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Automation Solutions in Machine and System Building

SOLUTIONS 12

Time Saving Plug-In Technology

MOELLER

We keep power under control.

Contents

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Quicklink: Easy Access to the Latest Technical Information

Quicklink is a new reader service from Moeller. It is provided at the end of every News text or technical article in Moeller Solutions. It allows easy access to further information on the Internet and saves time. Quicklinks consist of several short strings that lead you directly to the information you want.

Using Quicklinks

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1. All news and technical articles of Moeller Solutions are provided with Quicklinks. If a reader wants further information on a subject, an Info box with a 6-digit Quicklink number is provided at the end of the text.

2. You then have to use your browser. An entry field is provided in the top left-hand corner of the Moeller website www.moeller.net. Enter the Quicklink number of the article concerned and press Enter.

3. This will open a page that provides access to all relevant information that readers were introduced to with the previous links.

A brief thematic introduction lists all the material available through additional links:

- Detailed product information
- Selection aids
- Ordering data
- Technical data
- Brochures and catalogues
- Link to the Download area and much more

1 The new Quicklink in the Moeller Solutions.

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Perfect Solutions: Innovations in Contactor Technology

MS1201

Moeller completes its new generation of contactors up to 150 A/ 75 kW

The new xStart contactors up to 75 kW represent a seamless expansion of the contactor range up to 15 kW that has been available since last year. With only four frame sizes, Moeller is able to cover the entire rating range up to 150 A / 75 kW. The new contactor range once again boasts the technical expertise and high standard of quality for which Moeller is renowned. The considerably reduced dimensions and unprecedented low holding power of the DC contactors are the outstanding features of the new generation.

The relatively narrow 90 mm mounting width of contactors up to 150 A saves space in the control panel.

Moeller also uses a mechanical interlock on its reversing contactor combinations that does not require any additional space.

The patented and smart solution: A plastic sphere is simply inserted in the specially designed recesses on the side of both contactors where it can reliably prevent simultaneous switching. A lateral clearance between the contactors is also not required, since the contactors can be mounted and wired directly next to each other.

DC contactors up to 65 A are normally deeper than AC contactors. Not so with xStart. The use of electronically supported drives means that the dimensions of DC and AC versions are identical. If a series machine manufacturer uses different control voltages, the tedious checking of the control cabinet layout is no longer necessary.

In panel building the permissible packing density is limited by the heat dissipation. Some solutions that are mechanically possible cannot therefore be implemented simply due to the high temperatures involved.

The extremely low sealing power of 0.5 W to 2 W for Moeller DC contactors now offers options that were previously impossible.

DILM contactors: New directions thanks to combination plug connectors

The plug connection design of the new Moeller contactors up to 7.5 kW enables you to create innovative application solutions for contactors and saves a lot of time when mounting motor starters.

The benefits of the Moeller application board solution are due to the mechanical features of the connection between the board and the contactor. The contactor is fastened to the top-hat rail or mounting wall in the usual manner. Thanks to the combination plug connectors, the board can then be fitted to the contactor easily, without any tools required. In other words, with the new solution users no longer have to fit a heavy contactor to a delicate PCB as required by other solutions on the market. With Moeller contactors, the board is simply plugged in without any tools. This saves time and prevents errors. In the event of a fault, contactors can also be exchanged later - without any soldering required.

Moeller's application board solution enables users to implement their own applications directly on the contactor. In this way, solutions involving several contactors can also be implemented, such as the controls for a reversing contactor combination.

The soldering pins are available with a varying number of contacts. The customer defines the type and number of contacts used on the contactors according to the application involved. The material for the soldering pins has been selected so that they can be processed with both lead-based and lead-free solder.

Conclusion: Moeller's application board solution for contactors enables fast mounting and removal since unsoldering is no longer required. This reduces the time and costs involved.

The system also has an open and flexible design. Contactors can still be adapted on top-hat rails if necessary. For this, standard contactors are used. This simplifies logistics since it is not necessary to keep any special types in stock.

Fitting and Removing in Seconds: Toolless Motor Starter Mounting

MS1202

Combination plug connectors: faster mounting with xStart

Moeller's new MSC motor starter series is an innovative solution with several user benefits thanks to the new xStart starter combinations. The combination plug connectors enable motor starter combinations to be created simply from the standard DILM components and the optimised PKZ system. However, Moeller MSC motor starter combinations are also factory shipped as complete systems. This saves mounting and wiring costs, reduces testing costs and prevents any possibility of errors.

Furthermore, removing the combination plug connector creates a clearly visible isolation gap which increases safety for maintenance work. The easy to mount combination plug connector system is available for DOL starters up to 15.5 A and reversing starters up to 12 A. Moeller motor starters consist of perfectly matched components and thus always suitable for type "1" or "2" coordination.

Slimline solutions: DOL starters from standard components

Moeller DOL starters are available in four slimline mounting sizes, with the contactor and circuit-breaker having the same mounting width so that every millimetre of control cabinet space is effectively utilised. MSC starters with combination plug connectors simply require one top-hat rail for mounting. The mechanical link provides a secure fastening whilst the electrical connector ensures maximum safety. Ready-to-use mounting links for DOL and reversing starters are available in the range for starters from 17 to 32 A.

Reversing starter and star delta combinations: Toolless plug connection of standard components

Moeller uses combination plug connectors with all its reversing and star-delta combinations. This saves mounting time, reduces wiring costs, prevents faults and fully utilises space in the control cabinet. DILM contactors up to 15.5 A are provided with sockets as standard without any additional charge, into which users can fit the connection elements easily. Time consuming and costly operations such as cutting cables to length, cable stripping, preparing cable ends, labelling and screwing to a defined torque are thus no longer necessary. Checking the 21 electrical connection points between the mains, star and delta contactor is reduced to a simple visual inspection. Testing with test probes can also be carried out at a later time without having to remove the connection elements.

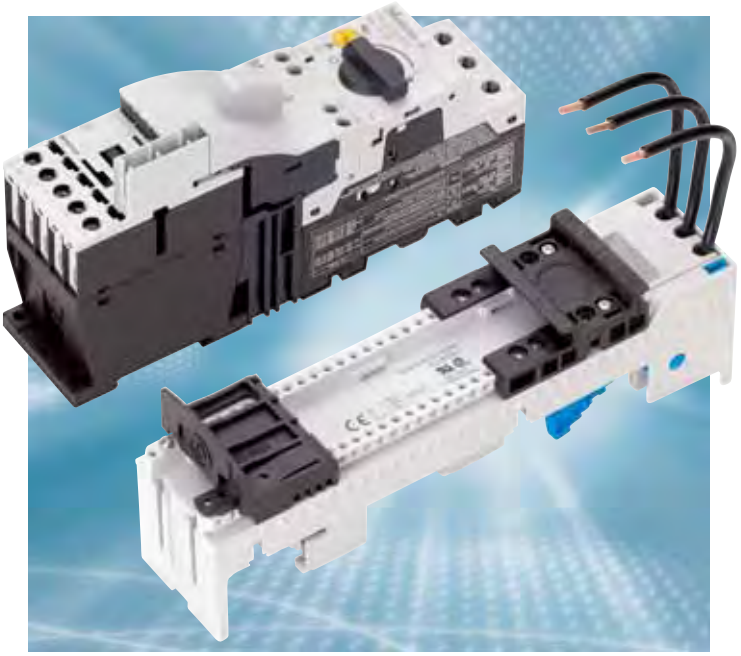
Busbar adapters: not just for motor starter combinations

Moeller's new busbar adapters round off the xStart system ideally. With their standard dimensions, they fit on all the 60 mm busbar systems of the world's leading manufacturers. Approvals are available for both the European and North American/Canadian market. Other approvals are available on request.

Moeller busbar adapters are 100 percent compatible with the system accessories of Wöhner, the busbar market leader. This total compatibility brings logistical advantages since the busbar material is available worldwide as standard copper profile.

