Master Channel Generator
Types G 3800 0016, G 3800 1016

Dupline®
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- Programmable channel generator
- Automatic data exchange between multiple networked Master Generators, allowing systems with up to 4096 I/O points
- Option for built-in GSM Modem for monitoring and control via SMS
- User-friendly configuration via Windows 98/2000/NT/XP software
- Real-time, timer and logic functions
- Analog set-point control and monitoring
- Light and Rollerblind control functions
- Alarm Monitoring
- Option for Radio controlled clock for high real time accuracy
- 2 x RS232 ports for configuration and Dupline data read/write
- 1 x RS485 port for networking of up to 32 Master Generators
- Modbus-RTU protocol
- Built-in software driver for external radio modem
- 4 digital inputs / 4 digital outputs on-board
- H8-housing for DIN-rail mounting (EN50022)
- AC or DC power supply

Product Description

Programmable channel generator with built-in dedicated intelligent functions for light and roller blind control, alarm monitoring and analog set-point control. In addition to that, there is realtime-, timer- and logic- functions. Programming is easily performed through Windows-based configuration software. An optional built-in GSM modem can be used for monitoring and control of Dupline signals via SMS. Up to 32 Master generators can be networked as slaves in a RS485 network using the Modbus protocol. The unit has 4 digital inputs and 4 digital outputs on-board, and it is possible to create links to other Dupline networks via external Radio Modem. The G3800X016 is different from the G3800X015 in that it has the capability to perform automatic data exchange with up to 32 other G3800X016's in a RS485 network, enabling up to 4096 I/O-points in one system.

Ordering Key

G 3800 1016 230

Type: Dupline®
H8-housing
GSM phone
Master channel generator
Supply

Type Selection

Supply	Ordering no.	Ordering no. w. GSM telephone
115/230 VAC	G 3800 0016 230	G 3800 1016 230
10-30 VDC	G 3800 0016 800	G 3800 1016 800

Input/Output Specifications

Serial Port		RS 232
COM 1		115 kBaud
COM 2		9600 Baud, adjustable
Data format		8 bit
COM 1, COM 2		No parity, 1 stop bit
		9-pole female SUB-D
Pin assignment	TxD	Pin 2
	RxD	Pin 3
	GND	Pin 5
Dielectric voltage		
Com.port - Dupline®		≥ 2 kVAC (rms)
Protocol		Modbus-RTU
RS 485	Termination	Pin 27 When in use, connect to pin 31
	Fs-B	Pin 28 When in use, connect to pin 30
	Fs-A	Pin 29 When in use, connect to pin 31
	+ (B)	Pin 30
	- (A)	Pin 31
	GND	Pin 32
	V+	Pin 33[*]
Protocol		Modbus-RTU
Dupline® Output		Dupline® carrier
Output voltage		8.2 V
Current		< 130 mA
Short-circuit protection		Yes

Sequence time	
32 channels / 128 channels	38.6 ms / 132.3 ms
Digital outputs	4 PNP transistors
Function	Programmable
Output voltage V_{DD}	≤ 35 VDC
Output current	≤ 100 mA
Output voltage drop	≤ 2 V
Off-state leakage current	≤ 100 µA
Short-circuit protection	None
Built-in protective diodes	None
Dielectric voltage	
Output - Dupline®	≥ 4 kVAC (rms)
Output - Input	200 V
Inductive loads	External noise suppression required
Inputs	
Digital	6 - 30 VDC
Voltage	ON > 5.5 V; OFF < 1.5 V
Current	≤ 6 mA
Dielectric voltage	
Input - Dupline®	≥ 4 kVAC
GSM Modem	
Siemens cellular engine	TC35
Dual Band	EGSM900 and GSM1800
Output power	Class 4 (2 W) EGSM900
	Class 1 (1 W) GSM1800
Antenna connector	FME

[*] V+ and GND may be used as supply for digital I/O's, if RS 485 is not used.

