A/N O830L634006 (A/N F61017)

This Installation and Operation Manual was originally published in German. In case of any disputes due to the translation, the reference will be solely the German text.

Issue: 15

Covers DSCC Software: Version 3.65 (Build 0663) or later

Covers Module Software: Version 1.1, Build Number 0.49 or later
(see **Settings** ➔ Tab **Identification Data**)

Supplementary documents

Programming Interface	A/N ODNDL03EN01(A/N D60020)
DS6000 Proxy Service	A/N ODNDL03EN02 (A/N D60021)
Ethernet Interface	A/N ODNDL03EN03 (A/N D60022)
PROFIBUS/PROFINET Communication	A/N ODNDL03EN04 (A/N D60023)
Single-Plane Pre-Balancing	A/N ODNAL03EN02 (A/N D60202)
Spectrum	A/N ODNAL03EN03 (A/N D60203)
Two-Plane Automatic Balancing	A/N ODNAL03DE04 (A/N D60204)
Two-Plane Pre-Balancing	A/N ODNAL03DE05 (A/N D60205)

Manual Revision History

This list gives you a description of the last changes of the **«Installation- and Operation Manual»** due to new software, new hardware, mistakes, or errors.

Issue	DESCRIPTION/REASON FOR CHANGE	Date
-	Created	April 2004
9	Change of Company's name into Dittel MESSTECHNIK GMBH	January 2009
10	DECLARATION OF CONFORMITY added	January 2010
11	Balancing from 300 RPM on	April 2011
12	"Balancing" replaced by "Pre-Balancing" due to customer requirement (for field balancing only), Safety instructions added, changes due to acquisition of full ownership by MARPOSS S.p.A., Italy, changes due to new requirements for CE-Conformity check	August 2013
13	Introduction of DSCC software version 3.60, MARPOSS MHIS/P7 software integration, adaption to Windows® 7	February 2014
14	Additional explanation Monitoring System	October 2015
15	M6000 PROFINET (A/N O830L634006), adaption to Windows® 10	May 2019

NOTICE

- ▶ **Before operating the unit, please read this Installation and Operating Manual thoroughly!**
- ▶ **Please observe the Safety Information!**
- ▶ **Keep this document at your workplace for further use!**

Table of Contents

1 For Your Safety

1.1 General

- The Dittel-System M6000 is a state-of-the-art Balancing Module, developed and produced according to recognised safety directives, rules, standards, and regulations. To preserve this standard and in order to maintain safety, you as a user must adhere to this Operation Manual.
- The Module M6000 must be powered from a 24 Vdc supply only! The power source must comply with EN 60950 SELV (Safety Extra Low Voltage). Applying a higher voltage can cause the destruction of the device.
- According to EN 61010-1:2010 the 24 Vdc power lines must be protected by a 4 amps fuse, time-lag.
- **NEVER** operate a machine tool without all proper safety guarding in place. Be sure to read all information and safety instructions given by the manufacturer of the machine tool.
- Switch OFF the machine tool when installing or adjusting components of the electromechanical balancing system! Be sure the machine spindle has come to a standstill before working on it! Secure the machine against unauthorized or accidental switching on!
- **NEVER** use the rev counter of the M6000 to check for standstill of the spindle! Even if the display shows "0" 1/min or the output at pin 24 of connector # 2 is 0 Volt, the actual speed may be between 0 and 72 rpm!
- Do not put any solid objects or liquids such as water into the unit. In case of an accident, cut off the power supply. Using the unit with any object inside may cause fire or electric shock!
- Do not remove the cover. Refer servicing to qualified personnel only!
- Do not pull or bend the power cable and the signal cables. Replace damaged cables right away! To protect against electrical interference unused ports and connectors must remain covered with protecting ESD caps.
- Only personnel ordered and instructed by the management may operate the M6000.
- The management must
  - make this Manual accessible to the operator and
  - make sure that the operator has read and understood it.
- This Installation- and Operation Manual is an integral part of the Module M6000. So if the M6000 is sold, disposed of, or rented out, always include this Manual with the M6000.

1.2 Intended Use

- Use the M6000 exclusively to balance machine spindles using electro-mechanically driven compensating weights!
- The device is not a safety component in accordance with the EU machine directive.
- The monitoring criteria of the spindle to be balanced, the “Raw Unbalance Signal” (equivalent to signal on connector # 2, pin 23, or PROFIBUS signal on connector # 13 or PROFINET signal on connectors # 30/31), may be used exclusively at a speed range between 300 RPM and 30,000 RPM.
- The monitoring criteria of the spindle to be balanced, the “Filtered Unbalance Signal” (equivalent to numeric display, display of coordinates and signal on connector # 2, pin 22, or PROFIBUS signal on connector # 13 or PROFINET signal on connectors # 30/31), may be used exclusively at a speed range between 300 RPM and 30,000 RPM.
- The settling time of the “Filtered Unbalance Signal” at speed changes between 0 RPM and 30,000 RPM can take up to 15 seconds. When the speed changes between 0 RPM and 6,000 RPM the settling time can take up to 8 seconds.
- Operate the Module in industrial environment only!
- The device is suitable for indoor use only.
- Operate the M6000 device only with original Dittel Messtechnik GmbH accessories.
- Do not operate the device in explosive areas! Operation of the M6000 in such an environment means an essential endangering of safety!
- Unauthorized modifications and changes of the system **are forbidden**. When replacing defective parts use only original spare parts or standard parts recommended by the manufacturer.

1.3 Maximum permitted Speed of Internal and External Balancing Heads

1.3.1 Internal Balancing Heads

Outer Diameter [mm]	38	42	50	55	60	70
Maximum Capacity [cm-g]	200	500	1,100	1,500	2,000	3,300
Maximum Speed [RPM]	**20,000**	**15,000**	**10,000**	**8,500**	**7,500**	**6,000**

1.3.2 External Balancing Heads

Outer Diameter [mm]	80	102	122
Maximum Capacity [cm-g]	800	2,500	5,000
Maximum Speed [RPM]	**10,000**	**5,500**	**4,000**

1.3.3 External Balancing Heads with attached Stator

Outer Diameter [mm]	80	102	122
Maximum Capacity [cm-g]	800	2,500	5,000
Maximum Speed [RPM]	**10,000**	**5,500**	**4,000**

1.4 Symbols used

In this Operation and Installation Manual the following symbols can be used:

DANGER
This warning note indicates a hazardous situation, which if not avoided, will result in death or serious injury.

WARNING
This warning note indicates a hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION
This warning note indicates a hazardous situation, which if not avoided, may result in minor or moderate injury.

NOTICE
This note describes particularly important application notes and facts. Failing to observe the note may cause in property damage or an unsatisfactorily working device.

▷ indicates a work step which must be executed.

[squared bracket] indicates soft keys or buttons on the screen or keys of the keyboard.

This font indicates program names or commands.

`This font` shows program lines.

2 Introduction

This Installation and Operation Manual contains notes for the installation, setup, and operation of the Electromechanical Balancing Module M6000 out of the Dittel-System (DS) 6000 Series.

2.1 Purpose of the M6000

The Dittel-System M6000 is a new generation of electromechanical balancing units. Primarily developed for use on high precision grinding machines, the M6000 enables detection, evaluation, and monitoring of unbalance. Fast and precise compensation is performed by an external or internal non-contact Balancing System - containing electromechanical adjustable compensating weights - fully automatic and at operating speed.

All settings, display and operation of the M6000 are exclusively carried out on a PC integrated Automation System for machine tools or a standard PC based on Microsoft Windows®. Predefined, individual adjustable user levels are provided like Service / Administrator / Expert / Operator / Observer. The display window can be specified individually as well with regard to graphic representation, or window width.

By additional balancing modules, it is possible to supervise and to balance many machine spindles at the same time; complicated switching-over is dropped. Carried out just as simple is the extension for process monitoring by one or more Acoustic Emission (AE) module(s) AE6000. The total number of all modules and control units (PC, Automation System) is restricted to 15.

A serial and parallel interface as well as a PROFIBUS interface are available. There are also variants with Ethernet instead of RS232 and PROFINET instead of PROFIBUS. An overview can be found in the following table.

Variant	RS232	Ethernet	PROFIBUS	PROFINET	Hardwire interface
M6000, A/N O830L634001 (A/N F61001)	X		X		X
M6000 Ethernet, A/N O830L634002 (A/N F61003)		X	X		X
M6000 PROFINET, A/N O830L634006 (A/N F61017)		X		X	X

M6000 Ethernet

The Ethernet interface of the Dittel System 6000 modules offers the possibility to operate the modules at Automation Systems or user PC without RS-232 interface. In addition, cable lengths to the Automation System of more than 20 metre can be realized without speed loss.

For this, the serial interface RS-232 is replaced by an Ethernet interface, the hardwire and PROFIBUS interfaces are further available unchanged (see Supplementary Document: Ethernet Interface, A/N ODNDL03EN03 / A/N D60022).

M6000 PROFINET

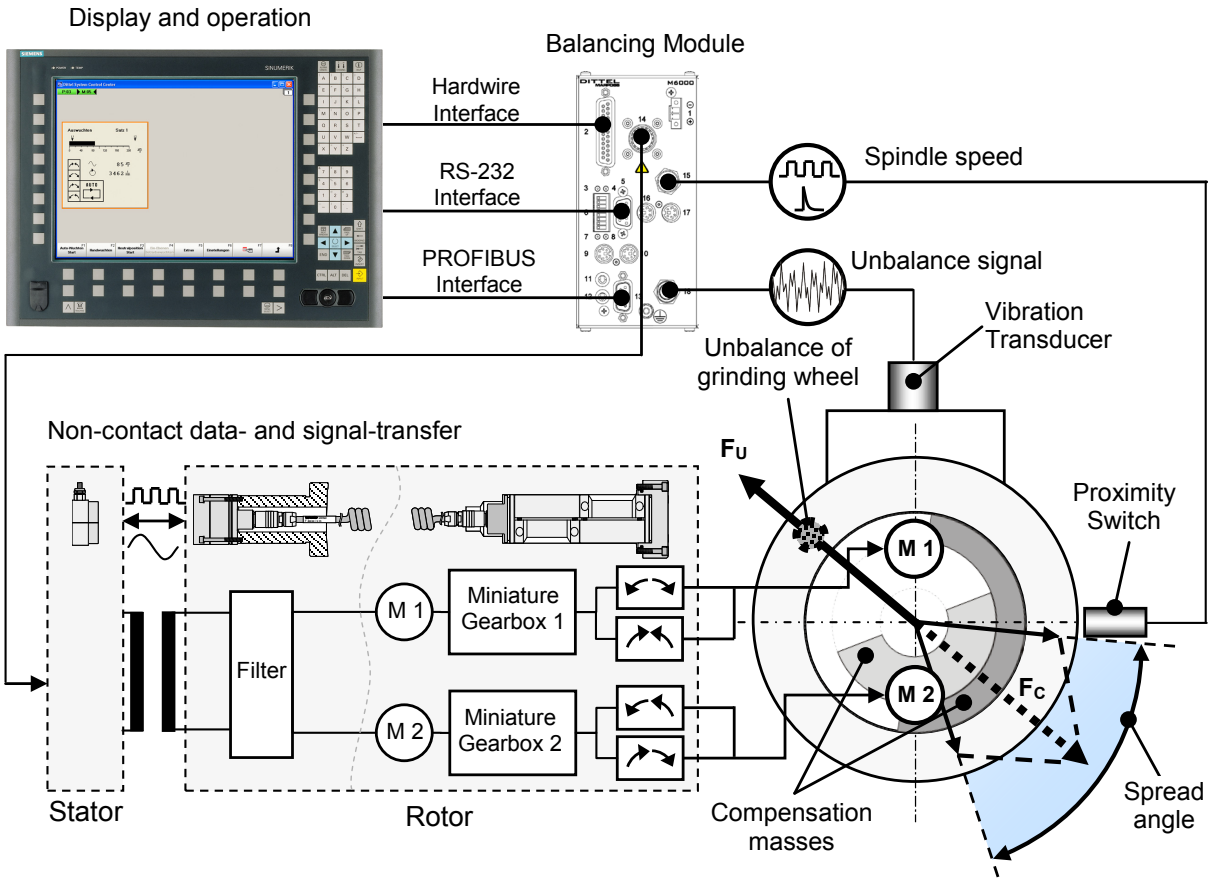
On the M6000 PROFINET module, the PROFIBUS interface was replaced with a PROFINET interface (see supplement to this operation manual, A/N ODNDL03EN04).

2.2 Components of an Electromechanical Balancing System

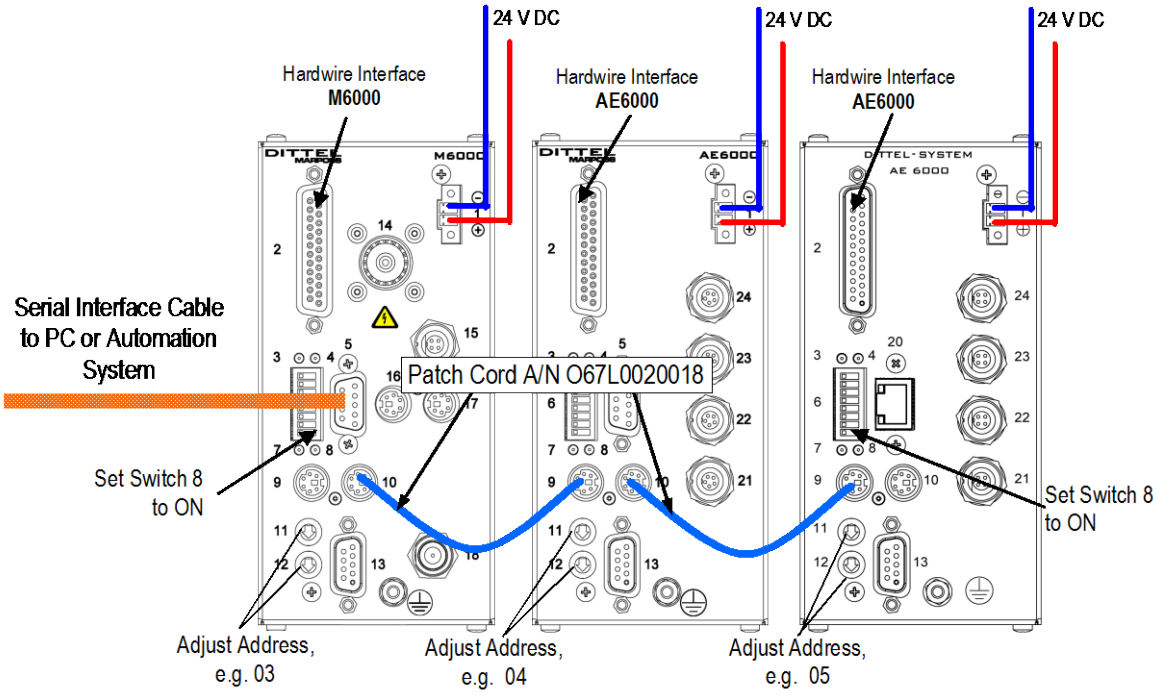
A complete electromechanical Balancing System for one machine tool spindle consists of the following components:

- A Balancing Module M6000,
- An Automation System or a standard PC based on Microsoft Windows®, and corresponding hardware,
- A DITTEL System Control Center (DSCC) Software,
- A Vibration Transducer BA 320D / BA 1020D for fixed mounting or a BA 320M / BA 1020M for magnet mounting,
- A Transmitting Unit (Transmitting Coil),
- A Proximity Switch M8×1 or M12×1, alternative integrated into the transmitting unit,
- An electromechanical Balancing Unit with or without neutral position capability and built-in or external receiver (balancing head, balancing ring or spindle integrated system),
- Connection and extension cables, as required.

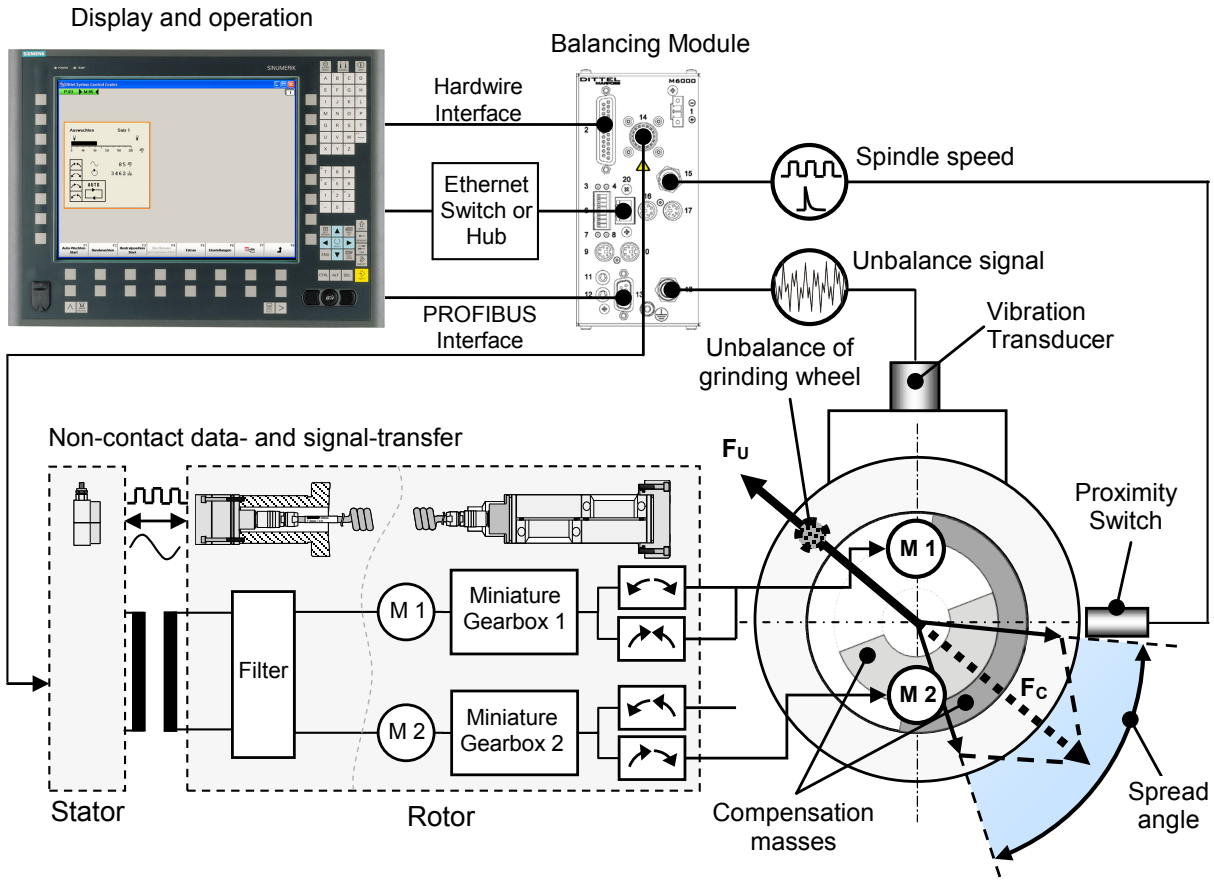
2.3 Principle of the M6000 Balancing System, RS-232 Module



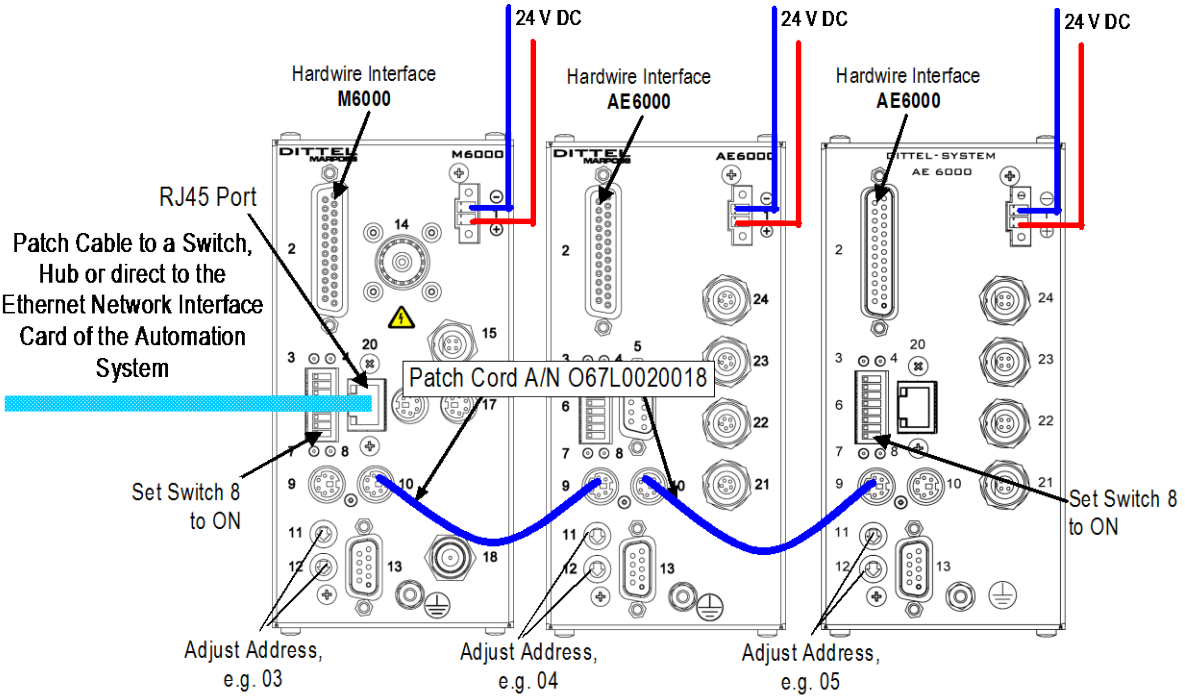
2.3.1 Connection of several DS6000 Modules to a M6000 RS-232 Module



2.4 Principle of the M6000 Balancing System, Ethernet Module



2.4.1 Connection of several DS6000 Modules to a M6000, Ethernet Module



NOTICE For modules with PROFINET, a patch cable of at least 25 cm length (A/N O67L0020025) must be used.

3 Installation of the Balancing System

3.1 Mechanical Installation

3.1.1 Balancing Module M6000

NOTICE

- The built-in fan should provide sufficient cooling. Therefore, do not cover the air inlet!
- To allow adequate air circulation, place the next Module at least 20 mm (0.8”) respectively 50 mm (2”) away from the Module's top and underside (see dimensions in Figure 3-1, Figure 3-2 and Figure 3-3).

The installation locality should fulfil the following conditions:

- Environmental temperature 0 °C … +50 °C / 32 °F … 122 °F,
- Relative humidity 20% … 80%,
- Altitude 0 … 2,000 m / 0 … 6,600 ft.,
- No direct sunlight.
- Atmosphere must be free of conductive substances, corrosive gases, vapours, oily mist, and dripping water. In addition, avoid salty air as well as localities where condensation can appear by temperature variation.

The Module M6000 is intended to be installed in control cubicles. Mounting hardware is available for installation on vertical surfaces, either a mounting panel (Mounting Set 6000-rear panel, article number O10L0001001, formerly A/N E59420) or a clamping device for DIN mounting rails (Mounting Set 6000-clamping device, article number O20L0001001, formerly A/N E59474).

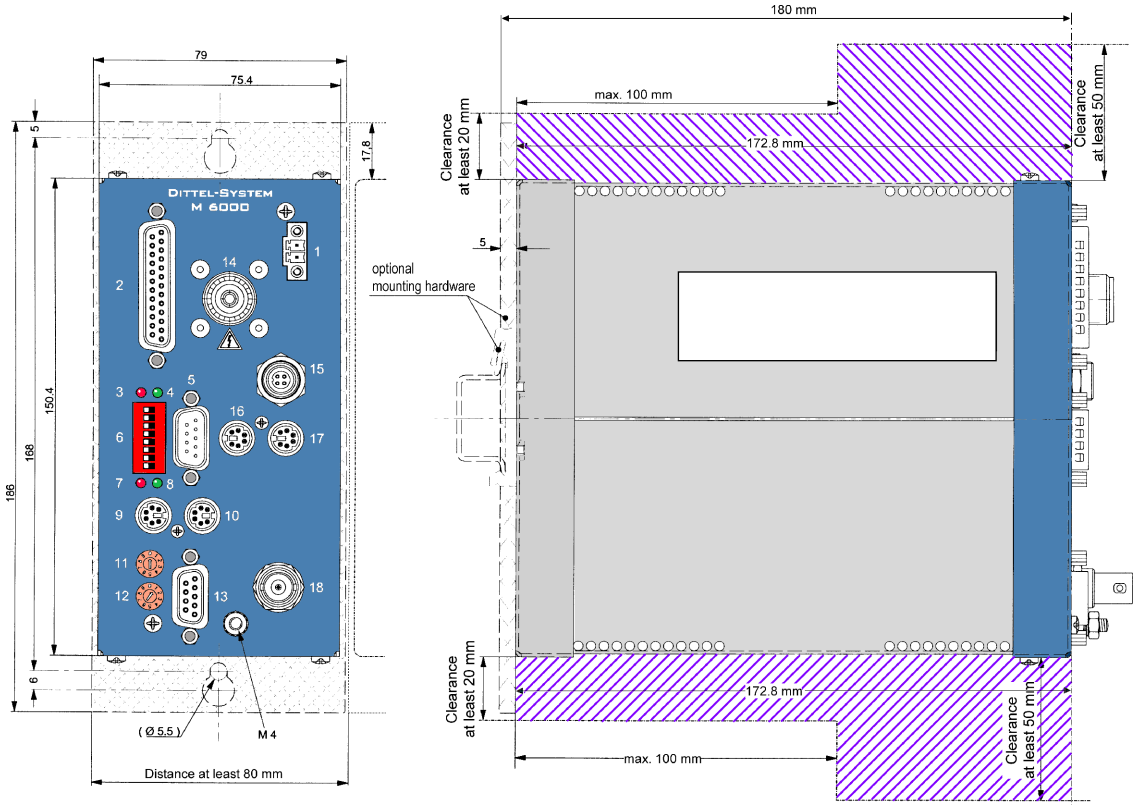


Figure 3-1 **M6000**
Dimensions

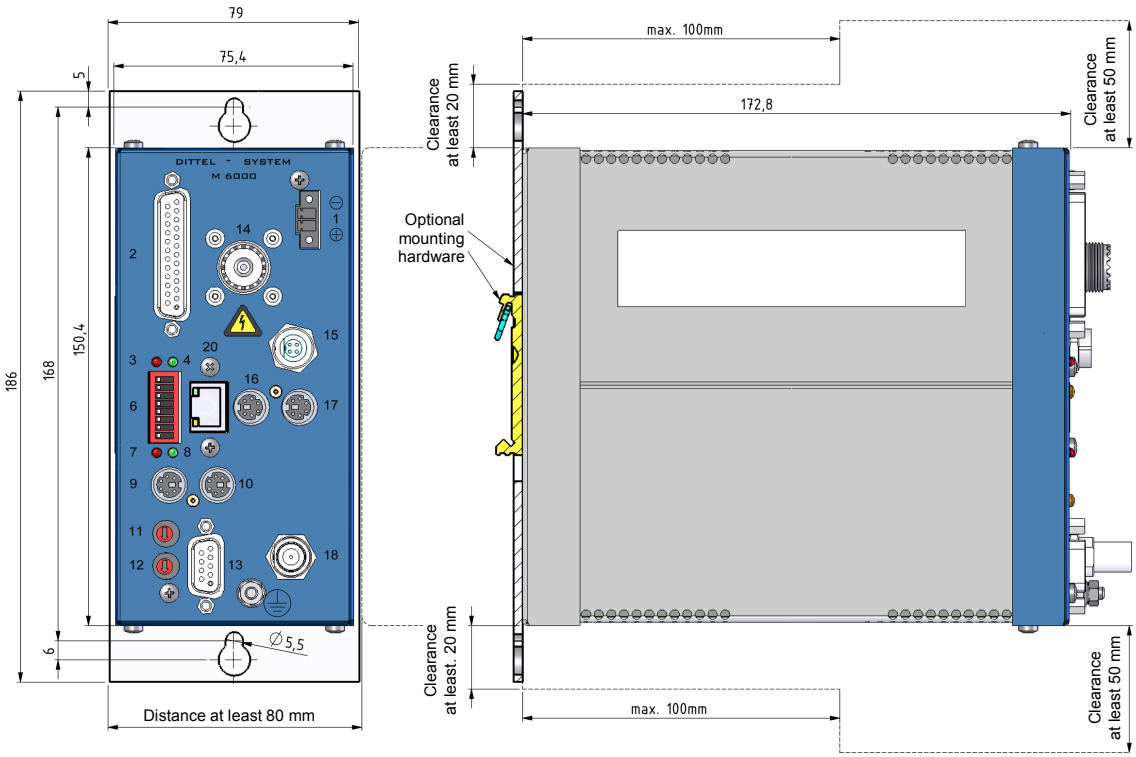


Figure 3-2 **M6000 Ethernet**
Dimensions

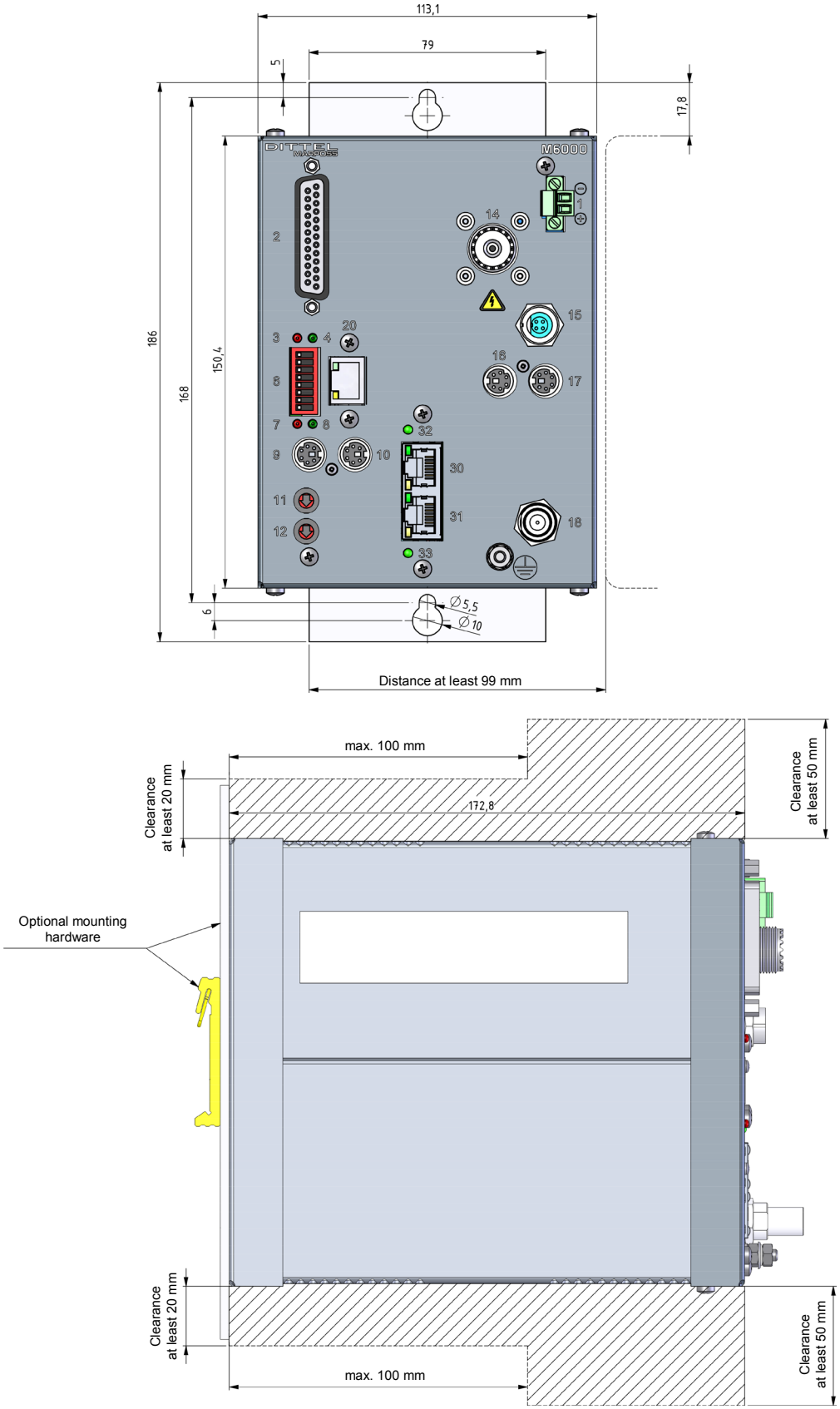


Figure 3-3 **M6000 PROFINET**
Dimensions

3.1.2 Vibration Transducer (Accelerometer)

NOTICE

- The location and installation of the Vibration Transducer are crucial to successful operation of the M6000 Balancing System!
- Each spindle to be balanced must be equipped with its own Vibration Transducer!
- The unbalance display is only true with a fictional Vibration Transducer having a sensitivity of 1000 pC/g and a Sensor Adaptation setting of :1.

The Vibration Transducer is mounted on the machine tool, either permanently stud mounted (type BA 320D/ BA 1020D), or kept by magnetic force (type BA 320M/ BA 1020M). Use the magnetic mount Vibration Transducer preferably for temporary unbalance measurements or/and to localize the best place for a stud mounted Vibration Transducer.

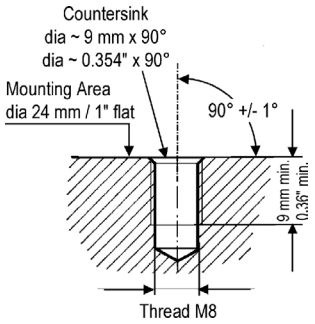
Due to the wide variety of grinding machine characteristics, no statement about the best Vibration Transducer location can be made. Following are two general rules that should help to find the proper Transducer location:

▷ Mount the Vibration Transducer on a rigid part of the machine structure, where vibration from the spindle will be accurately transmitted. For example, a good location is on the spindle housing, as close as possible to the spindle bearing at the wheel side.

▷ Mount the Vibration Transducer in the same direction as the centreline between the grinding wheel and the work piece. The Transducer should always be aligned at the wheel end of the machine.

For standard dimensions of Vibration Transducers, please contact our nearest representative.

Fastening screw thread



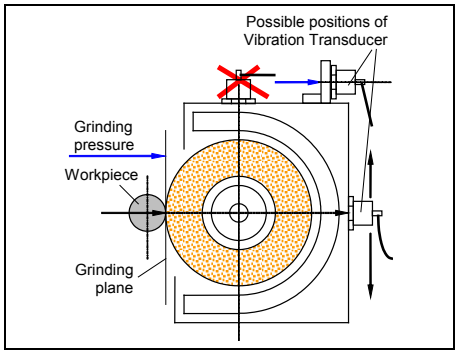
For best measurement results, grind or machine a smooth, flat area of at least 24 mm / 1 inch diameter. For permanent stud mounting (type BA 320D/BA 1020D) prepare a tapped hole M8 with a depth of at least 9 mm, which must be perpendicular within 1° of the mounting surface to ensure no gaps are present between the base of the Transducer and the structure. Before mounting the Vibration Transducer, inspect the area to insure that no metal burrs or other foreign particles interfere with the contacting surfaces. Apply a coupling fluid like silicone grease to achieve a high degree of intimate surface contact.

NOTICE

To avoid risk of damage, tighten the Transducer with not more than 10 N-m (88.5 lbf in).

Mounting Examples

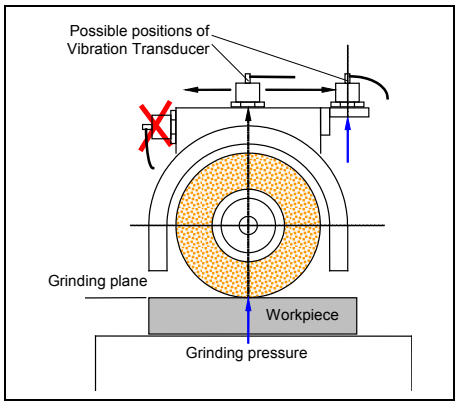
Cylindrical or Centerless Grinder



Arrangement of a Vibration Transducer in horizontal direction on a cylindrical or centerless grinder.

NOTICE Measurement direction parallel to the direction of grinding pressure or perpendicular to the grinding plane!

Surface Grinder



Arrangement of a Vibration Transducer in vertical direction on a surface or creep feed grinder.

NOTICE Measurement direction parallel to the direction of grinding pressure or perpendicular to the grinding plane!

3.1.3 Proximity Switch (Speed Sensor)

⚠WARNING **Risk of injury from rotating parts!**

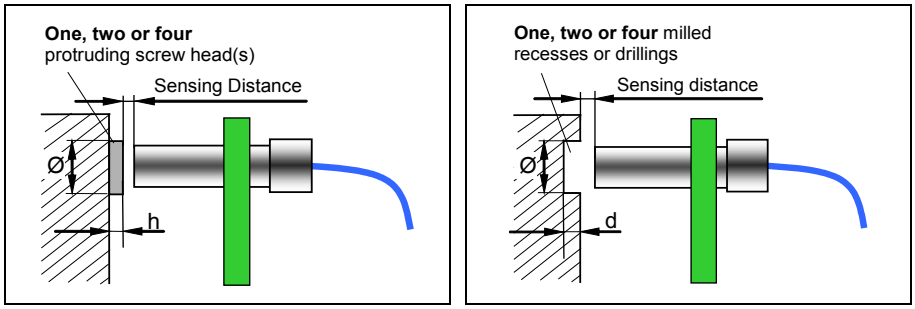
- ▷ Switch OFF the machine when installing or adjusting the Speed Sensor! Ensure that the rotor has stopped, before working on it!
- ▷ Protect the machine against unauthorized or accidental switching ON!
- ▷ NEVER operate a machine tool without all safety guarding in place!

The Proximity Switch or Speed Sensor provides information on the speed or rotation. This is necessary to determine the phase relationship between measured vibration and the rotating spindle. Some of our Transmitter Coils (Stators) are equipped with a Proximity Switch. If not, installation of the Proximity Switch has to be done according to local conditions on the machine.

NOTICE

- For the phase related Balancing Strategy ‘Adaptive 2’ and/or the licensed functions ‘Single-Plane/Two-Plane Pre-Balancing’, the M6000 may receive only ONE pulse per revolution!
- Take the speed direct from the grinding spindle. A protruding screw head or a milled/drilled recess in the pulley may obtain this.

Mounting Examples



The Proximity Switch should be mounted such that the recess(es) or protrusion(s) pass(es) directly under the Proximity Switch’s face.

For safe switching the following dimensions should be kept:

	PROX M 12 × 1	PROX M 8 × 1
Ø	> 15 mm	> 10 mm
h / d	≥ 2 mm	> 1 mm
Sensing Distance	≤ 4 mm	≤ 2 mm

The diameter of the screw head(s) or the milled recess(es) or drilling(s) must be bigger than the diameter of the proximity switch. Increase “h” / “d” at other materials as iron.

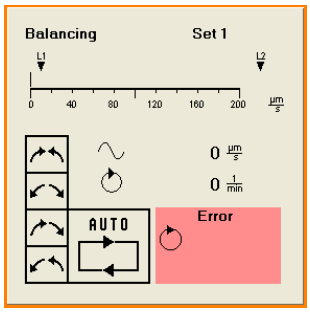
NOTICE

- When the M6000 is operated exclusively in Balancing Strategy **Normal** or **Adaptive 1**, the Proximity Switch may receive also two or four pulses per revolution. The corresponding pulse ratio must then be set in the menu **Current Settings** ➔ '**RPM Input**' (refer to Figure 6-28).
- The type of the Proximity Switch (PNP or NPN) must be set using the Tab "**M Parameter**" (refer to Figure 6-46).
- After installing and adjusting all components on the machine, turn machine spindle or grinding wheel slowly by hand, if possible. Check for protruding or scratching parts.