The new busbar adapters feature a number of improvements compared to the previous system. They are fully compatible with the starter combinations, which are combined simply from the xStart system thanks to the plug connection design. The complete motorstarter combination (MSC) can be exchanged within a few seconds, thus considerably reducing downtimes and production downtime costs for the user. The busbar adapters also increase safety during commissioning and eliminate the possibility of wiring errors.

The movable slide enables the user to fit a contactor or a contactor combination quickly and easily, such as a reversing starter from the xStart series. Moeller offers its busbar adapters individually or fully fitted with motor starters. All motor starter combinations of the MSC-D... and MSC-R... series can also be delivered complete. This reduces the time and financial resources required by the customer since the solution is available for immediate use in the busbar trunking system.



NZMH4-VE2000: Mains Connection for Wind Turbines up to 2000 A

The new NZMH4-VE2000 circuit-breaker is ideally suitable for connecting wind turbines to the mains network. It is a compact circuit-breaker (W/H/D 280 x 401 x 207 mm), that ensures the safe and reliable execution of all protective functions. The NZMH4-VE2000 has a short-circuit breaking capacity of 35 kA at 690 V and can thus disconnect a wind turbine safely from the mains in the event of a short-circuit. The short-circuit release itself can be adjusted to between 2 and 8 times the rated current range. The circuit-breaker is therefore suitable for protecting the generator against overloads in the event of a short-circuit. NZMH4-VE2000 circuit-breakers can be used without any derating at ambient temperatures of 50°C.

The combination of the circuit-breaker with DILH1400 or DILH2000 vacuum contactors is approved for type "1" coordination. Contactors execute the connection and disconnection of the wind turbine during normal operation, and the circuit-breaker provides the protective function. The DILH2000 enables users to implement direct mains connections. If the wind turbine is required for use in weak wind zones, a star-delta combination can be used to extend the operating range of the wind turbine. Users can create the star-delta combination for rated currents of up to 2000 A with DILH1400 contactors.

MS1204

Moeller EMR4 Three-Phase Monitors: Measuring and Monitoring Relays for Three-Phase Networks Increase System Availability

Moeller is offering a new and comprehensive product range for monitoring three-phase networks. Moeller' EMR4 three-phase monitors stands out for their low wiring requirements, a powerful and selective parameter monitoring facility, as well as a space-optimised device design.

The new product series consists of multi-functional three-phase monitors and single function devices for monitoring individual parameters. The outstanding feature of single-function three-phase monitors is their low cost.

Multi-functional three-phase monitors are available with or without neutral conductor monitoring. They monitor all phase parameters such as phase sequence, phase loss, overvoltage and undervoltage, as well as imbalance. The adjustable threshold value for imbalance ranges from 2 to 15 percent, depending on device version, and the threshold values for undervoltage and overvoltage can be set as required or fixed. The "with neutral conductor monitoring" function on the EMR4-AWN... versions is a new feature.

MS1203

NZM Circuit-Breakers: Diagnostics Included

Circuit-breakers protect installations, systems and persons, detect faults immediately and switch reliably. The following questions must be answered in order to restore the power supply quickly and safely:

- Is there an overload or short-circuit?
- What phases are involved?
- What chain of events led to tripping?
- Were settings changed beforehand?
- Can a restart be carried out, in particular safely?

Diagnostics in the event of a fault

All of Moeller's NZM electronic circuit-breakers provide answers to this so that key information for the diagnostics process is provided on board: The recording in the internal memory not only answers the fundamental question about the cause of tripping, but also records the status of each individual phase in detail. However, that is not all: Each circuit-breaker also records the history of each individual trip.

The last ten events are provided in detail so that the source of faults can be localised quickly. Modified settings of the protection parameters are likewise stored together with the events. This enables thorough and transparent diagnostics processes to be carried out.

The user-friendly NZM-XPC-SOFT with its straightforward display provides a fast overview of operating states in the field. All events can be documented on paper or electronically for more detailed fault analysis at a later time.

Diagnostics during commissioning

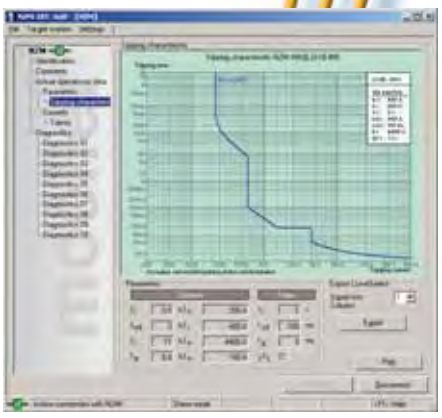
However, NZMs not only prevent risks in critical situations, they also save time and money during commissioning.

NZM circuit-breakers provide support for selecting optimum protection parameters. For this the NZM-XPC-SOFT V2.0 software provides an exact display of the relevant tripping characteristics using the NZM settings selected. This prevents faults when setting parameters and enables the upstream or downstream switching devices to be matched for selective protection or the adaption to particular motor characteristics. A tripping characteristic curve simplifies circuit-breaker documentation, which can be printed out with circuit-breaker and installation identification.

Diagnostics during operation

However, the functions of the NZM go a lot further: They also offer powerful diagnostics options for installations and systems in normal operation. NZM-XPC-SOFT V2.0 can be used to produce a trend plot from each electronic NZM2, NZM3 or NZM4. For this the PC cable is simply plugged in from the front and measuring is started. NZMs record the r.m.s. values of all phases as required over minutes, hours or even days. The scan function can be set to the accuracy required and adjusted even down to the nearest second. User-friendly zoom and cross-hair functions enable both overviews and detailed examinations to be carried out quickly. All measurements with circuit-breaker identification and comments can be called offline for making a thorough analysis. The print functions enable entire processes or individual sections to be documented. The integrated log function generates files for Microsoft Excel for comparing or processing measured values with each other.

NZMs are designed for worldwide use: NZM-XPC-SOFT offers nine menu languages for providing safety and suitability for use worldwide.



Conclusion: Already after the first installation, users will not want to be without the integrated diagnostics socket that is standard on all NZMs.

NZM – the only one with the diagnostics socket right on board.

MS1205

Moeller DF51 and DV51: Flexible Drives with Versatile Communication Connections

The new DF51 and DV51 frequency inverters from Moeller are extremely flexible, both with regard to the drive solution from 0.25 kW to 7.5 kW and the bus connection. DF51 and DV51 are factory shipped with an RS 485 interface on board that supports the Modbus RTU protocol. This alone allows users to create simple and inexpensive networks. The DV51 frequency inverters also have a modular design for networking with other industrial standards. In addition to the keypad, communication interfaces such as for Profibus DP and CANopen can also be fitted directly on the front. The DF51 compact devices can be connected to the same communication modules as the DV51 via their interface port.

The digital input terminals enable users to switch conveniently between local manual and bus operation - a significant benefit, especially during commissioning and servicing.

The DF51 and DV51 frequency inverters both support the PROFIDRIVE 3.0 and CANopen DS 402 Drives Profiles for implementing a wide range of networked drive solutions. This enables the standard and fast integration of drives in these communication systems.

Select Frequency Inverters Precisely with the Moeller Selector Slide

MS1206

It has proved its worth thousands of times over: Moeller's cardboard selector slide enables the fast selection of all Moeller frequency inverters including accessories. A PC or any other equipment is not required. The selector slide is now available in the updated version and the DF51/DV51 series have been added. The new slide shows you directly the components for a complete drive train system, from the mains supply up to the motor feeder. Mains fuse and mains contactor are also taken into account, as well as line reactors, radio suppression filters, frequency inverters, motor reactors and sinusoidal filters. Once the required motor rating is set, all associated products are shown immediately.

A distinction is likewise made between mains voltages and open-loop and closed loop frequency inverter technologies. All information on the selector slide is shown in German and English, and it can be obtained free-of-charge.