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1

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Supply Specifications

Power supply	AC-Types	Overvoltage cat. III (IEC 60664)
Rated operational voltage through term. 21 & 24		
jumper term. 22 & 23		230 VAC ± 15% (IEC 60038)
Power on term. 21 & 23		
Neutral on term. 22 & 24		115 VAC ± 15% (IEC 60038)
Frequency		45 to 65 Hz
Rated operational power		Typ. 7 VA/3 W
Power dissipation		
G38000016		≤ 6 W
G38001016		≤ 7 W
Rated impulse withstand voltage	230 V	4 kV
	115 V	2.5 kV
Dielectric voltage		
Supply - Dupline®		≥ 4 kVAC (rms)
Supply - Output		≥ 4 kVAC (rms)
Supply - Input		≥ 4 kVAC (rms)
Supply - Com. ports		≥ 4 kVAC (rms)
Heat dissipation		4 W

Power supply	DC-Types	Overvoltage cat. III (IEC 60664)
Rated operational voltage through term. 21 & 22		10 to 30 VDC
DC supply terminal 24 and 25		- 50 Hz for synchronizing the clock
		- in case of voltage break (AC) the log will automatically update itself until 10 mSec before the loss of current
Reverse polarity protection		Yes
Rated operational power		6 W
Power dissipation		
G38000016		≤ 6 W
G38001016		≤ 7 W

Supply Specifications (cont.)

Inrush current	1 A
Rated impulse withstand volt.	800 V
Dielectric voltage	
Supply - Dupline®	500 V
Supply - Output	200 V

General Specifications

Real-time clock	
Accuracy	Better than ± 1 minute/month
Internal back-up time	Typ. 48 hours
Power ON delay	< 2.5 s
Indication for	
Supply ON	LED, green
ON Line	LED, yellow
COM 1	LED, red
COM 2	LED, red
RS 485	LED, red
GSM	LED, red
Environment	
Degree of protection	IP 20
Pollution degree	3 (IEC 60664)
Operating temperature	0° to +50°C (+32° to +122°F)
Storage temperature	-20° to +85°C (-4° to +185°F)
Humidity (non-condensing)	20 to 80% RH
Mechanical resistance	
Shock	15 G (11 ms)
Vibration	2 G (6 to 55 Hz)
Dimensions	
Material	
(see "Technical Information")	H8-housing
Weight	640 g

Wiring Diagrams
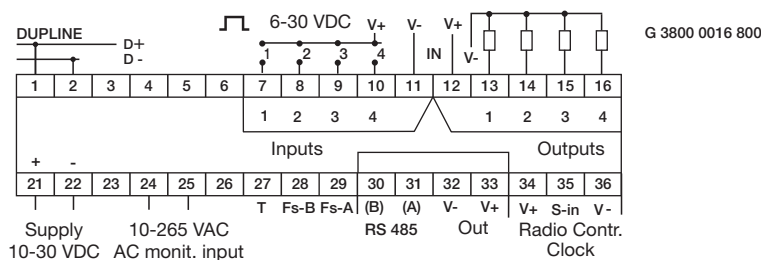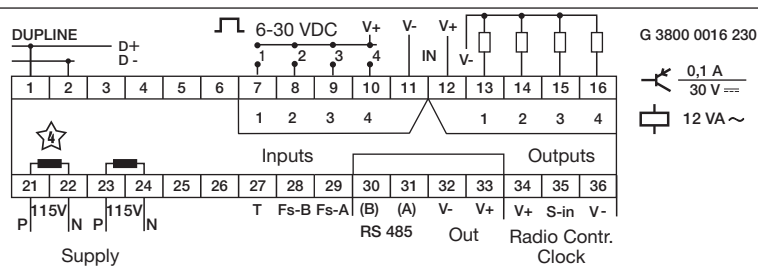
Mode of Operation

Intelligent functions

The G3890x016 Master Generator is a programmable channel generator which is particularly well suited for building automation applications due to the dedicated intelligent functions for lighting control, rollerblind control, temperature control and alarm monitoring. In addition to that the unit can be configured to perform real-time, logic and timer functions. The windows-based configuration software is extremely easy to use due to the pre-programmed functions.