Checking the Proximity Switch

Required

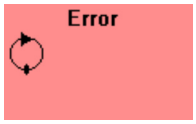
- The equipment M6000 is completely installed, powered by 24 Vdc, the software is ready to run.
- Proximity switch is assembled carefully on the machine and connected to the M6000, socket # 15.
- **The machine spindle is not turning!**
- Ensure that **NO** external HIGH signal is applied at pin 21 of connector # 2 or on PROFIBUS/PROFINET; otherwise the ERROR message is blanked. If in doubt pull off the interface connector # 2.
- Open the Standard Balancing screen of the M6000 Module concerned:



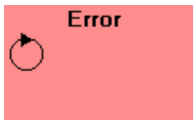
For example, it is shown:

- Unbalance: 0 µm/sec
- Speed: 0 rev/min (Spindle is not turning)
- Error: Speed error, because spindle is not turning

Check of Proximity Switch, when using protruding screw heads as reference:

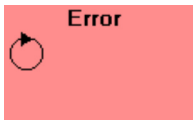


Turn machine spindle slowly by hand, until the protruding part is congruent to the Proximity Switch's face. A vertical mark must appear on the proximity switch **Error** message.

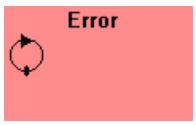


Turning the machine spindle further, the vertical mark must disappear.

Check of Proximity Switch, when using milled recesses or drillings as reference:



Turn machine spindle slowly by hand until the recess or drilling is congruent to the Proximity Switch's face. A proximity switch **Error** message without vertical mark must appear.



Turning the machine spindle further, the vertical mark must appear again.

NOTICE

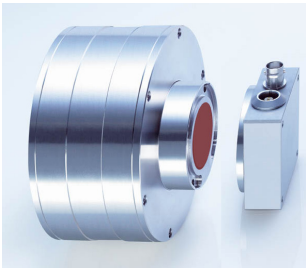
Depending on the manufacturer of the Proximity Switch, a shining LED can also show the switching state. Please notice the respective data sheet of the manufacturer.

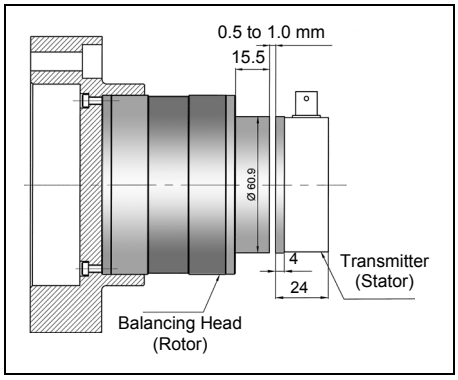
3.1.4 Mechanical Balancing System

⚠WARNING **Risk of injury from rotating parts!**

- ▷ Switch OFF the machine when installing or adjusting the mechanical Balancing System or parts of it! Ensure that the machine spindle has stopped before working on it!
- ▷ Protect the machine against unauthorized or accidental switching ON!
- ▷ **NEVER** operate a machine tool without all proper safety guarding in place.
- ▷ Mind the maximum permitted Speed of your Balancing System!

External Balancing Head



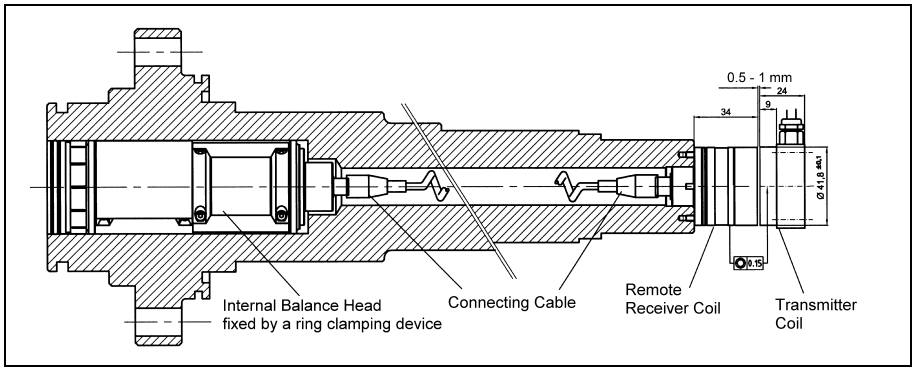


Mount transmitter coil (Stator) and balancing head (Rotor) according our installation drawing on the machine. Align the transmitter coil axially to the balancing head to less than ± 0.3 mm. With a feeler gauge, adjust a distance of 0.5 to 1 mm between transmitter coil and balancing head by moving the transmitter coil axially towards the centre of the balancing head. Check for proper fastening of the balancing head and transmitter coil after adjustment.

Balancing Ring

Mount ring coil and balancing ring according our installation drawing on the machine. Please make sure that the ring coil is congruently lined up to the coil in the balancing ring, axial offset should be less than ± 0.3 mm. With a feeler gauge, adjust a distance of 0.5 to 1 mm between ring coil and balancing ring. Check for proper fastening of the balancing ring and ring coil after adjustment.

Internal Balancing Head



NOTICE

To avoid serious damage of the coupling or gearbox, never twist the balancing weights by hand!

The machine manufacturer must provide a precision-machined mounting bore in order to accept an Internal Balancing Head.

Mount transmitter coil, Balancing Head and remote receiver coil, if applicable, according our installation drawing on the machine. Align the transmitter coil axially to the balancing head coil or remote receiver coil to less than ± 0.3 mm. With a feeler gauge, adjust a distance of 0.5 to 1 mm between transmitter coil and receiver coil. Check for proper fastening of the Balancing Head, (remote receiver coil, if applicable) and transmitter coil after adjustment.

Integrated Balancing System

NOTICE

- To avoid serious damage of the coupling or gearbox, never twist the balancing weights by hand!
- To avoid risk of deformation by bending, never put the Integrated Balancing System on the flange!

The machine manufacturer must provide a precision-machined mounting bore in order to accept an Integrated Balancing System.

Mount transmitter coil and Integrated Balancing System according our installation drawing on the machine. Align the transmitter coil axially to the receiver coil of the Balancing System to less than ± 0.3 mm. With a feeler gauge, adjust a distance of 0.5 to 1 mm between transmitter coil and receiver coil. Check for proper fastening of the Integrated Balancing System and transmitter coil after adjustment.

3.2 Electrical Installation

3.2.1 General

NOTICE

▷ To ensure proper function of the M6000 Module(s) use only connection cables or extension cables supplied by Dittel Messtechnik GmbH.

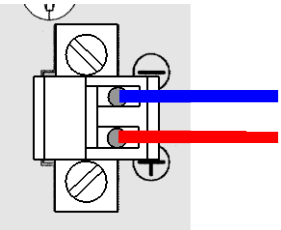
▷ Secure all Standard DB Connectors by using the provided screw locks.

▷ Please safeguard cables with strain relief. Make sure that no tensile stress is exerted on the connectors by the connected cables.

3.2.2 Connector # 1, 24 Vdc Supply

NOTICE

- Wiring the supply must be made by qualified staff of the customer!
- Power the device from a 24 Vdc supply only! The power source must comply with EN 60950 SELV (Safety Extra Low Voltage). Applying a higher voltage can cause the destruction of the device.
- The M6000 module must be protected by an external fuse of 4 amps time-lag (T4A).
  This fuse must comply with IEC 60127 and must blow within 120 sec or less at a current of 8.4 amps.



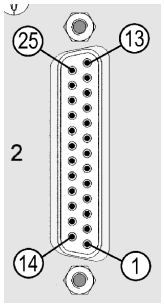
▷ The supplied 2-pole DC plug with coded lugs fits the DC input of the M6000. For wiring, use stranded wires, cross section 1.0 to 1.5 mm², and wire-end sleeves.

▷ Fix plug with both screws!

- The M6000 is switched ON and OFF by the external power supply, the Module itself contains no ON/OFF switch.
- Lack of supply voltage does not result in loss of information in the memory.

Contact	Signal
⊕	+ 24 Vdc ± 6 Vdc
⊖	Power Ground

3.2.3 Connector # 2, Hardwire Interface of the Balancing Function



Type: Standard DB-25 Connector, female

Static interface of the Balancing Function to the Automation System.

Via the inputs, the Automation System using HIGH or LOW signals can control the Balancing Module M6000.

Via the outputs, the Automation System receives various messages from the M6000 as HIGH or LOW signals.

NOTICE

- Wiring the interface mating plug # 2 (supplied) to the machine control must be made by qualified staff.
- Use only shielded cable (shield connected to mating plug housing), cross-section of the cable 0.25 sq mm (#24 AWG) minimum.
- Cover the solder joints on the 25-pole mating plug with shrinking tube.
- Safeguard cables with strain relief.

Pin no.	Function	**I**nput / **O**utput	Signal / Action
1	Monitoring Status	O	While Balancing: HIGH at the Output
2	Monitoring System	O	Speed Sensor Signal and Vibration Transducer Signal OK: HIGH at the Output Speed Sensor Error, Vibration Transducer Error, Transmitter-short-circuit, Balancing Time Exceeded, balancing cycle fails 5-times in a row, Neutral Position Start with speed bigger 500rpm, Neutral Position Start with unsuitable Balancing Head: LOW at the Output (see also appendix B)
3	Monitoring Balancing Time	O	Balancing Time exceeded: LOW at the Output
4	Monitoring Unbalance Limit 1	O	Below Unbalance Limit 1: HIGH at the Output Above Unbalance Limit 1: LOW at the Output
5	Monitoring Unbalance Limit 2	O	Below Unbalance Limit 2: HIGH at the Output Above Unbalance Limit 2: LOW at the Output
6	Monitoring Speed Limit 1	O	Speed below Speed Limit 1: HIGH at the Output Speed above Speed Limit 1: LOW at the Output
7	Monitoring Speed Limit 2	O	Speed below Speed Limit 2: HIGH at the Output Speed above Speed Limit 2: LOW at the Output
8	Monitoring Neutral Position	O	Weights have reached the Neutral Position: HIGH at the Output
9	CM	I	+24 Vdc, must comply with EN 60950 SELV, for example from Machine CNC Control

Connector # 2, Hardwire Interface of the Balancing Function

Pin no.	Function	**I**nput / **O**utput	Signal / Action
10	Monitoring Turn-off Threshold	O	Turn-off Threshold reached: HIGH at the Output
11	Monitoring Neutral Position Active	O	While weights turning towards Neutral Position: HIGH at the Output
12	Automatic Balancing Start/Stop	I	Static Signal from LOW to HIGH: Balancing START Static Signal from HIGH to LOW: Balancing STOP
13	Neutral Position Start/Stop	I	Static Signal from LOW to HIGH: Weights turning towards Neutral Position START Static Signal from HIGH to LOW: Weights turning towards Neutral Position STOP
14	Operation via keys or buttons inhibit	I	Static HIGH Signal: Operator actions on the PC or Automation System keyboard/softkeys are disabled
15	Set Number Selection 1	I	see following Truth Table
16	Set Number Selection 2	I	see following Truth Table
17	Set Number Selection 3	I	see following Truth Table
18	Set Number Selection 4	I	see following Truth Table
19	Blanking of the Unbalance Reading	I	Static HIGH Signal: Blanking of the Unbalance Reading, e.g. while grinding
20	24 Vdc Ground	I	24 Vdc Power Ground
21	Blanking of the Proximity Switch Error Reading	I	Static HIGH Signal: Blanking of the Proximity Switch Error Reading, e.g. at Spindle Stop
22	Analog Output "Filtered Unbalance Signal"	O	500 rpm to 30,000 rpm: 0 …1000 µm/s correspond to 0 … 10 Vdc / -5% 300 rpm to 30,000 rpm: 0 …1000 µm/s correspond to 0 … 10 Vdc / -15% Output equivalent to reading at display, coordinates, PROFIBUS
23	Analog Output "Raw Unbalance Signal"	O	500 rpm to 30,000 rpm: 0 …1000 µm/s correspond to 0 … 10 Vdc / -5% 300 rpm to 30,000 rpm: 0 …1000 µm/s correspond to 0 … 10 Vdc / -15%
24	Analog Output "Speed"	O	80 … 10.000/20.000/30.000 1/min (adjustable) correspond to 0 … 10 V each
25	Analog Ground	-	Common Analog Ground of Outputs 22, 23, 24

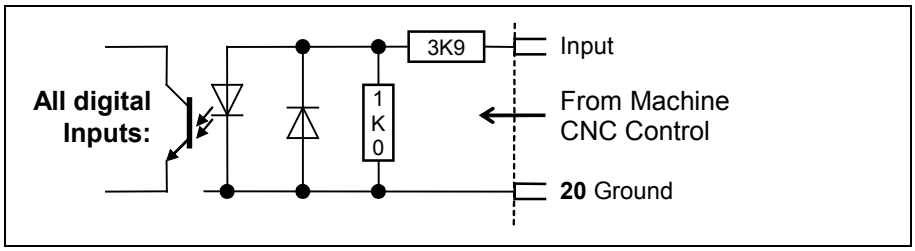
Connector # 2, continued

Truth Table, to select appropriate Set Number by the Machine CNC Control.

NOTICE During Automatic Balancing NO change of the Set Number is permitted. A change is not recognized by the unit or not possible!

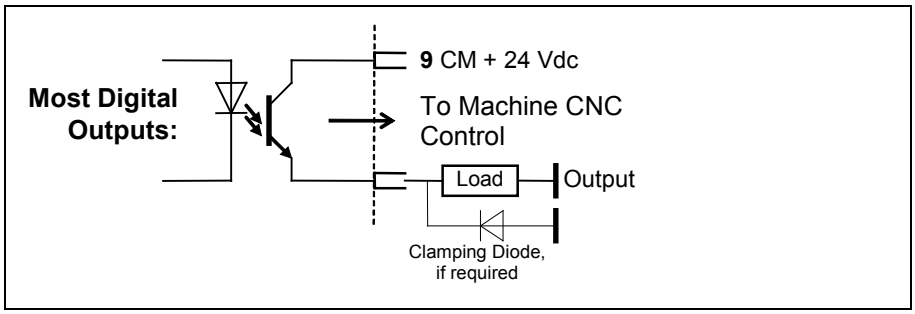
Set No. Selection	# 2/ pin 15	# 2/ pin 16	# 2/ pin 17	# 2/ pin 18
no change	LOW	LOW	LOW	LOW
1	HIGH	LOW	LOW	LOW
2	LOW	HIGH	LOW	LOW
3	HIGH	HIGH	LOW	LOW
4	LOW	LOW	HIGH	LOW
5	HIGH	LOW	HIGH	LOW
6	LOW	HIGH	HIGH	LOW
7	HIGH	HIGH	HIGH	LOW
8	LOW	LOW	LOW	HIGH
9	HIGH	LOW	LOW	HIGH
10	LOW	HIGH	LOW	HIGH
11	HIGH	HIGH	LOW	HIGH
12	LOW	LOW	HIGH	HIGH
13	HIGH	LOW	HIGH	HIGH
14	LOW	HIGH	HIGH	HIGH
15	HIGH	HIGH	HIGH	HIGH

Connector # 2, specification of all digital inputs



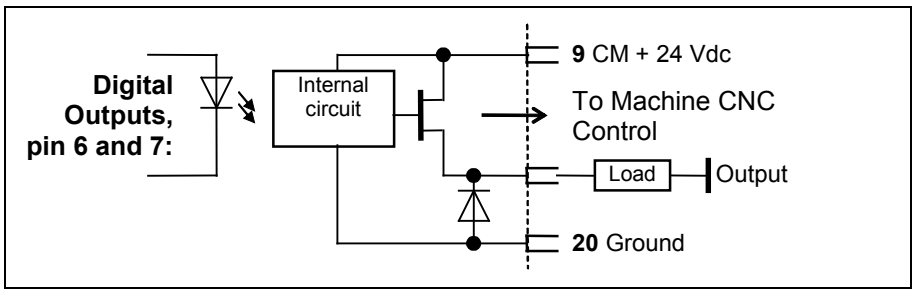
Input Signal LOW	-30 Vdc … +3 Vdc
Input Signal HIGH	+13 Vdc … +30 Vdc
Input Current	typical 5.5 mA at 24 Vdc

Connector # 2, specification of digital outputs, refer to pins 1 to 5, 8, 10 and 11



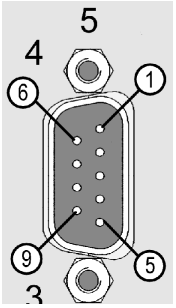
Output Current	10 mA
Recommended Load	2.2 kΩ – 4.7 kΩ at 24 Vdc **Drive inductive load with clamping diode only!**
Power dissipation of Switching Transistor	75 mW maximum

Connector # 2, specification of digital outputs, refer to pin 6 and 7



Output Current	500 mA max. short circuit proof and overload protected
Total of all Output Currents	2 amps maximum
Voltage Drop across Output	I_{Load} × 0.4 Ω maximum
Output Leak Current	10 µA maximum
Recommended Load	2.2 kΩ – 4.7 kΩ at 24 Vdc

3.2.4 Connector # 5 (only for M6000 Modules with RS-232 Interface)



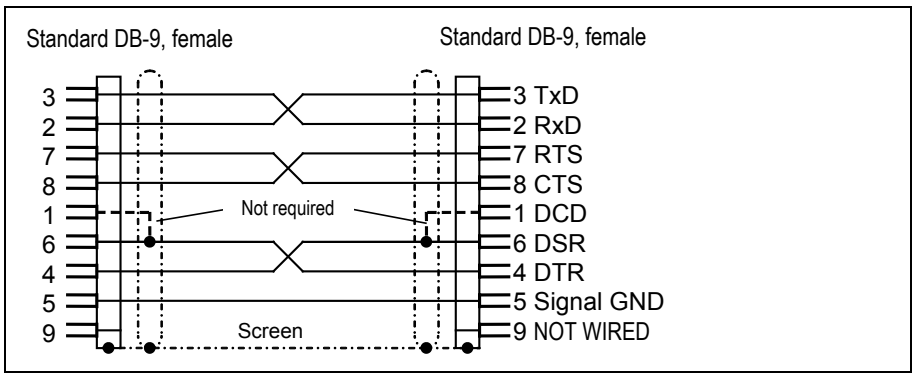
Type: Standard DB-9 Connector, male

RS-232-C Software Interface to operate the M6000 Module through a computer based Automation System or a standard Windows® Computer (Windows® XP / 7 / 10) and additional Dittel System Control Center Software.

Pin no.	**I**nput / **O**utput	Signal name
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5	-	Signal GND
6	In	DSR
7	Out	RTS
8	In	CTS
9	-	not wired

▷ Connect Module's Connector # 5 by a shielded 9-pole Serial Interface cable to an available serial port of your Automation System or Computer.

Serial Interface Cable to connect a PC or Automation System



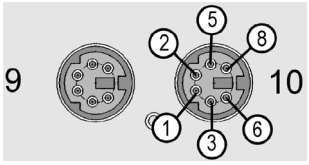
Serial Interface Cable

5 m	A/N O67L0010500 (A/N K0010500)	10 m	A/N O67L0011000 (A/N K0011000)
15 m	A/N O67L0011500 (A/N K0011500)	20 m	A/N O67L0012000 (A/N K0012000)

3.2.5 Connectors # 9 and # 10

NOTICE These sockets are used to connect up more than one DS6000 Module!

▷ The first and last Module of the network has to be terminated (refer to 3.3.1 Setting the DIP-Switch # 6, switch SW8 = ON).



Type: 6-pole Miniature DIN-Sockets

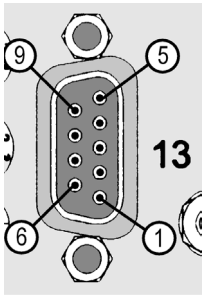
When operating more than one DS6000 Module they must be connected up by special Patch Cords, length e.g. 18 cm/ 7” (A/N O67L0020018, formerly A/N K0020018).

For modules with PROFINET, a patch cable of at least 25 cm length (A/N O67L0020025) must be used.

At Modules placed side by side, practically Connector # 9 is connected to Connector # 10 of the next Module and so on. However, connecting Connector # 9 to # 9 or Connector # 10 to # 10 is permitted as well.

Pin no.	Signal name
1	not connected
2	not connected
3	CAN-H
5	COMM GND
6	not connected
8	CAN-L

3.2.6 Connector # 13, PROFIBUS Interface of the Balancing Function (only for M6000 Modules with PROFIBUS Interface)



Type: Standard DB-9 Connector, female

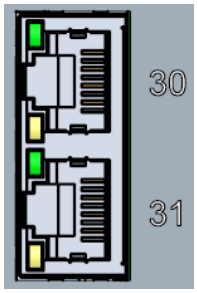
Replaces among others all digital inputs and outputs of the Hardwire Interface, Connector # 2.

Connection to a PROFIBUS Interface of an Automation System or PC via special PROFIBUS®-cable and -plug.

NOTICE Qualified staff of the customer must make the wiring of the PROFIBUS Interface, Connector # 13, to the PC or Automation System!

Pin no.	Signal name
1	not connected
2	not connected
3	RxD/TxD-P (Data line B)
4	CNTR-P
5	DGND (Data reference potential)
6	VP (Power supply plus)
7	not connected
8	RxD/TxD-N (Data line A)
9	not connected

3.2.7 Connectors # 30/31, PROFINET Interface of the Balancing Function (only for M6000 Modules with PROFINET Interface)



Type: Double Ethernet socket

Replaces all digital inputs and outputs of the Hardwire Interface, Connector # 2.

Connection to the PROFINET interface of an automation system or PC using a special cable and connector.

Connector # 31 – PROFINET port 1
Connector # 30 – PROFINET port 2

LED indicators: Network connected (lights yellow) and Data transfer (flashes green)

NOTICE Qualified staff of the customer must make the wiring of the PROFINET Interface, Connectors # 30/31, to the PC or Automation System! The minimum cable requirement is Cat 5e with SF/UTP shielding.

NOTICE The PROFINET implementation is certified to PNIO version V2.33. The interface is certified to Conformance Class A, B and C. The M6000 PROFINET module uses only Conformance Class A. The network load was tested to Class III.

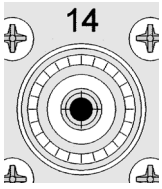
NOTICE

- The MAC address of the PROFINET module is shown on the rating plate of the M6000 module.
- The MAC address of port 1 is:
  MAC address of the PROFINET module + 1
- The MAC address of port 2 is:
  MAC address of the PROFINET module + 2
- Example:
  MAC address of PROFINET module: 70:B3:DB:00:80:**CE**
  MAC address of PROFINET port 1: 70:B3:DB:00:80:**CF**
  MAC address of PROFINET port 2: 70:B3:DB:00:80:**D0**

3.2.8 Connector # 14

⚠CAUTION **Risk of injury from high voltage!**

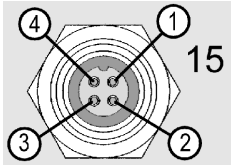
▷ On Connector # 14 a voltage up to 30 V_{RMS} may appear. Never operate the Module M6000 without transmitter unit connected or without protecting cap!



Type: UHF Socket

▷ Connect the Transmitting Unit of the Dittel Balancing System to this connector # 14 using a coaxial cable (one end UHF-plug, other end BNC-socket).

3.2.9 Connector # 15



Type: 4-pole Miniature Socket

Standard connector of the Proximity Switch. The Proximity Switch is either a part of the Transmitter Unit of the Balancing System or mounted separately at the machine tool to provide information on the speed of the rotor.

▷ Connect the Proximity Switch via a Prox Switch Cable to this socket # 15.

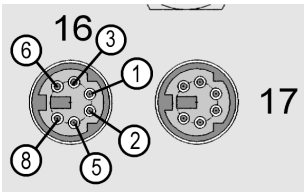
Mechanical installation of the Proximity Switch, see paragraph 3.1.3.

NOTICE

▷ Setting the type of the Proximity Switch (either PNP or NPN) is done in the DITTEL System Control Center Software (**Settings** ➔ Tab **M Parameter**).

Pin no.	**PNP Prox Switch**	**NPN Prox Switch**
1	Supply +24 Vdc	Supply +24 Vdc
2	PNP rpm Input	NPN rpm Input
3	Supply 0 Vdc (Gnd)	Supply 0 Vdc (Gnd)
4	Screen/Chassis Ground	Screen/Chassis Ground

3.2.10 Connectors # 16 and # 17



Type: Two 6-pole Miniature DIN-Sockets

Connector # 16:
Special speed input, for example for the switching pulses from the encoder interface of SIEMENS® Terminal Module TM41.

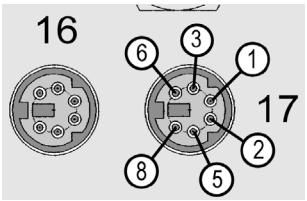
Pulse duration 20 µsec minimum! For units with serial number O18xxxxxx or later, 1 µs is permitted.

For proper use, use a suitable data cable with nominal impedance of 120 Ohms, or our prefabricated special cable A/N O67L1160XXX (A/N K116XXXX).

NOTICE

- For the phase-related Balancing Strategy '**Adaptive 2**' and/or the licensed feature **Single-Plane/Two-Plane Pre-Balancing** the encoder interface must supply a speed signal, the phase of which is related to the spindle. Without phase reference, balancing is not possible.
- For the phase related Balancing Strategy '**Adaptive 2**' and/or the licensed feature '**Single-Plane/Two-Plane Pre-Balancing**', the M6000 may receive only ONE pulse per revolution from the encoder interface!

Pin no.	Signal name
1	not connected
2	not connected
3	Encoder Signal 0 Vdc (Ground)
5	RS-422 + (Encoder Signal HIGH)
6	RS-422 - (Encoder Signal LOW)
8	not connected



Connector # 17:

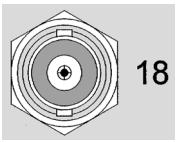
Output to pass the Speed Signal to a second Balancing Module, e.g. if **one** Speed Signal is used for **two** spindles.

The Proximity Switch signal from Connector # 15 is passed as well as the Encoder signal from Connector # 16!

For this use, connect Connector # 17 of the first unit to Connector # 16 of the second unit by our prefabricated special Patch Cords, length 18 cm/7”, A/N O67L0020018 (A/N K0020018).

Pin no.	Signal name
1	not connected
2	not connected
3	Encoder Signal 0 Vdc (Ground)
5	RS-422 + (Encoder Signal HIGH)
6	RS-422 - (Encoder Signal LOW)
8	not connected

3.2.11 Connector # 18



Type: Female BNC-Socket

to connect the Vibration Transducer of the Balancing system.

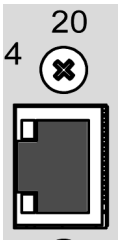
Connect the Vibration Transducer BA 320 or BA 1020 using a coaxial cable (one end TNC-, other end BNC plug) with this connector # 18.

Mechanical installation of the Vibration Transducer, see paragraph 3.1.2.

NOTICE

▷ To avoid electrical interference route the coaxial cable of the Vibration Transducer as far as possible from cables carrying heavy current!

3.2.12 Connector # 20 (only for M6000 Modules with Ethernet Interface)



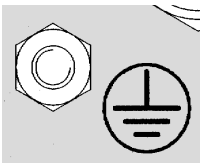
Type: RJ45-Jack

▷ Connect the RJ45 jack via a ready-made Ethernet cable with an Ethernet Hub or Switch, which in turn is connected to the Ethernet network interface card of the Automation System.

If you want to connect the M6000 Module directly to the Ethernet network interface card of a notebook computer, an Ethernet Cross over cable may be required.

LED indicators: Ethernet cable connected (lights green) and Data transfer (flashes yellow)

3.2.13 Ground terminal, stud M4 and hex nut



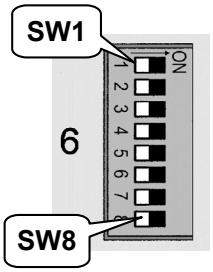
To reduce electrical interference make sure that the Module M6000, all balancing components and the machine CNC control are on a common mass potential. If this is not guaranteed by the installation on the machine all components must be bonded by suitable bonding straps to a common local earth (ground).

- The bonding straps should be as short as possible, the cross section as big as possible (recommended 16 mm²).
- Use cable lug for high-quality connection!

3.3 Settings before getting started

NOTICE Every change of the switches # 6, # 11, and # 12 (except SW8 of DIP-Switch # 6) gets effective only after switching OFF and ON again the supply voltage of the Module!

3.3.1 Setting the DIP-Switch # 6



NOTICE Before getting started the M6000, some settings must be carried out with the eight switches, if applicable!

Valid for RS-232 Module: Setting the RS-232 Baud Rate

The Baud Rate to be adjusted here must agree with the RS-232 interface of your PC or Automation System (always **57600**, see Figure 5-12), the Remote Control RC6000 or agree with the external interface converter (serial/Ethernet).

	SW1	SW2
Standard Setting: 57,600, 1 Stop bit, no Parity:	OFF	OFF
38,400, 1 Stop bit, no Parity:	ON	OFF
19,200, 1 Stop bit, no Parity:	OFF	ON
programmable from PC (Default Setting: 208,333)	ON	ON

Valid for Ethernet Module

NOTICE When operating the Ethernet Module both switches, **SW1** and **SW2**, must be **OFF**!

	SW1	SW2
Standard for M6000 Ethernet:	OFF	OFF

Setting the CAN Baud Rate

Required, if more than one Module is used!

	SW3	SW4
Default Setting: 500k:	OFF	OFF
250k:	ON	OFF
125k:	OFF	ON
1M:	ON	ON

Operation Mode

	SW5	SW6
Default setting **NORMAL**:	OFF	OFF
For future use:	ON	OFF
Reset to Factory Setting (for authorised personnel only):	OFF	ON
For future use:	ON	ON

Bootstrap Loader Mode

For authorised personnel only!

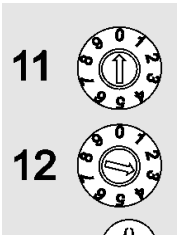
SW7:	**Standard: OFF**

CAN Terminator

The first and last Module of a module network must be terminated, i.e. switch SW8 of these Modules must be set to ON!

SW8:	ON / OFF Default Setting: OFF

3.3.2 Rotary Decode Switches # 11 and # 12



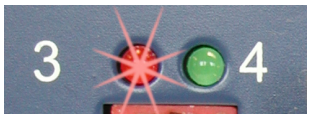
Factory setting: Module Address **‘03’!**

By using the rotary decode switches # 11 (tens) and # 12 (units) the **Module Address** (03 … 99) is set.

NOTICE

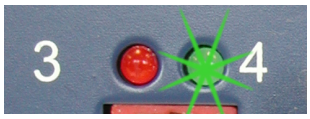
- At several Modules set on every Module another Module Address except **‘00’!**
- When setting the Module Address **‘00’**, the LEDs # 3 and # 7 are flashing slowly and alternately; the Module M6000 is not operational!
- When operating the M6000 Module via PROFIBUS Interface notice addresses of other PROFIBUS user. The Module Address complies with the PROFIBUS address.
- Every change of the Module Address gets effective only after switching OFF and ON again the supply voltage of the Module!

3.4 LED Displays while operating



Key Operation Inhibit LED # 3, red
Key Operation Inhibit LED is OFF:
Standard operator actions of the M6000 via keyboard, softkeys, or function keys of the Automation System or Personal Computer.

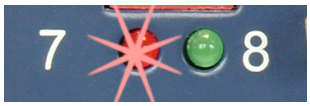
Key Operation Inhibit LED lights up:
Operator actions on the keyboard, softkeys, or function keys of the Automation System or Personal Computer are disabled (Connector # 2, pin 14 = HIGH or via PROFIBUS interface, Connector # 13, or PROFINET interface, Connectors # 30/31). The module can only be controlled externally via the Hardwire Interface # 2 or via PROFIBUS # 13 or PROFINET # 30/31.



ON LED # 4, green
ON LED is OFF:

- The M6000 Module is NOT powered by a 24 Vdc source and/or
- the internal, resettable fuse (4 Amp) and/or the external fuse has tripped.

ON LED lights up:
The M6000 is ready to operate.



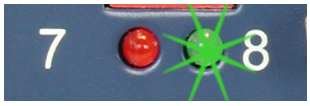
SYSTEM MONITOR LED # 7, red
SYSTEM MONITOR LED is OFF:
Complete Balancing System OK!

SYSTEM MONITOR LED lights up:

- **While in the Function Neutral Position**:
  unsuitable Balancing Head or faulty Balancing Head, and/or speed above 500 rpm.
- **While in the Function Balancing**:
  - Vibration Transducer signal is missing and/or
  - Speed below 300 rpm (if not blanked by a HIGH signal at pin 21 of connector # 2) or above 30,000 rpm, and/or
  - Short circuited Transmitter Unit and/or
  - Balancing Time exceeded and/or
  - Balancing failure.

NOTICE Except “Balancing Time exceeded”, all failures described above abort the Balancing Function immediately.

Simultaneously a System Monitor Failure Signal (LOW signal) is fed through pin 2 of connector # 2 to the machine CNC control or equivalent via PROFIBUS/PROFINET.
If the Balancing Time is exceeded, an **additional** LOW signal is fed through pin 3 of connector # 2 to the machine CNC control or equivalent via PROFIBUS/PROFINET.

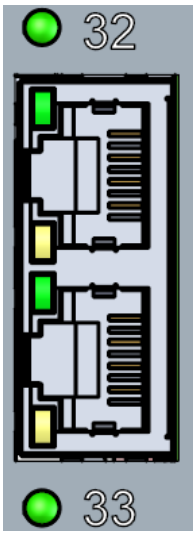


For M6000 modules with PROFIBUS interface only

PROFIBUS LED # 8, green

PROFIBUS LED lights up:

The Module is exchanging data with the MASTER



For M6000 modules with PROFINET interface only

PROFINET module status LED # 32, green/yellow/red

LED status	Description
green	The module is exchanging data with the master.
green, flashing continuously	I/O controller in the stopped state
red, flashing continuously	Configuration or parameter settings error
red	Error
yellow, flashing continuously	PROFINET LED flash command

PROFINET network status LED # 33, green/yellow/red

LED status	Description
green	The module is exchanging data with the master.
green, flashing continuously	Connecting
red, flashing continuously	No link/PROFINET configuration or parameter settings error
red	No network connection or IO controller not in operating mode
yellow, flashing continuously	PROFINET LED flash command

4 Dittel System Control Center Software

4.1 General

4.1.1 Hardware Requirements

To use our Dittel System Control Center (DSCC) Software the following hardware is required:

- a PC based Automation System for machine tools (e.g. SINUMERIK®) or a standard Windows® PC with Intel®- or AMD®-Processor and with a hardware equipment corresponding to the operating system,
- a free serial port (RS-232) on the Automation System or computer,
- or an Ethernet interface on the Automation System or computer.

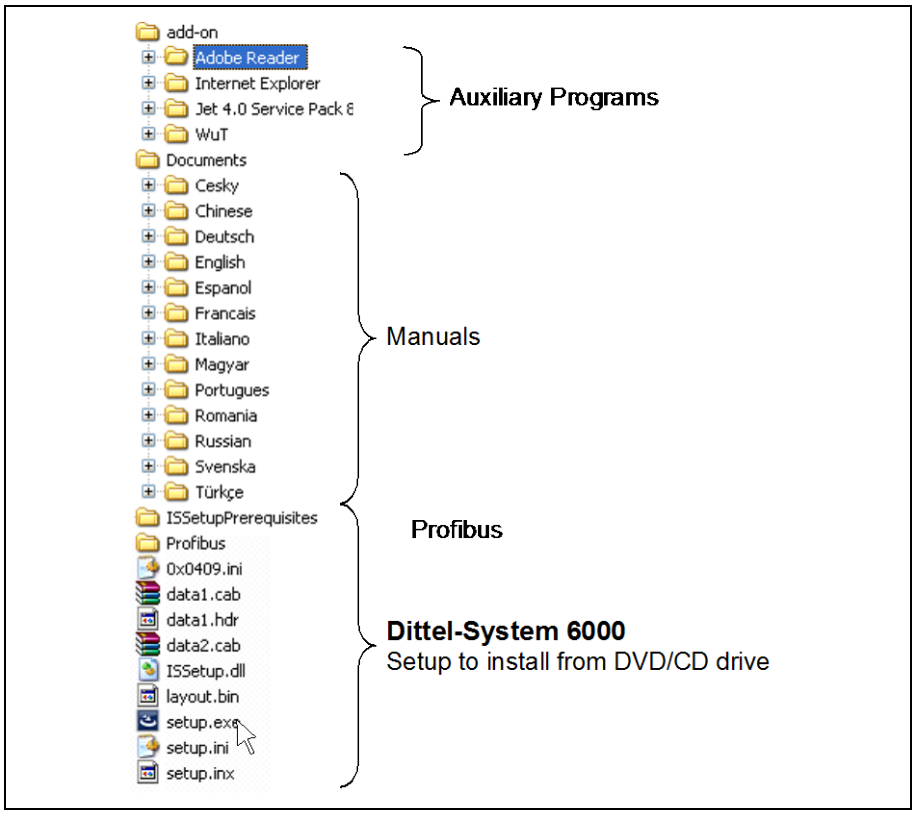
4.1.2 Supported Operating Systems / System Requirements

Operating System	Remarks
Windows® XP	no restriction
Windows® 7	no restriction
Windows® 10	no restriction

Applies to all operating systems:

- TCP/IP-Stack must be installed.
- At least an 8-bit (256 colours) screen display is recommended.
- For the Online Help function a Microsoft Internet Explorer Version 5.x or later is required (refer to 4.1.3 Directory structure ➔ Auxiliary Programs).

4.1.3 Directory Structure



4.1.4 Running set-up program using CD-ROM or DVD

NOTICE Installing the set-up program on Windows® XP / 7 / 10 must be done with administrator rights!

Proceed as follows

▷ Insert the Dittel System Control Center CD-ROM or DVD into the respective drive of your Automation System or computer.

▷ From Windows® start the file manager (e.g. Explorer) and select the appropriate drive.

▷ Start *Setup.exe*.

NOTICE

▷ Continue with running the set-up program as described in paragraph 4.2.

▷ If you want to update the program, continue as described in paragraph 4.3.

4.2 Software Installation

4.2.1 Standard Windows®

NOTICE Should the Dittel System Control Center Software be installed on a SINUMERIK® 840D, skip this chapter and proceed as described under paragraph 4.2.2, SINUMERIK® 840D.

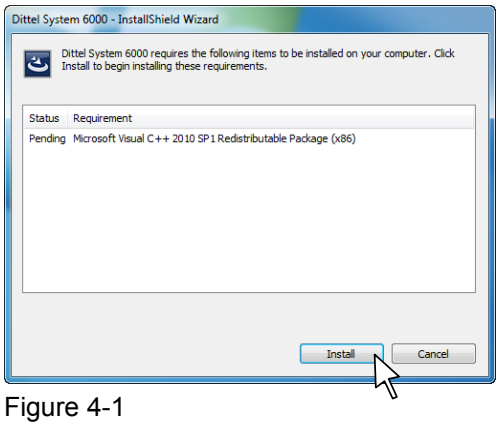


Figure 4-1

If not all prerequisites for installation have been met yet, the opposite dialog will be displayed.

▷ Click on [Install >] to continue.

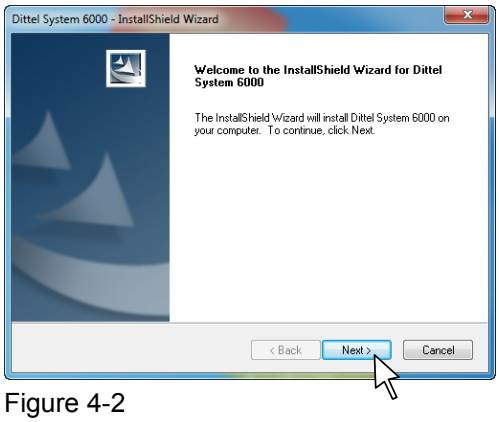


Figure 4-2

If all prerequisites for installation have been met, a Welcome window opens after starting the set-up.

▷ Click on [Next >] to continue.