If you prefer to use the selection slide online, this is available on the Internet at **www.moeller.net/select**

xStart - New DS6 Soft Starter Series: Greater Selection for Soft Starting

Moeller's latest DS soft starters for motor ratings between 18.5 and 110 kW combine the simple handling of the small DS4 devices (2.2 to 15 kW) with the high connection loads of the fully-featured DM4 soft starter series (7.5 to 900 kW).

The new DS6 soft starter uses microprocessors and thyristors to automatically control the starting and operation of asynchronous three-phase motors - without any parameter setting required. DS6 is connected to the motor in series and can be used in combination with overload protection and isolating device (NZM1 and NZM2 circuit-breakers) as a motor starter.

DS6 compact soft starters are available in two sizes with rated currents between 36 and 200 A. They enable soft acceleration and deceleration for the assigned motor ratings between 18.5 and 110 kW at 400 V. Acceleration and deceleration ramps can be adjusted separately.

The motor voltage is increased on the DS6-340-...-MX with phase control from a selected start value, with an adjustable ramp time up to the full mains voltage (Ue = 208 ... 460 V ± 10 %, 50/60 Hz). The patented and well-established asymmetrical trigger control from the DS4 firstly prevents DC components and secondly the formation of elliptical rotation fields. The DS6 is capable, for example, of around ten starts an hour with three times the startup current for five seconds in accordance with product standard IEC/EN 60947-4-2.

Start voltage, acceleration and deceleration ramp can be set by means of three potentiometers. The control is implemented using galvanically isolated 24 VDC inputs. LEDs indicate the operating status of the DS6 and two isolated relay contacts are used for signalling.

International certifications in compliance with CE, UL, CSA, CCC and the large mains voltage range enable the DS6 to be used worldwide for a host of different soft start applications, such as for pumps, fans, compressors, stirrers and conveyors.

MS1208

EASY-SOFT: New Functions for easy800 and MFD-Titan

The software for Moeller's easy control relay and MFD-Titan multi-function display is now available in a new version. EASY-SOFT now comes in two variants: EASY-SOFT-BASIC for easy500 and easy700, and EASY-SOFT-PRO (Professional) for all easy400, 500, 600, 700, 800 devices and MFD-Titan, which also comes with an integrated OPC server and a new label editor. EASY-SOFT can likewise simulate all device functions on a PC.

The new and extensive functions of easy800 and MFD-Titan can be programmed and assigned parameters using EASY-SOFT-PRO. easy800 and MFD-Titan thus now support 13 languages with specific national codes and appropriate fonts, which include Western, Central European and Cyrillic.

This new software offers a wide range of functions, such as the stepper motor control function block provided for easy800: The pulse output is used for controlling stepper motors and power modules directly. The serial protocol output function block allows you to output messages for which the data is output serially via the appropriate interface. MFD-Titan now supports Terminal mode, which allows users to easily access all stations on the easy.NET. MFD-Titan also supports new integrated visualization functions and screen elements. The entry values are then stored permanently in the program (FRAM).

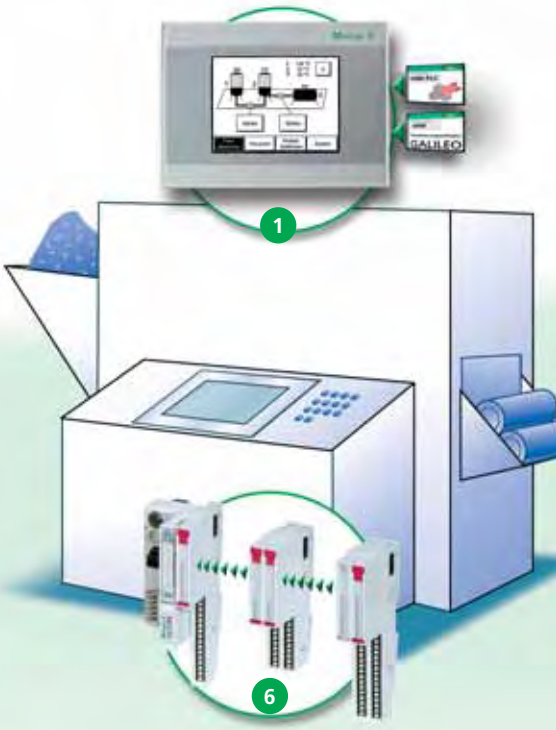
MS1207

Face the Machine

State-of-the-art machines and system lines place particular importance on optimum design. Suitable operating concepts support functionality and can considerably simplify intuitive handling. This is particularly the case with control circuit devices and man-machine interfaces. They form the face of the machine, inspire trust and ensure user-friendliness and safety.

1 HMI-PLC XV200: user-friendly machine operation and control

The XV200 touch display series offers a full graphic 5.7" LCD mono display with four greyscales, resistive touch technology and a host of communication and networking options. The Windows CE-based devices come with Ethernet and USB interface, and are available in three versions with an additional RS232, CAN or MPI interface. If required, XV200 can also provide the PLC functionality for small automation tasks.



6 Remote I/O XI/ON ECO: smart measuring and output of remote signals

The XI/ON system features a wide range of standard components such as digital and analog I/O modules, counters, temperature and technology modules. Two space-optimised I/O slices are new innovations for the XION I/O range. Depending on type, 8 or 16 inputs or 8 and 16 outputs can be connected on a narrow (12.5 mm) slice. All modules come with an integrated terminal level. Connections can be made quickly thanks to the use of spring-loaded terminals.

2 Control circuit devices and signal towers: rapid response thanks to clear signals

RMQ-Titan control circuit devices are designed for use in rugged environments. The IP65 devices use LEDs with a lifespan of over 100 000 hours. SL signal towers indicate machine states by using visual or acoustic signals. Positions are reliably detected with LS-Titan position switches. The LSE (Limit Switch Electronic) position switch is a highlight in this range, with a freely programmable switch point that can be programmed as required at any time.

3 Intelligent NZM circuit-breakers: controlling energy safely

The new NZM circuit-breakers cover a wide rating range with only four variants: Switching capacity levels are covered by the inexpensive 25 kA version for small subdistribution tasks up to the 150 kA version for complex high-power installations. The new compact 160A circuit-breaker saves space and acts as a main incomer or outgoer switch. The core of each NZM is the release electronics unit that detects and evaluates the actual currents. The circuit-breakers disconnect reliably if the adjustable release thresholds are exceeded.

4 easy control relay: versatile functions programmed simply

All functions of the easy control relay can be parameterised simply with EASY-SOFT software which provides a wide range of function blocks already integrated. The easy800 control relay and the MFD-Titan can be networked together simply and inexpensively via easy.NET or can be linked to standard bus systems by using gateway modules. Operation or message texts can be shown simply on the device display.

5 xEnergy low-voltage switchboards: combining modules for power distribution

The new xEnergy system range consists of power distribution systems specially designed for the building infrastructure up to 4000 A. The range consists of type-tested function modules (to IEC 60439 TTA) that can be combined to form type-tested modular switchgear assemblies (TTAs) in accordance with IEC 60439. The individual switchgear and protective devices with the associated mounting systems offer an economical, safe and flexible solution.

7 DS6 soft starters: soft starting three-phase motors

Compact DS6 soft starters (18.5 to 110 kW) combine the simple handling of the small DS4 devices (2.2 to 15 kW) with the high connection loads of the full-featured DM4 soft starter series (7.5 to 900 kW). Microprocessors and thyristors automatically control the starting and the operation of three-phase motors. DS6 is connected to the motor in series and can be used in combination with overload protection and isolating device (NZM1 and NZM2 circuit-breakers) as a motor starter.