Master Generator configuration

The Master Generator is as default configured to operate as a standard channel generator without intelligent functions. In order to make use of the intelligent functions the Master Generator must be configured by means of the user-friendly windows-based configuration software. This is included in the package and has to be installed on a Win 95/98/2000/NT/XP PC. When the configuration is completed the configuration is downloaded into the Master Generator via COM1 (RS232 port). The configuration can be saved on a file and it is also possible to upload the configuration from a Master Generator.

GSM Modem Option

The G38001016 Master Generator has a built-in GSM Modem which enables monitoring and control of Dupline signals via SMS messages to/from mobile GSM telephones. There are 3 different ways to use SMS messaging:

• The Master Generator can be programmed to send out event-based SMS messages. The event can be a channel switching ON or OFF, or it can be an analog signal crossing a setpoint.
• Requests for status of digital or analog data can be sent and answered via SMS messages
• Status of digital channels can be controlled by sending commands via SMS messages
In order to make use of the GSM modem, the following is required:

• A SIM-card with the pin-code 9090 needs to be inserted into the slot in the front of G38001016. The SIM-card must be a 3V type.
• A GSM antenna needs to be connected to the FME connector

on G38001016. If the unit is installed in a metal enclosure, the antenna must be installed outside the enclosure and connected to the Master Generator via a cable (an antenna of this type is available as accessory).

An LED in the front of G38001016 indicates the status of the GSM modem. By emitting different blink patterns, the LED indicates "connecting", "SIM-card missing", "No network found", "No response from modem", "SMS sent" and "SMS received".

Radio Controlled Clock Option

It is possible to equip the G3800x016 with an external antenna for radio-controlled clock in order to achieve high timing accuracy in connection with real-time functions and event time stamps. When the antenna ANT2 is used, the G3800x016 will receive accurate timing signals from the DCF77 transmitter located in Frankfurt a.M., Germany. The antenna outputs the demodulated signals to the Master Generator via an open collector driver.

The DCF77 transmitter covers all of Central Europe since the transmission radius is at least 1000 km. For longer distance the use of ANT2 depends on receiver conditions. ANT2 connects to the G3800x016 terminals.

RS232 ports

The Master Generator is provided with two RS232 ports (COM1 and COM2) which both can be used by PC's/PLC's for read/write of Dupline data using the Modbus-RTU protocol. COM1 is also used for download and upload of configuration files (created by the Master Generator configuration software) and for firmware upgrades. If the option for an external radio modem is desired, it needs to be connected to COM2. COM1 has a fixed baudrate of 115 kBaud, while the baudrate of COM2 is adjustable.

RS485 port

The RS485 port enables networking of up to 32 Master Generators with or without automatic data exchange. This enables control and monitoring of up to 4096 data points. If desired, it is also possible to use Ethernet instead of RS485. In that case each Master Generator must be

equipped with a converter. A Modbus Device Address needs to be assigned to each Master Generator during configuration.
In a network with automatic data exchange, one Master Generator is configured as RS485 Master, and will thus synchronize a continual automatic data exchange between all the Master Generators. When programming the individual Controllers it is then possible to make references to signals in other Dupline networks. For example the wind speed value measured by a sensor in one Dupline network, can be used in the roller blind control function in the other Dupline networks. It is also possible to make e.g. "all lights OFF" functions for a big building by activating a single pushbutton. A PC or PLC, connected to one of the COM-ports of the G3800X016 operating as RS485 Master, gets access to all 4096 data points using the Modbus protocol. Also, using the PC makes it possible to change the configuration in any of the Master Generators in the network.
In a network without automatic data exchange, a PC or PLC need to be RS485 Master and all the Master Generators will operate as Modbus-RTU slaves. This makes it possible for the PC or PLC to read/write data from any of the 32 Master Generators.

See following RS485 networking diagram for both operating modes.

Modbus-RTU protocol

Using the Modbus-RTU commands 2 and 3 through COM1, COM2 or RS485 makes it possible to read any type of Dupline data (digital, analink, multiplexed analog or counter data). The status of digital and multiplexed analog data and reset of counter can be controlled via the commands 5, 6 and 16. See manual for memory map information.