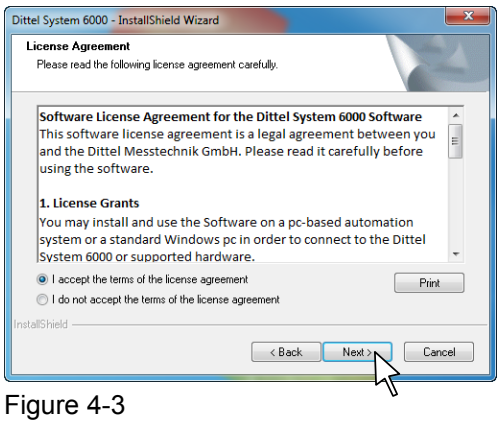


Figure 4-3

Read the License Agreement thoroughly. If required, the License Agreement can be printed, see button [Print].

▷ If you accept the License Agreement, click on [Next >].

The installation process will continue.

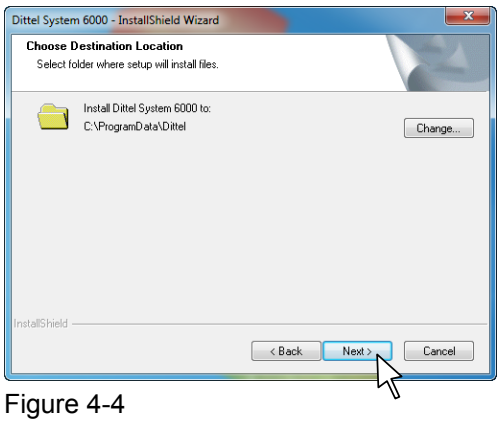


Figure 4-4

On the opposite window select the folder where the set-up will install the files:

It is recommended not to change the path.

▷ Click on [Next >] to continue.

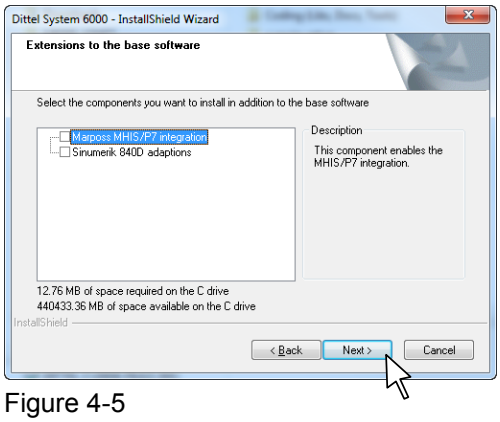


Figure 4-5

Additionally to the base software the following extensions may be installed:

- **Marposs MHIS/P7 integration**

NOTICE With this option the Marposs software MHIS is integrated and activated or deactivated.

- **Sinumerik 840D adaptions**

NOTICE This option should **NOT** be selected when a standard Windows® installation is running.

- If no extension is selected only the base software is installed.

▷ Click on [Next >] to confirm the extension - if any.

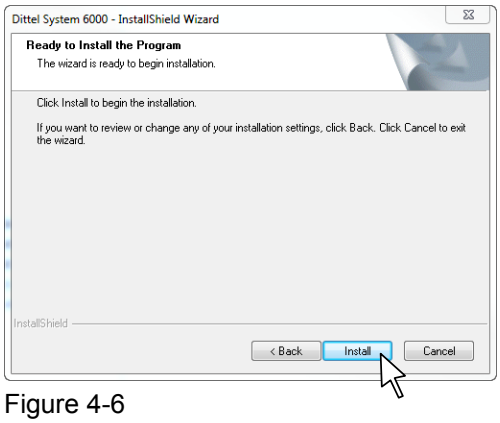


Figure 4-6

The installation starts with the opposite window:

▷ Click on [Install] to continue.

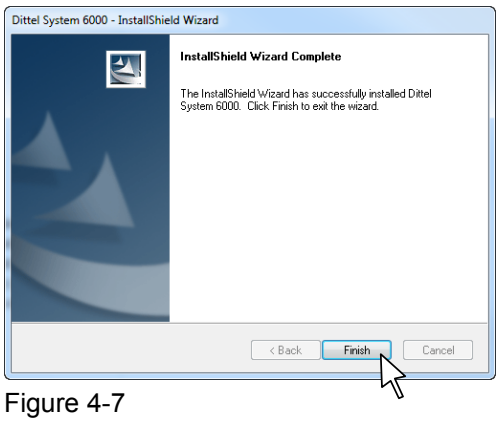


Figure 4-7

After successful installation the opposite window is displayed:

▷ Click on [Finish] to complete the installation of the Dittel System Control Center Software.

NOTICE

WHEN USING Windows® XP / 7 / 10:

If the request for a reboot should appear, then it is mandatory that you apply again with the same user name. The installation can be completed successfully only in such a way.

4.2.2 SINUMERIK® 840D

The following chapter describes the installation of the Dittel System Control Center Software on a SINUMERIK® 840D (based on Windows® XP / 7 / 10).

PCU 50 How to start the SINUMERIK® in the Service Mode:

- ▷ During the start-up phase of the SINUMERIK® the message "*Please select operating system to start*" is displayed. Press the [↓] key once.
- ▷ Confirm by pressing the yellow [Input] key and the main menu is displayed.
- ▷ Select "Standard Windows (Service Mode)" by pressing the [4] key.
- ▷ In the following menu select "Standard Windows (without starting SINUMERIK® HMI)" by pressing the [1] key.
- ▷ Without operating any key wait till the reboot is complete.
- ▷ If you are asked for the password, enter <*SUNRISE*>.
- ▷ Run the set-up as described in paragraph 4.1.4.

PCU 50.3 How to start the SINUMERIK® Service-Desktop:

- ▷ During the start-up phase of the SINUMERIK® press the [3] key as soon as the Version number is displayed in the lower right corner of the boot screen.
- ▷ If you are asked for the password, enter <*SUNRISE*>.
- ▷ In the following menu select "Service-Desktop" or press the [Return] key.
- ▷ Run the set-up as described in paragraph 4.1.4.

PCU 50.5 How to start the SINUMERIK® Service-Desktop:

- ▷ During the start-up phase of the SINUMERIK® press the [3] key as soon as the Version number is displayed in the lower right corner of the boot screen. Or if a Touch Panel is used, as soon as counted down from 3.
- ▷ Login with the administrator account, which was created by installing the *PCU Base Software.*
- ▷ Run the set-up as described in paragraph 4.1.4.

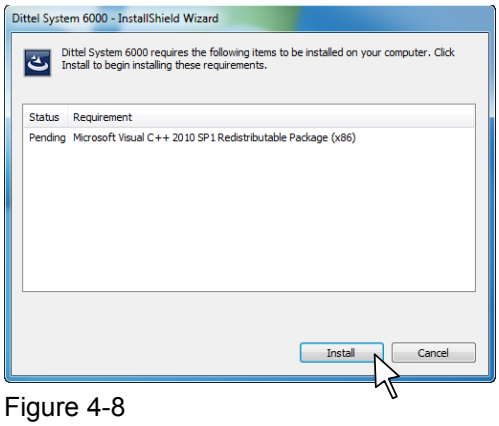


Figure 4-8

If not all prerequisites for installation have been met yet, the opposite dialog will be displayed.

▷ Click on [Install >] to continue.

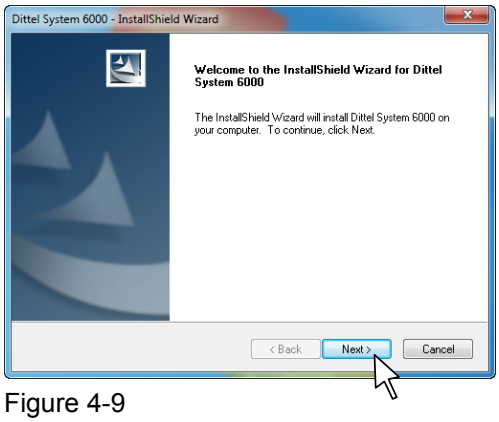


Figure 4-9

If all prerequisites for installation have been met, a Welcome window opens after starting the set-up.

▷ Click on [Next >] to continue.

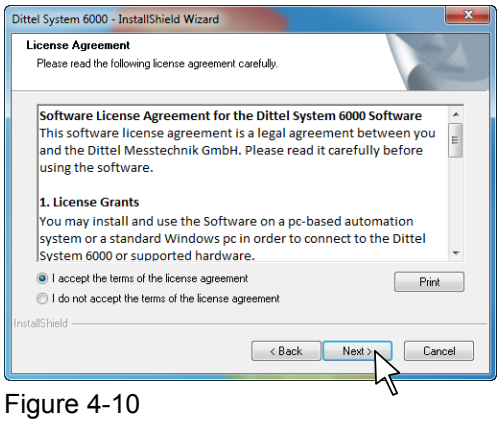


Figure 4-10

Read the License Agreement thoroughly. If required, the License Agreement can be printed, see button [Print].

▷ If you accept the License Agreement, click on [Next >].

The installation process will continue.

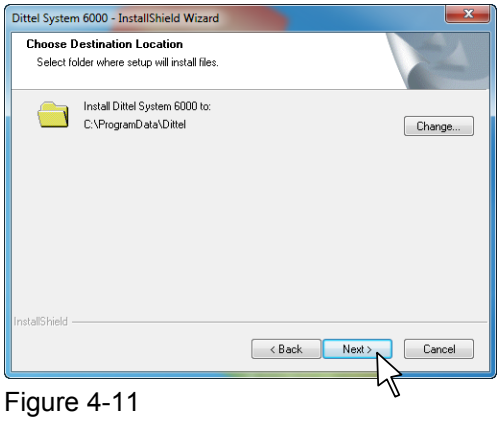


Figure 4-11

The target directory can be changed in the adjacent screen:

We recommend that you leave the path unchanged.

The following steps relate to the default installation path (see Section 4.5.1 on page 55).

▷ Click on [Next >] to continue.

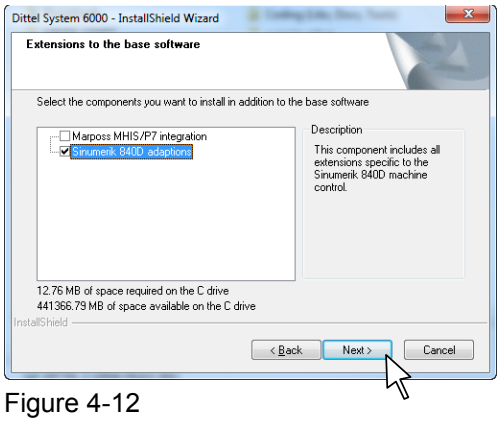


Figure 4-12

Additionally to the base software the following extensions may be installed:

- **Marposs MHIS/P7 integration**

NOTICE With this option the Marposs software MHIS is integrated and activated or deactivated.

- **Sinumerik 840D adaptions**

NOTICE **Make sure this option is selected!**

▷ Click on [Next >] to confirm the extension.

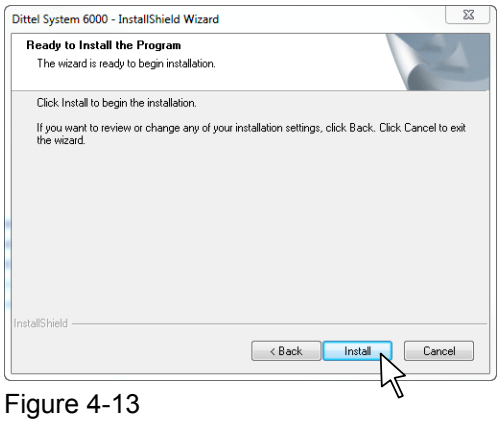


Figure 4-13

The installation starts with the opposite window:

▷ Click on [Install] to continue.

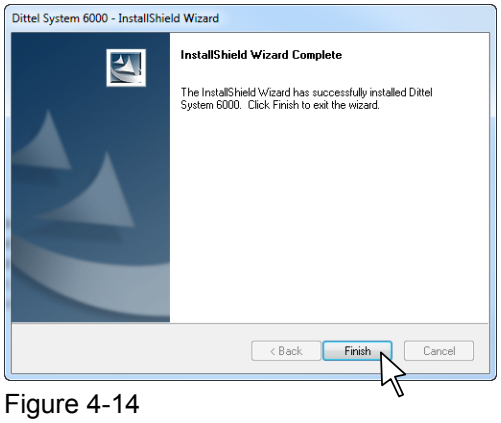


Figure 4-14

After successful installation the opposite window is displayed:

▷ Click on [Finish] to complete the installation of the Dittel System Control Center Software.

NOTICE **WHEN USING Windows® XP / 7 / 10:**

If the request for a reboot should appear, then it is mandatory that you apply again with the same user name. The installation can be completed successfully only in such a way. In this case start the SINUMERIK® in the "Service Mode" or with the "Service-Desktop" (as described at the beginning of this paragraph).

▷ Now you can generate a softkey for the Dittel System Control Center Software:

Additionally a directory *oem* was created in the directory *%ALLUSERSPROFILE%\Dittel*. Here you will find examples for the integration of the Dittel System Control Center into *SINUMERIK HMI Advanced (regie.ini, oemframe.ini* and *language\re_xx.ini)* or *SINUMERIK Operate (systemconfiguration.ini* and *oemframe.ini*).

The paths of the sample files *(systemconfiguration.ini* and *regie.ini)* to the executable files *scc.exe* and *sccviewer.exe* were adjusted automatically by the Setup.

NOTICE The system environment variable *%ALLUSERSPROFILE%* depends on the operating system and user settings.

To find out where the directory is actually located, enter the path *%ALLUSERSPROFILE%/Dittel* in the address bar of Windows Explorer. Confirm the input with the [Enter] key.

SINUMERIK HMI Advanced

- ▷ Copy the files *regie.ini, oemframe.ini* and *language\re_xx.ini* into your OEM-directory (e.g. *f:\oem)* or extend your configuration files according to the example files.
- ▷ Now you can close the Service Mode or the Service-Desktop and start the Automation System normally. The DSCC Program starts when pressing the appropriate softkey.

NOTICE If only a pre-configured minimum view shall be started and not the complete application the following program arguments are available when calling the program "sccviewer" (see example file *Regie.ini*):

```
Task10 = name := oemframe, cmdline :=
"f:\\oem\\DS6000\\sccviewer.exe /mode:start 0,400
220x140 /layer 1 /autohide", Timeout := 6000,
WindowName := "Dittel System viewer", HeaderOnTop
:= FALSE, Preload:=TRUE
```

Please note: it may be necessary to adjust the path to the *SCC.exe* and the *sccviewer.exe* in the file *regie.ini.*

In the example `/mode:start 0,400 220x140`

`0,400` x/y Position of window (related to the coordinate origin (0/0) in the upper left screen corner)

`220x140` Width and height of window

`/layer 1`

Program starts with Display Layer 1

`/autohide`

When the operating area 'MACHINE' is left, then the view is

blanked automatically. In this context, it is useful to set the parameter 'Preload' to 'TRUE' (see above). Through this the program is started automatically when starting the machine control. Without this option, the view is always visible on a fixed display position (even when the operating area MACHINE is not selected).

Example:
Balancing Module
M6000

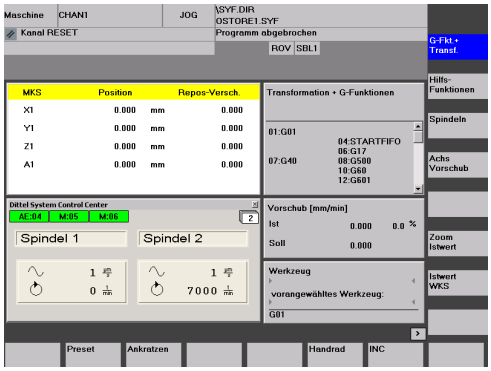


Figure 4-13

Example:
AE-Module AE6000

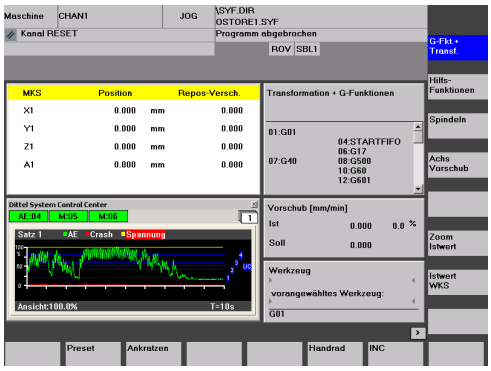


Figure 4-14

NOTICE

The full-screen mode and the minimum view mode are using the same interface settings. If one of these applications is already active and the second application is started additionally, the first application closes automatically to release the occupied interface.

SINUMERIK Operate

▷ Copy the file *systemconfiguration.ini* into your User or OEM-directory (e.g. *f:\oem)*.

• *<Sinumerik_Operate_Installation_Path>/user/sinumerik/hmi/cfg*

• *<Sinumerik_Operate_Installation_Path>/oem/sinumerik/hmi/cfg*

or extend your configuration files according to the example files.

▷ Copy the file *oemframe.ini* into your directory *<Sinumerik_Operate_Installation_Path>/compat/user/oem*

or extend an existing configuration file of the same name according to the example files.

▷ Now you can close the Service Mode or the Service-Desktop and start the Automation System normally. The DSCC Program starts when pressing the appropriate softkey.

NOTICE In the *systemconfiguration.ini* find examples how the *Dittel System Viewer* can be embedded in „Sinumerik Operate“.

Key shortcuts *SCC.exe sccviewer.exe*	[Ctrl] + [1] … [9]	selects the Display Layer 1 to 9 directly provided that the keyboard focus is set to that application (either particularly by computer mouse or by softkey “Dittel System viewer”)
	[Ctrl] + [End]	exits the application “sccviewer” (it does not matter if the keyboard focus is set to that application or not).

4.3 Software Update

Due to improvements and extensions like functions, languages, operation, etc. but also corrections, it may be necessary to update your Dittel System Control Center Software.

4.3.1 Changing the Installation Directory

If you run an update from a version earlier than 3.60, follow the instructions in the section "Software Installation". Your data are retained and imported into the new version.

Please note that from Version 3.60 on a change of the installation path took place. Now, the “Dittel System Control Center” software is located at *%ALLUSERSPROFILE%\Dittel*, where the environment variable is resolved differently depending on the operating system and any adjustments (see Section 4.5.1 on page 55).

Under Windows XP the resolved path is called by default *C:\Documents and Settings\All Users\Dittel* and under Windows 7 / 10 *C:\ProgramData\Dittel*.

Proceed as follows:

- ▷ Close the current DSCC Software on your Automation System or Computer, if applicable.
- ▷ Install the new software version from the CD/DVD considering the instructions given in section 4.1.4.
- ▷ Start the program *Setup.exe* by double-clicking.

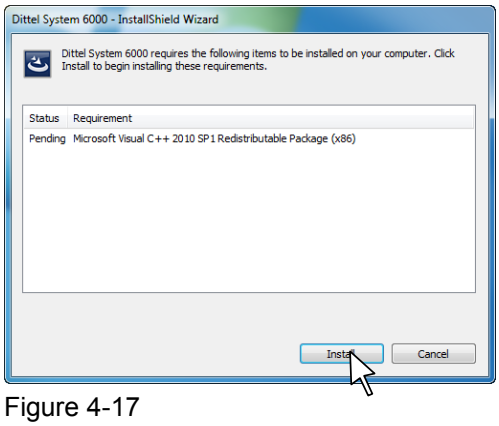


Figure 4-17

If not all prerequisites for installation have been met yet, the opposite dialog will be displayed.

Click on [Install >] to continue.

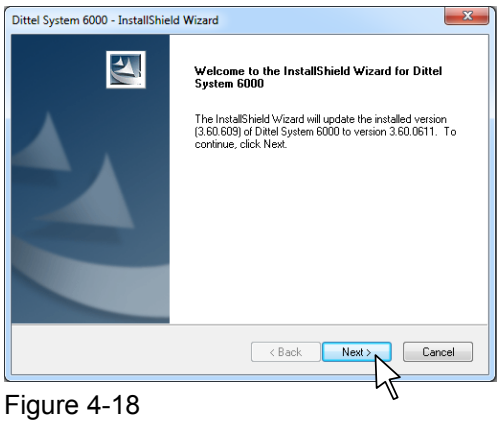


Figure 4-18

The program creates the InstallShield.

▷ Click on [Next >] to update the DSCC.

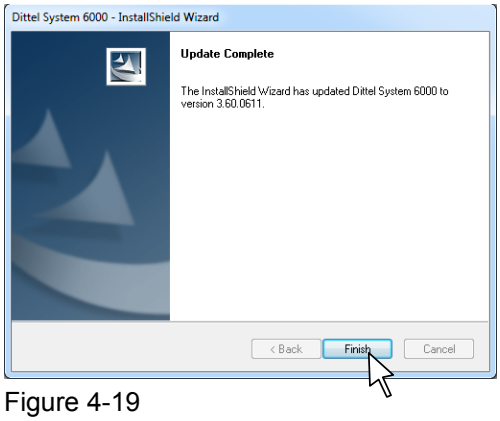


Figure 4-19

The new version of the Dittel System Control Center Software will overwrite the present version. All settings like Sets, Limits, Offset, etc. remain unchanged.

▷ To complete the Update click on [Finish].

▷ Start the program as usual.

4.4 Delete the DSCC Software

The DSCC Software can be deleted completely from your computer or Automation System using the Windows® Control Panel.

Proceed as follows:

- ▷ If applicable, close the current DSCC Program.
- ▷ Windows XP: Open the folder *Software* via *Start / (Settings) / Control Panel*.
- ▷ Windows 7: Open the folder *Programs and Functions* via *Start / (Settings) / Control Panel.*
- ▷ Windows 10: Open the folder *Programs and Features* via *Start / (Settings) / Control Panel.*
- ▷ In the list, highlight the line *Dittel System 6000* and click on Remove (Windows XP) or *Change (Add) / Remove* (Windows 7 / 10).

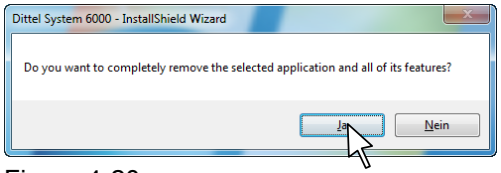


Figure 4-20

A dialog box opens and asks **Do you want to completely remove the selected application and all of its features?**

- ▷ Confirm the uninstallation by clicking on [Yes].

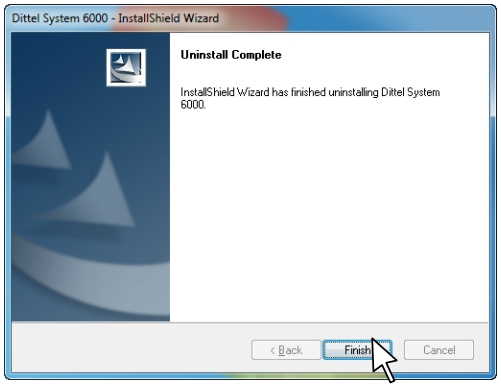


Figure 4-21

The Dittel System Control Center Software will be deleted.

- ▷ Also a system reboot may be necessary. Choose if you want to reboot your computer now or later.
- ▷ Complete the uninstallation by clicking on [Finish].

If the uninstallation program gives the message that files could not be removed completely, delete the remaining files in the folder Dittel System 6000 with the help of the Windows® Explorer.

4.5 Further information

4.5.1 Default installation path

The default installation path for the Dittel System Control Center software is *%ALLUSERSPROFILE%\Dittel*.

NOTICE *%ALLUSERSPROFILE%* is a system environment variable and depends on the operating system and user settings. To determine the precise location of the directory, enter the path *%ALLUSERSPROFILE%\Dittel* in the Windows Explorer address line and press [Enter] to confirm. Windows then automatically replaces the placeholder with the full path, which you can read in the Explorer address line.

Example Under Windows XP, the full default path is *C:\Documents and Settings\All Users\Dittel*.
Under Windows 7 / 10, it is *C:\ProgramData\Dittel*.

4.5.2 Command line options

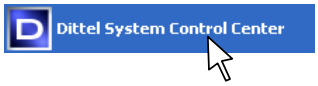
You can run the *SCC.exe* and *sccviewer.exe* programs using command line options. The text file *command-line.txt* in the *<Install_path>\ctrl\help* directory contains an overview of the available command line options.

4.5.3 Keyboard shortcuts

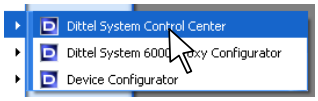
You can control the *SCC.exe* and *sccviewer.exe* programs using keyboard shortcuts. The text file *keyboard-shortcuts.txt* in the *<Install_path>\ctrl\help* directory contains an overview of the the available keyboard shortcuts.

5 General Settings

5.1 Starting the Program



▷ Start the Program on your Automation System or computer by clicking on button *Start* and then on symbol “Dittel System Control Center”.



▷ or start the Program by clicking on buttons *Start / Programs / Dittel System 6000* and finally on the symbol “Dittel System Control Center”.

▷ In the SINUMERIK® HMI-Environment you can start the “Dittel System Control Center” Program by pressing the appropriate softkey.

NOTICE

- A new installed DSCC Software always starts in the English language!
- These »General Settings«, particularly the RS-232 interface communication to the Automation System, can only be carried out with operational DS6000 Module(s)!

When starting the DSCC Software the very first time the following start screen should open:

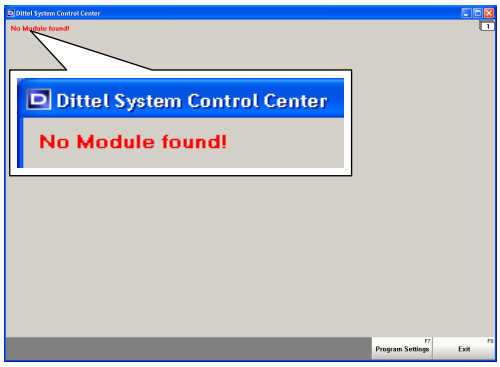


Figure 5-1

The message “**No Module found!**” appears since the Module M6000 cannot communicate with the Computer or Automation System yet.

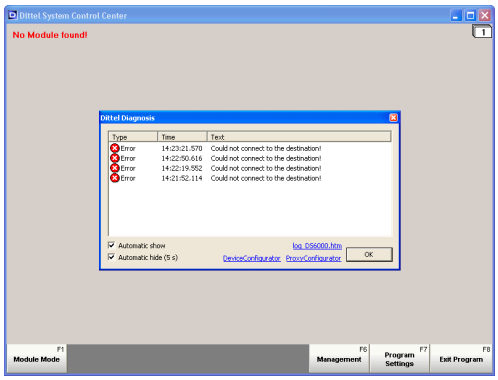


Figure 5-2

After some seconds, the notice ‘**Error Could not connect to the destination**’ is displayed repeatedly.

▷ Ignore this notice by clicking on [OK] button or pressing the [Enter] key on the PC keyboard or [Input] on the SINUMERIK® keypad to continue.

With an interface already configured once the following start screen of the module should open:

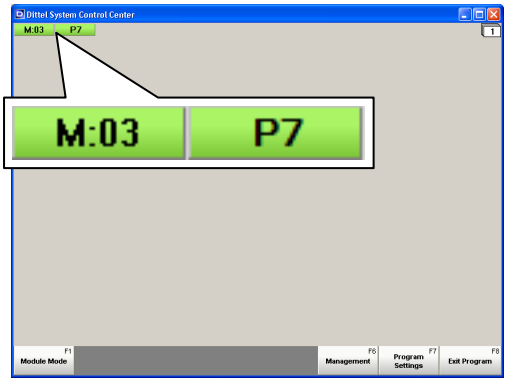


Figure 5-3

In this example a MARPOSS Module **P7** and a Dittel Module for electromechanical balancing, M6000 with the address **M:03**, are connected to the Automation System or Computer.

To set a different language of the screen, the access levels and the communication between your PC or Automation System and Module the following General Settings have to be carried out:

NOTICE For integration and operation of the MARPOSS module P7, see *Appendix A* and documentation regarding MARPOSS MHIS software and MARPOSS P7 hardware.

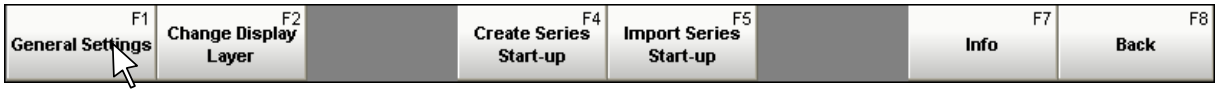
5.1.1 Requirements to configure the RS-232 interface

- The Dittel System Control Center (DSCC) Software with Software Version V 2.30 or later is installed on your Windows®-based Automation System or on your Standard Windows® computer with appropriate hardware equipment.
- One Module is connected via a serial interface cable to an available RS-232 Port of your Automation System or computer.
- All DS6000 Modules are connected to a suitable 24 Vdc power source (all green LEDs # 4 light).
- Several DS6000 Modules are connected with each other by special Patch Cords A/N O67L0020018, formerly A/N K0020018 (connectors # 9 or # 10), the first and last Module is terminated (DIP-Switch # 6, switch SW8 to „ON“).

5.2 General Settings

▷ To configure the DSCC Program press or click on the [Program Settings] key or the function key [F7).

▷ Then click or press on the [General Settings] key or function key [F1].



NOTICE

- If the Proxy Service was installed additionally while installing or updating the DSCC Software to version V 2.20 or later the shortcut to the Proxy Configurator is displayed at the lower left corner on the screen.
- The Device Configurator is installed automatically when installing or updating the DSCC Software to version V 2.30 or later.

The following screen should open:

5.2.1 General Settings: Language

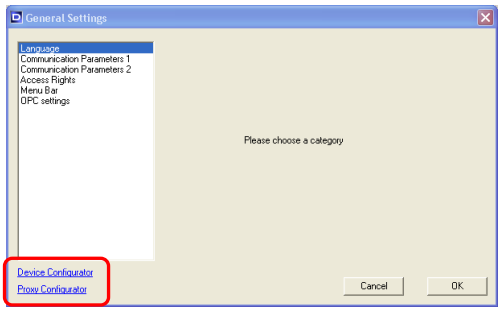


Figure 5-4

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] or Down- [▼] softkey or the function key [F1] or [F2] highlight the wanted Category. ▷ To open the options display press the softkey [Select] or function key [F6].	▷ Click on the wanted Category.

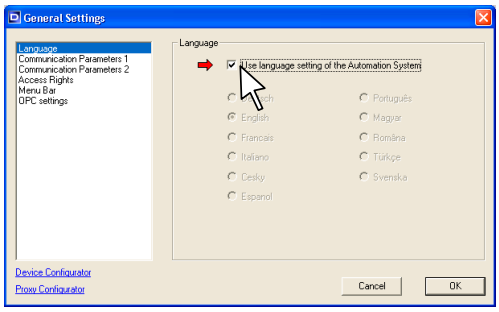


Figure 5-5

Use language setting of the Automation System

Only in combination with an Automation System and installed OPC Server!

Notice the OPC settings!

If this function is activated (check box active) the DSCC Software takes over the language setting of the Automation System.

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the [+] / [-] softkeys or the function keys [F3] / [F4] activate or deactivate the function.	▷ Click into the check box to activate or deactivate the function.

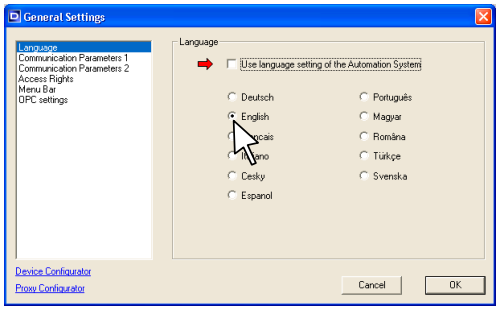


Figure 5-6

Manual Language setting

Factory setting: **English**,
can be set to German, English, French, Italian, Czech, Spanish, Portuguese, Hungarian, Romanian, Turkish or Swedish.

Additional languages on request.

▷ With the [+] / [-] softkeys or the function keys [F3] / [F4] highlight the wanted **Language**, in this case English.	▷ Click on the wanted **Language,** in this case English.

NOTICE

▷ Confirm a change in **Language** by clicking on the [OK] key or pressing the [OK] softkey or function key [F8].
The screen Figure 5-7 opens in the selected language.

▷ Press or click the [Back to General Settings] / [F5] key and you return without any change to select another **General Setting**.

▷ Press or click the [Cancel] / [F7] key and you return without any change to the English screen Figure 5-2 or 5-3.

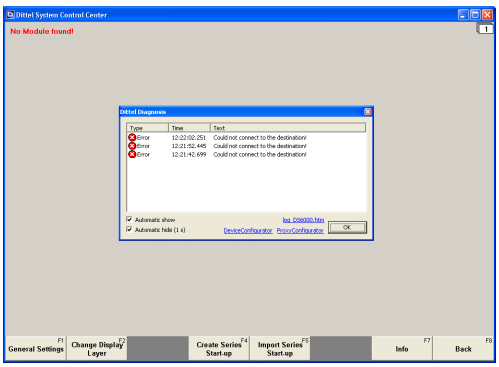


Figure 5-7

▷ After you have selected and confirmed the language, you return to the opposite screen Figure 5-7.

If the RS-232 Interface of the Module is not configured yet, the notice **Error Could not connect to the destination** can be displayed repeated.

▷ Ignore this notice by clicking on [OK] key or pressing the [Enter] key on the PC keyboard or [Input] on the SINUMERIK® keypad to continue.

The softkeys and messages have changed into the new language, if applicable.

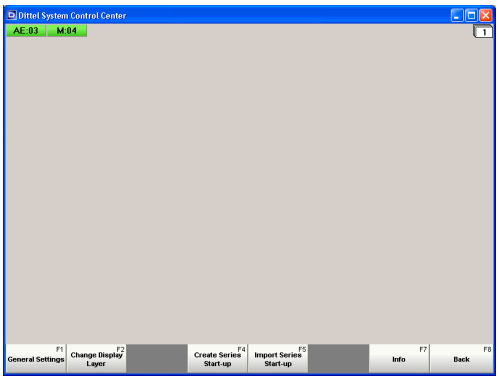
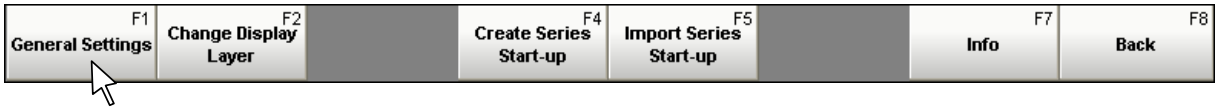


Figure 5-8

With configured interface and operational DS6000 Modules, the screen will show green Module addresses.

▷ To continue click or press on the [General Settings] key or function key [F1].



5.2.2 General Settings: Communication Parameters 1

NOTICE ▷ For a DS6000 Module with Ethernet Interface, see supplementary document »Ethernet Interface, article number ODNDL03EN03 (A/N D60022)«.

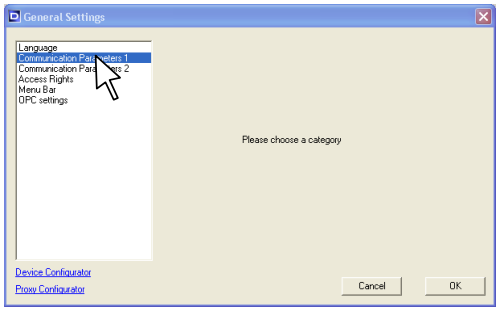


Figure 5-9

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] or Down- [▼] softkey or the function keys [F1] / [F2] highlight the Category **Communication Parameters 1**. ▷ To open the options display press the soft-key [Select] or function key [F6].	▷ Click on Category **Communication Parameters 1**.

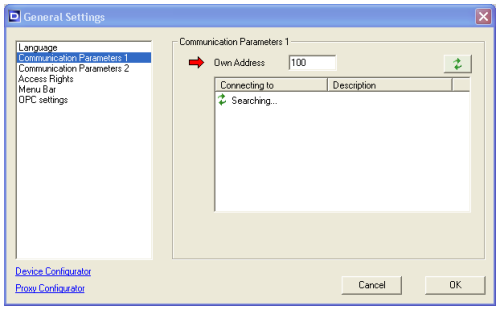


Figure 5-10

Own Address

Factory setting: **100**,
variable from 100 to 109.

NOTICE The address setting 100 is intended for the Operator PC or the Automation System. Only with this address, automatic data configuration is possible.

Enter an address higher than 100 when you want to configure the System externally via a Notebook etc. Then the functionality is restricted.

▷ With the [+] or [-] softkey or function keys [F3] / [F4] enter the wanted address.	▷ Click into the address window, highlight numbers and enter the wanted address. ▷ Or click on [+] or [-] keys to increase or decrease the address.

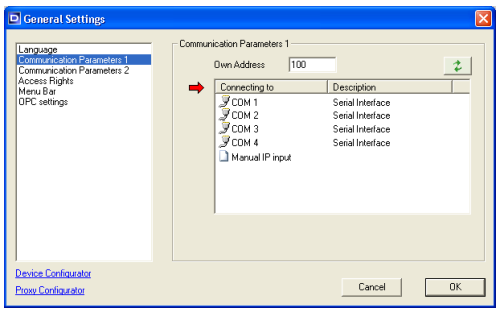


Figure 5-11

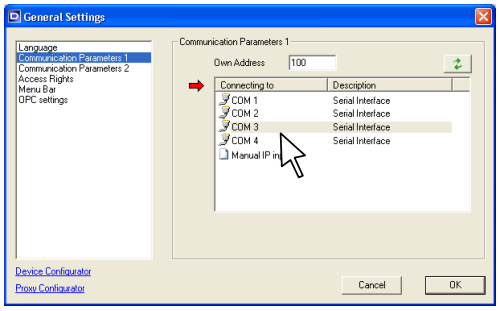


Figure 5-12

As soon as Category **Communication Parameters 1** is opened the DSCC Software is searching for available interfaces of your Computer or Automation System.

▷ With the Up- [▲] / [F1] or Down-softkey [▼] / [F2] set the red arrow to »**Connecting to**«.

▷ With the mouse cursor or with the [+] / [F3] or [-] / [F4] softkey highlight the Serial Interface of your Computer or Automation System which is connected via a RS-232 Interface cable to a DS6000 Module.

NOTICE

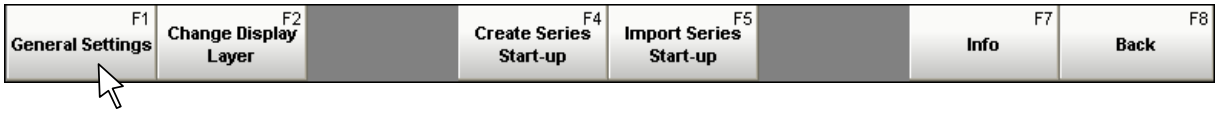
When using an Automation System SINUMERIK®, COM1 is **always** internally occupied, that means, you have to set the Serial Interface to COM2 or higher.

NOTICE

▷ Confirm the setting in **Communication Parameters 1** by clicking on the key [OK] or pressing the softkey [OK] or function key [F8]. Communication is done with a Standard Baud Rate of **57600** (see also 3.3.1 DIP-Switch # 6, SW1 and SW2). After successful connection to the module, the screen with green Module addresses will appear (Figure 5-8).

▷ Press or click the key [Back to General Settings] / [F5] and you return without any change to select a new **General Setting**.

▷ To continue click or press on the [General Settings] key or function key [F1].



Setting the IP Address of an Ethernet Interface Converter

When? This settings are required when the DS6000 Module(s) should be operated via an external interface converter (serial / Ethernet) with an Ethernet interface of your computer or Automation System. IP-address and TCP-Port must be set corresponding to your interface converter:

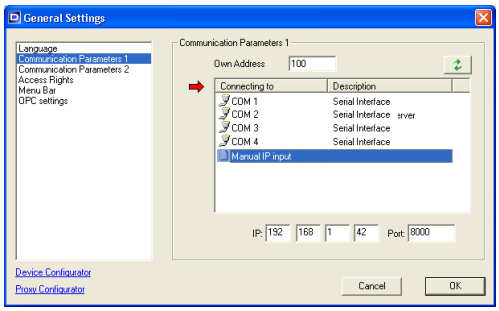


Figure 5-13

Manual IP input

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Down-softkey [▼] set the red arrow to **Connecting to**. ▷ With the [+] or [-] softkey highlight **Manual IP input**.	▷ With the mouse cursor click on **'Manual IP input'**.