8 Rapid Link: networking remote motor starters

The networkable and remote motor starters enable individual sections of a conveying system to be installed entirely at the factory. The individual mechanical sections and the mechanical switchgear form pre-assembled units that can be tested without a PLC. Apart from mechanical pre-assembly and adjustment, the electrics of the Rapid Link System can also be pre-assembled: The light barriers of the conveyor unit can already be connected to the motor starter and tested at the factory.

9 Frequency inverters: optimising variable speed drives

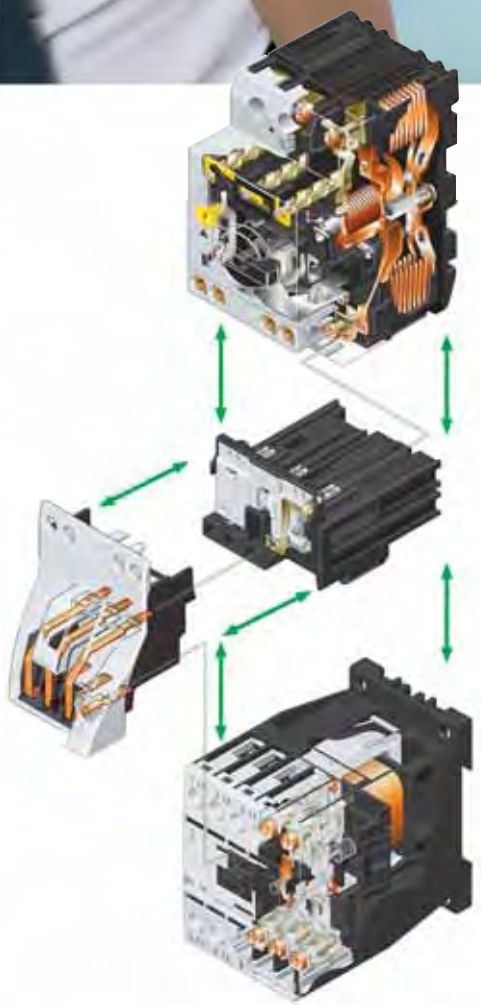
Moeller frequency inverters adapt the required speed of a standard three-phase motor ideally to the operating requirements at hand. With a user-friendly design, they offer a wide range of functions for ratings from 0.18 kW to 132 kW.

10 xStart: toolless plug connection

The new xStart combinations enable switchgear to be implemented even more easily and effectively into variable solutions. The plug connection design simplifies assembly, prevents wiring errors and saves space in the control panel.

Time Saving
Plug-In Technology

Mounting and wiring motor-protective circuit-breakers and contactors is a very time consuming and costly process, as well as often being the source of wiring errors.
Thanks to Moeller's toolless plug connection design, motor starters can now be combined and wired without any tools. The plug connection design saves time in mounting DOL, reversing and star-delta starters. It can be used for motor ratings from 0.06 to 7.5 kW, which represents the range for 80 percent of all standard three-phase motors.



PKZ and DIL in perfect combination

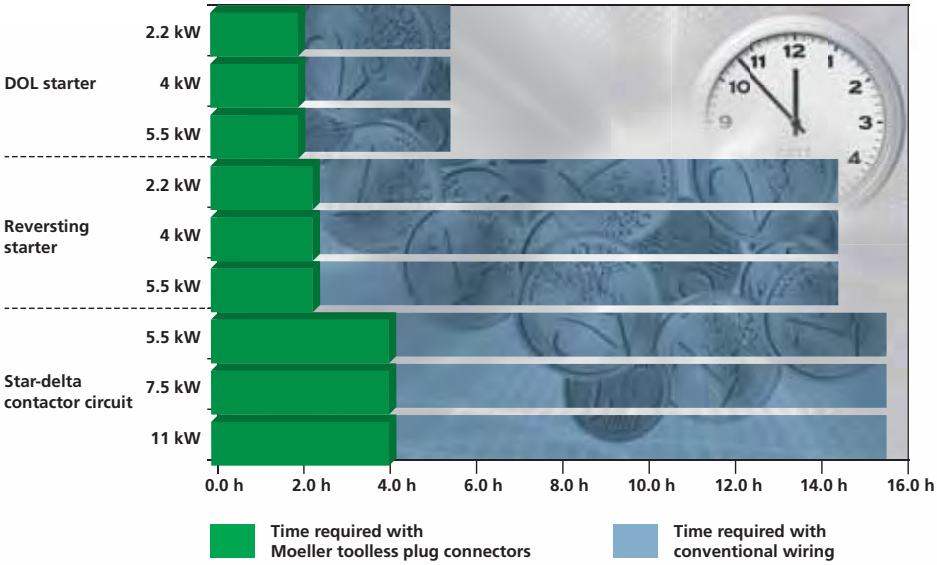
Assembling the motor starter with the toolless plug connectors reduces mounting and wiring time by enabling standard motor starter components to be combined quickly and error-free. With DOL starters, the user just clicks the components together. The DOL starter is a complete unit consisting of the proven standard PKZM0 motor-protective circuit-breaker and a DILM contactor. Both switches are mechanically interconnected by means of a pluggable connection module. A pluggable contact module provides the electrical connection between the motor-protective circuit-breaker and the contactor. The switchgear assembly can be fitted to a mounting rail or busbar without the need for an adapter.

With reversing starters and star-delta starters, the time consuming wiring of terminal points for parallel and reversing connectors or the star-point bridge is also reduced, and wiring errors are also prevented. All poles in the contact modules are plastic coated, and are thus protected against accidental contact. The selected shapes prevent the contact modules from being fitted incorrectly by accident. The toolless plug connection design thus produces cleanly wired and ordered switchgear assemblies that inspire trust in the reliability and safety of the switchgear.

Just prettier or also faster?

The toolless plug connection forms the basis for custom solutions all around the motor starter. To find out exactly how much time users actually saved, Moeller organised a practical test of the toolless plug connectors. An authorised panel builder was given the following tasks:

Mounting and Wiring Times for Assembling Motor Starters xStart



Test 1:

Motor-protective circuit-breakers and contactors had to be assembled, i.e. mounted on a top-hat rail in the control panel and then wired. These components were made available together with -H07V-K... wiring material and ferrules. The cables had to be prepared by the users themselves. Motor starter supply cable and motor feeder were already installed at the starter. The time was stopped once the starter was mounted and the main current and the associated control current poles were wired.

Test 2:

As in test 1, the PKZM0 motor-protective circuit-breakers and DIL M contactors were provided already. Instead of single-core flexible cables, the tester was provided with the appropriate wiring set with the plug connection design.

As expected, the mounting and wiring for Test 2 required less time. However, the difference was considerably greater than previously expected. The DOL, reversing and star-delta starters could be assembled over three times faster. In other words: Compared to the conventional method, the toolless plug connection design reduced the required time for mounting and wiring by almost 70 percent, and could thus significantly reduce the wiring costs involved.

Anyone who builds control systems and panels on a daily basis will appreciate the significance of this time advantage. The exclusion of error sources is also very useful. Short-circuit proof connections and coordinated starters are other benefits of this system: Moeller motor starters consist of perfectly matched components and are thus always suitable for type “1” or “2” coordination.

MS1209

Wide Belt Sanding Machines & Moeller Technology Combined

BÜTFERING

With state-of-the-art machines and system lines, much importance is placed on optimum machine design and operating concepts that support functionality and ensure intuitive handling. This in turn places particular importance on the control circuit devices and the man-machine interface to be used. These virtually represent the face of the machine, are required to inspire trust, support user-friendly operation and are a key factor in the customer's choice. Bütfering Schleiftechnik therefore relies on Moeller HMI and control devices for all its systems.

A company based in Berkum, Westphalia, Bütfering Schleiftechnik designed its SWO series specially for solid wood sanding tasks. The use of steel contact rollers, rubberised contact rollers and the sanding pad enable workpieces to be processed in one pass of the machine. Wide belt sanding machines perform calibration, coarse, presanding and fine sanding operations with a high level of surface quality.