Software

The Dupline Data Access software package (type no. DUP-DATACC) has been developed specifically for the Master Generator. It contains two software tools that provide easy access from a PC to Dupline digital, analog and counter data via one of the RS232 or RS485 ports. The DDE-driver provides a Dynamic Data Exchange interface, which can be used from

applications that support client side DDE such as Microsoft EXCEL. Getting Dupline data into an EXCEL spreadsheet is a simple copy-and-paste operation. The Dupline ActiveX driver provides an ActiveX interface, which is a Microsoft standard for communication between two products. The Dupline ActiveX driver can be used from any development tool that supports client side ActiveX such as Microsoft Visual Basic, Delphi and Borland C++ builder.
The Dupline Data Access package can be used on single Master Generators as well as Master Generator networks.
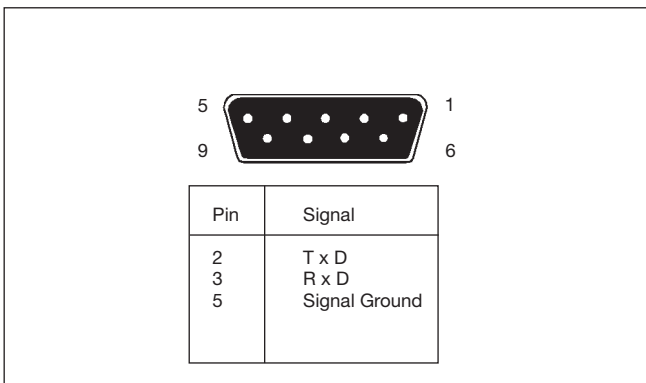
Radio Modem driver

The Master Generator has a built-in driver for control of an external Radio Modem, which can be used to create wireless links where no cable is available in parts of an installation. One Master Generator must be defined as the central MGEN and up to 32 Master Generators can be defined as remote MGEN's. The central MGEN is continuously polling and updating the Dupline data from all remote MGEN's via the radio modem network, and in this way it makes the entire system operate as one big Dupline network. Apart from increased reaction time (depending on the number of remote MGEN's), the system will operate as if it was one Master Generator connected to all the I/O-modules with cable. The Master Generator supports the Radio Modem type 2ASxE and all 3AS types from the Finnish manufacturer SATEL (www.satel.fi). Find below an application diagram for the Radio Modem option.
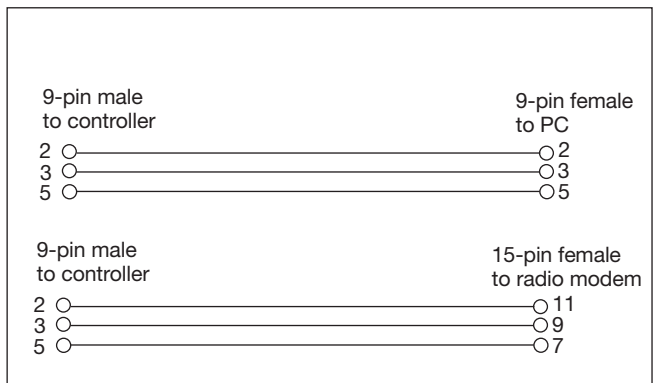Note: Analink modules cannot be used with Radio Modems.

On-board I/O

The Master Generator has 4 digital inputs and 4 digital outputs on-board. These have been implemented to reduce the cost of remote stations with only a few signals (e.g. in connection with an SMS alarm system or radio modem remote stations). The onboard I/O's are used via the logic functions of the Master Generator, where they can be assigned to specific channel addresses.

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Pin Assignment, COM1, COM2

Pin	Signal
2	T x D
3	R x D
5	Signal Ground

RS 232 Cable

9-pin male to controller — 9-pin female to PC
2 — 2
3 — 3
5 — 5

9-pin male to controller — 15-pin female to radio modem
2 — 11
3 — 9
5 — 7

Wiring Diagram

Example of a complete wiring diagram for a system with 3 Master Generators connected in an RS485 network.