Additional windows open:

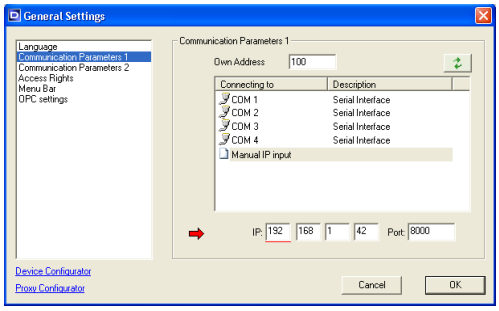


Figure 5-14

IP Address

Factory setting: **192 168 1 42**

▷ With the Down-softkey [▼] set the red arrow to **IP**. The first window is under-scored red. ▷ With the [+] or [-] softkey set the wanted IP-Address. With the Down-softkey [▼] underscore the second window, set the next numbers using the [+] or [-] softkeys and so on.	▷ Click or highlight each window and type the wanted IP Address or use the [+] or [-] keys.

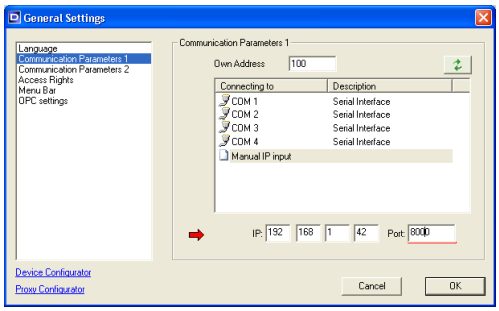


Figure 5-15

Port

Factory setting: **8000**

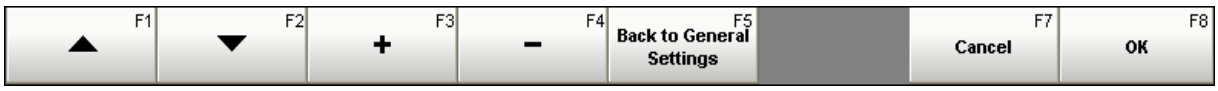
Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Down-softkey [▼] highlight the window **Port**. ▷ With the [+] or [-] softkey set the wanted TCP Port number.	▷ Click or highlight the window and type the wanted TCP Port or use the [+] or [-] keys.

NOTICE

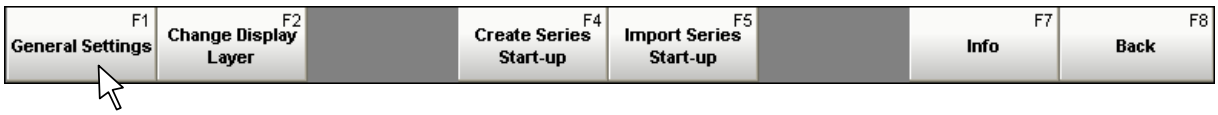
▷ Confirm a change in **Communication Parameters 1** by clicking on the [OK] key or pressing the [OK] softkey / function key [F8]. After successful connection to the module, the screen with green Module addresses will appear (Figure 5-8).

▷ Press or click the key [Back to General Settings] / [F5] and you return without any change to select a new **General Setting**.

▷ Clicking or pressing the [Cancel] / [F7] key returns you without any change to the screen Figure 5-7 or 5-8.



▷ To continue click or press on the [General Settings] key or function key [F1].



5.2.3 General Settings: Communication Parameters 2

NOTICE

- This setting is intended for future use, please DO NOT activate!
- An activation of this function may cause an error message and no connection to the module can be made!

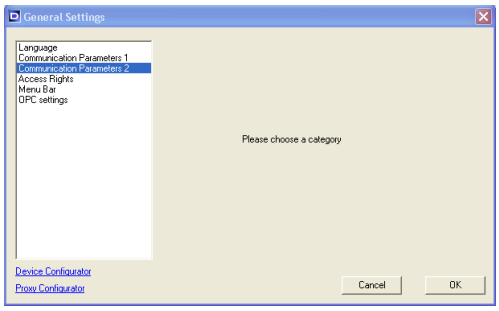


Figure 5-16

5.2.4 General Settings: Access Rights

NOTICE

- Ex-works the DSCC Software is shipped with Access Level 'Administrator' and without password.
- We recommend not restricting the Access Rights as long as the DS6000 Modules are not running properly on the machine tool!

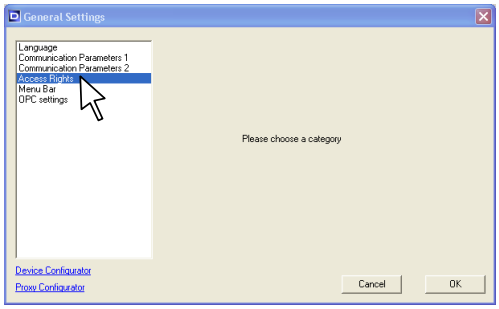
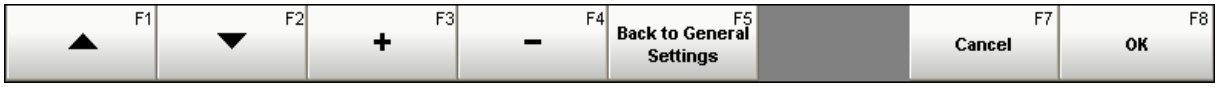


Figure 5-17

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] or Down- [▼] softkey highlight the category **Access Rights**. ▷ To open the options display press the softkey [Select] / [F6].	▷ Click on the category **Access Rights**.



NOTICE

- The following setting applies only in combination with an Automation System and installed OPC Server!
- Notice the OPC settings!

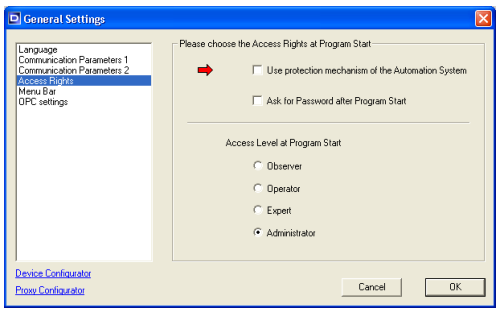


Figure 5-18

Use protection mechanism of the Automation System

Factory setting: ☐ (not active).
Can be set to ☐ (not active) or ☑ (active).

With this function, the used protection layers of the Automation System are transferred to the DS6000 Modules.

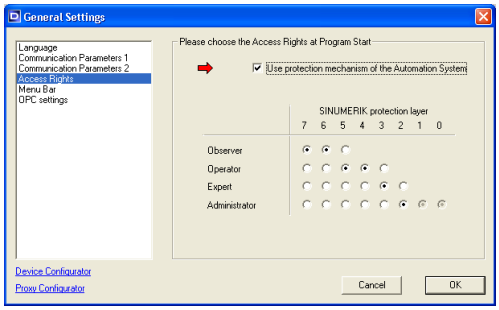
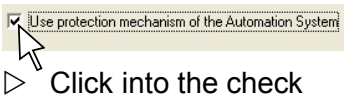


Figure 5-19

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the [+] / [F3] or [-] / [F4] key activate or deactivate the function. When activated the following setup window opens.	 ▷ Click into the check box and activate or deactivate the function. When activated the following setup window opens.

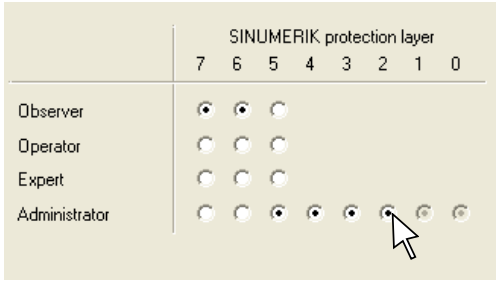


Figure 5-20

For example, the operation and programs of the SINUMERIK® Automation System are protected internally via a 7-stage access mode, in which ‘0’ indicates the highest and ‘7’ the lowest access level.

▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key and the [+] / [F3] or [-] / [F4] key activate the desired access levels. Or click into the respective check boxes.

When starting the DSCC software the program starts always with the access level predefined by the Automation System.
While operating the actual access level of the Automation System determines the access level of the DS6000 Modules according the opposite setting.

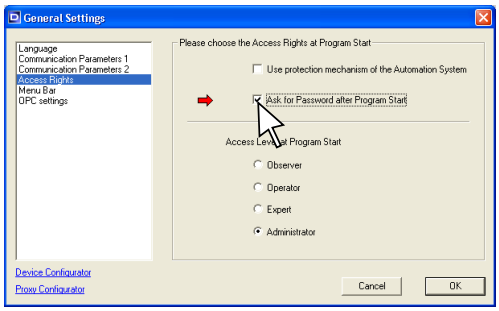


Figure 5-21

Ask for Password after Program Start

Factory setting: ☐ (not active), no password stored. Can be set to ☐ (not active) or ☑ (active).

If this function is active, a password for the selected access level must be entered when starting the program (see next setting).

If this function is not active then the program starts immediately without password in the selected access level.

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the setting **Ask for Password after Program Start.** ▷ With the [+] / [F3] or [-] / [F4] key activate or deactivate the password prompt.	 ▷ Click into the check box and activate or deactivate the password prompt.

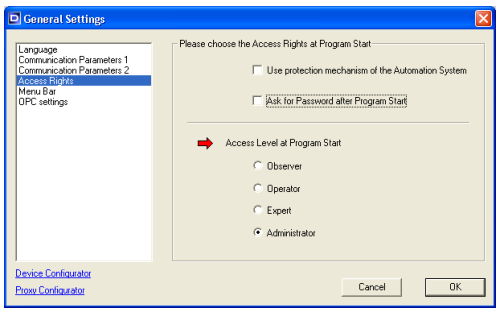


Figure 5-22

Access Level at Program Start

Factory setting: **Administrator**.

With this setting adjustments or operation can be limited, depending on the access level. Nevertheless, if the Administrator wants to access the program, it is possible any time after entering the valid password.

▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the setting **Access Level at Program Start.** ▷ With the [+] / [F3] or [-] / [F4] key set the wanted Access Level at Program Start	▷ Click into the check box to set the wanted **Access Level at Program Start**.

M6000:

Observer: Only observation of the Balancing process possible. Control is done solely by external machine commands.

Operator: Like Observer, additionally authorized to select the memory sets, manual balancing and to Start or Stop Automatic Balancing.

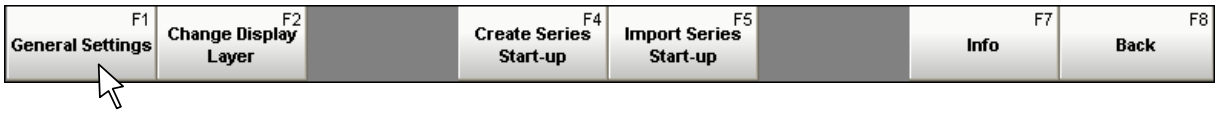
Expert: Like Operator, additionally authorized to set or change the memory sets of the Balancing Module.

Administrator: No restriction, full range of operation and setting.

NOTICE

- ▷ Confirm a change in **Access Rights** by clicking on the [OK] key or pressing the [OK] softkey or function key [F8]. You return to the screen Figure 5-8.
- ▷ Press or click the [Back to General Settings] / [F5] key and you return without any change to select a new **General Setting**.
- ▷ Pressing or clicking the [Cancel] / [F7] key returns you without any change to the screen Figure 5-8.

- ▷ To continue click or press on the [General Settings] key or function key [F1].



5.2.5 General Settings: Menu Bar

NOTICE The following settings get effective only after a reboot of the DSCC software!

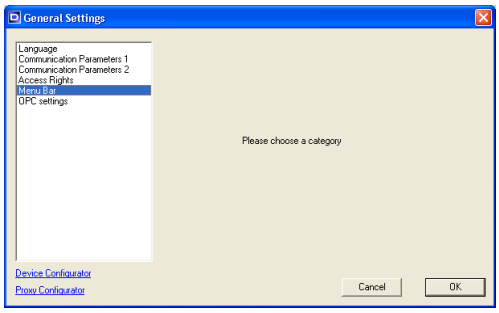
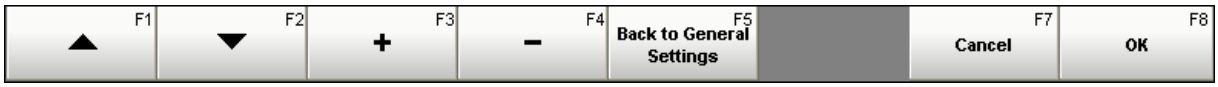


Figure 5-23

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the category **Menu Bar.** ▷ To open the options display press the softkey [Select] or [F6].	▷ Click on the category **Menu Bar**.



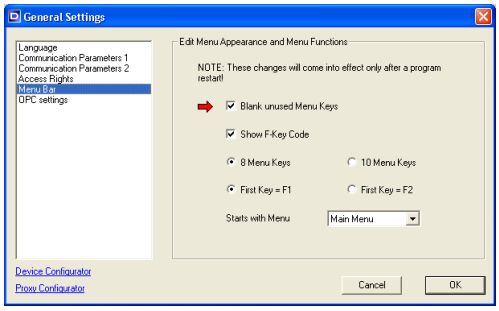


Figure 5-24

Blank unused Menu Keys

Factory setting: ☑ (active),
can be set to ☐ (not active) or ☑ (active).

With this setting, unused menu keys are either blanked or visible.

▷ With the [+] / [F3] or [-] / [F4] key activate or deactivate the function.	▷ Click into the check box and activate or deactivate the function.

Setting: ☑ **Blank unused Menu Keys**

Setting: ☐ **Blank unused Menu Keys**

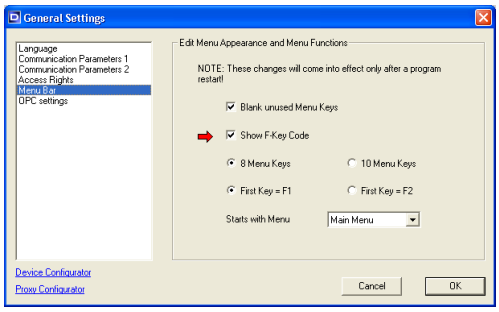


Figure 5-25

Show F-Key Code

Factory setting: ☑ (active),
can be set to ☐ (not active) or ☑ (active).

With this setting, the F-Key Code of the function keys is either blanked or visible.

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the line **Show F-Key Code.** ▷ With the [+] / [F3] or [-] / [F4] key activate or deactivate the function.	▷ Click into the check box and activate or deactivate the function.

Setting: ☑ **Show F-Key Code**

Setting: ☐ **Show F-Key Code**

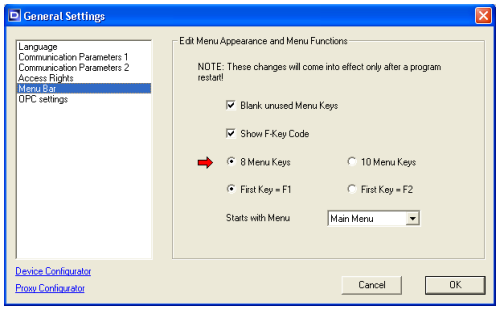


Figure 5-26

8 Menu Keys - 10 Menu Keys

Factory setting: **8 Menu Keys**,
can be set to **8 Menu Keys** or **10 Menu Keys**.

With this setting, you can adapt the number of menu keys (softkeys) to the number of buttons at the Automation System.

▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the line **8 Menu Keys - 10 Menu Keys.** ▷ With the [+] / [F3] or [-] / [F4] key determine the number of menu keys.	▷ Determine the number of menu keys by clicking into the appropriate check box.

Setting: ☑ **8 Menu Keys**

Setting: ☑ **10 Menu Keys**

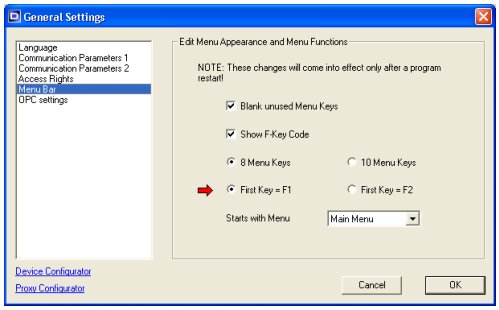


Figure 5-27

First Key = F1 – First Key = F2

Factory setting: **First Key = F1**,
can be set to **First Key = F1** or **First Key = F2**.

If the **F1-Key** is already occupied, e.g. for the HELP function, the first softkey can be set as **F2-Key**.

NOTICE All function keys described in this operator's manual apply to the setting **First Key = F1**!

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the line **First Key = F1 – First Key = F2**. ▷ With the [+] / [F3] or [-] / [F4] key determine the appropriate setting.	▷ Determine the setting by clicking into the appropriate check box.

Setting: ☑ **First Key = F1**

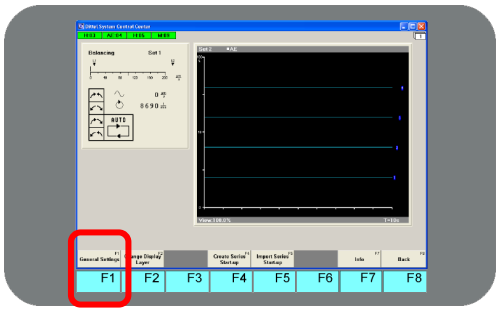


Figure 5-28

Setting: ☑ **First Key = F2**

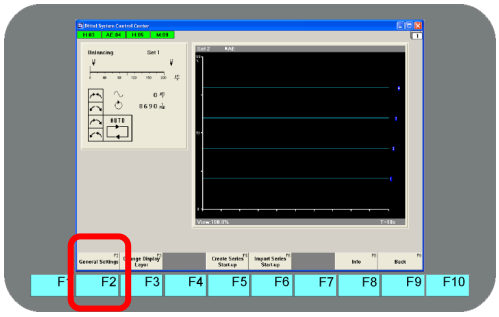


Figure 5-29

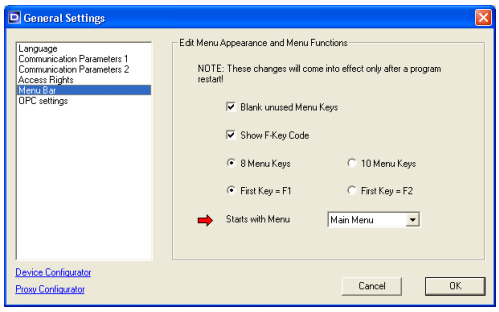


Figure 5-30

Starts with Menu

Factory setting: **Main Menu**.
can be set to **Main Menu** or **Functions**.

With this setting, you can determine with which menu the DSCC software starts.

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the line **Starts with Menu.** ▷ With the [+] / [F3] or [-] / [F4] key determine the **Starts with Menu**.	 ▷ Click on the wanted **Starts with Menu**.

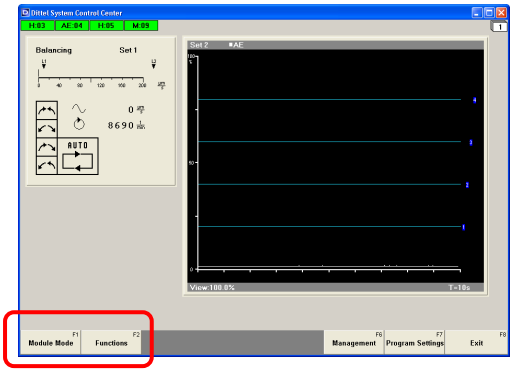


Figure 5-31

Program starts with setting **Main Menu**

The additional key [Functions] is only available when new menu keys were defined in the menu **Management ➔ Setup Functions**.

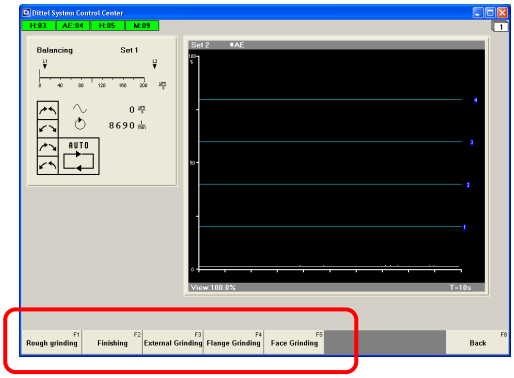


Figure 5-32

Program starts with setting **Functions**

The program starts with the keys defined in the menu **Management ➔ Setup Functions**.

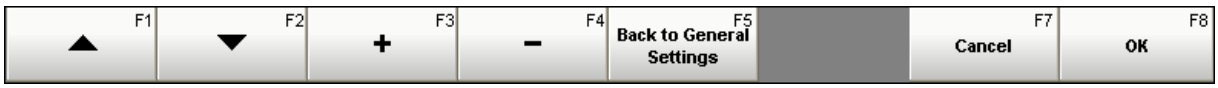
In this example the keys are defined as ‘Rough grinding’, ‘Finishing’, ‘External Grinding’, etc.

NOTICE

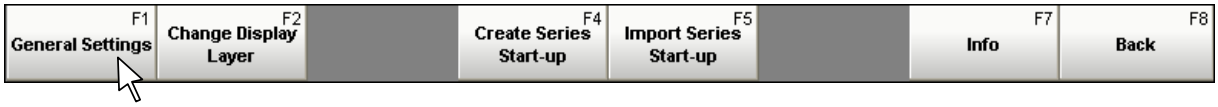
▷ Confirm a change in **Menu Bar** by clicking on the [OK] button or pressing the [OK] softkey or function key [F8]. You return to the screen Figure 5-8.
Exit the DSCC software and reboot it, only then the changes get effective!

▷ Press or click the [Back to General Settings] / [F5] key and you return without any change to select a new **General Setting**.

▷ Pressing or clicking the [Cancel] / [F7] key returns you without any change to the screen Figure 5-8.



▷ To continue click or press on the [General Settings] key or function key [F1].



5.2.6 General Settings: OPC Settings

NOTICE An OPC Server software must be installed on your Automation System!

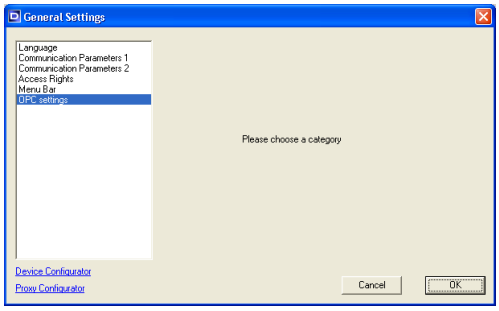


Figure 5-33

Operation using softkeys/function keys:	Operation using computer mouse:
▷ With the Up- [▲] / [F1] or Down- [▼] / [F2] key highlight the category **OPC Settings.** ▷ To open the options display press the soft-key [Select] or [F6].	▷ Click on the category **OPC Settings**.

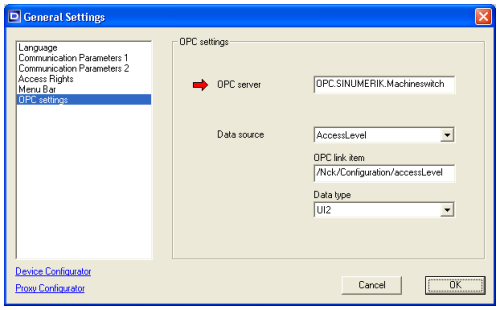


Figure 5-34

OPC Server

Factory setting: OPC.SINUMERIK.Machineswitch

For more information, please contact our Sales Department.

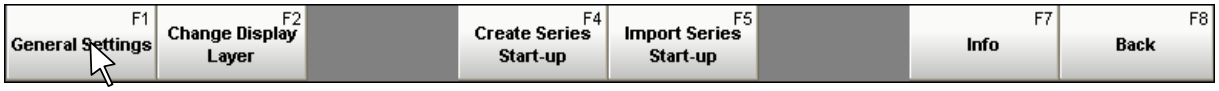
NOTICE

▷ Confirm a change in **OPC Settings** by clicking on the [OK] button or pressing the [OK] softkey or function key [F8]. You return to the screen Figure 5-8.

▷ Press or click the [Back to General Settings] / [F5] key and you return without any change to select a new **General Setting**.

▷ Pressing or clicking the [Cancel] / [F7] key returns you without any change to the screen Figure 5-8.

▷ To continue click or press on the [General Settings] key or function key [F1].



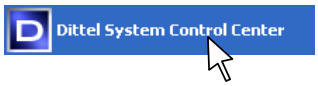
6 Module specific Settings

6.1 Precondition

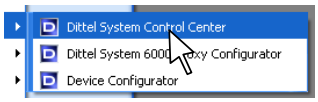
a) **ONE** pre-set Balancing Module M6000 is
- connected to a 24 Vdc power source (green LED # 4 lights),
- connected to an Automation System (e.g. SINUMERIK®) or Standard-Windows® Computer with appropriate hardware equipment via the serial interface (RS-232) or via Ethernet.
- The DITTEL System Control Center (DSCC) Program is properly installed (refer to Section 4) and the interface configured (see 5.2.2). For Ethernet interface, see Supplementary Document A/N ODNDL03EN03 “Ethernet Interface”.

b) **SEVERAL** pre-set Balancing Modules M6000 and/or Process Monitoring Modules AE6000 are
- connected to a 24 Vdc power source (all green LEDs # 4 light),
- connected with each other by special Patch Cords (A/N O67L0020018, formerly A/N K0020018), the first and last Module is terminated (DIP-Switch # 6 / SW8 is ON).
- **ONE Module** is connected to an Automation System (e.g. SINUMERIK®) or Standard-Windows® Computer with appropriate hardware equipment via the serial interface (RS-232) or via Ethernet. The interface of THIS Module is appropriately configured (see 5.2.2 for RS-232, for Ethernet see Supplementary Document A/N ODNDL03EN03 / A/N D60022).
- The DITTEL System Control Center Program is properly installed (refer to Section 4).

6.2 Starting the Program



▷ Start the Program on your Automation System or computer by clicking on button *Start* and then on symbol “Dittel System Control Center”.



▷ or start the Program by clicking on buttons *Start / Programs / Dittel System 6000* and finally on the symbol “Dittel System Control Center”.

▷ In the SINUMERIK® HMI-Environment, you can start the “Dittel System Control Center” Program by pressing the appropriate softkey.

The following Start Screen should open:

6.2.1 Start Screen

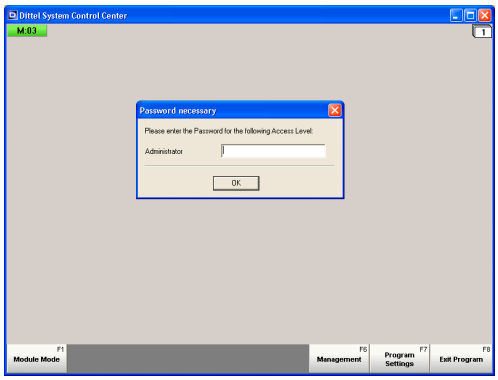


Figure 6-1

When the password prompt is activated (see § 5.2.4 **General Settings ➔ Access Rights**) the opposite screen is displayed.

▷ If no password has been entered till now, click on [OK] or press [Enter] on your computer keyboard or [Input] on the SINUMERIK® keypad.

▷ Otherwise enter your password and click on [OK] or press [Enter] on your computer keyboard or [Input] on the SINUMERIK® keypad.

When the password prompt is not activated or you have confirmed by clicking on [OK] or pressing [Enter] / [Input] the following start screen is displayed depending on number of connected Modules:

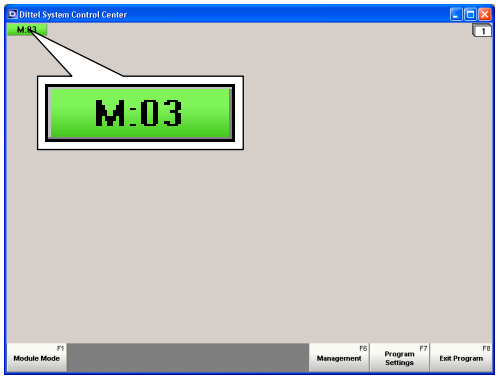


Figure 6-2

A green Module Address M:03 shows a ready to operate M6000 Balancing Module with the address 03 (refer to § 3.3.2).

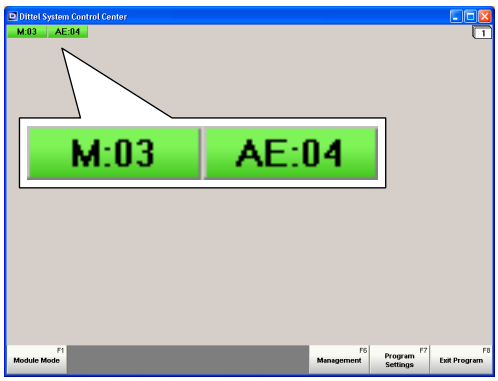


Figure 6-3

Two green Module Addresses M:03 AE:04 show two ready to operate Modules; one M6000 Electromechanical Balancing Module with the address 03 and one AE6000 Process Monitoring Module with the address 04 (refer to § 3.3.2).

6.2.2 Activating Module(s)

NOTICE Without the following settings, a M6000 Balancing Module is not operable via an Automation System or PC! Each Module must be "visible" on one of the Display Layers!

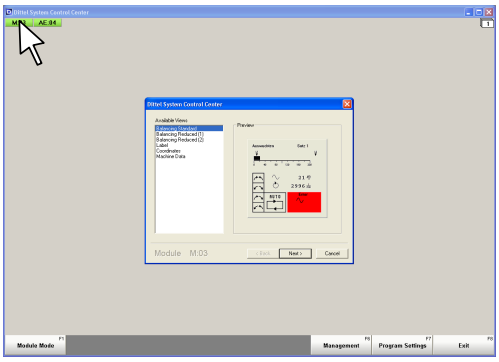


Figure 6-4

Activate the Balancing Module by double-clicking, in this example on M:03. The opposite options display opens.

There are five different Module Views available to represent a Balancing Module M6000 on the screen. The Preview shows you examples.

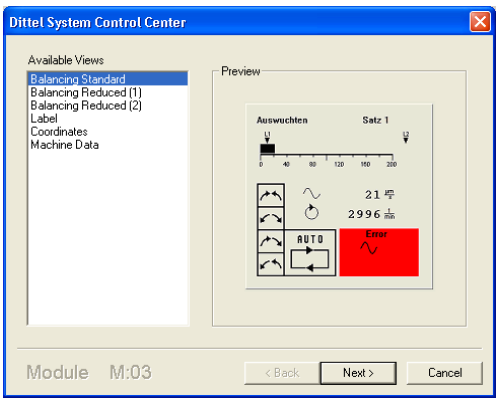


Figure 6-5

Balancing Standard

The View “Balancing Standard” shows a complete Balancing window, which is **NOT** scalable.

It shows

- Set-Number,
- Unbalance in digits and as bar graph,
- revolutions per minute,
- limits,
- operating mode and
- Error messages.

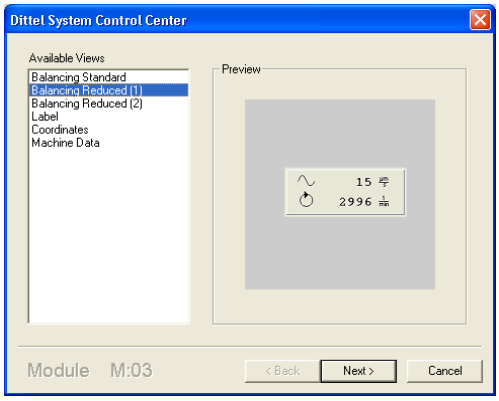


Figure 6-6

Balancing Reduced (1)

The View “Balancing Reduced (1)” shows only the Unbalance in digits and speed in revolutions per minute in a non-scalable window.

All other balancing functions occur in the background; no error messages are displayed on the screen.

NOTICE In this View the Balancing Module M6000 is fully able to work. All balancing functions occur in the background; no error messages are displayed on the screen!

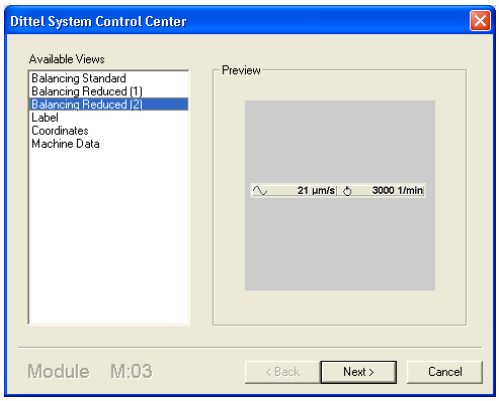


Figure 6-7

Balancing Reduced (2)

The View “Balancing Reduced (2)” shows the Unbalance in digits and the speed in revolutions per minute in a fully scalable window.

All other balancing functions occur in the background; no Error messages are displayed on the screen.

NOTICE Also in this View, the Balancing Module M6000 is fully able to work. All balancing functions occur in the background; no error messages are displayed on the screen!

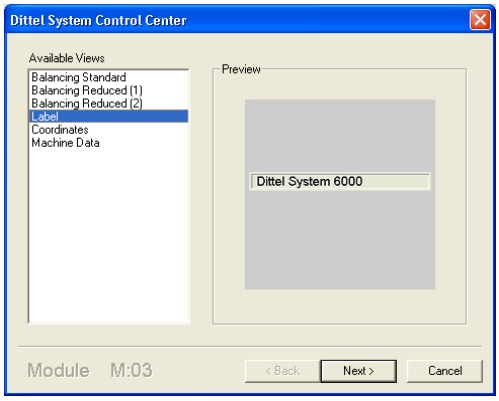


Figure 6-8

Label

The View “Label” is further reduced to a lettering space which is scalable.

NOTICE Also in this View, the Balancing Module M6000 is fully able to work. All balancing functions occur in the background; no error messages are displayed on the screen!

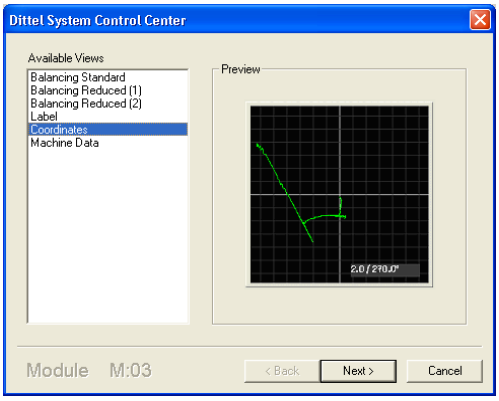


Figure 6-9

Coordinates

During Manual Balancing, the View “Coordinates” shows the amount of the unbalance and its position in a coordinate system. The View is fully scalable.

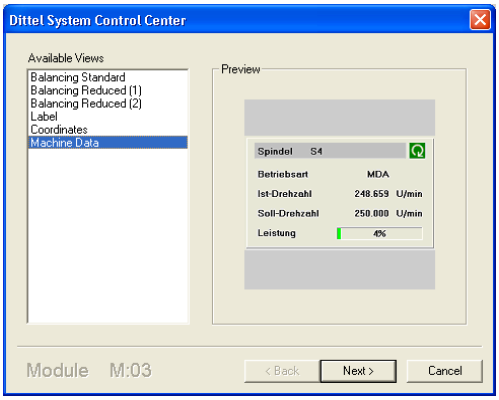


Figure 6-10

Machine Data

THIS IS NOT A BALANCING FUNCTION!

This screen representation “Machine Data” only makes sense in connection with a SINUMERIK® Automation System and OPC server software.

In this view, the machine data of the actual operated spindle are displayed.

▷ With a computer mouse click or the cursor keys [↑] / [↓] select the wanted Module View and click on [Next >] or press the [Enter] key on the keyboard.

If you have chosen the Module View **Coordinates** the window Figure 6-13 opens immediately.

If you have chosen the Module View **Balancing Standard**, **Balancing Reduced (1)** or **Balancing Reduced (2)** the following option display opens:

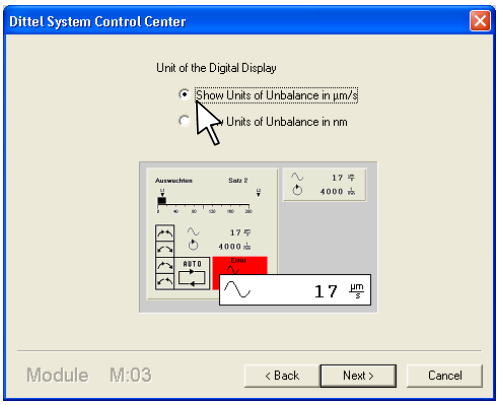


Figure 6-11

With this setting you determine the unit of the digital display:

Show Units of Unbalance in µm/s: the digital display and the analog bar graph show the unbalance velocity in µm per second.

Show Units of Unbalance in nm: the digital display shows the displacement in nano-meter whereas the analog bar graph shows the unbalance velocity in µm per second.

▷ With a computer mouse click or the cursor keys [↑] / [↓] select the wanted unit and click on [Next >] or press [Enter].

If you have chosen the Module View **Label** the following window opens:

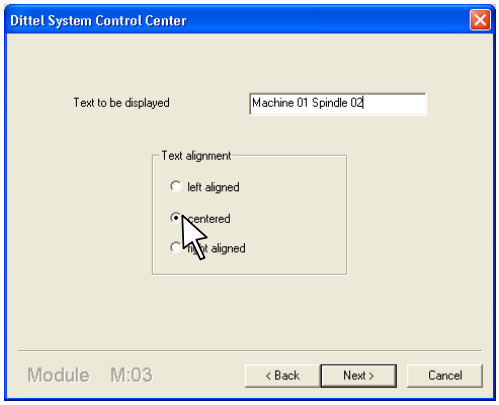


Figure 6-12

Highlight and overwrite the example text with your application, e.g. **Machine 01, Spindle 02**.

▷ With a mouse click, select the Text Alignment of the displayed Label.

▷ Click on [Next >] or press [Enter].

In all five cases the following window opens:

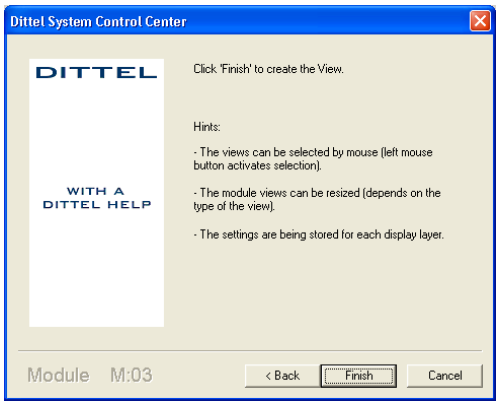


Figure 6-13

▷ Click on [Finish] or press [Enter] to create the wanted Module View.

NOTICE

▷ **Make every Balancing Module operable as described above!**

▷ You can open every Module View on the screen as many as you like. Simply repeat the steps as described above.