The machine concept is based on Bütfering's platform technology. The constant working height - with large-sized trapezoidal thread spindles - enables stand-alone machine solutions to be created or allows the systems to be integrated in machine lines. Other standards include a 2620 mm sanding belt length and integrated vacuum clamping device. Its own drive motor ensures that every unit can provide the ideal power level for the sanding tool concerned. The low-maintenance design and powerful basic equipment are the characteristic features of the SWO series that was developed as an economic solution.

HMI and control devices

For several years Moeller has been market leader in this field with its high quality and attractively designed RMQ-Titan control circuit devices. This series stands out for its modular design, uniform look & feel, rugged and sophisticated technology, and innovative further development. The RMQ-Titan series has been expanded with the MFD-Titan HMI and control devices that are part of the easy series.

Bütfering uses a wide range of Moeller technology consistently in its SWO series including: RMQ-Titan control circuit devices such as pushbutton actuators and joysticks, the MFD-Titan multi-function display, easy800 control relay and XStart motor starters.

With its operations worldwide, the following features were of special importance for Bütfering: MFD-Titan can display machine states and fault messages graphically. The display of length information in centimetres or inches can be selected easily on the display, as required by the location where the machine is used. Furthermore, consignment-based machines can make use of the operating hours counter integrated in the MFD-Titan. Bütfering makes full use of the device's precision and versatility. Thanks to MFD-Titan, the air sanding shoe can be applied to or removed from the sanded material at conveying speeds of 2 m/s to 13 m/s. The pneumatic dead time of the air sanding shoes can be neutralised by means of compensation calculations in the MFD-Titan device. Setpoints can be entered easily on the display, and MFD-Titan can be expanded easily by networking easy800 when the customer requires an additional air sanding shoe. The same applies to the addition of further functions.

Future-proof automation solutions

With its easy control relay range and associated MFD-Titan multi-function display, Moeller is already setting standards. Thanks to their new and extensive range of functions, easy control relays can be used as a genuine alternative to conventional PLCs in price sensitive machine and system building applications. After all, Moeller control relays now cover all the tasks required for low-complexity and medium-complexity automation solutions that were previously the traditional domains of PLCs. Whilst MFD-Titan and easy800 have the same range of functions, the full graphic MFD-Titan mini controller combines HMI and controller functions in one compact device. The graphic display (IP 65) with 132 x 64 pixels comes with a backlight that can be activated as required. MFD-Titan is designed for industrial applications (in accordance with IEC/EN 60947), and can thus be used in both harsh environments and in outdoor applications.

Up to eight MFD-Titans or easy800s can be networked together using easy.NET for more complex tasks. Users can thus implement applications with up to 320 I/O points. MFD-Titan offers open communication options and complies with a wide range of standards: AS-Interface, Profibus DP, CANopen, DeviceNet, serial interface, Windows DLLs, OPC. The MFD-Titan can therefore also be integrated in larger automation solutions.

CONCLUSION

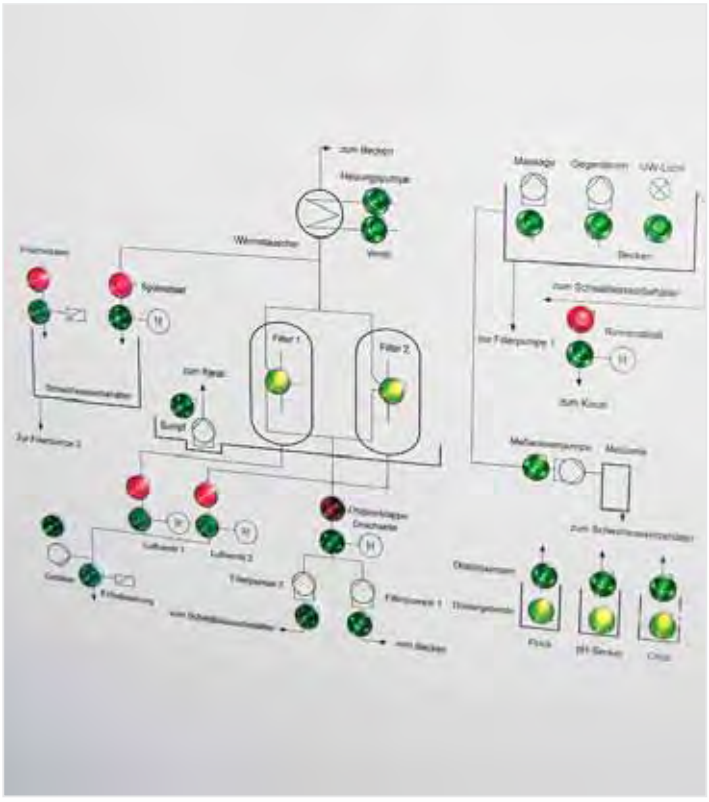
Martin Settele, SWO project manager at Bütfering Schleiftechnik, had this to say: "As our machines are used worldwide, we ensure that machine states are displayed graphically. This minimises costs for the operator in the event of faults or refitting, and graphics can be understood intuitively worldwide. In the event of a fault, a graphical message is far more effective than a text message. For this price range and with this level of functionality, the MFD-Titan was the only controller solution suitable for us on the market. The visualization system on the MFD-Titan is also easy to program, and the user just has to enter parameters. We were also particularly attracted by the price/performance ratio of the hardware and software."

THE COMPANY

Bütfering Schleiftechnik GmbH has its headquarters in Beckum and was founded in 1946. The company now belongs to the HOMAG Group. Woodworking plants all over the world use sanding machines made by Bütfering. The company produces wide belt sanding machines for virtually any application field. This ranges from inexpensive entry level machines to fully fitted special models and product-specific special machines with sanding functions for calibration, fine finishes and varnishes. The sanding machines are manufactured in a 18 000 square metre production facility in Beckum.

MS1213

Swimming Pool Control with easy and MFD-Titan



The company Schwimmbadtechnik Kirchner installed a flexible control system for functions such as water temperature, massage jets and chlorine metering for the swimming and exercise pools of the renowned HELIOS Clinic at Bleicherode in North Thuringia. The easy control relay and the multi-function display ensure fault-free operation with a high level of water quality.

The HELIOS Clinic, Bleicherode, is a specialist orthopaedic hospital in North Thuringia with a focus on operative orthopaedic medicine. It has an excellent reputation for artificial hip, knee and shoulder operations, a reputation that goes far beyond its specific region. With well over 1000 navigated knee replacements the clinic has the most extensive experience worldwide in this field.

Like all equipment in the clinic, all its therapy, swimming and exercise pools also have to meet the high expectations of the patients in every aspect. All the more reason for Schwimmbadtechnik Kirchner to require maximum flexibility, a wide range of functions and reliability for the pool controls. They therefore decided on a modular system with networked units consisting of easy control relays. In this system, each relay is assigned to a functional group.

High operational reliability

The modular design of the system ensures a high level of operational reliability for the clinic operators and for the patients. Faults in individual system sections are detected quickly and normally do not impair the function of the pools, since, in the event of a failure in individual system sections or modules, the remaining sections continue to operate. In this way, required functions such as the control of water temperature, pool water level, filtering and control of massage jets, as well as the metering of pool chemicals are fully retained.