The Cable
The RS485 communication cable is a shielded, twisted pair cable. The cable must be installed to pass close by each mode. The maximum length of a single cable run is 1200 m.
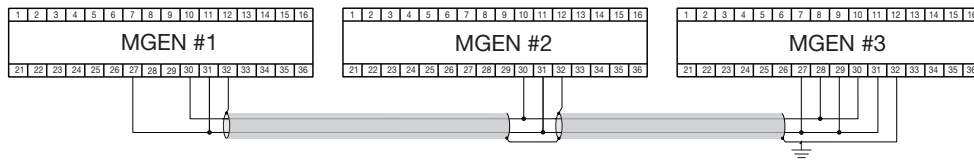The cable must be terminated at each end.
The termination resistor is connected to terminal 30 (B) and terminal 27 internally. Therefore pin 27 needs to be connected to pin 31 (A) in both of the cable endings in order to make the terminations effective.
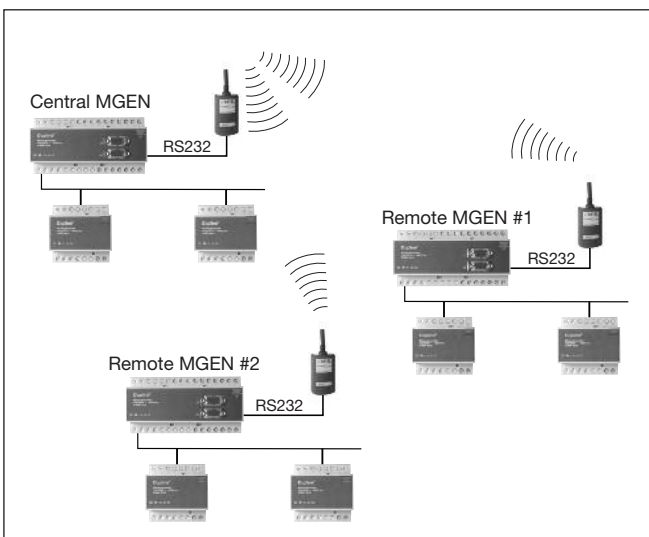
The fail-safe resistors shall only be used in one cable end. By connecting pin 31 (A) to pin 29, and by connecting pin 30 (B) to pin 28, the fail-safe resistors are made effective.
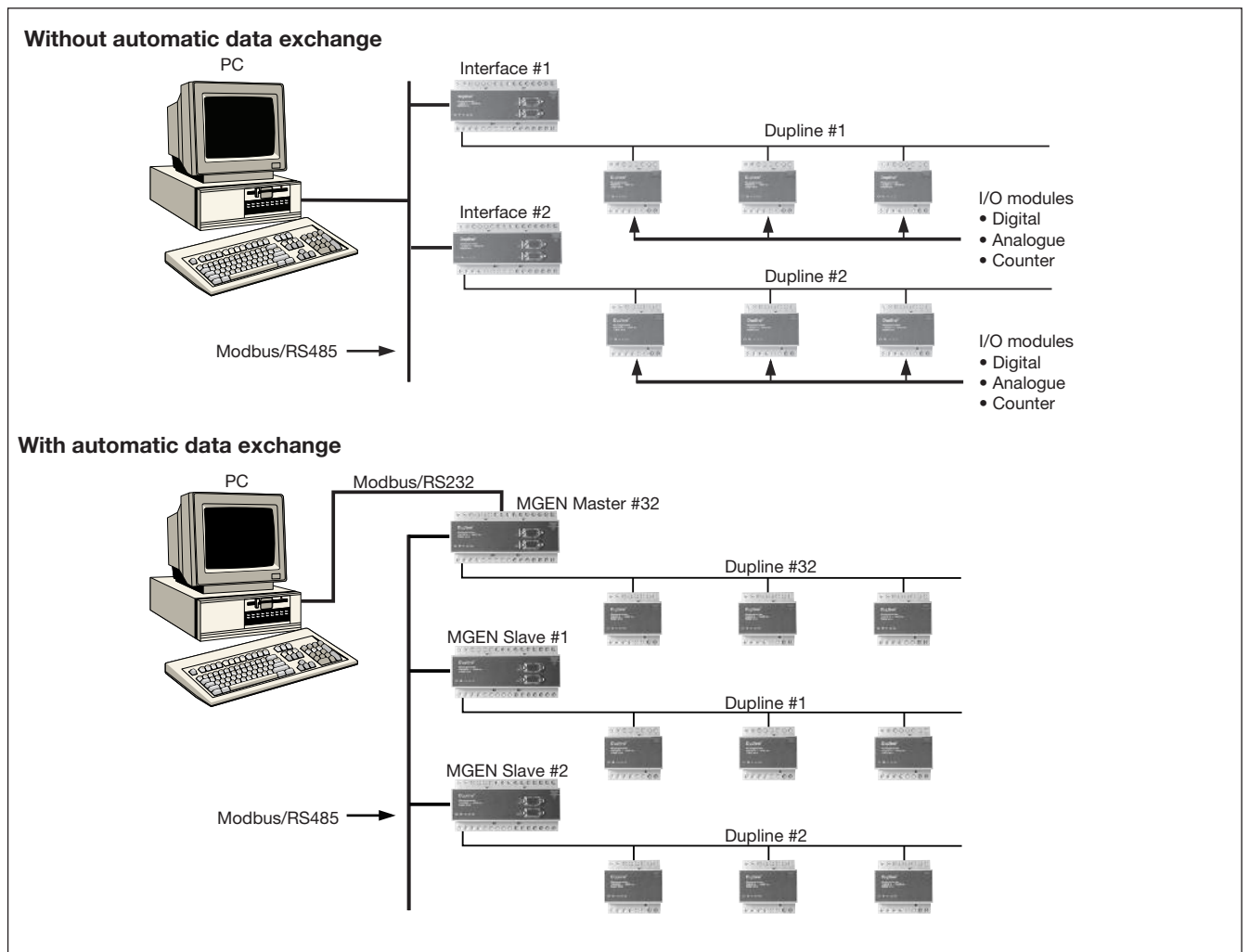
Cable isolation
The communication cable must not be run in cable trays carrying power wiring nor in close proximity to power wiring.
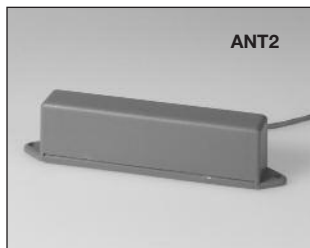