Example: The Balancing Module **M:03** is opened in all five available Views:

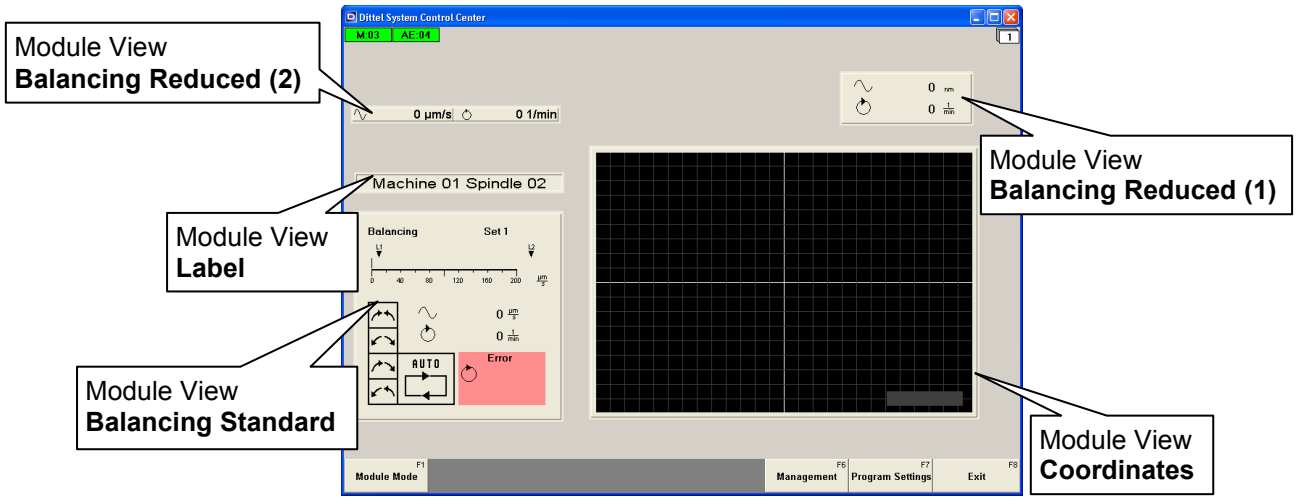


Figure 6-14

6.2.3 Module View - highlighting, positioning and scaling

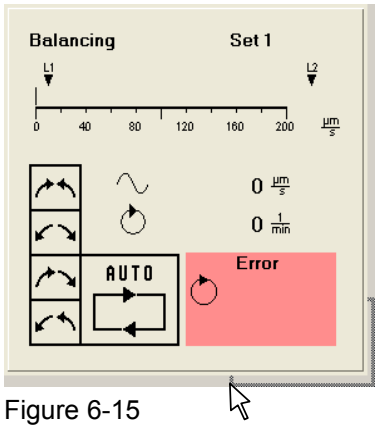


Figure 6-15

To position and/or scale the Module View, highlight the Module View first.

▷ To highlight the Module View move the cursor arrow outside the Module View, press and hold the LEFT computer mouse button.

▷ Drag a frame into the Module View and release the mouse button. The Module View will be highlighted (marked).

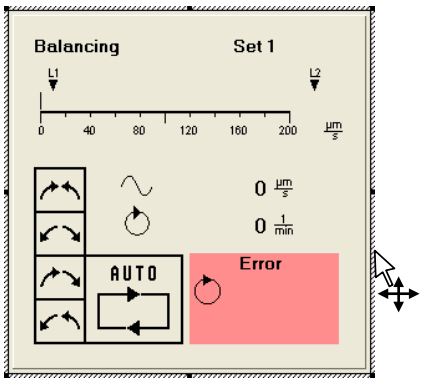


Figure 6-16

▷ To position the Module View(s) move the cursor arrow to touch the marking of the Module View. An additional “move” symbol appears.

▷ Press and hold the LEFT mouse button and move the Module View to a convenient position on the screen.

▷ Release the mouse button.

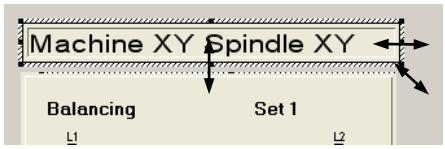


Figure 6-17

After highlighting, the width, and height of the Module Views **Label**, **Balancing Reduced (2)** and **Coordinates** can be scaled.

▷ To do this, move the cursor arrow to a “handle” of the marking. The cursor arrow changes to make horizontal, vertical, or diagonal changes in size.

▷ Press and hold the LEFT mouse button and drag the view to a convenient size. The font size and symbols adapt to the label size automatically.

▷ Release the mouse button.

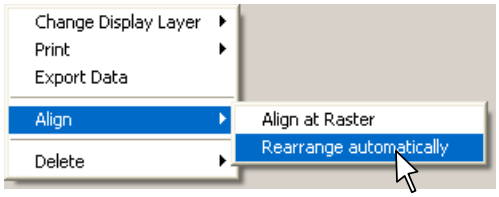


Figure 6-18

▷ To align different Module Views move the cursor arrow outside a Module View, then press the RIGHT mouse button. Move the cursor to ‘Align’, a context menu opens where you can select how to align the Module Views:

Align at Raster: The Module Views are aligned within a 10 x 10 pixel raster**.**

Rearrange automatically: The Module Views are arranged automatically from left to right in the order of their module addresses.

▷ With the cursor highlight the wanted alignment and click with the LEFT mouse button.

6.2.4 Create different Display Layers

The DSCC Software offers you to create up to twenty different display layers.

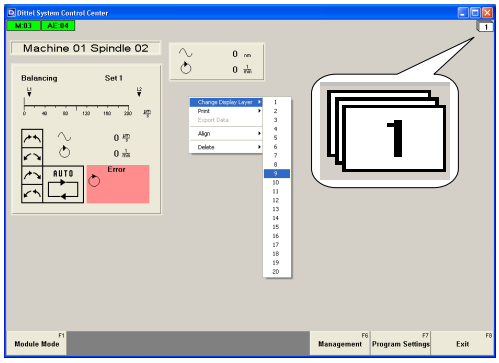


Figure 6-19

When opening the program the first time always Display Layer 1 is shown (if not changed, see paragraph 4.2.2, Remark).

▷ For creating another Display Layer move the cursor arrow outside the Module View and press the RIGHT mouse button.

A context menu opens where you can create a new Display Layer:

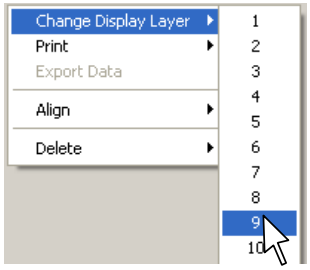
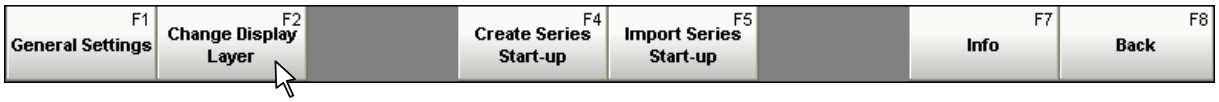


Figure 6-20

▷ With the mouse button, click on the wanted Display Layer number. The screen changes immediately to the new Display Layer.

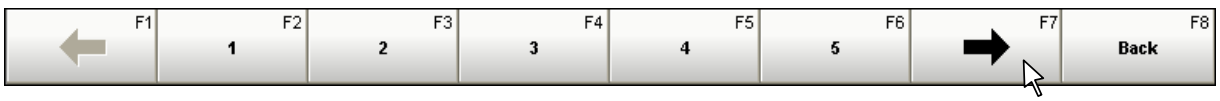
▷ **Or** you press the softkey [Program Settings] / [F7]

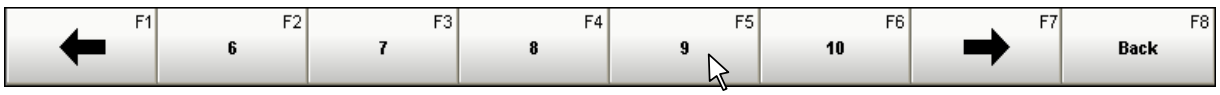
▷ and then [Change Display Layer] / [F2].



With the arrow keys or function keys [F1] / [F7] the keys 1 to 20 are displayed.

▷ Press the key with the wanted Display Layer number. The screen changes immediately to the new Display Layer.





▷ Create a new Display Layer, e.g. Display Layer 9, as described in paragraph 6.2.2, Activating Module(s):

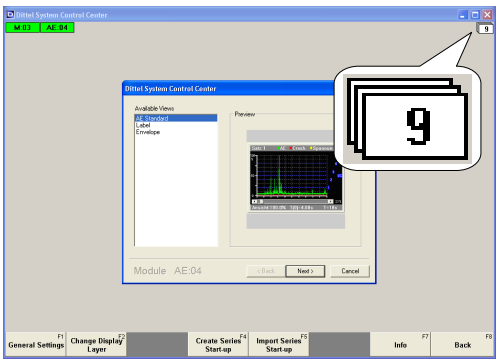


Figure 6-21

NOTICE

With the key shortcut [Ctrl] + [1] … [9] a direct and fast selection of the **first nine** Display Layers is possible as well.

6.2.5 Delete Module View(s)

NOTICE

Never delete all Module Views.
If all Module Views are deleted on all Display Layers, the Balancing Module is no longer operational via the Automation System or computer!

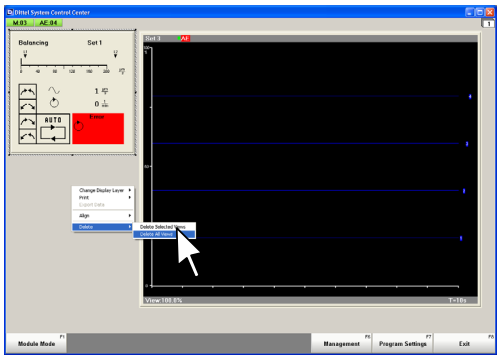


Figure 6-22

Change to the Display Layer in which you would like to delete Module Views.

▷ If you would like to delete only certain Module Views, highlight the Module Views to be deleted. After holding down the RIGHT mouse button, a context menu opens.

▷ Click on **Delete Selected Views**.

The selected Module View(s) are deleted immediately.

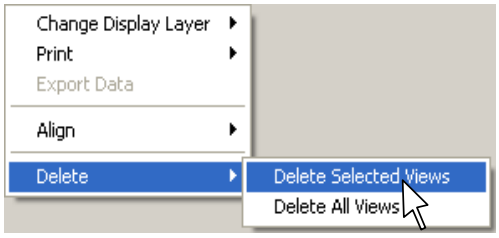


Figure 6-23

▷ If you would like to delete all Module Views on that Display Layer, hold down the RIGHT mouse button and a context menu opens.

▷ Click on **Delete All Views**.

All Module Views are deleted immediately.

6.3 Module Settings

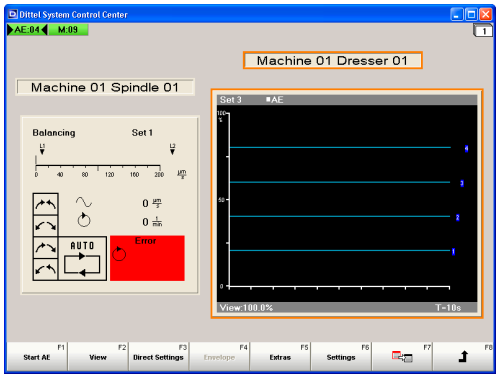
NOTICE

- The Balancing Module M6000 is factory pre-set for check and testing purposes. To achieve perfect balancing results it is therefore necessary to adapt the Module M6000 to your conditions. Please carry out the following adjustments carefully.
- The following adjustments are only possible with Access Rights **Expert** or **Administrator**.
- All quantities like unbalance (µm/s), Limit 1, Limit 2, speed (1/min), shown in the following illustrations, are **examples** or **factory settings!**

When rebooting the system always the Display Layer 1 is shown (if not changed, see paragraph 4.2.2, Remark).

▷ With [Ctrl] + [1] … [9] or the softkeys [Program Settings] ➔ [Change Display Layer] select the Display Layer where the Module to be set is shown.

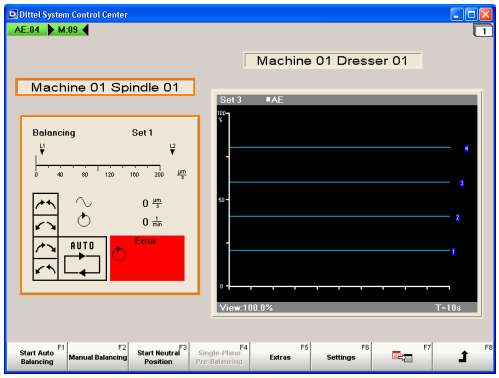
▷ To carry out the Module Setting of a M6000 Module press or click on [Module Mode] or [F1].



When restarting the program, on the selected Display Layer always the first “visible” Module is highlighted, e.g. **AE:04**, AE:04 as well as the corresponding Module View (marked orange).

The softkeys to operate the Module are displayed.

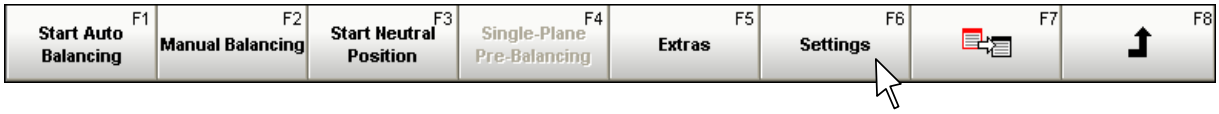
Figure 6-24



With several modules "visible" select the module to be set by using the key F7 or [F7] = next Module, in this example M:09. The Module will be highlighted as well as the corresponding Module View (marked orange).

▷ Press or click on the key [Settings] / [F6].

Figure 6-25



An options display with Preview Window opens – independent of the Module View - to set the selected Balancing Module M6000:

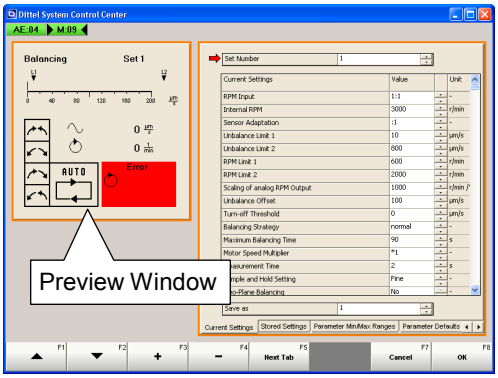


Figure 6-26

Settings using Softkeys:

▷ By pressing the Up- [▲] or Down-key [▼] scroll through the options display, the red arrow cursor jumps into the wanted line.

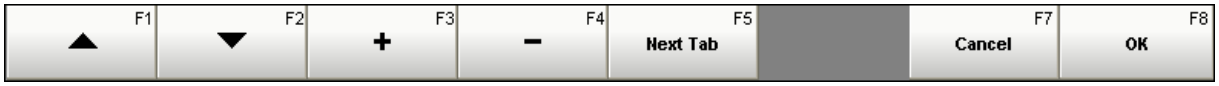
▷ By pressing the keys [+] or [-] the value of the selected line is changed.

▷ By pressing the key [Next Tab] the next Tab will be shown.

Have a choice of the following tabs:

- Current Settings,
- Stored Settings,
- Parameter Min/Max Range*),
- Parameter Defaults*),
- M Parameters,
- Module Parameters and
- Identification Data.

*) only available with access level “Administrator”!



NOTICE

▷ When pressing the key [Cancel] / [F7] you return without storage of any changes to the Module Balancing Mode.

▷ When pressing the key [OK] / [F8] changes in the Module Settings are taken over into the Set Number displayed in the line **Save as**. You return to the Module Balancing Mode.

▷ When pressing the key shortcut [Ctrl] + [H] or the HELP button at the SINUMERIK® keyboard, a window opens containing explanations of the following settings.

6.3.1 Tab: Current Settings

NOTICE The following settings determine essentially the balancing quality, as well as the monitoring function of M6000. Only trained staff should therefore perform all settings.

▷ Choose the Tab '**Current Settings**'. When using this Tab you see the consequence of the change on some settings directly on the Preview Window.

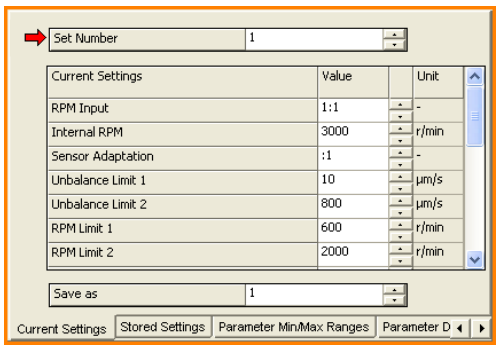


Figure 6-27

Set Number
Factory setting: **1**,
can be set with the [+] or [-] key from **1** to **15**.

All parameters, which are necessary to balance a machine tool spindle, can be saved under a Set Number. By switching over the sets it is possible to define different parameters depending on application (e.g. coarse or fine grinding). All parameters can be saved permanently; switching off the M6000 and/or the machine CNC control does not result in loss of data.

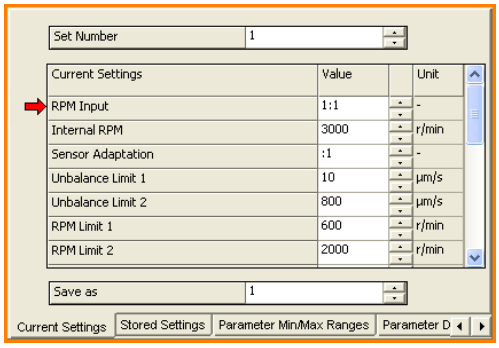


Figure 6-28

RPM Input (Connector # 15 or # 16)
Factory setting: **1:1**,
can be set with the [+] or [-] key to **1:1**, **1:2**, **1:4** or **Internal**.

This setting depends on the number of pulses per revolution, which the Balancing Module receives from the speed sensor. If it receives one, two or four pulse(s) per rev, set the RPM Input to "1:1", "1:2" or "1:4" accordingly.

NOTICE

- Carefully set the divider ratio of the RPM Input according to the number of pulses per revolution coming from the speed sensor. A faulty setting leads to a wrong display of speed and thus a faulty monitoring of the RPM Limits 1 and 2.
- **When "RPM Input" is set to "Internal" the Speed Limit 1 and Speed Limit 2 is NOT monitored!**
- When passing on the rpm signal (via connector # 17) the **RPM Input** of the second or further Modules must be set to the same divider ratio.
- When using the Balancing Strategy **Adaptive 2** or the licensed function **Single Plane/Two Plane Pre-Balancing** the Module M6000 may receive only one pulse per revolution of the spindle affected and therefore **RPM Input** should be set to **1:1**.

- The setting **RPM Input ➔ Internal** is **NOT** suitable for **Balancing Strategy Adaptive 2** or for **Single Plane/Two Plane Pre-Balancing**!
  RPM Input ➔ Internal should be used only temporarily, e.g. when the proximity switch is faulty. For this, the function **Internal RPM** must be adjusted as well (see next setting).

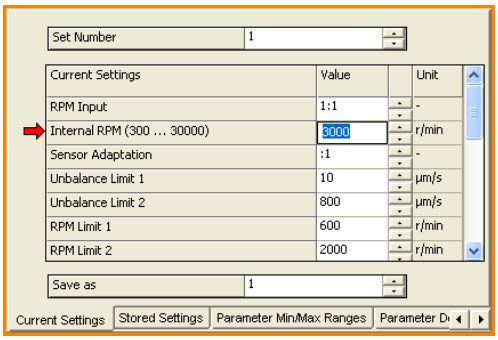


Figure 6-29

Internal RPM

Factory setting: **3000 r/min**,
can be set with the [+] or [-] key from **300 r/min** to **30,000 r/min** or entered directly with the keyboard.

This feature is used, when the proximity switch is faulty and a spare not at hand, or for environmental vibration measurements without the spindle running.

Use the [+] or [-] key to set the Module to the operational speed of the machine manually. The Balancing Module M6000 is then able to operate without rpm signal.

Remember to set the **"RPM Input"** to **"Internal"** (refer to previous step).

When varying the spindle's speed the value of the **Internal RPM** has to be adjusted as well. Otherwise less or no unbalance is shown although perhaps a large unbalance is present.

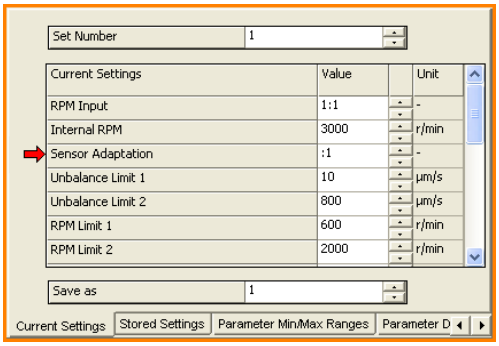


Figure 6-30

Sensor Adaptation (Connector # 18)

Factory setting: **:1**,
can be set with the [+] or [-] key to **:1**, **:2**, **:3** or **:6**.

With this operator defined setting, the signal of the Vibration Transducer will be attenuated by the ratio as stated.
E.g., at high unbalance signals coming from the Vibration Transducer, overdriving the amplifier can be prevented or when using a high sensitive Vibration Transducer, the input signal can be attenuated.

NOTICE

- The setting of the Sensor Adaptation affects the analog and digital display of the unbalance in µm/s or nm, the display of the Unbalance Limits 1 and 2 and the Unbalance Offset. In addition, it affects the status of the Unbalance Limits 1 and 2 and the Filtered and Raw Unbalance signals, which are available at the static interface connector # 2 and via PROFIBUS/PROFINET.
- The measurement **display** of the unbalance (µm/s) is only true with a vibration transducer having a charge sensitivity of 1,000 pC/g (BA 1020X) and a Sensor Adaptation setting of **:1**.

- When using a Dittel Vibration Transducer BA 320D or BA 320M the setting should be **:1**.

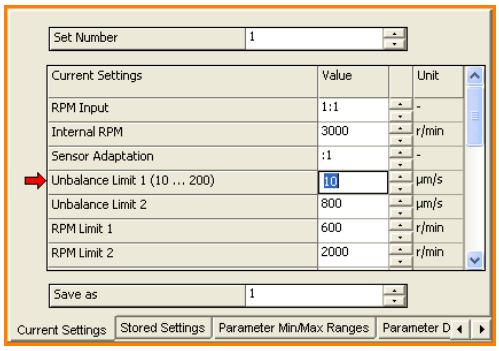


Figure 6-31

Unbalance Limit 1

Factory setting: **10 µm/s**,
can be set with the [+] or [-] key from **10 µm/s** to **200 µm/s** or entered directly with the keyboard.
On the Preview Window or Balancing Standard View, the quantity of the Unbalance Limit 1 is indicated as triangle, marked **L1**.
This operator defined setting establishes the vibration level, which acts as an "upper limit 1" for the process. When reached, this setting will indicate the need to perform a re-balance operation. This indication is given via pin 4 of connector # 2 (HIGH signal turns to LOW), or equivalent via PROFIBUS interface, connector # 13, or PROFINET interface, connectors # 30/31 to the machine CNC control.

NOTICE

- Carry out the setting of the Unbalance Limit 1 carefully!
  An incorrect setting of the Unbalance Limit 1 leads to a premature or delayed message "Unbalance 1 Limit exceeded".
- Additionally note the setting of "Sensor Adaptation" and "Unbalance Offset".

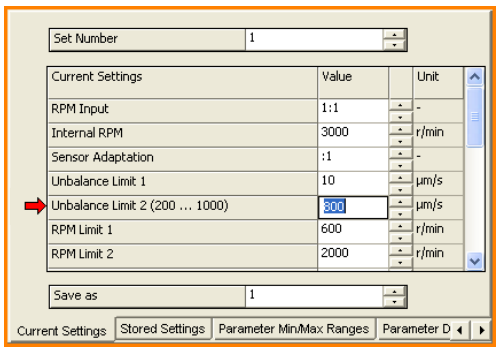


Figure 6-32

Unbalance Limit 2

Factory setting: **800 µm/s**,
can be set with the [+] or [-] key from **200 µm/s** to **1,000 µm/s** or entered directly with the keyboard.
On the Preview Window or Balancing Standard View, the quantity of the Unbalance Limit 2 is indicated as triangle, marked **L2**.
This operator defined setting establishes the vibration level, which acts as an indicator of the operational upper safety limit for the machine tool. When reached, this setting will indicate an inadmissible unbalance. This indication is given at pin 5 of connector # 2 (HIGH signal turns to LOW), or equivalent via PROFIBUS interface, connector # 13, or PROFINET interface, connectors # 30/31. This signal, fed to the machine CNC control, may be used to emergency shutdown the machine tool.

NOTICE

- Carry out the setting of the Unbalance Limit 2 carefully!
  An incorrect setting of the Unbalance Limit 2 leads to a premature or delayed message "Unbalance 2 Limit exceeded". This may cause an emergency shutdown signal before time or an

unacceptably high unbalance arises.

- Please note that the sum of the Unbalance Offset and the Unbalance Limit 2 must be less than 1020. Otherwise, the Unbalance Limit 2 is no longer monitored.
- Notice the setting of "Sensor Adaptation" and "Unbalance Offset".

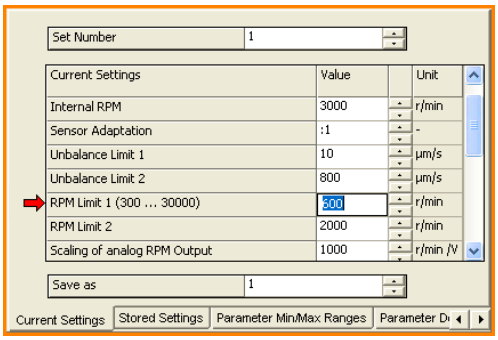


Figure 6-33

RPM Limit 1

Factory setting **600 r/min**,
can be set with the [+] or [-] key from **300 r/min** to **30,000 r/min** or entered directly with the keyboard.
With the operator defined setting RPM Limit 1 the speed of the machine spindle may be monitored.
For example, if the actual spindle speed has not reached RPM Limit 1, the motor drive may be faulty.
When the actual speed exceeds RPM Limit 1 indication is given via pin 6 of connector # 2 (HIGH signal turns to LOW), or equivalent via PROFIBUS interface, connector # 13, or PROFINET interface, connectors # 30/31, to the machine CNC control.

NOTICE

- The M6000 module may get one, two, or four switching pulses per revolution of the spindle. If the setting of the Speed Input does not correspond with the number of switching pulses, it leads to a wrong display of speed and thus a wrong monitoring of the Speed Limit 1.
- When “RPM Input” is set to “Internal” (refer to Figure 6-28) the RPM Limit 1 is NOT monitored!
- If setting of the RPM LIMIT 1 is not possible, this setting is inhibited by an »Administrator« for safety reasons (see Tab ‘M Parameters’)!

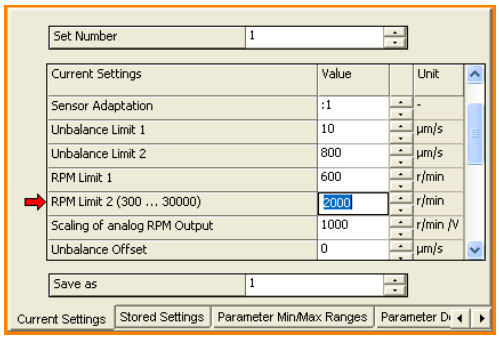


Figure 6-34

RPM Limit 2

Factory setting **2000 r/min**,
can be set with the [+] or [-] key from **300 r/min** to **30,000 r/min** or entered directly with the keyboard.
With the operator defined setting RPM Limit 2 a second speed of the machine spindle may be monitored.
For example, if the actual spindle speed is higher than RPM Limit 2, the grinding wheel could be damaged.
When the actual speed exceeds RPM Limit 2 indication is given at pin 7 of connector # 2 (HIGH signal turns to LOW) or equivalent via PROFIBUS interface, connector # 13, or PROFINET interface, connectors # 30/31. This signal, fed to the machine CNC control, may be used to stop the machine tool.

NOTICE

- The M6000 module may get one, two, or four switching pulses per revolution of the spindle. If the setting of the Speed Input does not correspond with the number of switching pulses, it leads to a wrong display of speed and thus a wrong monitoring of the Speed Limit 2.
- When “RPM Input” is set to “Internal” (refer to Figure 6-28) the RPM Limit 2 is NOT monitored!
- If setting of the RPM LIMIT 2 is not possible, this setting is inhibited by an »Administrator« for safety reasons (see Tab ‘M Parameters’)!

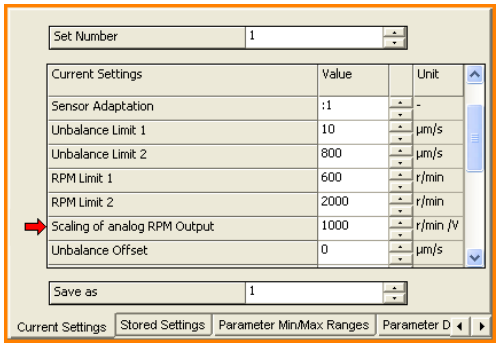


Figure 6-35

Scaling of analog RPM Output

Factory setting **1000 rpm/V**,
can be set with the [+] or [-] key to **1000 rpm/V**, **2000 rpm/V** or **3000 rpm/V**.
The spindle speed is presented as a proportional DC voltage at pin 24 of connector # 2, for example to operate a recording equipment.

NOTICE

Perform the setting of the Scaling of analog RPM Output carefully. A wrong scale factor can lead to a misinterpreted output voltage of the spindle speed.

The output voltage is limited to 10 Vdc!

At a setting of, e.g. 2000/V, a maximum speed of 20,000 rpm can be measured (corresponds to the limit of 10 Vdc). The output voltage will not increase any further at a speed of more than 20,000 rpm.

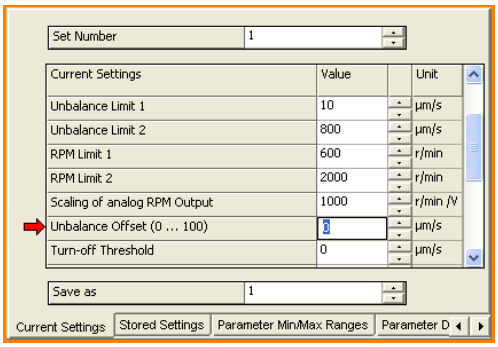
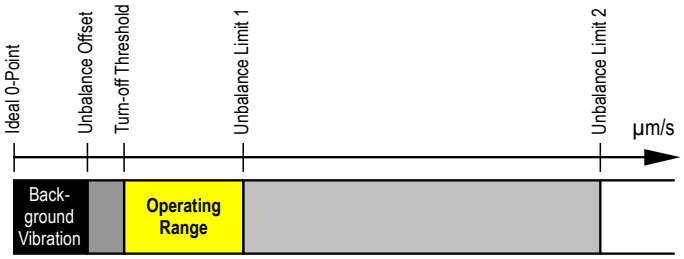


Figure 6-36

Unbalance Offset

Factory setting **0 µm/s**,
can be set with the [+] or [-] key from **0 µm/s** to **100 µm/s** or entered directly with the keyboard.

Since no balancing system is capable to balance a grinding wheel to a value below the environmental vibration level, this operator defined setting “suppresses” vibration coming from adjacent machinery, etc.



At the very beginning set the Unbalance Offset to "0 µm/s"! The Unbalance Offset is defined during «Section 7. Getting started with manual Balancing».

NOTICE Please note, that the sum of Unbalance Offset and Unbalance Limit 2 must be less than 1020. Otherwise, the Unbalance Limit 2 is no longer monitored.

Additionally note the setting of "Sensor Adaptation".

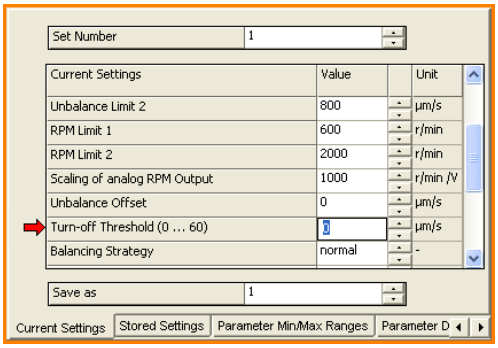


Figure 6-37

Turn-off Threshold

Factory setting: **0 µm/s**,
can be set with the [+] or [-] key from **0 µm/s** to **60 µm/s** or entered directly with the keyboard.

The setting of the Turn-off Threshold is associated to the Unbalance Limit 1.

The setting of the Unbalance Offset is done due to ambient or background vibrations (see above). The operator defined setting of the Turn-off Threshold however allows a certain tolerance in balancing. It can be set from 0 to 60 µm/s, depending on quality demands or time requirements.

NOTICE The Unbalance Limit 1 must be at least 5 µm/s above the Turn-off Threshold (operating range), forbidden settings are inhibited!

▷ **For the first balancing tests, leave the Turn-off Threshold at “0 µm/s”! Setting of the Turn-off Threshold is defined later, if necessary.**

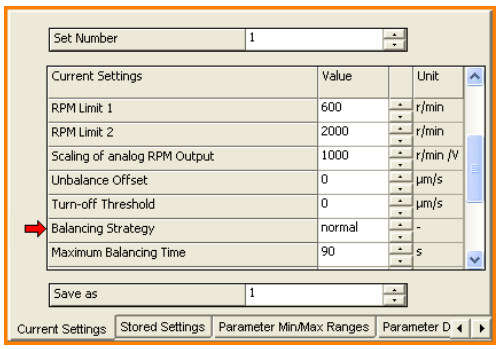


Figure 6-38

Balancing Strategy

Factory setting: **Normal**,
can be set with the [+] or [-] key to

Normal Standard balancing method. Same reaction of the balancing weights 1 and 2 when they are moving together left or right, or when they moving to each other or apart.

Adaptive 1 This balancing strategy uses the absolute amount of the unbalance to position the balancing weights.

Adaptive 2 This balancing strategy uses additionally the phase angle information to position the balancing weights.

THIS STRATEGY IS NOT SUITABLE WHEN THE MODULE IS SET TO 'RPM INPUT' ➔ 'INTERNAL' or '1:2' or '1:4'!

NOTICE Due to the variety of machine tools, no statement can be made which strategy works more correctly or faster!

▷ Observe the operation of the system on its first few balancing cycles, then change the Balancing Strategy, add manually an unbalance and run two or three more tests! Refer to § 8.2.1.

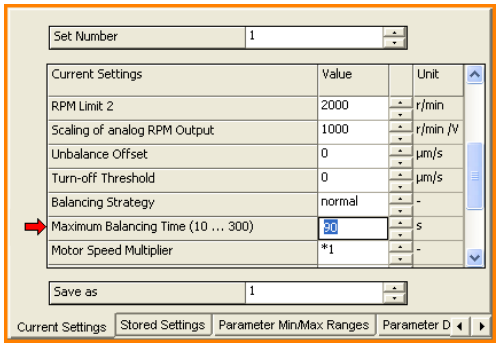


Figure 6-39

Maximum Balancing Time

Factory setting: **90 s**,
can be set with the [+] or [-] key from **10 s** to **300 s** in steps of 1 second or entered directly with the keyboard.

This operator defined setting establishes the maximum duration of a balancing cycle. When balancing lasts longer, this setting will indicate any malfunction. This indication is given by

- a clock symbol appearing in the red ERROR area,
- a LOW signal each at pin 2 and 3 of connector # 2 or equivalent at PROFIBUS interface connector # 13 or PROFINET connectors # 30/31,
- A red lighting LED # 7.

NOTICE Exceeding the balancing time does **NOT** cause necessarily an automatic balancing stop, but may be initiated by the machine CNC control.

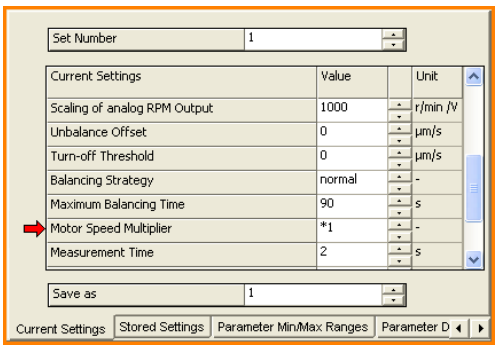


Figure 6-40

Motor Speed Multiplier

Factory setting: **×1**,
can be set with the [+] or [-] key from **×1** to **×5** in steps of 0.5.

With all balancing strategies, the setting **"×1"** is suitable for approximately 80% of the applications.

An increase of the **Motor Speed Multiplier** value causes longer duration of the pulses sent to the motors in the Balancing Unit. The weights are moving longer but this may result in "overcompensation", i.e. unbalance swings about the zero point (observe unbalance indication). In this case, reduce the **Motor Speed Multiplier** value.

NOTICE **To determine the correct setting, it is necessary to observe the operation of the system on its first few balancing cycles! Refer to paragraph 8.2.1.**

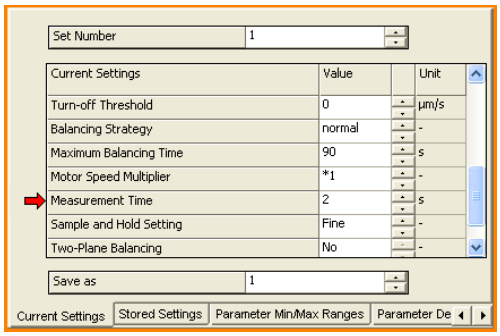


Figure 6-41

Measurement Time

Factory setting: **2 s**,
can be set with the [+] or [-] key from **1 s** to **10 s** in steps of 1 second.

Due to our unique peak measurement method, it is possible to balance automatically, even if a beat frequency occurs on the unbalance signal. If a beat frequency appears at a certain operating speed, whose period is longer than 2 sec (standard measurement time), the measurement time has to be extended such, that a complete beat period is equal to the Measurement Time.

NOTICE A beat frequency is visible by a rising and falling unbalance indication (bar graph or digits), in particular on a balanced system.

▷ **Determine the duration of a beat frequency period by observation on its first few balancing cycles.**

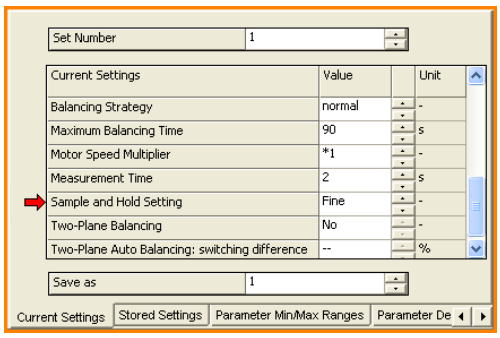


Figure 6-42

Sample and Hold Setting

Factory setting: **Fine**,
can be set with the [+] or [-] key to **Fine**, **Medium** or **Rough**.

If the Balancing System M6000 is exposed to heavy interference or if noisy signals of the Vibration Transducer occur, it is necessary to set the system to **Medium** or **Rough**. Otherwise, interference may cause the system to change its balancing mode uncontrollable. Balancing time is increased by this measure.

On the other hand, at low interference surroundings and very stiff machine spindles, the system may be set to **Fine** so that a small increase of unbalance already causes a change to the next balancing mode.

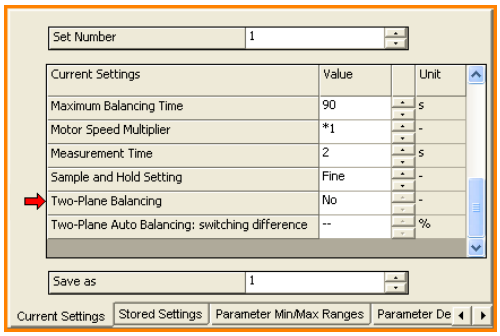


Figure 6-43

Two-Plane Balancing

Factory setting: **No**

This setting is only enabled when the function **Two-Plane Pre-Balancing** and/or **Two-Plane Auto Balancing** is licensed!

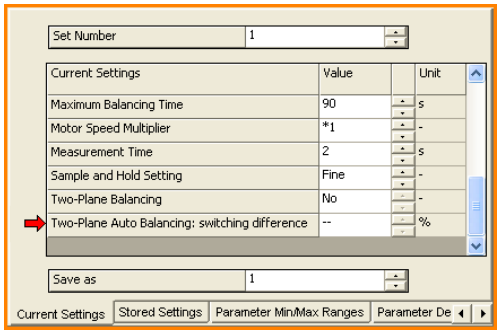


Figure 6-44

Two-Plane Auto Balancing: switching difference

Factory setting: **--**%

This setting is only enabled when the function **Two-Plane Auto Balancing** is licensed!

Save as

Can be set with the [+] or [-] key to **Current Settings** or **1** … **15**.

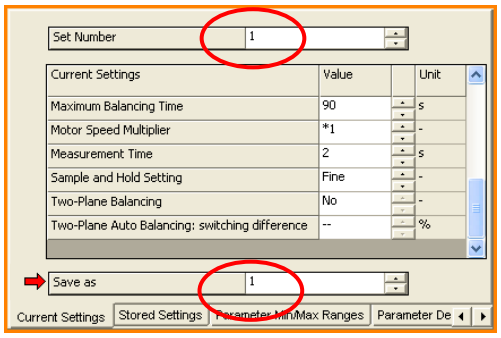


Figure 6-45a

▷ **Standard Setting**: If you want to store the changes permanently under the same **Set Number** as above, set with the [+] or [-] key **Save as** to the Set Number above and click to **OK**. The Set Number will be overwritten with the new data. You return to the Module Mode.