The easy.NET topology consists of three easy 819-DC-RCX units, partly with central expansion modules, three easy 618-DC-RE units and one MFD-80-B with CP8-NT and an easy 618-DC-RE central expansion. This infrastructure is used to control, regulate and visualise the following parameters:

- 2 sand filters with 6-way valves, with volume flow and pressure differential measurement using 0-10V analog sensors
- Control of various motor-activated valves for water flow during filtering, rinsing, backwash and waste, for air purging and emptying, for locking and reporting all switch states.
- 2 splash water tanks with 4-20mA analog level sensor. Functions: control of the splash water volume with automatic replenishment according to pool use by patients, supply of filter backwash and consumption measurement
- 2 Filter pumps, 1.5 KW
- Jet stream and massage unit
- Underwater lighting with lighting scenarios
- Control of pool water temperature with heating by means of heat exchangers, measurement using 0-10V active temperature sensor, digital setting and display on the MFD display
- Pumping system for leakage water
- Data exchange with metering system and the metering pumps for swimming pool chemicals (chlorine metering, flocculating agent, PH value setting)
- Monitoring of important switching states with selective display in the MFD-Titan and central signalling to the house alarm

The MFD-Titan display from the easy product range enables the user to select between Manual and Automatic mode as required. Individual sections of the system can be operated and set up manually as required, whilst the remaining system continues to run in Automatic mode. The full-featured graphic display with 132 x 64 pixels comes with a backlight that can be switched on as required, and offers a high level of protection to IP65. Two freely programmable status LEDs are used to display additional operating states and signal alarms. Connections with maintenance-free and vibration-proof spring-loaded terminals ensure a high level of operational reliability.

MS1217

THE COMPANY

Schwimmbadtechnik Kirchner was founded in December 1994 in Sondershausen, not far from the Harz mountains. The company is based in Thuringia and offers different services for all the requirements of private and public swimming pools, saunas and solarium facilities. This includes consultation, construction, maintenance, and sauna sales and installation. For around three years, Kirchner has been successfully using easy devices for all control tasks in swimming pool applications.

CONCLUSION

Dipl.-Ing. (FH) Herbert Kirchner, owner of Schwimmbadtechnik Kirchner, had this to say: "Moeller's switching devices from the easy series and the MFD-Titan display provide the HELIOS Clinic in Bleicherode with a highly reliable and flexible control system for all pool functions. The modular design enables the number of individual components to be kept to a minimum. In this way, space requirements and wiring costs are considerably reduced. The clearly structured visualization system provided by the MFD-Titan multi-function display enables it to be operated by users without any technical background. The customer is absolutely delighted with the solution."

Emergency Power Systems: NZMs Protect Generators

Emergency power supply systems can save lives in hospitals, protect production processes or ensure continuous operation in IT centres and administrative buildings. In the event of a mains failure, the emergency power systems feed the consumers for which continuous operation is vital. This is where Moeller's NZM circuit-breakers are used to implement key functions: They protect, switch and synchronize the generators reliably and safely.

As part of the NZM range, Moeller offers circuit-breakers with an electronic release that can be adjusted exactly for generator protection. The circuit-breakers are suitable for rated currents from 50 to 1600 A and can reliably disconnect short-circuit currents up to 150 000 A.

Generator specifications require them to be able to withstand a multiple of their rated current for several seconds without damage. The setting values of the release can be adjusted, for example, to double the rated current linked with a one second delay, so as to ensure optimum protection of the generator from overload on the one hand, and optimum use of generator capacity on the other. This firstly ensures that temporary overcurrents above the rated current are ignored by the circuit-breaker electronics. Downstream protective devices then have the chance of disconnecting faulty system sections, whilst remaining sections are still supplied. Secondly, they reliably and quickly disconnect larger overcurrents over one second so that the generator is not damaged.

Moeller NZM circuit-breakers can also be equipped with motor operators so that they can be actuated remotely. These ensure circuit-breaker make times of less than 60 ms so that they are ideally suited to synchronizing generators with the mains supply. Manual on switching with an equally fast make time of below 60 ms is also possible in the event of failures in the auxiliary supply. Protective seals and locking facilities are also available for protecting settings and operating buttons from unauthorised access, in which a distinction can be made simply between local and remote operation.

Thanks to accessories such as shunt releases, emergency shutdowns can be completed in 20 ms. Undervoltage releases monitor the voltage and carry out an immediate disconnection of the circuit-breaker if the voltage present clearly goes below the required level.

Moeller circuit-breakers offer an outstandingly long service life. Circuit-breaker, remote

operator and accessories can withstand up to 20 000 switch operations without any damage. With up to 50 switch operations per month, this corresponds to a lifespan of over thirty years.

NZM in six operating modes

PSL Prozessortechnik GmbH is a company based in Nettetal-Kaldenkirchen and includes the production of switchboards and electronic devices to its operations, tailor made for power generation with combustion motors. This ranges from standard standby generator sets up to fully automated power supply systems. For example, PSL Prozessortechnik planned, constructed and installed an emergency power supply system with three 630 KVA / 910 A units for the IT centre of a bank in Düsseldorf. NZM circuit-breakers were used in the project.

Georg Lüdecke, managing director of PSL Prozessortechnik GmbH explains: "You can even rely on NZM circuit-breakers when, in the event of a short-circuit, generators have difficulty only producing twice to six times the continuous current. They reliably disconnect even the smallest short-circuit currents within a few milliseconds, and can also be set for special requirements so that small short-circuit currents are ignored for up to a second."

Another reason for Georg Lüdecke choosing the NZM is its extensive range of functions: NZMs basically allow six operating modes that can be used as required by the customer. The use of all six operating modes is well illustrated in the IT centre application.

Emergency power operation: Three units are available on standby in the power supply of the IT centre. In the event of a mains failure all three units start up. This means that all three generator circuit-breakers are connected to the generator busbar and the generators excited virtually simultaneously using a special startup synchronization. As soon as all three units are connected to the busbar and supply the generator voltage, the mains coupling switch is disconnected and the generator coupling switch connected. All units can supply the consumers within 15 seconds, with every unit taking the same share of the load. The units themselves are regulated at a rated frequency of 50 Hz.

Return synchronization: After the mains supply is restored and the supply recovery time has expired, the units are synchronized back to the mains supply, powered down to the minimum output and the generator switches disconnected. The units continue running for around three more minutes to cool down and are then stopped and returned to standby mode.

Peak load operation: When the "Peak load" keyswitch is actuated, the preselected base load unit is started, connected to the generator busbar and the coupling switch synchronized. The unit then runs in parallel operation and is regulated to the reference value set. When the load test operation is deselected, the unit is run to the minimum output, the generator and coupling switches are disconnected and the unit is stopped after the cooling time has elapsed.

Mains supply failure during mains parallel operation: When a mains fault is detected during parallel operation, the mains and coupling switch is disconnected within 100 milliseconds. The base load unit is discharged, the two other units are started and connected in a rapid synchronization procedure. Once all units are in operation, the generator coupling switch closes. The units then continue running in emergency power mode with effective load balancing and set frequency regulation to supply the consumers. After the mains supply is restored and the supply recovery time has expired, the same return synchronization steps are executed as previously described.

Manual operation: In manual operation, the operator is responsible for the entire system.

Manual synchronization: In this operating mode, the speed (frequency) is set to the comparison frequency with the speed adjuster. If the synchroscope shows that the generators are in phase, the circuit-breaker is switched on via the "Manual synchronization switch On" button. It is then only necessary to adjust the effective power component with the speed adjuster.

CONCLUSION

Georg Lüdecke, managing director of PSL Prozessortechnik GmbH explains: "The design of emergency power systems requires a special level of care that must be applied to all the components used. Moeller's NZM circuit-breakers are verifiably stable and reliable. They are easy to operate and offer a good price/performance ratio."