Radio Modem Application

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Master Generator Network

Without automatic data exchange

PC

Interface #1

Dupline #1

I/O modules
• Digital
• Analogue
• Counter

Interface #2

Dupline #2

I/O modules
• Digital
• Analogue
• Counter

Modbus/RS485 →

With automatic data exchange

PC

Modbus/RS232

MGEN Master #32

Dupline #32

MGEN Slave #1

Dupline #1

MGEN Slave #2

Modbus/RS485 →

Dupline #2

Accessories

Dupline Data Access Software	DUPDATACC
GSM Antenna 900 MHz	ANT1
Antenna for	
Radio controlled clock	ANT2

ANT1

ANT2

Dimensions (mm)

H8-housing

144
77
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

70
80
45
28

73

Scope of Supply

1 x Master Channel Generator	G 3800 x016 xxx
1 x User manual	MAN G 3800 0016 ENG
1 x RS 232 cable	RS 232-9 M/9 F
1 x Configuration software	SW G 38xx16

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5
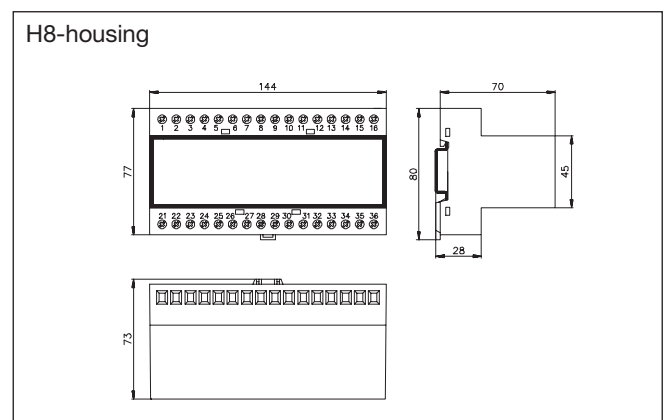
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