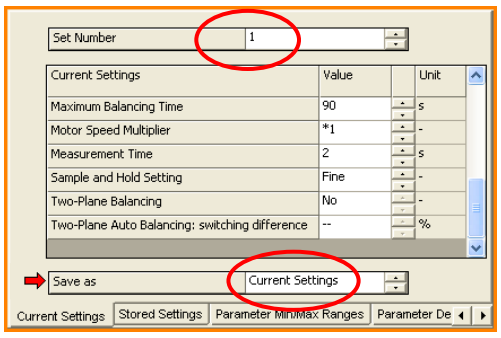


Figure 6-45b

▷ If you want to store the changes temporarily (e.g. for testing) set with the [+] or [-] key **Save as** to **'Current Settings'** and then click to **OK**. You return to the Module Mode. The new settings are taken over till the next Set Number is called up.

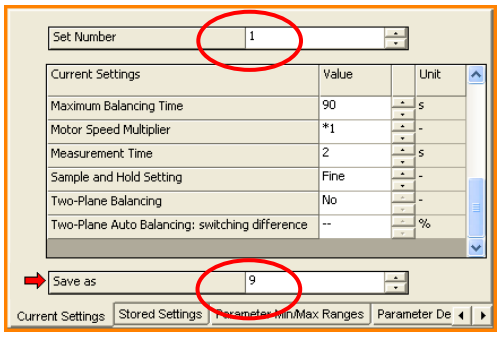
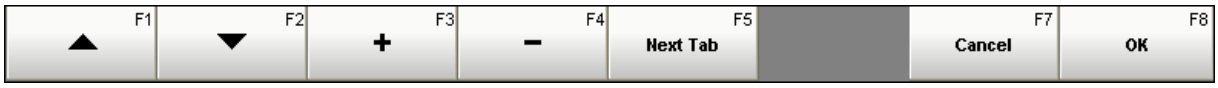


Figure 6-45c

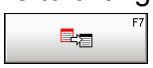
▷ If you want to store the changes under a different **Set Number** as above, set with the [+] or [-] key **Save as** to **1** … **15** and click to **OK**. The new Set Number will be overwritten with the new data. You return to the Module Mode.

▷ If you want to bypass the changes click or press the key [Cancel]. You return to the Module Mode.



NOTICE

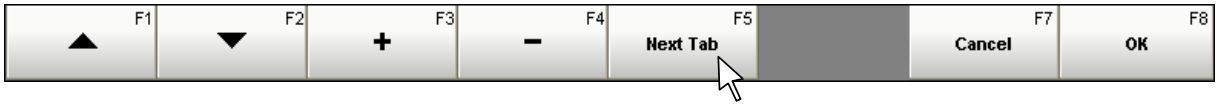
▷ If you want to save new settings in a further set, press the key [Settings] again and choose the Set Number 2, for example. Repeat the settings as described above.

▷ If you would like to change settings of another Balancing Module, press the key  (= next Module) so often till the desired Module is highlighted. Then press the key [Settings] and choose the Set Number 5, for example. Repeat the settings as described above.

6.3.2 Tab: M Parameters

NOTICE The following settings are true for all 15 Set Numbers of Module M6000!

▷ If applicable press the key [Settings] again and open the Tab **M Parameters** by pressing or clicking on the key [Next Tab] or [F5] repeatedly.



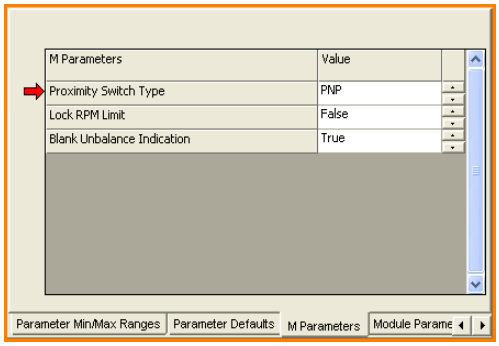


Figure 6-46

Proximity Switch Type

Factory setting: **PNP**,
can be set with the [+] or [-] key to:

NPN enables the M6000 to handle rpm signals from a NPN Proximity switch.

PNP enables the M6000 to handle rpm signals from a PNP Proximity switch.

In our Mechanical Balancing Systems **PNP** Proximity switches are fitted as standard!

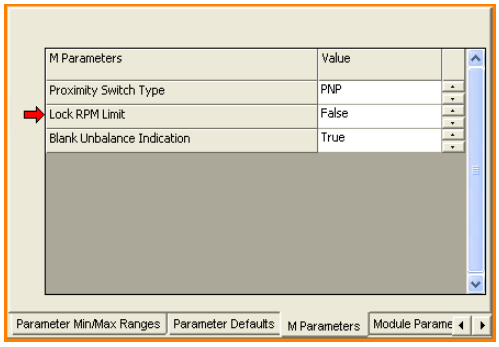


Figure 6-47

ONLY ACCESSIBLE WITH ADMINISTRATOR RIGHTS!

Lock RPM Limit

Factory setting: **False**,
can be set with the [+] or [-] key to:

True i.e. the RPM Limits 1 and 2 are locked. They cannot be altered (see paragraph 6.3, Module Settings, RPM Limit 1 and 2).

False i.e. the RPM Limits 1 and 2 can be altered by an **Expert** or **Administrator**.

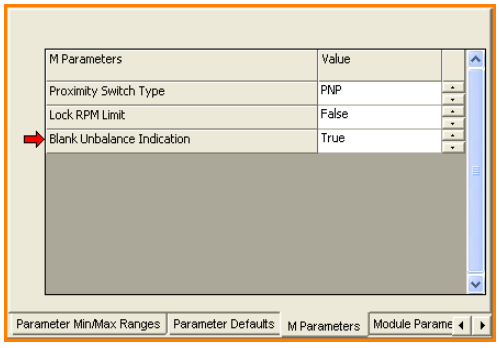


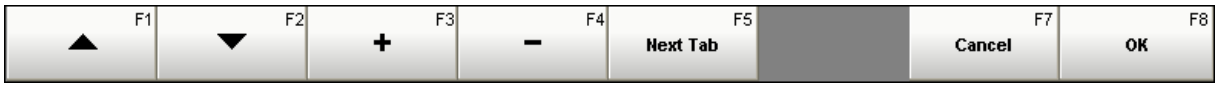
Figure 6-48

Blank Unbalance Indication

Factory setting: **True**,
can be set with the [+] or [-] key to:

True After a successful Automatic Balancing cycle (unbalance was less than the turn-off threshold or has reached the 0-point), the indication of the unbalance is blanked (display “0”) till the increasing unbalance exceeds **Unbalance Limit 1**.

False The actual unbalance is always displayed digitally and by an analog bar graph (true for Balancing Standard View) or only digitally (true for Balancing Reduced Views).



NOTICE

▷ Save your settings of this Tab by clicking or pressing on key [OK]. You are leaving the Tab **M Parameters**.

▷ Bypass any changes by pressing or clicking on key [Cancel]. You are leaving the Tab **M Parameters**.

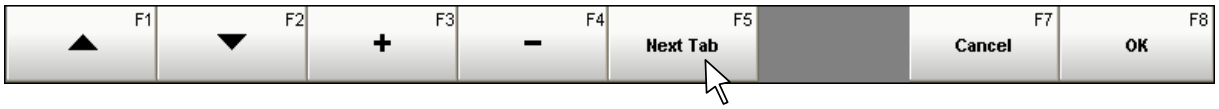
6.3.3 Tab: Module Parameters

NOTICE

ONLY ACCESSIBLE WITH ADMINISTRATOR RIGHTS!

The setting of the Programmable Serial Baud Rate concerns only the DS6000 Module, which is connected via RS-232 or Interface Converter to the PC or Automation System! With this setting the Baud Rate of the Module is set from the PC or Automation System.
Refer to paragraph 3.3.1, DIP-Switch # 6, SW1 and SW2!

▷ Press the key [Settings] again and open the Tab **Module Parameters** by pressing or clicking on the key [Next Tab] or [F5] repeatedly.



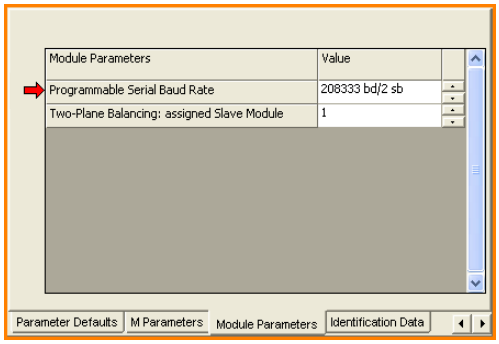


Figure 6-49

Programmable Serial Baud Rate

Factory setting: **208333 bd/2 sb**,
can be set with the [+] or [-] key to a Baud Rate (bd) of 1200, 2400, 4800, 9600, 19200, 38400, 57600, 125000, 156250 or 208333, no parity. Except 208333, all others can be set to either 1 or 2 Stopbit(s) (sb).

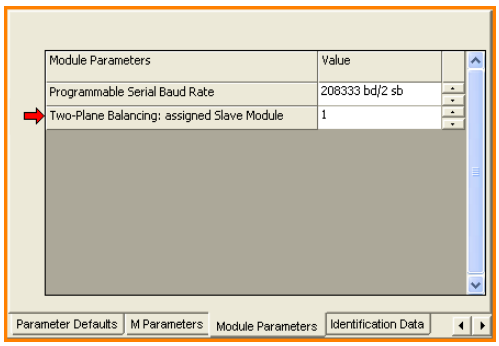


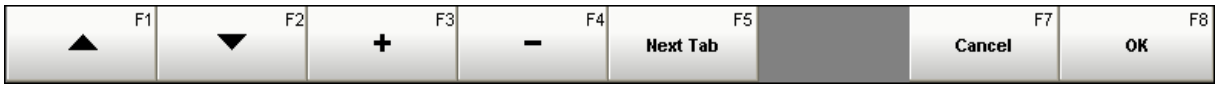
Figure 6-50

Two-Plane Balancing: assigned Slave Module

Factory setting: **1**,

can be set with the [+] or [-] key from **1** to **99**.

This setting is only enabled when the function **Two-Plane Pre-Balancing or Two-Plane Auto Balancing** is licensed!



NOTICE

▷ Save your settings of this Tab by clicking or pressing on key [OK]. You are leaving the Tab **Module Parameters**.

▷ **Refers only to setting of the Programmable Serial Baud Rate:** On the Module set the switches SW1 and SW2 of DIP-Switch # 6 to **ON** (see paragraph 3.3.1)!

If applicable, set your Interface-Converter or the interface of your PC / Automation System which is connected to the DS6000 Module to the Baud Rate as above.
Now switch OFF the 24 Vdc power of the Module and then ON again, from now on the new programmed Baud Rate is active!

▷ Bypass any changes by pressing or clicking on key [Cancel].
You are leaving the Tab **Module Parameters**.

7 Getting started with manual Balancing

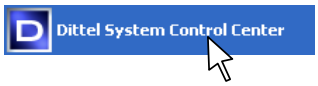
This Section contains a description how to get started when operating the Balancing Module M6000 the first time in the Balancing Function. The System needs to be set for proper operation by first initiating a kind of learning cycle, which will compare the background vibrations with the specific machine and spindle vibrations.

NOTICE To get started with the Balancing Module M6000 we recommend to select the **Standard Balancing** view so you can observe unbalance, speed, error etc.

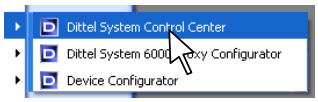
7.1 Prerequisite

- **The machine tool spindle is turning with less than 300 rpm or is standing still!**
- A Balancing Module M6000 is installed, pre-set (for example module address 03) and properly powered (LED # 4 lights),
- on your computer or automation system the Dittel System Control Center Software is installed and operating,
- Proximity Switch, Vibration Transducer and Transmitting Coil are mounted on the machine and connected to the M6000 Module, and
- a suitable mechanical Balancing System is fitted in or on the machine spindle.

7.2 Getting started



▷ Start the Program on your Automation System or computer by clicking on button *Start* and then on symbol “Dittel System Control Center”.



▷ or start the Program by clicking on buttons *Start* / *Programs* / *Dittel System 6000* and finally on the symbol “Dittel System Control Center”.

▷ In the SINUMERIK® HMI-Environment you can start the DSCC Program by pressing the appropriate softkey.

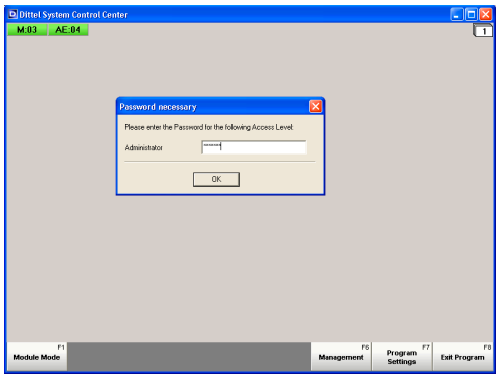


Figure 7-1

When the password prompt is activated (see § 5.2.4 **General Settings ➔ Access Rights**) the opposite screen is displayed.

▷ If no password has been entered till now, click on [OK] or press the key [Enter] on your computer keyboard or [Input] on the SINUMERIK® keypad.

▷ Otherwise enter your password and click on key [OK] or press the [Enter] / [Input] key.

The next screen opens:

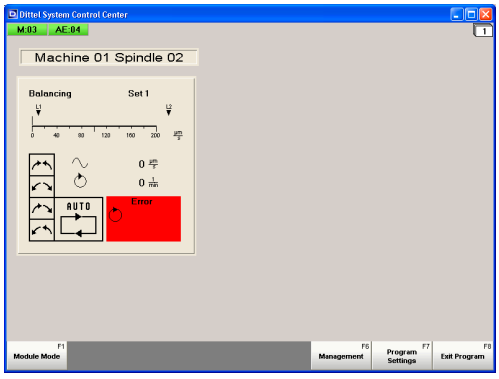


Figure 7-2

When the password prompt is NOT activated (see § 5.2.4 **General Settings ➔ Access Rights**) this screen opens immediately (number of views depends on your setting).

The example shows a connected and activated Balancing Module M6000 M:03 and a connected Process Monitoring Module AE6000 AE:04 .

▷ Click or press on the key [Module Mode] / [F1].

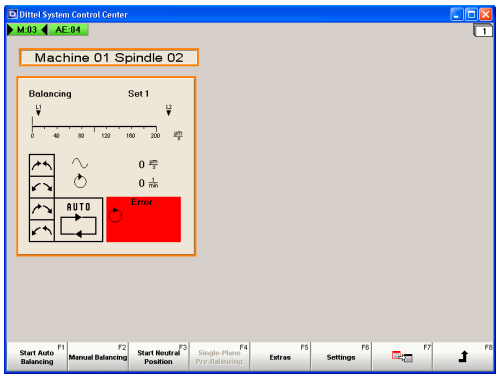


Figure 7-3

- The Module M:03 will be highlighted 

- as well as the Standard Balancing view,
- the key assignment changes into Balancing Mode.

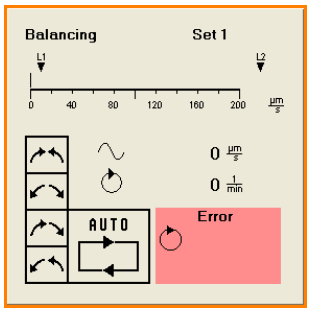


Figure 7-4

It is displayed:

- the module Set number (here 1),
- the settings of the module Set (L1, L2),
- the actual Unbalance (here 0 µm/s),
- the spindle's speed (here 0 1/min),
- the Error message "speed" (speed of spindle is less 72 rpm).
- The Module M6000 is ready for Automatic Balancing (standby).

7.2.1 For electromechanical Balancing Heads with Neutral Position only:

NOTICE

Before the first start-up of the tool spindle, place the balancing weights of the electromechanical Balancing Head exactly opposite, i.e. into neutral position. Otherwise – in the most unfavourable case – the “heavy part” of the grinding wheel could meet the “heavy part” of the Balancing Head.

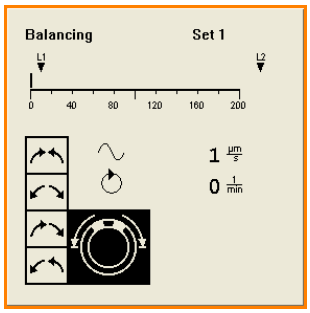


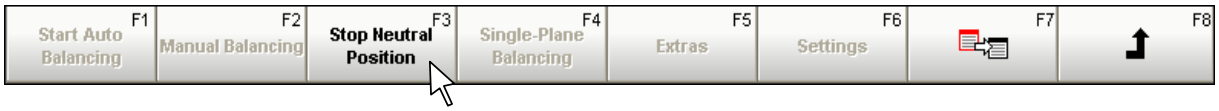
Figure 7-5

▷ Now click or press on the key [Start Neutral Position]. Or the machine CNC control applies a HIGH signal at connector # 2 / pin 13, equivalent via PROFIBUS, connector # 13, or PROFINET, connectors # 30/31.

The screen changes.

The inverted symbol  indicates that the two balancing weights of the Balancing System are moving towards the neutral position.

▷ The movement can be aborted any time by pressing or clicking on the key [Stop Neutral Position] or by applying a LOW signal at connector # 2 / pin 13 (equivalent via PROFIBUS/PROFINET). Immediately you return to the standby Automatic Balancing Mode.



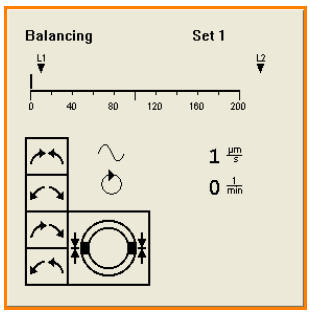


Figure 7-6

After reaching the neutral position, the driving motors switch off. The opposite figure shows the screen after the balancing weights have reached their neutral position.

Simultaneously a HIGH signal is available at pin 8 of connector # 2 (equivalent via PROFIBUS/PROFINET) to report that the weights are in their neutral position.

The key [Stop Neutral Position] changes to [Neutral Position completed].

▷ Exit the Neutral Position function by pressing or clicking on key [Neutral Position completed].

You return to the standby Automatic Balancing Mode.

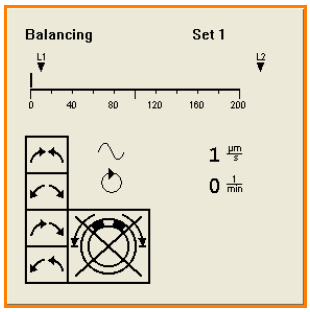


Figure 7-7

If a crossed out symbol appears instead (as shown in opposite Figure 7-7) either an unsuitable Balancing Head is installed (without neutral position feature) or the balancing weights have not reached their neutral position (e.g. malfunctioning system). In addition, a failure signal (LOW) is available at pin 2 of connector # 2 (equivalent via PROFIBUS/PROFINET).

▷ Continue by pressing or clicking on key [Neutral Position completed], investigate cause and start a new trial by clicking or pressing on the [Start Neutral Position] key.

7.3 Manual Balancing

NOTICE

- ▷ Start the grinding machine and run the wheel at an operating speed not less than 300 rpm.
- ▷ Turn on the coolant flow and all secondary machine systems.
- ▷ **In order to balance properly never balance during grinding or dressing!**

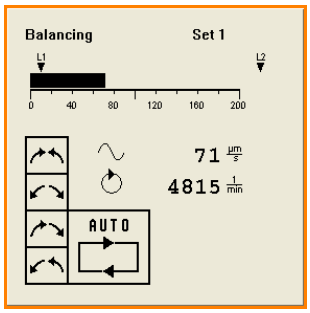


Figure 7-8

The Balancing Module M6000 is in the stopped Automatic Balancing Mode (standby).

It is displayed:

- the Module's Set number,
- the Limits 1 and 2 (L1, L2),
- Current unbalance level shown on the bar graph (auto scaling from 0 to 200 µm/s or 0 to 1000 µm/s) and in digits (depends on setting: units of nm or µm/sec),
- Current speed (1/min).

No red Error message may be displayed:

- **no** speed-symbol,
- **no** unbalance-symbol,
- **no** transmitting-symbol,
- **no** clock-symbol!

If an Error message is visible anyway, refer to *Appendix B, Troubleshooting Guide*.

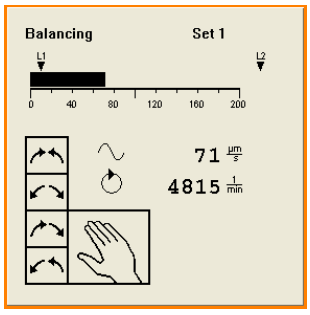
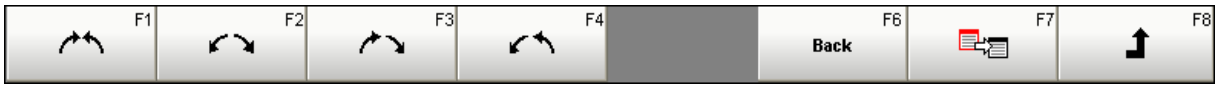


Figure 7-9

- By pressing or clicking on the key [Manual Balancing] the operating mode Manual Balancing gets active.
- The AUTO symbol changes to MANUAL symbol, the key assignments change for manual operation.
- By pressing or clicking on the arrow keys the two balancing weights in the Balancing Head are moved correspondingly; the MANUAL symbol and the corresponding operating mode symbol are displayed inverted:



The balancing weights are moving as long as the arrow key is operated.

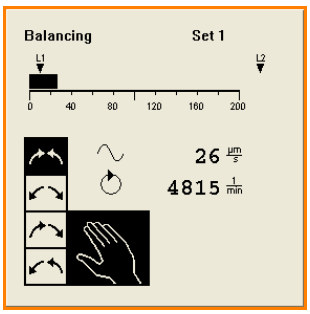


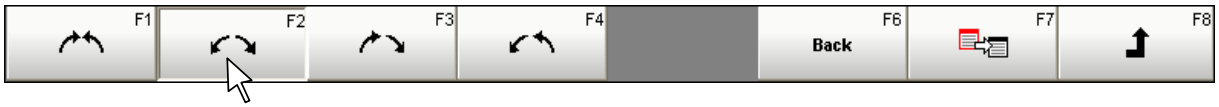
Figure 7-10

Both balancing weights are moving to or apart each other.

Same as before, but with opposite turning direction.

Both balancing weights are moving equally in the same direction.

Same as before, but with opposite turning direction.



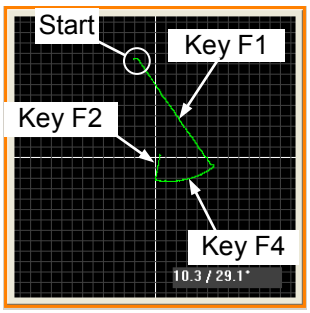
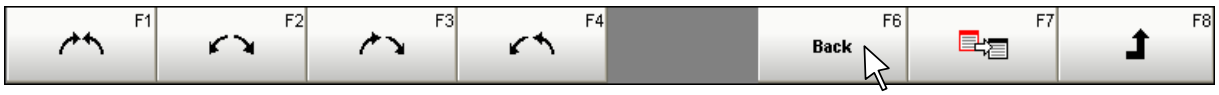


Figure 7-11

Manual Balancing is particularly comfortable in the **Coordinates** view. At this view, the unbalance is represented as a vector.
The aim is to bring the unbalance to the centre of the coordinate system = 0 µm/s.
After clicking or pressing one of the four arrow buttons, you see the consequence immediately.
In the lower right window, the unbalance is displayed in units of µm/s (**without Offset!**) and an internal relative measuring angle.
When you move the cursor arrow into the **Coordinates** view, the cursor arrow changes to a magnifying glass.
When clicking with the RIGHT mouse button you zoom out, when clicking with the LEFT mouse button you zoom in.

NOTICE

- ▷ **Only one arrow key may be operated at a time!**
- ▷ You must try to move the two balancing weights in the direction which reduces the unbalance reading to a minimum.
- ▷ When pressing an arrow key and the unbalance increases, then choose the key with the opposite turning direction.
- ▷ It should be realized that any change in unbalance of the machine would lag a little behind the movement of the balancing weights. Therefore, any movement of the balancing weights should be performed in short “bursts” to evaluate the effect of the balancing weight movement.
- ▷ If the unbalance remains almost constant when pressing any arrow key or an acceptable “remaining unbalance” cannot be achieved, the spindle may be in resonance. Then a check using the M6000 Extra-Function SPECTRUM (if licensed) is highly recommended.



- ▷ Exit the Manual Balancing function by pressing or clicking on key [Back]. You return to the standby Automatic Balancing Mode.

7.4 Setting the Unbalance Offset

NOTICE The following setting determines essentially the monitoring function of the M6000. Only trained staff should therefore perform this setting.

- The Unbalance Offset setting suppresses background vibration coming from neighbouring machines or caused by the machine structure.
- Determine the Unbalance Offset in periods of maximum environmental noise and background vibrations.
- Only when installing new neighbouring machines, changing motor drives, bearings, or position of the Vibration Transducer (magnetic mount) this setting of the Unbalance Offset has to be repeated!

▷ Start the machine tool and run the wheel at an operating speed not less than 300 rpm.

▷ Turn on the coolant flow and all secondary machine systems.

▷ **In order to adjust the Unbalance Offset properly never allow the wheel is in contact with the work piece or dresser!!**

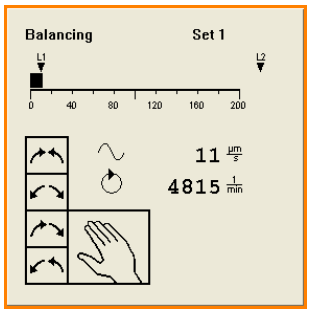


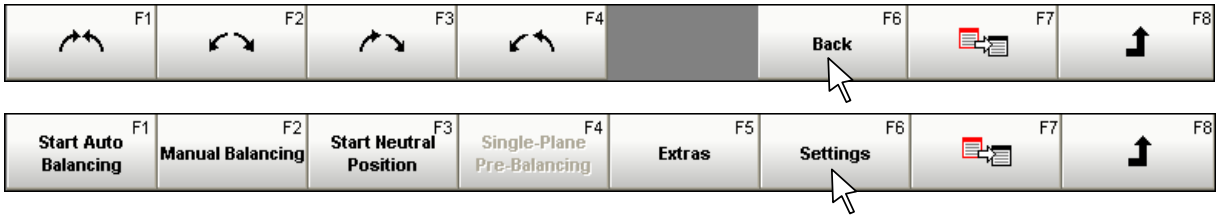
Figure 7-12

▷ Try to balance the tool spindle in the operating mode **Manual Balancing** or **Auto Balancing** (refer to § 8.2) as good as possible (residual unbalance = 11 µm/s in this example)

If no more reduction of the unbalance is possible, it can be assumed that this is a residual value of unbalance or vibration. It is caused by the machine structure, its foundation or adjacent machinery and therefore cannot be compensated by the Balancing System.

▷ **Record this residual unbalance (here 11 µm/s)!**

▷ To set the Unbalance Offset, first press or click on [Back] and then on [Settings].



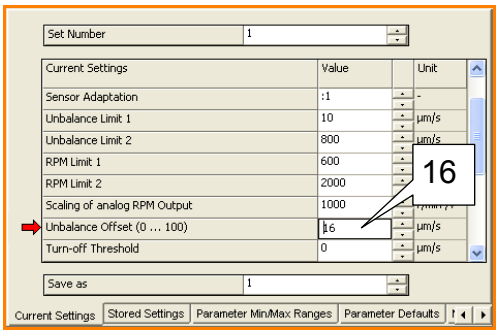


Figure 7-13

▷ Highlight the line “Unbalance Offset” using the Down key [▼].

▷ **With the [+] or [-] key set an Unbalance Offset of residual unbalance plus 5 µm/s!**

In our example: When balanced, the recorded residual unbalance was 11 µm/s, now add 5 µm/s and set “Unbalance Offset” to “16 µm/s”.

NOTICE

▷ Perform the setting of the Unbalance Offset carefully. A great Unbalance Offset value leads to an incorrect unbalance display. This results e.g. in a delayed signal “Unbalance-Limit 1 or 2 exceeded”.

▷ With the Down key [▼] highlight the line “Save as”. With the [+] or [-] key set the Set number as above or a new Set number and confirm the Unbalance Offset by pressing or clicking on the [OK] key.

You return to the stopped Automatic Balancing Mode screen.

▷ If you are using several Sets, the Unbalance Offset has to be found and set for every Set Number individually.

▷ If you are clicking or pressing on the key Return [↥] you return to the beginning of the Balancing program

8 Automatic Balancing Function

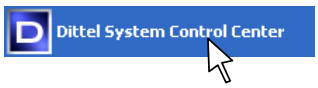
This Section contains a description when operating the Balancing Module M6000 the first time in the automatic BALANCING FUNCTION.

NOTICE

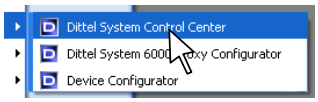
- After wheel replacement and worst case position of the balancing weights in the balancing head, an inadmissible unbalance may occur. Therefore, we recommend to drive the balancing weights to their neutral position before start-up the spindle.
- Automatic Balancing should be performed with the machine running, and coolant flowing, but **not while the wheel is in contact with the work piece**. The process of grinding a part, dressing the wheel, moving the wheelhead, etc. can introduce vibrations into the machine which are unrelated to wheel unbalance.
- Attempting to balance during such processes will not work, and will have detrimental effect on the grinding or dressing results.
- During grinding or feeding, a distorted unbalance reading may be displayed on the screen. To blank this reading, feed a static HIGH signal from the machine CNC control to pin 19 of connector # 2 or equivalent via PROFIBUS/PROFINET (reading “0 µm/s”).
- For the manually started Automatic Balancing Function the “Standard Balancing View” should be selected to watch the unbalance, speed, error, etc.

8.1 Prerequisite

- **For Balancing Heads with Neutral Position ONLY: The machine tool spindle is spinning with less than 72 rpm or is standing still!**
- A Balancing Module M6000 is installed, pre-set (Offset, Limits, etc) and properly powered (LED # 4 lights),
- on your Computer or Automation system the DITTEL System Control Center Software is installed and operating,
- Proximity Switch, Vibration Transducer and Transmitting Coil are mounted at the machine and connected to the M6000 Module, and
- a suitable mechanical Balancing System is fitted in or at the machine spindle.



▷ Start the Program on your Automation System or computer by clicking on button *Start* and then on symbol “Dittel System Control Center”.



▷ or start the Program by clicking on buttons *Start / Programs / Dittel System 6000* and finally on the symbol “Dittel System Control Center”.

▷ In the SINUMERIK® HMI-Environment, you can start the DSCC Program by pressing the appropriate softkey.

In the following example, the Automation System finds two Modules.

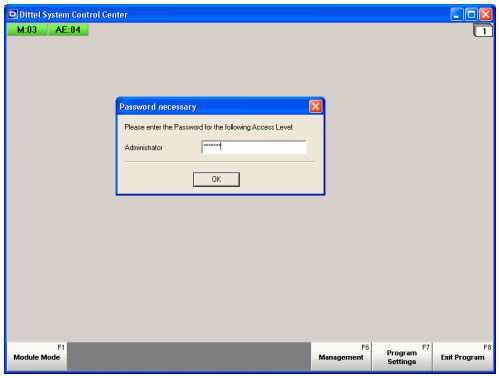


Figure 8-1

To start the Automatic Balancing Function the opposite or the following screen should open:

The access right shown corresponds to the setting in paragraph 5.2.4.

▷ If you have not allocated any password yet (see paragraph 9.1) click on [OK] or press the key [Enter] on your computer keyboard or [Input] on the SINUMERIK® keypad.

▷ Otherwise enter your password and confirm by clicking on key [OK] or pressing the [Enter] / [Input] key.

The next screen opens:

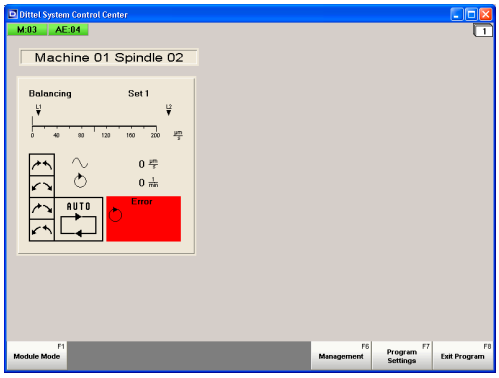


Figure 8-2

Or this screen opens immediately (number of views depends on your setting).

It is displayed:

- the module Set number (here 1),
- the settings of the module Set 1 (L1, L2),
- the actual Unbalance (0 µm/s)
- the spindle’s speed (0 1/min),
- the Error message "speed" (speed of spindle is less 72 rpm, only for Neutral Position).

▷ Click or press on the key [Module Mode].

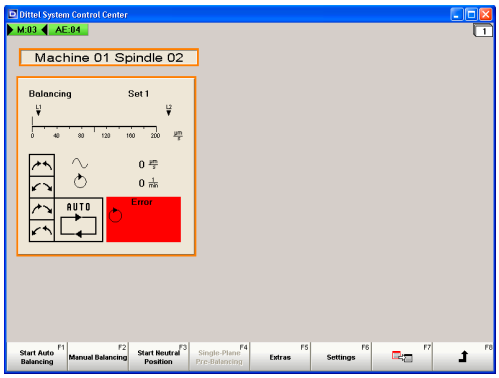


Figure 8-3

- The Module Address **M:03** will be highlighted 
- as well as the Standard Balancing view,
- the key assignment changes.

▷ If wanted, press or click on the key [Start Neutral Position] and wait till the balancing weights are into the neutral position (Symbol ). Exit by clicking or pushing on the key [Neutral Position completed].

▷ Start the grinding machine and run the wheel at an operating speed not less than 300 rpm.

▷ Turn on the coolant flow and all secondary machine systems.

▷ **In order to balance properly never balance during grinding or dressing!**

▷ Press or click on the key [Settings] and select the Set number under which the Balancing Process should be performed.

▷ Confirm by pressing the key [OK].

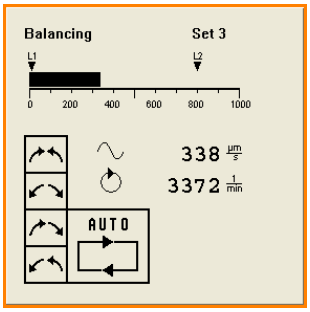


Figure 8-4

The Balancing Module M6000 is in the stopped Automatic Balancing Mode (standby).

It is displayed:

- the Set number (here: Set no. 3)
- the Limits 1 and 2 (L1, L2),
- Current unbalance level (here: 338 µm/s),
- Current speed (here: 3372 rpm)

No red Error message should be displayed:

- **no** speed-symbol,
- **no** unbalance-symbol,
- **no** transmitting-symbol,
- **no** clock-symbol!

If an Error message is visible anyway, refer to *Appendix B, Troubleshooting Guide.*

8.2 Manual Start of the Automatic Balancing Function

▷ To start the Automatic Balancing Function manually, press or click now on key [Start Auto Balancing].

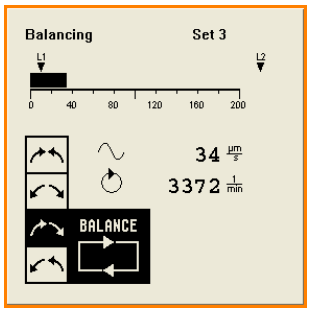


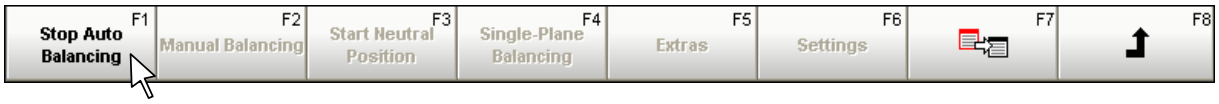
Figure 8-5

Now the Balancing Module M6000 starts to balance automatically using the parameters e.g. saved in Set 3.

During balancing you see on the screen:

- The direction indication of the balancing weights changes depending on balancing mode.
- The unbalance decreases, visible on the digital and bar graph display.

▷ The balancing process may be aborted any time by pressing or clicking on the [Stop Auto Balancing] key, if the keypad is not inhibited by the machine CNC control.



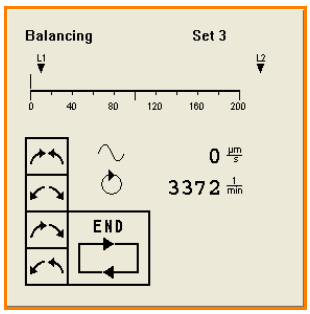


Figure 8-6

Balancing of the M6000 continues until the pre-set zero mark (Unbalance Offset plus Turn-off Threshold) is reached. The screen changes as follows:

- The direction indication of the balancing weights gets blank (the motors driving the balancing weights switch OFF),
- the digital indication shows "0 µm/s",
- the symbol '**BALANCE**' changes to '**END**',
- the key [Stop Auto Balancing] becomes the key [Start Auto Balancing] again, the keys [Manual Balancing] and [Start Neutral Position] are available again.

Depending on setting in the Tab "**M Parameter**" the unbalance is either displayed again after exceeding Limit L1 (**Blank Unbalance Indication ➔ True**) or the unbalance reading is visible continuously (**Blank Unbalance Indication ➔ False**).

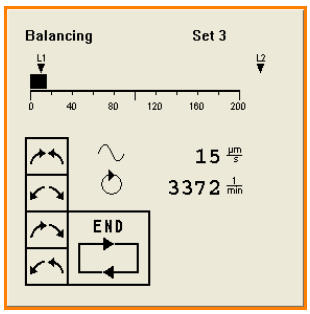


Figure 8-7

▷ If the unbalance increases after several dressing or grinding cycles the manually started Automatic Balancing process can be repeated by pressing or clicking on the key [Start Auto Balancing] at a suitable time (time between grinding or dressing cycles).

8.2.1 Optimizing the Balancing Process

If the Balancing System requires too much time to achieve a balanced wheel, or when the System does not reach the 0-point, the following parameters in the Tab "**Current Settings**" can be changed (see 6.3 Module Settings):

- Balancing Strategy,
- Motor Speed Multiplier,
- Turn-off Threshold (if it is allowed by the quality demand).

For the first test balancing cycles, the Turn-off threshold should be set to "0 µm/s".

To determine the correct setting of the Balancing Strategy and Motor Speed Multiplier, first press or click on the key [Manual Balancing] and with the arrow keys unbalance the system to a certain amount. Then press or click on [Start Auto Balancing] and observe the time and steady progress to reach the balancing point.

Again unbalance the system manually, change Balancing Strategy or Motor Speed Multiplier, save the new setting temporary by pressing the [OK] key and initiate a manually started Automatic Balancing Cycle.

Repeat this quick check a few times, each changing the Balancing Strategy or Motor Speed Multiplier. Find out the best combination for maximum balancing speed and accuracy.

Save the best setting under your desired Set Number(s).

Increase the Turn-off Threshold only when surface quality is not a problem (e.g. rough grinding). On the other hand, the higher the Turn-off Threshold is set, the less time the Balancing System will typically require to achieve balancing! You can use the Set Numbers to match the different grinding or dressing processes to certain Turn-off Thresholds.

8.3 Automatic Balancing Function started by the Machine Control

NOTICE When hardwired to the machine CNC control via connector # 2 or equivalent via PROFIBUS interface connector # 13 the Balancing Module M6000 works completely in stand-alone, i.e. no manual intervention or display is necessary.

8.3.1 Prerequisite

- A Balancing Module M6000 is installed, connected to the machine CNC control, has already successfully been put into operation and is properly powered (LED # 4 lights green),
- Proximity Switch, Vibration Transducer and Transmitting Coil are mounted at the machine and connected to the M6000 Module, and
- a suitable mechanical Balancing System is fitted in or at the machine spindle.