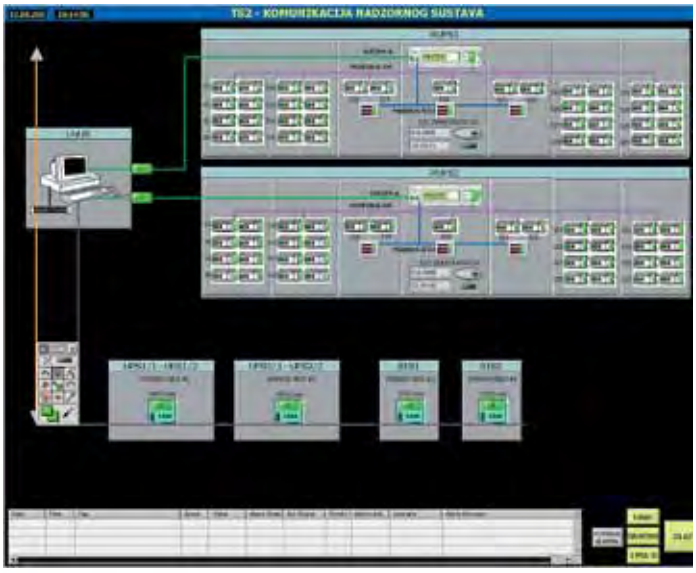
MS1215

Always Up and Running: Radio and TV in Croatia

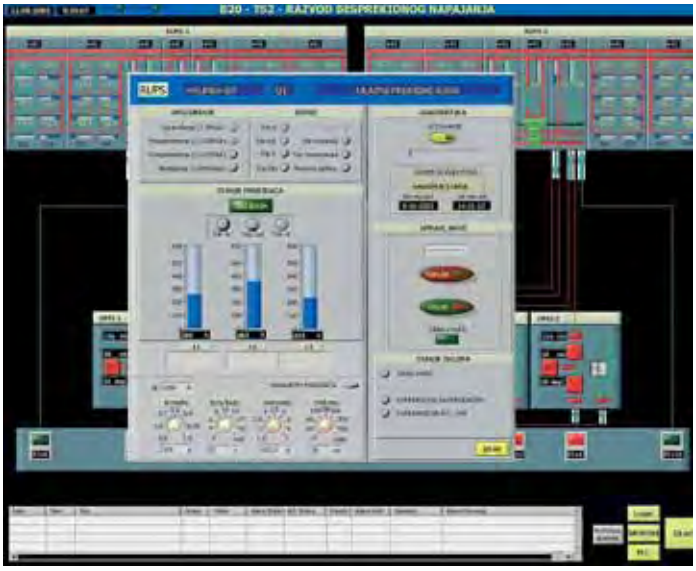
HRT, the Croatian Radio and Television Institute, is a public corporation that offers programme content of public interest from the latest news broadcasts to film documentaries, sports and entertainment programmes for all age groups. For the past twenty years HRT has trusted in Moeller's reliable switchgear and automation via the Zagreb distributor unikomerc-elektro to ensure continuous broadcasting operation.

THE COMPANY

HRT, the Croatian Radio and Television institute, is a public corporation with headquarters in Zagreb. It produces and broadcasts radio, television and music programmes, as well as broadcasting two terrestrial programmes, which can also be viewed by satellite. Forty hours of broadcasting are offered every day. The two satellite programmes are called HRT PLUS and Images of Croatia. The Croatian Radio broadcasts some 215 hours of programme each day via three national and eight regional stations. For Croats abroad it broadcasts the daily show "Voice of Croatia".



System overview as fieldbus topology



System overview and switch details

The latest solution for HRT is part of a UPS system. In the event of a general blackout, the power supply for the most important parts of the broadcasting infrastructure has to be maintained by switching immediately to battery power followed by generated power. The reliable power supply is ensured as soon as the generators are running and synchronized.

To ensure the most efficient use of the stored energy, the demand needs to be closely monitored individually on all incomers and outgoers by means of a central SCADA system. For rated currents from 50A to 1600A, NZM2, NZM3 and NZM4 circuit-breakers offer built-in measurement of all phases, thus allowing additional space and cost savings.

Access to all device and process data

All the status and load data for each circuit-breaker is displayed on the front panel with the NZM-XDMI612 Data Management Interface. Six relay outputs are provided for tasks such as signalling load warnings or causes of tripping. The modular concept enables information to be forwarded to a PLC via Profibus DP, CANopen or DeviceNet.

For HRT, the NZM-XDMI-DPV1 Profibus module was exactly the right choice. Now all device and process data such as status and load information is available immediately. NZM circuit-breakers provide all data in accordance with the low-voltage switchgear profile specified by the PNO (Profibus user organisation). This simplifies implementation since data format and structure are vendor independent, allowing a powerful overview over the whole system at a glance.

Communicative and intelligent

The DPV1 standard allows the full scope of NZM functionality to be accessed easily. This ranges from ID data, parameter data, statistical counters and the last 10 event logs inside the NZM. Already in the installation phase our clients at HRT were impressed by the intelligent and communicative circuit-breakers and the external system integrator. NZMs fully support all the required features for monitoring, alarm signalling, diagnostics and control of the UPS concept in equal measure. Full access to over 100 NZM circuit-breakers was implemented using Moeller PS4-341 as PLC and LabView as a SCADA system.

CONCLUSION

NZM circuit-breakers come with intelligent functions already built-in. By equipping the circuit-breakers with electronic release units, they are able to provide higher-level units with information on currents, voltages, phase position, power and fault states, including a fault history and fault causes. NZM features a wide range of options that make it easy to handle. They are ideal for applications that combine power distribution and automation.

MS1211

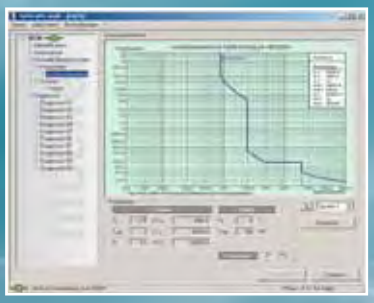
Low-Voltage System: Shopping & Entertainment Over 36 000 Square Metres

xEnergy

Built by
Moeller System Partner

Cost-efficient and standard power distribution systems must be able to adapt to customer requirements. They need to offer the same level of efficiency in planning, construction, assembly and operation. Moeller's xEnergy is designed to meet all these requirements and stands for maximum flexibility, economy and reliability.

Clever NZM Circuit-Breakers Include Diagnostics



“That's what I call maximum safety: a diagnostics socket always at hand”.

NZM circuit-breakers protect installations, systems and persons, detect faults immediately and switch reliably. The following questions must be answered in order to restore the power supply quickly and safely:

- Is there an overload or short-circuit?
- What phases are involved?
- What chain of events led to tripping?
- Were settings changed beforehand?

All Moeller's electronic **NZM circuit-breakers** give the answers: with the valuable diagnostics information directly on board. A straightforward and clear display with **NZM-XPC-SOFT** provides a fast overview in the field and documents all events on paper or electronically.

A04/38E

xEnergy

Reliably and safely controlling, switching and managing power. In industry, in buildings and in machine construction. Innovative protection concepts. With built-in diagnostics and communication functions. Housed in modern switchboard systems.

NZM Circuit-Breakers

IZM Circuit-Breakers

Switchboard Systems

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info@moeller.net

MOELLER

We keep power under control.

THE COMPANY

Galeria Kazimierz, a modern shopping and entertainment centre, is in the heart of Cracow near the historic part of the town. The shopping and entertainment centre run by the Globe Trade Centre (GTC) in Cracow consists of more than 36,000 square metres of floor space on two levels. Galeria Kazimierz will accommodate 160 chain stores and several restaurants, as well as offering various entertainment facilities, such as a Multiplex Cinema City with ten cinemas. 1700 car parking spaces are already provided.

xEnergy: one technical unit

xEnergy is Moeller's new system range, and consists of power distribution systems specially designed for the building infrastructure up to 4000 A. With the Moeller power distribution system, the individual switching and protective devices, the associated mounting system design and also the switchboard form one technical unit. This kind of system is both economical and reliable at the same time, as perfectly matched and type-tested functional units have been developed as a modular system. Exactly tailored function modules that have been type-tested in accordance with IEC 60439 with an internal separation from Form 1 to Form 4, comply with local installation requirements (DIN VDE, CEI, NF, UNE).