8.3.2 Hardwire Interface # 2: Timing Diagram

NOTICE

- After changing a grinding wheel and before starting the spindle, it is recommended to drive the balancing weights of the Balancing System into Neutral Position.
- During Automatic Balancing **NO** change of the Set Number is permitted (a change is not recognized by the unit) or possible!

Figure 8-8 shows a timing diagram to Start and Stop the Auto Balancing Function. The inputs of hardwire Interface, Connector # 2, are highlighted grey. Control is carried out accordingly via PROFIBUS/PROFINET.

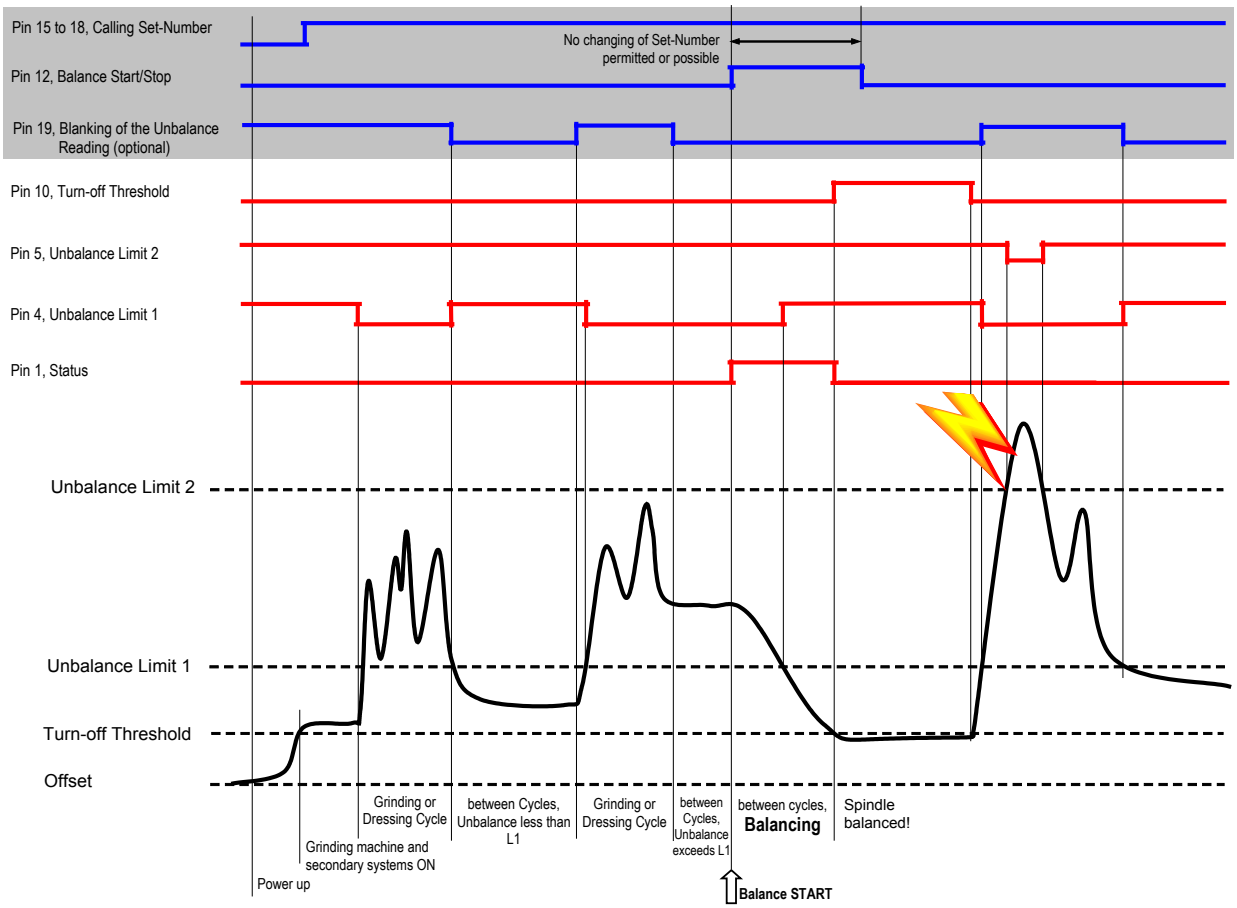


Figure 8-8

NOTICE

- If you would like to watch the function of the Balancing Module M6000, activate the **Balancing Standard** view or at least one of the **Balancing Reduced** views.
- The signals at interface connector # 2 given above are equivalent for the PROFIBUS/PROFINET interface.

Power up

The first action of the machine CNC control is - after starting up the machine tool spindle - to call one of the 15 memory sets under which the parameters are stored to perform the following Balancing Process. For this, the four inputs *Set Number 1* to *Set Number 4* have to be set correspondingly (refer to paragraph 3.2.3, Connector # 2, truth table, or *Appendix E.1.3, PROFIBUS/PROFINET*). With the setting of the Set Number, the Balancing Module M6000 gets active.

After power up and switching on coolant flow, secondary systems etc, the machine tools spindle reaches its nominal speed. The unbalance detected is below the Unbalance Limit 1 stored in the selected memory set.

1st Grinding or Dressing Cycle

During a grinding or dressing cycle, the unbalance may rise above the pre-set Unbalance Limit 1. This is permitted but the machine control may not activate a Start command to balance the spindle.

1st Time between Grinding or Dressing Cycle

At a break between grinding or dressing cycles the machine CNC control examine by interrogation the Unbalance Limit 1 signal (connector # 2 / pin 4) whether there is need to balance the spindle or not. Since the unbalance is below Unbalance Limit 1 (HIGH signal at connector # 2 / pin 4) no Balancing Start command is given.

After a few Grinding or Dressing Cycles

At a break between cycles the machine CNC control examine again whether there is need to balance the spindle or not by querying the Unbalance Limit 1 signal (connector # 2 / pin 4). Now the unbalance is above Unbalance Limit 1 and a LOW signal is applied at connector # 2 / pin 4. The machine CNC control gives a Balancing START command (HIGH signal) to connector # 2 / pin 12. Simultaneously the Status signal at connector # 2, pin 1 goes HIGH to prevent the machine CNC control from starting any process like grinding, dressing, feeding etc. The Balancing Module M6000 starts balancing the machine tool spindle. After the Turn-off Threshold or Offset (when turn-off threshold is set to 0) is reached, the M6000 applies a HIGH signal to connector # 2 / pin 10 to report a successfully finished balancing process. Simultaneously the Status signal at connector # 2, pin 1, goes LOW. After that, the machine CNC control stops the balancing process by applying a LOW signal to pin 12 of connector # 2. Hereby the Balancing Cycle is complete.

Optionally blank an obviously wrong unbalance display during grinding or dressing cycles by feeding a HIGH signal to pin 19 of connector # 2.

9 Special Features

9.1 Placing the Access Rights

NOTICE

- Ex-factory the Dittel System Control Center Software is shipped with Access Level **Administrator** and without password, except for access level **Service**.
- Passwords and access rights are valid for all DS6000 Modules connected to the Computer or Automation System. An individual placing is not possible.

After completion of all settings and the first successful operation attempts, the DS6000 Module(s) can be locked or unlocked for the respective user group.

9.1.1 Placing a password the very first time

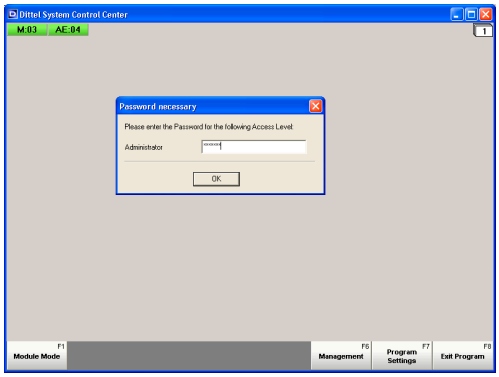


Figure 9-1

If you have activated **Ask for Password after Program Start** in the options menu **Access Rights** (see paragraph 5.2.4), the opposite screen opens on every program start.

▷ Since you have not entered a password, click on the key [OK] or press the key [Enter] on your keyboard or [Input] on the SINUMERIK®.

The next screen opens (Figure 9-2):

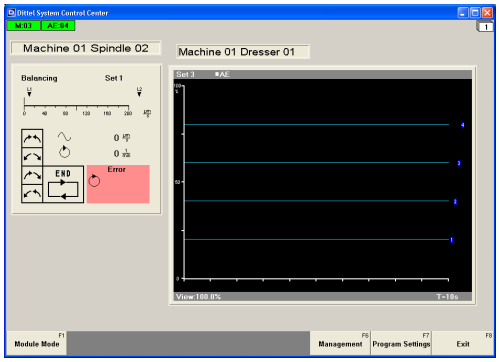


Figure 9-2

If you have **NOT** activated **Ask for Password after Program Start** in the options menu **Access Rights** (see paragraph 5.2.4), the opposite screen opens on every program start.

It opens always with Display Layer 1 (if not changed, see paragraph 4.2.2, Remark) and its Module View(s) which were created or active before last leaving the DSCC Program.

This Module View is just an example.

▷ To enter a password press or click on key [Management] / [F6]

▷ and then the key [Access Rights] / [F1].

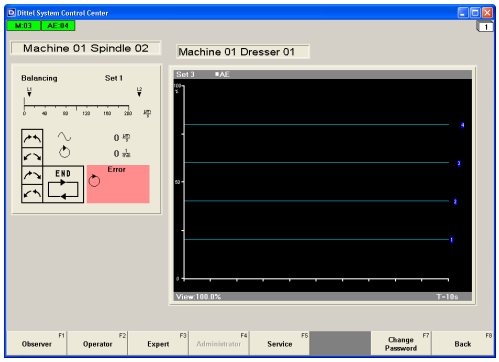
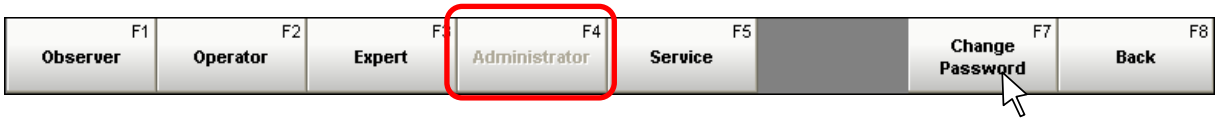


Figure 9-3

The key assignments change to enter or to change a password or to change the access level. The current access level is highlighted

▷ To enter a password the **very first time** – in this example for “Administrator” - click or press the [Change Password] key.



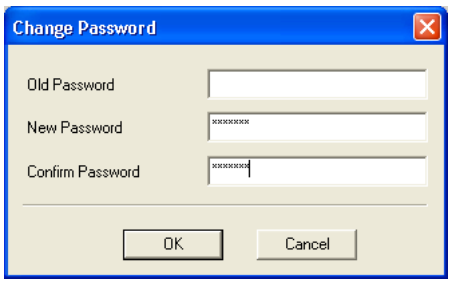


Figure 9-4

The DSCC Software is shipped ex works without Password.

▷ Therefore, with the keyboard or keypad enter your password only in the “New Password” window.

▷ Enter again your password in the “Confirm Password” window and then click on the [OK] key or press the [Enter] / [Input] key.

Figure 9-5

▷ Execute the entered password by clicking on the [OK] key or pressing the [Enter] / [Input] key.

You can allocate a separate password for every access level. Click or push on the desired access level and then again on the button [Change Password]. Repeat the procedure for the new password as described above.

9.1.2 Change actual Access Level

▷ When the Access Level shall be changed from a high access level to a lower access level, e.g. from **Administrator** to **Operator** it is sufficed to click or to press the softkey in question.

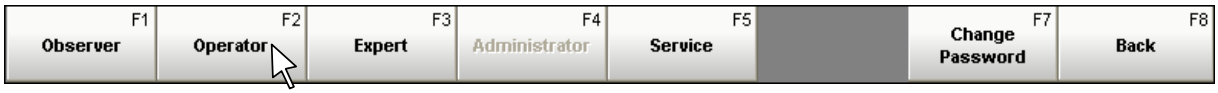


Figure 9-6

▷ Confirm the new Access Level by clicking on the [OK] key or pressing the [Enter] / [Input] key.

To change the Access Level from a **low access** level to a **higher access** level, e.g. from **Operator** to **Administrator**, click or press the softkey in question.

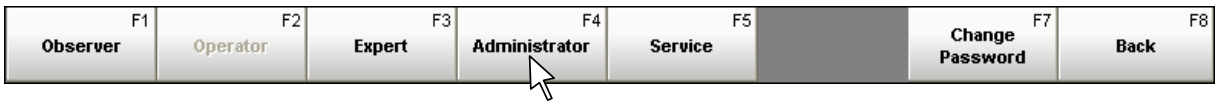


Figure 9-7

▷ With the keyboard or keypad, enter the Administrator password. Confirm by clicking on the [OK] key or pressing the [Enter] / [Input] key.

Figure 9-8

▷ Execute by clicking on the [OK] key or pressing the [Enter] / [Input] key.

From now on, you have all access rights of an Administrator.

9.1.3 Change your Password

▷ If you want to change your password of the current Access Level (highlighted, here Administrator) click or press on the softkey [Change Password]:]:

Figure 9-9

▷ With the keyboard or keypad, enter your “Old Password” and then your “New Password” into the respective window.

▷ Repeat your “New Password” in the third line.

▷ Confirm by clicking on the key [OK] or pressing the [Enter] / [Input] key.

Figure 9-10

▷ Execute by clicking on the key [OK] or pressing the [Enter] / [Input] key.

From now on, the new password is valid.

9.2 User-defined Function Keys

The Dittel System Control Center Program gives you the opportunity to create user-defined Function Keys. This allows a fast access to the respective Module, the Display Layer or the Set number.

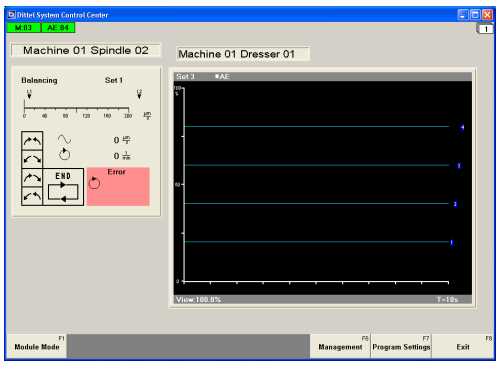


Figure 9-11

When rebooting, the program opens always with Display Layer 1 (if not changed, see paragraph 4.2.2, Remark) and its Module View(s) which were created or active before last leaving the DSCC Program.

This Module View is just an example.

▷ To create user-defined Function Keys press or click on key [Management] / [F6]

▷ and then the key [Setup Functions] / [F2].

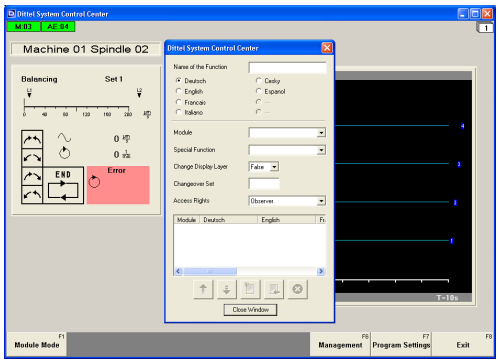


Figure 9-12

To create a user-defined Function Key a separate set-up window opens.

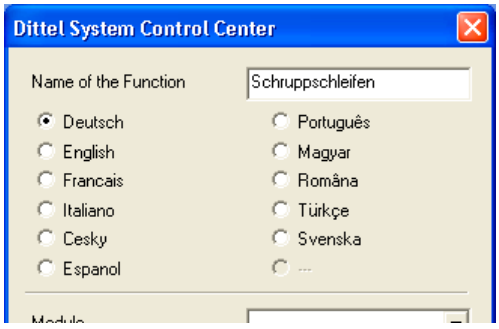


Figure 9-13

Name of the Function

With the keyboard, enter the desired name of the function, e.g. Rough Grinding. This name of the function appears later on the user-defined Function Key, too.

If you enter only **one** name (no matter in which available language), then the user-defined Function Key shows the same name in every language selected.

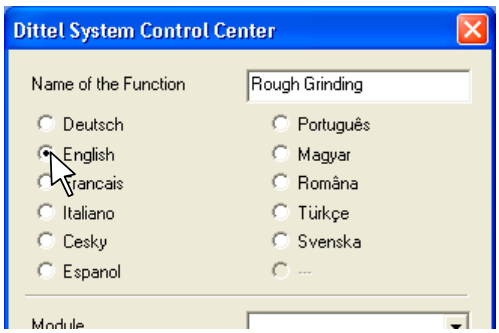


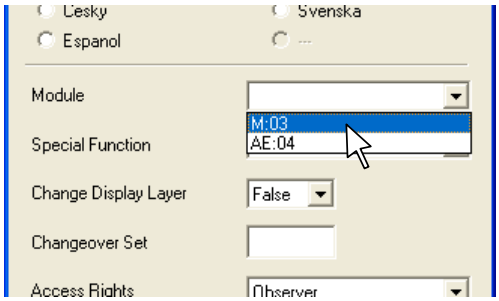
Figure 9-14

Language

You can assign a separate name of the Function in every available language by selecting a language.

If you enter the name in every language, then the user-defined Function Key shows the respective name of the Function when switching over the language.

Not filled names are displayed with the English name.



Module

In the context menu, select the wanted module, here e.g. the Balancing Module M6000 with the address 03.

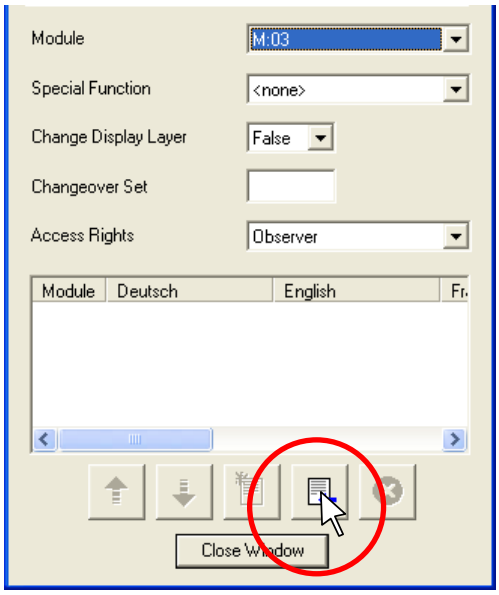


Figure 9-15

From now on the **Save** button is active.

▷ By clicking on the **Save** button the entered Function name is displayed in the window below.

Then any further setup of the user-defined Function Key is no longer possible.

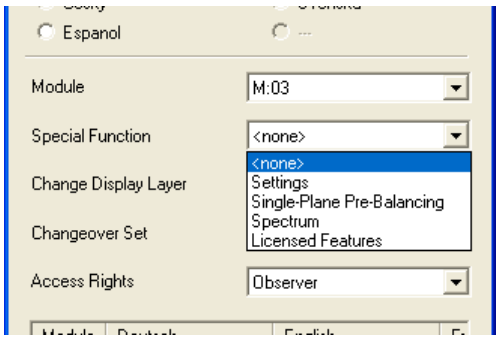


Figure 9-16

Special Function

In this context menu, select the function in which the Module – selected above – should start after pressing the user-defined Function Key. Only available functions are displayed.

When the setting **<none>** is selected the Module starts with its activated Module View.

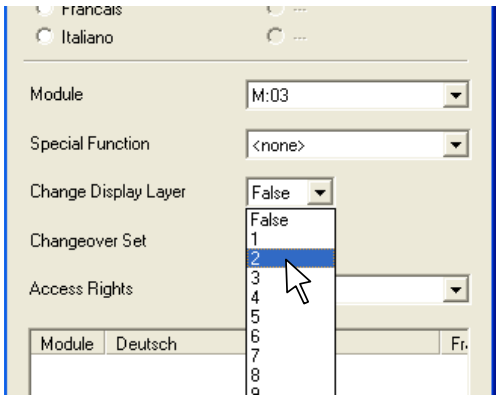


Figure 9-17

Change Display Layer

This setting is only available when **Special Function** is set to **<none>!**

In this context menu, select the Display Layer on which the Module – selected above – should start after pressing the user-defined Function Key. For this purpose, the Module must be activated (visible) on that Display Layer.

When the setting **False** is selected the Display Layer does not change.

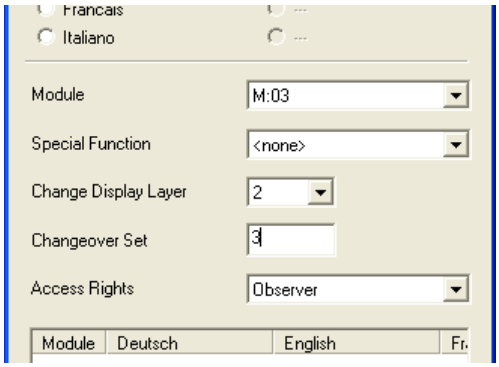


Figure 9-18

Changeover Set

With the keyboard, enter the Set Number in which the Module should start after pressing the user-defined Function Key.

At an empty window the actual Set Number does not change.

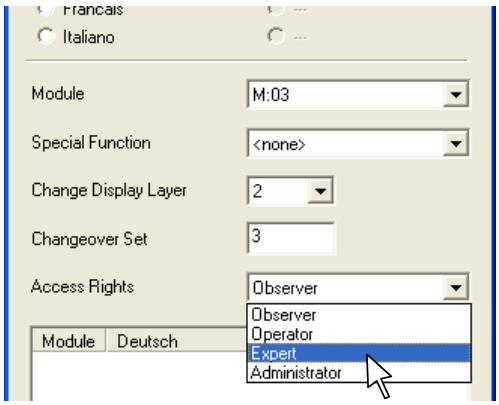


Figure 9-19

Access Rights

In this context menu, select the Access Right under which the user-defined Function Key may be operated.

Example:

When you choose **Observer**, then the Function Key can be operated in **all** Access Levels assigned to the Module(s).

When you choose **Administrator**, then the Function Key can be operated only when the Access Level **Administrator** is assigned to the Module(s) (see paragraph 9.1).

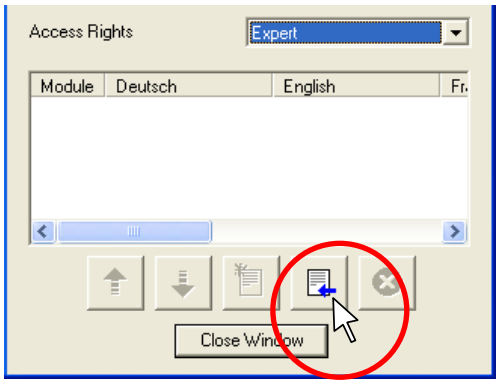


Figure 9-20

With this setting, the setup of the user-defined Function Key is complete.

▷ To save the settings click on the **'Save'** key.

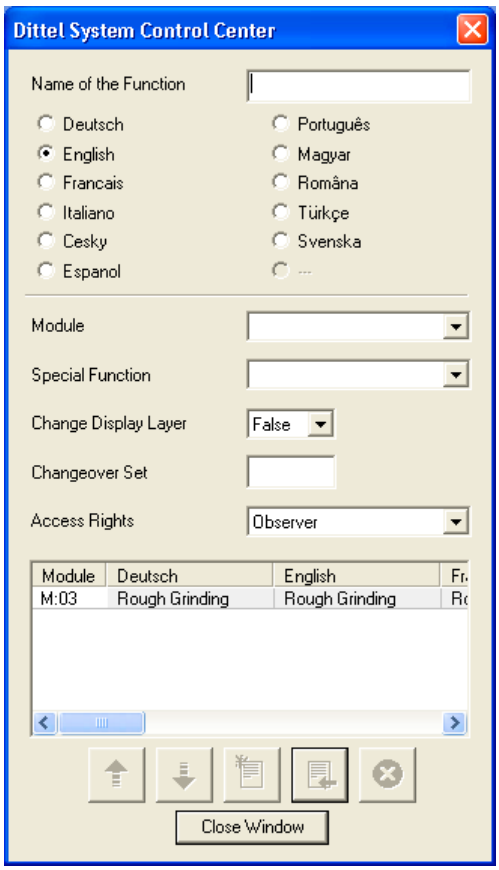


Figure 9-21

The setup is stored and the windows to create another user-defined Function Key are ready for a new input.

Example:

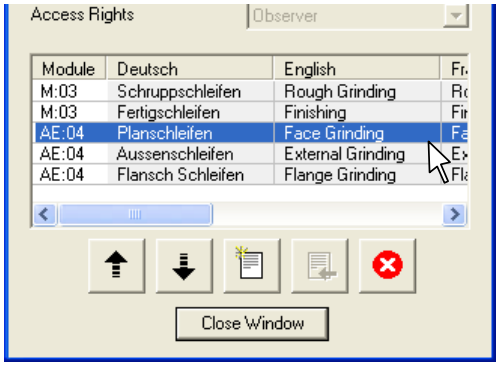


Figure 9-22

Create for every Module user-defined buttons as many as you like. See example.

To organise the list the following keys are used:

With the **Up** or **Down** key the lines and therefore the Function Keys are changed in their order.

Highlight the line in question and move it with the Up- or Down key.

With the **New** key, all input fields are cleared and ready to create a new user-defined Function Key.

With the **Delete** key, a user-defined Function Key can be deleted.

Highlight the line in question and then click on this key.

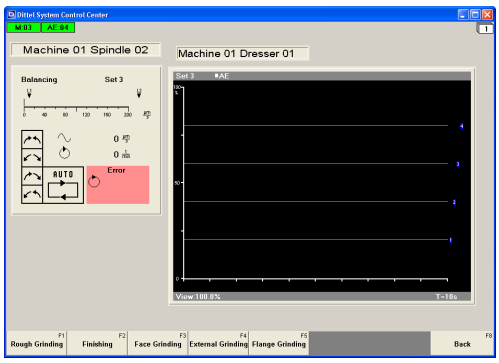


Figure 9-23

When you have selected **Functions** as **Starts with Menu** (**Program Settings ➔ General Settings ➔ Menu Bar ➔ Starts with Menu ,** see Figure 5-30) the program starts with the opposite screen showing the user-defined Function Keys.

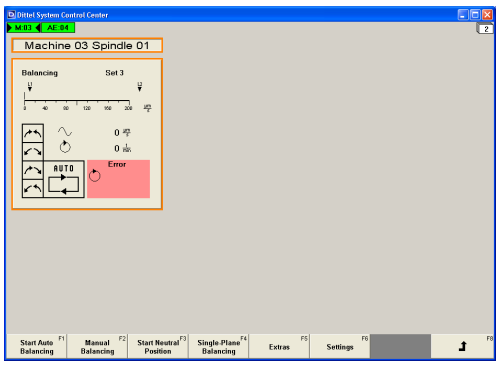


Figure 9-24

So if you press, for example, Function Key **Rough Grinding** the screen changes into Display Layer 2, and the Balancing Module **M:03** gets active with Set number 3 (refer to the settings above).

9.3 Series Start-up

9.3.1 Creating a Series Start-up File

The DSCC Program gives you the opportunity to save all **stored** settings of all modules connected to the Automation System or Computer in a Series Start-up File, either as a backup file or to transfer it into other systems.

▷ To create a Series Start-up File press or click on the key [Program Settings] or press the function key [F7].

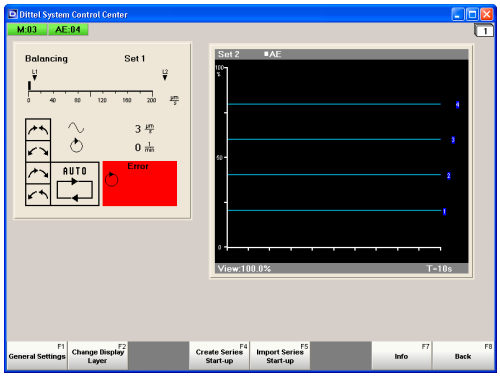
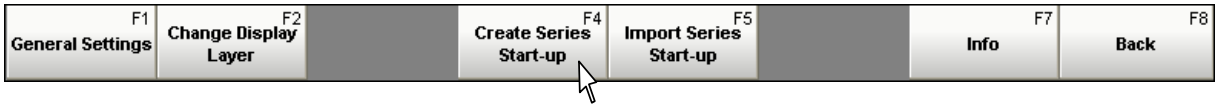


Figure 9-25

Example:

These settings like language, passwords, Module Views, Display Layers etc. should be transferred to a second or further machine(s).

▷ Continue by pressing or clicking on key [Create Series Start-up] or press the function key [F4].



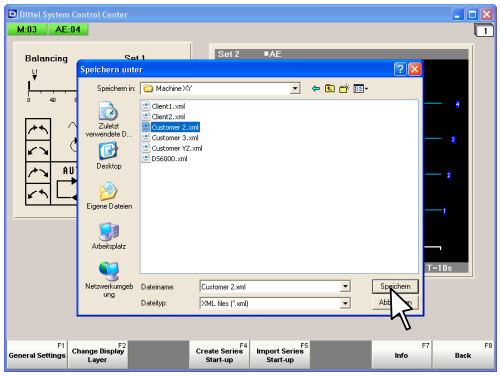


Figure 9-26

A **Save as** window opens.

▷ Open the directory **Save in** and click on **Network Environment** (when using a notebook), the disk drive or the folder in which the Series Start-up file shall be saved. Create a new folder if necessary.

▷ Enter a suitable file name.

▷ Click on **Save**.

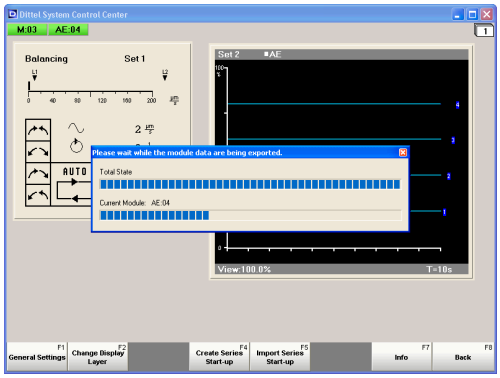


Figure 9-27

A *.*xml* file is created automatically. One by one the data of the Computer settings, the display layers and **stored** module settings are read out and stored.

Both the complete progress and the progress of the just current module are readable in an additional window.

After a successful completion the additional window closes.

9.3.2 Importing the Series Start-up File

Prerequisite:

- On your **NEW** computer or Automation System, the Dittel System Control Center Software is installed and operational.
- All Modules are connected to the Computer or Automation System and operational (LED # 4 lights on each Module).
- The addresses of the respective Modules must be the same as in the case of the first machine (e.g. Balancing Module = **M:03**, Process Monitoring Module = **AE:04**).

▷ Start the DSCC program on your computer or Automation System.

▷ If necessary, put the data carrier with the Series Start-up file in the disk drive.

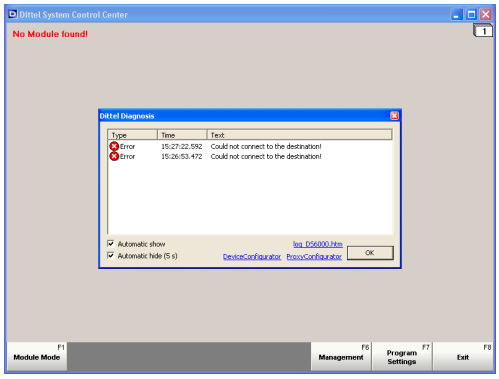


Figure 9-28

When starting the Dittel System Control Center Program the very first time all messages will be in English.

If no Module is found by the Automation System or computer, for example due to wrong interface setting, the opposite screen will appear.

▷ Confirm this message by clicking on the key [OK] or pressing the [Enter] button.

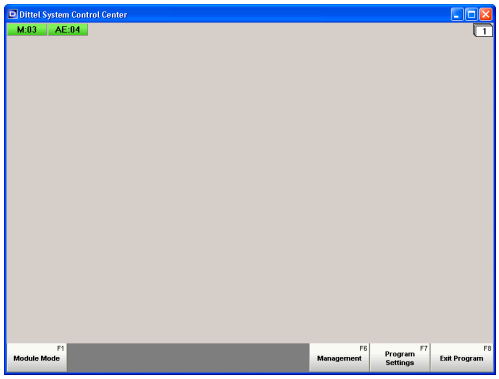


Figure 9-29

If the Automation System or Computer recognizes the Modules, the opposite screen appears.

▷ To get access to the Series Start-up File click or press the key [Program Settings] or the function key [F7].

▷ Continue with pressing or clicking on key [Import Series Start-up] or the function key [F5].

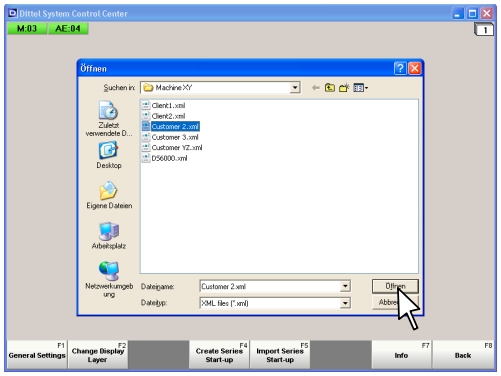


Figure 9-30

An additional window opens.

▷ Open the directory **Look in** and click on **Network Environment** (when using a notebook), the disk drive or the folder in which the Series Start-up File (**.xml*) is contained.

▷ Highlight the **.xml*-file and then click on **Open**.

A new window opens:

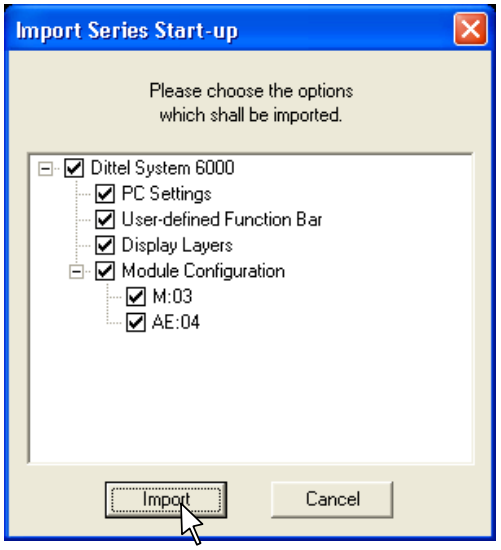


Figure 9-31

NOTICE If the Automation System or computer did NOT recognize the Modules, only the options **PC Settings**, **User-defined Function Bar** and **Display Layers** are available!

▷ Click into the respective check box to activate or deactivate the desired options:

Dittel System 6000	all shown options are activated, all stored settings are imported.
PC Settings	all PC/Automation System settings like language, interface and its setting, addresses etc. are imported.
User-defined Function Bar	all user-defined Function Bars are imported
Display Layers	all Display Layers are imported.
Module Configuration	the Module Configuration of all or only the selected Modules are imported.

NOTICE

▷ If the Modules were **NOT** found by the automation system or computer import only the **PC Settings** (and the **User-defined Function Bar** and **Display Layers**, if selected) by clicking on the key [Import] or pressing the [Enter] key. The PC settings are imported (see figure 9-32).
A screen with green module addresses should appear (see figure 9-29). If not refer to *Appendix B, Troubleshooting Guide*.

▷ Repeat the import of the Series Start-up file as described above. All options should now be available. Select the Module Configuration and click on the key [Import] or press the [Enter] key.

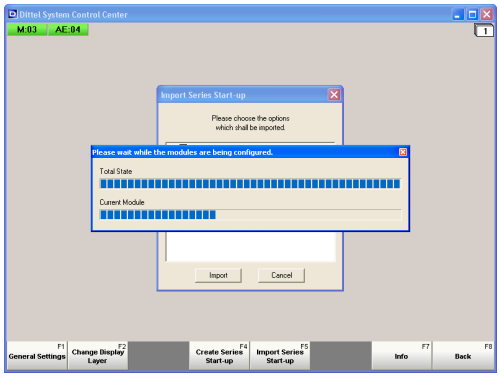


Figure 9-32

One by one, the selected options are imported and saved.

Both the complete progress and the progress of the just current module are readable in an additional window.

After a successful completion, the additional window closes.

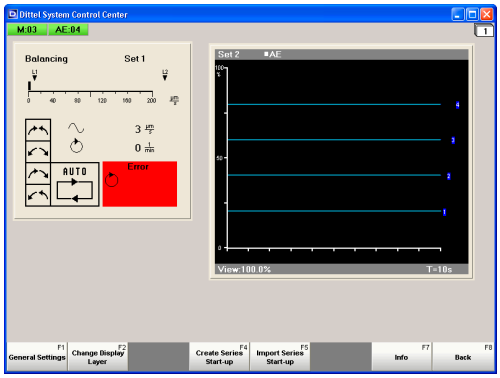


Figure 9-33

This completes the import of the Series Start-up data.

All Module Views including all stored settings of the DS6000 Modules correspond exactly to the first installation.

9.4 Hardcopy of the Module View or Display Layer

For documentation or evaluation the Module View or Display Layer can be printed. A suitable printer must be connected and installed on your Automation System or Computer.

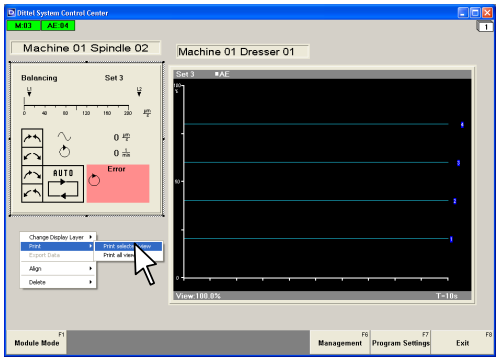


Figure 9-34

▷ To print the Display Layer or a part of it move the mouse cursor outside a Module View and press the RIGHT mouse button. Select ‚**Print**' and a context menu opens:

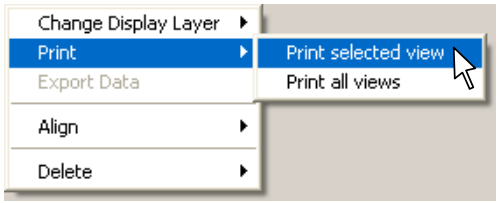


Figure 9-35

Print selected view: For that the Module View must be highlighted, see § 6.2.3. Only a highlighted Module View is printed.

Print all views: The print complies with the Display Layer view except the softkey bar.

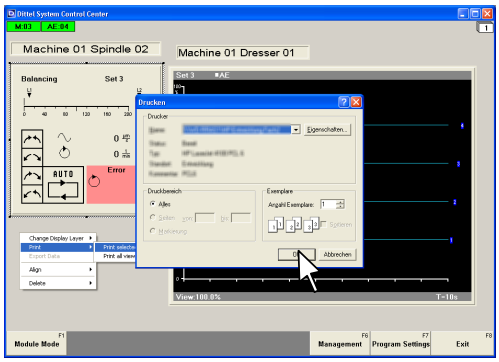


Figure 9-36

The dialog box **Print** opens.

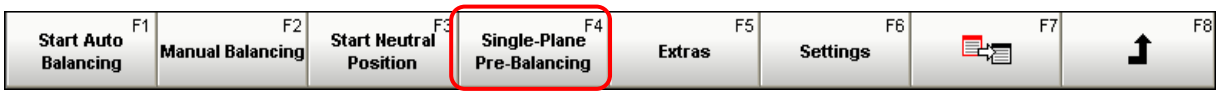
▷ Print as usual.

10 Activating Licensed Features

NOTICE Temporary (maximum 250 hours) or permanent activation of additional licensed features happens in the respective DS6000 Module. This means a separate License of its own must be applied or ordered for each module, which shall get an additional feature.

10.1 Activating licensed features when ordered

For example, when you order a Balancing Module M6000 together with the licensed feature Single-Plane Pre-Balancing the module comes ready for use, no further steps are required. Together with the delivery papers, you get for checking your Licence Key of the module and the activated function in question.



10.2 Activating licensed features after delivery or installation

A temporary or permanent activation of licensed features afterwards is possible at every time. Order to the Sales Department of Dittel Messtechnik GmbH, 86899 Landsberg may be done by Mail, Telephone, Fax, or E-mail.