Varied software tools

Moeller offers software tools for the panel builder to plan and document their projects simply. These range from tools for network calculation, configuration, quotations, dimensioning and system engineering to order handling. The Moeller tools, which contain the system data for both the power distribution system and the switchgear integrated, allow the system required to be selected and configured precisely and quickly, in accordance with international standards.

Reliable, safe, with high availability

Globe Trade Centre (GTC) is the company that built and runs the Galeria Kazimierz in Cracow, Poland, a combined shopping and entertainment centre with 36,000 square metres of floor space. Panel builders Hulanicki Bednarek Sp. z o.o. are Moeller's partner for xEnergy and MODAN in this project. Both project partners, Hulanicki Bednarek and Moeller Poland, have enjoyed good relations for a long time. Furthermore, the panel builders appreciate the competent support provided by Moeller in Poland.

The low-voltage power distribution system designed for the Galeria Kazimierz consists of 62 xEnergy sections (around 50 metres) distributed over three main power distribution boards. The main busbars transfer currents of 2500A, 3200A and 4000A. xEnergy power sections with IZM and NZM4 with mechanical interlocks and busbar links are also installed. xEnergy outgoing sections with NZM1 to 3 power feeders are used for substations, as well as motor starter combinations with PKZ and DIL contactors. xEnergy sections with power factor compensation are also provided with the xEnergy corner sections.

The xEnergy range consists of:

- Feeder and coupling sections for circuit-breakers up to 4000 A,
- Individually equipped outgoer sections with fixed compartment modules for switching and protective devices including motor starter combinations up to 630 A,
- Outgoing sections up to 630 A for flush-mounted switch-fuse strips, fuse rails and fuse switch-disconnectors with different mounting depths,
- Control sections and empty sections for ancillary components such as motor starters, PFC modules, frequency inverters, soft starters or for automation solutions,
- Mounting systems for rail-mounted service installation devices for conventional service distribution boards up to to 630 A

MS1212

CONCLUSION

On project completion, the end customer, Globe Trade Center (GTC), was very satisfied how professionally and reliably the project partners had worked. The entire modular power distribution system was supplied in just one week, the individual switchgear and mounting systems fitted together perfectly, enabling the partners to commission the system without any problems. “xEnergy meets our requirements in all that we expected, we can fully recommend the system”.

Intelligent
Power Distribution & FDT

The FDT technology simplifies the system integration of communicative circuit-breakers. The outstanding features of FDT include the ability to integrate device drivers in parameter software, control systems and engineering systems. The requirements of an intelligent power distribution system are largely known. Over the system life cycle, these requirements include: cost reduction with the system integration and simple commissioning, high availability in the operating phase, provision of data and functions for effective energy management, as well as rapid diagnostics in the event of a fault.

Monitoring circuit-breakers with turnkey software modules

Intelligent circuit-breakers open up new options

FDT-Navigator: service station for networked circuit-breakers

Power distribution components such as state-of-the-art circuit-breakers now come equipped with integrated electronics and can be connected for communication. They can be parameterised, monitored and switched remotely, and provide useful diagnostics information in the event of a fault. An adapted operation software provides these functions in a convenient interface and simplifies integration in the control system in the form of DTMs (Device Type Manager).

Configurable protective function

The circuit-breakers in Moeller's new NZM series guide the power to the connected loads and disconnect them reliably in the event of overloads or short-circuits. They can be used for system and cable protection, motor protection, or selective and generator protection. The release electronics unit forms the core of every NZM, and is used to not only detect the actual currents quickly but also evaluate them at the same time. The circuit-breaker disconnects if the set release thresholds are exceeded, thus preventing damage to machines or systems.

In power distribution systems, incoming circuit-breakers and several outgoer circuit-breakers are arranged hierarchically and their parameters matched up so that unaffected sections of the system can continue operating without any interruption. Circuit-breaker parameters can be shown graphically in the form of tripping characteristics so that they can be optimally adjusted. This particularly simplifies setting during commissioning.

Avoid downtimes and ensure efficient energy management

The release electronics unit derives other important operating and diagnostics data from the actual currents detected. For example, load warnings and overloads are reported, thus enabling measures to be taken early before a system shutdown occurs. However, in the event of a disconnection, the cause of tripping and the previous events leading up to it (e.g. short-circuit, load warning, affected phase, imbalanced phase load of a motor) can be read from the electronics unit. Faults can thus be rectified rapidly thanks to this important information.

The current and status monitoring, the remote switching of the circuit-breakers and, if necessary, all connected devices also provide the basis for tariff optimised load and energy management. By recording and logging the currents, the energy used can be assigned to particular cost centres. This creates greater transparency and generates vital data for further budget planning.

Simple system integration

An FDT-compatible control system can offer remote diagnostics, status and current monitoring, remote parameter functions and remote control via operating software, without any additional engineering required. The standard FDT interface ensures that a DTM from manufacturer A is fully compatible with the control software of manufacturer B. The device integration simply requires the installation of the appropriate DTMs. The control system establishes communication with the device, for example via Profibus-DPV1 or Ethernet/Profibus gateways. All device parameters can be stored in a central database of the control system. This simplifies the exchange of devices since the parameters can now be loaded on a replacement device and reproduced.

Fast overview

The remote monitoring, maintenance and servicing of the power distribution system are usually carried out by specially trained personnel using autonomous service stations. The FDT-Navigator in combination with NZM-DTM is one such service station. This virtually turnkey combination enables networked circuit-breakers to be read in simply with a fieldbus scan and displayed graphically in the topology. In this way, a fast overview can be obtained of any faults present and their location, as well as the type of fault involved. In many cases, the software package thus replaces a visualization system with its additional requirements for creating pictures or the tedious allocation of communication variables. The FDT interface also makes the system open for additional devices for power distribution and automation.

MS1218

Accessing Technical Information Online and Just In Time

The requirements for fast and precise information are noticeably increasing. Moeller is meeting these requirements in different ways in order to suit the user. For example, the Moeller Wiring Manual is available online in two versions. At the same time, Moeller provides specialist support and service for its mature technology. With this in mind, the Download centre provides a wide range of information for all aspects of Moeller products.

Online - the Moeller Wiring Manual

The Moeller Wiring Manual contains information on basic principles, useful tips and practical examples for the most important and commonly used circuits in low-voltage technology. It not only provides knowledge on Moeller products, but also on all related aspects.

Not only specialists benefit from this compact guide, but also teachers in vocational colleges find the Wiring Manual a useful aid in training future electricians. With over 552 pages, the latest issue supports work on site, in the laboratory, in the workshop or for consultative discussions.

The easy-to-use navigation and rapid search function means that the Wiring Manual can be viewed online in HTML format without any additional software required. Tables, pictures or drawings can be copied into your own documents via the Clipboard. Alternatively, users can download the Wiring Manual as an offline PDF so that they always have a valuable resource available on a laptop or PC. Individual pages can now be taken out simply as required. The Wiring Manual integrates links and refers directly to relevant additional information. Moeller's Download Centre provides this service and is always just a click away at the Support Portal.

One click to the Download centre

Moeller's mature technology requires specialist expertise. The Download Centre provides technical know-how and additional information on all Moeller products. At the click of a mouse, users can obtain catalogues, manuals, installation instructions, as well as product information such as brochures, selection aids, technical papers and the Moeller Wiring Manual in PDF format. The Download Centre also offers demo versions, updates, software modules and application modules.

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The different manuals are equally popular, and are available in German, English, French, Italian and Spanish.

Another link takes users to Moeller specialist publications. These provide support for planning and engineering Moeller systems and are also available in PDF format for downloading.

MS1219

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- ☐ NZM Circuit-Breakers
- ☐ NZM Circuit-Breakers, Communication
- ☐ DS Soft Starters
- ☐ xEnergy Distribution Boards
- ☐ Electronic Catalogue
- ☐ easy control relay / MFD-Titan multi-function display

MOELLER

We keep power under control.