To order the activation of licensed features the following data are required:

- Description of the required license (e.g. Single-Plane Pre-Balancing, Envelope, etc.)
- Article Number of the Module (see Figure 10-3)
- Serial Number of the Module (see Figure 10-3)
- Operating Hours (only required for temporary activation, see Figure 10-3).

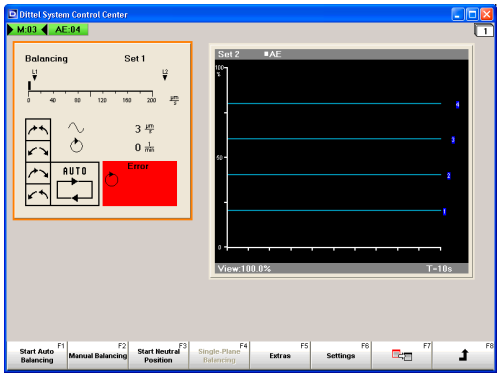


Figure 10-1

You obtain the data required (except Operating Hours) from the Module's type plate. When the type plate is not accessible, then operate the Module, which should get the additional feature, in the Module Mode.

▷ Click on the [Settings] key or press the [Settings] softkey.

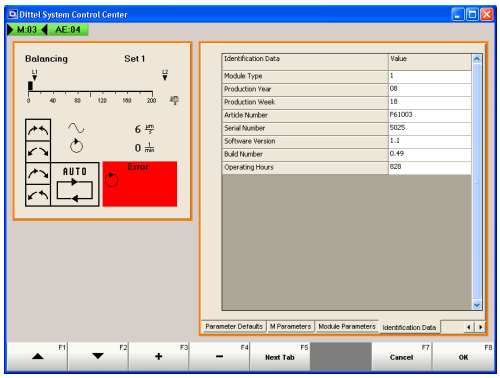
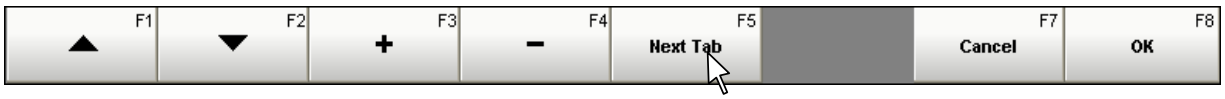


Figure 10-2

▷ Open the Tab “Identification Data” by clicking on the [Next Tab] key or click directly with the computer mouse on Tab “Identification Data”.



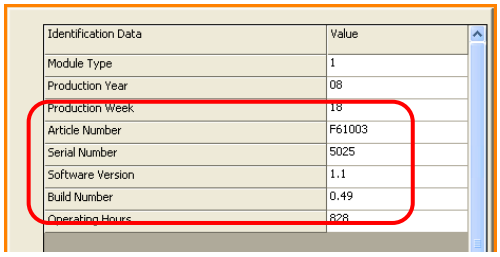


Figure 10-3

▷ Note down

- Article Number,
- Serial Number,
- Operating Hours (required for temporary activation),

and send it together with your order.

Without these data, Dittel Messtechnik cannot generate a License Key or a Licence File.

After you have ordered the licensed feature(s) you will get from the Dittel Messtechnik Sales Department a **License Key** by phone, fax or mail or a **License File** by e-Mail.

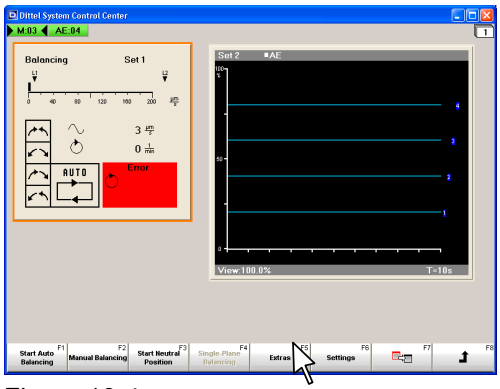
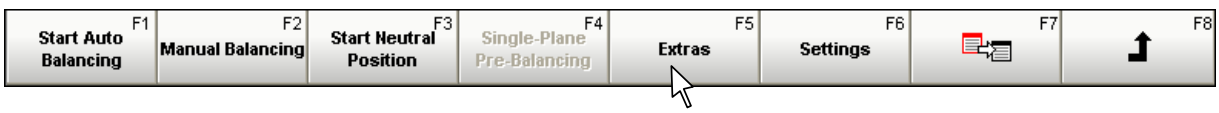


Figure 10-4

To enter the License Key or the License File operate the Module, which should get the additional feature, in the Module Mode.

▷ Click on the [Extras] key or press the [Extras] softkey.



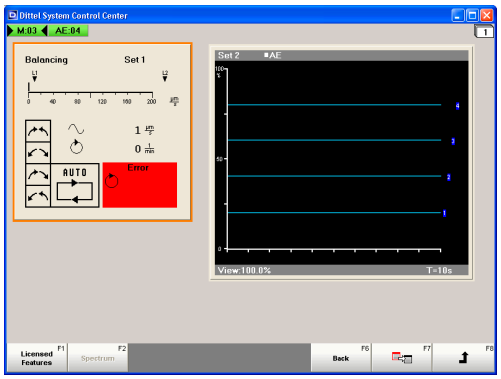


Figure 10-5

▷ Click now on the [Licensed Features] key or press the [Licensed Features] softkey.

10.2.1 When you have received a License Key by phone, fax or mail

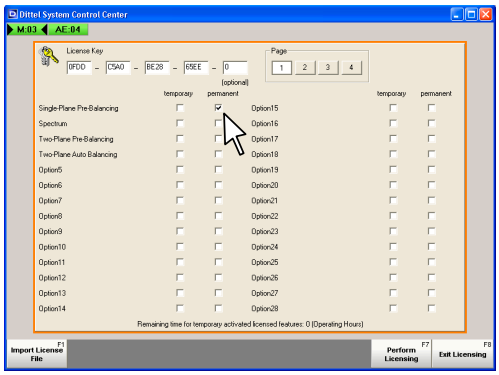


Figure 10-6

▷ Click into the first window and enter the complete License Key.

▷ Highlight the licensed feature and the period of activation you have ordered.

▷ Click on the [Perform Licensing] key or press the [Perform Licensing] softkey.

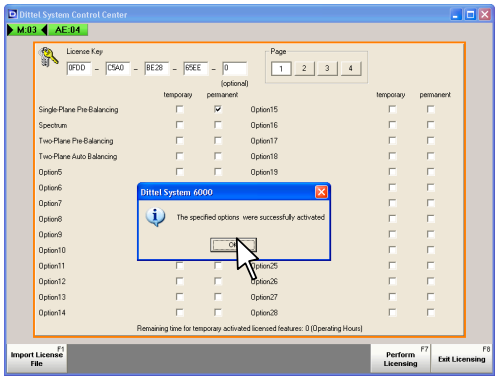


Figure 10-7

▷ The message “The specified options were successfully activated” is shown.

▷ Confirm the message.

▷ Finally click or press the key [Exit Licensing].

10.2.2 When you have received a License File by E-Mail

Save the License File (*.*lic*) under a suitable file name on a notebook or disk.

▷ Click or press on key [Import License File], an additional window opens.

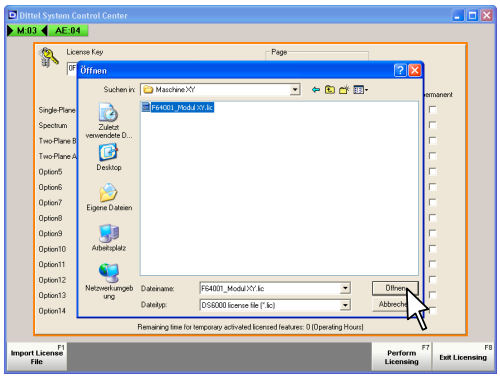


Figure 10-8

▷ Open the directory **Look in** and click on **Network Environment** (when using a notebook), the disk drive or the folder in which the License File (*.*lic*) is contained.

▷ Highlight the *.*lic*-file and then click on **Open**.

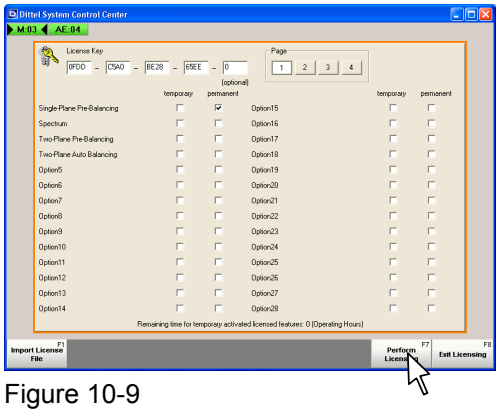


Figure 10-9

The complete License Key and the feature(s) together with the period of activation you have ordered should be entered in the corresponding windows.

▷ Click on the [Perform Licensing] key or press the [Perform Licensing] softkey.

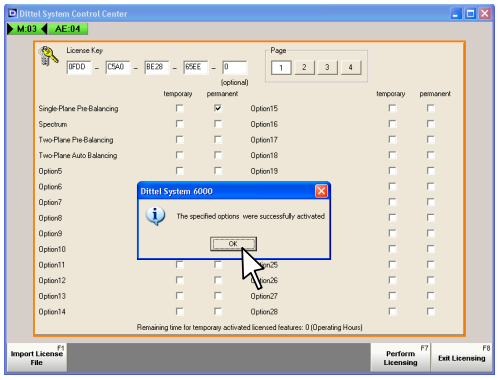


Figure 10-10

▷ The message “The specified options were successfully activated” is shown.

▷ Confirm the message.

▷ Finally click or press the key [Exit Licensing].

Appendix A MHIS Software - MARPOSS Human Interface SW

A.1 Integration of MARPOSS MHIS Software

The purpose of the MHIS <-> DSCC integration is to have one single view for both software. This is realized by integrating the ActiveX control of the other application.

Starting from version 3.60 of the Dittel System Control Center software, it is possible to integrate the MARPOSS software MHIS for the P7 in the Dittel System Control Center software

A.1.1 Requirement

The MARPOSS software MHIS (starting from 5.2G or 5.3C) must be installed on your Windows© computer or Automation System SINUMERIK©. However, the MARPOSS software can also be installed after the DSCC software.

A.1.2 DSCC Software Installation

During the DSCC installation process, there is an option to enable or disable the MHIS/P7 integration.

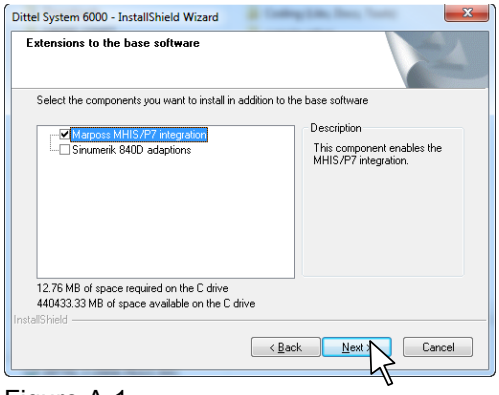


Figure A-1

Additionally to the base software the following extensions may be installed:

- **Marposs MHIS/P7 integration**
  With this option the integration of Marposs software MHIS is enabled or disabled.
- **Sinumerik 840D adaptions**

NOTICE

Windows®-Installation:

The option **Sinumerik 840D adaptions** should **NOT** be selected when a standard Windows® installation is running.

SINUMERIK 840D Installation:

Make sure that the option **Sinumerik 840D adaptions** is selected!

▷ Click on [Next >] to confirm the extension(s) and continue installation.

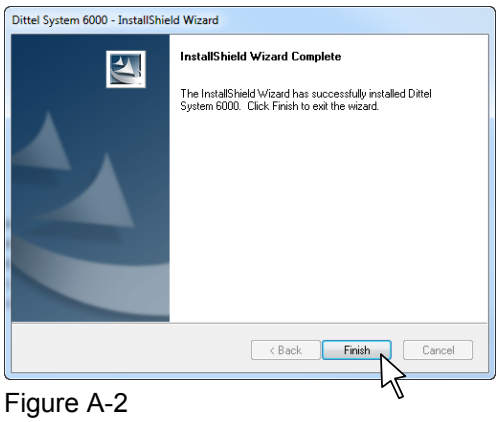


Figure A-2

After successful installation the opposite window is displayed:

▷ Click on [Finish] to complete the installation of the Dittel System Control Center Software together with Marposs MHIS/P7 integration.

A.1.3 Starting the Program

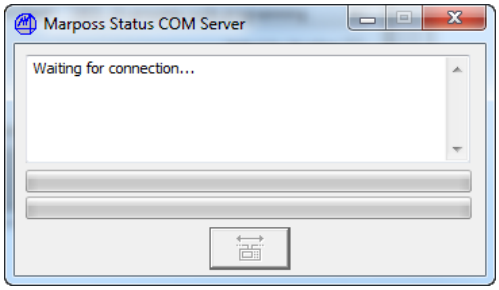


Figure A-3

▷ When the integration is ***enabled***, on DSCC startup the “Marposs Status COM Server” dialog is shown and a green “P7” button is present on top of DSCC regardless of the connection between P7 and MHIS.

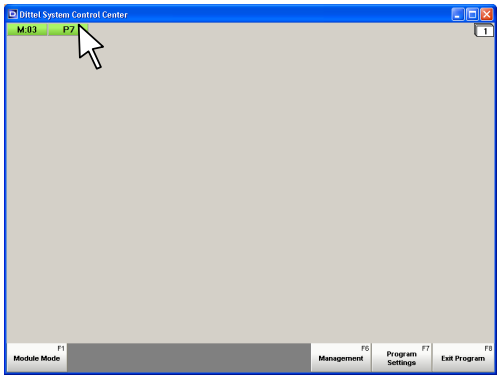


Figure A-4

▷ Double-clicking the P7 button opens a dialog where P7 views are listed that can be added to the DSCC user interface. Now a MHIS/P7 page can be selected.

It is possible to add multiple P7 widgets.

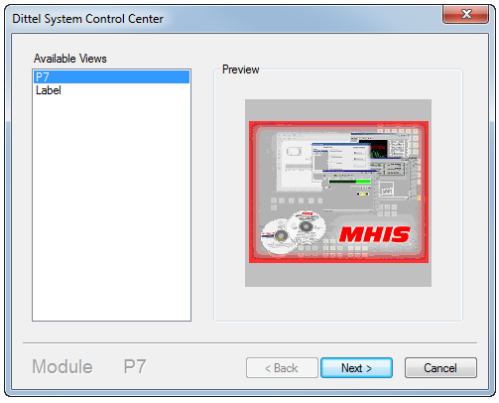


Figure A-5

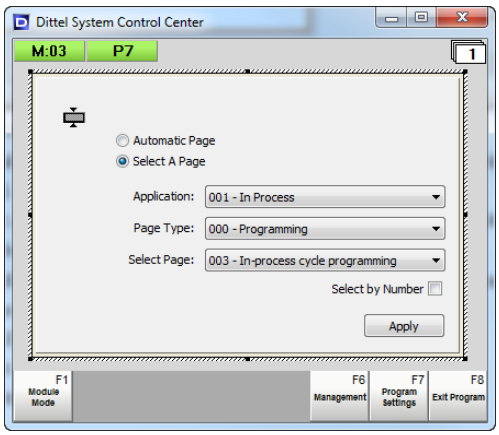


Figure A-6

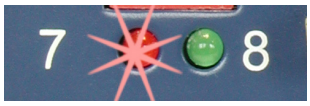
▷ The opposite screenshot is the result of choosing the P7 view.

▷ To continue refer to documentation regarding MARPOSS MHIS software and MARPOSS P7 hardware.

Appendix B Troubleshooting Guide

B.1 Troubleshooting the Hardware

The following errors are only displayed on the screen when the **Balancing Standard** view is set; they may appear as single failure or in any combination.



A System Control failure however is always indicated

- by a **RED** lighting System Control LED # 7,
- and by a LOW signal at pin 2 of connector # 2, (additionally a LOW signal on pin 3, if Balancing Time is exceeded), or equivalent via PROFIBUS/PROFINET.

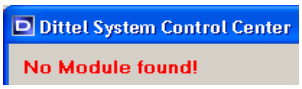
NOTICE

- When an **Error** message of the Proximity Switch, the Vibration Transducer, or the Transmitting Unit appears, the M6000 aborts itself the automatic Balancing Process (Auto Balancing Stop).
- An **Error** message **Balancing Time exceeded** does **NOT** cause an automatic balancing abort, but this may be initiated by the machine CNC control if correspondingly wired and programmed.

Phenomenon	Malfunction	Solution
Error	No Proximity Switch signal: Spindle stands still	Check Proximity Switch, sensing distance, plugs, and cable. Error message disappears when spindle runs (> 300 rpm).
Error	Blinking vertical mark! If **RPM Input** is set to **1:1**: speed ≤ 240 rpm, if **RPM Input** is set to **1:2**: speed ≤ 120 rpm, if **RPM Input** is set to **1:4**: speed < 72 rpm. Speed more than 30,000 rpm:	Increase speed. Decrease speed.
Error	Error message when activating the “Neutral Position Start” function: speed > 500 rpm.	Reduce speed or stop spindle. Wait until the wheel slow down, and then activate again the “Neutral Position Start”.
Error	No Vibration Transducer signal:	Check Vibration Transducer, plugs and cable.
Error	Short circuit in Transmitting Unit of the Balancing System:	Check Transmitting Unit, plugs and cable.

Phenomenon	Malfunction	Solution
	Error message when the balancing cycle fails 5-times in a row and the unbalance is higher than the initial unbalance. M6000 switches off (STOP).	Balancing System defective (for example, only one balancing weight is moving). Clear Error by restarting the Automatic Balancing Function.
	The Error message "Balancing Time Exceeded" may have the following reasons:	
	• "Maximum Balancing Time" adjusted too short	Increase the max. Balancing time in the menu “Settings” ➔ Tab “Current Settings” (standard 90 seconds).
	• Balancing capacity of the Balancing System too big or too small	The maximum balancing capacity depends usually on the biggest grinding wheel used. If even bigger or very small wheels are used the balancing capacity may not be sufficient, or overcompensation may occur.
	• Unbalance of grinding wheel inadmissible high	Pre-balance the grinding wheel
	• Clamping of grinding wheel insufficient	Check clamping of the grinding wheel.
	• Modifications of motor drive, bearing, foundation	Unbalance Offset adjust must be carried out or repeated (refer to § 7.4).
	Reset of the "Balancing Time Exceeded" message is either made by * clicking or pressing the [Stop Auto Balancing] key and again clicking or pressing the [Start Auto Balancing] key, **or** * an external “Stop Balancing” signal (static from HIGH to LOW) followed by a “Balancing Start” signal (from LOW to HIGH) coming from the machine CNC control to pin 12 of connector # 2, or equivalent via PROFIBUS/PROFINET.	

No unbalance reading visible on the screen	Blanking of the unbalance reading by a static HIGH signal coming from the machine control.	Clear static HIGH signal at pin 19 of connector # 2 or equivalent at PROFIBUS® interface connector # 13.
Obviously wrong unbalance reading on the screen	Unbalance indication active during grinding, loading, feeding, etc.	During grinding, loading, feeding etc., apply a HIGH signal at pin 19 of connector # 2 or equivalent at PROFIBUS® interface connector # 13 to blank the unbalance reading.

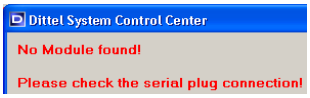


No Module found!

Error message after starting the DSCC Program.

Solution
- ▷ Check power supply of the module(s) (fuse).
- ▷ Check connection to the Automation System or Computer (# 5).
- ▷ Check settings of the COM-Port used.

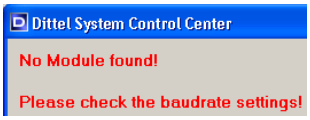
After correction, the DITTEL System Control Center Program should recognize the connected module(s) automatically.



No Module found!
Please check the serial plug connection!

Error message after starting the DSCC Program.

Solution
- ▷ Check the power supply of the module(s) (fuse).
- ▷ Check the serial interface cable from connector # 5 of the module to the computer or Automation System.
  Does the interface cable correspond to our specifications (see paragraph 3.2.4)?



No Module found!
Please check the Baud Rate setting!

Error message short time after starting the DSCC Program.

Solution The RS-232 Baud Rate of the module and the Automation System or Computer which are connected together via RS-232 must be equal.
- ▷ Check the position of the DIP-Switches **SW1** and **SW2** on the Module (paragraph 3.3.1).

(red)

Respective Module does not answer:

Error message **AFTER** first recognition of the Module by the program**.**

Solution
- ▷ Check power supply of the respective Module (fuse, lights LED # 4?).
- ▷ Check connection to other Modules (Connector # 9 and # 10).
- ▷ Check connection to Automation System or Computer (connector # 5).

After successful troubleshooting, the respective Module Address gets green again!

For Modules with Ethernet Interface, refer to Supplementary Document “Ethernet Interface”.

The Module M6000 is not operable via keyboard of the Automation System or PC; no module related softkey is available:

Solution
- ▷ Clear static HIGH Signal on connector # 2, pin 14, or via PROFIBUS/PROFINET.
- ▷ Check actual **Access Level**.

B.2 Software Troubleshooting

B.2.1 General

Message »New hardware found (serial mouse)«

When a DS6000 hardware is connected to the computer or automation system and you start your Windows® XP / 7 / 10 the first time, the message »New hardware found (serial mouse)« appears.

Cause Windows® recognizes the new hardware incorrect as a serial mouse.

Solution Open the file *c:\boot.ini* and add at the end of the start command the following option:

`/NoSerialMouse:COMx` (x = COM-Port used)

Example for WIN® XP `multi(0)disk(0)rdisk(0)partition(2)\WINDOWS="Windows XP ... " /fastdetect`

Remove the option `/fastdetect` at the end of the line.

Or Make sure that the DS6000 hardware is switched on after system start.

Message »Could not connect to the destination«

After a program start the message »Could not connect to the destination« appears.

Cause Another device driver (e.g. mouse driver) or another application uses the selected serial interface.

Solution Select a free COM port or make sure that another device driver or another application does not use this COM port.

Windows® XP / 7 / 10 Management of Rights

In principle, the installation of the software must be carried out with administrator rights (see Section 4).

Under Windows® XP / 7 / 10 the software needs at least **Power User** rights. If the software, which runs under Windows® XP / 7 / 10, shall also be used by a "normal" user, then the access rights must be changed as follows:

File permission Permit "fully access" for the user or for all users (“Everyone”) on the contents directory (default: *C:\ProgramData\Dittel* [Windows 7 / 10] or *C:\Dokumente und Einstellungen\Dittel* [Windows XP]) The software needs these rights to be able to access the databases and the configuration files.

B.2.2 SINUMERIK®

Pressing the softkey does not start the software, or when starting, an error message appears:

Cause Various causes possible!

Solution ▷ Start the SINUMERIK® in the Service Mode (refer to paragraph 4.2.2).

▷ Check the installation path and the entries (path information) in file *regie.ini* (SINUMERIK HMI Advanced) or *systemconfiguration.ini* (SINUMERIK Operate).

If the problem could not be solved in that way proceed as follows:

▷ Create a safety copy of the file *f:\user\oemframe.ini*.

▷ Open the file *f:\user\oemframe.ini*.

▷ Delete the following sections:

```
[sccviewer]
hOEMFrameWnd=30456
hOEMFrameTask=04E4
hOEMAppWnd=304BC
hOEMAppTask=0
hOEMAppWndRelatedOEMAppTask=01F8
hOEMAppThread=0001
[scc]
hOEMFrameWnd=604C0
hOEMFrameTask=061C
hOEMAppWnd=304CA
hOEMAppTask=0
hOEMAppWndRelatedOEMAppTask=0698
hOEMAppThread=0001
```

If you still have problems with the operation or function despite the instructions mentioned above, please consult your local MARPOSS service centre for assistance (see last page of this manual).

Appendix C Cleaning, Maintenance and Environmental Protection

C.1 Cleaning

Clean the outside surface - primarily the blue front panel - as soon as spots, grease or dirt are visible. Using a clean, lint-free cloth lightly moistened with a solution of standard household washing-up liquid, remove all foreign matter from the case and front panel. Make sure, that no solution is dripping into the housing or remains in the proximity of plugs or gaps. Wipe dry using a clean, lint-free cloth.

NOTICE Certain chemicals and its vapours can damage the front panel and its lettering. Therefore, avoid the use of aggressive cleaning agents, solvents and other chemicals.

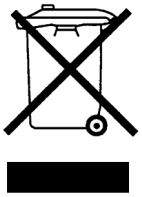
C.2 Maintenance

Since the inside of the M6000 is mostly insensitive against dirt and dust, the necessity for cleaning is only during repair. Isopropyl alcohol (75 Vol. %) is the only recommendable cleaning agent for printed circuit boards and the components. Apply the alcohol sparingly with a stiff, not metallic, short bristly brush. Wash the solved dirt to the edges. For quicker drying or removing dust from inaccessible areas a hand controlled dry air jet may be used. Care should be taken to prevent damage by the air blast.

NOTICE

- The compressed air must be free of water, oil and other foreign matter and may not have any higher pressure than 15 psi / 1 bar.
- Use always fresh Isopropyl alcohol and a clean container to clean the printed circuit boards.

C.3 Environmental Protection



After the implementation of the European Directive 2012/19/EU in the national legal system, the following applies:

Dispose electrical and electronic devices not with domestic waste. Consumers are obliged by law to return electrical and electronic devices at the end of their service lives to the public collecting points set up for this purpose or point of sale. Details to this are defined by the national law of the respective country. This symbol on the product, the instruction manual, or the package indicates that a product is subject to these regulations. By recycling, reusing the materials or other forms of utilising old devices, you are making an important contribution to protecting our environment.

Appendix D Technical Specifications M6000

Supply, nominal range	24 Vdc ± 6 Vdc, ripple ≤ 5% (DIN 19 240), must comply with EN 60950 SELV.	
Power consumption	ca. 47 Watts	
Internal Fuse:	4 Amps resettable fuse (Poly Switch RUE 400)	
External Fuse	4 Amps, time-lag (T4A), IEC 60127 type	
Environmental Temperature	0 °C … +50 °C (32 °F … 122 °F)	
Pollution Degree 2	Do not use in environment with conducting pollutants	
Altitude	0 … 2,000 m (0 … 6,562 ft.)	
Relative Humidity	20% … 80%, without condensation	
Safety Class	IP 20	
In-/Outputs	24 Vdc according EN 60950 SELV .....# 1 Hardwire Interface .....# 2 Serial Interface RS-232 .....# 5 **or** Ethernet Interface .....# 20 Serial Interface RS-422.....# 9 and # 10 PROFIBUS Interface.....# 13 **or** PROFINET Interface.....# 30/31 To Transmitter Coil of Balancing Unit.....# 14 From Proximity Switch .....# 15 and # 16/# 17 From Vibration Transducer .....# 18 Chassis Ground .....Stud and Hex Nut M4	
Displayed Unbalance Range	0 µm/s to 1000 µm/s; the unbalance display is only true with a Vibration Transducer having a sensitivity of 1000 pC/g and a Sensor Adaptation setting (divider ratio) of :1.	
Displayed Speed Range	72 rpm to 30,000 rpm	
Speed Range while Balancing	300 rpm to 30,000 rpm	
Hardwire Interface Connector # 2		
All digital Inputs	Input signal LOW Input signal HIGH Input current	-30 Vdc … +3 Vdc +13 Vdc … +30 Vdc 5.5 mA at 24 Vdc typical

Digital Outputs 1 to 5, 8, 10 and 11	Output current Recommended load Power dissipation of switching transistor	10 mA 2K2 to 4K7 at 24 Vdc **Drive inductive load with clamping diode only!** maximum 75 mwatts
Digital Outputs 6 and 7	Output current Total of output currents Voltage drop at output: Output leak current: Recommended load	500 mA, short-circuit and overload proof 2 A max. I_{Load} × 0.4 R max. 10 µA max. 2K2 to 4K7 at 24 Vdc
Analog Output 22	"Filtered Unbalance Signal" 500 rpm to 30,000 rpm 0 … 1,000 µm/s correspond to 0 … 10 Vdc / -5% 300 rpm to 30,000 rpm 0 … 1,000 µm/s correspond to 0 … 10 Vdc / -10%	
Analog Output 23	"Raw Unbalance Signal" 500 rpm to 30,000 rpm 0 … 1,000 µm/s correspond to 0 … 10 Vdc / -5% 300 rpm to 30,000 rpm 0 … 1,000 µm/s correspond to 0 … 10 Vdc / -10%	
Analog Output 24	"Speed Signal" 80 … 10,000/ 20,000/ 30,000 rpm (adjustable) correspond to 0 … 10 Vdc	
M6000 A/N O830L634001 (A/N F61001), Serial Interface, Connector # 5		
	RS-232-C Interface Hardware-handshake RTS/CTS, 8 Data bits, Baud rate adjustable by SW1 and SW2 of DIP-Switch # 6 to 19,200, 38,400 or **57,600 Baud**, 1 Stop bit, no parity, or via DITTEL System Control Center Software.	
M6000 Ethernet A/N O830L634002 (A/N F61003), Ethernet interface, Connector # 20		
	RJ45 Port, Ethernet 10BASE-T or 100BASE-TX (Auto-Sensing) LED indicators Network connected (lights green) Data transfer (flashes yellow)	
M6000 PROFINET A/N O830L634006 (A/N F61017), PROFINET interface, Connectors # 30/31		
	RJ45 Port, Ethernet 100BASE-TX with Autocrossover, the minimum cable requirement is Cat 5e with SF/UTP shielding. LED indicators Network connected (lights yellow) Data transfer (flashes green)	

Maximum number of Modules and Control Equipment (Computer, Automation System etc)	15	
Accessory supplied	CD-ROM or DVD containing DSCC Software and Installation and Operation Manuals (1) 24 Vdc cable plug (1), Standard DB-25 connector, male, with shell (1)	
Module Weight	ca. 1.5 kg (3.3 lbs.), without mounting hardware	
Dimensions	Mounting Panel	width 79 mm, height 186 mm,
	Front Panel	width 75.4 mm (M6000 PROFINET: 113.1 mm), height 150.4 mm
	Depth	180 mm incl. Mounting Panel to leading edge of Front Panel

Appendix E Abstract PROFIBUS/PROFINET Interface M6000

E.1 Data Format

NOTICE Project with "DS6000 2 Byte In, 2 Byte Out" or "DS6000 1 Word In, 1 Word Out"

E.1.1 Automation System to Module M6000 (Inputs)

Pos. Word.Bit	Pos. Byte.Bit	Function	Signal/Description
0.0	1.0	Balancing Start/Stop	Static Signal from 0 to 1: Balancing START Static Signal from 1 to 0: Balancing STOP
0.1	1.1	Neutral Position Start/Stop	Static Signal from 0 to 1: Neutral Position START Static Signal from 1 to 0: Neutral Position STOP
0.2	1.2	Keyboard Operation inhibit	Static 1: Operator keyboard actions on the PC or Automation System are disabled
0.3	1.3	Selects Set Number 1	see following Truth Table E.1.3
0.4	1.4	Selects Set Number 2	see following Truth Table E.1.3
0.5	1.5	Selects Set Number 3	see following Truth Table E.1.3
0.6	1.6	Selects Set Number 4	see following Truth Table E.1.3
0.7	1.7	Blanking of the Unbalance Reading	while Static 1: no Unbalance Reading, e.g. while grinding
0.8	0.0	Blanking of the Proximity Switch Error Reading	while Static 1: Blanking of the Proximity Switch Error Reading, e.g. at Spindle Stop
0.9	0.1	Reserved	Static 0
0.10	0.2	Reserved	Static 0
0.11	0.3	Reserved	Static 0
0.12	0.4	Reserved	Static 0
0.13	0.5	Reserved	Static 0
0.14	0.6	Reserved	Static 0
0.15	0.7	Reserved	Static 0

Parallel Operation PROFIBUS/PROFINET with the Hardwire Interface # 2:

In principle parallel operation of the PROFIBUS/PROFINET interface with the hardwire interface is possible. In this case, the last change is executed, both on the hardwire interface and on PROFIBUS/PROFINET word 0.
Exceptions are the signals "**Keyboard Operation inhibit**", "**Blanking of the Unbalance Reading**" and "**Blanking of the**

Proximity Switch Error Reading" at which the static and the PROFIBUS/PROFINET signals are connected by **logical OR**.

E.1.2 Module M6000 (Outputs) to Automation System

Pos. Word.Bit	Pos. Byte.Bit	Function	Value/Description
0.0	1.0	Monitoring Status	While Balancing: 1
0.1	1.1	Monitoring System	System OK: 1
0.2	1.2	Monitoring Balancing Time	Balancing Time exceeded: 0
0.3	1.3	Monitoring Unbalance Limit 1	Below Unbalance Limit 1: 1 Above Unbalance Limit 1: 0
0.4	1.4	Monitoring Unbalance Limit 2	Below Unbalance Limit 2: 1 Above Unbalance Limit 2: 0
0.5	1.5	Monitoring Speed Limit 1	Speed below Speed Limit 1: 1 Speed above Speed Limit 1: 0
0.6	1.6	Monitoring Speed Limit 2	Speed below Speed Limit 2: 1 Speed above Speed Limit 2: 0
0.7	1.7	Monitoring Neutral Position	Neutral Position reached: 1
0.8	0.0	Monitoring Turn-off Threshold	Turn-off Threshold reached: 1
0.9	0.1	Neutral Position active	While weights are turning towards Neutral Position: 1
0.10	0.2	Pre-Balancing active	from Module Software Version 1.1, Build Number 0.50 Pre-Balancing active: 1
0.11	0.3	Confirms Set Number 1	from Module Software Version 1.1, Build Number 0.50 see following Truth Table E.1.3
0.12	0.4	Confirms Set Number 2	from Module Software Version 1.1, Build Number 0.50 see following Truth Table E.1.3
0.13	0.5	Confirms Set Number 3	from Module Software Version 1.1, Build Number 0.50 see following Truth Table E.1.3
0.14	0.6	Confirms Set Number 4	from Module Software Version 1.1, Build Number 0.50 see following Truth Table E.1.3
0.15	0.7	Reserved	

E.1.3 Truth Table to select or confirm the appropriate Memory Sets

NOTICE During Automatic Balancing NO change of the Set-Number is permitted. A change of the Set-Number is not recognized by the unit or not possible!

Selects Set-Number / confirms Set Number	Binary coded Set-Number			
	4	3	2	1
No change	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

Appendix F Glossary – Abbreviations – Index

F.1 Glossary

Access rights	Programs and other files are protected by a 5-level system of access restrictions: Five password levels for Service, Administrator, Expert, Operator, and Observer.
Baud	Baud is a unit of computer etc. signalling speed. The speed in Baud is the number of discrete conditions or signal elements per second. If each signal event represents only one bit condition, then Baud is the same as bits per second. Baud does not equal bits per second.
CENELEC	*Comité Européen de Normalisation Electrotechnique* CENELEC is the European committee for electrical standardization.
CNC	Computerized Numerical Control for machine tools (for example SINUMERIK®, Siemens AG)
ETHERNET	A local-area network (LAN) architecture developed by Xerox Corporation in cooperation with DEC and Intel in 1976. Ethernet uses a bus or star topology and supports data transfer rates of 10 Mbps. The Ethernet specification served as the basis for the IEEE 802.3 standard, which specifies the physical and lower software layers. Ethernet uses the CSMA/CD access method to handle simultaneous demands. It is one of the most widely implemented LAN standards.
IP Address	An identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255. For example, 138.57.7.27 could be an IP address.
PROFIBUS®	*Process Field Bus* is a fast, open field bus system widely used in automation technology. It is internationally standardised.
PROFINET®	PROFINET (*Process Field Network*) is the open industrial Ethernet standard for automation published by PROFIBUS & PROFINET International (PI). PROFINET uses TCP/IP and IT standards, is real-time Ethernet-compliant and allows the integration of field bus systems.

RS-232 Interface	Short for **R**ecommended **S**tandard-232C, a standard interface approved by the Electronic Industries Alliance (EIA) for connecting serial devices. In 1987, the EIA released a new version of the standard and changed the name to EIA-232-D. And in 1991, the EIA teamed up with Telecommunications Industry Association (TIA) and issued a new version of the standard called EIA/TIA-232-E. Many people, however, still refer to the standard as RS-232-C, or just RS-232. The EIA-232 standard supports two types of connectors - a 25-pin D-type connector (DB-25) and a 9-pin D-type connector (DB-9). The type of serial communications used by PCs requires only 9 pins so either type of connector will work equally well.
RS-422 Interface	Standard interface approved by the Electronic Industries Alliance (EIA) for connecting serial devices. The RS-422 standard is designed to replace the older RS-232 standard because it supports higher data rates and greater immunity to electrical interference. This standard is backward compatible so that RS-232 devices can connect to an RS-422 port.
SINUMERIK®	SINUMERIK® is a Computerized Numerical Control for Processing Machines, e.g. Machine Tools, made by Siemens AG.
Softkey	A key whose name appears on an area of the screen. The choice of softkeys displayed is adapted dynamically to the operating situation. Freely assignable function keys (softkeys) are assigned to functions defined in the software.
TCP/IP	Abbreviation of *Transmission Control Protocol/Internet Protocol,* and pronounced as separate letters. TCP is one of the main protocols in TCP/IP networks. Whereas the IP protocol deals only with packets, TCP enables two hosts to establish a connection and exchange streams of data. TCP guarantees delivery of data and guarantees that packets will be delivered in the same order in which they were sent.
Termination	Electrical termination of a signal involves providing a terminator at the end of a wire or cable to prevent an RF signal from being reflected back from the end, causing interference. The terminator is placed at the end of a transmission line or daisy chain bus, designed to match impedance and hence minimize signal reflections.

F.2 Abbreviations

µm/s	Unbalance velocity
1/min	Speed, revolutions per minute
AE	Acoustic Emission
A/N	Article Number MARPOSS S.p.A. (Dittel Messtechnik GmbH)
AWG	Wire gauge (US)
BNC	Bayonet mount locking mechanism, RF coaxial connector
CAN	Controller Area Network
CAN-H	Data Line CAN
CAN-L	Data Line CAN
CNC	Computerized Numerical Control
CNTR-P	Data Line PROFIBUS
CSV	Short for **c**omma-**s**eparated **v**alues, another name for the comma-delimited format of data representation.
Ctrl	Control Key (keyboard)
CTS	Clear To Send (serial Interface)
DCD	Data Carrier Detected (serial Interface)
DGND	Digital Ground PROFIBUS
DIN	Deutsche Industrie Norm (German Industry Standard)
DIP	Dual In-Line Package
DSCC	Dittel System Control Center (Dittel Software)
DSR	Dataset Ready (serial Interface)
DTR	Data Terminal Ready (serial Interface)
EIA	Electronic Industries Association (US)
ESD	Electrostatic Discharge
g	Acceleration due to gravity, 9.80665 m/s²
GND	Ground
HMI	Human Machine Interface: SINUMERIK® operator functionality for operation, programming and simulation: HMI has the same meaning as MMC
LED	Light Emitting Diode
MMC	Man Machine Communication: see HMI
nm	Displacement in Nanometer
PC	Personal computer
pC	Pico Coulomb, 10^{-12} Coulomb, SI unit of electric charge
PROX	Proximity Switch (Speed Sensor)
r/min RPM	Revolution per minute
RS-232	Standard of a serial Interface
RS-422	Standard of a serial Interface
RTS	Request To Send (serial Interface)
RxD	Receive Data (serial Interface)
RxD/TxD-N	Data Line PROFIBUS
RxD/TxD-P	Data Line PROFIBUS
SELV	Safety Extra Low Voltage, SELV circuits are isolated from the input voltage (line voltage) by double insulation or reinforced insulation. The voltage must not exceed 60 Vdc (or 42.4 VAC).
TNC	Threaded version of a BNC connector, RF coaxial connector
TxD	Transmit Data (serial Interface)
U	Voltage
USB	Universal Serial Bus; serial bus system to connect peripheral equipment to the computer
VP	Supply voltage of the terminator (5 V), PROFIBUS
XML	Extensible Markup Language, is a W3C recommendation for creating special-purpose markup languages.

F.3 Index

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